INSTALLATION & MAINTENANCE MANUAL

AVIATOR 700

Thrane & Thrane

AVIATOR 700

Installation and maintenance manual

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The information, drawings and wiring diagrams contained in this manual are intended as a reference for engineering planning only. The drawings and wiring diagrams contained herein do not represent any specific Supplemental Type Certificate (STC). It is the installer's responsibility to compose installation drawings specific to the aircraft. This manual and the drawings and wiring diagrams contained herein may not be used as a substitute for an STC package.

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

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

Record of revisions

Rev.	Description	Release Date	Initials
A	Original document	28 March 2007	CC
B	General update	4 January 2010	UFO
C	The following figures have been edited: 2-5, 5-1, 6-7, 6-43, 6-45, 6-53 and 6-55. Table 2-4 added. Section 6.10.8 Remote management added.	25 March 2010	UFO
D	The AVIATOR 700 replaces the earlier Thrane & Thrane Aero-SB$^+$. The Aero-SDU Configuration Program replaces the earlier HSD+SB+ Configuration Program. The following sections have been added: 3.5, 5.3.6, 6.7.8, 6.7.10, 6.7.14, 6.8.8, 6.9.5, 6.9.10, 6.9.11, 6.9.12, C.2.2. The following sections have been edited:2.1.1 (p. 2-6), 2.2.2 (p. 2-12), 2.3.2, 2.3.4, 2.3.5, 3.11, 3.12, 3.13, 4.3.3 (p. 4-17), 5.3.3 (p. 5-17), 5.3.4 (p. 5-23 + 5-33), 5.3.5, 5.3.18 (p. 5-75), 5.4.6, 5.6.1 (p. 5-98), 6.2.1 - 6.2.3, 6.8.1, 6.8.2, 6.8.3, 6.7.7 (p. 6-39), 6.7.12, 6.7.13, 6.9.2, 8.2.2, 8.2.4, 8.3.2, 8.4.5, 8.5, D.4, F.3.1. The following figures have been added: C-1 The following figures have been edited: 2-1, 2-3, 2-4, 2-10, 2-12, 5-1, 6-6, 6-7, 6-8, 6-9, 6-20, 6-50, 6-57, 6-59, 8-6, F-1. The following tables have been edited: 1-1, 2-4, 4-2, 5-25, 6-5, 6-6, A-1 – A-10, C-1, C-2, D-6. The following sections have been moved to the user manual: Using the call log. The following sections have been deleted: 2.3.6, 5.3.11	28 January 2011	UFO
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About this manual

1.1 Purpose

The purpose of this manual is to provide information for installation, maintenance and troubleshooting of the AVIATOR 700 system. This manual covers AVIATOR 700 and AVIATOR 700D.

Important The information, drawings and wiring diagrams contained in this manual are intended as a reference for engineering planning only. The drawings and wiring diagrams contained herein do not represent any specific Supplemental Type Certificate (STC). It is the installer's responsibility to compose installation drawings specific to the aircraft. This manual and the drawings and wiring diagrams contained herein may not be used as a substitute for an STC package.

1.2 Organization

- **Introduction.** A short overview of the AVIATOR 700 system and services.
- **Equipment Drawings**
  Outline drawings of the units, trays and connectors of the AVIATOR 700 system.
- **Connectors**
  Drawings and pin-out for the connectors, and a description of the required mating connectors.
- **Installation**
  Wiring drawings and detailed installation and wiring requirements.
- **Configuration**
  An introduction to the Aero-SDU Configuration Program and the SwiftBroadband Unit’s web interface, and a description of how to configure the AVIATOR 700 system. a short description of how to configure some of the 3rd party handsets.
- **Check Procedures.** An overview of the recommended check procedures and checklists.
- **Maintenance and Troubleshooting**
  Descriptions of Airworthiness, help desk, software update, LEDs, BITE test and how to return units for repair. Also flow charts how to perform initial troubleshooting.
- **Appendices**
  Equipment specifications, DO-160 Forms, procedure to upgrade an HSD$^+$ system to AVIATOR 700, lists of error messages, WLAN country codes, SIP setup for Wifi enabled phones and a list of applicable standards.

1.3 Related documentation

T&T part number	Description
98-130578	AVIATOR 700 User Manual
98-130554	AVIATOR 700 Quick Guide
98-129599	AVIATOR Wireless Handset and Cradle User Manual
98-129600	AVIATOR Wireless Handset and Cradle Installation & Maintenance Manual
98-132721	Swift64 and H+ Data Service, Supplement to AVIATOR 700 and Aero-HSD+ User Manual (available for download)

Table 1-1: List of Related Documentation

1.4 Precautions: Warnings, Cautions and Notes

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

- **Warning**: A Warning is an operation or maintenance procedure that, if not obeyed, can cause injury or death, or jeopardize the flight safety on the aircraft.
- **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, flight safety nor personal safety.

General precautions

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

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

CAUTION! The AVIATOR 700 system contains items that are electrostatic discharge sensitive. Use approved industry precautions to keep the risk of damage to a minimum when you touch, remove or insert parts or assemblies.

Introduction to the AVIATOR 700 system

2.1 General description

This Installation manual describes the administrative and technical aspects, features, functions and components of the AVIATOR 700 system. All comments or recommendations regarding the installation, acceptance or operation of the system or its accessories and components should be directed to Thrane & Thrane.

Note: The AVIATOR 700 system is available in two versions:

- AVIATOR 700 approved to RTCA specification DO- 178B level E and DO-254 level E
- AVIATOR 700D approved to RTCA specification DO-178B level D and DO-254 level D.

In general descriptions the nomenclature AVIATOR 700 covers both versions. Where necessary, the Level D system is specified as AVIATOR 700D.

2.1.1 The AVIATOR 700 system

Important for AVIATOR 700 (Level E)!

The design of the system is **not** intended to support flight communication for safety purposes, in particular for Air Traffic Services (ATS) or Aeronautical Operational Control (AOC), during flight time.

Important: The software used to control the unit operation complies with **RTCA specification DO-178B level E** application software.

Important: The firmware used to control the unit operation complies with **RTCA specification DO-254 level E** firmware.

The Satellite Data Unit (SDU), the SwiftBroadband Unit (SBU) and the High Power Amplifier (HPA) must all be level E approved. **No mismatch is allowed.**

Important for AVIATOR 700D (Level D)!

The design of the system is intended to support flight communication for safety purposes, including Air Traffic Services (ATS) and Aeronautical Operational Control (AOC), during flight time.

Important: The software used to control the unit operation complies with **RTCA specification DO-178B level D** application software.

Important The firmware used to control the unit operation complies with **RTCA specification DO-254 level D** firmware.

The Satellite Data Unit (SDU), the SwiftBroadband Unit (SBU) and the High Power Amplifier (HPA) must all be level D approved. **No mismatch is allowed.**

Non-Safety interfaces for AVIATOR 700 (Level E)

The following interfaces in the AVIATOR 700 system are strictly for non-safety usage:

- Cockpit voice
- ACARS/AFIS/CMU (information and management systems)
- MCDU (Multifunction Control and Display Unit)

Safety interfaces for AVIATOR 700D (Level D)

The following interfaces in the AVIATOR 700D system are approved for safety usage:

- Cockpit voice
- ACARS/AFIS/CMU (information and management systems)
- MCDU (Multifunction Control and Display Unit)

Wiring safety interfaces

Important When wiring safety interfaces for voice and data from a unit to cockpit equipment, you must make sure that you do not wire other interfaces of the same unit to equipment located in the cabin.

Use another unit for wiring non-safety interfaces to equipment located in the cabin.

Overview of the AVIATOR 700 system

The AVIATOR 700 system offers the classical aeronautical communications services and the SwiftBroadband service. The TT-5035A Satellite Data Unit (SDU) provides multi-channel voice and fax and data (Swift 64), while the SwiftBroadband Unit (SBU) provides access to SwiftBroadband, the aeronautical BGAN service. The SDU is the controlling unit of the system and the SBU works as a slave unit to the SDU. The data services available depend on the satellite coverage, read more about satellite coverage at ***Services*** on page 2-4.

The AVIATOR 700 system provides a wide range of user interfaces: several 4-wire and 2-wire interfaces, ISDN, WLAN and Ethernet interfaces available on the SDU and SBU.

The following drawing shows the AVIATOR 700 cabin installation with connected communication devices and available options:

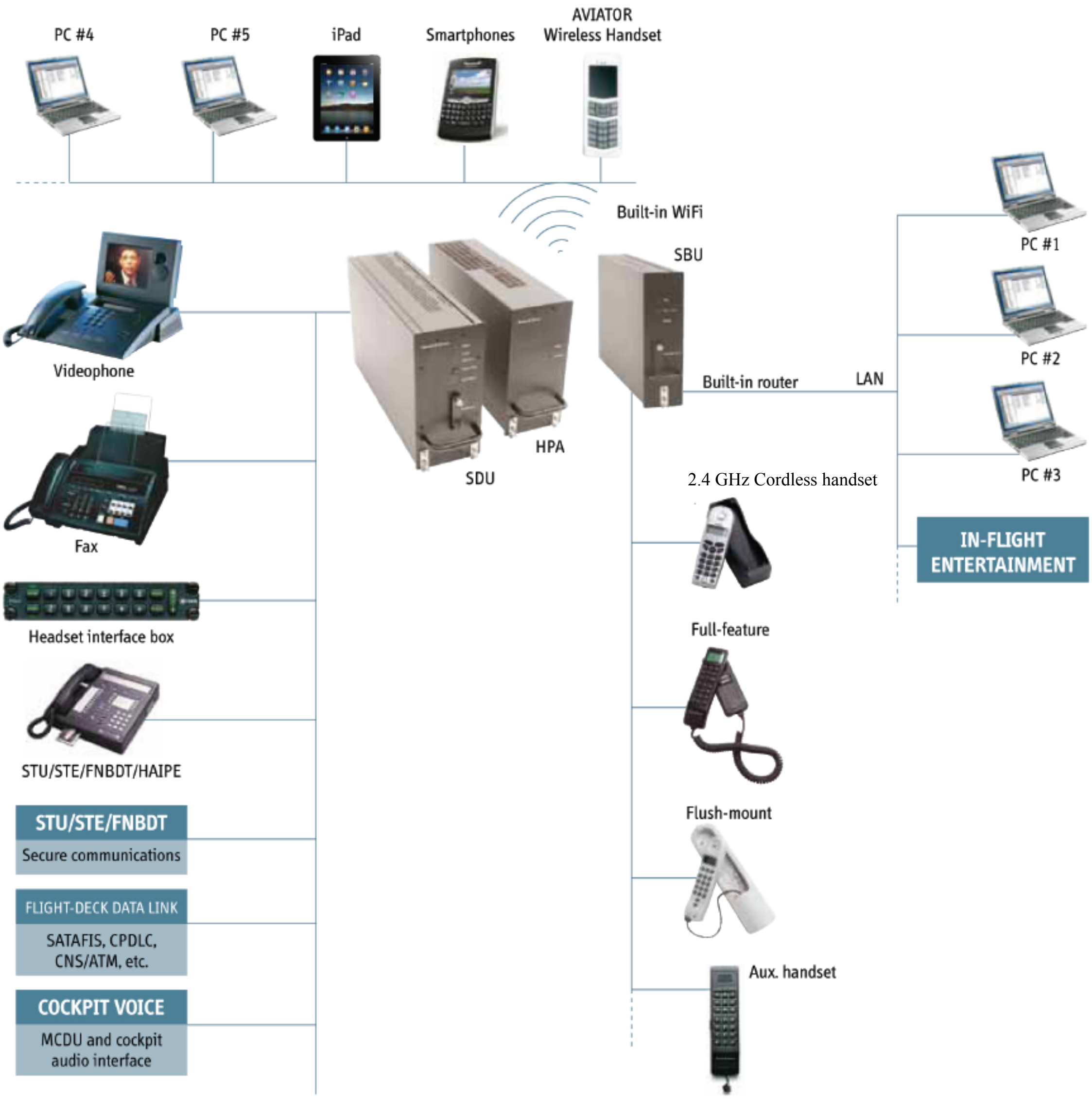


Figure 2-1: Communication devices for the AVIATOR 700 system (example)

The basic units in the AVIATOR 700 system are:

- TT-5035A SDU
- TT-5035A-001 Configuration Module (inserted in the SDU)
- TT-5014A HPA
- TT-5040A SBU
- TT-5040A-001 Configuration Module (inserted in the SBU)
  The SBU Configuration Module holds permanently installed SIM card, which provides access to the BGAN network.
- TT-5040A-005 SDU to SBU Software Interface

Services

In the AVIATOR 700 system the classic aeronautical communication services H^+ and Swift64 are combined with the aeronautical BGAN service, SwiftBroadband. To see how the AVIATOR 700 system handles the communication with Inmarsat's satellites I4 and I3 that support these services see the following figure.

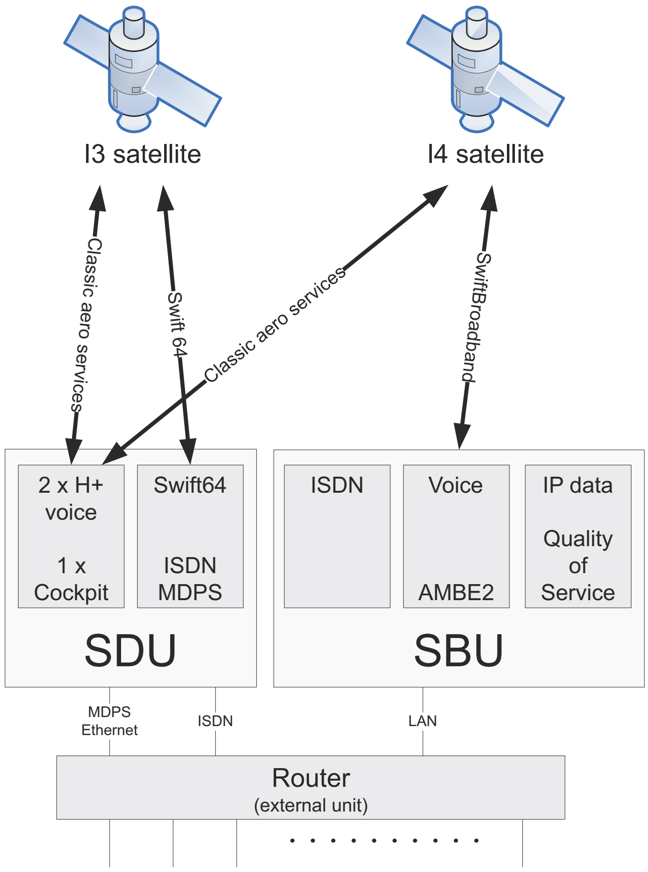


Figure 2-2: Satellite coverage of data and voice services

- The SwiftBroadband service provides a channel dedicated to high-speed data using the BGAN service, operated on Inmarsat's I4 satellites. SwiftBroadband allows for

IP-based data transfer up to432 kbps with an HGA (Class 6) and Integrated Services Digital Network (ISDN @ 64 kbps) circuit-switched data. The SwiftBroadband service may also be used for speech or 3.1 kHz audio, it accommodates simultaneous voice and data. You can use the AVIATOR 700 cabin installation for IP background data, IP data streaming at 8/16/32/64/128 kbps and standard AMBE 2 voice.

- The Aero-H+ classic services provide two channels for global voice, fax or PC modem data and one low-speed channel for cockpit communication.
- The Swift64 service provides a 64 kbps backup channel for areas where there is no I4 satellite coverage. The Swift64 channel may operate using ISDN or packet data mode, it may also be used for speech or for 3.1 kHz audio e.g. for fax.

The following figures show the coverage maps for SwiftBroadband, Swift64 and classic services available worldwide.

Inmarsat's I4 satellite coverage (AMER, EMEA, APAC)

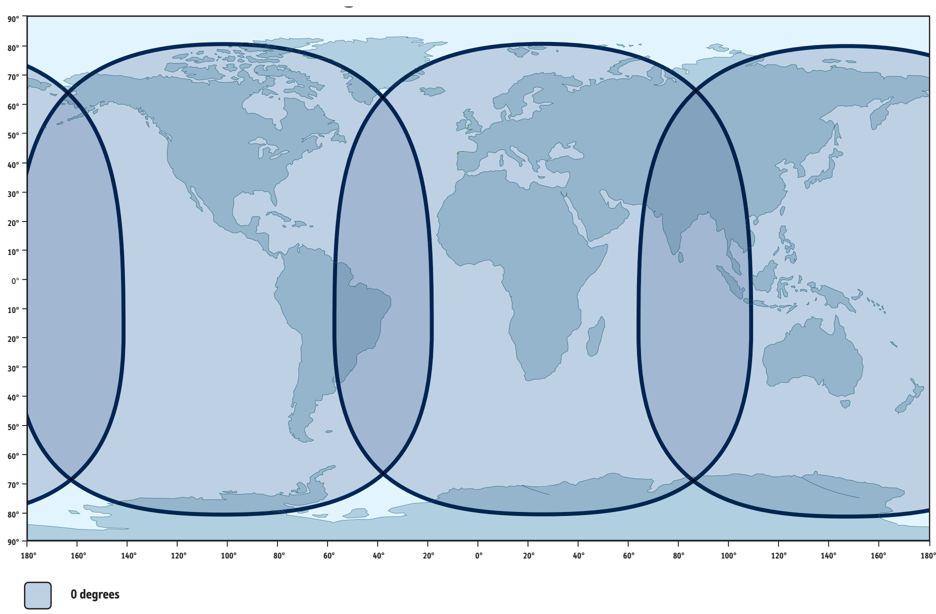


Figure 2-3: SwiftBroadband and classic aeronautical services coverage on I4 satellite

Swift64 and Classic aeronautical services coverage (IOR, POR, AORE, AORW)

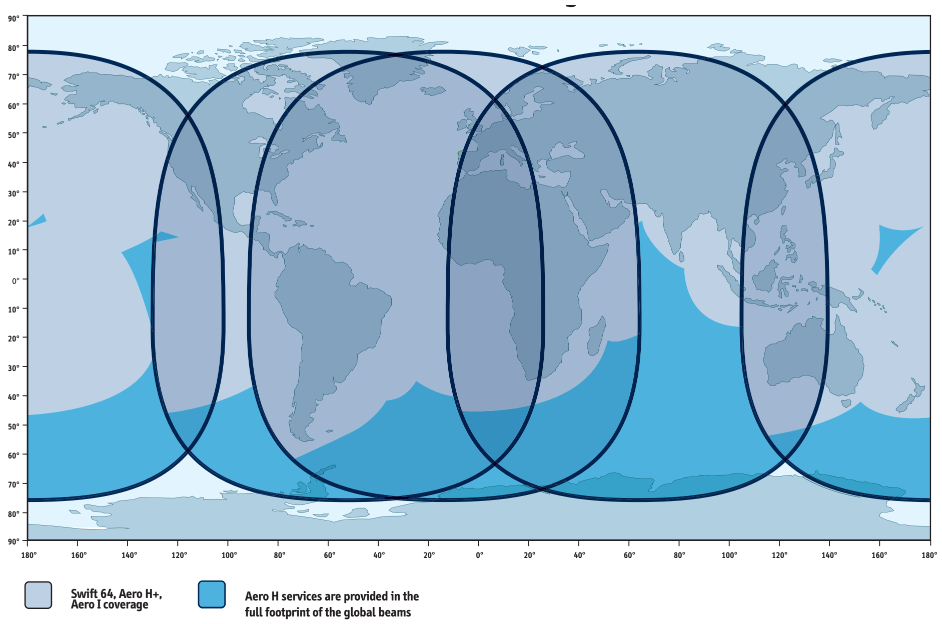


Figure 2-4: Swift64 and classic aeronautical services coverage on I3 satellite

The maps show Inmarsat's expectations of coverage but do not represent a guarantee of service. The availability of service at the edge of coverage areas fluctuates depending on various conditions.

PBX telephone exchange

The AVIATOR 700 system has two built-in PBX units: One in the SDU and one in the SBU, making the AVIATOR 700 capable of connecting in total four 4-wire handsets and four 2-wire devices.

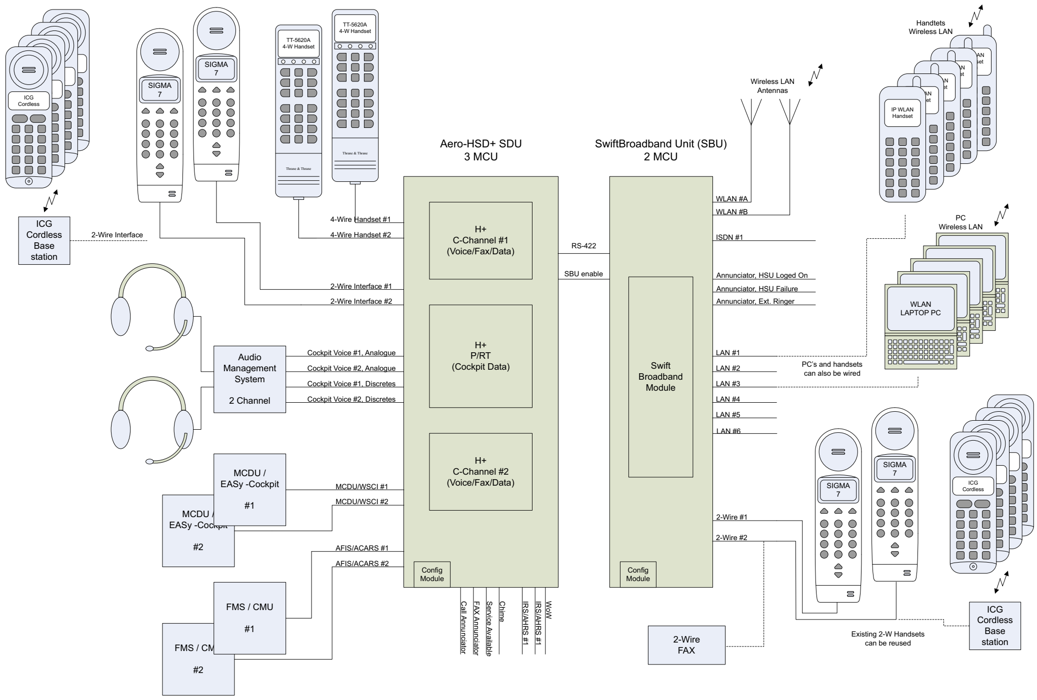


Figure 2-5: PBX functionality in SDU and SBU

The built-in PBX of the SDU connects up to four 4-wire handsets, two direct 2-wire POTS interfaces for faxes, PC modems, auxiliary phones, headset interface boxes etc. and one ISDN interface for ISDN phones, fax machines or Secure communication.

The built-in PBX of the SBU connects two direct 2-wire POTS interfaces for faxes, auxiliary phones, headset interface boxes etc., as well as an ISDN interface for ISDN phones, fax machines or Secure communication. The built-in PBX of the SBU can route VoIP calls that are terminated in the SIP server of the SBU.

Note There is no routing between the PBX of the SDU and the PBX of the SBU.

Configuration Modules (CM)

There are two Configuration Modules in the AVIATOR 700 system:

- SDU Configuration Module
- SBU Configuration Module

The Configuration Module (CM) for the SDU contains system and user settings for easy replacement of the Satellite Data Unit (SDU). To access these settings use the Aero-SDU Configuration Program. For further information on the configuration program, see

Configuring the basic system on page 6-1. Different layers of write protection protect the CM contents; this includes hardware protection of installation settings and optional pin code protection of user data. The SDU Configuration Module is designed as a “plug-in” module for the SDU, making it easier to replace the SDU while retaining all system and user settings.

The Configuration Module (CM) for the SBU is inserted in the SBU and holds system and user settings for easy replacement of the SwiftBroadband Unit (SBU). Different layers of write protection protect the CM contents; this includes hardware protection of installation settings and optional pin code protection of user data. It is designed as a “plug-in” module for the SBU, so the SBU can be replaced while retaining all SBU and user settings. The SBU CM contains a permanently built-in SIM card for access to the SwiftBroadband services.

Configuration of the AVIATOR 700 system

The AVIATOR 700 system is configured with two tools:

- The Aero-SDU Configuration Program to setup and configure the SDU.
- SBU web interface to setup and configure the SBU.

Use the Aero-SDU Configuration Program to access the SDU and antenna settings that must be configured. The configuration settings are stored in CM of the SDU. To setup or change a configuration you must connect a PC to the connector marked **Maintenance** on the SDU front plate. For further information how to install the configuration program see ***Aero-SDU Configuration Program for the SDU*** on page 6-2.

Use the built-in web interface of the SBU to access the SBU configuration settings in the CM of the SBU. A subset of the configuration settings are stored in a write-protected area of the CM. This subset contains the physical settings for the antenna, cabling and other external input.

To setup or change the settings of the write-protected area you must connect a PC to the connector marked **Maintenance** on the SBU front plate. You can view all SBU settings from any LAN or WLAN interface. For further information on the web interface, see ***SBU Configuration tasks*** on page 6-13.

The TT-5040A-005 SDU to SBU Software Interface is part of the basic AVIATOR 700 system. It activates the software code that enables the interface between the SDU and the SBU. The SDU to SBU Software Interface is pre-configured at the factory when ordering the basic AVIATOR 700 system.

Satcom antenna systems

The AVIATOR 700 system can be used with a wide range of satcom antennas. You can choose between the following antenna models:

- ARINC 741 compatible antennas
- ARINC 781 compatible antennas

- HGA-7000/HGA-7001

Contact your Thrane & Thrane sales representative or see http://www.thrane.com/Aero/Products/ApprovedSatcomAntennas.aspx for a list of satcom antennas that have received Inmarsat type approval.

Built-in router and Wireless (WLAN) options

The AVIATOR 700 system offers a built-in router as an option. With this option multiple users and applications can use the system simultaneously. Without this option only the first device that connects to the SBU will be allowed on the Internet.

The system also offers a built-in WLAN option for wireless communication devices and a WLAN antenna approved for aeronautical use. This includes full WLAN routing functionality.

If ordered, these options are enabled in the AVIATOR 700 from the factory. If these options are not included from the start, the system can be upgraded at a later stage. Then you receive the FLEX key for the purchased options and enter it in the AVIATOR 700 web interface.

Interface to MCDU

The Multifunction Control and Display Unit (MCDU) can be used to control and operate the SATCOM equipment from the cockpit. The MCDU has the same menus and functions as the 4-wire cabin handsets. Using the cockpit voice interface which connects to the pilot headset via the cockpit Audio Management System the pilot can then make satcom calls from the cockpit without using a handset. He can also read status messages of the AVIATOR 700 system in the MCDU display.

2.1.2 AVIATOR 700 features

The AVIATOR 700 system has the following features:

- Unique multi-channel solution, combining the Inmarsat Aero-H+, Swift64 and SwiftBroadband services with the following channels available:
  - one spot beam SwiftBroadband channel, providing access to the BGAN system with data rates up to 432 kbps.
  - one spot beam High Speed Data (HSD) channel (Backup ISDN)
  - two CS (circuit switched) mode H^+ channels for voice, G3 fax or PC modem data for global or spot beam operation.
  - one global H^+ packet data channel for cockpit communications
- Full duplex, single or multi-user.
- Automatic satellite selection.

- Built-in PBX in the SDU interfacing to four 4-wire and two 2-wire connections and one ISDN connection.
- Built-in PBX in the SBU interfacing to two 2-wire connections, one ISDN interface and WLAN in the SBU, and integrated SIP server for VOIP telephony.
- Standard voice.
- 3.1 kHz audio for modems, G3 fax, 14.4 kbps high quality voice etc.
- ISDN voice for Secure communication, G4 fax etc.
- ISDN data for video conferences etc.
- Built-In Router option in the SBU with DHCP, NAT for six Ethernet interfaces.
- Built-In Wireless option (WLAN) IEEE 802.11 b/g in the SBU.
- Access to built-in web interface for daily use using SBU LAN and WLAN.
- Aero-SDU Configuration Program
- Built-in web interface for SBU configuration using the Maintenance connector on the SBU front plate.
- ARINC 741 and ARINC 781 antenna compatibility
- HGA-7000 antenna compatibility

2.2 Application

2.2.1 Minimum system

A minimum working system has at least:

- one TT-5035A SDU
- one TT-5035A-001 CM
- one TT-5014A HPA
- one TT-5040A SBU
- one TT-5040A-001 CM
- one TT-5040A-005 SDU to SBU Software interface
- one TT-5038A-002 Tx Coupler
- one TT-5038A-003 Rx Power Splitter

- one handset and cradle, e.g. a TT-5620A 4-Wire Handset and a TT-5622A 4-Wire Cradle (optional)
- one antenna system with TT-5013A DNLA type F. As antenna system, use either an ARINC 741 or ARINC 781 antenna system.

The minimum wiring required for an AVIATOR 700 system is described in the section ***Minimum system drawing*** on page 5-3.

2.2.2 Part numbers

Applicable Thrane & Thrane model- and part numbers

This Installation Manual is for the AVIATOR 700 system and is applicable to the model- and part numbers below:

T&T part number	Model number	Description
405035A	TT-5035A	Satellite Data Unit (SDU) [without CM] AVIATOR 700
405035A-THD	TT-5035A	Satellite Data Unit (SDU) [without CM] AVIATOR 700D
405035A-001	TT-5035A-001	Configuration Module (CM) for SDU for AVIATOR 700 and AVIATOR 700D
405040A	TT-5040A	SwiftBroadband Unit (SBU) [without CM] for AVIATOR 700
405040A-THD	TT-5040A	SwiftBroadband Unit (SBU) [without CM] for AVIATOR 700D
405040A-001	TT-5040A-001	Configuration Module (CM) for SBU for AVIATOR 700 and AVIATOR 700D
405040A-002	TT-5040A-002	Built-In Router Option
405040A-003	TT-5040A-003	Built-In Wireless Option
405040A-004	TT-5040A-004	WLAN Antenna, optional (2 pieces recommended)
405040A-005	TT-5040A-005	SDU to SBU Software Interface
405038A-002	TT-5038A-002	Tx Coupler
405038A-003	TT-5038A-003	Rx Power Splitter
405014A	TT-5014A	High Power Amplifier (HPA) AVIATOR 700
405014A-THD	TT-5014A	High Power Amplifier (HPA) AVIATOR 700D
405013A	TT-5013A	DLNA Type F
405620A-THW	TT-5620A	4-Wire Handset (white)
405620A-THR	TT-5620A	4-Wire Handset (black)

Table 2-1: Model and part numbers for the AVIATOR 700 system (T&T units)

T&T part number	Model number	Description
405622A-THW	TT-5622A	4-Wire Cradle (white)
405622A-THR	TT-5622A	4-Wire Cradle (black)
405621B-THW	TT-5621B	2-Wire Handset (white)
405621B-THR	TT-5621B	2-Wire Handset (black)
405622B-THW	TT-5622B	2-Wire Cradle (white)
405622B-THR	TT-5622B	2-Wire Cradle (black)
TT 37-112940		Maintenance Cable (SDU Front Connector Maintenance to PC)
TT 83-119958		CD with Aero-SDU Configuration Program

Table 2-1: Model and part numbers for the AVIATOR 700 system (T&T units) (Continued)

The Satellite Data Unit (SDU), the SwiftBroadband Unit (SBU) and the High Power Amplifier (HPA) must all be level E or level D approved. **No mismatch is allowed.**

Circuit breakers

Part number	Recommended aircraft circuit breakers
2TC2-4	Klixon 2TC series, 4 A current rating (SDU)
2TC2-7.5	Klixon 2TC series, 7.5 A current rating (SBU)
2TC2-20	Klixon 2TC series, 20 A current rating (HPA)

Table 2-2: Part numbers for Klixon circuit breakers

Trays and connectors

Part number	Approved tray
PO299-101	ECS Tray Assembly 1/4-size ATR (for SBU)
MT4-2346-101	EMTEQ Tray Assembly 1/4-size ATR (for SBU)
200-86686-101	ECS Tray Assembly 3/8-size ATR (for HPA and SDU)
MT4-3300-110	EMTEQ Tray Assembly 3/8-size ATR (for HPA and SDU)
Part Number	**Required Connector Kit for SDU Tray**
DPX2NA-67322-463	ITT Cannon Connector, Dual Plug, contact arrangement top:33C4, bottom:106.
Part Number	**Required Connector Kit for HPA Tray**
616 697 173	RADIALL Dual Plug Connector, contact arrangement top: MC2, bottom: 32C2.
Part number	**Required Connector Kit for SBU tray**
DPX2NA-67322-500	ITT Cannon Connector, Dual Plug, contact arrangement top: 33C4, bottom: 33C4.

Table 2-3: Part numbers for trays and connectors

Installation kits

For installation kits for the AVIATOR 700 system contact:

ECS, a Carlisle IT company, USA
Phone: +1 414-421-5300
E-mail: sales@ecsdirect.com
Home page: www.ecsdirect.com

EMTEQ Inc., USA
Phone: +1 262-679-6170 or +1 888-679-6170
E-mail: sales@emteq.com
Home page: www.emteq.com

ECS offers two installation kits, one for AVIATOR 700 (ECS part number: 120-14973-101) and one for the SBU (ECS part number: 120-14973-102).

Item in installation kit	AVIATOR 700	Upgrade from HSD+ to AVIATOR 700
ARINC connector, SBU (DPX2NA-67322-500)	1	1
Tray Assembly, SBU, 1/4-size ATR W/DPX2 (P0299-101)	1	1
ARINC connector, SDU (DPX2NA-67322-463)	1	–
ARINC connector, HPA (616697173)	1	–
Tray Assembly, HPA and SDU, 3/8-size ATR W/DPX2 (200-86686-101)	2	–

Table 2-4: Basic installation kits from ECS

2.3 System block diagrams

2.3.1 Introduction

Overview

In the following block diagrams, and in the wiring diagrams in section 5.3.3, all satcom antennas that can be connected to the AVIATOR 700 systems are shown.

In order to use the satcom antenna with the AVIATOR 700 systems, the specific antenna type and the AVIATOR 700 system must be ***Type Approved*** by Inmarsat as a combined system. AVIATOR 700 systems will be Inmarsat Type Approved with more antennas as requested by market requirements. Contact your Thrane & Thrane sales/support representative for the latest status on Inmarsat Type Approvals for satcom antennas for the AVIATOR 700 system.

Contact your Thrane & Thrane sales representative or see http://www.thrane.com/Aero/Products/ApprovedSatcomAntennas.aspx for a list of satcom antennas that have received Inmarsat type approval.

The following block diagrams show the basic system component interconnection.

The first diagrams show the wiring differences according to antenna choice and antenna steering source. The following system block diagrams show the user interfaces and the system interface to the MagnaStar system PBX communication.

Selection of DLNA

Important Whether the antenna system is ARINC 741 or ARINC 781, **the DLNA must be ARINC 781 Type F compliant**, that contains extra TX-filtering for protection of the GNSS and Iridium band.

2.3.2 ARINC 741 compatible High Gain Antenna

The AVIATOR 700 system supports ARINC 741 compatible antenna systems, such as the mechanically steered AMT-50 subsystem, an HGA-6000 antenna or an HGA-7000 antenna with an HGA-7000 BSU.

Note: In an AVIATOR 700 system, there are extra requirements to the DLNA. For further information, see ***Selection of DLNA*** on page 2-15.

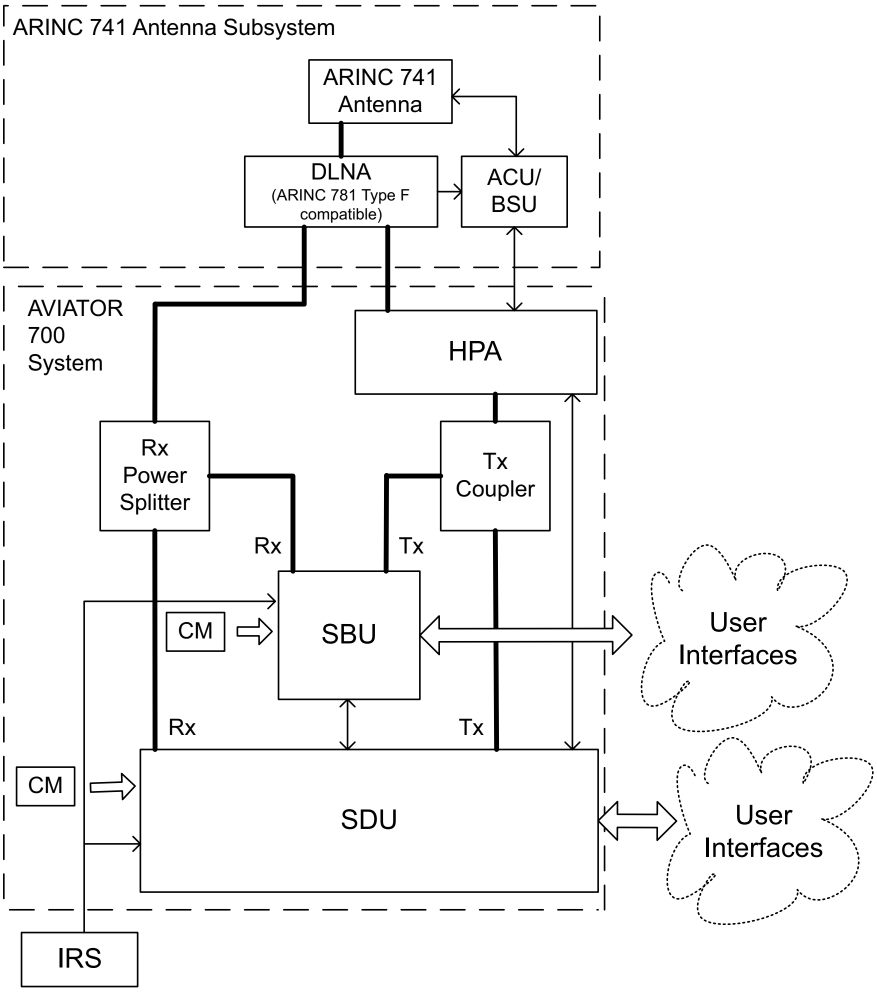
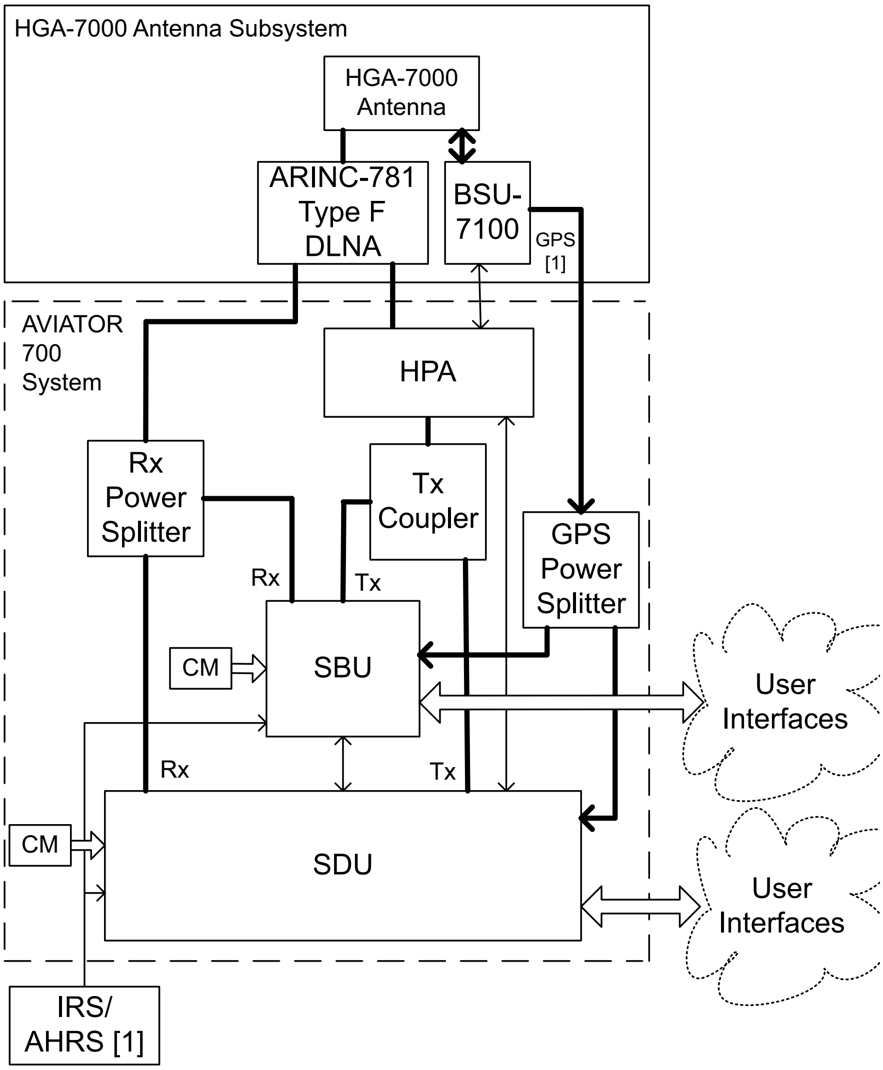


Figure 2-6: System Configuration with ARINC 741 Compatible HGA and IRS

You can also configure the system with AHRS/GPS.



[1] : AHRS can only be used when GPS signal is routed from the BSU-7100

Figure 2-7: System Configuration with HGA 7000

2.3.3 Dual side panel antenna system (future use)

An ARINC 741 dual side panel antenna system may be installed, in order to improve the view to the satellite.

Note In an AVIATOR 700 system, there are extra requirements to the DLNA. For further information, see ***Selection of DLNA*** on page 2-15.

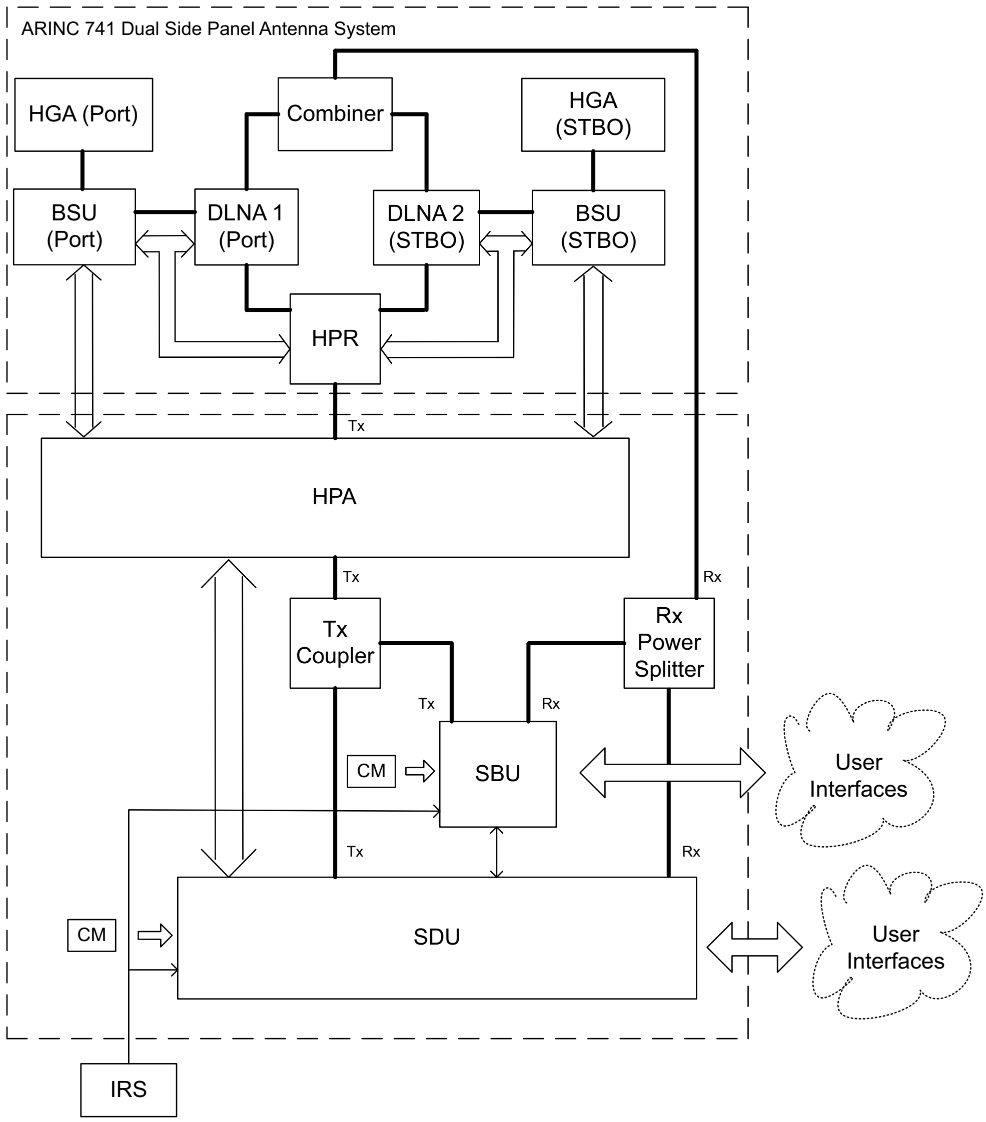


Figure 2-8: System Configuration with Dual Side Panel Antenna System & IRS (Future Use)

2.3.4 ARINC 781 compatible High Gain Antenna

The AVIATOR 700 system also supports ARINC 781 compatible antenna systems.

Note: In an AVIATOR 700 system, there are extra requirements to the DLNA. For further information, see ***Selection of DLNA*** on page 5-18.

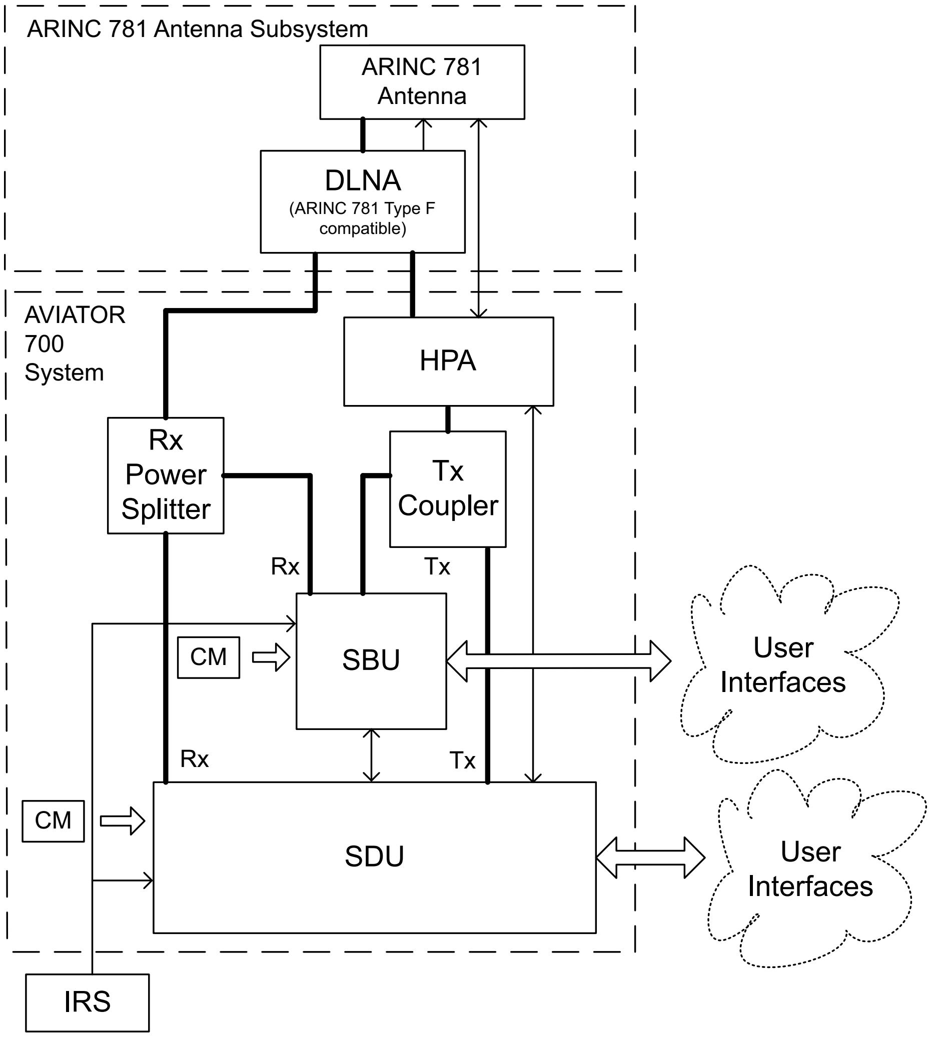


Figure 2-9: System Configuration with ARINC 781 Compatible HGA with IRS

You can also configure the system with AHRS/GPS.

2.3.5 User interfaces

The AVIATOR 700 system has the following user interfaces:

Interfaces	SDU	SBU
4-wire PBX interfaces This interface can be used e.g. for the TT-5620A 4-Wire Handset and TT-5622A 4-Wire Cradle. For additional information on the use of the 4-wire interfaces see ***Wiring telephone systems*** on page 5-48.	4	0
2-wire POTS interface This interface can be used for the TT-5621B 2-Wire Handset and TT-5622B 2-Wire Cradle or other POTS handsets. The TT-5622B 2-Wire Cradle has an RJ11 connector to which additional 2-wire terminals can be connected, e.g. for fax or modem data.	2	2
10/100BaseT Ethernet interfaces for connecting IP equipment. Note that the SBU has a Built-in Router option. The SBU has an additional Ethernet interface for system configuration (Maintenance connector on the SBU front plate, not shown in the following figure)	1	6
Built-in Wireless Option with two WLAN antenna interfaces for diversity operation to connect WiFi-enabled equipment like lap tops, Smart phones or VOIP handsets.	0	1
Euro ISDN S-bus interface for PC, Fax or STE)	1	1[a]
ARINC 429 interfaces for e.g. ACARS/AFIS/CMU (2 x) or MCDU (2 x).	4	0
Discrete outputs for annunciators	3	4

Table 2-5: User interfaces, overview

a. Without DC power support.

The following figure shows most of the possible user interfaces.

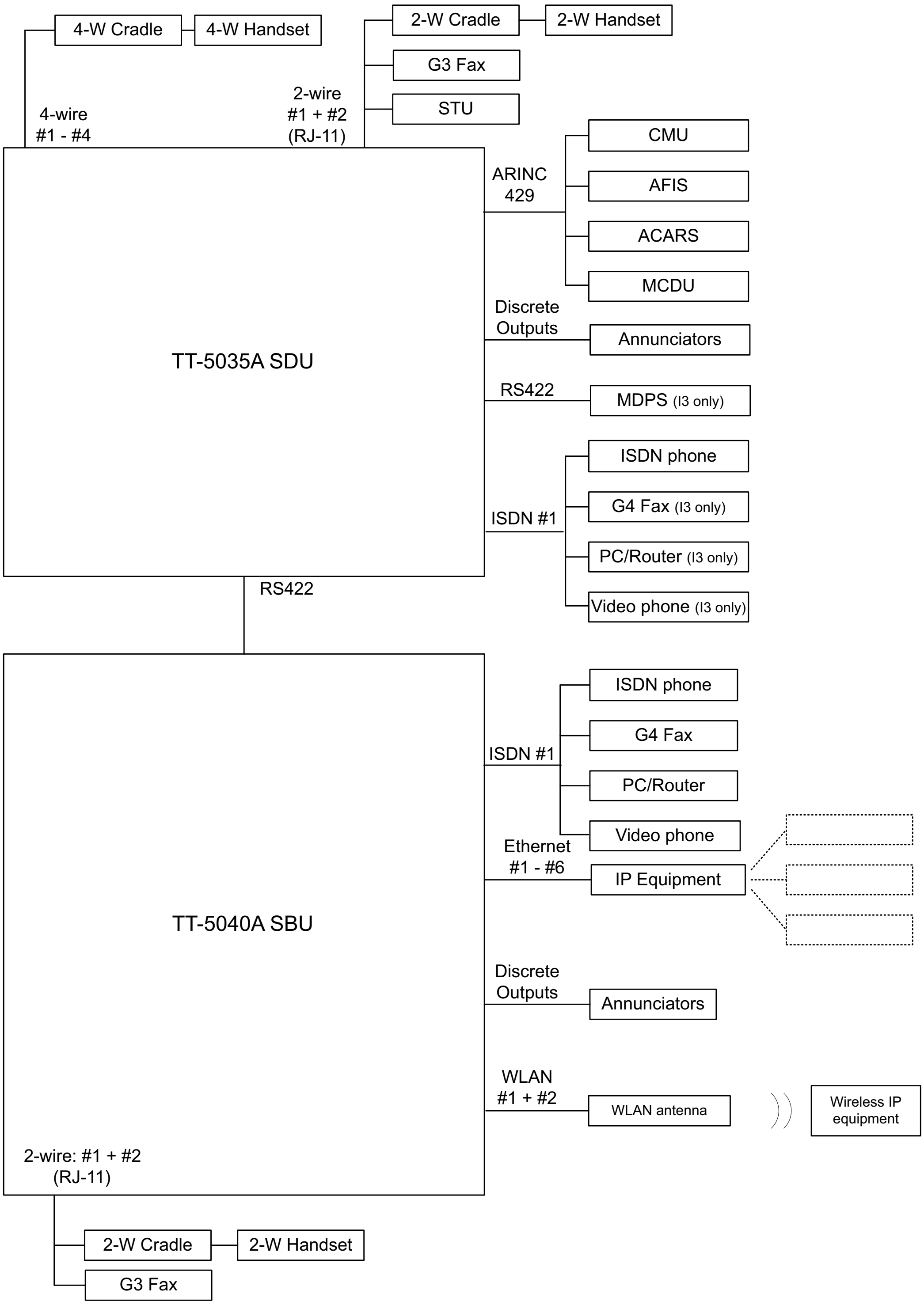


Figure 2-10: System Configuration showing the user interfaces

2.4 Operation overview

2.4.1 Configuration

There are two configuration tools for the AVIATOR 700 system:

- Aero-SDU Configuration Program for the SDU
  The configuration tool for the SDU is the Aero-SDU Configuration Program. It is launched from a standard PC connected to the front connector of the SDU (RS232) with the maintenance cable (see ***TT 37-112940 maintenance cable for front connector on SDU and PC*** on page 5-81). For further information, see ***Configuring the basic system*** on page 6-1.
- Web interface for the SBU
  The configuration tool for the SBU is the built-in web interface, which can be accessed from a standard PC connected to the Maintenance connector of the SBU. Note that the configuration settings can only be accessed from the Maintenance connector (Ethernet) on the front of the SBU. For further information, see ***SBU Configuration tasks*** on page 6-13.

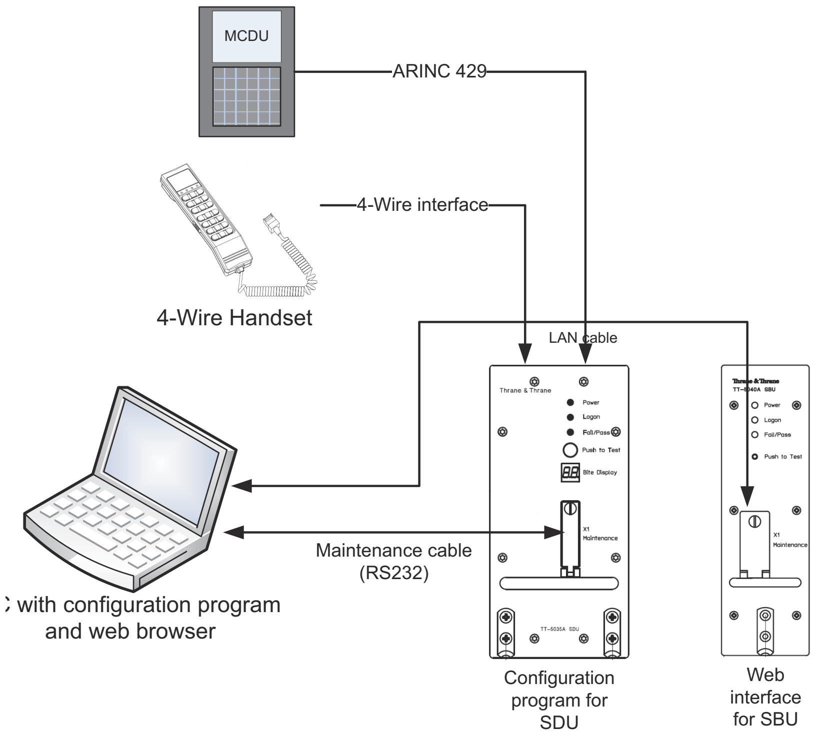


Figure 2-11: Configuration of the SDU and SBU, overview

2.4.2 Operation

The core components of the AVIATOR 700 System are the SDU with the classic aero services and the SBU providing SwiftBroadband services. These two units share the same satcom antenna and HPA. When installing the system you must bear in mind at which unit the handsets and PC equipment are connected, so you prepare the installation for the future use of various handsets and computers in the cabin.

You can operate the AVIATOR 700 System from several user interfaces:

- A 4-Wire Handset connected to the SDU. The display and keypad of the handset give access to the menu system of the SDU.
- The MCDU connected to the SDU. The display and keys of the MCDU give access to a menu system to control the SDU.
- The web interface of the SBU. It is used to for Internet access, e-mail, IP streaming and FTP services. It gives also access the SBU phone book, call log and SBU settings. used for daily operation of the SBU. The settings can be accessed from any of the LAN interfaces, including WLAN.

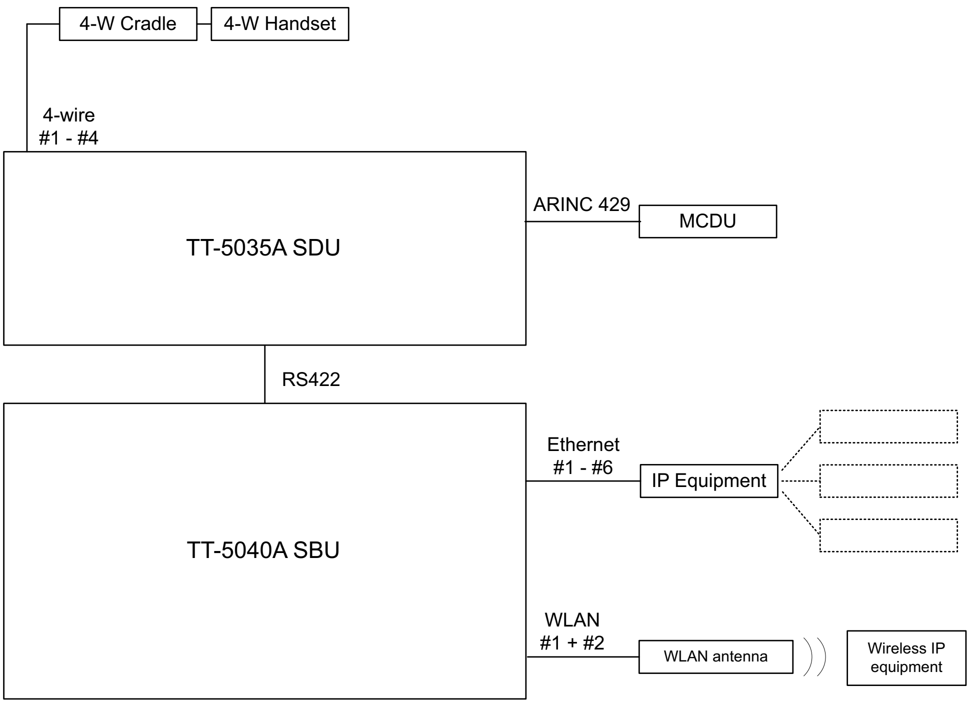


Figure 2-12: Interfaces for operating the AVIATOR 700 system

Refer to the AVIATOR 700 User Manual for detailed operating procedures. The AVIATOR 700 User Manual introduces and explains system capabilities and features, handset controls and functions, placing and receiving calls, accessing the Internet, streaming sessions and use of the menu system.

Equipment drawings

3.1 Introduction

The following pages show copies of outline drawings of important system units relevant for an installation.

Important The drawings in this manual are for reference only. If you have access to Thrane & Thrane's Extranet you can get copies of the outline drawings at: http://extranet.thrane.com. You can download the drawings as PDF files. There are also 3D models of selected units.

Note For equipment drawings of the AVIATOR Wireless Handset and Cradle see ***AVIATOR Wireless Handset and Cradle Installation & Maintenance Manual*** (***98-129600***).

3.2 TT-5035A Satellite Data Unit

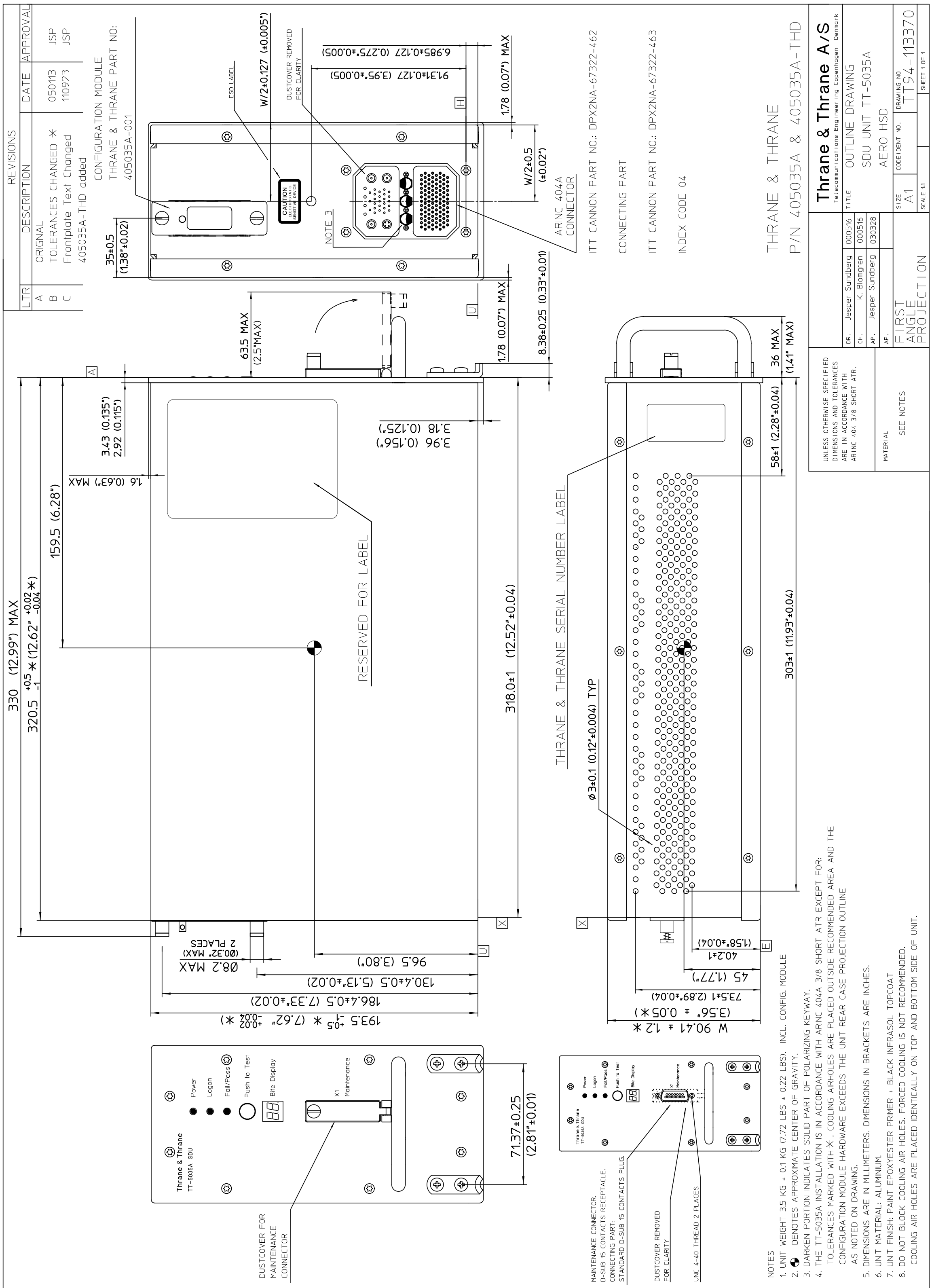


Figure 3-1: Outline Drawing: Satellite Data Unit

3.2.1 TT-5035A-001 Configuration Module (inserted in the SDU)

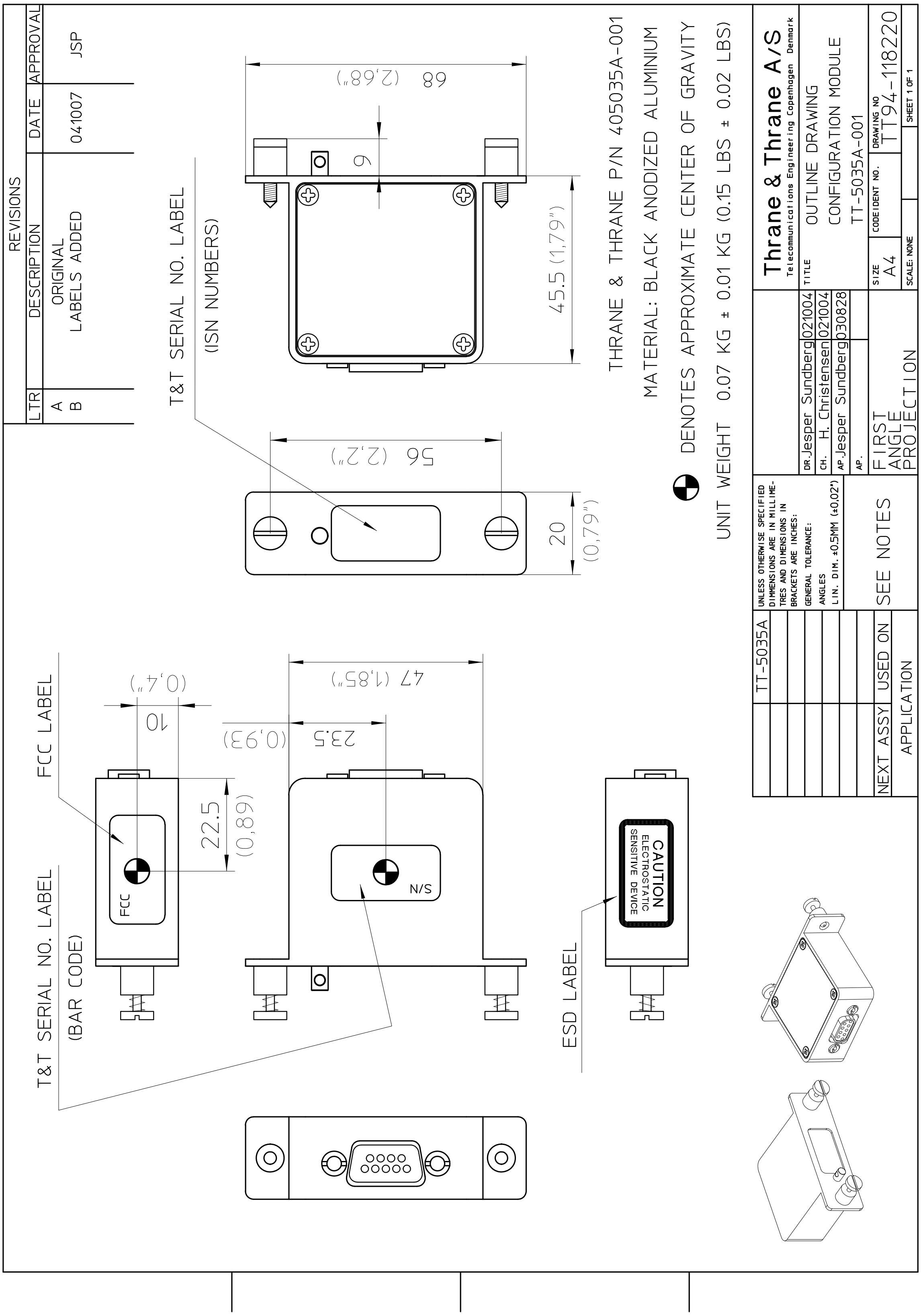


Figure 3-2: Outline Drawing: Configuration Module

3.3 TT-5014A High Power Amplifier

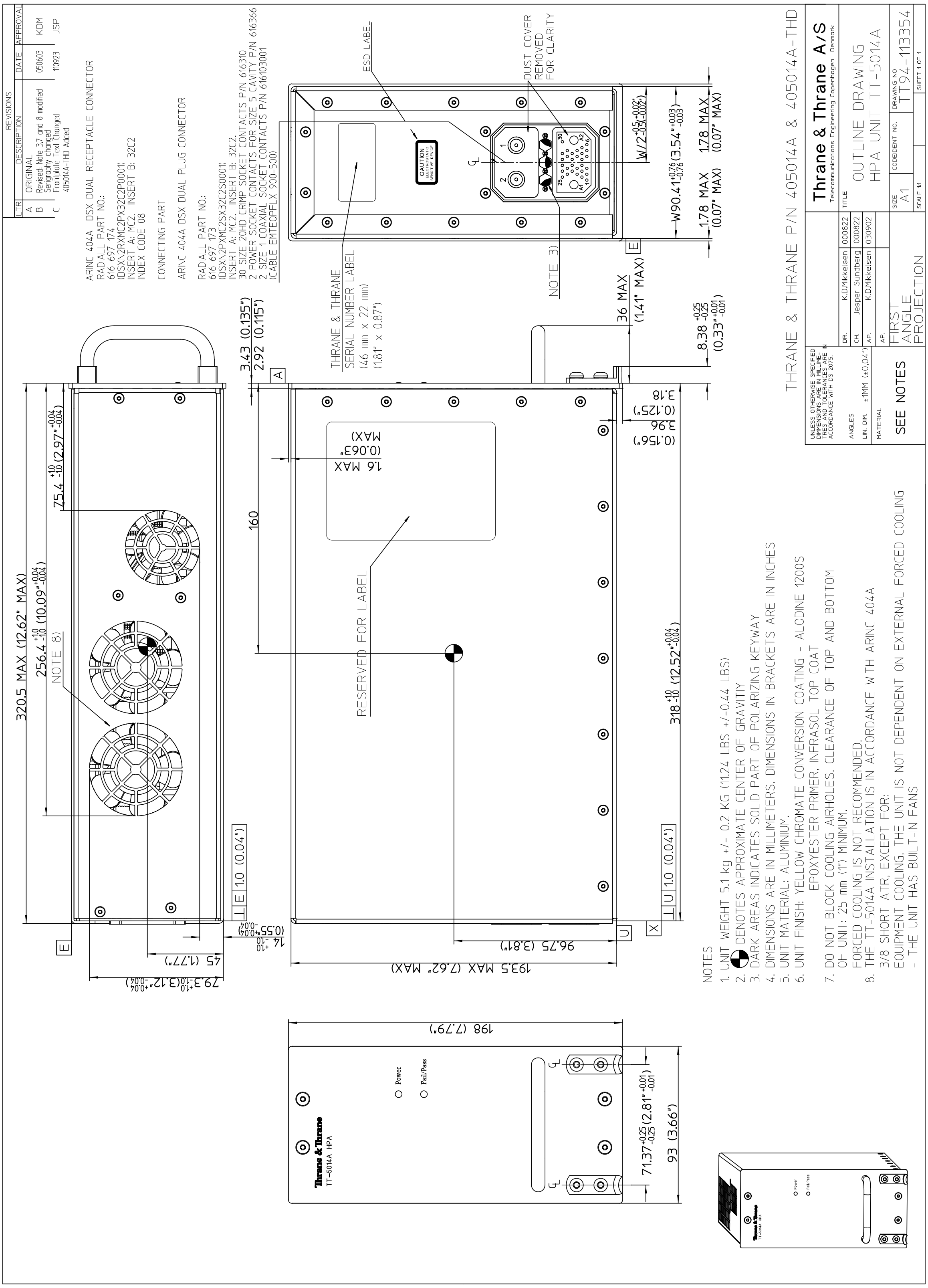


Figure 3-3: Outline Drawing: High Power Amplifier

3.4 TT-5040A SBU

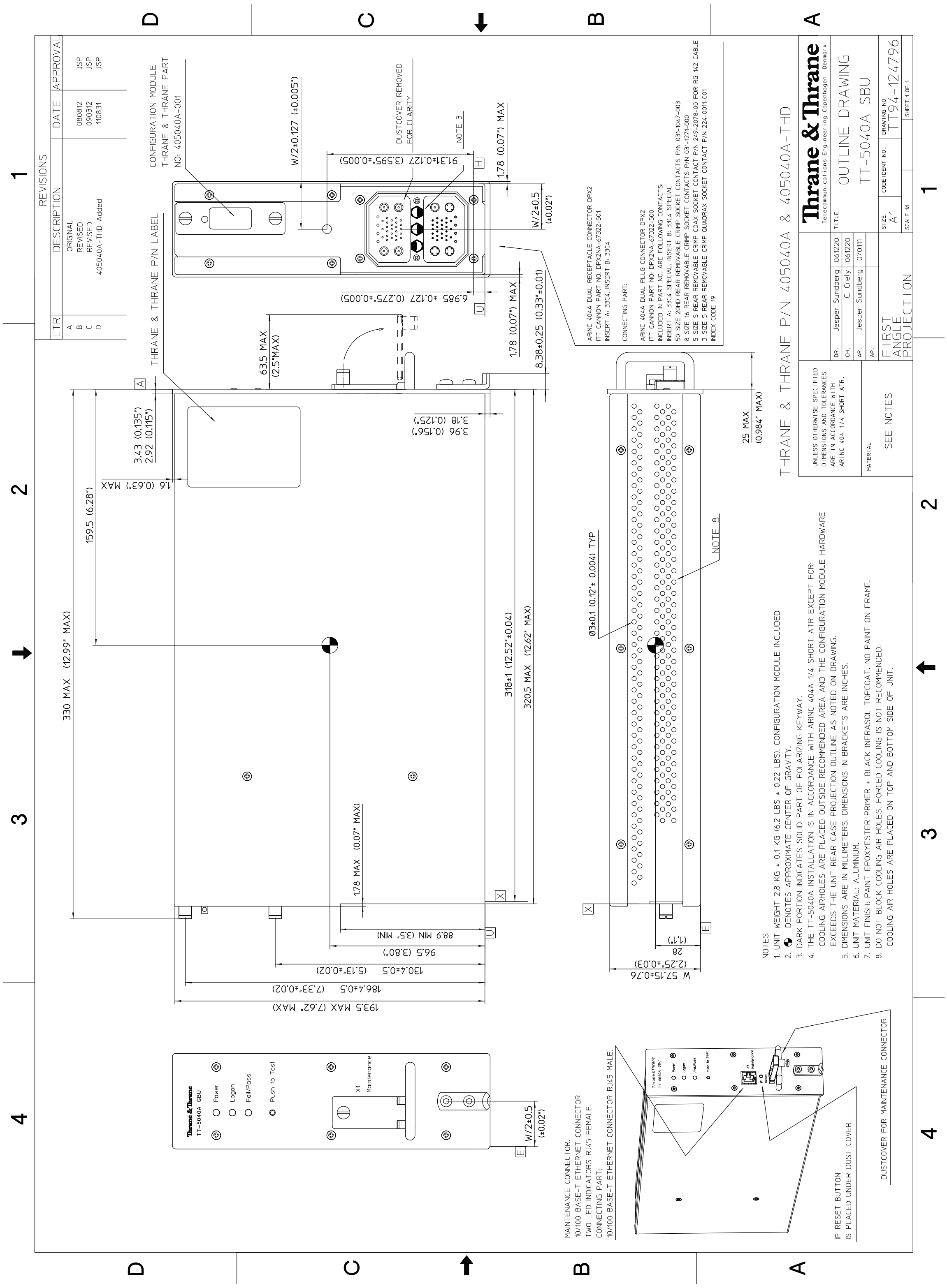


Figure 3-4: Outline drawing: TT-5040A SBU

3.4.1 TT-5040A-001 CM (inserted in the SBU)

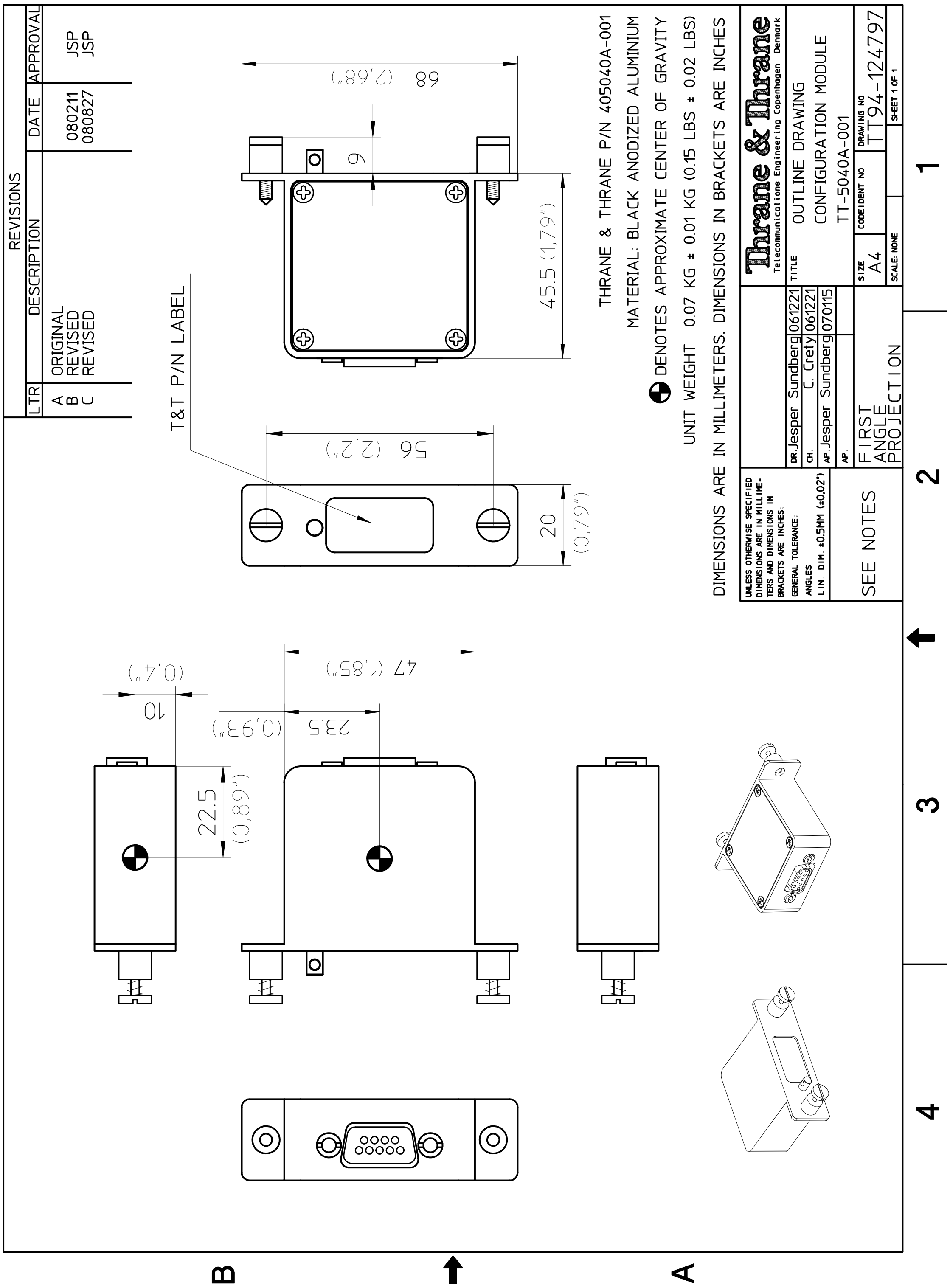


Figure 3-5: Outline drawing: TT-5040A-001 CM, inserted in the SBU

3.5 TT-5038A-002 Tx Coupler

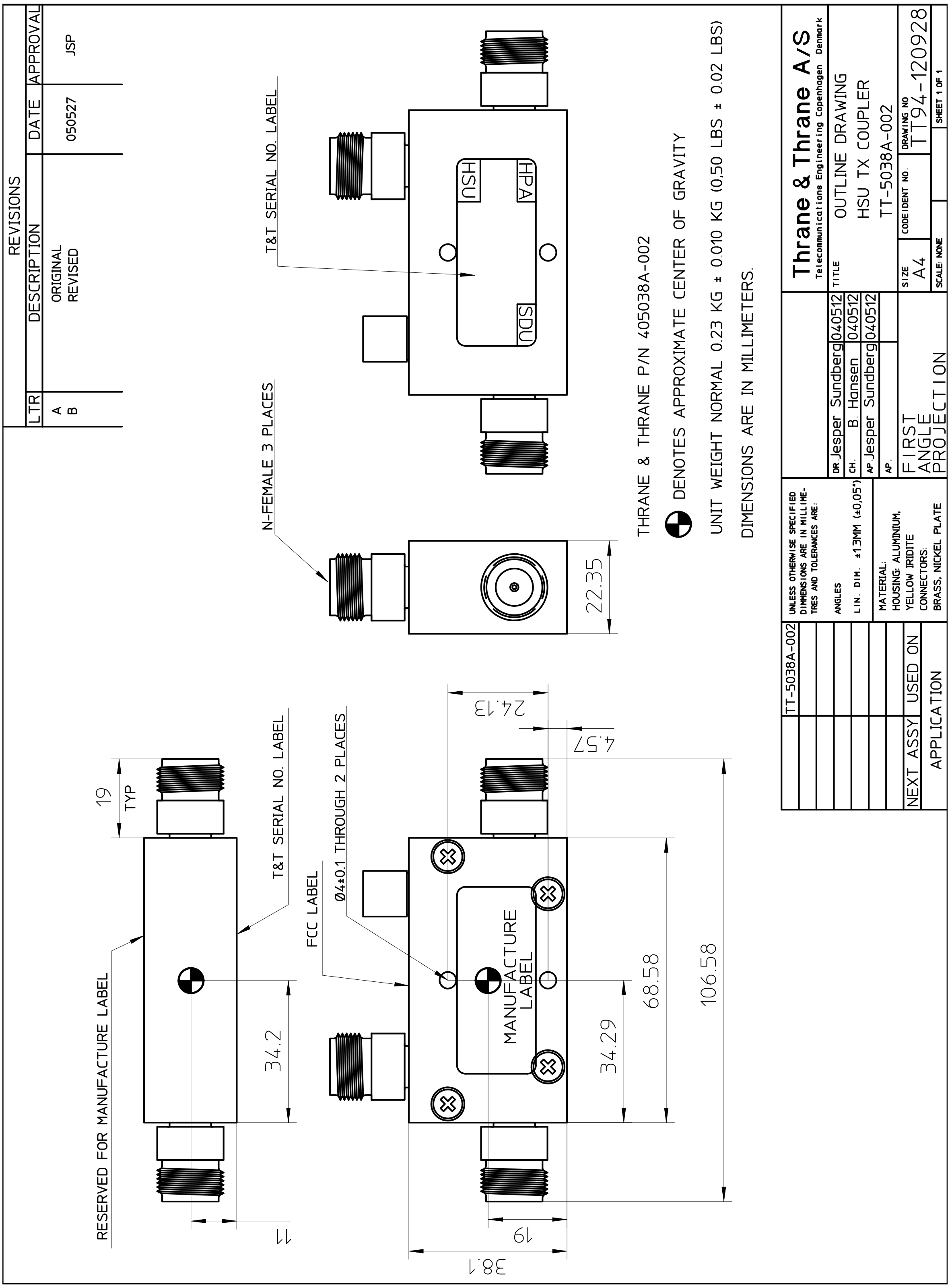


Figure 3-6: Outline Drawing: Tx Coupler

3.6 TT-5038A-003 Rx Power Splitter

Note If the Rx Power Splitter is to be mounted on a flat surface, mount it on a 3 mm mounting plate to provide enough space for mounting of the connectors. For further information see ***Rx Power Splitter*** on page 5-6.

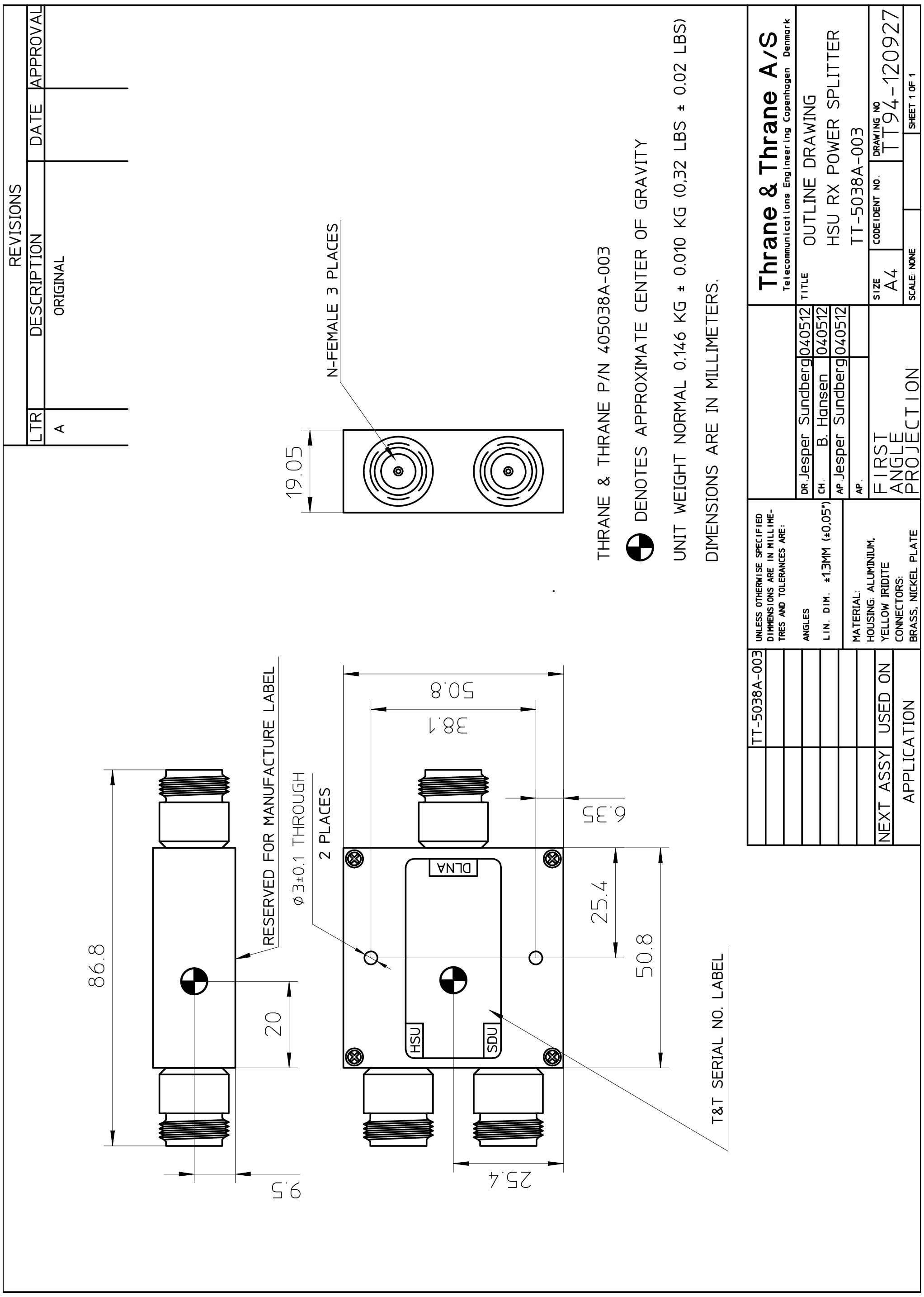


Figure 3-7: Outline Drawing: Rx Power Splitter

3.7 TT-5013A DLNA Type F

Original Manufacturer P/N: COMDEV 173628-101

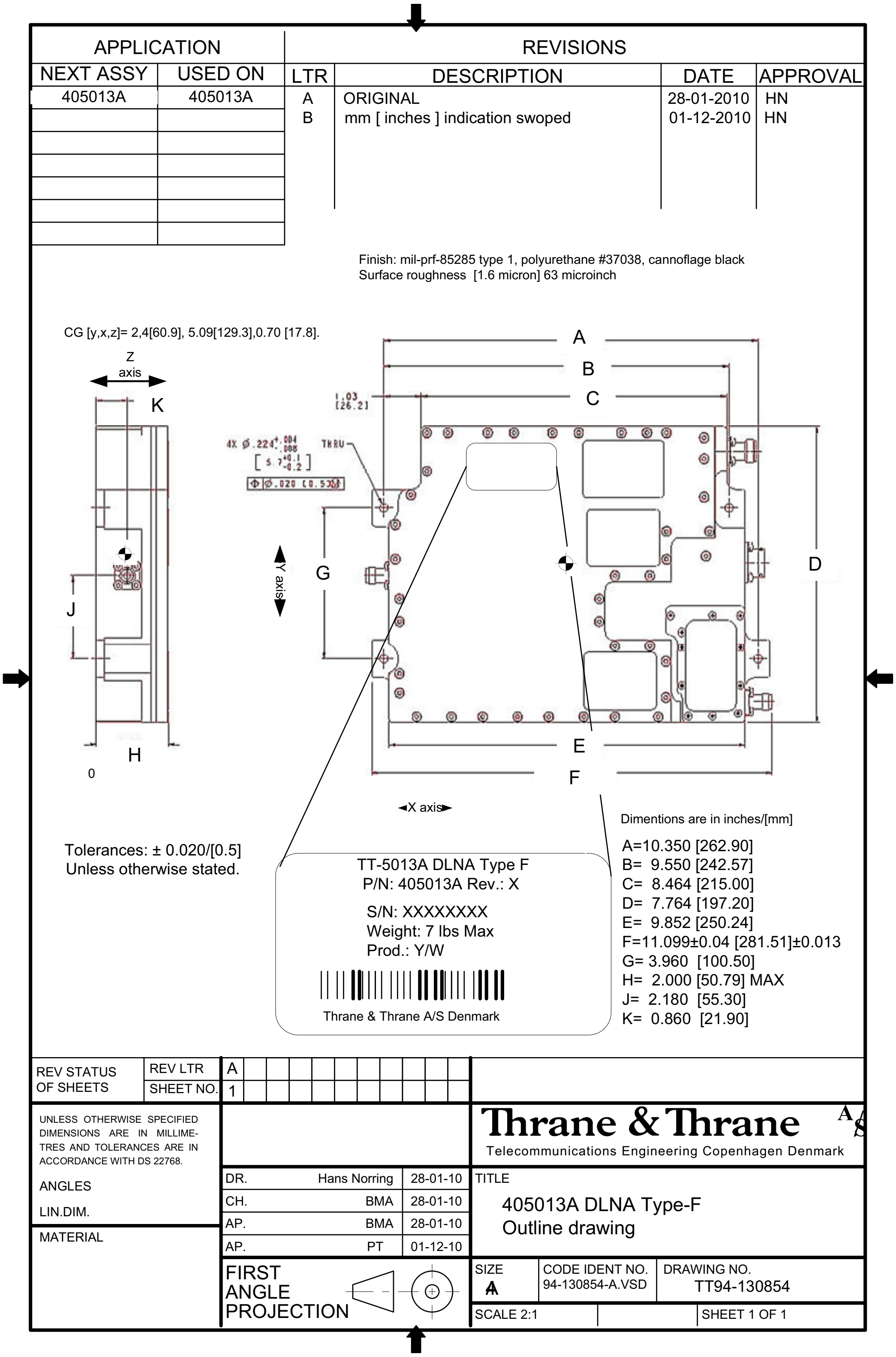


Figure 3-8: Outline drawing: DLNA Type F

3.8 TT-5620A 4-Wire Handset

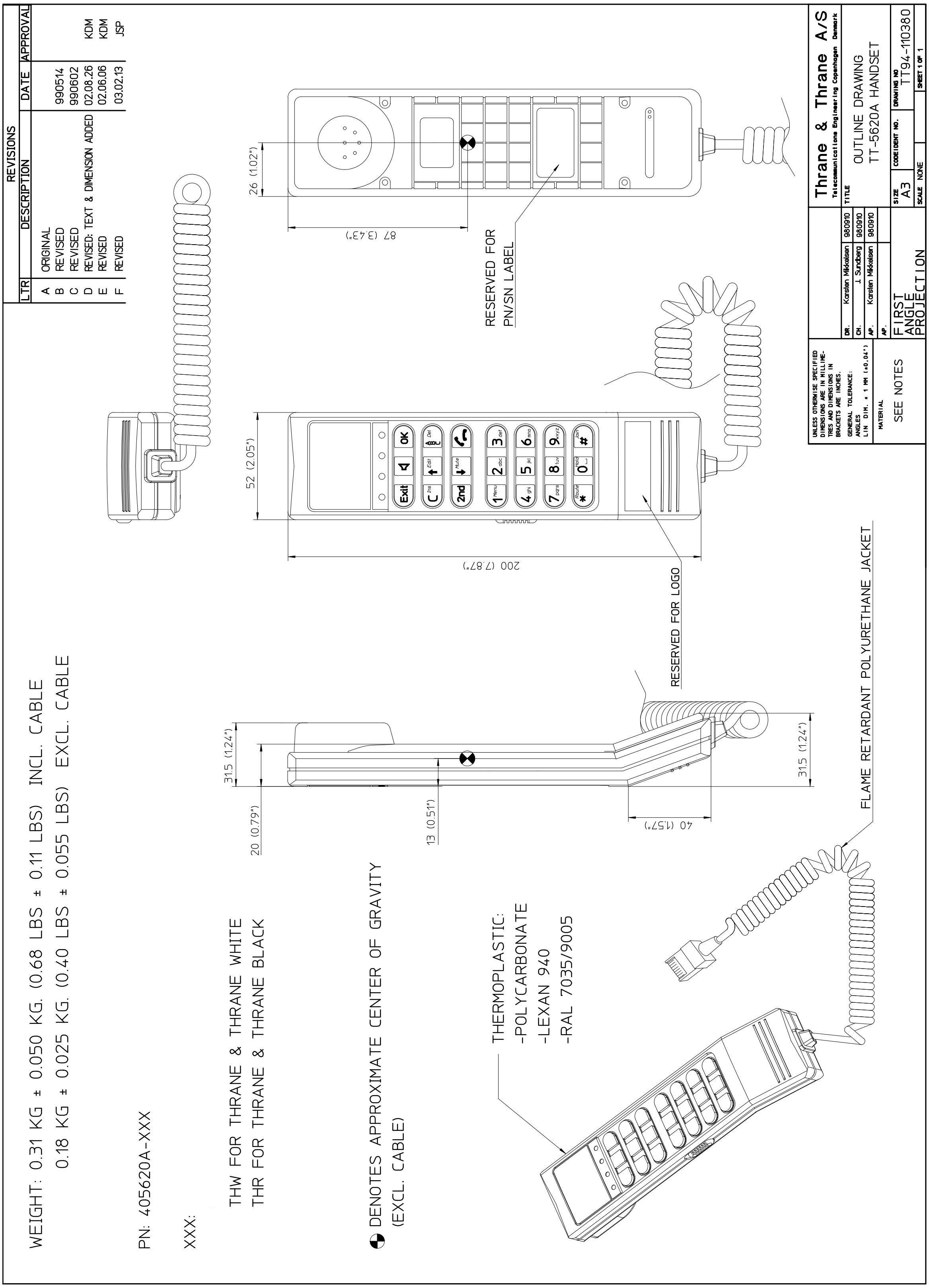


Figure 3-9: Outline Drawing: 4-Wire Handset

3.9 TT-5622A 4-Wire Cradle

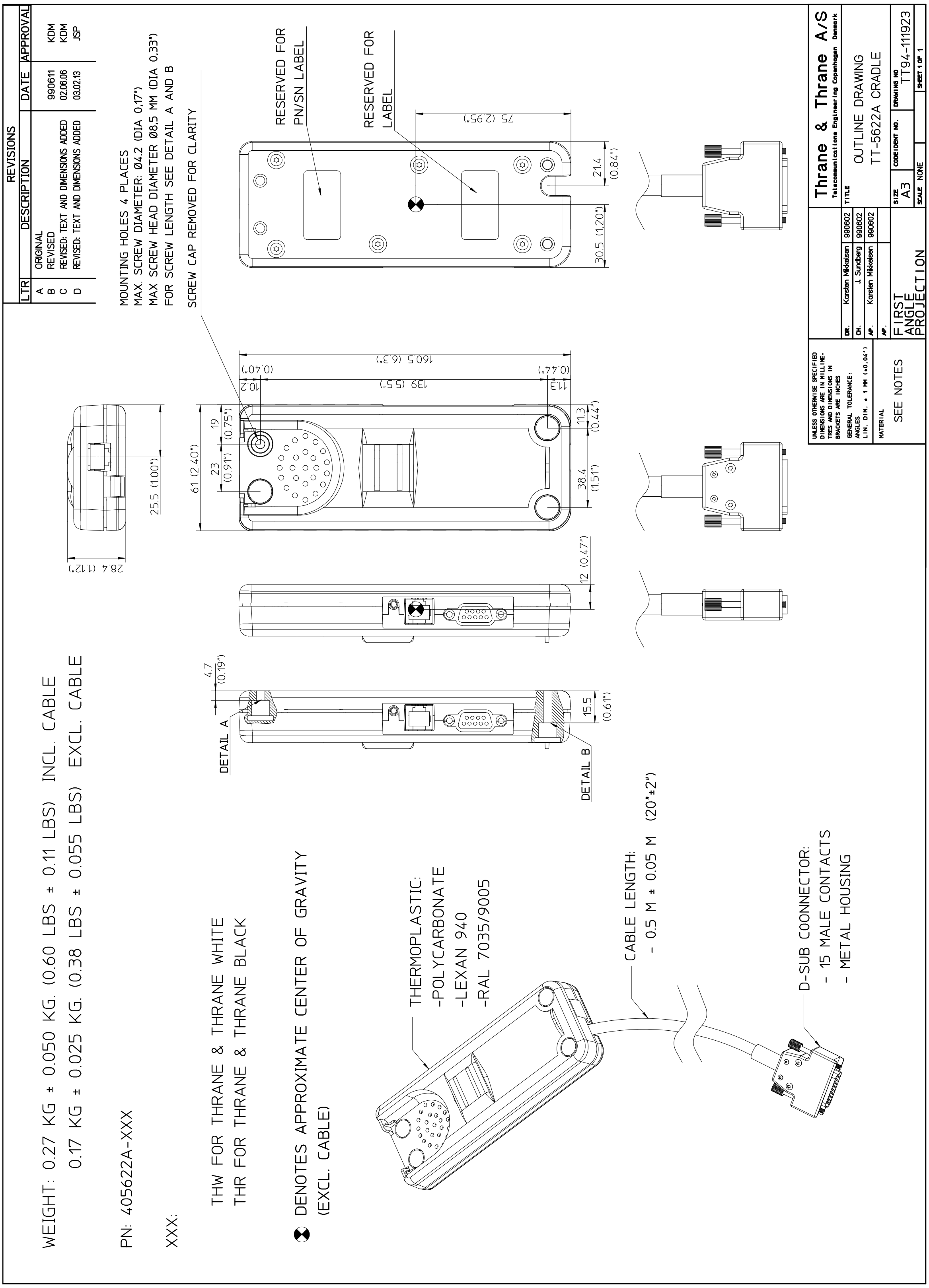


Figure 3-10: Outline Drawing: 4-Wire Cradle

3.10 TT-5621B 2-Wire Handset

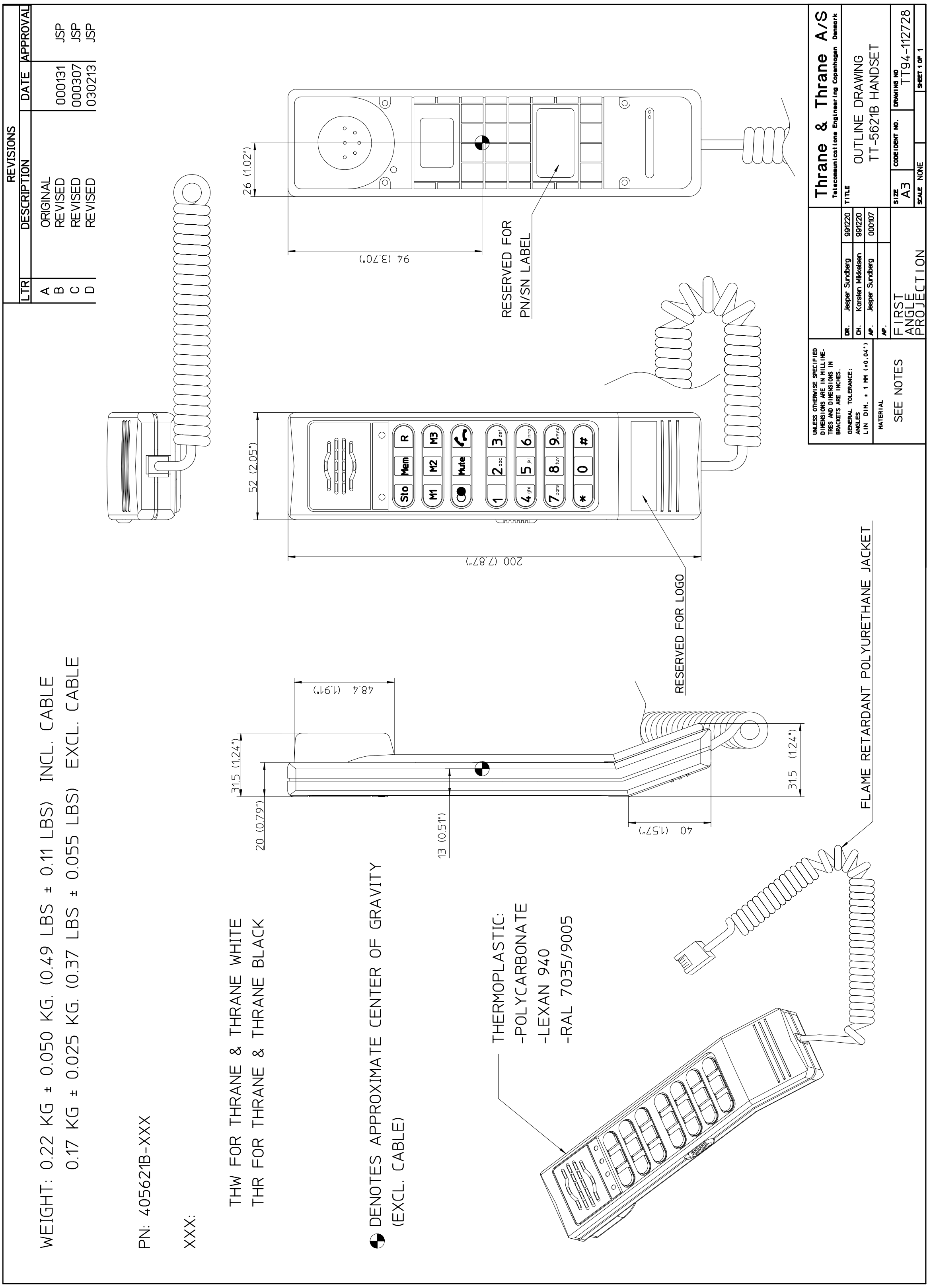


Figure 3-11: Outline drawing: TT-5621B 2-Wire Handset

3.11 TT-5622B 2-Wire Cradle

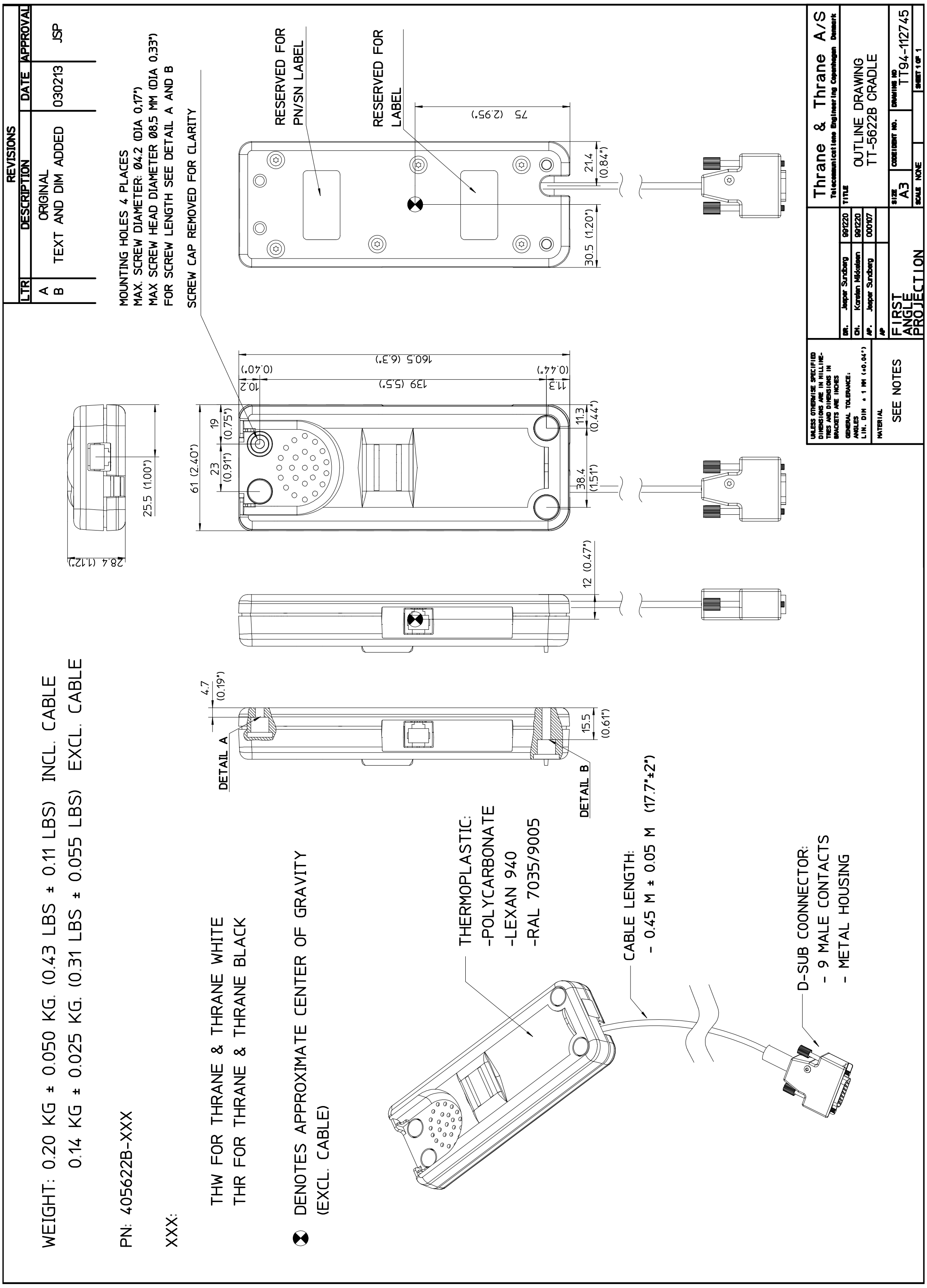


Figure 3-12: Outline drawing: TT-5622B 2-Wire Cradle

3.12 SBU trays

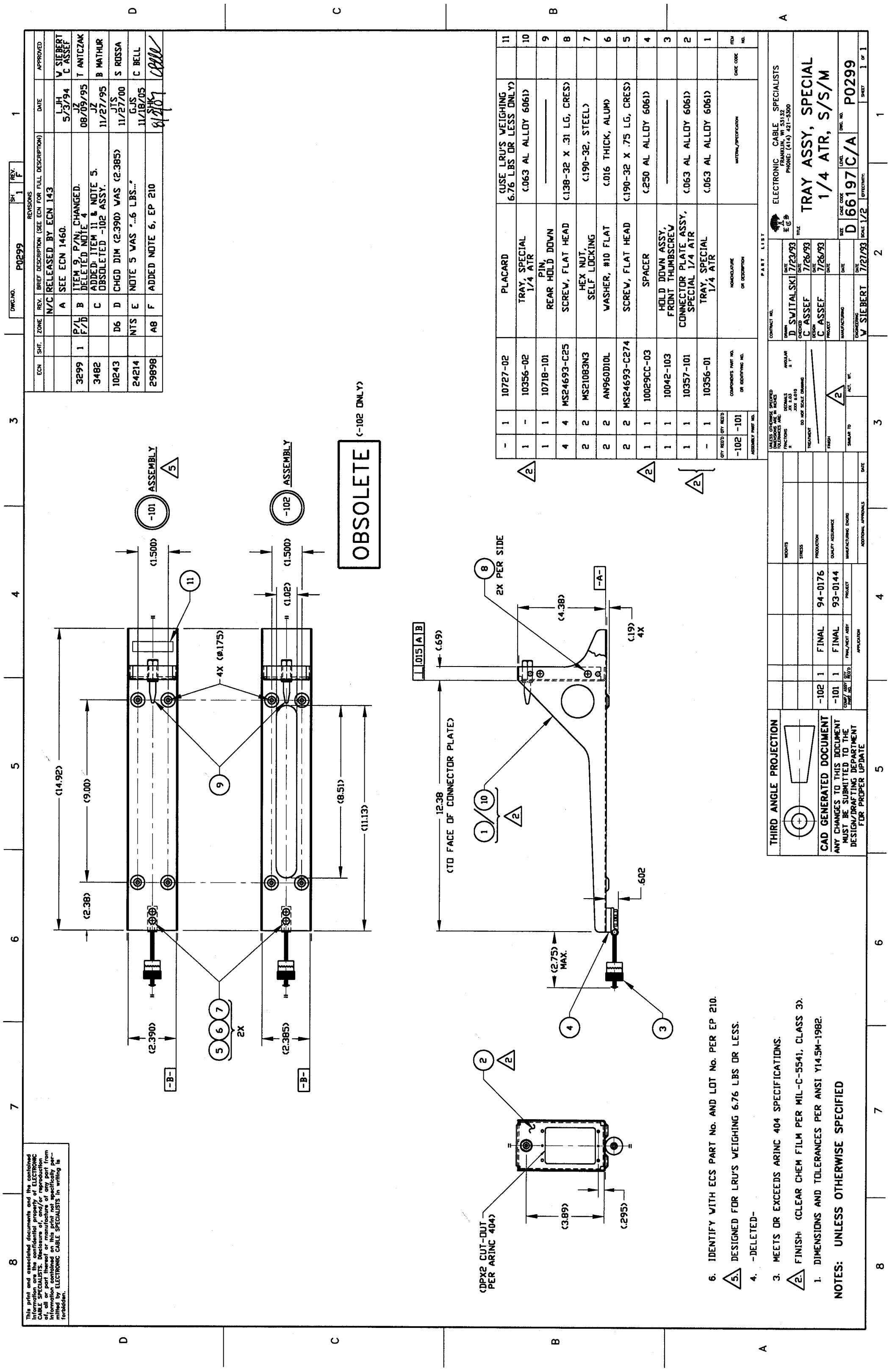


Figure 3-13: Outline drawing: SBU tray: ECS P0299-101

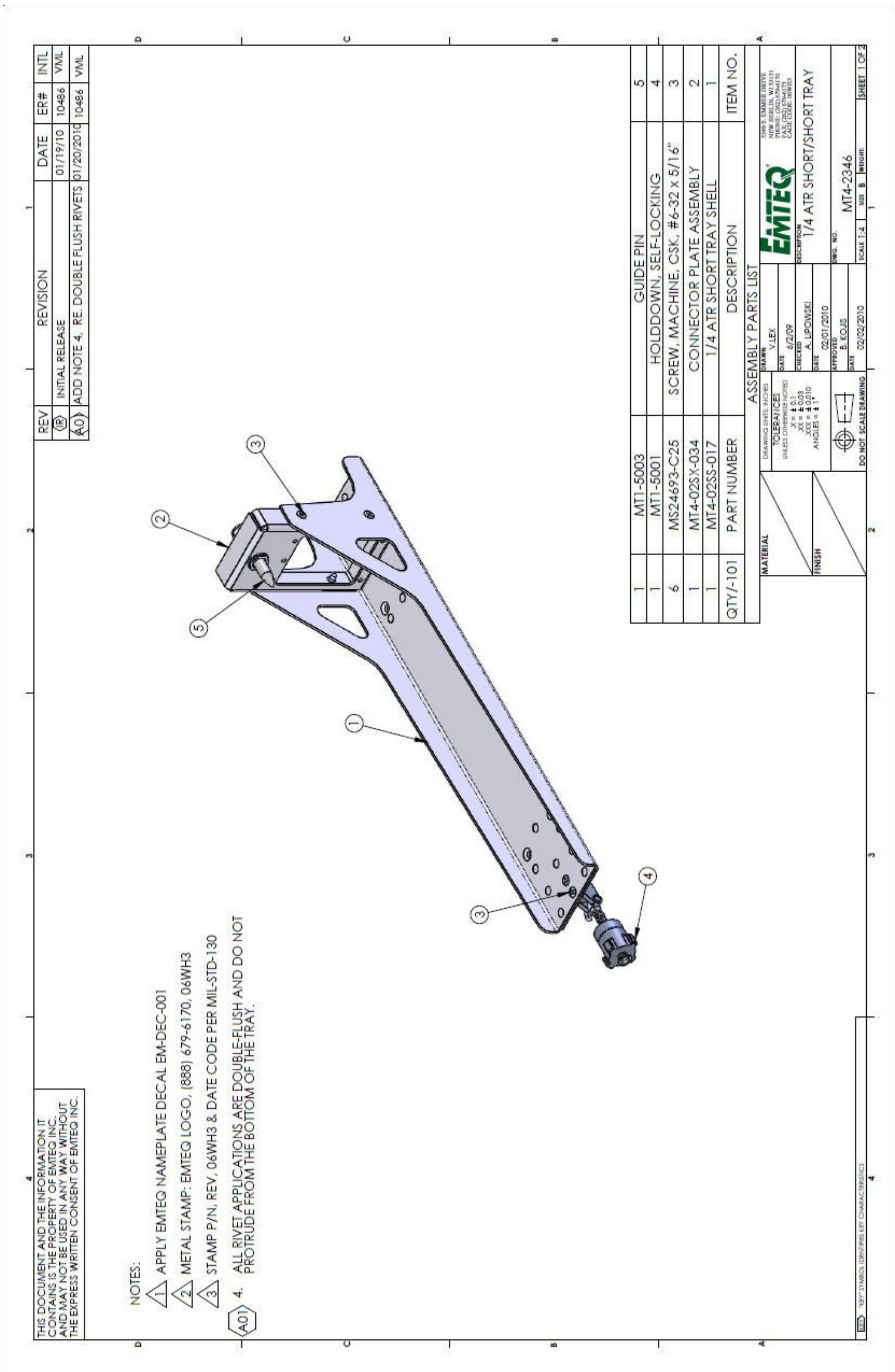


Figure 3-14: Outline drawing: SBU tray: EMTEQ MT4-2346-101 (page 1)

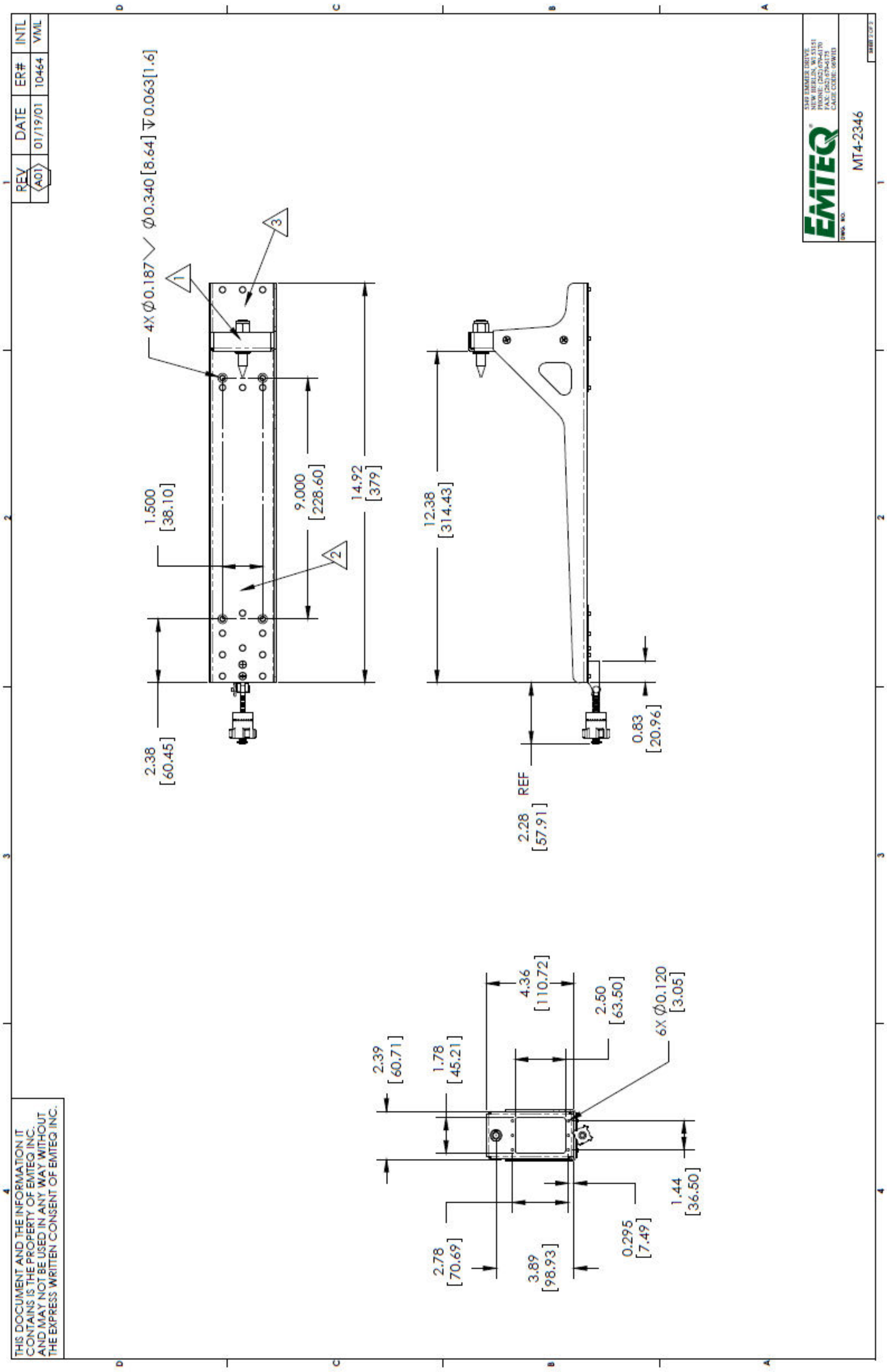


Figure 3-15: Outline drawing: SBU tray: EMTEQ MT4-2346-101 (page 2)

3.12.1 SDU and HPA tray

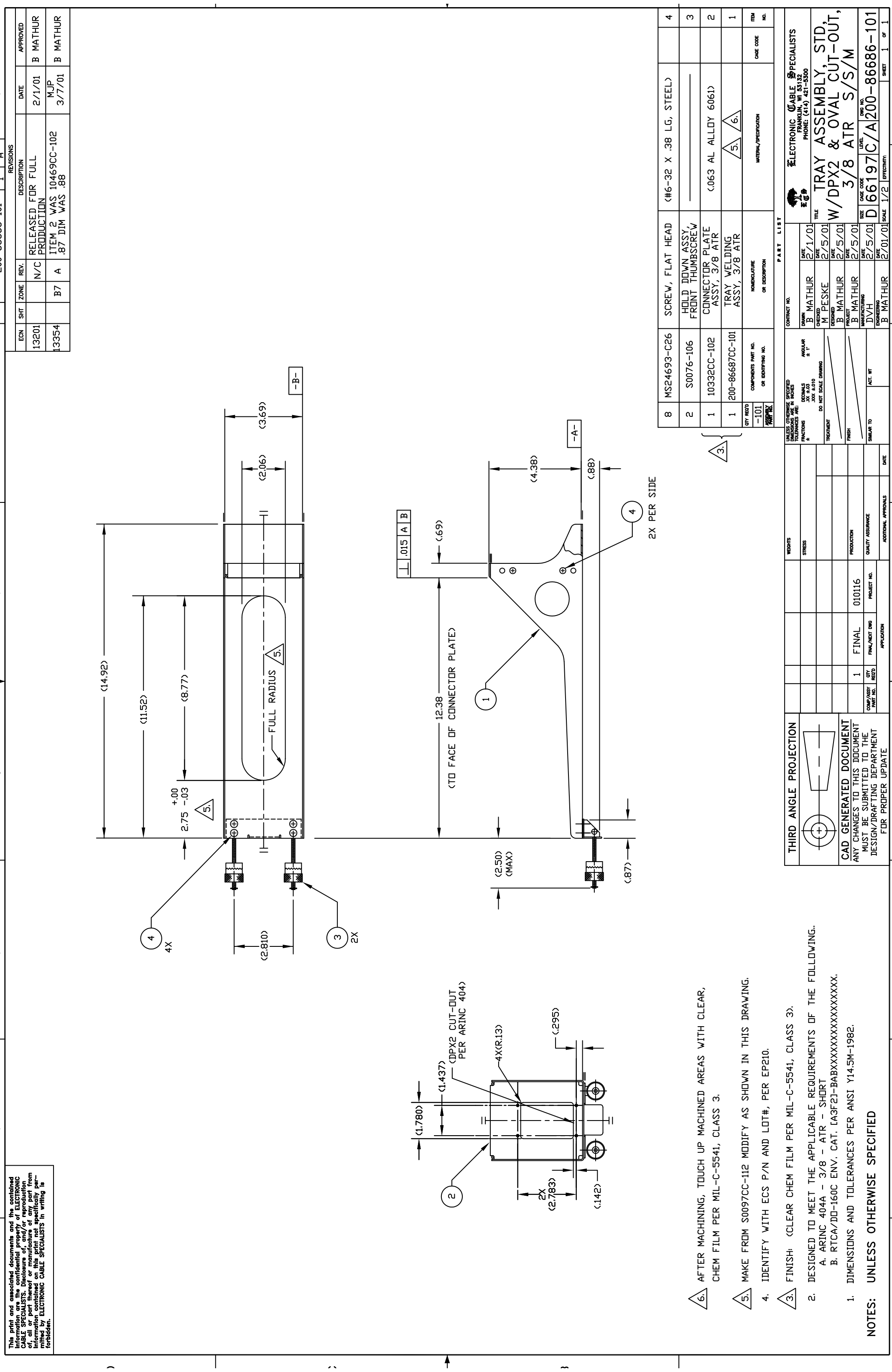


Figure 3-16: Outline Drawing: Tray for SDU and HPA.

3.13 SDU tray connector

For correct index pin codes for the SDU see **Figure 4-2: SDU Rear Receptacle and Mating Plug in Tray, Engaging End**.

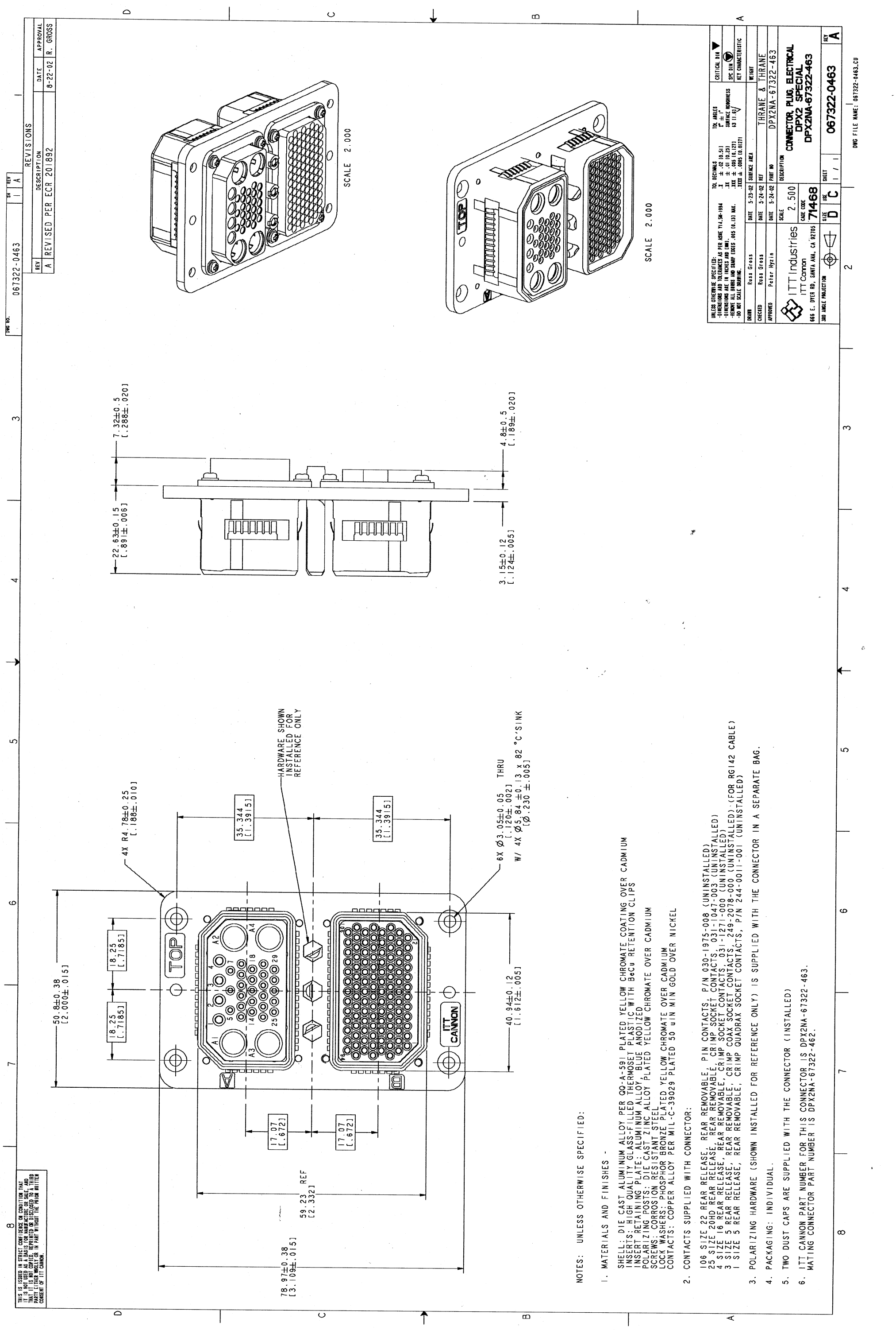


Figure 3-17: SDU Tray Connector: ITT Cannon DPX2NA-67322-463

3.14 HPA tray connector

For correct index pin codes for the HPA see **Figure 4-3: HPA Receptacle, Face View of Engaging End. Index Code is 08**.

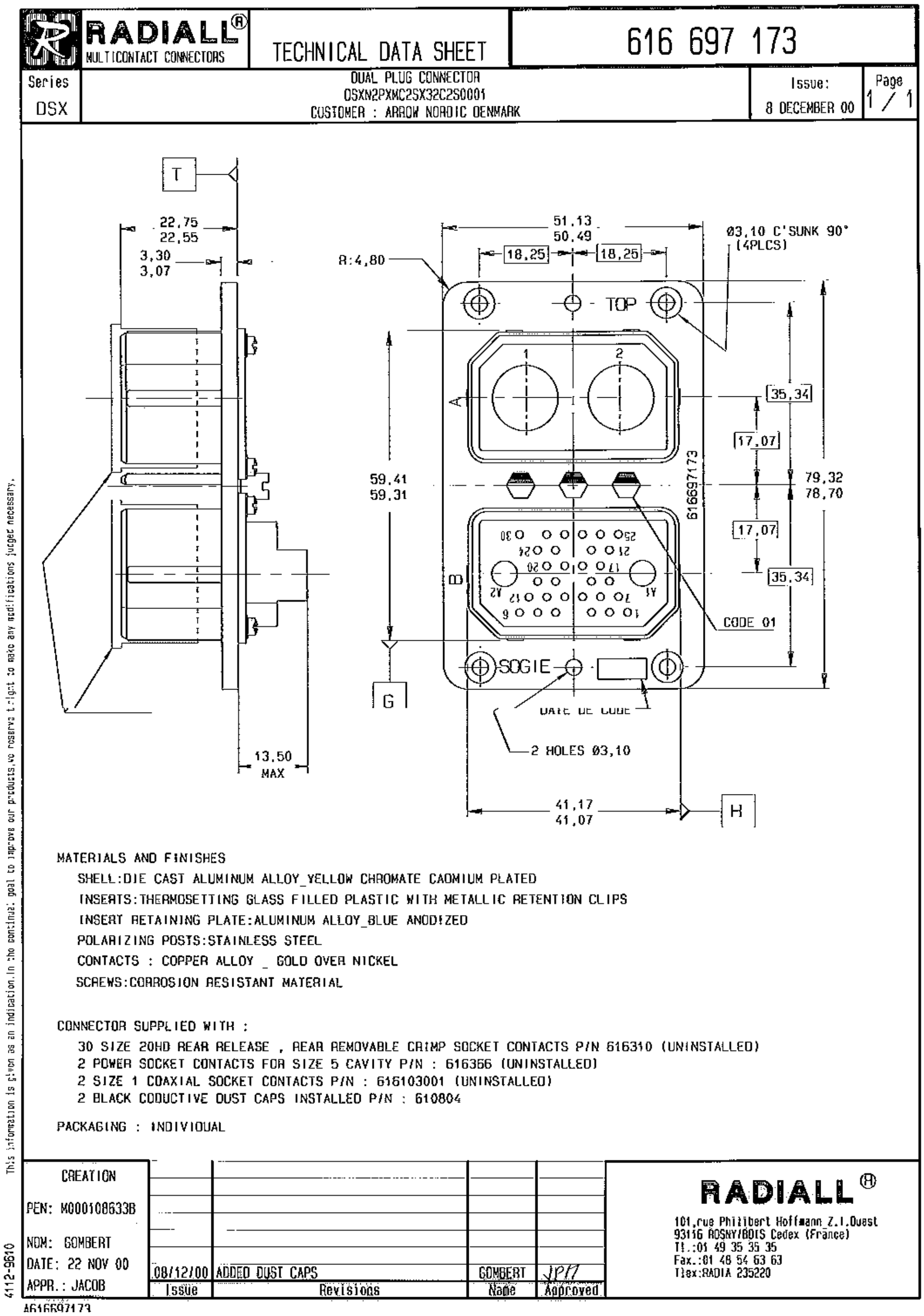


Figure 3-18: HPA Tray Connector

3.15 SBU tray connector

For correct index pin codes for the SBU see **Figure 4-5: SBU rear receptacle, engaging end (Index code: 19)**.

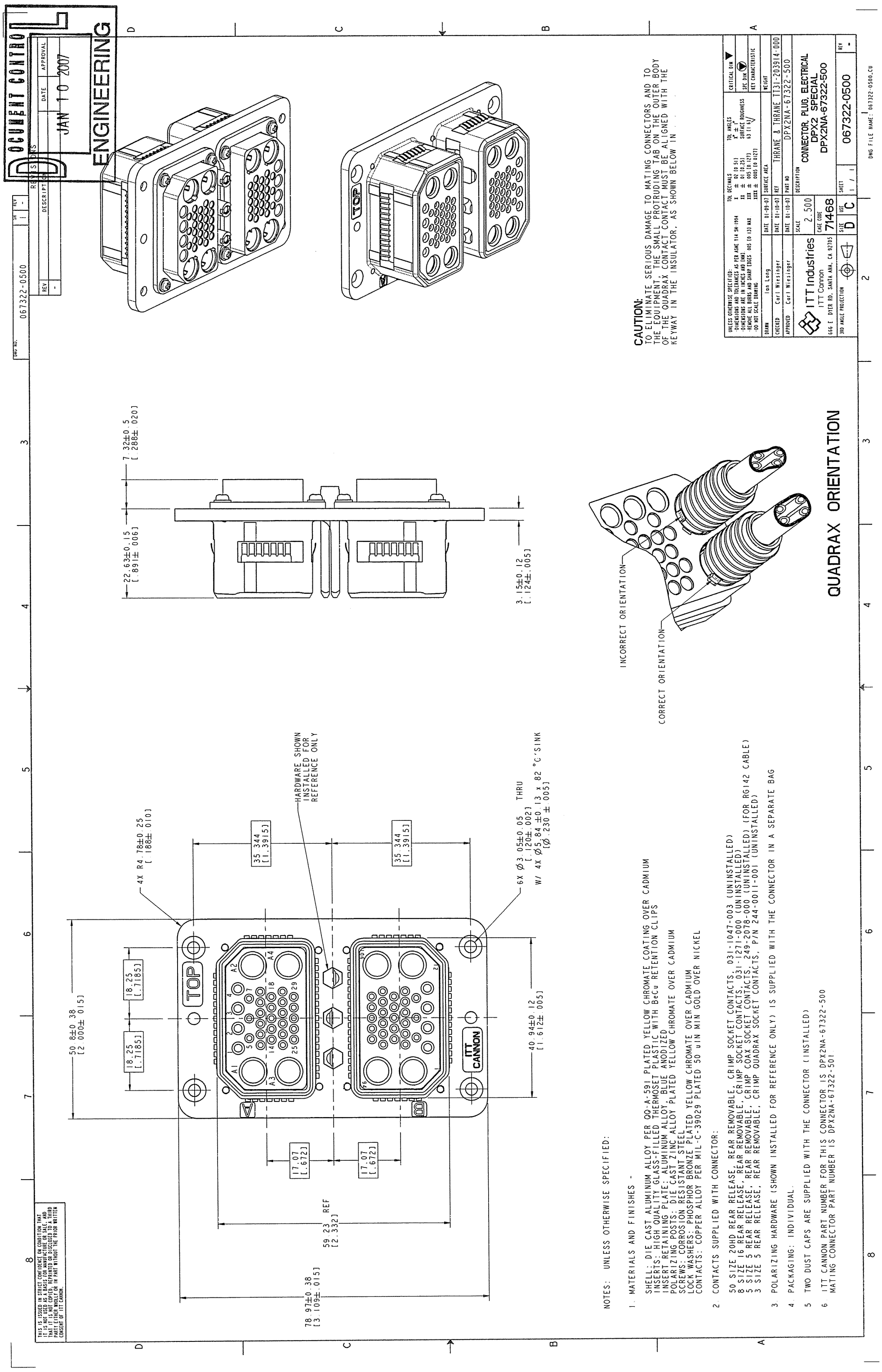


Figure 3-19: Outline drawing: SBU tray connector: ITT Cannon DPX2NA-67322-0500

3.16 Contact Assembly: Quadrax Pin size 5 special

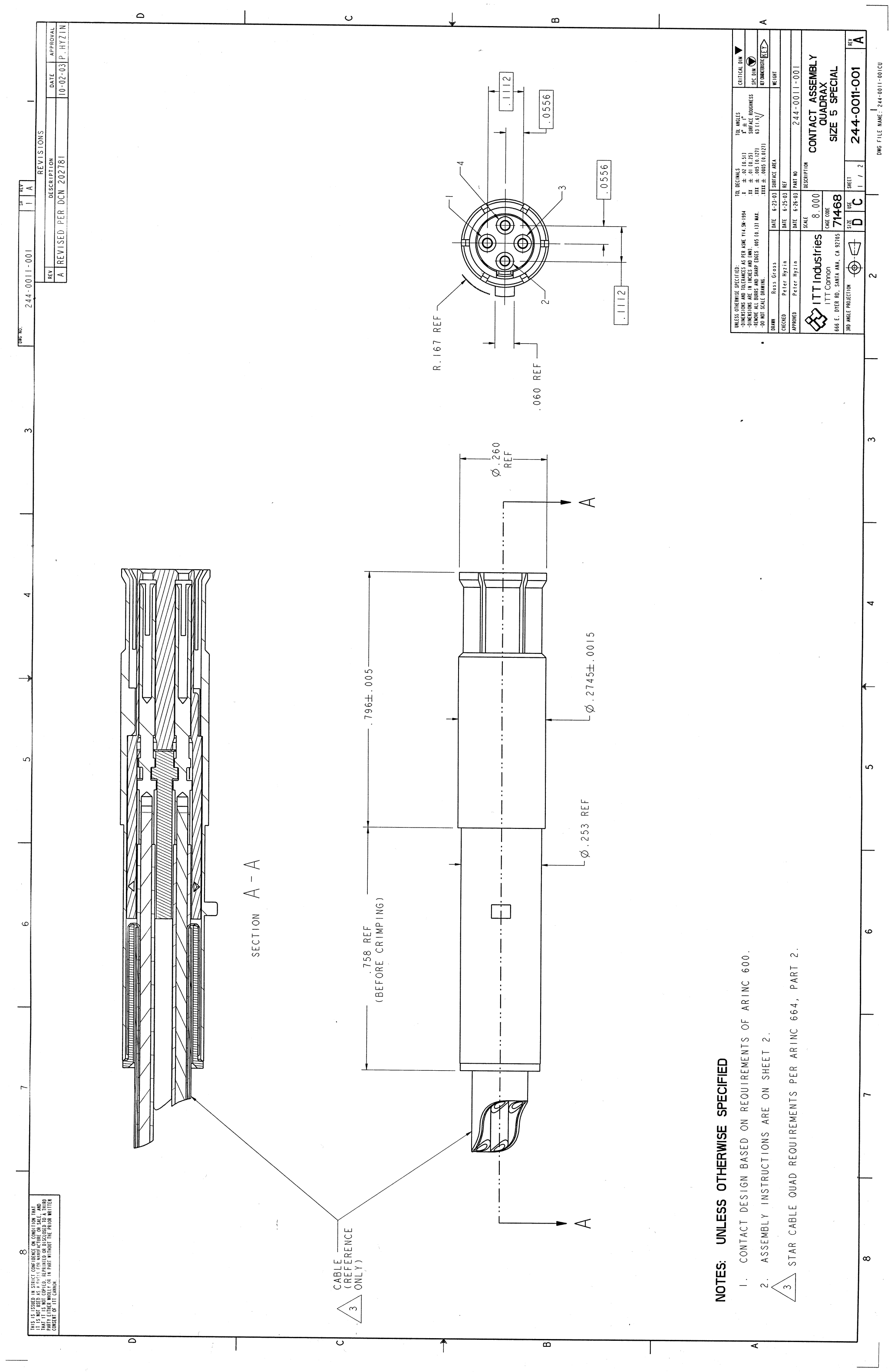


Figure 3-20: Contact Assembly: Quadrax Pin size 5 special: ITT Cannon 244-0011-001

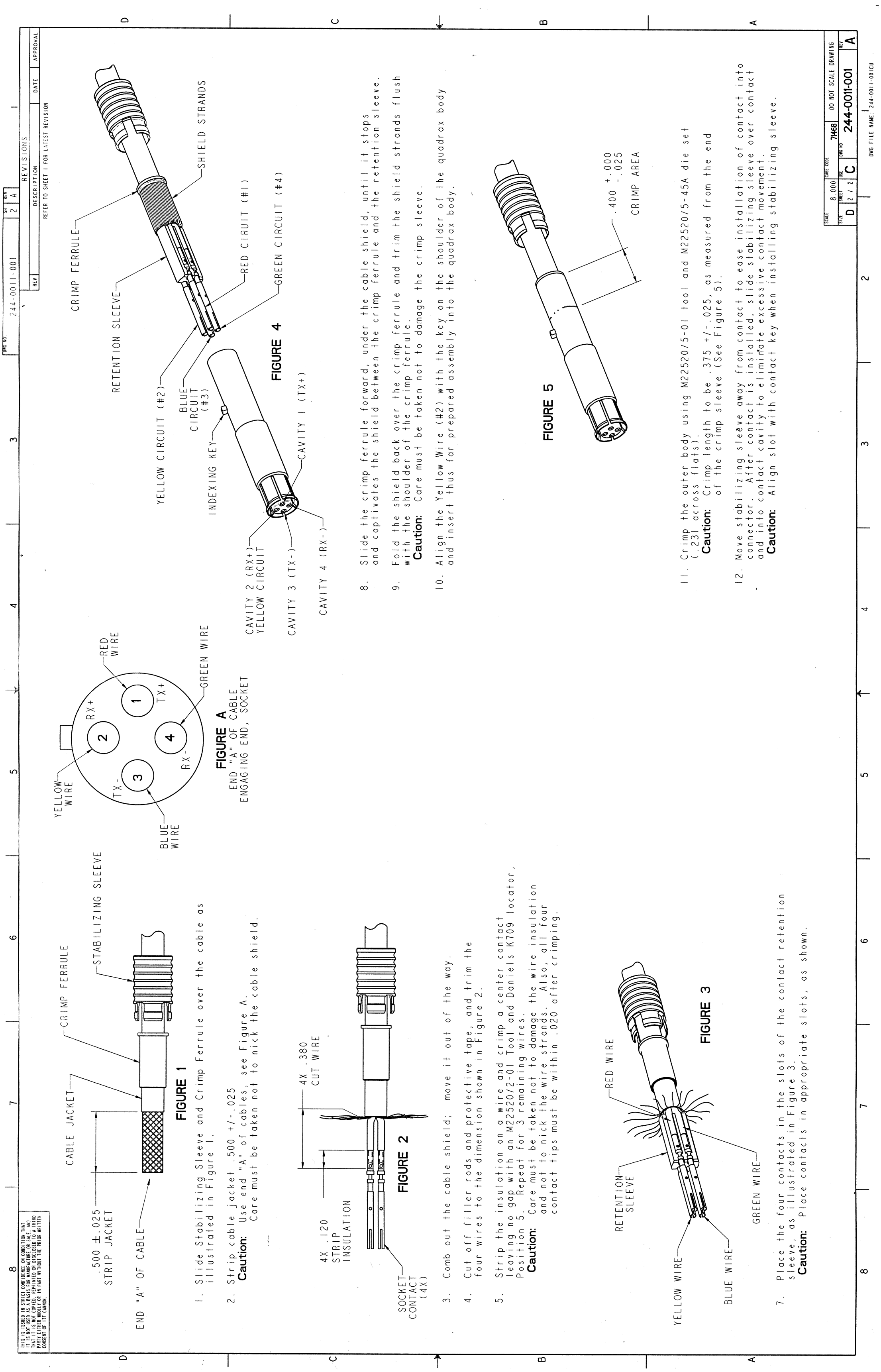


Figure 3-20: Contact Assembly: Quadrax Pin size 5 special: ITT Cannon 244-0011-001 (Continued)

3.17 TT-5040A-004 WLAN antenna

Original Manufacturer P/N: VT Miltope 901167-2.

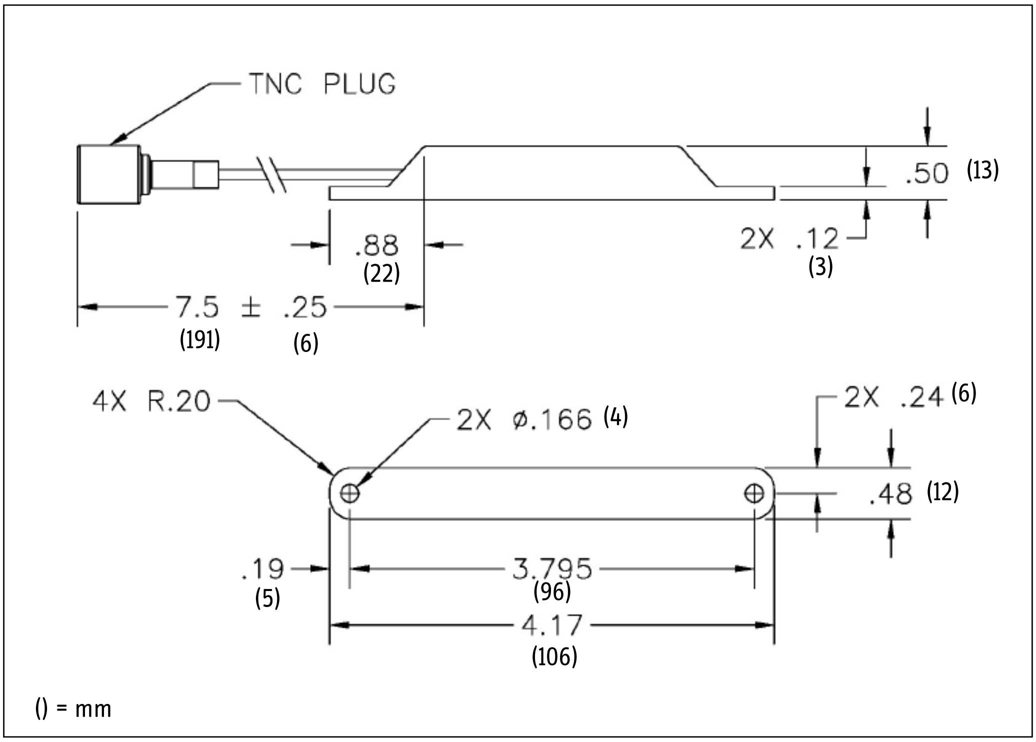


Figure 3-21: Outline drawing: TT-5040A-004 WLAN antenna

Connectors and pin-out

4.1 TT-5035A Satellite Data Unit

4.1.1 Connectors on SDU

There are three connectors on the SDU:

- Maintenance (front connector):
  Interface to PC and Handset for configuration and maintenance purposes.
  A 15 pin Female Sub-D Filter connector
- ARINC 404 (rear connector):
  Interfaces to Aircraft and SATCOM interconnections.
  An ARINC 404 Shell Size 2 Receptacle.
- Configuration Module (rear, inside connector):
  A 9 pin Sub-D Female Connector. This is an internal connector used only as interface to the Configuration Module.

4.1.2 SDU Maintenance front connector

Connector drawing

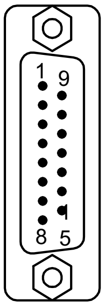


Figure 4-1: SDU Front Connector, Face View of Engaging End. (DB15F)

Functions

The front connector is a 15 pin Female Sub-D Filter connector, and contains the following interfaces:

- EIA/TIA-232-E PC port to connect to PC with Aero-SDU Configuration Program
- 4-Wire Thrane & Thrane Handset
- RS-485 Data interface for T&T Handset
- +12 V DC for powering the Handset
- Write Enable Input for Configuration Module.

Pin-out for SDU front connector

Pin. No.	Pin Name
FP1	Maintenance Handset Audio In Hi
FP2	Maintenance Handset Audio In Lo
FP3	Maintenance Handset Audio Out Hi
FP4	Maintenance Handset Audio Out Lo
FP5	Signal Ground SGND
FP6	Maintenance Handset RS-485 Data A
FP7	Maintenance Handset RS-485 Data B
FP8	+12 V DC/120 mA
FP9	GND, Power Return (for +12 V DC)
FP10	PC EIA/TIA-232-E RxD Output
FP11	PC EIA/TIA-232-E TxD Input
FP12	PC EIA/TIA-232-E CTS Output
FP13	PC EIA/TIA-232-E RTS Input
FP14	GND
FP15	Configuration Module Write Enable In

Table 4-1: Pin-out for SDU Front Connector

4.1.3 SDU rear receptacle

Connector drawing

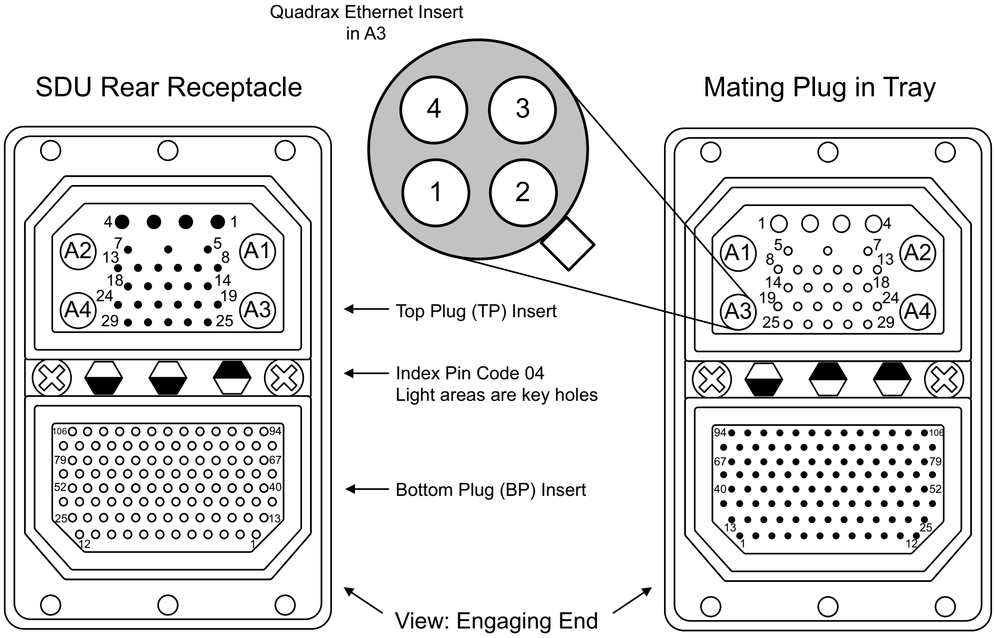


Figure 4-2: SDU Rear Receptacle and Mating Plug in Tray, Engaging End

Functions, top plug

The Top Plug (TP) connects the following signals:

Power, RF Interfaces and Antenna Modem:

- +28 V DC Power + chassis ground
- +28 V DC/600 mA 4-wire handset supply
- Remote ON/OFF (nON)
- RF Tx signal to HPA
- RF Rx signal from DLNA
- GPS/Antenna modem interface

Handset interfaces (analog):

- Four analog 4-wire interfaces for Thrane & Thrane Handsets Systems (including +28 V DC handset supply with nON/OFF power supply control)

Voice/Fax/Modem interfaces:

- Two Voice/Fax/Modem/STU-III, analog 2-wire standard POTS interfaces

Functions, bottom plug

The Bottom Plug (BP) connects the following signals:

Aircraft Avionics Interfaces:

- 24 bit discrete hardwire strapped ICAO address
- Two high speed ARINC 429 Inertial Reference System (IRS) or
- Two high or low speed ARINC 429 Attitude and Heading Reference System (AHRS)
- Two high or low ARINC 429 Communication Management Units (ACARS/AFIS/CMU)
- Three high or low speed ARINC 429 MCDU (1 output, 2 inputs) or 1 high or low speed ARINC 429 AES ID input (ICAO address, for future use)
- Two Discrete inputs for “Weight On Wheels”
- Discrete Inputs/Outputs for WH-10/MagnaStar AIU control or Cockpit Voice

SATCOM Interfaces:

- One RS-422 SBU control interface
- One RS-422 Multi Control HPA Interface (Tx)
- One RS-422 BITE/Status HPA Interface (Rx)
- One Discrete HPA Remote nON/OFF output

Maintenance Interfaces:

- One Discrete SDU Hardware Reset

Handset interfaces (digital):

- Four RS-485 data interfaces for Thrane & Thrane Handsets

Other interfaces:

- Three Annunciators: #1 “Call”, #2 “Fax” and #3 “Service Available”
- Three ATE pins (Automatic Test Equipment) - **Do not connect!**

Pin-out for SDU rear receptacle (top plug)

Pin No.	Pin Name
TP A1	RF Rx input from power splitter
TP A2	RF Tx output to coupler (Coax)
TP A3.1	Tx + 10BaseT Ethernet (Swift64 MPDS)
TP A3.2	Rx + 10BaseT Ethernet (Swift64 MPDS)
TP A3.3	Tx - 10BaseT Ethernet (Swift64 MPDS)
TP A3.4	Rx - 10BaseT Ethernet (Swift64 MPDS)
TP A4	GPS/Antenna Modem Interface (Coax)
TP1	+28 V DC Power
TP2	GND, Power Return
TP3	Chassis Ground and Handset Power Return
TP4	+28 V DC/600 mA Handset Supply
TP5	Remote ON/OFF (nON)
TP6	2-Wire Voice/Fax/Modem #5 (Ring)
TP7	2-Wire Voice/Fax/Modem #6 (Ring)
TP8	2-Wire Voice/Fax/Modem #6 (Tip)
TP9	Not Connected
TP10	Handset #1 Audio In Hi / Cockpit Voice Audio #1 In Hi
TP11	Handset #1 Audio In Lo / Cockpit Voice Audio #1 In Lo
TP12	Handset #1 Audio Out Hi / Cockpit Voice Audio #1 Out Hi
TP13	Handset #1 Audio Out Lo / Cockpit Voice Audio #1 Out Lo
TP14	Not Connected
TP15	Handset #2 Audio In Hi / Cockpit Voice Audio #2 In Hi

Pin No.	Pin Name
TP16	Handset #2 Audio In Lo / Cockpit Voice Audio #2 In Lo
TP17	Handset #2 Audio Out Hi / Cockpit Voice Audio #2 Out Hi
TP18	Handset #2 Audio Out Lo / Cockpit Voice Audio #2 Out Lo
TP19	2-Wire Voice/Fax/Modem #5 (Tip)
TP20	AGND
TP21	Handset #3 Audio In Hi
TP22	Handset #3 audio In Lo
TP23	Handset #3 audio Out Hi
TP24	Handset #3 audio Out Lo
TP25	Do not connect! (+12 V DC / 25 mA)
TP26	Handset #4 audio In Hi
TP27	Handset #4 audio In Lo
TP28	Handset #4 audio Out Hi
TP29	Handset #4 audio Out Lo

Table 4-2: Pin-out for SDU Rear Receptacle (Top Plug)

Pin-out for SDU rear receptacle (bottom plug)

Pin No.	Pin Name
BP1	ICAO Address Bit #1 (MSB)
BP2	ICAO Address Bit #2
BP3	ICAO Address Bit #3
BP4	ICAO Address Bit #4
BP5	ICAO Address Bit #5
BP6	ICAO Address Bit #6
BP7	ICAO Address Bit #7
BP8	ICAO Address Bit #8
BP9	ICAO Address Bit #9
BP10	ICAO Address Bit #10
BP11	ICAO Address Bit #11
BP12	ICAO Address Bit #12
BP13	ICAO Address Bit #13
BP14	ICAO Address Bit #14
BP15	ICAO Address Bit #15
BP16	ICAO Address Bit #16
BP17	ICAO Address Bit #17
BP18	ICAO Address Bit #18
BP19	ICAO Address Bit #19
BP20	ICAO Address Bit #20
BP21	ICAO Address Bit #21
BP22	ICAO Address Bit #22
BP23	ICAO Address Bit #23
BP24	ICAO Address Bit #24
BP25	ICAO Address Common
BP26	Data from primary IRS 429 A / Data from primary AHRS 429 A

Pin No.	Pin Name
BP27	Data from primary IRS 429 B / Data from primary AHRS 429 B
BP28	Data from second IRS 429 A / Data from second AHRS 429 A
BP29	Data from second. IRS 429 B / Data from second AHRS 429 B
BP30	Data bus from MCDU #2/ AES ID input 429 A (future use)
BP31	Data bus from MCDU #2/ AES ID input 429 B (future use)
BP32	Spare #1 429 A
BP33	Spare #1 429 B
BP34	Spare #1 429 A
BP35	Spare #1 429 B
BP36	Spare #2 429 A
BP37	Spare #2 429 B
BP38	Spare #2 429 A
BP39	Spare #2 429 B
BP40	Data bus from ACARS / AFIS / CMU #1 429 A
BP41	Data bus from ACARS / AFIS / CMU #1 429 B
BP42	Data bus to ACARS / AFIS / CMU #1 & #2 429 A
BP43	Data bus to ACARS / AFIS / CMU #1 & #2 429 B
BP44	Data bus from ACARS / AFIS / CMU #2 429 A
BP45	Data bus from ACARS / AFIS / CMU #2 429 B

Pin No.	Pin Name
BP46	Data bus from MCDU #1 429 A
BP47	Data bus from MCDU #1 429 B
BP48	Data bus to MCDU #1 & #2 429 A
BP49	Data bus to MCDU #1 & #2 429 B
BP50	Reserved for Weight-On-Wheels Input #1
BP51	Reserved for Weight-On-Wheels Input #2
BP52	CP Voice Chime Signal Contact #1; Current from Chime
BP53	CP Voice Chime Signal Contact #2; Current to Chime
BP54	MagnaStar/ICS-200: Satcom Service Unavailable
BP55	WH-10/MagnaStar Hook switch #3 or ICS-200 Ringer Input #3
BP56	SBU Enable output
BP57	HPA remote nON/OFF output
BP58	**Spare** TxD-B RS-422 (I)
BP59	**Spare** TxD-A RS-422 (I)
BP60	**Spare** RxD-B RS-422 (O)
BP61	**Spare** RxD-A RS-422 (O)
BP62	**Spare** RTS-B RS-422 (I)
BP63	**Spare** RTS-A RS-422 (I)
BP64	**Spare** CTS-B RS-422 (O)
BP65	**Spare** CTS-A RS-422 (O)
BP66	ISDN RxP (c)
BP67	ISDN TxP (d)
BP68	ISDN TxN (e)
BP69	ISDN RxN (f)
BP70	Data bus output to SBU; Output B, RS-422

Pin No.	Pin Name
BP71	Data bus output to SBU; Output A, RS-422
BP72	Data bus input from SBU; Input B, RS-422
BP73	Data bus input from SBU; Input A, RS-422
BP74	ATE 1 **Do not connect!**
BP75	ATE 2 **Do not connect!**
BP76	ATE 3 **Do not connect!**
BP77	SDU Reset, Active Low
BP78	HPA Control Output A, RS-422
BP79	HPA Control Output B, RS-422
BP80	HPA Data/BITE Input A, RS-422
BP81	HPA Data/BITE Input B, RS-422
BP82	WH-10/MagnaStar Hook Switch #1 or ICS-200 Ringer Input #1 or CP Voice Call Cancel Input #1 (Discrete I)
BP83	WH-10/MagnaStar Ringer Output A1 or ICS-200 Hook Switch Output #1 or CP Voice Mic On Input #1 (Discrete I/O)
BP84	WH-10/MagnaStar Ringer Output B1 or CP Voice Call Light Output #1 (Discrete O)
BP85	WH-10/MagnaStar Hook Switch #2 or ICS-200 Ringer Input #2 or CP Voice Call Cancel Input #2 (Discrete I)
BP86	WH-10/MagnaStar Ringer Output A2 or ICS-200 Hook Switch Output #2 or CP Voice Mic On Input #2 (Discrete I/O)
BP87	WH-10/MagnaStar Ringer Output B2 or CP Voice Call Light Output #2 (Discrete O)
BP88	Chime/ Lamps Inhibit Input (Discrete I)
BP89	WH-10/MagnaStar Ringer Output A3 or ICS-200 Hook Switch Output #3 or Annunciator #3 (Discrete I/O)
BP90	WH-10/MagnaStar Ringer Output B3

Pin No.	Pin Name
BP91	CP Voice Chime Reset Input #1 (Discrete I)
BP92	Annunciator #1 (Discrete I/O)
BP93	Annunciator #2 (Discrete Output)
BP94	4-Wire Handset #1 RS-485 Data A
BP95	4-Wire Handset #1 RS-485 Data B
BP96	4-Wire Handset #2 RS-485 Data A
BP97	4-Wire Handset #2 RS-485 Data B
BP98	4-Wire Handset #3 RS-485 Data A
BP99	4-Wire Handset #3 RS-485 Data B
BP100	4-Wire Handset #4 RS-485 Data A
BP101	4-Wire Handset #4 RS-485 Data B
BP102	**Spare** DTR-B RS-422 (I)
BP103	**Spare** DTR-A RS-422 (I)
BP104	**Spare** DCD-B RS-422 (O)
BP105	**Spare** DCD-A RS-422 (O)
BP106	Port 1 GND

Table 4-3: Pin-out for SDU Rear Receptacle (Bottom Plug)

4.2 TT-5014A High Power Amplifier

4.2.1 HPA rear receptacle

The HPA has one connector: An ARINC 404, shell size 2, rear receptacle, used for connection to the antenna system and the SDU.

Connector drawing

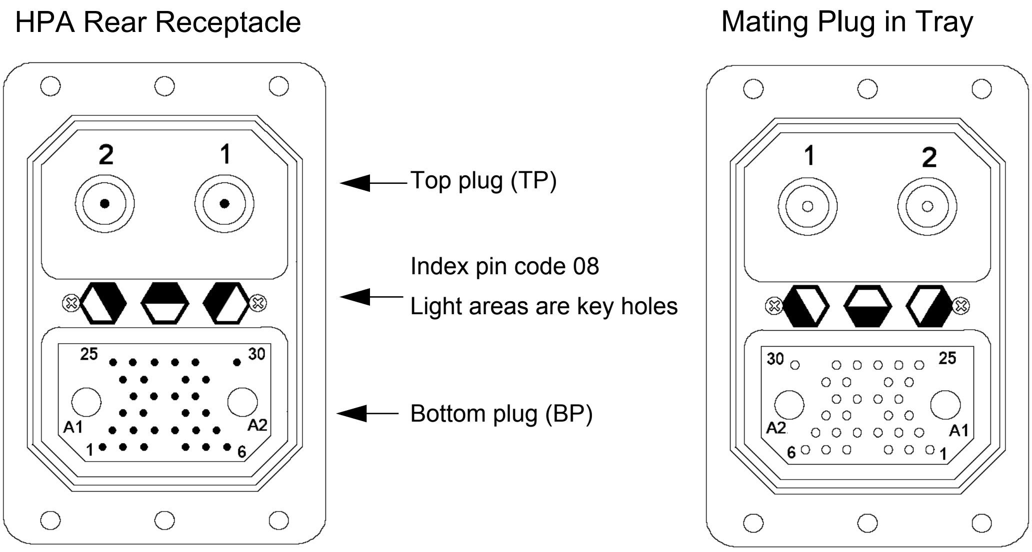


Figure 4-3: HPA Receptacle, Face View of Engaging End. Index Code is 08

Functions

The **Top Plug** connects the following signals:

- RF Tx signal to DLNA
- RF Tx signal from SDU

The **Bottom Plug** connects the following signals:

- +28 V DC Power (Aircraft Power Bus)
- Chassis ground
- ARINC 429 Tx and Rx connections for interfacing to ARINC 741 antennas
- Remote ON/OFF (nON) from SDU
- RS-422 data interface to SDU

Pin-out for HPA receptacle

Top Pin	Pin Name
TP1	RF Tx output to DLNA
TP2	RF Tx input from coupler

Table 4-4: Pin-out for HPA Receptacle (Top Plug)

Bottom Pin	Pin Name
BP A1	+28 V DC Power
BP A2	GND, Power Return
BP1	ATE 1 **Do not connect!**
BP2	ATE 2 **Do not connect!**
BP3	ATE 3 **Do not connect!**
BP4	ATE 4 **Do not connect!**
BP5	Spare
BP6	nON
BP7	Spare
BP8	A429 Tx1 A
BP9	A429 Tx1 B
BP10	A429 Tx2 A
BP11	A429 Tx2 B
BP12	Spare
BP13	A429 Rx1 A
BP14	A429 Rx1 B
BP15	A429 Rx2 A
BP16	A429 Rx2 B

Bottom Pin	Pin Name
BP17	HPA Mute 1 A
BP18	HPA Mute 1 B
BP19	HPA Mute 2 A
BP20	HPA Mute 2 B
BP21	Spare
BP22	Spare
BP23	Spare
BP24	Spare
BP25	RS-422 Tx A, HPA Data/BITE Output A, from HPA to SDU
BP26	RS-422 Tx B, HPA Data/BITE Output B, from HPA to SDU
BP27	RS-422 Rx A, HPA Control Input A, from SDU to HPA
BP28	RS-422 Rx B, HPA Control Input B, from SDU to HPA
BP29	Spare
BP30	Chassis

Table 4-5: Pin-out for HPA Receptacle (Bottom Plug)

4.3 TT-5040A SBU

The TT-5040A SBU provides interfaces for configuration, Aircraft and satcom interconnections and for the CM.

4.3.1 Connectors on SBU

There are three connectors on the SBU:

- SBU Maintenance connector (front):
  Interface to PC for configuration and maintenance purposes.
  A 10/100BaseT Ethernet connector with two LED indicators, RJ45 female.
- SBU rear receptacle (top plug and bottom plug):
  Interface to Aircraft and satcom interconnections.
  An ARINC 404 Shell Size 2 Receptacle.
- Connector for CM (rear, inside connector):
  Internal connector used only as interface to the CM.
  A female 9-pin Sub-D Connector.

4.3.2 SBU Maintenance connector

Connector drawing

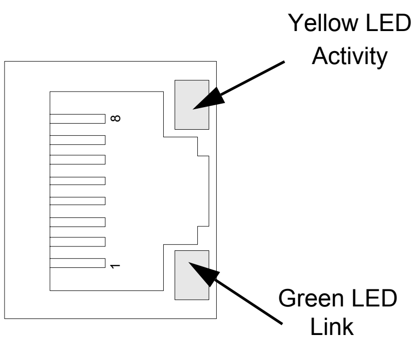


Figure 4-4: SBU Maintenance connector, face view of engaging end

Connector functions

The front Maintenance interface is 10/100BaseT Ethernet, IEEE802.3.

Use this interface for the following purposes:

- AVIATOR 700 system configuration
- Maintenance
- System software upgrade

Important For systems without the Built-in Router option enabled, i.e. the basic version or the version with Wireless option: To use the SBU Maintenance connector disconnect or switch off any PC connected to another LAN interface of the SBU.

Use a standard straight network cable.

For instructions how to configure the AVIATOR 700 system see ***SBU Configuration tasks*** on page 6-13.

Pin-out for SBU Maintenance connector

Pin no.	Pin Name
FP1	TxD+ input
FP2	TxD- input
FP3	RxD+ output
FP4	Not Used
FP5	Not Used
FP6	RxD- output
FP7	Not Used
FP8	Not Used

Table 4-6: Pin-out for SBU Maintenance connector (standard Ethernet)

4.3.3 SBU rear receptacle

Connector drawing

The following drawing shows the SBU rear receptacle and mating plug.

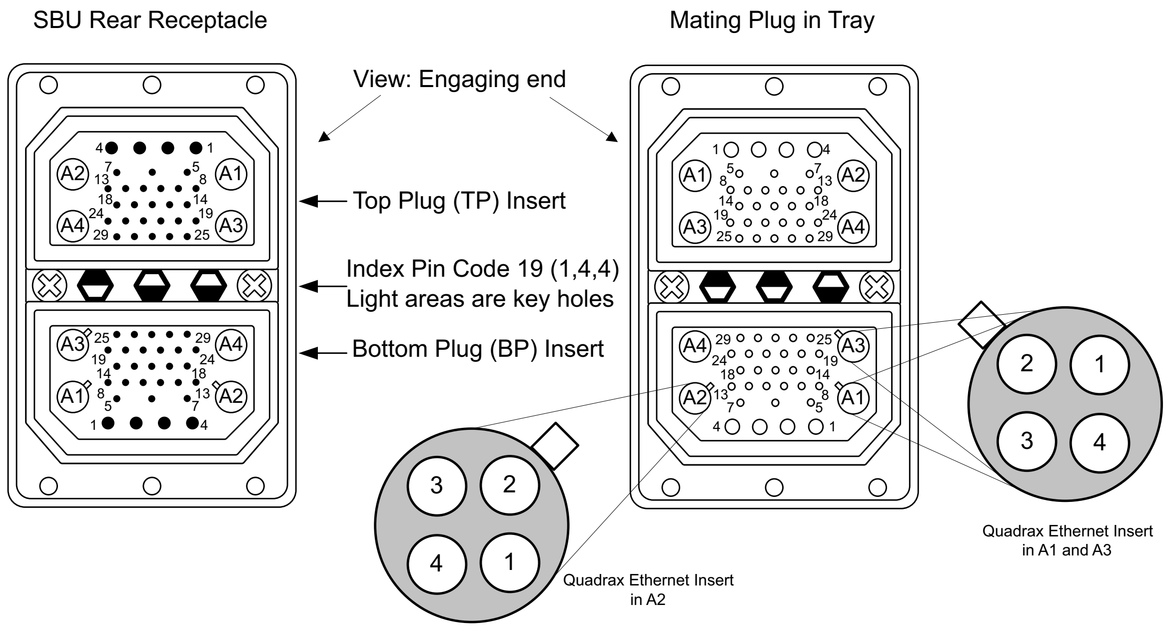


Figure 4-5: SBU rear receptacle, engaging end (Index code: 19)

Connector drawing with functions

The following drawing shows the SBU rear receptacle with pin functions. For wiring details of this interface see ***Electrical installation and wiring*** on page 5-10.

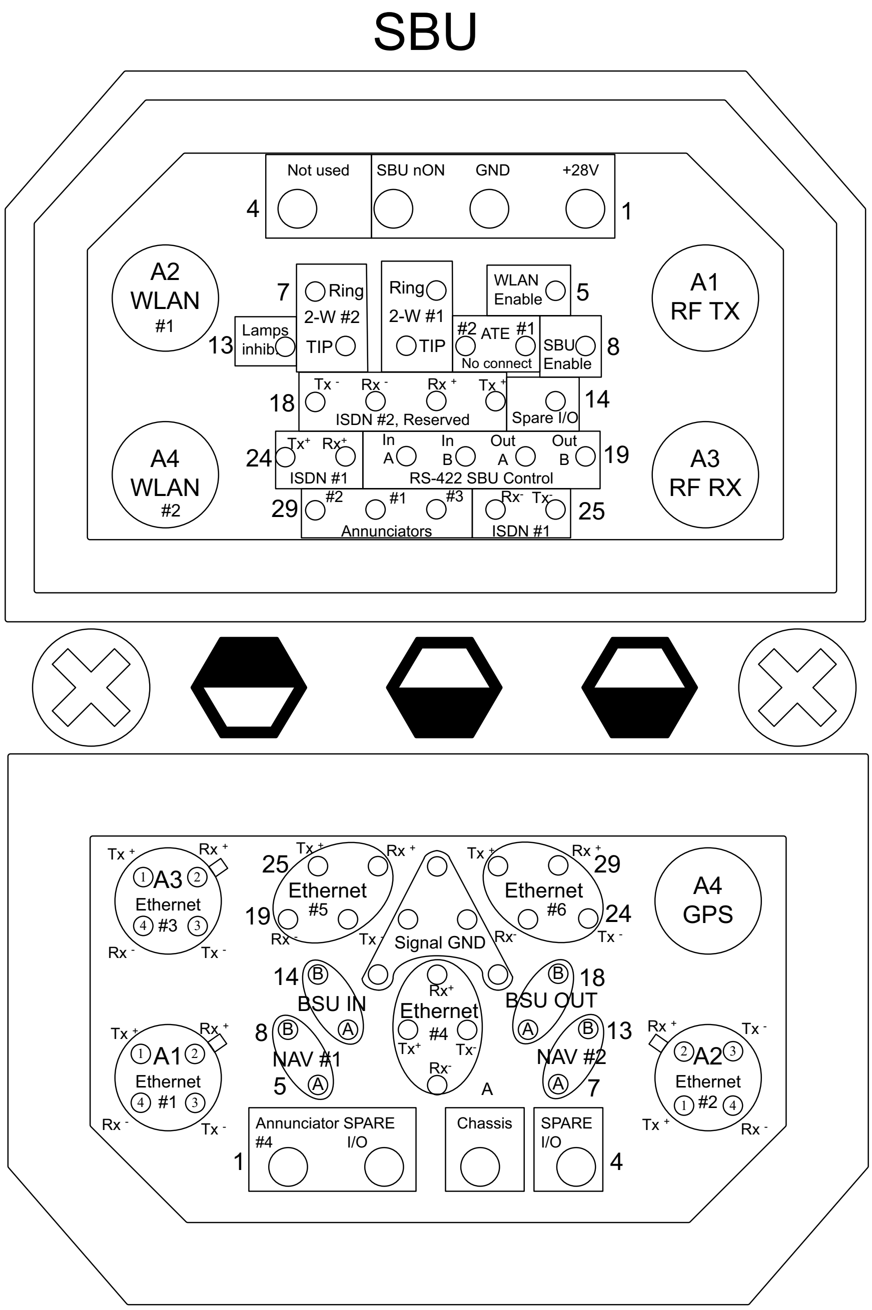


Figure 4-6: SBU rear receptacle with pin functions

Connector functions, top plug

The top plug of the SBU rear receptacle connects the following signals:

Power & RF Interfaces:

- +28 V DC and GND, Power return
- RF Tx signal to 405038A-002 HSU Tx Coupler
- RF Rx signal from 405038A-003 HSU Rx Power Splitter
- Two RF WLAN antenna connectors (2.4 GHz)

User Interfaces:

- One ISDN, 4-wire connection
- Two analogue 2-wire standard POTS interfaces for Voice/Fax/Modem/secure voice

Control & Maintenance Interfaces:

- RS-422 SBU Control Interface
- Discrete SBU nON input
- Discrete SBU Enable input
- Discrete WLAN Enable input
- Discrete Chime/Lamps Inhibit Input
- 4 configurable Annunciators: #1 (“Incoming call”), #2 (“SBU Failed”) and #3 (“Service Available”), #4 (“Message received)
- Two ATE Discrete inputs for factory use - **Do not connect**
- One Discrete Spare I/O
- ISDN #2, Reserved - **Do not connect**

Connector functions, bottom plug

The bottom plug of the SBU rear receptacle connects the following signals:

Power & RF Interfaces:

- GPS antenna input
- Chassis ground

User Interfaces:

- Six 10/100BaseT Ethernet

Aircraft interfaces:

- Two high or low speed ARINC 429 navigational input

Control & Maintenance Interfaces:

- Two Discrete Spare I/O
- 1 Discrete Output: Message received

Pin-out for SBU rear receptacle (top plug)

Pin	Function
TP A1	RF TX output to 405038A-002 HSU TX Coupler
TP A2	WLAN antenna #1 (coax)
TP A3	RF RX input from 405038A-003 HSU RX Power Splitter
TP A4	WLAN antenna #2 (coax)
TP1	SBU +28 V DC Power
TP2	SBU GND, Power Return
TP3	SBU nON, Discrete Input
TP4	Not used
TP5	WLAN Enable, Discrete Input
TP6	2-Wire Voice/Fax/Modem #1 (Ring)
TP7	2-Wire Voice/Fax/Modem #2 (Ring)
TP8	SBU Enable, Discrete Input (active low)
TP9	ATE #1, for factory use - **Do not connect!**
TP10	ATE #2, for factory use - **Do not connect!**
TP11	2-Wire Voice/Fax/Modem #1 (Tip)
TP12	2-Wire Voice/Fax/Modem #2 (Tip)
TP13	Chime/Lamps Inhibit Input, (Discrete I/O)
TP14	Spare I/O, (Discrete I/O)
TP15	ISDN #2 Tx+ (c) output (TE) **Do not connect!**
TP16	ISDN #2 Rx+ (d) input (TE) **Do not connect!**
TP17	ISDN #2 Rx- (e) input (TE) **Do not connect!**
TP18	ISDN #2 Tx- (f) output (TE) **Do not connect!**
TP19	Data bus output to SDU; Output B, RS-422
TP20	Data bus output to SDU; Output A, RS-422
TP21	Data bus input from SDU; Input B, RS-422
TP22	Data bus input from SDU; Input A, RS-422
TP23	ISDN #1 Rx+ (c) input (NT)
TP24	ISDN #1 Tx+ (d) output (NT)
TP25	ISDN #1 Tx- (e) output (NT)
TP26	ISDN #1 Rx- (f) input (NT)
TP27	Annunciator #3, (Discrete I/O, Service available)
TP28	Annunciator #1, (Discrete I/O, Incoming call)
TP29	Annunciator #2, (Discrete I/O, SBU fail)

Table 4-7: Pin-out for SBU rear receptacle, top plug

Pin-out for SBU rear receptacle (bottom plug)

Pin no.	Pin name
BP A1.1	Tx+ 10/100BaseT Ethernet #1 (Quadrax pin 1, Input)
BP A1.2	Rx+ 10/100BaseT Ethernet #1 (Quadrax pin 2, Output)
BP A1.3	Tx- 10/100BaseT Ethernet #1 (Quadrax pin 3, Input)
BP A1.4	Rx- 10/100BaseT Ethernet #1 (Quadrax pin 4, Output)
BP A2.1	Tx+ 10/100BaseT Ethernet #2 (Quadrax pin 1, Input)
BP A2.2	Rx+ 10/100BaseT Ethernet #2 (Quadrax pin 2, Output)
BP A2.3	Tx- 10/100BaseT Ethernet #2 (Quadrax pin 3, Input)
BP A2.4	Rx- 10/100BaseT Ethernet #2 (Quadrax pin 4, Output)
BP A3.1	Tx+ 10/100BaseT Ethernet #3 (Quadrax pin 1, Input)
BP A3.2	Rx+ 10/100BaseT Ethernet #3 (Quadrax pin 2, Output)
BP A3.3	Tx- 10/100BaseT Ethernet #3 (Quadrax pin 3, Input)
BP A3.4	Rx- 10/100BaseT Ethernet #3 (Quadrax pin 4, Output)
BP A4	GPS antenna input (coax), Modem, DC out (SBU stand-alone)
BP1	Annunciator #4 (Discrete I/O, Message received)
BP2	Spare I/O, (Discrete I/O)
BP3	SBU Chassis Ground
BP4	Spare I/O, (Discrete I/O)
BP5	Data from primary ARINC429 navigational input, A
BP6	Rx- 10/100BaseT Ethernet #4, (Output)
BP7	Data from secondary ARINC429 navigational input, A
BP8	Data from primary ARINC429 navigational input, B
BP9	Data from BSU, reserved, ARINC 429 A
BP10	Tx+ 10/100BaseT Ethernet #4, (Input)
BP11	Tx- 10/100BaseT Ethernet #4, (Input)
BP12	Data to BSU, reserved, ARINC 429 A
BP13	Data from secondary ARINC429 navigational input, B
BP14	Data from BSU, reserved, ARINC 429 B
BP15	Common Signal GND for Ethernet
BP16	Rx+ 10/100BaseT Ethernet #4, (Output)
BP17	Common Signal GND for Ethernet
BP18	Data to BSU, reserved, ARINC 429 B
BP19	Rx- 10/100BaseT Ethernet #5, (Output)
BP20	Tx- 10/100BaseT Ethernet #5, (Input)
BP21	Common Signal GND for Ethernet
BP22	Common Signal GND for Ethernet
BP23	Rx- 10/100BaseT Ethernet #6, (Output)
BP24	Tx- 10/100BaseT Ethernet #6, (Input)
BP25	Tx+ 10/100BaseT Ethernet #5, (Input)
BP26	Rx+ 10/100BaseT Ethernet #5, (Output)
BP27	Common Signal GND for Ethernet
BP28	Tx+ 10/100BaseT Ethernet #6, (Input)
BP29	Rx+ 10/100BaseT Ethernet #6, (Output)

Table 4-8: Pin-out for SBU rear receptacle, bottom plug

4.4 Cradle connectors

4.4.1 Connectors on 4-Wire Cradle

There are four connectors on the 4-Wire Cradle, two on the side of the cradle and two at the end:

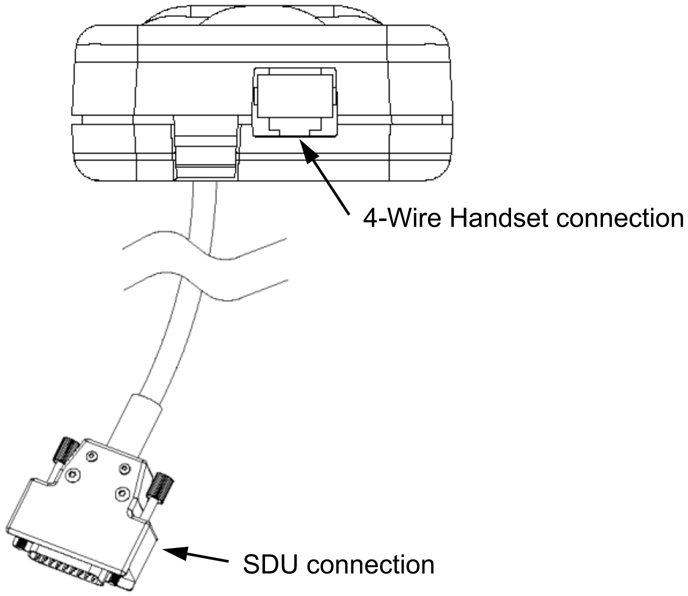


Figure 4-7: 4-Wire Cradle Connectors, End View of Cradle

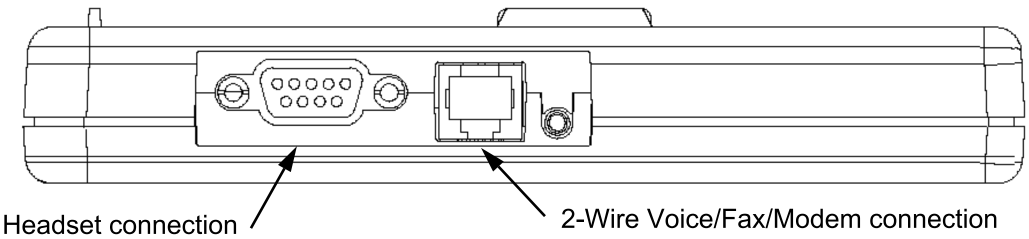


Figure 4-8: 4-Wire Cradle Connectors, Side View of Cradle

4.4.2 4-wire connector to SDU

Connector drawing

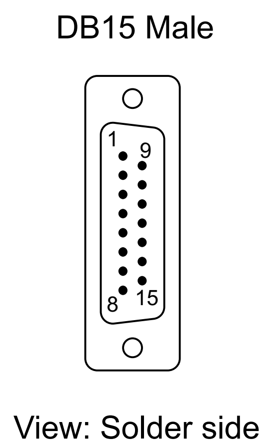


Figure 4-9: 4-Wire Cradle Connector (DB15M). View: Solder Side

Functions

The 15 pin Sub-D male connector on the short cable at the end of the 4-Wire Cradle connects the following signals on the SDU:

Handset interface (analog):

- analog 4-wire interface (including +28 V DC Handset supply)

Handset interface (digital):

- RS-485 data interface

Voice/Fax/Modem interface:

- Voice/Fax/Modem/STU-III, analog 2-wire standard POTS interface

OR

Maintenance handset interface:

- Maintenance 4-wire handset connection to SDU front connector

Pin-out for DB15 connector

The 4-Wire Cradle connector for connection to the SDU has the following pin-out:

Pin	Function
1	2-Wire Tip (Fax/PC_modem/Auxiliary)
2	2-Wire Ring (Fax/PC_modem/Auxiliary)
3	GND
4	+28 V DC
5	GND, Power Return
6	SDU Audio in +
7	SDU Audio in -

Pin	Function
8	GND
9	GND
10	RS-485 Data A
11	RS-485 Data B
12	GND
13	SDU Audio out +
14	SDU Audio out -
15	NC

Table 4-9: Pin-out for 15 Pin Sub-D Male Connector on short cable in 4-Wire Cradle

4.4.3 Connectors on 2-Wire Cradle

There are three connectors on the 2-Wire Cradle, one at the side and two at the end:

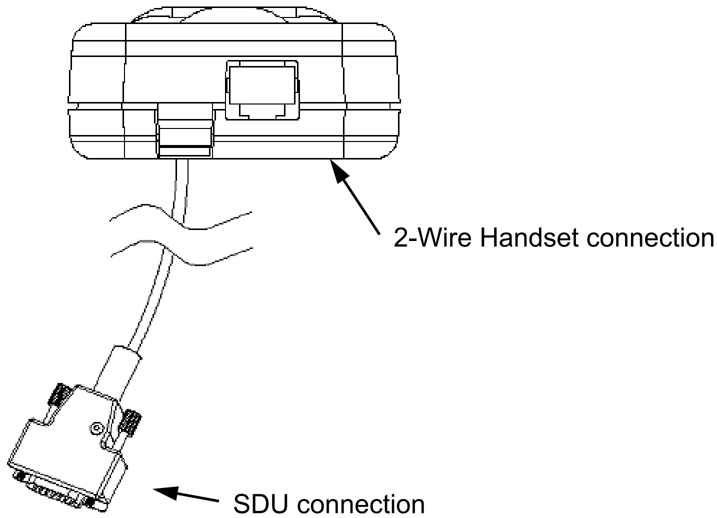


Figure 4-10: 2-Wire Cradle connectors, end view of cradle

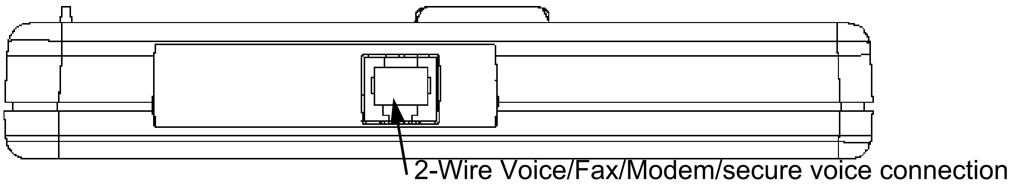


Figure 4-11: TT-5622B 2-Wire Cradle connectors, side view of cradle

4.4.4 2-Wire Cradle connector to SDU or SBU

Connector drawing

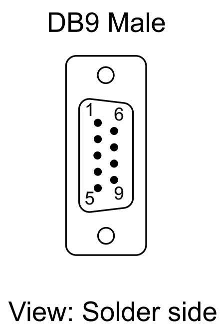


Figure 4-12: 2-Wire Cradle connector (DB9M). View: Solder side

Connector functions

The 9 pin Sub-D male connector on the short cable at the end of the 2-Wire Cradle connects the following signals on the SDU or SBU:

- Analogue 2-wire standard POTS interface for Voice/Fax/Modem/secure voice.

Pin-out for 2-Wire Cradle connector to SBU

The 2-Wire Cradle connector to connect to the SDU has the following pin-out:

Pin	Function
1	Auxiliary Tip
2	Auxiliary Ring
3	Shield
4	Not connected
5	Not connected
6	Not connected
7	Not connected
8	Not connected
9	Not connected

Table 4-10: Pin-out for 9 pin Sub-D male connector in TT-5622B 2-Wire Cradle

The other two connectors are standard POTS RJ11 connectors.

4.5 Mating connectors in aircraft

4.5.1 Connection with SDU

The installation requires the following mating connectors in the aircraft. Note that the SDU tray holds the mating connector for the SDU rear connector.

Connector	Mating Connector Type
Front Panel Connector	15 pin SUB-D male
Rear Connector	ARINC 404 shell size 2 plug with the following contact arrangements: Insert A (Top Plug): 33C4 • 4 #16 pin socket contacts • 25 #20HD socket contacts • 3 #5 coax socket contacts • 1 #5 Quadrax socket contact Insert B (Bottom Plug): 106 • 106 #22 pin contacts ITT Cannon Part number DPX2NA-67322-463

Table 4-11: Mating Connectors in Aircraft for SDU

4.5.2 Connection with HPA

The installation tray for the HPA is equipped with the following connector:

Connector	Mating Connector Type
Rear Connector	ARINC 404 shell size 2 plug with the following contact arrangements: Insert A (Top Plug): MC2 • 2 #1 coax socket contacts for RG142B Insert B (Bottom Plug): 32C2 • 2 #5 socket contacts for AWG 8-10 • 30 #20 HD socket contacts for AWG 20-24 Radiall part number 616 697 173

Table 4-12: Mating Connector in Aircraft for HPA

4.5.3 Connection with SBU

Note that the SBU tray holds the mating connector for the SBU rear connector.

Connector	Mating connector type
SBU Maintenance connector (on front panel)	RJ45 male
SBU rear receptacle (rear connector in the SBU tray)	ARINC 404 shell size 2 plug with the following contact arrangements: Insert A (Top Plug): 33C4 • 4 #16 socket contacts • 25 #20 socket contacts • 4 #5 coax sockets Insert B (Bottom Plug): 33C4 • 4 #16 socket contacts • 25 #20 socket contacts • 1 #5 coax sockets • 3 #5 quadrax sockets Part number DPX2NA-67322-500

Table 4-13: Mating connectors in aircraft for SBU

Size 5 coax contacts fit for cable type RG-142. For other cable types you must order suitable contact inserts. For part numbers see Table 5-61 on page 88 and Table 5-62 on page 88.

Installation

5.1 General installation information

5.1.1 Overview

This chapter contains considerations and recommendations for installation of the AVIATOR 700 System. Interconnect harness wiring and physical mounting must satisfy all applicable regulations.

Note: Installation kits including wiring can be obtained through ECS (Electronic Cable Specialists, Inc.) or EMTEQ Inc. For details and order numbers see ***Installation kits*** on page 2-14.

For installation kits for the AVIATOR 700 system contact:

ECS, a Carlisle IT company, USA	**EMTEQ Inc., USA**
Phone: +1 414-421-5300	Phone: +1 262-679-6170 or +1 888-679-6170
E-mail: sales@ecsdirect.com	E-mail: sales@emteq.com
Home page: www.ecsdirect.com	Home page: www.emteq.com

The Installation chapter is organized in the following sections:

- ***Mounting considerations***.
  This section provides guidelines for the mechanical installation of the units in the AVIATOR 700 system.
- ***Electrical installation and wiring***.
  This section provides wiring drawings and guidelines for the electrical installation of the AVIATOR 700 system. It also lists the requirements to the cables.
- ***Recommended cables***.
  This section provides lists of recommended cables and maximum cable lengths.
- ***Activation of airtime services***
  This section provides information how to activate airtime service and details about the system's SIM card.

The information, drawings and wiring diagrams contained in this manual are intended as a reference for engineering planning only. The drawings and wiring diagrams contained herein do not represent any specific STC. It is the installer's responsibility to compose installation drawings specific to the aircraft. This manual and the drawings and wiring diagrams contained herein may not be used as a substitute for an STC.

Note: To ensure optimal performance from the AVIATOR 700 system, you must maintain strict adherence to the installation guidelines in this chapter.

5.1.2 Minimum system components

A minimum working system has at least:

- one TT-5035A SDU
- one TT-5035A-001 CM
- one TT-5014A HPA
- one TT-5040A SBU
- one TT-5040A-001 CM
- one TT-5040A-005 SDU to SBU Software interface
- one TT-5038A-002 Tx Coupler
- one TT-5038A-003 Rx Power Splitter
- one handset and cradle, e.g. a TT-5620A 4-Wire Handset and a TT-5622A 4-Wire Cradle (optional)
- one antenna system with DNLA type F. As antenna system, use either an ARINC 741 or ARINC 781 compatible system or an HGA-6000, HGA-6500. HGA-7000, HGA-8000 antenna system or AMT50.

The following drawing shows the minimum installation required in the AVIATOR 700 system.

Minimum system drawing

This drawing is an overview of which units to connect as a minimum.

Note For information on other satcom antenna types supported and wiring of the individual antenna types, refer to the appropriate section of ***Electrical installation and wiring*** on page 5-10 and onwards.

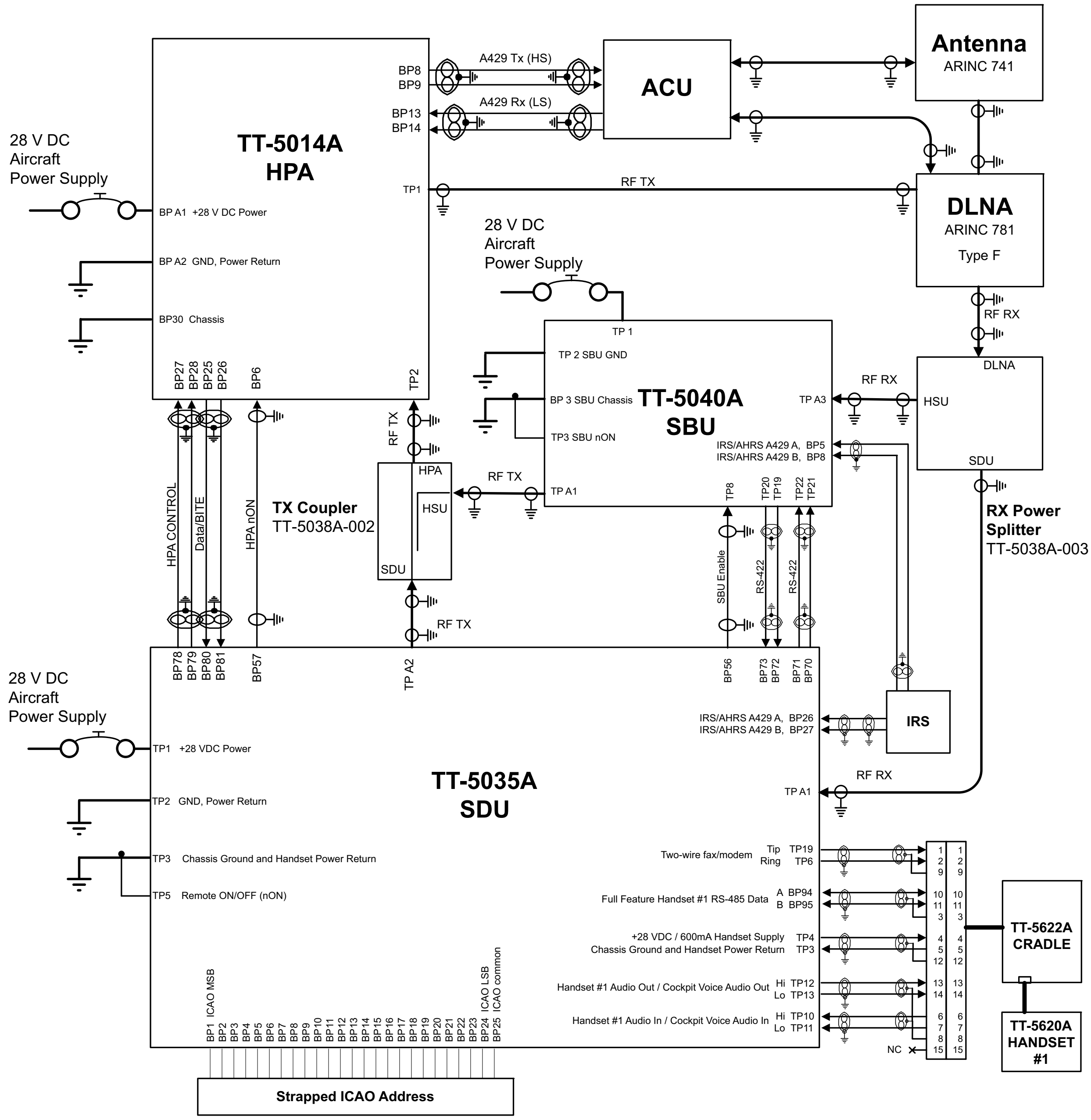


Figure 5-1: AVIATOR 700 minimum system

For navigational input we recommend to use input from an IRS/AHRS navigation system.

Note This example includes an ARINC 741 antenna system, but the antenna system may as well be e.g. an ARINC 781 system or an HGA-7000 antenna.

Note For easy access to the system configuration and troubleshooting it is recommended to connect a Thrane & Thrane 4-Wire Handset.

5.1.3 Upgrading your installation from Aero-HSD$^+$ to AVIATOR 700

The Aero-HSD+ system can be upgraded to an AVIATOR 700 system. To make the upgrade you replace the HSU with an SBU. The upgrade procedure is described in detail in the appendix ***Upgrade from Aero-HSD+ to AVIATOR 700*** on page C-1.

5.2 Mounting considerations

5.2.1 Overview

For optimum system performance, some guidelines on where to install or mount the components of the AVIATOR 700 system must be followed. Mounting and placement details are included in this section.

For information on requirements to cables, see the individual sections in ***Electrical installation and wiring*** on page 5-10. For information on recommended cable types and lengths, see ***Recommended cables*** on page 5-85.

Note When mounting the units, allow enough space to provide a sufficient bend radius for the cables. See the cable data sheet for minimum bend radius.

5.2.2 SDU

Forced cooling is not required and not recommended.

- Installation in temperature controlled areas and inside or outside pressurized locations (e.g. avionics bay).
- Mount the SDU where the cooling air holes are not blocked. Note that cooling air holes in the SDU are placed outside the recommended area for ARINC 404A 3/8 ATR short units.
- Mount the SDU in an ARINC 404A 3/8 ATR short tray with oval cut-out as shown in **Figure 3-16: Outline Drawing: Tray for SDU and HPA.**
- AVIATOR 700D**: For safety reasons do not install the 4-wire handset in the cabin.** see also ***Wiring safety interfaces*** on page 2-2. Control of the AVIATOR 700D system is done with the MCDU or via the 4-wire handset installed in the cockpit. It is possible to log-off the AVIATOR 700D system or change the satellite etc. using the 4-wire handset. Hereby it is possible to disable the cockpit Data2 functionality using the 4-wire handset.

5.2.3 SBU

Forced cooling is not required and not recommended.

- Installation in temperature controlled areas and inside or outside pressurized locations (e.g. avionics bay).
- Mount the SBU in an ARINC 404A 1/4 ATR short tray as shown in **Figure 3-13: Outline drawing: SBU tray: ECS PO299-101** or see ***SBU trays*** on page 3-14 for allowed SBU trays.

5.2.4 Rx Power Splitter

If the Rx Power Splitter is to be mounted on a flat surface, mount it on a 3 mm mounting plate to provide enough space for mounting of the connectors.

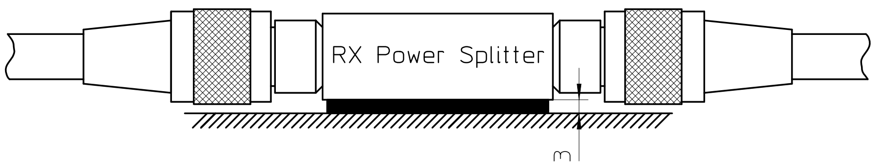


Figure 5-2: Mounting the Rx Power Splitter

5.2.5 HPA

The HPA can be installed in a non-temperature controlled area.

The HPA is designed with built-in forced cooling (fans).
Internal temperature monitoring prevents damage caused by overheating.

Important Respect the minimum clearance of 25 mm from top and bottom.

- Mount the HPA vertically on a panel to ensure maximum cooling. Mount the HPA in an ARINC 404A 3/8 ATR short tray with oval cut-out as shown in **Figure 3-16: Outline Drawing: Tray for SDU and HPA.**
- Install the HPA as close to the DLNA as possible.
  The cable between the HPA and the DLNA must be a special low-loss coax cable. See ***Wiring the satcom antenna*** on page 5-18 and the wiring drawings on page 19 and page 26.

5.2.6 Satcom antenna

In order to steer the satcom antenna towards the satellite, the AVIATOR 700 system needs to know the position and attitude of the aircraft. Several methods are available to achieve this.

About satcom antenna steering

- **IRS**
  If IRS is used, the antenna positioning data is computed from the IRS data alone. All necessary data is available from the IRS. The IRS signal must be connected to both the SBU and the SDU.

- **AHRS & GPS**

  AHRS does not include all the necessary data, therefore a GPS RF signal must also be sent to the SBU/SDU. A GPS module is built into the SBU/SDU, it computes the necessary position and speed information.

  AHRS must be connected only to the SDU.

In case the HGA-7000 antenna is used, a GPS antenna is built into the antenna, and the GPS-RF signal can be fed to the SBU/SDU via the Chelton BSU. See Figure 5-10: ***Wiring HGA-7000 antenna system*** on page 5-29

If another satcom antenna is used, the GPS RF signal may be obtained from a GPS antenna already installed on the aircraft.

Satcom antenna types supported

For a list of satcom antenna types supported in the AVIATOR 700 system see ***Satcom antenna systems*** on page 2-8.The following satcom antenna types can be installed for the AVIATOR 700 system:

- ARINC 741 antenna
- ARINC 781 antenna

An AVIATOR 700 system must only be used with satcom antennas that have received type approval by Inmarsat.

Contact your Thrane & Thrane sales representative or see http://www.thrane.com/Aero/Products/ApprovedSatcomAntennas.aspx for a list of satcom antennas that have received Inmarsat type approval.

General mounting considerations

Refer to the satcom antenna manual for instructions and details on mounting the antenna. Make sure all requirements in the antenna mounting instructions are met.

Place the antenna with unobstructed view to the satellite.

WARNING! Keep a safety distance of minimum 90 cm (3 ft) for HGA to the antenna when the system is transmitting, unless the antenna manual or the specific system configuration presents different requirements. This safety distance ensures that a maximum radiation power density of maximum 10 W/m^2 is not exceeded (Recommended by the American National Standards Institute, ANSI/LEEE C95.1-1992).

Note: The antenna installation must be in accordance with the aircraft manufacturers requirements and/or FAA AC 43.13 - 1B/2A and approved by the appropriate Civil Aviation Authorities.

Distance between GPS or Glonass antenna and satcom antenna

Make sure the GPS or Glonass antenna is installed with sufficient distance to the satcom antenna. For requirements to the radiation distance, refer to the manual for the GPS or Glonass system.

Important However, always keep the following distances between the satcom antenna and the GPS or Glonass antenna:

- 5.1 m (200 inches)

If the existing GPS or Glonass antenna on board the aircraft does not provide sufficient filtering of the satcom antenna signal to give a usable GPS or Glonass signal, you must replace the existing GPS or Glonass antenna with a GPS or Glonass antenna that has a satcom filter.

Cables between TT-5014A HPA and satcom antenna

We recommend to keep the cable length as short as possible.

Do not bend the cables to a radius smaller than the minimum bend radius stated for the cables. For further information on cables, see ***Wiring the satcom antenna*** on page 5-18 and ***Recommended cables*** on page 5-85.

5.2.7 WLAN antennas

The recommended WLAN antenna to use with the AVIATOR 700 system is the TT5040A-004 Wireless Antenna. The WLAN antenna is PMA approved by VT Miltope (P/N 901167-2). You may also use other WLAN antennas approved for aeronautical use.

Note Thrane & Thrane recommends to use 2 WLAN antennas to get optimum performance on board.

1. Mount the WLAN-antennas in the aircraft cabin. Install the 2 WLAN antennas in the same plane (surface).
2. Install the two WLAN antennas with a distance of minimum 12.5 cm (5 inches) between the two antennas.
3. For optimum performance mount the two antennas at an angle of 90° to each other.

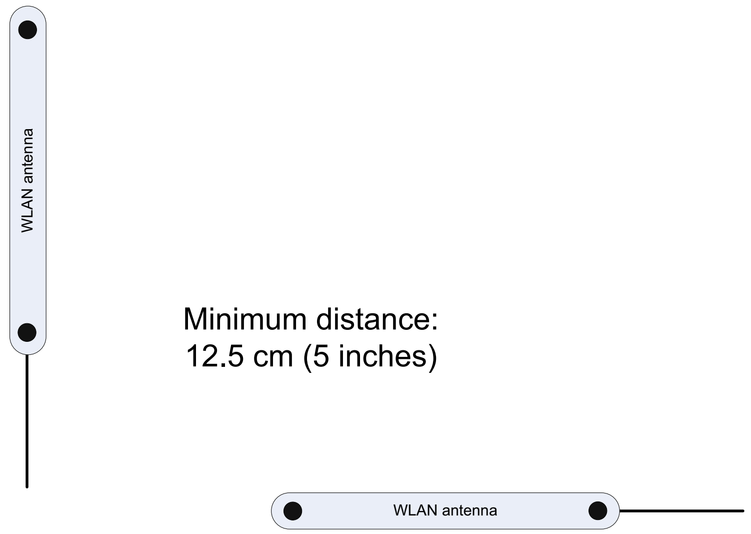


Figure 5-3: Mounting two WLAN antennas for optimum performance

Make sure the cable loss requirements are met, for further details see in the section ***Wiring WLAN antenna interface*** on page 5-44.

Operating with one WLAN antenna

You can also use a single WLAN antenna. For details how to wire a single WLAN antenna see ***Wiring WLAN antenna interface*** on page 5-44.

5.3 Electrical installation and wiring

5.3.1 Wiring symbols

Throughout the wiring section these common symbols are used:

 Coax

 Shield

 Ground (fuselage)

 Twisted

 Twisted and shielded

Important Each wiring drawing in this chapter only shows the connections referred to in that particular section. Other connections may be required for the system to work properly.

5.3.2 Wiring SDU to SBU

SDU pin	SBU pin	Description with reference to SDU
BP56	TP8	SBU Enable
BP73	TP20	Data bus input from SBU; Input A, RS422
BP72	TP19	Data bus input from SBU; Input B, RS422
BP71	TP22	Data bus output to SBU; Output A, RS422
BP70	TP21	Data bus output to SBU; Output B, RS422

Table 5-1: Pins for Wiring SDU to SBU

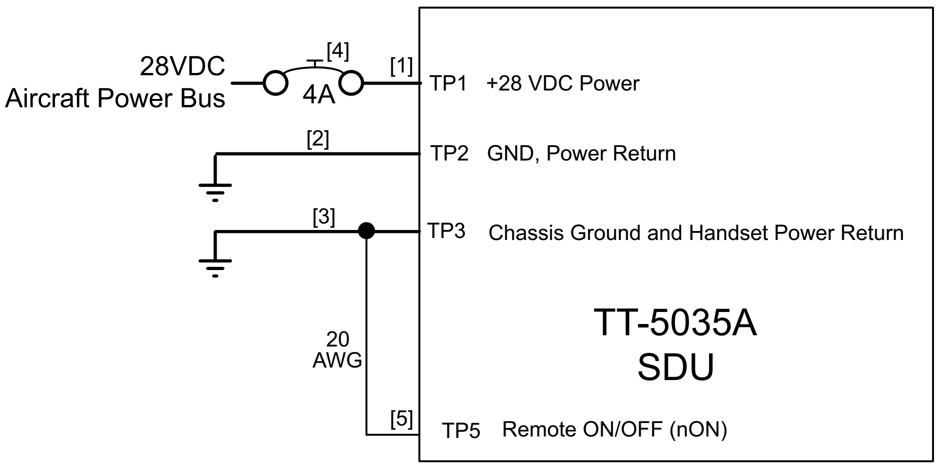
5.3.3 Wiring power supply

Important Do not use the same 20 A circuit breaker for both the HPA and the SDU/SBU. Use a separate circuit breaker for each unit as described in this section, and with the current rating stated here.

Wiring the Satellite Data Unit

The Aircraft Power Bus provides the electric power required to operate the SDU, and a chassis connection to the aircraft chassis and the installation tray. The +28 V DC Power wire must include a circuit breaker capable of carrying the required current continuously under the required environmental conditions.

The following drawing shows the wiring of the SDU power supply.
Requirements to the wiring are stated in the notes on the drawing and in the section ***Cable requirements, SDU power supply*** on page 5-13.



[1] Total resistance max. 200 m□ incl. Circuit Breaker.

[2] Total resistance max. 25 m□□.

[3] Directly to Aircraft chassis, max. 1 m cable length to prevent EMC problems and max. 25 m□

[4] Recommended circuit breaker: Klixon 2TC series, 4 A current rating

[5] If SATCOM On/Off switch is required, TP5 is routed to an external switch to ground

Figure 5-4: Wiring SDU power supply

Pins for SDU power supply

The following list shows the pins used for the SDU power supply.

SDU pin	Name	Description
TP1	+28 V DC Power	+28 V DC Power input from Aircraft power bus.
TP2	GND, Power Return	Aircraft Ground connection
TP3	Chassis Ground and Handset Power Return	Chassis connection, connected to installation tray and Aircraft chassis. Also used for handset power return.
TP5	Remote ON/OFF (nON)	Power On/Off for the SDU and handsets.

Table 5-2: Pins for SDU power supply

Description of SDU power supply

+28 V DC Power (TP1)

It is essential to keep the line impedance below the specified limits. See ***Cable requirements, SDU power supply*** on page 5-13.
Reverse polarity protection is only guaranteed if the suggested circuit breaker is used.

Required current capability for the Circuit Breaker: 48 W @ 17.3 V DC which equals 2.8 A DC at the required environmental conditions. A suitable circuit breaker would be **Klixon 2TC series** with 4 A current rating.

Important Use a separate 4 A circuit breaker for the SDU.

Chassis Ground / Handset Power Return (TP3)

The Chassis connection makes sure that the HPA cabinet and the installation tray has the same potential, and that there is a connection from the wiring shields to the cabinet for EMC purposes.

Connect the wire directly to the installation tray, and to aircraft chassis.

TP3 also connects to the Handset Power Return.

Remote On/Off (nON) input (TP5)

The nON input is used to turn the SDU on and off. Connection of this input to ground turns on the SDU and all units powered by the SDU.

The electrical specifications are defined like the discrete WOW input type. Please refer to ***Discrete type and description:*** on page 5-71.

Note that when you switch off the SDU, the SBU is indirectly also switched off.

Cable requirements, SDU power supply

Cable[a]	Max. Resistance	Other Requirements
[1] (+28 V DC)	200 mΩ, incl. circuit breaker	
[2] (GND, Power Return)	25 mΩ	The cable should be as short as possible.
[3] (Chassis Ground)	25 mΩ	Connect directly to aircraft chassis.

Table 5-3: Requirements to SDU power cables

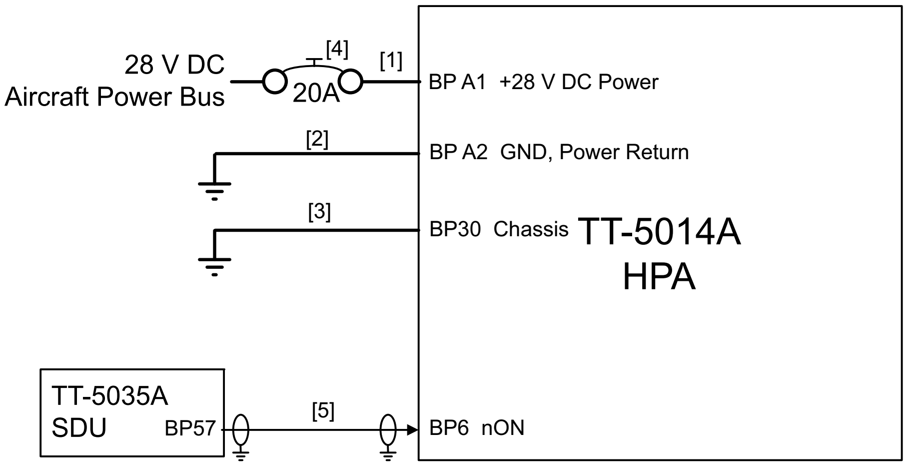
a. The cable numbers refer to the numbers stated on the wiring drawing in the section ***Wiring the Satellite Data Unit*** on page 5-11.

Note Maximum cable lengths are calculated and listed in the section ***Power cables, allowed cable lengths*** on page 5-85.

Wiring the High Power Amplifier

The Aircraft power bus provides the electric power required to operate the HPA, and a chassis connection to the aircraft chassis and the installation tray. The +28 V DC Power wire must include a circuit breaker capable of carrying the required current continuously under the required environmental conditions.

The following drawing shows the wiring of the HPA power supply. Requirements to the wiring are stated in the notes on the drawing and in the section ***Cable requirements, HPA power supply*** on page 5-16.



[1] Total resistance max. 100 m□ incl. Circuit Breaker.

[2] Total resistance max. 25 m□.

[3] Directly to Aircraft chassis, max. 0.6 m cable length (AWG 20) to prevent EMC problems and max. resistance 25 m□□

[4] Recommended circuit breaker: Klixon 2TC series, 20 A current rating.

[5] Must be shielded to prevent EMC problems.

Figure 5-5: Wiring HPA power supply

Pins for HPA power supply

The following list shows the pins used for the HPA power supply.

HPA pin	Name	Description
BP A1	+28 V DC Power	+28 V DC Power input from Aircraft power bus.
BP A2	GND, Power Return	Aircraft ground connection.
BP30	Chassis	Chassis connection, connected to installation tray and Aircraft chassis.
BP6	nON	HPA power on/off controlled by the SDU.

Table 5-4: Pins for HPA power supply

SDU pin	Name	Description
BP57	HPA remote nON/OFF output	Power On/Off control for the HPA.

Table 5-5: Pin for Remote HPA Power on/off by SDU

Description of HPA power supply

This section describes the installation requirements for HPA power supply interface. The connection from the HPA to the Aircraft power bus normally goes through the tray connector. The connector also supports other signals. For information on pin-out, please refer to ***TT-5014A High Power Amplifier*** on page 4-10.

+28 V DC Power

It is essential to keep the line impedance below the specified limits. See ***Cable requirements, HPA power supply*** on page 5-16.
Reverse polarity protection is only guaranteed if the suggested circuit breaker is used.

Required current capability for the Circuit Breaker: 235 W @ 15.7 V DC, which equals 15 A DC, at the required environmental conditions.A suitable circuit breaker would be **Klixon 2TC series** with 20 A current rating.

Important | Use a separate 20 A circuit breaker for the HPA.

Chassis (BP30)

The Chassis connection makes sure that the HPA cabinet and the installation tray has the same potential, and that there is a connection from the wiring shields to cabinet for EMC purposes.

Connect the wire directly to the installation tray, and to aircraft chassis.

nON (BP6)

The nON input is used by the SDU (BP57) to turn the HPA on and off. The SDU connects this input to ground to turn on the HPA.

Cable requirements, HPA power supply

Cable[a]	Max. Resistance	Other Requirements
[1] (+28 V DC Power)	100 mΩ, incl. circuit breaker	
[2] (GND, Power Return)	25 mΩ	
[3] (Chassis)	25 mΩ	Connect directly to aircraft chassis.
[5] (nON)	-	Must be shielded to avoid EMC problems.

Table 5-6: Requirements to HPA power cables

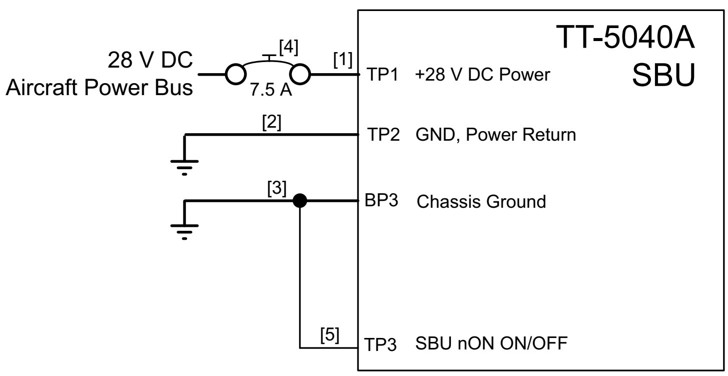
a. The cable numbers refer to the numbers stated on the wiring drawing in the section ***Wiring the High Power Amplifier*** on page 5-14.

Note Maximum cable lengths are calculated and listed in the section ***Power cables, allowed cable lengths*** on page 5-85.

Wiring the SwiftBroadband Unit

The Aircraft power bus interfaces supply the electric power required to operate the SBU. They also supply a chassis connection to the aircraft chassis and the installation tray for EMC purposes. The +28 V DC Power wire must include a circuit breaker capable of carrying the required current continuously under the required environmental conditions.

The following drawing shows the wiring of the SBU to the Aircraft Power Bus.



[1] Total resistance max. 250 mΩ incl. Circuit Breaker.

[2] Directly to Aircraft Ground with less than 1 m cable. Total resistance max. 25 mΩ.

[3] Directly to installation tray and aircraft chassis, max. 25 mΩ resistance.

[4] Recommended circuit breaker: Klixon 2TC series, 7.5 A current rating.

[5] If SATCOM On/Off switch is required, TP3 is routed to an external switch to ground

Figure 5-6: Wiring SBU power supply

SBU maximum power consumption

In the AVIATOR 700 system the SBU does not supply power for neither the HPA nor external satcom antennas. See Table A-3 on page A-6 for the total power consumption of the SBU (including CM).

Pins for SBU power supply

The following list shows the pins used for the SBU power supply.

SBU pin	Name	Description
TP1	+28 V DC Power	+28 V DC Power input from Aircraft power bus.
TP2	GND, Power Return	Aircraft Ground connection
BP3	Chassis Ground	Chassis connection, connected to installation tray and Aircraft chassis.
TP3	SBU nOn, Discrete Input	Power On/Off for the SBU and units powered by the SBU

Table 5-7: Pins for SBU power supply

Description of SBU power supply

+28 V DC Power

It is essential to keep the line impedance below the specified limits. See ***Cable requirements, SBU power supply*** on page 5-18.

Reverse polarity protection is only guaranteed if the suggested circuit breaker is used. A suitable circuit breaker with sufficiently low resistance would be Klixon 2TC series with 7.5 A current rating.

Important | Use a separate 7.5 A circuit breaker for the SBU.

Chassis Ground (BP3)

The Chassis connection ensures that the SBU cabinet and the installation tray have the same potential, and that there is a connection from the cable shields to the cabinet to comply with EMC requirements.

Connect the wire directly to the installation tray and to aircraft chassis.

Remote ON/OFF - SBU nON, Discrete Input (TP3)

The nON input is used to turn the SBU on and off. Connection of this input to ground turns on the SBU and all units powered by the SBU.

The electrical specifications are defined in ***Description of the discrete types*** on page 5-71.

Cable requirements, SBU power supply

Cable[a]	Max. resistance	Other requirements
[1] (+28 V DC Power)	250 mΩ, incl. circuit breaker	
[2] (GND, Power Return)	25 mΩ	The cable should be as short as possible, max. 1 m.
[3] (Chassis Ground)	25 mΩ	Connect directly to aircraft chassis.

Table 5-8: Requirements to SBU power cables

a. The cable numbers refer to the numbers stated on the wiring drawing in the section **Figure 5-6: Wiring SBU power supply**.

Note For maximum allowed cable lengths, see ***Power cables, allowed cable lengths*** on page 5-85.

5.3.4 Wiring the satcom antenna

Cable losses

Note During installation, measure and write down the cable loss of the RF cables. You need these values later on for the SDU in the Aero-SDU Configuration Program and for the SBU in the web interface during configuration of the system. For further details see ***Basic configuration of the SDU*** on page 6-9 or the online help in the Aero-SDU Configuration Program and ***Configuring RF settings of the SBU*** on page 6-50.

Selection of DLNA

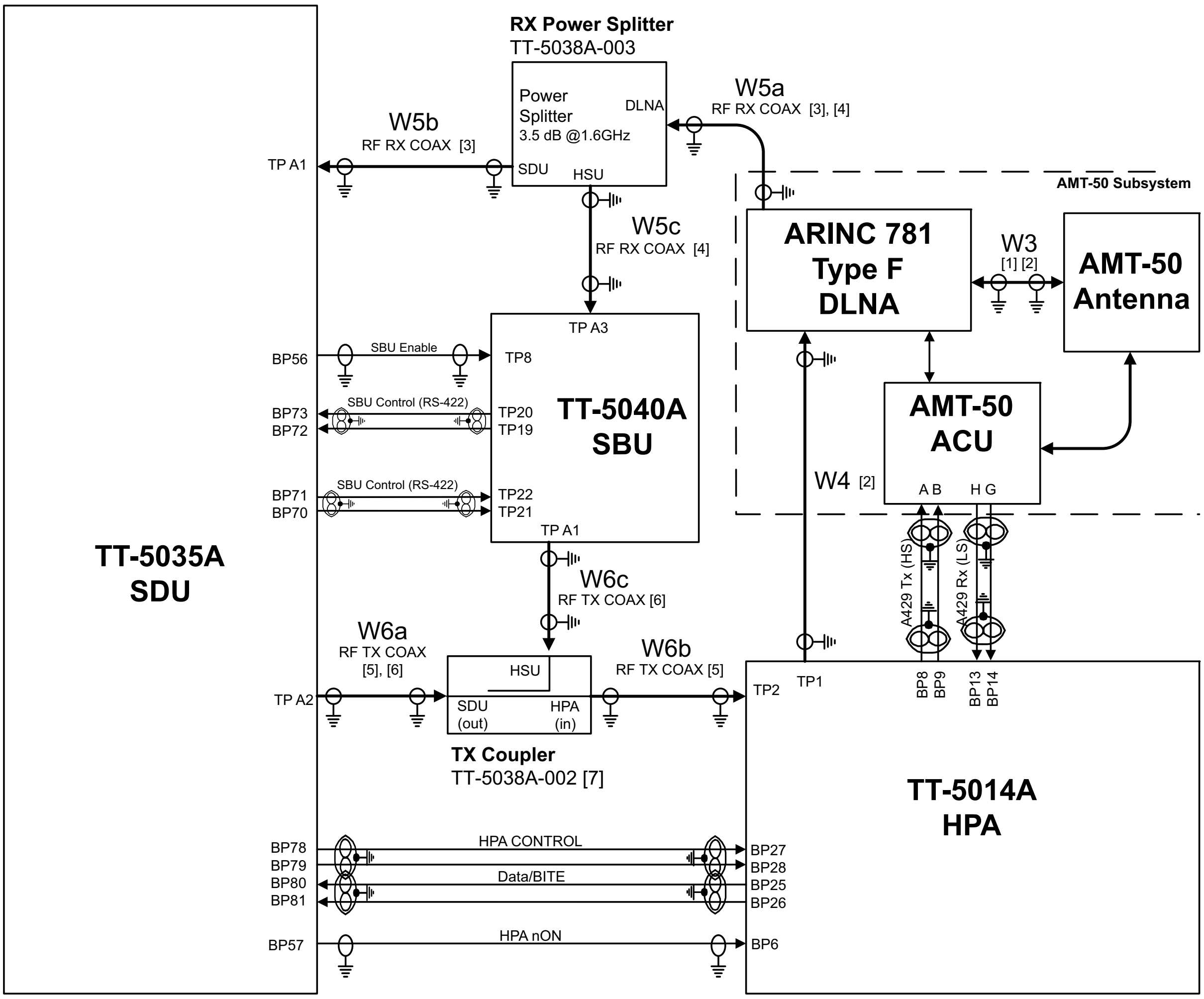
Use the 405013A DLNA Type F.

Important The DLNA used in the AVIATOR 700 system must contain improved Tx-filtering for protection of the GNSS and Iridium band.

Wiring ARINC 741 antenna systems

An example of an ARINC 741 antenna system is the AMT-50 system. The following drawing shows the wiring for an AVIATOR 700 system using an AMT-50 antenna.

Note In an AVIATOR 700 system, the DLNA must be ARINC 781 Type F compatible and contain extra TX-filtering for protection of the GNSS and Iridium band.



[1] The cable loss of W3 (between DLNA and antenna) must be: 0.0 to 0.3 dB @ 1.6 GHz

[2] The total cable loss of W3+DLNA loss+W4 must be: 0.0 to 2.6 dB @ 1.6 GHz

[3] The total cable loss of W5a + Splitter loss + W5b must be: 6.0 to 29.0 dB @ 1.6 GHz

[4] The total cable loss of W5a + Splitter loss + W5c must be: 6.0 to 25.0 dB @ 1.6 GHz

[5] The total cable loss of W6a + W6b must be: 0.0 to 11.0 dB @ 1.6 GHz

[6] The cable losses of W6a and W6c must be equal within ±2.5 dB @ 1.6 GHz

[7] Note that (in) and (out) are wired inverse.

Figure 5-7: Wiring AMT-50 Subsystem

Pins for ARINC 741 antenna system

The following lists show the SBU, SDU and HPA pins in the AVIATOR 700 system used for connecting an ARINC 741 antenna system.

SBU pin	Description
TP A1	RF Tx output to Tx Coupler (HSU port)
TP A3	RF Rx input from Rx Power Splitter (HSU port)
TP8	SBU Enable input (active low)
TP19	Data bus output to SDU; Output B, RS-422
TP20	Data bus output to SDU; Output A, RS-422
TP21	Data bus input from SDU; Input B, RS-422
TP22	Data bus input from SDU; Input A, RS-422

Table 5-9: SBU Pins for AMT-50 antenna subsystem

SDU pin	Description
TP A1	RF Rx input from Rx Power Splitter (SDU port)
TP A2	RF Tx output to Tx Coupler (SDU port)
BP70	Data bus output to SBU; Output B, RS-422
BP71	Data bus output to SBU; Output A, RS-422
BP72	Data bus input from SBU; Input B, RS-422
BP73	Data bus input from SBU; Input A, RS-422
BP56	SBU Enable output
BP57	HPA remote nOn/Off output
BP78	HPA Control Output A, RS-422
BP79	HPA Control Output B, RS-422
BP80	HPA Data/BITE Input A, RS-422
BP81	HPA Data/BITE Input B, RS-422

Table 5-10: SDU Pins for AMT-50 antenna subsystem

HPA pin	Description
TP1	RF Tx output to DLNA
TP2	RF Tx input from Tx Coupler
BP6	Remote nOn/Off input from SDU
BP8	A429 Tx A output to ACU/BSU
BP9	A429 Tx B output to ACU/BSU
BP13	A429 Rx1 A input from ACU/BSU
BP14	A429 Rx1 B input from ACU/BSU
BP25	Tx Data/BITE Output A, RS-422, to SDU
BP26	Tx Data/BITE Output B, RS-422, to SDU
BP27	Rx Control Input A, RS-422, from SDU
BP28	Rx Control Input B, RS-422, from SDU

Table 5-11: HPA Pins for ARINC 741 antenna system

Description of control interfaces

SBU control interface (TP19-TP22)

The RS-422 control interface on SBU pins TP19-TP22 is used by the SDU to control the SBU. The SBU operates as a slave to the SDU.

HPA ARINC 429 interface (BP8, BP9, BP13, BP14 on HPA)

An ARINC 429 high speed Tx interface and an ARINC 429 low speed Rx interface is used for communication between the HPA and the AMT-50 ACU.

SBU Enable (TP8)

The SDU uses the SBU Enable input to reset and inhibit the transmitter output signal from the SBU. The electrical specification is defined as for the discrete Weight-On-Wheels input type. If TP8 is not connected to the SDU pin, the SBU stays in reset state.

RF cable requirements, ARINC 741 antenna system

Cable[a]	Min. Cable Loss @1.6 GHz	Max. Cable Loss@1.6 GHz
W3 (DLNA to Antenna)	0 dB	0.3 dB
W3 + DLNA loss + W4	0 dB	Total: 2.6 dB
W5a + Splitter loss + W5b	6 dB	29 dB
W5a + Splitter loss + W5c	6 dB	25 dB
W6a + W6b	0 dB	11 dB
W6a, W6c	The cable losses of W6a and W6c must be equal within ±2.5 dB	

Table 5-12: Requirements to RF Cables, ARINC 741 antenna systems

a. The “W” cable numbers refer to the numbers stated on the wiring drawing in **Figure 5-7: Wiring AMT-50 Subsystem**.

ARINC 429 cable and RS-422 SBU control interface cable requirements

The cables for these interfaces must be twisted and shielded and conform to the standards for aeronautical use.

For recommended cable types, see ***Recommended cables for ARINC 429*** on page 5-89 and ***Recommended cables for RS-422 SBU control interface*** on page 5-89.

Wiring ARINC 741 dual side panel antenna system (future use)

The following drawing shows the wiring of an ARINC 741 dual side panel antenna system.

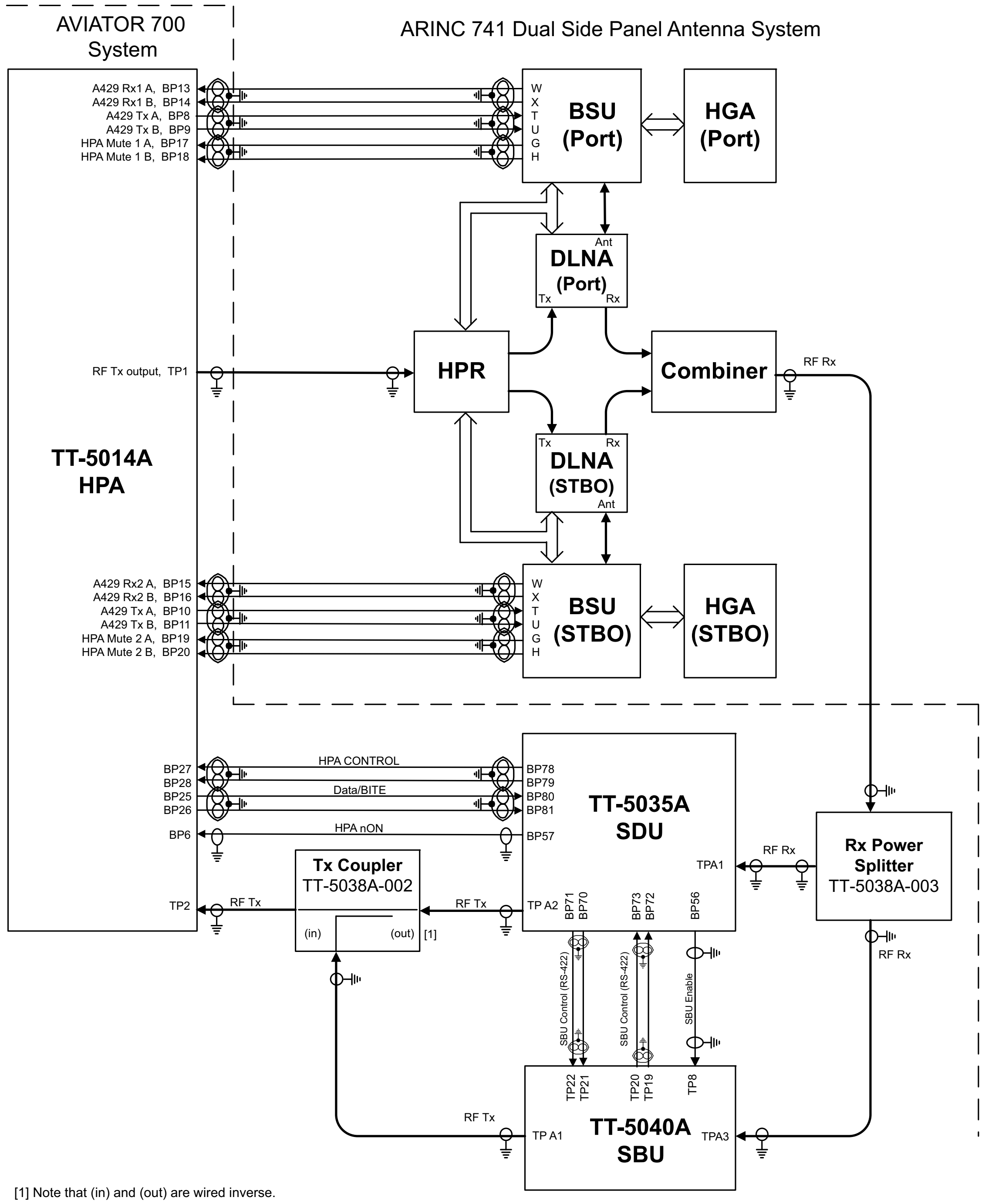


Figure 5-8: Wiring ARINC 741 dual side panel antenna system

Important Remember to write down the cable losses. See ***Cable losses*** on page 5-18.

Pins for Dual Side Panel antenna system

The following list shows the pins in the AVIATOR 700 system used for connecting a Dual Side Panel antenna system.

HPA pin	Name/Description
TP1	RF Tx output to HPR
TP2	RF Tx input from SDU
BP6	Remote nOn/Off input from SDU
BP8	A429 Tx A output to BSU (Port)
BP9	A429 Tx B output to BSU (Port)
BP10	A429 Tx A output to BSU (STBO)
BP11	A429 Tx B output to BSU (STBO)
BP13	A429 Rx1 A input from BSU (Port)
BP14	A429 Rx1 B input from BSU (Port)
BP15	A429 Rx2 A input from BSU (STBO)
BP16	A429 Rx2 B input from BSU (STBO)
BP17	HPA Mute 1 A input from BSU (Port)
BP18	HPA Mute 1 B input from BSU (Port)
BP19	HPA Mute 2 A input from BSU (STBO)
BP20	HPA Mute 2 B input from BSU (STBO)
BP25	Tx Data/BITE Output A, RS-422, to SDU
BP26	Tx Data/BITE Output B, RS-422, to SDU
BP27	Rx Control Input A, RS-422, from SDU
BP28	Rx Control Input B, RS-422, from SDU

Table 5-13: HPA pins for dual side panel antenna system

SDU pin	Name/Description
TP A1	RF Rx input from RX Power Splitter (SDU port)
TP A2	RF Tx output to Tx Coupler (SDU port)
BP56	SBU Enable output (active low)
BP57	HPA remote nOn/Off output
BP70	Data bus output to SBU; Output B, RS-422
BP71	Data bus output to SBU; Output A, RS-422
BP72	Data bus input from SBU; Input B, RS-422
BP73	Data bus input from SBU; Input A, RS-422
BP78	HPA Control Output A, RS-422
BP79	HPA Control Output B, RS-422
BP80	HPA Data/BITE Input A, RS-422
BP81	HPA Data/BITE Input B, RS-422

Table 5-14: SDU pins for dual side panel antenna system

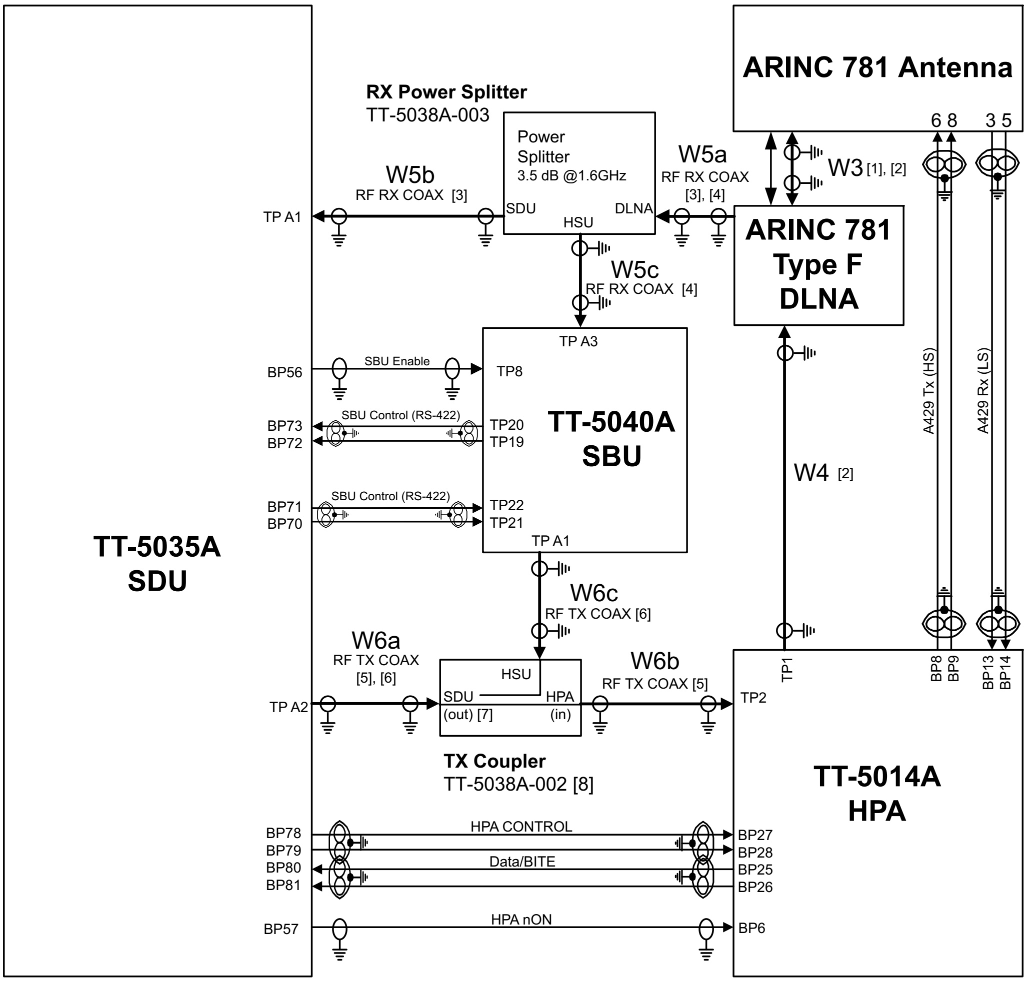
SBU pin	Description
TP A1	RF Tx output to Tx Coupler (HSU port)
TP A3	RF Rx input from Rx Power Splitter (HSU port)
TP8	SBU Enable input
TP19	Data bus output to SDU; Output B, RS-422
TP20	Data bus output to SDU; Output A, RS-422
TP21	Data bus input from SDU; Input B, RS-422
TP22	Data bus input from SDU; Input A, RS-422

Table 5-15: SBU pins for dual side panel antenna system

Wiring ARINC 781 antenna systems

The following drawing shows the wiring for an AVIATOR 700 system using an ARINC 781 antenna system.

Requirements to the cables are stated on the drawing and in the next section RF cable requirements, ARINC 781 antenna systems.



[1] The cable loss of W3 (between DLNA and antenna) must be: 0.0 to 0.3 dB @ 1.6 GHz

[2] The total cable loss of W3+DLNA loss+W4 must be: 0.0 to 2.6 dB @ 1.6 GHz

[3] The total cable loss of W5a + Splitter loss + W5b must be: 6.0 to 29.0 dB @ 1.6 GHz

[4] The total cable loss of W5a + Splitter loss + W5c must be: 6.0 to 25.0 dB @ 1.6 GHz

[5] The total cable loss of W6a + W6b must be: 0.0 to 11.0 dB @ 1.6 GHz

[6] The cable losses of W6a and W6c must be equal within ±2.5 dB @ 1.6 GHz

[7] Note that (in) and (out) are wired inverse.

Figure 5-9: Wiring ARINC 781 antenna system

Pins for ARINC 781 antenna system

The following lists show the SBU, SDU and HPA pins in the AVIATOR 700 system used for connecting an ARINC 781 antenna system.

SBU pin	Description
TP A1	RF Tx output to Tx Coupler (SBU port)
TP A3	RF Rx input from Rx Power Splitter (SBU port)
TP8	SBU Enable input (active low)
TP19	Data bus output to SDU; Output B, RS-422
TP20	Data bus output to SDU; Output A, RS-422
TP21	Data bus input from SDU; Input B, RS-422
TP22	Data bus input from SDU; Input A, RS-422

Table 5-16: SBU pins for ARINC 781 antenna system

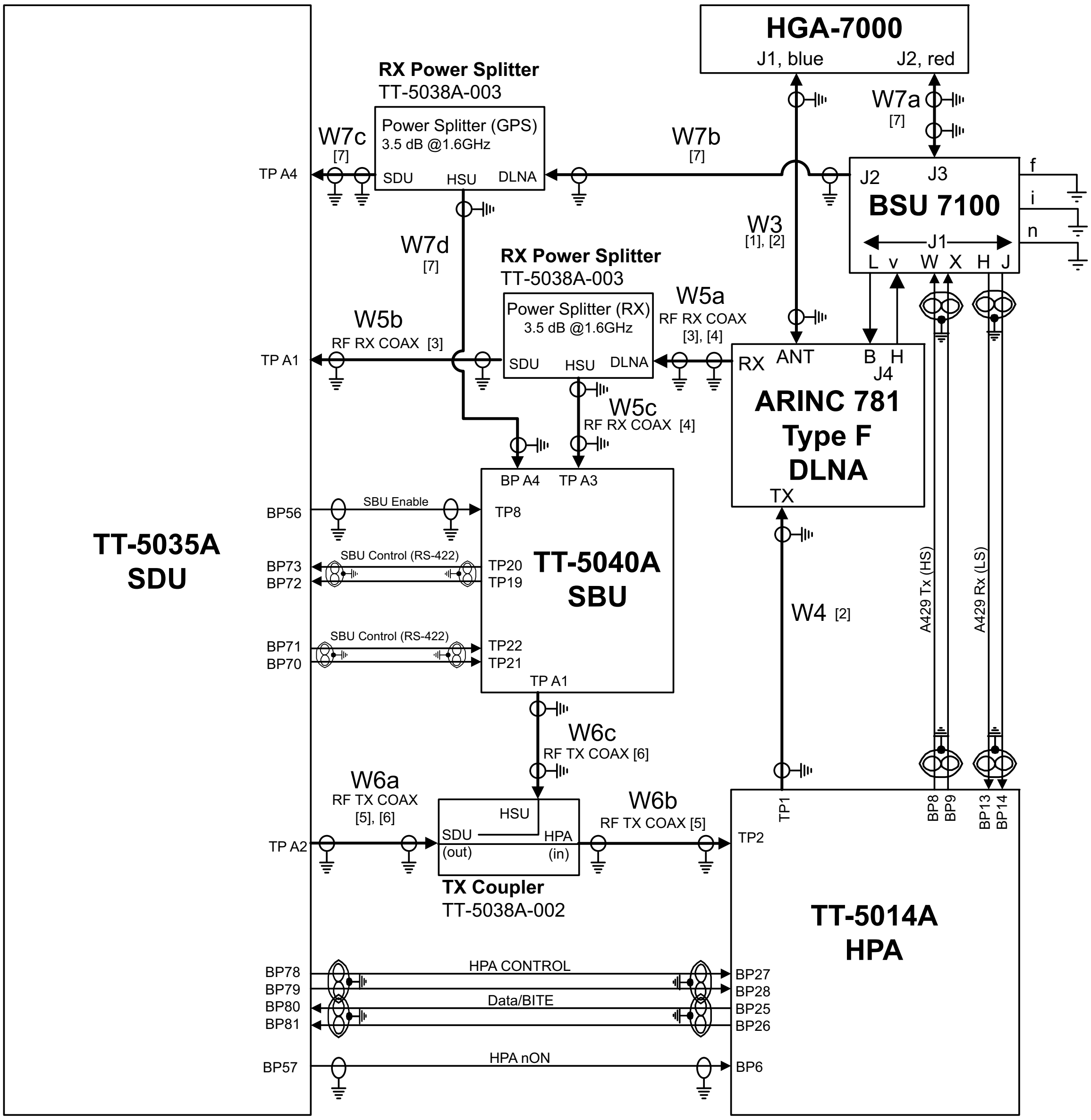
SDU pin	Description
TP A1	RF Rx input from Rx Power Splitter (SDU port)
TP A2	RF Tx output to Tx Coupler (SDU port)
BP70	Data bus output to SBU; Output B, RS-422
BP71	Data bus output to SBU; Output A, RS-422
BP72	Data bus input from SBU; Input B, RS-422
BP73	Data bus input from SBU; Input A, RS-422
BP56	SBU Enable output
BP57	HPA remote nOn/Off output
BP78	HPA Control Output A, RS-422
BP79	HPA Control Output B, RS-422
BP80	HPA Data/BITE Input A, RS-422
BP81	HPA Data/BITE Input B, RS-422

Table 5-17: SDU pins for ARINC 781 antenna system

HPA pin	Description
TP1	RF Tx output to DLNA
TP2	RF Tx input from Tx Coupler (HPA port)
BP6	Remote nOn/Off input from SDU
BP8	A429 Tx A output to ARINC 781 antenna
BP9	A429 Tx B output to ARINC 781 antenna
BP13	A429 Rx1 A input from ARINC 781 antenna
BP14	A429 Rx1 B input from ARINC 781 antenna
BP25	Tx Data/BITE Output A, RS-422, to SDU
BP26	Tx Data/BITE Output B, RS-422, to SDU
BP27	Rx Control Input A, RS-422, from SDU
BP28	Rx Control Input B, RS-422, from SDU

Table 5-18: HPA pins for ARINC 781 antenna system

Wiring HGA 7000 antenna system



[1] The cable loss of W3 (between DLNA and antenna) must be: 0.0 to 0.3 dB @ 1.6 GHz

[2] The total cable loss of W3+DLNA loss+W4 must be: 0.0 to 2.6 dB @ 1.6 GHz

[3] The total cable loss of W5a + Splitter loss + W5b must be: 6.0 to 29.0 dB @ 1.6 GHz

[4] The total cable loss of W5a + Splitter loss + W5c must be: 6.0 to 25.0 dB @ 1.6 GHz

[5] The total cable loss of W6a + W6b must be: 0.0 to 11.0 dB @ 1.6 GHz

[6] The cable losses of W6a and W6c must be equal within ±2.5 dB @ 1.6 GHz

[7] GPS cables W7b, W7c and W7d must be wired if AHRS is used instead of IRS.
Cable W7a must be wired in both cases.

The total cable losses of W7a + W7b + W7c must be: 0 to 11.0 dB @ 1.6 GHz
The total cable losses of W7a + W7b + W7d must be: 0 to 11.0 dB @ 1.6 GHz

Figure 5-10: Wiring HGA-7000 antenna system

Pins for HGA-7000 antenna system

The following lists show the SBU, SDU and HPA pins in the AVIATOR 700 system used for connecting an HGA 7000 antenna system.

SBU pin	Description
TP A1	RF Tx output to Tx Coupler (SBU port)
TP A3	RF Rx input from Rx Power Splitter (SBU port)
TP8	SBU Enable input (active low)
TP19	Data bus output to SDU; Output B, RS-422
TP20	Data bus output to SDU; Output A, RS-422
TP21	Data bus input from SDU; Input B, RS-422
TP22	Data bus input from SDU; Input A, RS-422
BP A4	Input from Power Splitter (GPS) (HSU port)

Table 5-19: SBU pins for HGA 7000 antenna system

SDU pin	Description
TP A1	RF Rx input from Rx Power Splitter (SDU port)
TP A2	RF Tx output to Tx Coupler (SDU port)
BP70	Data bus output to SBU; Output B, RS-422
BP71	Data bus output to SBU; Output A, RS-422
BP72	Data bus input from SBU; Input B, RS-422
BP73	Data bus input from SBU; Input A, RS-422
BP56	SBU Enable output
BP57	HPA remote nOn/Off output
BP78	HPA Control Output A, RS-422
BP79	HPA Control Output B, RS-422
BP80	HPA Data/BITE Input A, RS-422
BP81	HPA Data/BITE Input B, RS-422

Table 5-20: SDU pins for HGA 7000 antenna system

HPA pin	Description
TP1	RF Tx output to DLNA
TP2	RF Tx input from Tx Coupler (HPA port)

Table 5-21: HPA pins for HGA 7000 antenna system

HPA pin	Description
BP6	Remote nOn/Off input from SDU
BP8	A429 Tx A output to ARINC 781 antenna
BP9	A429 Tx B output to ARINC 781 antenna
BP13	A429 Rx1 A input from ARINC 781 antenna
BP14	A429 Rx1 B input from ARINC 781 antenna
BP25	Tx Data/BITE Output A, RS-422, to SDU
BP26	Tx Data/BITE Output B, RS-422, to SDU
BP27	Rx Control Input A, RS-422, from SDU
BP28	Rx Control Input B, RS-422, from SDU

Table 5-21: HPA pins for HGA 7000 antenna system

Description of control interfaces

SBU control interface (TP19-TP22)

The RS-422 control interface on SBU pins TP19-TP22 is used by the SDU to control the SBU. The SBU operates as a slave to the SDU.

HPA ARINC 429 interface (BP8, BP9, BP13, BP14 on HPA)

An ARINC 429 high speed Tx interface and an ARINC 429 low speed Rx interface is used for communication between the HPA and the internal BSU of the ARINC 781 antenna.

SBU Enable (TP8)

The SDU uses the SBU Enable input to reset and inhibit the transmitter output signal from the SBU. The electrical specification is defined as for the discrete Weight-On-Wheels input type. If TP8 is not connected to the SDU pin, the SBU stays in reset state.

RF cable requirements, ARINC 781 antenna systems

Cable[a]	Min. Cable Loss @1.6 GHz	Max. Cable Loss@1.6 GHz
W3 (DLNA to Antenna)	0 dB	0.3 dB
W3 + DLNA loss + W4	0 dB	Total: 2.6 dB
W5a + Splitter loss + W5b	6 dB	29 dB
W5a + Splitter loss + W5c	6 dB	25 dB
W6a + W6b	0 dB	11 dB
W6a, W6c	The cable losses of W6a and W6c must be equal within ±2.5 dB	

Table 5-22: Requirements to RF cables, ARINC 781 antenna systems

a. The “W” cable numbers refer to the numbers stated on the wiring drawing in **Figure 5-9: Wiring ARINC 781 antenna system**.

ARINC 429 cable and RS-422 SBU control interface cable requirements

The cables for these interfaces must be twisted and shielded and conform to the standards for aeronautical use.

For recommended cable types, see ***Recommended cables for ARINC 429*** on page 5-89 and ***Recommended cables for RS-422 SBU control interface*** on page 5-89.

RF GPS input on SBU (for use with HGA7000)

Systems without IRS data can use AHRS data instead. In that case the RF GPS input (BPA4) must be connected to the BSU7100 J2 via Rx Power Splitter (see **Figure 5-10: Wiring HGA-7000 antenna system**).

5.3.5 Wiring ARINC 429 interfaces

Note The source for navigational data over ARINC 429 can be either an IRS, AHRS or another navigational input compatible with the requirements in this section.

Wiring an ARINC 429 source system

The SDU has two ARINC 429 input interfaces for 2 NAV sources. The SBU has two ARINC 429 input interfaces for two navigational inputs.

Important For instructions how to install and set up the IRS or AHRS system see the respective installation manual.

The following drawing shows the wiring of a navigational input. Requirements to the cables are stated in the section ***Cable requirements, ARINC 429*** on page 5-37.

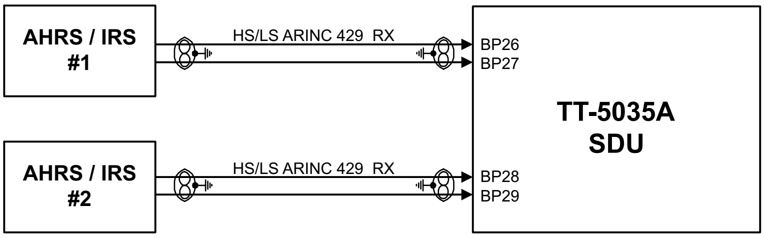


Figure 5-11: Wiring AHRS/IRS to SDU

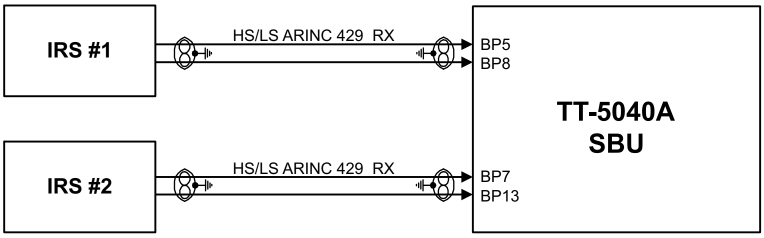


Figure 5-12: Wiring IRS to SBU

For more information on AHRS/IRS see ***About satcom antenna steering*** on page 5-6.

Pins for AHRS/IRS for SDU

The following list shows the pins used for AHRS or IRS:

SDU Pin	Name/Description
BP26	Data from primary IRS 429 A /Data from primary AHRS 429 A
BP27	Data from primary IRS 429 B /Data from primary AHRS 429 B
BP28	Data from secondary IRS 429 A /Data from secondary AHRS 429 A
BP29	Data from secondary IRS 429 B /Data from secondary AHRS 429 B

Table 5-23: SDU pins for IRS and AHARS

Pins for input from ARINC 429 sources for SBU

The pins for navigational input are located in the bottom plug of the SBU rear receptacle.

SBU pin	Name/description
BP5	Data from primary ARINC 429 navigational input A
BP8	Data from primary ARINC 429 navigational input B
BP7	Data from secondary ARINC 429 navigational input A
BP13	Data from secondary ARINC 429 navigational input B

Table 5-24: SBU pins for input from a navigational ARINC 429 source

Description of the interface for navigational input

For SDU: When the system is configured with the Aero-SDU Configuration Program, the Configuration Module will contain the information of:

- Which navigational input is selected: IRS or AHRS.
- Whether primary or secondary input or both are installed.

  Note If #1 and #2 are both installed, they must be of the same type (IRS or AHRS).

- ARINC 429 Speed (High or Low). The primary and secondary AHRS/IRS inputs can individually be set to high or low speed, depending on your configuration.

Note AHRS can only be used with the HGA 7000 antenna, which contains a built-in GPS antenna.

For SBU: When the system is configured with the web interface, the Configuration Module will contain the information:

- Which navigational input is selected: IRS or GPS.
- Whether primary or secondary input or both are installed.
- ARINC 429 Speed (High or Low). The primary and secondary navigational inputs can individually be set to high or low speed, depending on your configuration.

ARINC data format for IRS

The required ARINC data format for IRS is listed in the following table:

Label (octal)	Name	Minimum Update rate
150	UTC Time (optional)[a]	1 Hz
260	UTC Date (optional)[a]	1 Hz
310	Latitude	1 Hz
311	Longitude	1 Hz
312	Ground speed	1 Hz
313	Track angle True	1 Hz
314	True heading	10 Hz
324	Pitch angle	10 Hz
325	Roll angle	10 Hz
361	Altitude Inertial (optional)[a]	1 Hz

Table 5-25: ARINC data format for IRS

a. The labels marked optional do not have an effect on the operation of the AVIATOR 700 system, but may increase precision in the antenna pointing and time management.

ARINC data format for AHRS

The required ARINC data format for AHRS is listed in the following table:

Label (octal)	Name	Minimum update rate
320	Magnetic heading	10 Hz
324	Pitch angle	10 Hz
325	Roll angle	10 Hz
336	Inertial pitch rate (optional)[a]	10 Hz
337	Inertial roll rate (optional)[a]	10 Hz

Table 5-26: ARINC data format for AHRS

a. The labels marked optional do not have an effect on the operation of the AVIATOR 700 system, but may increase precision in the antenna pointing.

Wiring ACARS/AFIS/CMU

The SDU has ARINC 429 interfaces for 2 high or low speed (HS/LS) ACARS/AFIS/CMU including one output port and 2 input ports.

The following drawing shows the wiring of ACARS/AFIS/CMU. Requirements to the cables are stated in the section ***Cable requirements, ARINC 429*** on page 5-37.

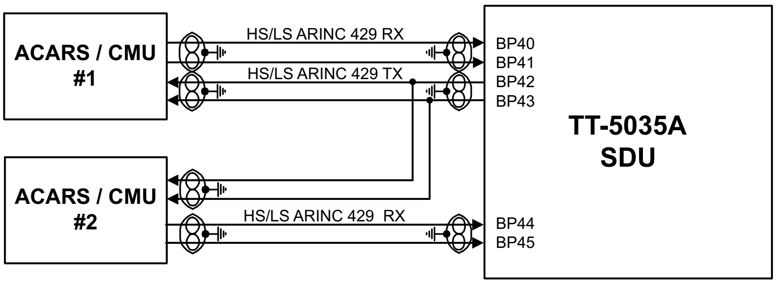


Figure 5-13: Wiring ACARS/AFIS/CMU

Pins for ACARS/AFIS/CMU

The following list shows the pins used for an Airborne Communications Addressing and Reporting System (ACARS), Airborne Flight Information System (AFIS) or a Communications Management Unit (CMU):

SDU Pin	Name/Description
BP40	Data bus from ACARS/AFIS/CMU #1 429 A
BP41	Data bus from ACARS/AFIS/CMU #1 429 B
BP42	Data bus to ACARS/AFIS/CMU #1 & #2 429 A
BP43	Data bus to ACARS/AFIS/CMU #1 & #2 429 B
BP44	Data bus from ACARS/AFIS/CMU #2 429 A
BP45	Data bus from ACARS/AFIS/CMU #2 429 B

Table 5-27: SDU pins for ACARS/AFIS/CMU

The data speed can be configured to high or low (HS/LS), defined by the Configuration Module.

Wiring MCDU

The SDU has interfaces prepared for two high or low speed ARINC 429 interfaces for communication with MCDU #1 and MCDU #2. One common output and two inputs.

The following drawing shows the wiring of MCDU. Requirements to the cables are stated in the section ***Cable requirements, ARINC 429*** on page 5-37.

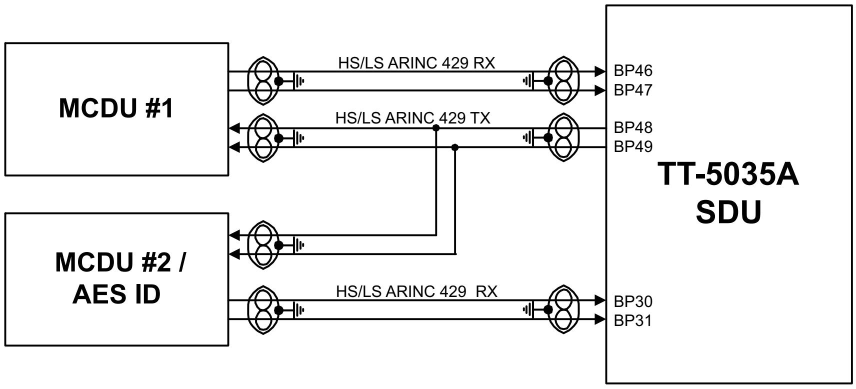


Figure 5-14: Wiring MCDU

The Configuration Module contains information if the MCDU is installed, and which data rate is used (high or low).

MCDU input #2 may also, in the future, be configured to AES ID input (ARINC 429 ICAO Address). However, this is not yet implemented.

Cable requirements, ARINC 429

The cables for the ARINC 429 interfaces must be twisted and shielded. They must conform to the standards for aeronautical use.

For recommended cable types, see ***Recommended cables for ARINC 429*** on page 5-89.

5.3.6 Wiring GPS interface

Wiring the GPS antenna

The following figure shows the wiring of the GPS interface when using a power splitter. You can use the power splitter shown in ***TT-5038A-003 Rx Power Splitter*** on page 3-8.

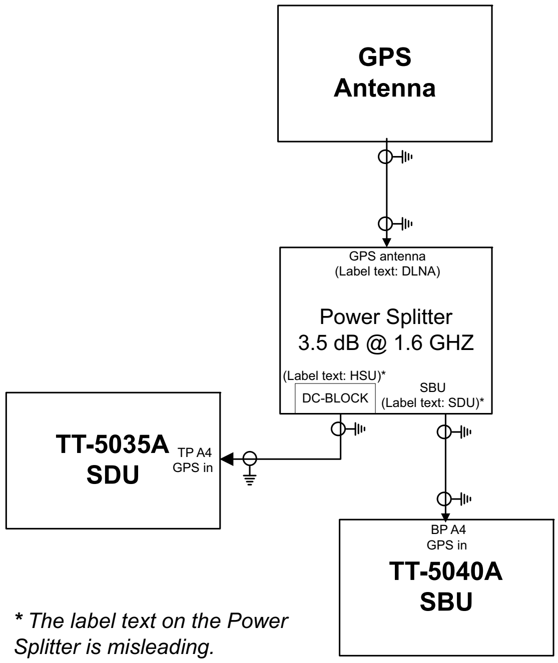


Figure 5-15: Wiring GPS Interface with Power Splitter

PIN for input from the GPS antenna

SBU pin	Name/description
BP A4	GPS antenna input (coax), modem, DC out

Table 5-28: SBU pins for input from GPS antenna

SDU pin	Name/description
TP A4	GPS/Antenna modem interface (coax)

Table 5-29: SDU pins for input from GPS antenna

5.3.7 Wiring ICAO address

Strapped ICAO address

A unique aircraft identification code (ICAO address) must be assigned at installation. The national authority of aeronautical identification coordinates assignment of the code.

The ICAO address must be entered in the Configuration Module, using the Aero-SDU Configuration Program.

The SDU obtains the ICAO address from the 24 bit discrete address (must be hardware strapped using the 24 discrete inputs on the SDU).

The strapped ICAO address is compared to the ICAO address entered in the Configuration Module of the SDU. If they do not match, the AVIATOR 700 system suspends all RF communication.

Wiring ICAO address

The following drawing shows the wiring of the 24 bit discrete ICAO address and the AES ID (future use). Requirements to the AES ID ARINC 429 cable are stated in the section ***Cable requirements, ARINC 429*** on page 5-37.

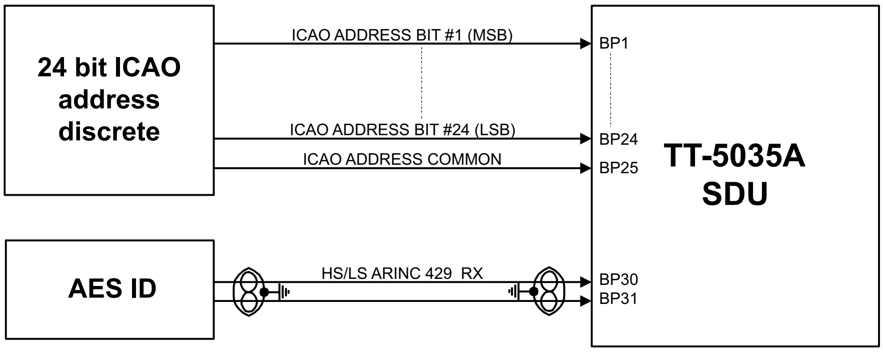


Figure 5-16: Wiring ICAO

Wiring 24 bit discrete ICAO address

The SDU has 24 discrete inputs used to encode the 24-bit ICAO address, in which the SDU is installed.

Each ICAO address consists of eight digits, and each digit value is determined by strapping 3 bits (octal).

Note The Aero-SDU Configuration Program shows which pins to connect if you type in the wanted ICAO address in the Config Module field in the Identification window.

Do as follows to strap the ICAO address:

1. Leave pins assigned to the binary “one” state open (internal pull up).
   Binary “one” (open circuit) is ≥100 kΩ.
2. Strap pins assigned to the binary “zero” state to BP25 (ICAO Address Common) on the airframe side of the connector.
   Binary “zero” (strapped to BP25) is ≤10 Ω.
3. Enter the ICAO address in the Aero-SDU Configuration Program.
   If the aircraft uses a US N-type registration number, the Aero-SDU Configuration Program can calculate the ICAO address from this number. Use the **US N-Type Calculator** button in the Identification window of the Aero-SDU Configuration Program.

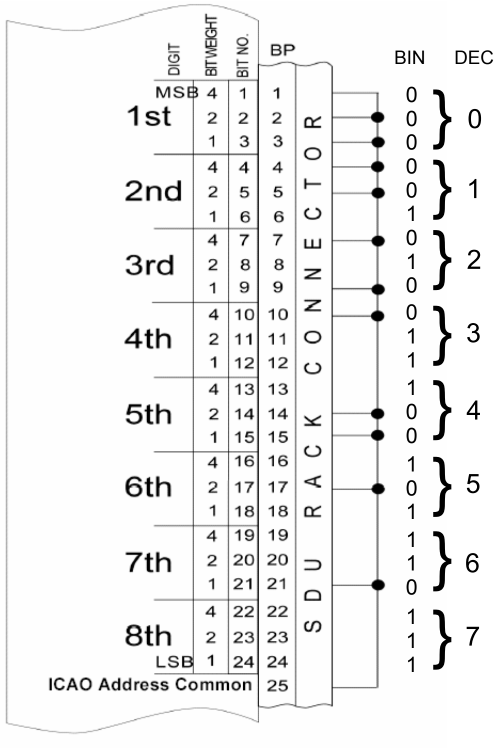


Figure 5-17: Example of wiring the fictional ICAO address 01234567

When the system is powered, the SDU reads the strapped ICAO address from the SDU rack connector and compares it to the ICAO address entered in the Configuration Module. If the SDU does not detect or recognize the strapped ICAO address, the AVIATOR 700 system suspends all RF communication until the error is corrected.

5.3.8 Wiring Ethernet at the SBU

Overview

The SBU has six 10/100BaseT Ethernet interfaces, plus the interface on the front of the SBU described in ***Wiring the Maintenance interfaces and Reset*** on page 5-79.

The following drawing shows the wiring of the rear SBU Ethernet interfaces.

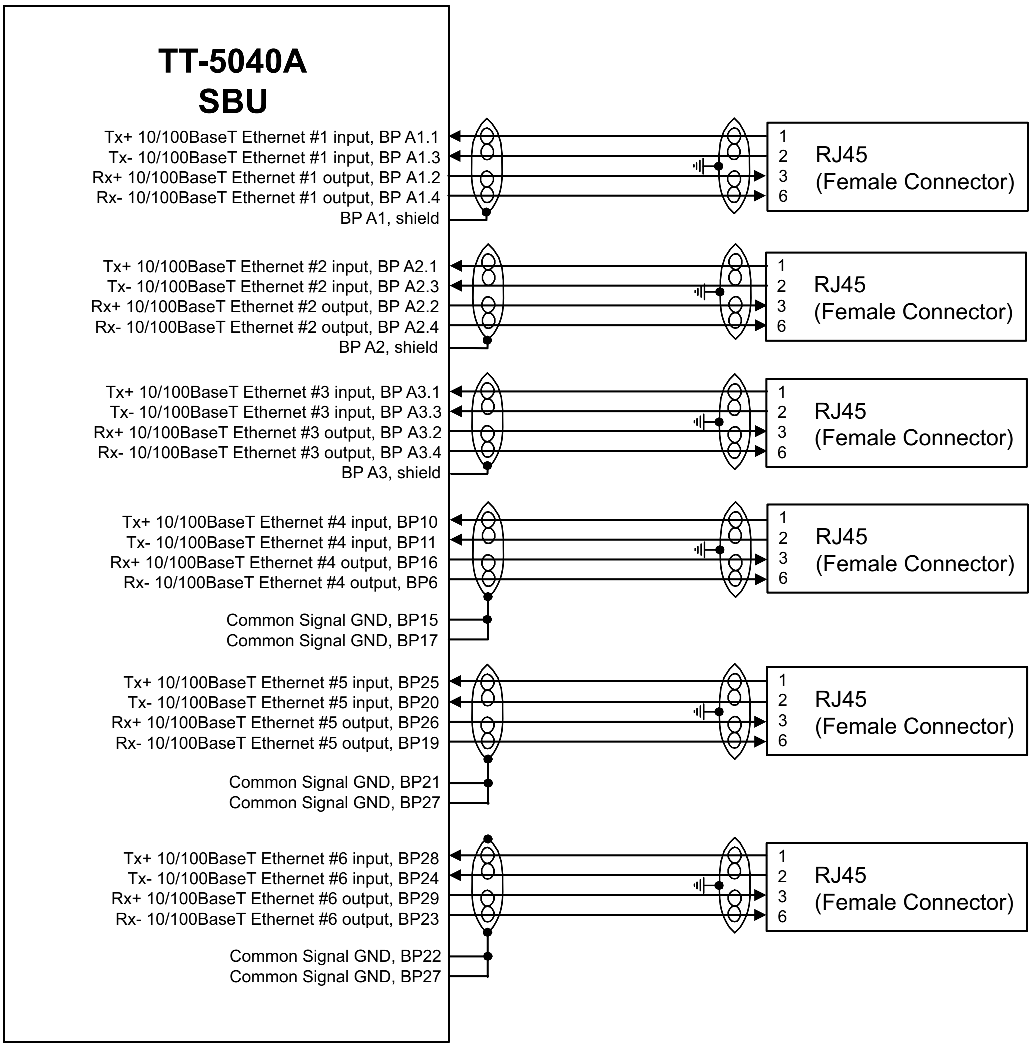


Figure 5-18: Wiring Ethernet

The RJ45 Ethernet interfaces match a standard straight network cable. You can freely select which of the Ethernet connections you want to use.

The supported cable length is up to 100 meters (328 feet).

Pins for 10/100BaseT Ethernet

The following list shows the pins used for the Ethernet interface.

SBU pin	Name	Description	RJ45 pin (F)	Name
BP A1.1	Tx+ 10/100BaseT Ethernet #1	Input	1	TxD+
BP A1.2	Rx+ 10/100BaseT Ethernet #1	Output	3	RxD+
BP A1.3	Tx- 10/100BaseT Ethernet #1	Input	2	TxD-
BP A1.4	Rx- 10/100BaseT Ethernet #1	Output	6	RxD-
BP A2.1	Tx+ 10/100BaseT Ethernet #2	Input	1	TxD+
BP A2.2	Rx+ 10/100BaseT Ethernet #2	Output	3	RxD+
BP A2.3	Tx- 10/100BaseT Ethernet #2	Input	2	TxD-
BP A2.4	Rx- 10/100BaseT Ethernet #2	Output	6	RxD-
BP A3.1	Tx+ 10/100BaseT Ethernet #3	Input	1	TxD+
BP A3.2	Rx+ 10/100BaseT Ethernet #3	Output	3	RxD+
BP A3.3	Tx- 10/100BaseT Ethernet #3	Input	2	TxD-
BP A3.4	Rx- 10/100BaseT Ethernet #3	Output	6	RxD-
BP6	Rx- 10/100BaseT Ethernet #4	Output	6	RxD-
BP10	Tx+ 10/100BaseT Ethernet #4	Input	1	TxD+
BP11	Tx- 10/100BaseT Ethernet #4	Input	2	TxD-
BP15	Common Signal GND for Ethernet	GND	Shield	
BP16	Rx+ 10/100BaseT Ethernet #4	Output	3	RxD+
BP17	Common Signal GND for Ethernet	GND	Shield	
BP19	Rx- 10/100BaseT Ethernet #5	Output	6	RxD-
BP20	Tx- 10/100BaseT Ethernet #5	Input	2	TxD-
BP21	Common Signal GND for Ethernet	GND	Shield	
BP22	Common Signal GND for Ethernet	GND	Shield	
BP23	Rx- 10/100BaseT Ethernet #6	Output	6	RxD-
BP24	Tx- 10/100BaseT Ethernet #6	Input	2	TxD-
BP25	Tx+ 10/100BaseT Ethernet #5	Input	1	TxD+
BP26	Rx+ 10/100BaseT Ethernet #5	Output	3	RxD+
BP27	Common Signal GND for Ethernet	GND	Shield	

Table 5-30: SBU Pins for 10/100BaseT Ethernet

SBU pin	Name	Description	RJ45 pin (F)	Name
BP28	Tx+ 10/100BaseT Ethernet #6	Input	1	TxD+
BP29	Rx+ 10/100BaseT Ethernet #6	Output	3	RxD+

Table 5-30: SBU Pins for 10/100BaseT Ethernet (Continued)

Wiring of RJ45 connector to Quadrax connector

The physical layer conforms to IEEE standard 802.3 [1], Chapter 14: “Twisted Pair medium attachment unit”, except for the connector type. To be compliant with [1], use an RJ45 female connector for the user interface. The below drawing shows the corresponding RJ45 connection. The SBU is configured as Data communication Equipment (DCE), i.e. TX +/- are input and RX +/- are outputs.

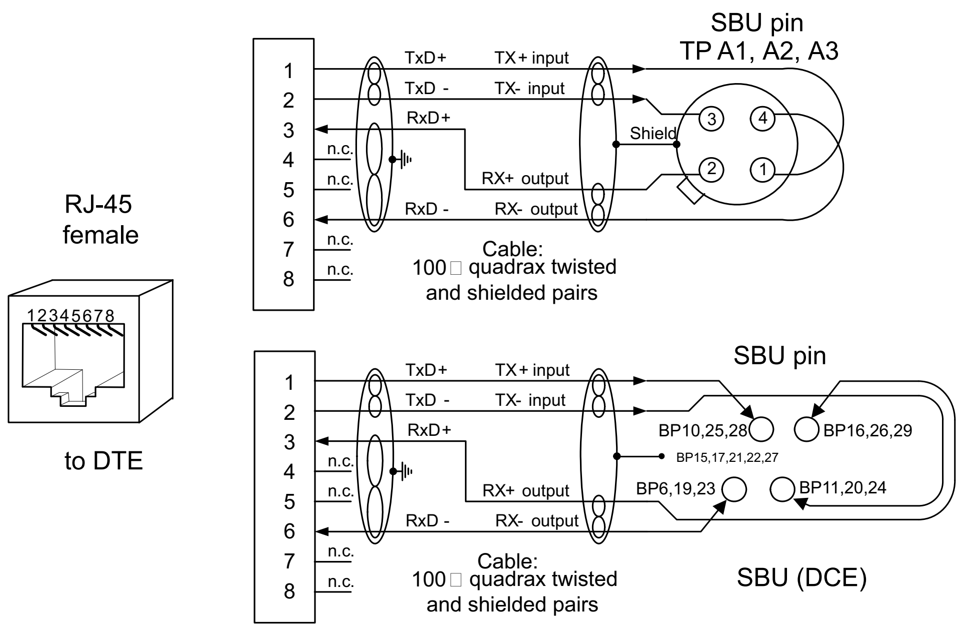


Figure 5-19: Ethernet pin configuration for SBU

Common Signal GND (BP15, BP17, BP21, BP22 and BP27)

Common Signal GND is used to connect the shield of the Ethernet cables for Ethernet #4, #5 and #6 on the SBU. The shield for each cable is connected according to **Figure 5-18: Wiring Ethernet**. The shield of the Ethernet cables for Ethernet #1, #2 and #3 is connected to the shield of the Quadrax connectors.

5.3.9 Wiring WLAN antenna interface

Before wiring the WLAN antenna interface make sure that your system has the Built-in Wireless Option TT-5040A-003.

Overview

The following drawing shows the wiring of the SBU WLAN antenna interfaces.

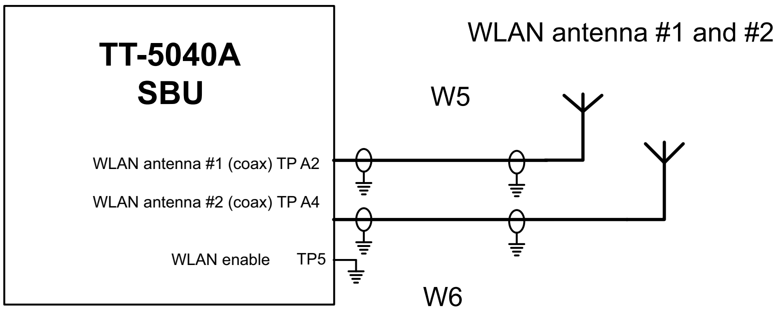


Figure 5-20: Wiring WLAN antenna interfaces #1 and #2

WLAN low pass filter

The WLAN module in the SBU can in theory transmit in the 5 GHz (802.11a) frequency range. This is inhibited permanently by the software in the SBU. If the aircraft cannot be tested to be immune to 5 GHz signals, you can optionally insert a 2.4 GHz low pass filter into the WLAN Coax to safeguard the aircraft against transmission in the 5 GHz frequency range.

WLAN pins

The following list shows the pins used for the WLAN antenna interface on the SBU.

SBU pin	Name/description
TPA2	WLAN antenna #1 (coax)
TPA4	WLAN antenna #2 (coax)
TP5	WLAN Enable, Discrete Input (active low)

Table 5-31: SBU pins for WLAN antenna #1 and #2

Description of WLAN interface

The WLAN interface on the SBU supports operation according to the IEEE 802.11b and 802.11g standards. The WLAN (2.4GHz) frequency band is divided into 14 channels.

Not all countries allow full use of all channels. Also, some countries do not allow operation according to the 802.11g standard. Therefore the WLAN interface must be set up to the right country code. For further information, see ***WLAN country codes*** on page E-1.

The maximum EIRP output level for WLAN 802.11b and 802.11g is 100 mW for indoors use. To prevent the EIRP output power from exceeding this limit, the maximum antenna gain must not exceed the cable loss between the antenna and the SBU.

Operating with a single WLAN antenna

If operating with a single WLAN antenna, it is recommended to use the WLAN pin TP A4.

Make sure to set up WLAN interface correctly – Antenna configuration: Main or Aux for single antenna operation – see ***WLAN interface of the SBU*** on page 6-31.

Antenna configuration	SBU TP A2	SBU TP A4
Diversity (antenna #1 and #2)	RX	TX/RX
Main (antenna #2)	–	TX/RX
Aux (antenna #1)	TX/RX	–

Table 5-32: WLAN antenna configuration

RF cable requirements for WLAN

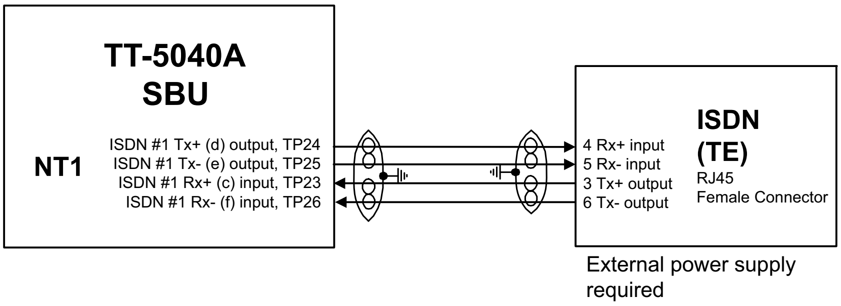
To achieve optimal performance for the WLAN system select a cable type with a minimal cable loss when cabling the TT5040A-004 WLAN antenna. For a table with cable types and cable losses see ***Recommended RF cables*** on page 5-88.

Cable	Min. cable loss @2.4 GHz	Max. cable loss @2.4 GHz
From TP A2 to TT5040A-004 WLAN antenna and TP A4 to TT5040A-004 WLAN antenna	0 dB	5 dB

Table 5-33: Cable requirements for WLAN

5.3.10 Wiring ISDN

Wiring drawing



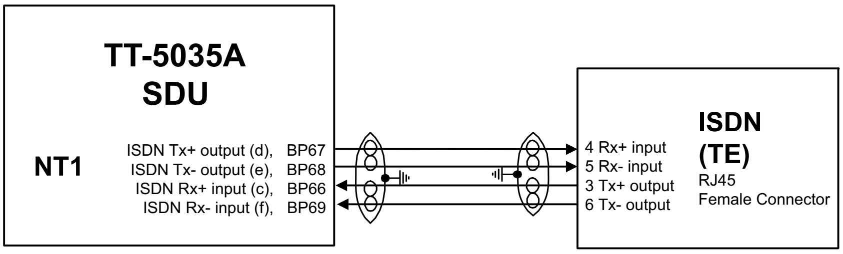


Figure 5-21: Wiring ISDN

Note that even though the AVIATOR 700 system supports connection of several ISDN devices, the satellite channel only supports transmission on one ISDN channel.

Pins for ISDN

The following list shows the pins used for the ISDN interfaces on the SBU and the SDU.

SBU pin	Name/description
TP23	ISDN #1 Rx+ (c) input (NT)
TP24	ISDN #1 Tx+ (d) output (NT)
TP25	ISDN #1 Tx- (e) output (NT)
TP26	ISDN #1 Rx- (f) input (NT)
TP15	ISDN #2 Tx+ (c) output (TE), reserved for future use
TP16	ISDN #2 Rx+ (d) input (TE), reserved for future use
TP17	ISDN #2 Rx- (e) input (TE), reserved for future use
TP18	ISDN #2 Tx- (f) output (TE), reserved for future use

Table 5-34: SBU pins for ISDN

SDU pin	Name/Description
BP67	ISDN Tx+ output (d)
BP68	ISDN Tx- output (e)
BP66	ISDN Rx+ input (c)
BP69	ISDN Rx- input (f)

Table 5-35: SDU pins for ISDN

Description of SBU and SDU ISDN interface

The SBU and SDU have one ISDN interface each. The ISDN of the SDU uses the Swift64 service (I3), the ISDN of the SBU uses the SwiftBroadband service (I4). Each interface has its own ISDN controller and front end.

The Euro ISDN S-bus interface is configured as the network side of the NT1 interface i.e. Rx is an input and Tx is an output Please note that this configuration of input and output differs from the configuration of the 10BaseT Ethernet, RS-422 and RS-232 PC interface input/output (valid for SBU and SDU).

The ISDN interface can address up to 8 ISDN devices. The SBU ISDN interface supports 56/64kbps data rate and G4 Fax on the SwiftBroadband connection. You can also use the SBU ISDN interface to make an AMBE2 or 3.1 kHz audio call. The SDU interface supports 56/64kbps data rate and G4 Fax on Swift64.

Important There is no DC power on the ISDN interface of the SBU. All ISDN devices connected to the SBU must be powered externally.

To be compliant with ISO8877 [2] and the ISDN connector specification defined by ITU I.420 [6], an RJ45 Female Connector must be connected to the four-wire ISDN lines from the SBU.

The SBU includes an internal 100 Ω termination resistor to support cable lengths up to 100 meters (109 yards). Make sure the other end of the cable is terminated properly.

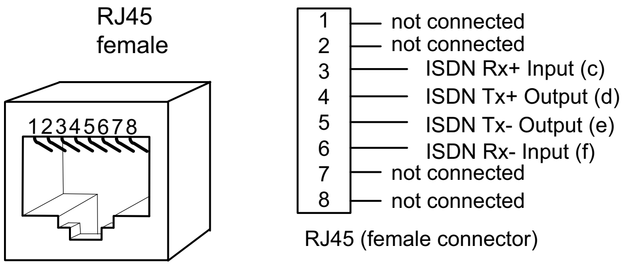


Figure 5-22: ISDN RJ45 connector

Cable requirements, ISDN

- Cable for the ISDN interface: 100 Ω 4-wire shielded cable.
- The conductors must be twisted in pairs.
- Supported cable lengths: up to 100 meters (328 feet).

5.3.11 Wiring telephone systems

Built-in Private Branch Exchange (PBX)

The AVIATOR 700 system has two built-in PBX systems: one in the SDU and one in the SBU.

- The PBX of the SDU controls four 4-wire audio interfaces, two 2-wire POTS interfaces and one ISDN interface.
- The built-in PBX of the SBU controls the 2-wire POTS interfaces #1 and #2 and one ISDN interface.

The built-in PBX of the SBU can also route VoIP calls that are terminated in the SIP server of the SBU.

Note that the AVIATOR 700 system supports one external call at a time going through the SBU and two external calls going through the SDU.

VoIP calls and SIP telephony

You can use phones with a SIP client and the WLAN interface to make calls. These calls are terminated in the SIP server of the SBU and routed as a CS call through the built-in PBX on the Swift Broadband channel. For a detailed description how to setup your phone see ***SIP setup for Wifi-enabled phones*** on page H-1.

4-wire audio

The 4-wire interfaces can be connected and configured to the 4-wire systems listed below:

- TT-5620A/TT-5622A Handset/Cradle system
- Up to two MagnaStar AIU (Analog Interface Units)
- One Iridium ICS telephone system
- Up to three 2.4 GHz Cordless handset base stations with WH-10 Satcom interface
- Up to three WH-10 handsets
- Up to two Cockpit Voice Interfaces

The four 4-wire handset interfaces are numbered handset interface #1 to #4.

- Handset interface #1 and #2 may interface to all systems mentioned above.
- Handset interface #3 may interface to all systems mentioned above except Cockpit Voice.
- Handset interface #4 may only interface to TT-5620A/TT-5622A Handset/Cradle system.

The TT-5620A/TT-5622A 4-wire Handset/Cradle system is also used for configuration of the handsets, phone book etc., and as a BITE and Satcom Status display. In order to use these features, the SDU must be connected to at least one TT-5620A/TT-5622A Handset/Cradle system (typically handset #4).

2-wire POTS interface #1 and #2

The 2-wire interfaces may be connected and configured to the 2-wire systems listed below:

- TT-5621B 2-Wire Handset / TT-5622B 2-Wire Cradle
- ICG DECT Cordless Handset with POTS interface
- Sigma[7] phone with POTS interface
- Fax or Modem data with POTS interface
- Headset interface box PTA-12 Airborne telephone adapter
- Secure devices with POTS interface (STU/FNBDT)

The maximum number of telephones on each 2-wire POTS interface is:
Two TT-5621B 2-Wire Handset / TT-5622B 2-Wire Cradle or two Sigma[7] phones.

The AVIATOR 700 system supports 3 external call at a time: 2 calls on H^+, 1 call on SwiftBroadband.

ISDN interface

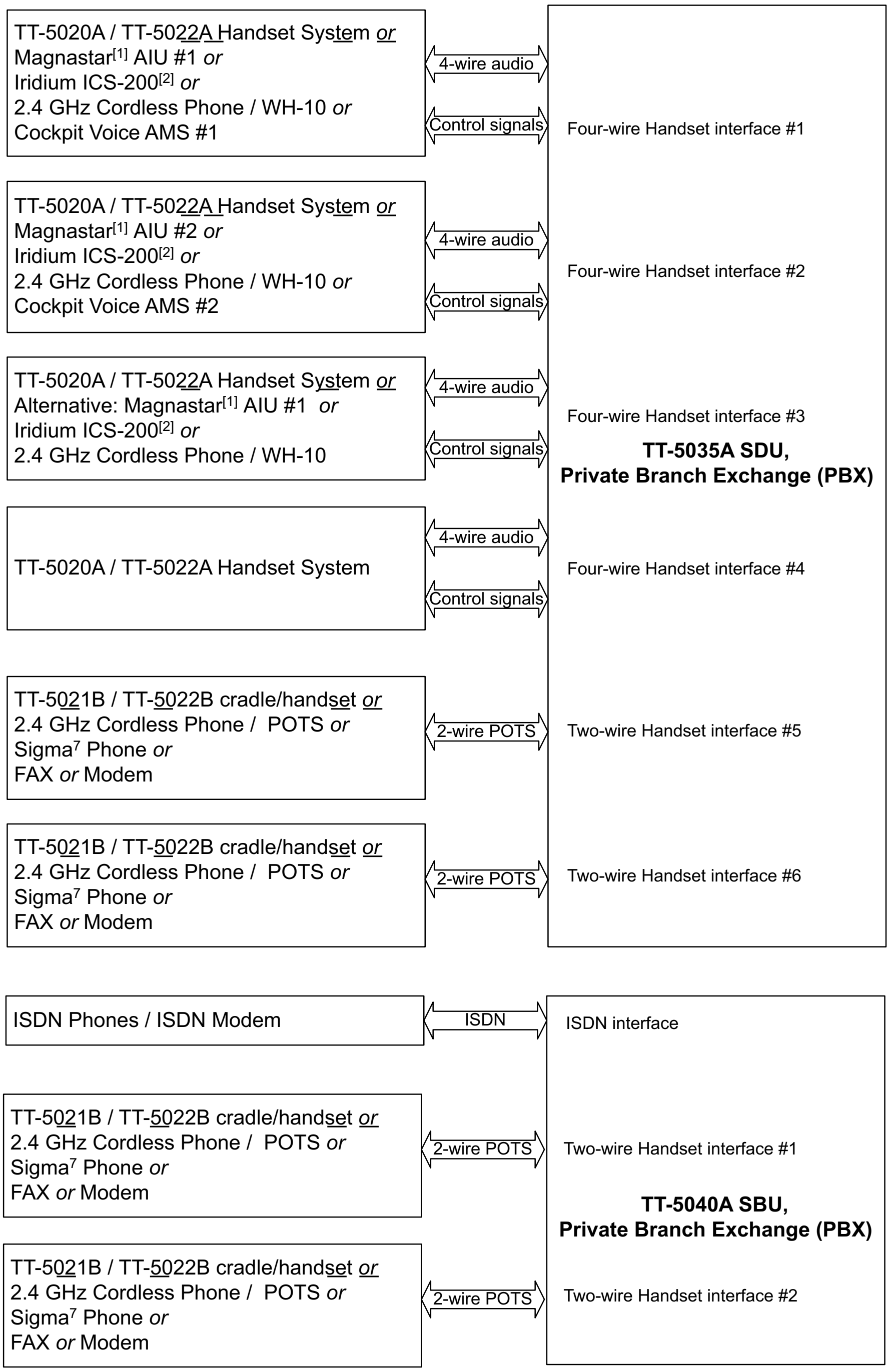
The ISDN interface on the SBU and SDU may be used with an ISDN phone or fax machine and/or an ISDN data modem.

A maximum of 8 ISDN units (ISDN phones, ISDN fax or ISDN data modem) may be connected to the ISDN interface, but only one unit may be active at a time.

Secure device is supported with ISDN interface (STE).

Configuration of wired handset interfaces

The following drawing shows the possible combinations of devices connected to the handset interfaces.



[1]: Maximum two MagnaStar AIUs may be installed. The preferred installation of AIU #1 is to the four-wire Handset #1 interface, but AIU #1 may alternatively be connected to the four-wire Handset #3 interface instead.

[2]: Two handset interfaces from the ICS-200 system can be connected to two of the three 4-wire interfaces #1, #2 and #3.

Figure 5-23: Handset interfaces, possible combinations of connected devices.

Wiring 4-Wire Handsets

The following drawing shows the wiring of the TT-5622A/TT-5620A 4-Wire Handsets.

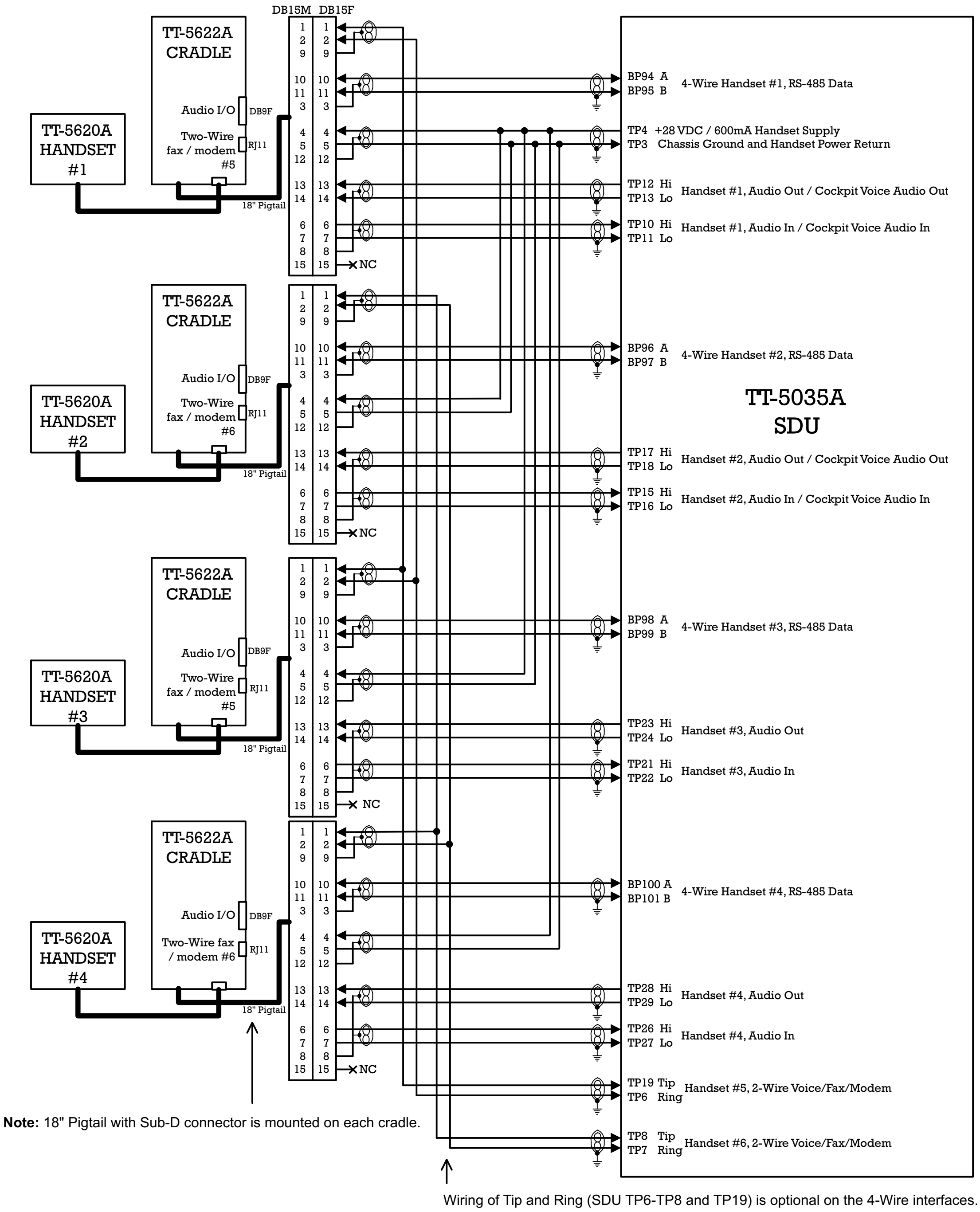


Figure 5-24: Wiring T&T 4-Wire Handset systems

SDU pins for 4-wire interfaces

Pin no.	Name/Description
TP10	Handset #1 Audio In Hi / Cockpit Voice Audio #1 In Hi
TP11	Handset #1 Audio In Lo / Cockpit Voice Audio #1 In Lo
TP12	Handset #1 Audio Out Hi / Cockpit Voice Audio #1 Out Hi
TP13	Handset #1 Audio Out Lo / Cockpit Voice Audio #1 Out Lo
BP94	Handset #1 RS-485 Data A
BP95	Handset #1 RS-485 Data B
TP15	Handset #2 Audio In Hi / Cockpit Voice Audio #2 In Hi
TP16	Handset #2 Audio In Lo / Cockpit Voice Audio #2 In Lo
TP17	Handset #2 Audio Out Hi / Cockpit Voice Audio #2 Out Hi
TP18	Handset #2 Audio Out Lo / Cockpit Voice Audio #2 Out Lo
BP96	Handset #2 RS-485 Data A
BP97	Handset #2 RS-485 Data B
TP21	Handset #3 Audio In Hi
TP22	Handset #3 Audio In Lo
TP23	Handset #3 Audio Out Hi
TP24	Handset #3 Audio Out Lo
BP98	Handset #3 RS-485 Data A
BP99	Handset #3 RS-485 Data B
TP26	Handset #4 Audio In Hi
TP27	Handset #4 Audio In Lo
TP28	Handset #4 Audio Out Hi
TP29	Handset #4 Audio Out Lo
BP100	Handset #4 RS-485 Data A
BP101	Handset #4 RS-485 Data B
TP4	+28 V DC / 600 mA Handset supply, remote On/Off control by TP5 (nON)
TP3	Handset Power Return
TP25	+12 V DC Spare Supply for test only - do not connect!

Table 5-36: SDU pins for 4-wire interface

Description of 4-wire interfaces

The SDU has four 4-wire analog interfaces for the TT-5620A/ TT-5622A Thrane & Thrane aeronautical handset system on the rear connector. The handsets use an RS-485 data bus for on/off hook signalling, display control, keyboard control, background light, etc.

Important AVIATOR 700D: For safety reasons do not install the 4-wire handset in the cabin, see also ***Mounting considerations***, ***SDU*** on page 5-5.

Three of the 4-wire interfaces, #1, #2 and #3, can alternatively be used for connection of other supported phones (MagnaStar, WH-10 phones, Iridium ICS-200 telephone system, FONE). For information on possible combinations, see ***Configuration of wired handset interfaces*** on page 5-51. You must configure the handset interfaces must be configured in the Aero-SDU Configuration Program.

For information on wiring of WH-10 phones, refer to ***Wiring WH-10 handsets*** on page 5-57.

For information on wiring of ICS-200 telephone system, refer to ***Wiring ICS-200 telephone system*** on page 5-60.

For information on wiring of 2.4GHz Cordless phones, refer to ***Wiring 2.4GHz Cordless (4-wire) phone*** on page 5-63.

Wiring 2-Wire Handsets

The following drawing shows the wiring of the TT-5621B 2-Wire Handset / TT-5622B 2-Wire Cradle.

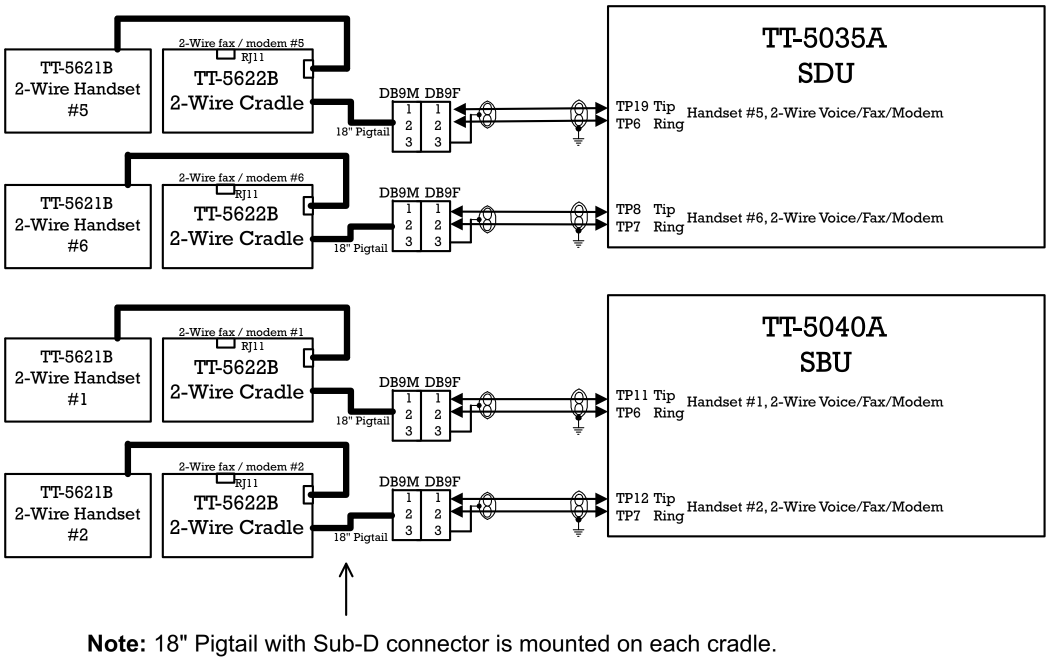


Figure 5-25: Wiring T&T 2-Wire Handset systems

Pins for 2-wire interfaces

The below lists show the pins used for the 2-wire interfaces of the SDU and the SBU.

SDU pin	Name/Description
TP6	2-Wire Voice/Fax/Modem #1 (Ring)
TP7	2-Wire Voice/Fax/Modem #2 (Ring)
TP8	2-Wire Voice/Fax/Modem #2(Tip)
TP19	2-Wire Voice/Fax/Modem #1 (Tip)

Table 5-37: SDU pins for 2-wire interface

SBU pin	Name/Description
TP6	2-Wire Voice/Fax/Modem #1 (Ring)
TP7	2-Wire Voice/Fax/Modem #2 (Ring)

Table 5-38: SBU pins for 2-Wire interface

SBU pin	Name/Description
TP11	2-Wire Voice/Fax/Modem #1 (Tip)
TP12	2-Wire Voice/Fax/Modem #2 (Tip)

Table 5-38: SBU pins for 2-Wire interface

Description of 2-wire interfaces

The SDU and the SBU each have two 2-wire Voice/Fax/Modem POTS interfaces connected to the PBX. The interfaces comply with 2-wire 600 Ω standard US DTMF telephones. The 2-wire interfaces are not galvanically isolated from the aircraft frame. Galvanic isolation is required at the external 2-wire terminal.

Two TT-5621B 2-Wire Handset phones can be connected in parallel on each interface. These interfaces are used for the TT-5621B/ TT-5622B Thrane & Thrane aeronautical handset system, but may also be used for e.g. the Sigma[7], ICG DECT Cordless Handset phones, fax, modem or secure devices and PTA-12.

For information on wiring of Sigma[7] phones, see ***Wiring Sigma[7] (2-wire) handsets*** on page 5-66. For information on wiring of ICG DECT Cordless Handset phones, see ***Wiring ICG DECT Cordless Handset (2-wire) phone*** on page 5-67.

- Supported cable length: 100 meters (328 feet)

5.3.12 Wiring WH-10 handsets

Overview

The following drawing shows the wiring of WH-10 handsets.

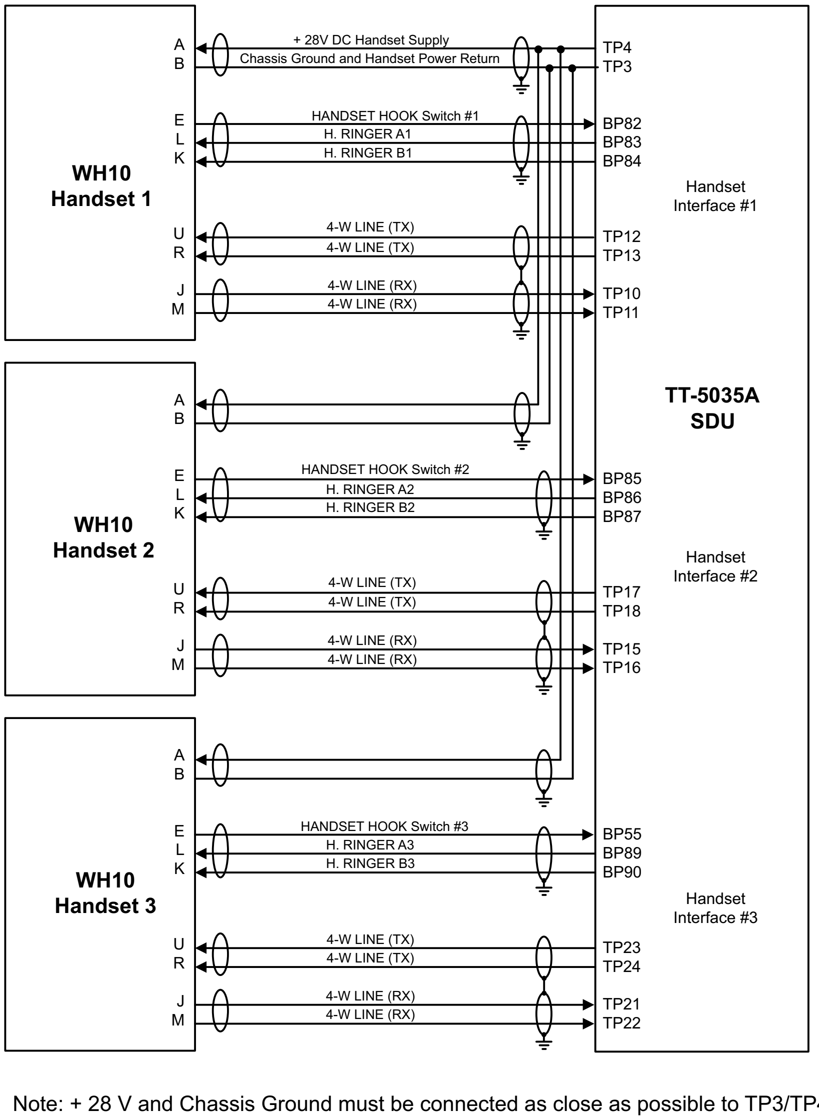


Figure 5-26: Wiring WH-10 handsets

WH-10 pins

The below list shows the pins used for the WH-10 interfaces on the SDU.

Pin no.	Name/Description
TP3	Chassis Ground and Handset Power Return
TP4	+28 V DC/600 mA Handset Supply
TP10	Handset #1 Audio In Hi / Cockpit Voice Audio #1 In Hi
TP11	Handset #1 Audio In Lo / Cockpit Voice Audio #1 In Lo
TP12	Handset #1 Audio Out Hi / Cockpit Voice Audio #1 Out Hi
TP13	Handset #1 Audio Out Lo / Cockpit Voice Audio #1 Out Lo
BP82	WH-10/MagnaStar Hook Switch #1. Discrete input.
BP83	WH-10/MagnaStar Ringer Output A1. Discrete I/O.
BP84	WH-10/MagnaStar Ringer Output B1. Discrete output.
TP15	Handset #2 Audio In Hi
TP16	Handset #2 Audio In Lo
TP17	Handset #2 Audio Out Hi
TP18	Handset #2 Audio Out Lo
BP85	WH-10/MagnaStar Hook Switch #2. Discrete input.
BP86	WH-10/MagnaStar Ringer Output A2. Discrete I/O.
BP87	WH-10/MagnaStar Ringer Output B2. Discrete output.
TP21	Handset #3 Audio In Hi
TP22	Handset #3 Audio In Lo
TP23	Handset #3 Audio Out Hi
TP24	Handset #3 Audio Out Lo
BP55	WH-10/MagnaStar Hook switch #3
BP89	WH-10/MagnaStar Ringer Output A3. Discrete I/O.
BP90	WH-10/MagnaStar Ringer Output B3

Table 5-39: SDU pins for WH-10 interface

Description of WH-10 interfaces

Up to three WH-10 systems can be connected to the AVIATOR 700 system, using the interfaces #1, #2 or #3.

Note The 4-wire handset system #1, #2 and #3 interfaces are used for either the 4-Wire Handset system, MagnaStar, ICS-200, 2.4GHz Cordless or WH-10 phones, as configurations share the same interface. For information on possible combinations, see ***Configuration of wired handset interfaces*** on page 5-51.

The handset interfaces must be configured in the Aero-SDU Configuration Program.

For further information on the interfaces, see ***SDU pins for 4-wire interfaces*** on page 5-53.

Apart from the handset interfaces, the SDU has a number of discrete inputs/outputs used for MagnaStar/WH-10 systems. For information on these interfaces, see ***Discretes for WH-10 handset systems*** on page 5-59.

5.3.13 Discretes for WH-10 handset systems

The below list shows the discretes used for the MagnaStar/WH-10 interfaces on the SDU. For more information on the discrete types, refer to ***Description of the discrete types*** on page 5-71.

Pin no.	Name/Description	Discrete Type
BP54	MagnaStar: Satcom Service Unavailable	Lamp Driver output
BP55	WH-10/MagnaStar Hook switch #3	WOW input
BP82	WH-10/MagnaStar Hook Switch #1	WOW input
BP83	WH-10/MagnaStar Ringer Output A1	Lamp Driver output
BP84	WH-10/MagnaStar Ringer Output B1	Lamp Driver output
BP85	WH-10/MagnaStar Hook Switch #2	WOW input
BP86	WH-10/MagnaStar Ringer Output A2	Lamp Driver output
BP87	WH-10/MagnaStar Ringer Output B2	Lamp Driver output
BP89	WH-10/MagnaStar Ringer Output A3	Lamp Driver output
BP90	WH-10/MagnaStar Ringer Output B3	Lamp Driver output

Table 5-40: SDU discretes for MagnaStar/WH-10 systems

5.3.14 Wiring ICS-200 telephone system

Important When simultaneously operating the AVIATOR 700 over the Inmarsat network and the ICS-200 there is a potential risk of interference.

Overview

The following drawing shows the wiring of the ICS-200 telephone system.

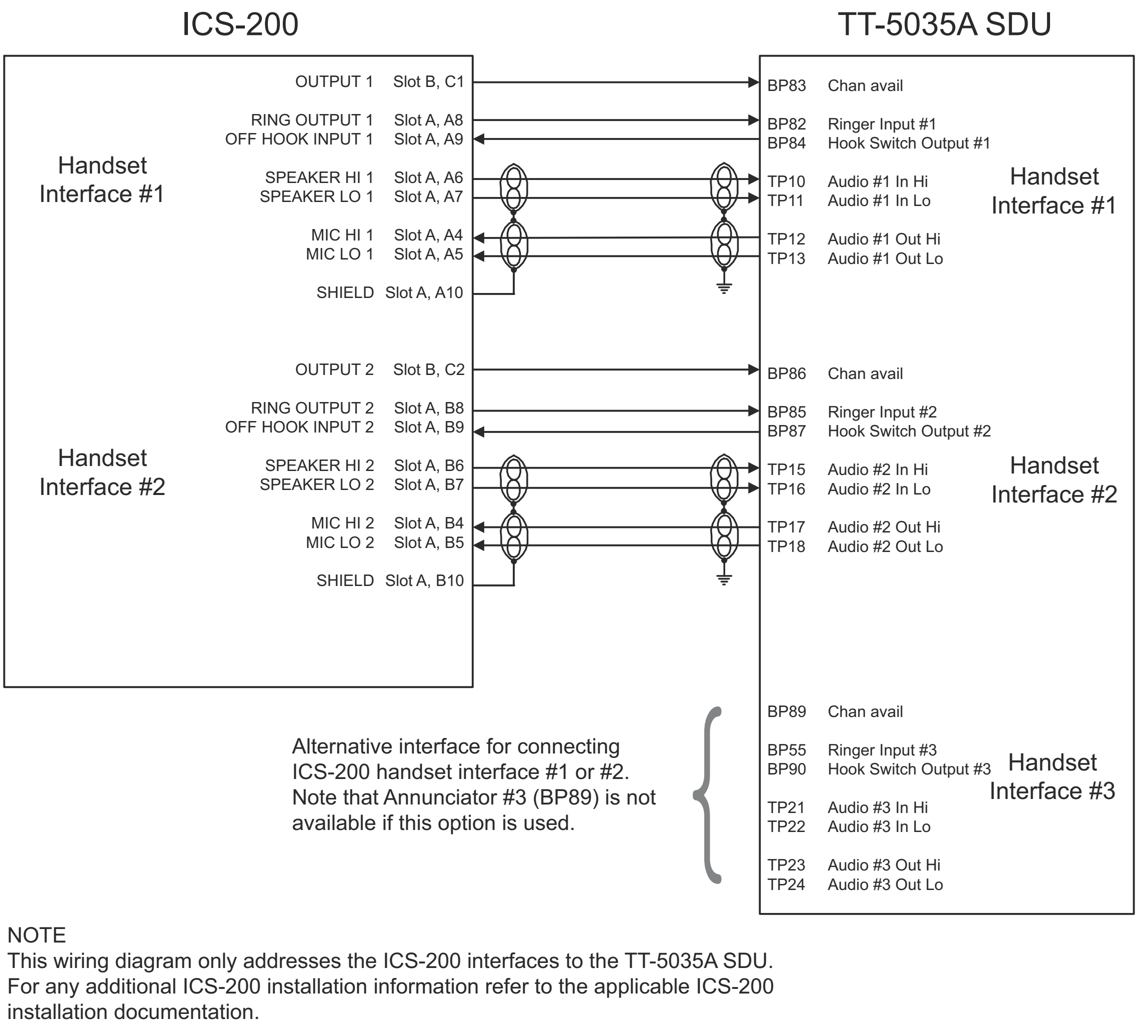


Figure 5-27: Wiring ICS-200 Iridium Communication System interface

Pins on SDU for ICS-200 telephone system

The below list shows the pins used for the ICS-200 interface on the SDU.

Pin no.	Name/Description
TP10	Handset #1 Audio In Hi
TP11	Handset #1 Audio In Lo
TP12	Handset #1 Audio Out Hi
TP13	Handset #1 Audio Out Lo
BP82	ICS-200 Ringer Input #1
BP83	ICS-200 Hook Switch Output #1
TBD	TBD
TP15	Handset #2 Audio In Hi
TP16	Handset #2 Audio In Lo
TP17	Handset #2 Audio Out Hi
TP18	Handset #2 Audio Out Lo
BP85	ICS-200 Ringer Input #2
BP86	ICS-200 Hook Switch Output #2
TBD	TBD
BP54	Satcom Service Unavailable
TP21	Handset #3 Audio In Hi
TP22	Handset #3 Audio In Lo
TP23	Handset #3 Audio Out Hi
TP24	Handset #3 Audio Out Lo
BP55	ICS-200 Ringer Input #3
BP89	ICS-200 Hook Switch Output #3
TBD	TBD

Table 5-41: SDU pins for ICS-200 interface

Description of Iridium ICS-200 interface

The Iridium Communication System ICS-200 can be connected to the SDU, providing the possibility of routing calls from the AVIATOR 700 system to the Iridium satellite network.

Note

The 4-wire handset system #1, #2 and #3 interfaces are used for either the 4-Wire Handset system, MagnaStar, ICS-200, 2.4GHz Cordless or WH-10 phones, as configurations share the same interface. For information on possible combinations, see ***Configuration of wired handset interfaces*** on page 5-51.

The handset interfaces must be configured in the Aero-SDU Configuration Program.

For further information on the handset interfaces, see ***SDU pins for 4-wire interfaces*** on page 5-53.

Apart from the handset interfaces, the SDU uses the discrete input/output Satcom Service Unavailable.

5.3.15 Wiring 2.4GHz Cordless (4-wire) phone

Overview

The following drawing shows the wiring of 2.4GHz Cordless 4-wire phones.

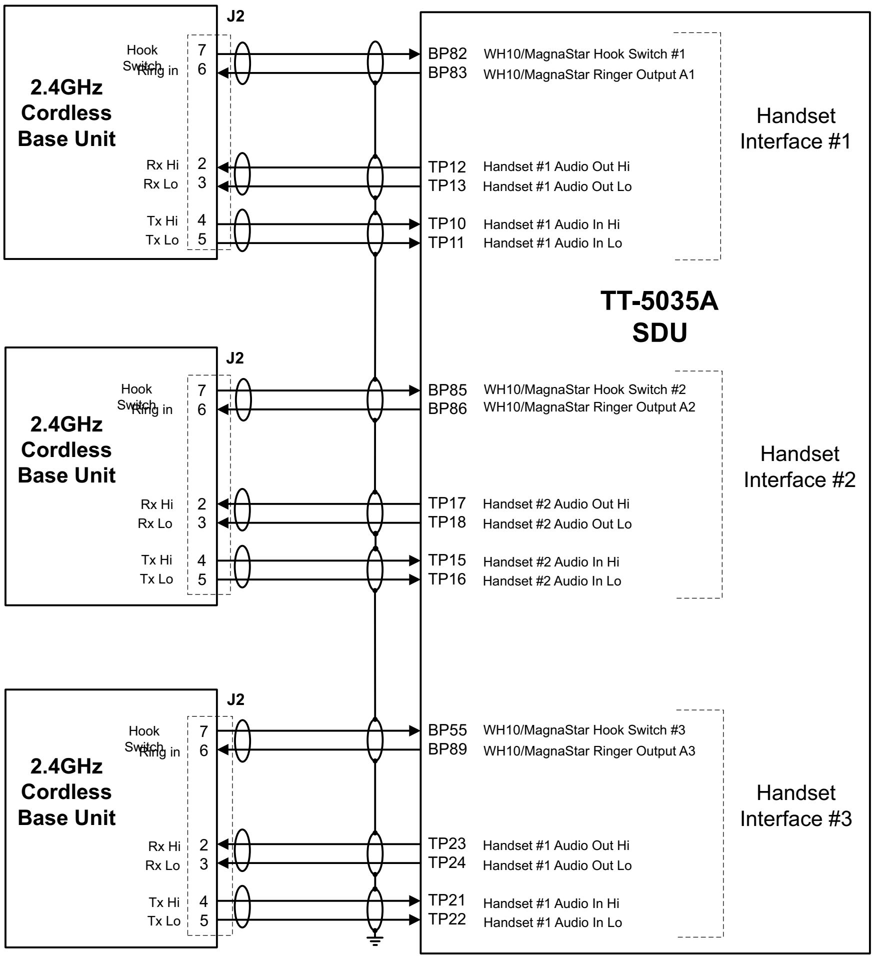


Figure 5-28: Wiring 2.4GHz Cordless 4-wire phones

Note The power for the 2.4GHz Cordless base unit must be supplied from an external power supply. See the 2.4GHz Cordless manual for details.

Pins for 2.4GHz Cordless (WH-10) interfaces

The below list shows the pins used for the 2.4GHz Cordless (WH-10) interfaces on the SDU.

Pin no.	Name/Description
TP10	Handset #1 Audio In Hi
TP11	Handset #1 Audio In Lo
TP12	Handset #1 Audio Out Hi
TP13	Handset #1 Audio Out Lo
BP82	WH-10/MagnaStar Hook Switch #1
BP83	WH-10/MagnaStar Ringer Output A1
TP15	Handset #2 Audio In Hi
TP16	Handset #2 Audio In Lo
TP17	Handset #2 Audio Out Hi
TP18	Handset #2 Audio Out Lo
BP85	WH-10/MagnaStar Hook Switch #2
BP86	WH-10/MagnaStar Ringer Output A2
TP21	Handset #3 Audio In Hi
TP22	Handset #3 Audio In Lo
TP23	Handset #3 Audio Out Hi
TP24	Handset #3 Audio Out Lo
BP55	WH-10/MagnaStar: Hook switch #3
BP89	WH-10/MagnaStar Ringer Output A3

Table 5-42: SDU pins for 2.4GHz Cordless (WH-10) interface

Description of 2.4GHz Cordless interfaces

Up to three 2.4GHz Cordless Handsets can be connected to the AVIATOR 700 system, using the interfaces #1, #2 or #3.

Note: The 4-wire handset system #1, #2 and #3 interfaces are used for either the 4-Wire Handset System, MagnaStar, 2.4GHz Cordless or WH-10 phones, as configurations share the same interface. For information on possible combinations, see ***Configuration of wired handset interfaces*** on page 5-51. Handset interface #4 can only be used for the 4-Wire Handset System.

The handset interfaces must be configured in the Aero-SDU Configuration Program.

For further information on the interfaces, see ***SDU pins for 4-wire interfaces*** on page 5-53.

Apart from the handset interfaces, the SDU has a number of discrete inputs/outputs used for MagnaStar/WH-10 systems. For information on these interfaces, see ***Discretes for WH-10 handset systems*** on page 5-59.

5.3.16 Wiring Sigma^7 (2-wire) handsets

The following drawing shows the wiring of Sigma^7 handsets.

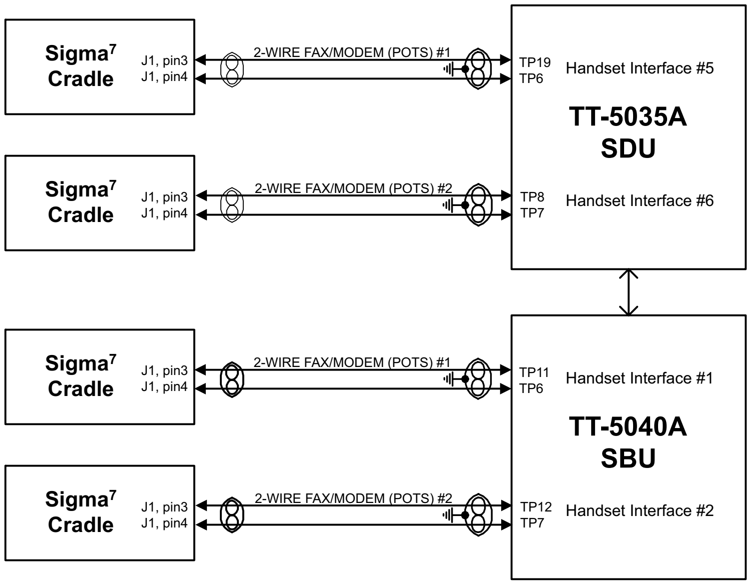


Figure 5-29: Wiring Sigma^7 handsets

Note The above wiring shows the connection for the non-backlit Sigma^7 handset. The backlit version Sigma^7 handset uses pin 6 for Tip 1 and pin 3 for Ring 1.

One to four Sigma^7 handsets can be connected to the 2-wire interfaces of the AVIATOR 700 system.

Connect J1 on the Sigma^7 handset to the rear receptacle of the SDU and/or SBU according to the wiring drawing above.

Important In order for the volume in the Sigma^7 handset to be sufficient, it is normally necessary to adjust the “ear volume” using the menu system of the handset. For information on how to do this, see ***Sigma^7 setup*** on page 6-94.

For information on the 2-wire interface, see ***Pins for 2-wire interfaces*** on page 5-55.

5.3.17 Wiring ICG DECT Cordless Handset (2-wire) phone

The following drawing shows the wiring of ICG DECT Cordless Handset 2-wire phones.

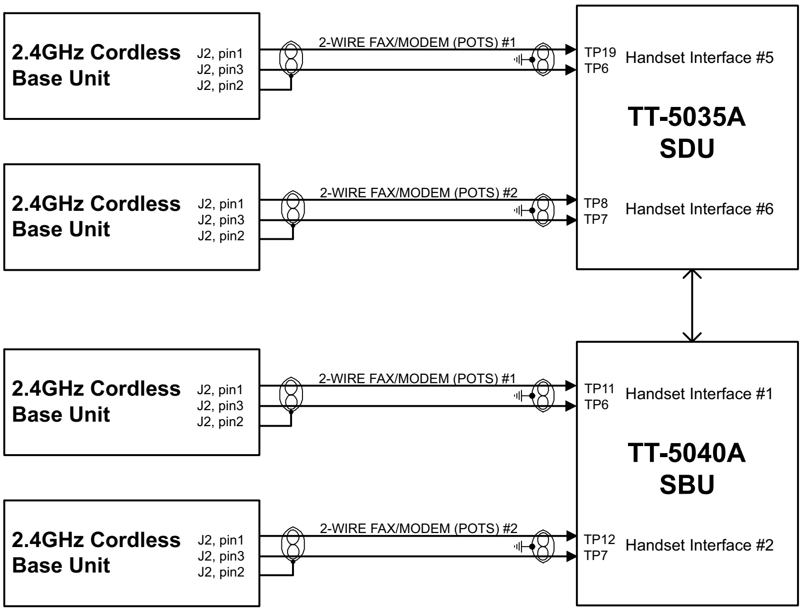


Figure 5-30: Wiring 2.4GHz Cordless handsets

One to four ICG DECT Cordless Handset phones can be connected to the 2-wire interfaces of the AVIATOR 700 system.

Connect J2 on the base station of the ICG DECT Cordless Handset phone to the rear receptacle of the SDU and/or SBU according to the wiring drawing above. The base station is supplied together with the handset and cradle.

Important In order for the ICG DECT Cordless Handset phone to work properly, it is normally necessary to make a few initial adjustments of the handset. For information on how to do this, see ***ICG DECT Cordless Handset setup*** on page 6-95.

For information on the 2-wire interface, see ***Pins for 2-wire interfaces*** on page 5-55.

5.3.18 Wiring discretes

Discrete annunciators, Chime/Lamps Inhibit and WOW

The following drawing shows the wiring of discrete annunciators, Chime/Lamps Inhibit and Weight-on-Wheels (WOW).

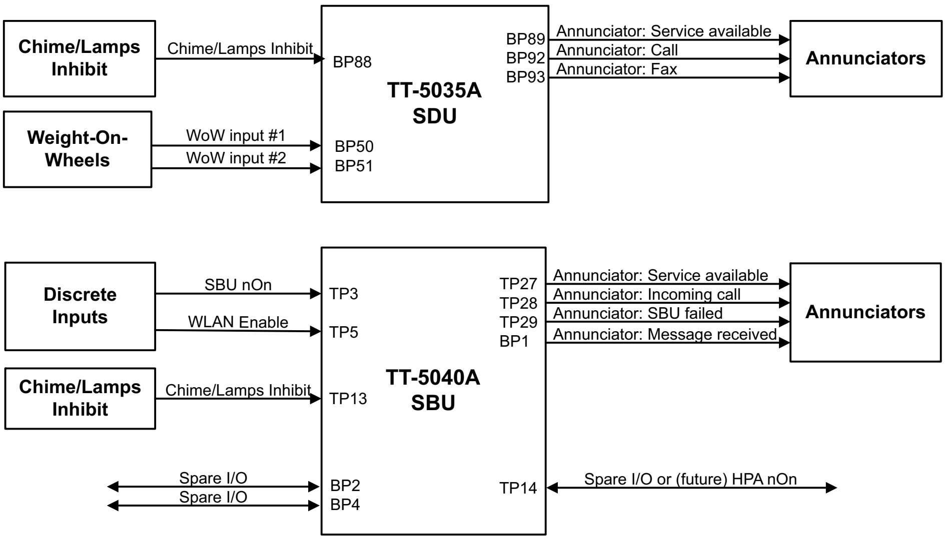


Figure 5-31: Wiring discrete annunciators and Weight-on-Wheels

Pins for discrete annunciators

The following list shows the pins used for discrete annunciators:

SDU Pin	Name/Description	Specification of discrete type[a]
BP89	Annunciator #3 “Service Available” (Discrete I/O)	Output: Lamp Driver
BP92	Annunciator #1 “Call” (Discrete I/O)	Output: Lamp Driver
BP93	Annunciator #2 “Fax” (Discrete Output)	Output: Lamp Driver

Table 5-43: SDU pins for discrete annunciators

a. The discrete interfaces are described in ***Description of the discrete types*** on page 5-71.

Note Annunciator #3 on pin BP89 is not available if you are using handset interface #3 for MagnaStar, 2.4GHz Cordless (4-wire) or WH-10 Handsets.

SBU pin	Name and description	Discrete type[a]
TP27	Annunciator #3 “Service available” (Discrete I/O)	Output: Lamp Driver
TP28	Annunciator #1 “Incoming call” (Discrete I/O)	Output: Lamp Driver
TP29	Annunciator #2 “SBU failed” (Discrete I/O)	Output: Lamp Driver
BP1	Annunciator #4 “Message received” (Discrete I/O)	Output: Lamp Driver

Table 5-44: SBU pins for discrete annunciators

a. The discrete interfaces are described in ***Description of the discrete types*** on page 5-71.

Function of discrete annunciators

The function of the **SDU** Annunciators is as follows:

- Annunciator #1 “Call”.
  This Annunciator is used for signalling incoming voice calls. The Annunciator is “flashing” like the Connection LED on a 4-Wire Handset (default setting) and is turned off when the call is answered or terminated by the initiator.
- Annunciator #2 “Fax”.
  This Annunciator is used for signalling incoming fax. The Annunciator is “steady ON” until a receipt for the fax has been given in the handset (default setting).
- Annunciator #3 “Service Available”.
  This Annunciator is used for indicating satcom service availability. The Annunciator is “steady ON” when H^+ service is available (default setting).

You can configure the behavior of the annunciators. To do this use the Aero-SDU Configuration Program. While in the **configuration** select **Ring Profiles**, **Annunciator Behavior** and select for each annunciator.

The function of the **SBU** annunciators is as follows:

- Annunciator #1 “Incoming call” (TP28)
  Default behavior: Active (low) when a handset is ringing.
- Annunciator #2 “SBU Failed” (TP29).
  Default behavior: Active (low) whenever a BITE with severity essential or fatal is active on the SBU. (Fatal in this context means fatal locally on the SBU. When displayed at the SDU any fatal error on the SBU will only cause an essential BITE to be raised at the SDU).
- Annunciator #3 “Service available” (TP27).
  Default behavior: Active (low) when the SwiftBroadband Service is available.
- Annunciator #4 “Message received” (BP1).
  Default behavior: Active (low) when a Message is received in the SBU.

Pins for Chime/Lamps Inhibit input

Pins used for the Chime/Lamps Inhibit input:

SDU Pin	Name/Description	Specification of discrete type[a]
BP88	Chime/Lamps Inhibit Input	Input: WOW (active low)

Table 5-45: SDU Pin for Chime/Lamps Inhibit input

a. The discrete interfaces are described in ***Description of the discrete types*** on page 5-71.

SBU pin	Name/description	Specification of discrete type
TP13	Chime/Lamps Inhibit	Discrete input (default: active low)

Table 5-46: SBU pin for Chime/Lamps Inhibit input

Description of the Chime/Lamps Inhibit interfaces

The SDU and the SBU each have one discrete input for the Chime/Lamps Inhibit function. This input is used to inhibit Satcom activation of the chime and call lights during take-off and landing. The Inhibit function is activated by connecting this input to ground. The Inhibit function of the SDU also activates the ring profile “TakeOfLandng”.

Polarity of the discrete annunciators and Chime/Lamps Inhibit input

The ring profiles are defined using the Aero-SDU Configuration Program where call inhibit/non-inhibit is set up for each of the 4-wire and 2-wire interfaces and annunciators.

In the web interface you can change the polarity of the discrete annunciators and the Chime/Lamps Inhibit input from Active low (default) to Active high. For instructions how to do this see ***Configuring the discrete I/O interfaces of the SBU*** on page 6-47.

Weight-On-Wheels (not currently in use)

The following list shows the pins used for Weight-On-Wheels (WOW):

SDU Pin	Name/Description	Specification of discrete type[a]
BP50	Weight-on-Wheels Input #1	Input: WOW
BP51	Weight-on-Wheels Input #2	Input: WOW

Table 5-47: SDU pins for WOW

a. The discrete interfaces are described in ***Description of the discrete types*** on page 5-71.

The SDU has 2 discrete inputs for Weight-On-Wheels (WOW), which can detect whether the aircraft is airborne or not. Currently this information is not used in the SDU.

The interpretation of the polarity (airframe DC ground or open circuit) of the input is defined by the Configuration Module (WOW Active Polarity).
The Configuration Module also defines if WOW is installed or not. For further information, see the online help in the Aero-SDU Configuration Program.

Pins for non-configurable discrete inputs on the SBU

The SBU has two non-configurable discrete inputs: one for SBU nON, one for WLAN Enable. The below table shows the pin-out for the discrete inputs:

SBU pin	Name/description
TP3	SBU nON input
TP5	WLAN Enable input

Table 5-48: SBU pins for discrete inputs

SBU nON (TP3): The SBU nON input is used to power the SBU on and off. Connect this input to ground to turn on the SBU. The electrical specification is defined in Description of the discrete types below.

WLAN Enable (TP5): WLAN Enable input is used to enable the WLAN interface. The input is active low and the WLAN interface is kept disabled and reset as long as the input is at the high state. When the input is connected to ground or to low state the WLAN interface will be initialized and ready for use. When the WLAN interface is not enabled no RF is emitted from the interface.

Description of the discrete types

Discrete type and description:

Discrete type	Description
Lamp Driver	The SDU and SBU have several discrete Lamp Driver outputs. The output configuration forms a switch closure to ground. The electrical specification for the Lamp type switch is: Open switch hold-off voltage: max. +39.5 V DC Closed switch voltage: max. 1 V DC at 500 mA Open switch resistance (OFF): min. 100 kΩ

Table 5-49: Specification of discrete types

Discrete type	Description
Discrete input	The discrete input detects the following states: “Open” voltage: 7 V DC to 39.5 V DC or $\geq$100 kΩ to ground. “Short” voltage: 0 ±3.5 V DC or $\leq$1500 Ω to ground. Input characteristics: Reaction time is <500 ms. The internal interface is diode-isolated for parallel connection externally to any other LRU(s), with at least 200 kΩ of isolation, when power is not applied.

Table 5-49: Specification of discrete types (Continued)

5.3.19 Wiring Cockpit Voice interface

Introduction

The Cockpit Voice interface must be wired to the Audio Management System (AMS) and an Audio Control Panel (ACP) or similar. Figure 5-32: shows a typical Cockpit Voice installation. Pay attention to the drawing notes:

NOTES:

[1] The balanced audio outputs from the SDU (TP10, TP11, TP17 and TP18) are not transformer coupled. Do not connect HI or LO output to ground.

[2] Off-hook is signalled in 3 ways (per configuration). Use either

- Push-To-Talk (PTT) switch
- Latched Audio Control Panel switch
- MCDU line switch

[3] If the AMS has unbalanced audio inputs or outputs, transformers should be inserted in the audio lines, to convert the balanced signals to unbalanced and vice versa. Figure 5-33: shows a typical installation for an AMS with unbalanced audio inputs/ outputs. The ***Universal Interface Amplifier*** model 270-16 from ***Northern Airborne Technology*** (NAT) has built-in transformers. Alternatively the model AA34-300 may be used (with the same I/O pin configuration). The settings of the Universal Interface Amplifier are listed in Table 5-51 on page 5-76 and Table 5-52 on page 5-77.

Northern Airborne Technology (NAT) part numbers

Part name	Part number
Universal Interface Amplifier	Model 270-16
Universal Radio Interface	Model AA34-300

Table 5-50: Northern Airborne Technology (NAT) part numbers.

Typical Cockpit Voice installation

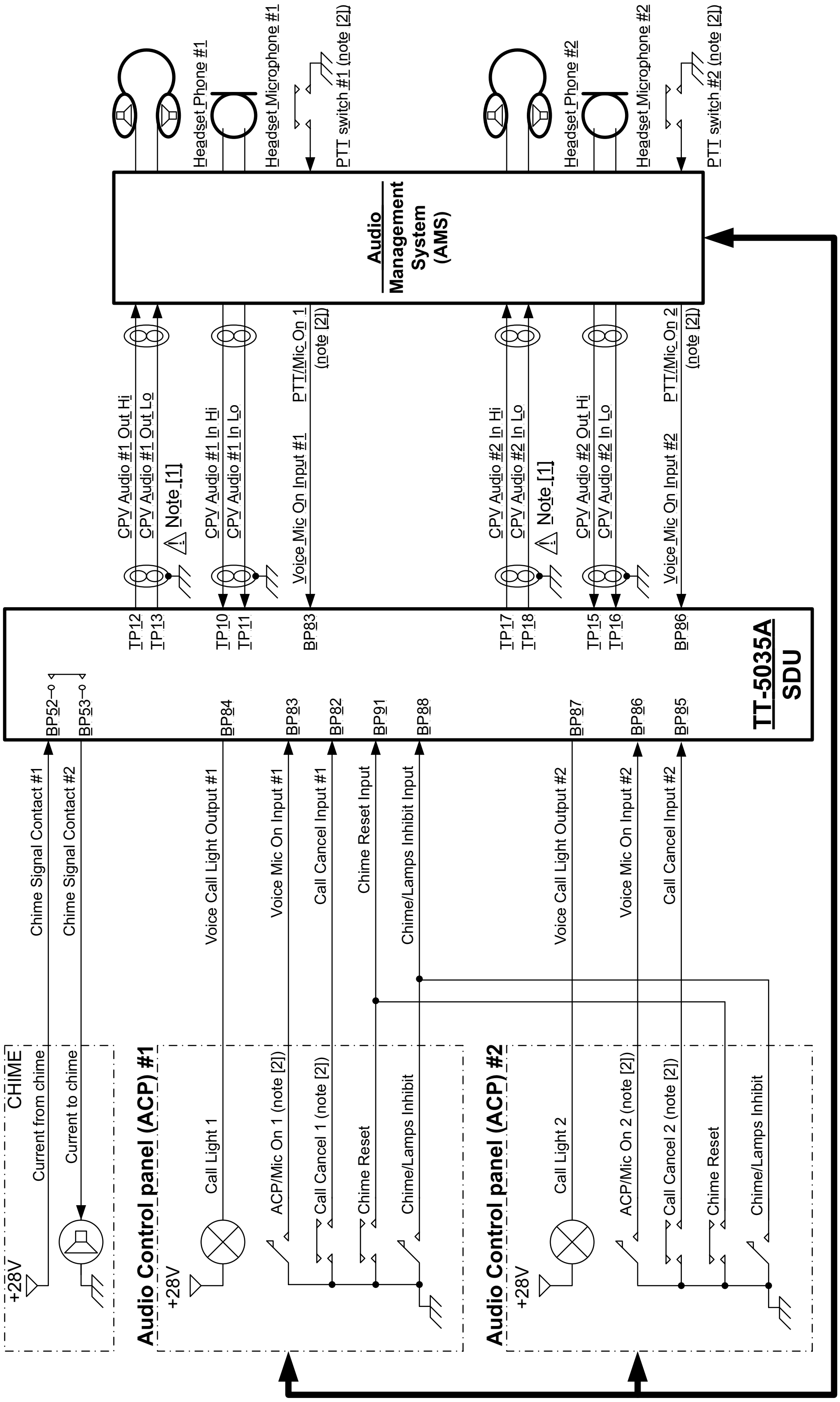


Figure 5-32: Typical Cockpit Voice installation

Cockpit Voice with unbalanced AMS audio interface

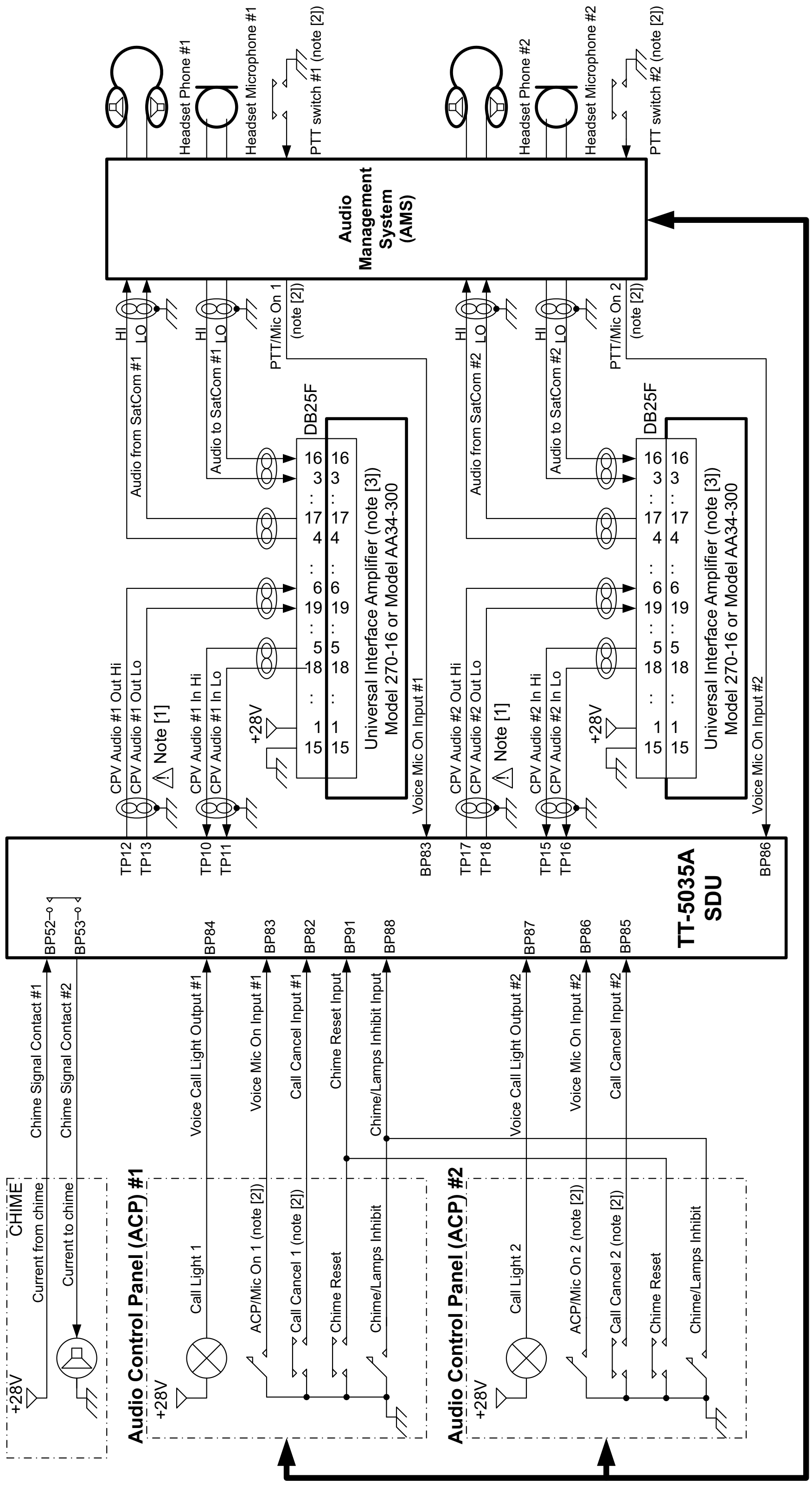


Figure 5-33: Typical Cockpit Voice installation with unbalanced AMS audio interface

NAT, Universal Interface Amplifier model 270-16 settings

Switch/Jumper/ Adjustment ID	NAT, Universal Interface Amplifier model 270-16 settings
9V bias, MS3	The SDU does not provide microphone DC power. If the microphone needs DC-power, and if the AMS does not provide DC power this switch shall be set to "9V bias".
Load Sel. MS4	Set switch to 600 Ohm (Audio output channel to AMS Audio Input).
Load Sel. MS5	Set switch to 600 Ohm (Mic. output channel to SDU Audio Input).
Mic SDTN	Set mic. side tone level to minimum (side tone is handled by the SDU).
Mic. Gain	The mic. gain can be adjusted, but it is preferred to use the SDU adjustment capability (approximately 18dB). As starting point the mic. gain should be set to maximum.
Rcvr. level	The receiver level (headset phone level) can be adjusted, but it is preferred to use the SDU adjustment capability (approximately 18dB). As starting point the Rcvr. level should be set to maximum, and the audio output from the SDU should be adjusted to match other system components (VHF radios etc).

Table 5-51: Universal Interface Amplifier model 270-16 settings

NAT, Universal Interface Amplifier model AA34-300 settings

Switch/Jumper/ Adjustment ID	NAT, Universal Interface Amplifier model AA34-300 settings
Microphone DC bias, S1	The SDU does not provide microphone DC power. If the microphone needs DC-power, and if the AMS does not provide DC power this switch shall be set to "closed".
Microphone gain C1/C2	Set switch to "C2" in order to select the microphone amplifier and the transformer coupling.
Mic. output impedance, JP1	Set jumper JP1 to 150 Ohm, position "B-C" (Mic. output channel to SDU Audio Input).
Audio Output Impedance JP2	Set jumper JP2 to 600 Ohm position "B-C" (Audio output channel to AMS Audio Input).
Mic S/T level	Set mic. side tone level to minimum (side tone is handled by the SDU).
Mic. Level	The mic. gain can be adjusted, but it is preferred to use the SDU adjustment capability (approximately 18dB). As starting point the mic. gain should be set to maximum.
RX level	The receiver level (headset phone level) can be adjusted, but it is preferred to use the SDU adjustment capability (approximately 18dB). As starting point the RX level should be set to maximum, and the audio output from the SDU should be adjusted to match other system components (VHF radios etc).

Table 5-52: Universal Interface Amplifier model AA34-300 settings

SDU pins for Cockpit Voice

SDU Pin	Name/Description	Specification
BP52	CP Voice Chime Signal Contact #1; Current from Chime	Relay type, forms a circuit closure between BP52 and BP53 [a]
BP53	CP Voice Chime Signal Contact #2; Current to Chime	Relay type, forms a circuit closure between BP52 and BP53 [a]
BP82	CP Voice Call Cancel Input #1 (Discrete I)	Input: WOW (active low) [b]
BP83	CP Voice Mic On Input #1 (Discrete I/O)	Input: WOW (active low) [b]
BP84	CP Voice Call Light Output #1 (Discrete O)	Output: Lamp driver [b]
BP85	CP Voice Call Cancel Input #2 (Discrete I)	Input: WOW (active low) [b]
BP86	CP Voice Mic On Input #2 (Discrete I/O)	Input: WOW (active low) [b]
BP87	CP Voice Call Light Output #2 (Discrete O)	Output: Lamp driver [b]
BP88	Chime/Lamps Inhibit Input (Discrete I)	Input: WOW (active low) [b]
BP91	CP Voice Chime Reset Input (Discrete I)	Input: WOW (active low) [b]
TP10	Cockpit Voice Audio #1 In Hi	Balanced input. Impedance > 35 kOhm [c]
TP11	Cockpit Voice Audio #1 In Lo	Balanced input. Impedance > 35 kOhm [c]
TP12	Cockpit Voice Audio #1 Out Hi	Balanced output. Impedance < 20 Ohm [d]
TP13	Cockpit Voice Audio #1 Out Lo	Balanced output. Impedance < 20 Ohm [d]
TP15	Cockpit Voice Audio #2 In Hi	Balanced input. Impedance > 35 kOhm [c]
TP16	Cockpit Voice Audio #2 In Lo	Balanced input. Impedance > 35 kOhm [c]
TP17	Cockpit Voice Audio #2 Out Hi	Balanced output. Impedance < 20 Ohm [d]
TP18	Cockpit Voice Audio #2 Out Lo	Balanced output. Impedance < 20 Ohm [d]

Table 5-53: SDU pins for Cockpit Voice interface

a. Chime relay contact specification (BP52,BP53):
Maximum current: 1.0 A.
Maximum hold-off voltage (open circuit): 36.0 V.

b. The discrete interfaces are described in ***Description of the discrete types*** on page 5-71.

c. Dynamic input range: 0.12 V_{RMS} to 1.5V_{RMS}.

d. Rated output power into 600 Ohm: > 40mW (4.9VRMS).
The outputs are NOT transformer coupled, and must not be shorted to ground.
Minimum load impedance: >= 250 Ohm.

Description of the Cockpit Voice interface

CP Voice Chime Signal Contact #1/#2 (BP52, BP53)

The solid state relay drives a chime, that is sounded on incoming calls (ground-to-air call), and per configuration on outgoing calls (air-to-ground calls), when the line is connected and ready (single stroke or multi stroke chime).

CP Voice Call Light Output #1/#2 (BP84, BP87)

The discrete outputs drive the call lights, that are turned on at incoming and outgoing calls. The lamps are either flashing or steady on (per configuration), until off-hook.

CP Voice Mic On Input #1/#2 (BP83, BP86)

The discrete inputs are used for entering the off-hook state on incoming and outgoing calls. The input may be wired (per configuration) to the Push-To-Talk (PTT) switch, or the latched **Mic On** switch on the Audio Control Panel (ACP).

PTT switch wiring: The off-hook state is entered on the first high-to-low transition.

ACP switch wiring: When the input is low, the state is off-hook. When the input is high the state is on-hook.

CP Voice Call Cancel Input #1/#2 (BP82, BP85)

If the above Mic. On inputs are configured to PTT switch wiring, the Call Cancel inputs may be used for entering on-hook state. The input reacts on a high-to-low transition.

CP Voice Chime Reset Input (BP91)

The discrete input is used for silencing the chime, but off-hook state will not be entered. The input reacts on a high-to-low transition.

Chime/Lamps Inhibit Input (BP88)

The discrete input is used for inhibiting the Call Lamps and the Chime from becoming active, and is typically used during take-off and landing. The inhibit function is active as long as the input is kept low.

5.3.20 Wiring the Maintenance interfaces and Reset

Important Make sure that there is no cable connected to the SDU or SBU Maintenance connector when the aircraft is airborne.

Maintenance PC, CM Write Enable, SDU Reset and ATE

The following drawing shows the wiring of:

- the RS-232 Maintenance PC connection on the SDU,
- the LAN Maintenance PC connection on the SBU,
- SDU Reset,

- Write enable for the SDU Configuration Module and
- ATE interface (for factory use only - **do not connect!**)

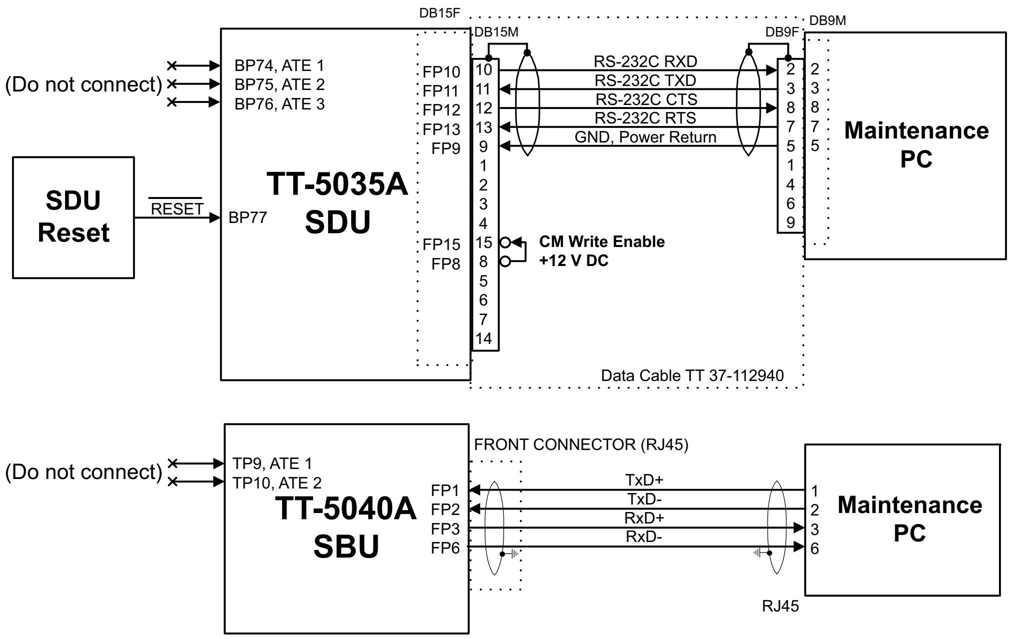


Figure 5-34: Wiring Maintenance PC and Reset

Pins for SDU RS-232 Maintenance PC interface and CM Write Enable (SDU)

The following list shows the SDU pins used for RS-232 PC interface and for CM Write Enable. Both interfaces are included in the TT 37-112940 data cable described at the end of this section.

SDU Pin	Name/Description
FP10	TxD Input
FP11	RxD Output
FP12	RTS Input
FP13	CTS Output
FP9	GND, Power Return (for +12 V DC)
FP8	+12 V DC/120 mA
FP15	Configuration Module Write Enable In

Table 5-54: SDU pins for RS-232 PC interface

Description of SDU RS-232 Maintenance PC interface and CM Write Enable

The SDU has a PC interface at the front connector, supporting the RS-232 standard. The front PC interface can also be used for uploading software.
The interface is configured as DCE on the SDU (i.e. TxD + RTS are inputs and RxD + CTS are outputs).

The PC interface has the following characteristics:

- Baud rate: 115.2 kbps fixed
- Data bits: 8
- Parity: None
- Stop bit: 1
- Flow control: Hardware (RTS/CTS only)

The Write Enable Input - FP15 - enables write cycles to the write protected area in the Configuration Module. FP15 must be connected to +12 V DC (FP8) in order to have access to the write protected area. Electrical specifications:

Enable Write cycles: +10.0 V ≤ VFP15 ≤ +13.0 V

Write Protected: VFP15 ≤ +1.9 V

The following drawing shows the wiring of the maintenance cable for the SDU front connector.

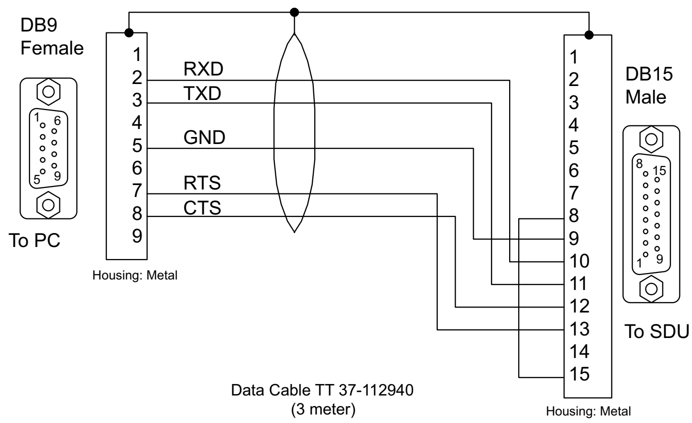


Figure 5-35: TT 37-112940 maintenance cable for front connector on SDU and PC

Pins for the Maintenance interface on SBU

The following list shows the pins used for the Maintenance interface on the SBU.

SBU pin	Name/Description
FP1	TxD+
FP2	TxD-
FP3	RxD+
FP6	RxD-

Table 5-55: SBU pins for Maintenance interface

Description of the Maintenance interface on the SBU

Use the Maintenance interface on the front of the SBU for configuration and maintenance purpose, i.e. for tasks like configuring RF cable settings for the installation, satcom antenna setup, navigational input and software upgrades.

The interface is a 10/100BaseT Ethernet and can be accessed from a PC with Ethernet interface. The PC is connected using a standard straight network cable.

The maintenance interface has the following characteristics:

- 100 Base-T /10 Base-T Ethernet
- IEEE 802.3

To access the configuration settings, use a PC with a browser and open the built-in web interface of the SBU. For further information, see ***SBU Configuration tasks*** on page 6-13.

Reset

The SDU has a discrete input (BP77) on the rear connector, which can be used for SDU hardware reset. The specification complies with the discrete WOW input.

Note You only need to connect this input if you have special requirements to the reset function. For normal use, the push-button on the front panel of the SDU should be sufficient.

SDU hardware reset is initiated by connecting the input to ground. This input is filtered carefully, and the input must be activated for approximately 5 s before the reset procedure takes action. It is highly recommended to use a guarded switch to avoid accidental operation of the switch.

Electrical DC characteristics: WOW Input type, refer to ***Description of the discrete types*** on page 5-71.

Pins for Automatic Test Equipment (ATE)

The ATE pins are for factory use only.The SDU and the SBU both have pins for Automatic Test Equipment (ATE).

- SDU rear connector Bottom Plug (BP) pins: ATE 1 (BP74), ATE 2 (BP75) and ATE 3 (BP76).
- SBU rear connector Top Plug (TP) pins: ATE #1 (TP9) and ATE #2 (TP10).

Important **Do not connect anything to the ATE pins**, not even ground! Connecting the ATE pins can cause unintended function of the system.

Maintenance handset interface

The following drawing shows the wiring of the maintenance handset interface to the front connector of the SDU.

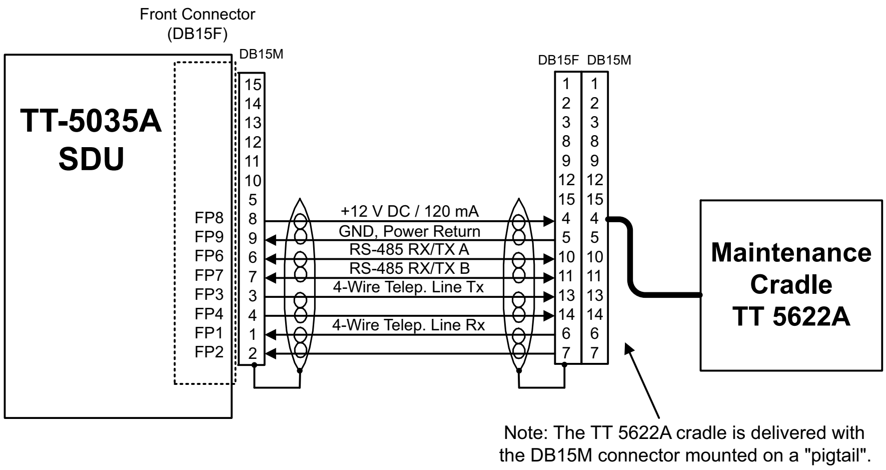


Figure 5-36: Wiring maintenance handset

Pins for Maintenance handset interface

The following list shows the pins used for maintenance handset interface.

SDU Pin	Function: Handset Interface
FP1	Maintenance Handset Audio In Hi
FP2	Maintenance Handset Audio In Lo
FP3	Maintenance Handset Audio Out Hi
FP4	Maintenance Handset Audio Out Lo

Table 5-56: SDU pins for Maintenance handset interface

SDU Pin	Function: Handset Interface
FP6	Maintenance Handset RS-485 Data A
FP7	Maintenance Handset RS-485 Data B
FP8	+12 V DC/120 mA
FP9	GND Power Return (for +12 V DC)

Table 5-56: SDU pins for Maintenance handset interface

Description of the Maintenance handset interface

The SDU has a handset interface for the TT-5620A Handset for maintenance use. This interface can be used to access the menu system using a 4-Wire Handset.

The front connector provides +12 V DC handset power (FP8). The RS-485 bus on the front connector is common with the RS-485 bus for Handset #4 on the rear connector. The Maintenance handset provides a common mode voltage (2.5 V DC) on the Audio In lines to the SDU. This voltage is used to detect the presence of the handset on the front connector, so the RS-485 #4 can be redirected to the front connector.

5.4 Recommended cables

5.4.1 Introduction

This section lists recommended cables and allowed cable lengths for the cables in the AVIATOR 700 system.

Important: For specific requirements to the cables, see the applicable section in **5.3 Electrical installation and wiring**.

5.4.2 Power cables, allowed cable lengths

Allowed cable lengths, SDU

The following table shows the allowed SDU cable lengths for selected AWG types. If other AWG types are used, make sure the contact type supports the AWG type.

Note: It is generally recommended to keep cable lengths as short as possible, specially on cables for **Chassis GND**.

Description	Pin	Contact Type	Max. resistance	Max Length (at 70°C)			
				AWG20	AWG18	AWG16	AWG14
SDU +28 V DC Power	TP1	16	87.5 mΩ [a] (200 mΩ-112.5 mΩ in circuit breaker)	7 ft[a] (2.1 m)	11 ft[a] (3.4 m)	18 ft[a] (5.4 m)	(not suitable for this contact size)
SDU GND, Power Return	TP2	16	25 mΩ	2 ft (0.6 m)	3 ft (0.9 m)	5 ft (1.5 m)	(not suitable for this contact size)
SDU Chassis Ground	TP3	16	25 mΩ (additional requirement: max. length 1 m)	2 ft (0.6 m)	3 ft (0.9 m)	3 ft (1.0 m)	(not suitable for this contact size)

Table 5-57: Allowed lengths for SDU power cables

a. The max. cable resistance is calculated using the resistance of a Klixon 2TC circuit breaker. If another circuit breaker is used, the max. resistance and cable length may differ from these values.

Allowed cable lengths, HPA

The following table shows the allowed HPA cable lengths for selected AWG types. If other AWG types are used, make sure the contact type supports the AWG type.

Note It is generally recommended to keep cable lengths as short as possible, specially on cables for **Chassis**.

Description	Pin	Contact Type	Max. resistance	Max Length (at 70°C)		
				AWG12	AWG10	AWG8
HPA +28 V DC Power	BP A1	5	87.5 mΩ [a] (100 mΩ-12.5 mΩ in circuit breaker)	(not suitable for this contact type)	71 ft[a] (21.6 m)	126 ft[a] (38.4 m)
HPA GND, Power Return	BP A2	5	25 mΩ	(not suitable for this contact type)	20 ft (6.1 m)	36 ft (11.0 m)

Table 5-58: Allowed lengths for HPA power cables

a. The max. cable resistance is calculated using the resistance of a Klixon 2TC circuit breaker. If another circuit breaker is used, the max. resistance and cable length may differ from these values.

Description	Pin	Contact Type	Max. resistance	Max Length (at 70°C)	
				AWG20	AWG18
HPA Chassis	BP30	20HD	25 mΩ	2 ft (0.6 m)	(not suitable for this contact size)

Table 5-59: Allowed lengths for HPA chassis cable

Allowed cable lengths, SBU

The following table shows the allowed SBU cable lengths for selected AWG types. If other AWG types are used, make sure the contact type supports the AWG type.

Note: It is generally recommended to keep cable lengths as short as possible, specially on cables for **Chassis GND**.

Description	Pin	Contact type	Max. resistance	Max length (at 70°C)			
				AWG20	AWG18	AWG16	AWG14
SBU +28 V DC Power	TP1	16	210 mΩ [a] (250 mΩ-40 mΩ in 7.5 A circuit breaker)	17 ft[a] (5.2 m)	27 ft[a] (8.3 m)	43 ft[a] (13.2 m)	(not suitable for this contact size)
SBU +28 V DC Power	TP1	16	137.5 mΩ[a] (250 mΩ-112.5 mΩ in 4 A circuit breaker)	11 ft[a] (3.4 m)	18 ft[a] (5.5 m)	28 ft[a] (8.5 m)	(not suitable for this contact size)
SBU GND, Power Return	TP2	16	25 mΩ The cable should be as short as possible, max. 1 m.	2 ft (0.6 m)	3 ft (0.9 m)	5 ft (1.5 m)	(not suitable for this contact size)
SBU Chassis Ground	BP3	16	25 mΩ Connect directly to aircraft chassis.	2 ft (0.6 m)	3 ft (0.9 m)	3.3 ft (1.0 m)	(not suitable for this contact size)

Table 5-60: Allowed lengths for SBU power cables

a. The max. cable resistance is calculated using the resistance of a Klixon 2TC circuit breaker. If another circuit breaker is used, the max. resistance and cable length may differ from these values.

5.4.3 Recommended Power cables

The cable types shall meet the following standards:

- M27500 for shielded wire.
- M22759 for single wire.

5.4.4 Recommended RF cables

The following cable types are recommended for the RF cables.

Note Equivalent cable types, which meet the requirements, may also be used.

CABLE TYPE	SPECIFICATIONS			
Part number	**Diameter (mm/in.)**	**Minimum Bend Radius (mm/ in.)**	**Attenuation (dB/100ft) @ 1.6 GHz**	**Size 5 contact part number**
ECS 3C142B	4.95/0.19	25.4/1.0	18.1	620021
PIC S22089	11.0/0.43	63.5 / 2.5	4.8	n.a.
PIC S33141	6.9/0.27	35.6 / 1.4	8.6	n.a.
ECS 310801	11.48/0.452	57.4 / 2.26	4.6	n.a.
ECS 311201	8.05/0.317	40.6 / 1.6	6.7	n.a.
ECS 311501	5.82/0.229	30.5 / 1.2	9.1	P922
EMTEQ TFLX165-100	4.19/0.17	21.6 / 0.85	16.8	A45165-1
EMTEQ PFLX195-500	5.08/0.2	12.7/0.5	14.0	A45195-1
EMTEQ TFLX295-100	7.95/0.31	40.6 / 1.6	7.9	n.a.
EMTEQ TFLX480-100	12.2/0.48	57.2 / 2.25	4.5	n.a.

Table 5-61: List of Recommended RF Cables

Contact your cable supplier for other cable types.

Maximum cable lengths for WLAN cables

Cable from SBU to WLAN antenna			W5 and W6 [a]	
Part number	**Cable diameter (mm/in.)**	**Attenuation (dB/100 ft)**	**Maximum cable length**	**Size 5 contact part number**
RF specification @2.4 GHz: 5 dB				
PIC S22089	11.0/0.43	6.7 dB	75 ft (23 m)	n.a.
PIC S33141	6.9/0.27	11.0 dB	46 ft (14 m)	n.a.
ECS 3C142B	4.95/0.19	22.2 dB	22 ft (6 m)	620021
ECS 310801	11.48/0.452	6.5 dB	75 ft (23 m)	n.a.
ECS 311201	8.05/0.317	8.9 dB	56 ft (17 m)	n.a.
ECS 311501	5.82/0.229	10.7 dB	46 ft (14 m)	P922
EMTEQ PFLX195-500	5.08/0.2	16.81	30 ft (9 m)	A45195-1

Table 5-62: Allowed lengths for WLAN cables

Cable from SBU to WLAN antenna			W5 and W6 [a]	
Part number	Cable diameter (mm/in.)	Attenuation (dB/100 ft)	Maximum cable length	Size 5 contact part number
EMTEQ TFLX165 100	4.19/0.17	21.16 dB	23 ft (7 m)	A45165-1
EMTEQ TFLX295 100	7.95/0.31	9.8 dB	52 ft (16 m)	n.a.
EMTEQ TFLX480 100	12.2/0.48	5.8 dB	85 ft (26 m)	n.a.

Table 5-62: Allowed lengths for WLAN cables (Continued)

a. W5 and W6 stand for the cables needed when wiring the TT-5040A SBU, see ***Wiring WLAN antenna interface*** on page 5-44.

5.4.5 Recommended cables for ARINC 429

ARINC 429 cables shall meet the following standards:

- M27500 for shielded wire.

The cables for the ARINC 429 interfaces must be twisted and shielded and conform to the standards for aeronautical use.

5.4.6 Recommended cables for RS-422 SBU control interface

The interface is designed to be terminated with the characteristic impedance of the twisted shielded cable: M27500-22SB2T23 from RAYCHEM.

5.4.7 Recommended cables for Ethernet

Cables for Ethernet on SBU (Quadrax connectors)

Ethernet cables shall meet the following standards:

- TIA/EIA568-A CAT5 Requirements.
- FAR 25.869(a).

The following cable types meet the requirements:

- Part number 422404, Quadrax 24 Awg from ECS
- Part number F 4704-4 from Draka Fileca

5.4.8 Cables for Discrete Signals

Cables for discrete wiring shall meet the following standards:

- M27500 for shielded wire.

5.5 Verifying the installation

Certain check procedures must be performed during and after installation of the AVIATOR 700 system. The first check procedures are performed after wiring, but before inserting LRUs.For information on the required and recommended check procedures, see ***Check procedures*** on page 7-1.

5.6 Activation of airtime services

Before the AVIATOR 700 system becomes operational, the aircraft owner or operator must settle a contract with an Inmarsat Service Provider (ISP) so the system can be activated. The airtime provider handles terminal activation, billing and technical support that is related to the communication network.

The activation process may take some time, so to make sure it is ready in time, start the activation procedure some time **before the installation on the aircraft** begins.

5.6.1 The 3 ID numbers for the AVIATOR 700 system

The AVIATOR 700 system is a hybrid system with 3 individual parts. Each part uses different Inmarsat services and therefore has its own ID number in the Inmarsat network.

Service name	ID	Format (example)	Obtained from
Classic Aero (H+)	ICAO aka AES ID	52535714	CAA or tail number
SwiftBroadband	IMSI	123456789009876	SBU CM label or Dashboard
Swift64	ISN	76TT12AABBCC	SDU CM label or Aero-SDU Configuration Program

Table 5-63: ID numbers in the Inmarsat network

ICAO address

The ICAO address (International Civil Aviation Organization) is a unique 24-bit number assigned to an aircraft by the civil aviation authority of the state in which the aircraft is registered. This number is the same number used for the Mode S transponder and the TCAS system and in some countries it's calculated from the tail no.

In the Inmarsat world, this is also referred to as the AES ID (Airborne Earth Station ID). The ICAO is normally noted in Oct (octal), but in some cases Hex is also used.

- Enter the aircraft's ICAO number in the Aero-SDU Configuration Program.
- Strap pins BP1-25 according to the ICAO. For further guidelines see ***Wiring ICAO address*** on page 5-39.

ISN

The Inmarsat Serial Number (ISN) is the ID of the Swift64 part of AVIATOR 700. It has a format like 76TT12AABBCC, where 76TT12 indicates a Thrane Swift64 system and the AABBCC is the actual 24 bit ID, also called forward ID. The ISN is pre-assigned to the system by Thrane & Thrane and is printed on the label of the SDU configuration module (CM). Note the CM has 2 ISN. Make sure to use the one marked **SDU ISN** for AVIATOR 700. The ISN can also be seen in the Aero-SDU Configuration Program under the **Commissioning IDs**.

IMSI

The IMSI (International Mobile Subscriber Identity) is the ID for the SwiftBroadband service and is tied to the SBU Configuration Module (CM). The IMSI can be found either on the label on the SBU CM or on the Dashboard of the SBU web interface.

Other Classic Aero numbers

The contract for classic aero services with your airtime provider contains among other items the following phone numbers and identifiers:

- IMN (Inmarsat Mobile Number) on Swift64
- DDI (Direct Dial-In) on Aero H+
- Direct phone number to call the AVIATOR 700 system from the ground without specifying the satellite region the terminal is located in (this is supported by a few providers).

SwiftBroadband

The AVIATOR 700 system is delivered with the SIM card permanently installed in the CM of the SBU, but not activated. The SIM card is pre-authenticated by Inmarsat and identified by its unique IMSI number (International Mobile Subscriber Identity). The IMSI is usually 15 digits long.

Note The IMSI number is printed on the part number label of the CM. It is also printed on the Certificate of Conformity letter belonging to the CM.

You need the IMSI to activate the Satellite communication service.

For details how to activate the SIM card please contact your airtime Provider.

The contract for SwiftBroadband services with your airtime provider contains among other items the following phone numbers and identifiers:

- Direct phone number that is associated with the IMSI number of the installation.

Typically the service provider provisions the SIM card automatically to open up for the circuit-switched and packet switched services.

Note: To use the packet switched services you may have to enter the APN (Access Point Name), make sure that you have received this information from your service provider.

For step-by-step instructions how to enter the APN see ***Setting the common interface settings of the SBU*** on page 6-37.

Making calls and using the Internet

For information on how to make a call to and from the system or go on the Internet etc. see the User Manual.

Service providers

You find a list of Service providers on Inmarsat's web site, Services, How to buy, Aeronautical service providers (http://www.inmarsat.com/Services/Aeronautical/How_to_buy/Service_providers.aspx).

Configuring the AVIATOR 700 system

> **Note**
> **Line of sight during operation**
>
> You can configure the system while the aircraft is in the hangar. Note that you cannot typically check the satellite communication while the aircraft is still in the hangar. There must be a line of sight between the Satcom antenna and the satellite in order to use the satellite service.

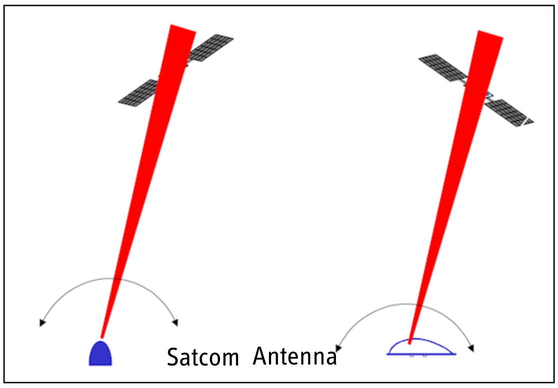


Figure 6-1: Line of sight when communicating with the satellite

6.1 Configuring the basic system

To configure the AVIATOR 700 system you use the ***Aero-SDU Configuration Program for the SDU*** and the ***Built-in web interface for the SBU***.

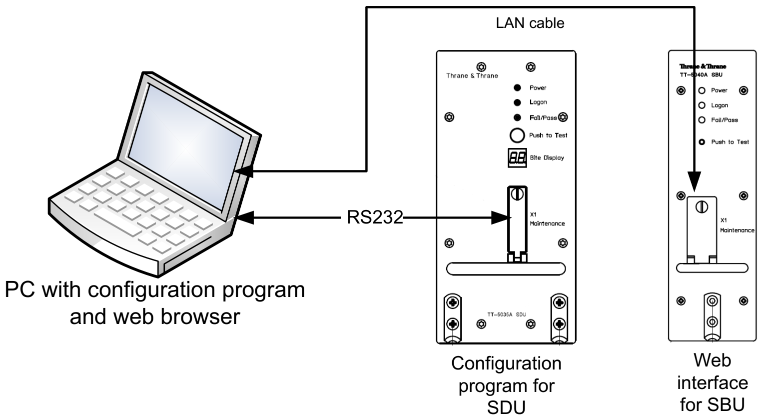


Figure 6-2: Configuration tools for SDU and SBU

For quick start instructions see:

- ***Basic configuration of the SDU*** on page 6-9
- ***Basic configuration of the SBU*** on page 6-13

6.2 Aero-SDU Configuration Program for the SDU

Configuration parameters for the SDU are stored in the SDU Configuration Module (CM), which is managed from the Aero-SDU Configuration Program for the MS Windows® operating systems.

The Aero-SDU Configuration Program makes it possible to:

- Read, write and edit a complete set of operating parameters for the SDU system
- Show which units are available
- Set up the SDU and cabling with all configurable parameters
- Access the SBU configuration tool (web interface)
- Save/load an SDU configuration to/from a file
- Print reports to a printer
- Update the SDU and HPA software
- Access a terminal emulator for troubleshooting purposes
- Acquire elevation and azimuth for I3 and I4 satellites for any geographical location
- Get online help on specific topics through the Help menu, by pressing F1, or by using the “What’s This?” button

6.2.1 Installing the Aero-SDU Configuration Program

Installation requirements

- Installation CD (included in the delivery of the AVIATOR 700 system). You can download the Aero-SDU Configuration Program at http://extranet.thrane.com/Support.aspx or http://thrane.com/ssc for non-partners.
- A PC running Windows 2000, Windows XP, Windows NT, Windows Vista or Windows 7.
- 1024×768 or higher display resolution. The program is best viewed using small fonts.
- Data Cable (Part number TT 37-112940-A or equivalent) to connect a PC to the SDU.
- An available serial COM port (DB9) for the Data Cable.
- Ethernet cable (straight)

Installation procedure

Insert the CD-ROM with the Aero-SDU Configuration Program into the CD ROM drive and wait until the PC automatically starts the installation program (if the installation program does not start automatically, open the file-explorer and double-click the file named setup.exe).

Go through the InstallShield Wizard. When installation is done, a shortcut is placed on your desktop.

6.2.2 Using the Aero-SDU Configuration Program

The Aero-SDU Configuration Program is used to configure both AVIATOR 700 and Aero-HSD^{+}systems.

Important **No mismatch for Level D and Level E allowed:** If a level-D certified system detects an inconsistent hardware unit (level E) or software image (level E), it enters failure mode and the system will not be operational. Inconsistency messages are displayed to clearly inform the service personnel about the reason for this failure mode.

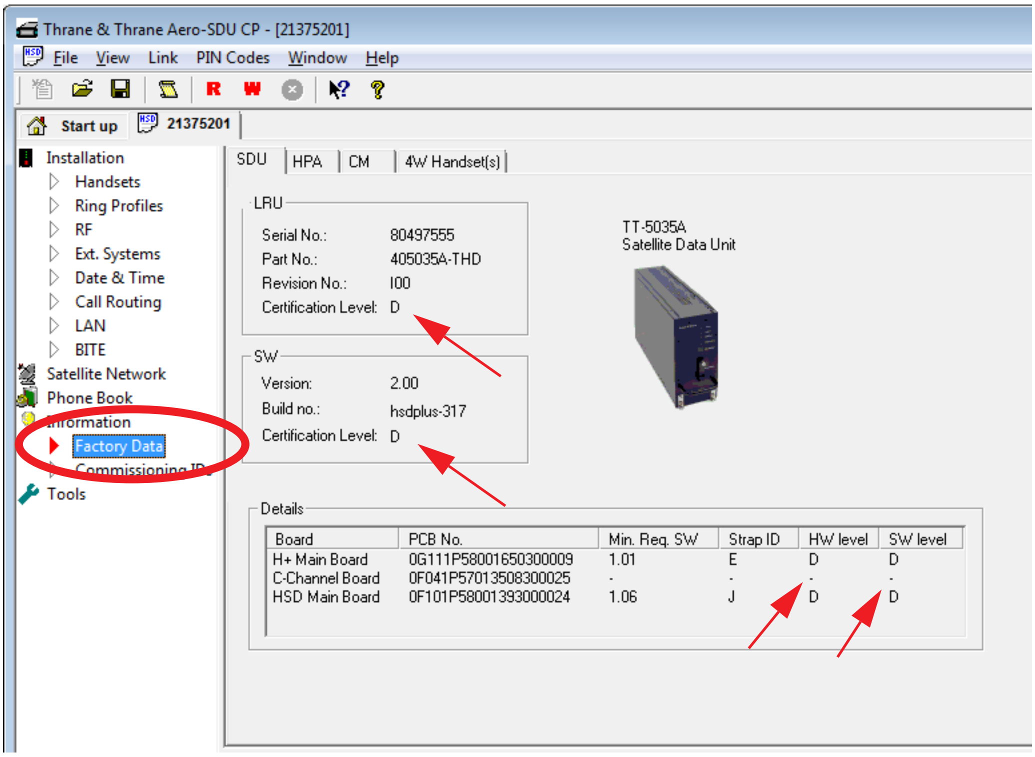


Figure 6-3: Aero-SDU Configuration Program: View Level D and Level E certification level

Starting the Aero-SDU Configuration Program

To start up the Aero-SDU Configuration Program, double-click the program icon on your desktop.

The following picture shows the start up window of the configuration program.

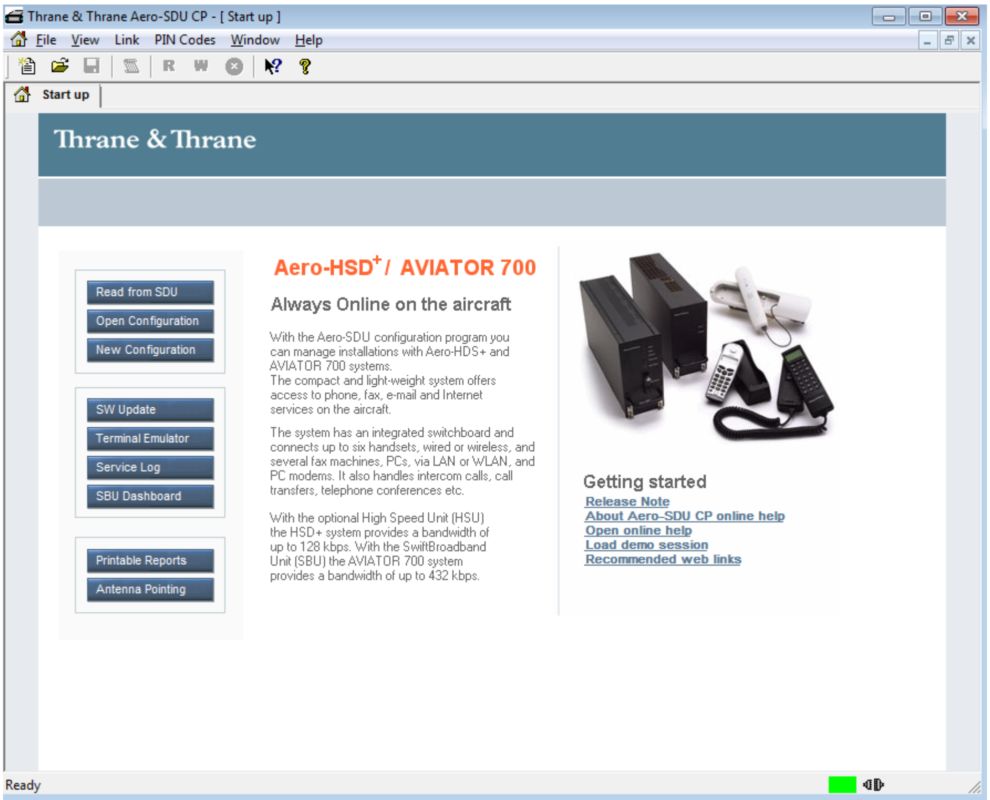


Figure 6-4: Aero-SDU Configuration Program: Start-up window

You can perform several tasks from the start up window. This chapter concentrates on the configuration task.

Navigation

The most important menu commands to start managing a configuration are:

Menu keys	Icon or button	Description
File, New		Create a new configuration from scratch (Only the most critical parameters are initialized, the rest is up to you). Confirm the system to configure: AVIATOR 700 Up to four different configurations can be open at the same time. The configuration can be created off-line (i.e. without an SDU connected to the PC). The settings can then be written to the SDU at a later stage. **Note**: Offline configuration can only be done for the SDU. To configure the SBU you must be online.
File, Open		Opens a previously saved configuration from the disk.
File, Read Configuration from SDU		Read configuration from the connected SDU and copy the data into a new configuration. Note. This function is most suited for tasks that involve minor modifications to already installed systems.

Table 6-1: Configuration related menu commands

Having opened a new configuration, you are prompted to confirm the system you are about to configure. Select AVIATOR 700 and click OK to continue.

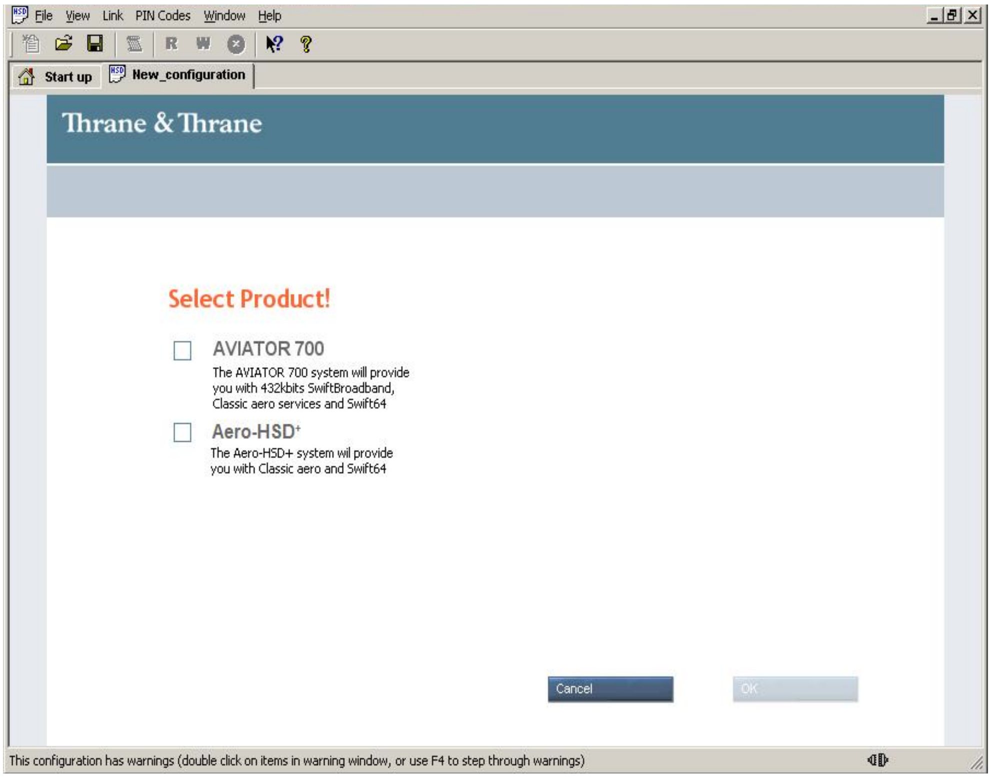


Figure 6-5: Configuration program: System selection, Aero-SDU Configuration Program

When one of the products is selected, the configuration view opens.

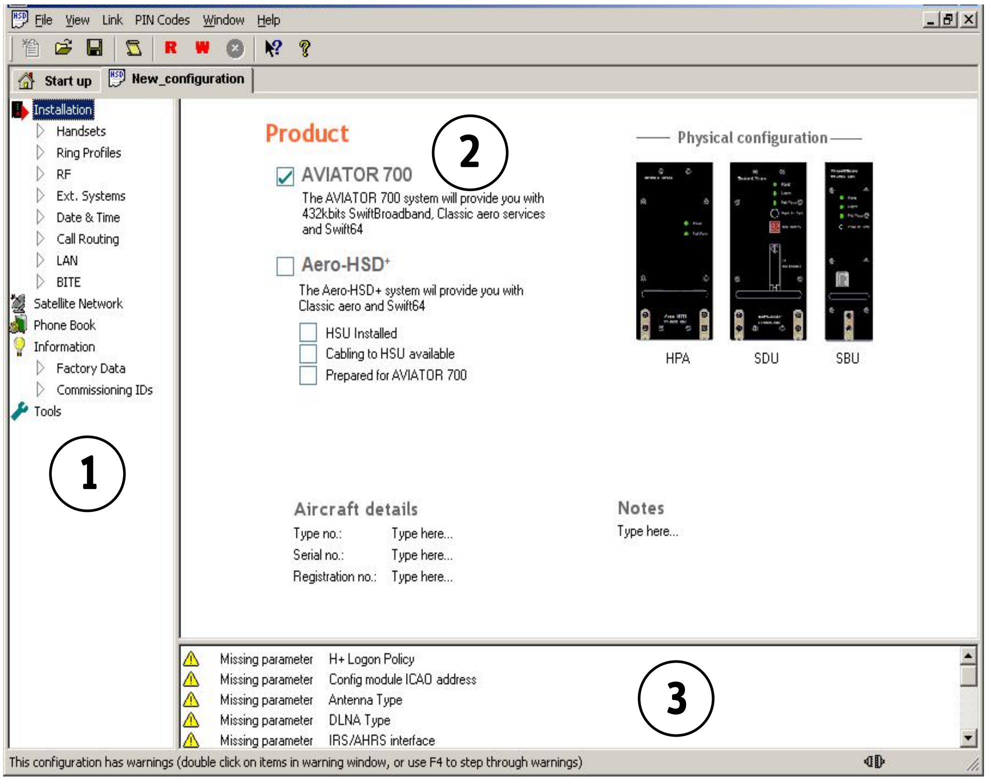


Figure 6-6: Aero-SDU Configuration Program, configuration view

The configuration view is divided into three panes:

1. Navigation pane to access specific sections of the configuration
2. Settings pane to set individual configuration settings
3. Warnings pane listing the tasks to setup a valid configuration, and displaying errors and notes.

Note For instructions how to make a software update see ***Software update*** on page 8-9.

Menus in the Navigation pane

The Aero-SDU Configuration Program comprises the following items:

- **Installation** - aircraft details and installed units.
  - **Handsets** - setting of handset type, volume, ring tones etc. Fax connected to 2-wire.
  - **Ring Profiles** - setup of ring profiles that each determine the behavior of all handsets and annunciators.
  - **RF** - setup of antenna and DLNA types, antenna heading, SBU unit installed and RF cable losses.

- **Ext. Systems** - setup of external systems such as IRS/AHRS, ACARS/AFIS/CMU, MCDU etc.
- **Date & Time** - setup of date and time in the SDU and synchronization.
- **Call Routing** - setup of how the SDU should behave to incoming and outgoing calls.
- **LAN** - IP parameters for LAN connection. Under normal conditions, these parameters should not be changed.
- **BITE** - List of BITE codes with the option to disable display of selected codes.

■ **Satellite Network** - setup of the conditions for logon to the satellite network, including automatic/manual logon, setup of GES for the H+ service and LES for the Swift64 service and initial satellite data.

■ **SDU Phone Book** - a list of up to 99 phone numbers. From this window you can add, edit and delete information in the phone book and assign quick-dial numbers.

■ **Information**

- **Factory data** - showing the version of the software installed in the SDU, including the certification level D or E, the PCB numbers of the individual boards in the system, the serial numbers of the LRUs in the system, the LRU revision numbers of the: SDU, CM, HPA, 4W Handset(s) units.

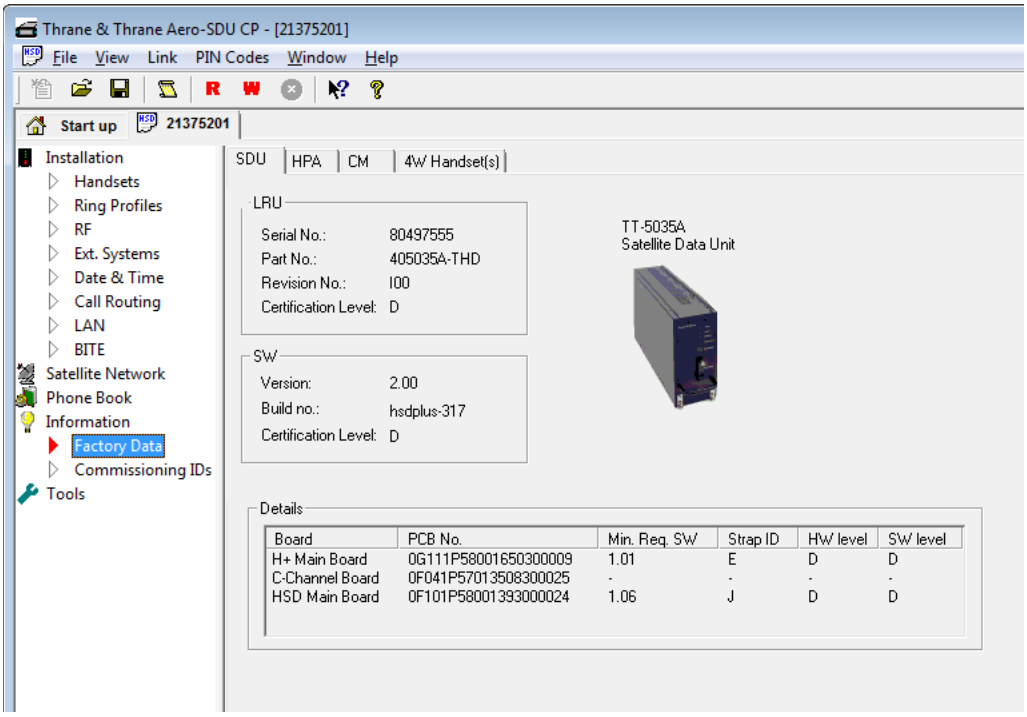


Figure 6-7: SDU configuration, Information> Factory Data: View the certification level

- **Commissioning IDs** - setup of ICAO address and inspection of ISN numbers.

Settings pane

This pane contains the details related to the items you can select in the Navigation pane.

Warnings pane and SDU configuration guide

This pane contains a list that can hold a mix of: A list of the parameters that need to be entered, errors and notes. The list serves two main purposes:

1. **Configuration guide**: To show what you need to change/setup before the configuration can be written to the SDU. If something important remains in this list when the write to SDU function is applied an error dialog appears.
   When you have configured the system correctly, this warnings pane will be empty.
2. **Warnings and notes**: To indicate where your configuration differs from what Thrane & Thrane recommends (ex. antenna gain exceeds expected limits).

Note: Double click on the items in the list one by one to work through the necessary configuration settings. A click on an item brings you directly to the hot spots in the configuration that need your attention.

6.2.3 Basic configuration of the SDU

For detailed information on how to use the Aero-SDU Configuration Program, please refer to the built-in help system of the program. Press F1 or use the Help menu.

As a minimum setup, you need to set up the following parameters:

Commissioning ID

- **ICAO address.**
  In the navigation pane of the Aero-SDU Configuration Program, select **Commissioning ID** under **Information**. Then click the **Copy** button to copy the strapped ICAO address to the Config Module, or type in the ICAO address in the **Config Module** field.

RF settings SDU

- **Antenna type and heading offset.**
  Select **RF** under **Installation** and select the antenna type.
- **DLNA type.**
  In the **RF** pane select the DLNA type.
- **Cable loss for SDU.**
  In the **RF** pane, enter the cable losses in the **Cable Loss** fields. These cable loss values are without losses from the RX splitter and TX combiner.

The necessary RF settings for the SBU are described in ***Basic configuration of the SBU* on page 6-13**.

External systems

- **Navigation parameters, IRS/AHRS.**
  Select **Ext. Systems** under **Installation**.
  Then select IRS or AHRS, select which interfaces are connected and whether they run at low or high speed.

Satellite network

- **Preferred GES**
  Select **Satellite Network** and set up the list of **preferred GES.**
- **Preferred LES and Logon Policy**
  Set up the list of preferred LESs.
  Set **H+ Logon Policy** to **Automatic** or **Manual**.

Enable handsets

- **Handset parameters, Broadcast Ring Tone.**
  Select **Handsets** under **installation**. Then select a ring tone from the **Broadcast Ring Tone** scroll list.

External equipment

Depending on the connected equipment, it may be necessary to enter information on some of the following items:

- **Handsets**.
  Select **Handsets** under **Installation**.
  Then enter which handset is installed on which interface and set the parameters for each handset.
  - For handset interface #1 and #2 you may select TT Handset, MagnaStar, WH10, IRIDIUM1, IRIDIUM2, Cockpit Audio or FONE.
  - For handset interface #3 you may select TT Handset, MagnaStar, WH10, IRIDIUM1, IRIDIUM2 or FONE.
  - For handset interface #4 only TT handset is available.
  - For handset interface #5 and #6 you may select Handset, Fax or ICG Sigma7.
- **Fax**.
  In the **Handsets** pane, select the Fax handset-type under Two-Wire POTS #5 or #6. This means the interface will not ring on a broadcast call.

- **Ring Profiles**.
  Select **Ring Profiles** under **Handsets**. Set up one or more profiles that determine which interfaces should ring when a broadcast call is received, and which should not.
  There are five possible profiles. One of them, “TakeOfLandng”, is preset and cannot be changed. If the “Chime/Lamps Inhibit” input is activated, the “TakeOfLandng” profile is automatically used. This input should be activated during take-off and landing.
- **ACARS/AFIS/CMU/MCDU/WOW**.
  Select **Ext. Systems** under **Installation**.
  Then enter which systems are connected and enter the requested parameters for each system.

Write the configuration to the SDU

To transfer the content of the active configuration view into the connected SDU click the button 

.

6.2.4 Transferring configuration data to the SDU

You transfer configuration data to the SDU using the Aero-SDU Configuration Program. Before transferring the settings, connect the TT 37-112940-A data cable between the serial port of the PC and the front connector of the SDU. Use the menu commands listed below to select the direction of the transmission.

Menu key combination	Icon	Description
Link - Read configuration from SDU (Or use keyboard shortcut Ctrl-R)		Transfer the configuration from the SDU connected into the configuration view that is active right now.

Table 6-2: Menu commands for configuration data transfer

Menu key combination	Icon	Description
Link - Write configuration to SDU (Or use keyboard shortcut Ctrl-W)		Transfer the content of the active configuration view into the connected SDU. 1. Before writing the configuration, the configuration program validates the data. If this validation fails due to errors in the configuration, a dialog will inform you about it, and the write operation is cancelled. See also messages in the warning pane for more information. 2. Before the write operation is started you will have the choice to turn off reset-after-write. Please note that settings are only applied to the system after a reset. Under normal circumstances you do not need to change this.

Table 6-2: Menu commands for configuration data transfer

Select a COM port: The first time you try to communicate with the SDU, a popup dialog will ask you to select a COM-port from a list of installed COM-ports. This dialog will also appear if the SDU was not found on the selected COM-port.

6.3 SBU Configuration tasks

Having installed the AVIATOR 700 System you must also configure the SwiftBroadband Unit properly for use with the current antenna setup, including cable losses for the installation, and select the correct navigational input. Furthermore the interfaces have to be setup and configured to the specific aircraft installation and application requirements. IP connections, network user groups and profiles for IP data usage including LAN/WLAN network management must be configured so the required applications run smoothly on the system. For this purpose you use the built-in web interface of the SBU.

Note Before you start configuring the SBU make sure that the Configuration Module for the SBU is mounted in the SwiftBroadband Unit.

There are two ways to access the SBU web interface:

1. Use a web browser and enter the IP address of the SBU. The standard IP address is **192.168.0.1**.
2. Using the Aero-SDU Configuration Program, click on the button **SBU Dashboard**.

Figure 6-8: 2 ways to access the SBU web interface

6.3.1 Basic configuration of the SBU

As a minimum setup, you need to set up the following parameters in the built-in web interface of the SBU:

1. On the **DASHBOARD** verify the SBU software version to be 1.04 for Level E and 2.00 for Level D or higher. Verify also that the certification level is correct (Level-D or Level-E). For more information on the individual fields see ***Using the Dashboard*** on

page 6-23.

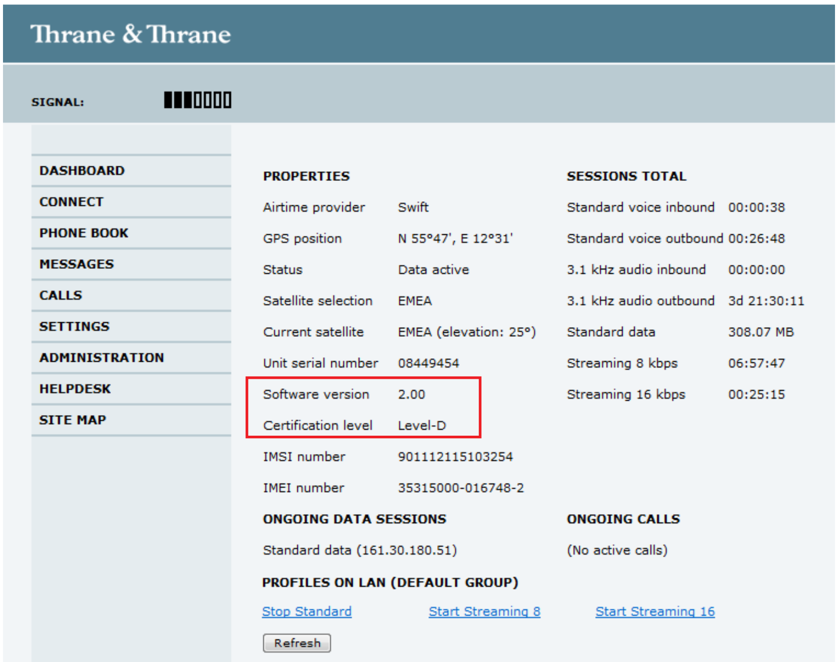


Figure 6-9: Basic configuration of the SBU, step 1/5

2. In **SETTINGS > System type,** select AVIATOR 700.

CAUTION! Selecting a wrong system type may cause damage to the satcom antenna or GPS antenna. If the system type purchased can not be selected, please contact the supplier of your AVIATOR 700 system.

Do not try to use a different system type!

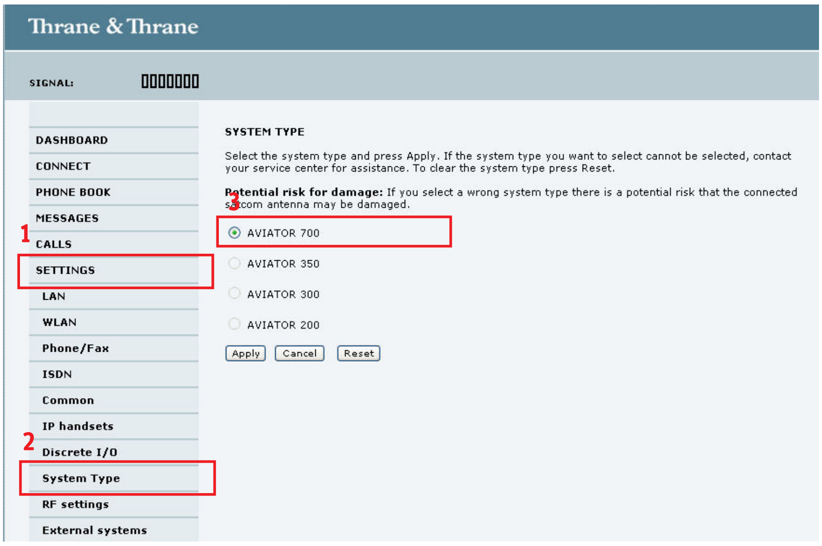


Figure 6-10: Basic configuration of the SBU, step 2/5

3. In **SETTINGS > External systems** enter the values for Navigational input and GPS voltage. For detailed instructions see ***Setting up the navigational input of the SBU*** on page 6-51.

Figure 6-11: Basic configuration of the SBU, step 3/5

4. In **SETTINGS > RF settings**, enter the cable losses applicable to the SBU. For detailed instructions see ***Configuring RF settings of the SBU*** on page 6-50.

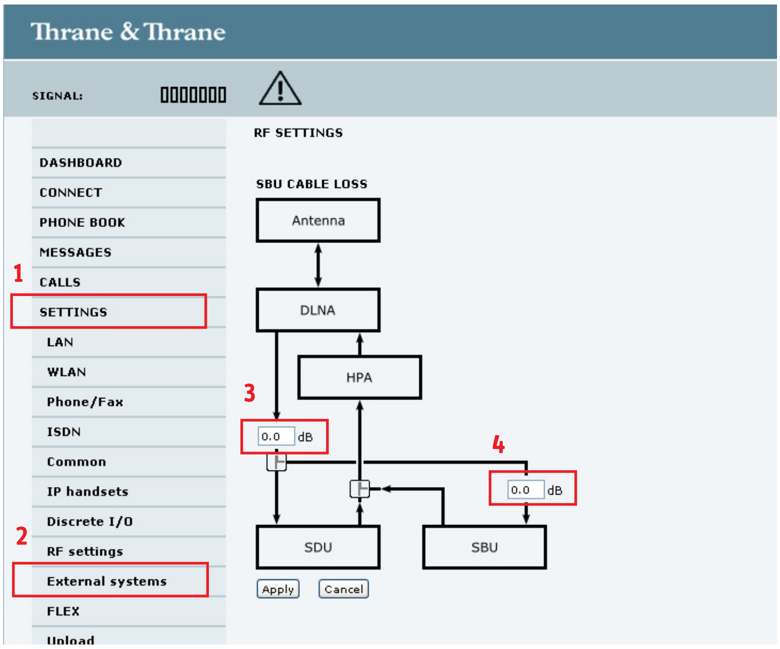


Figure 6-12: Basic configuration of the SBU, step 4/5

5. In **SETTINGS > LAN > Network user groups** enter the APN from your service provider. For detailed instructions see ***Setting up the network user groups*** on page 6-57.

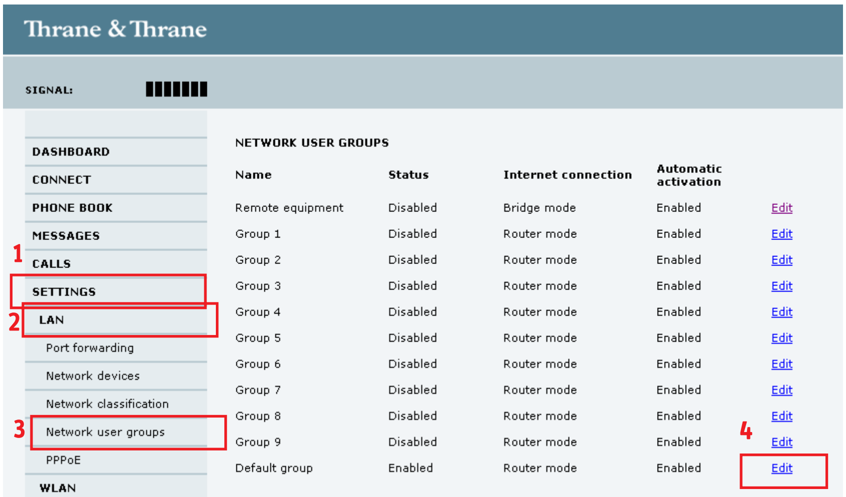


Figure 6-13: Basic configuration of the SBU, step 5/5

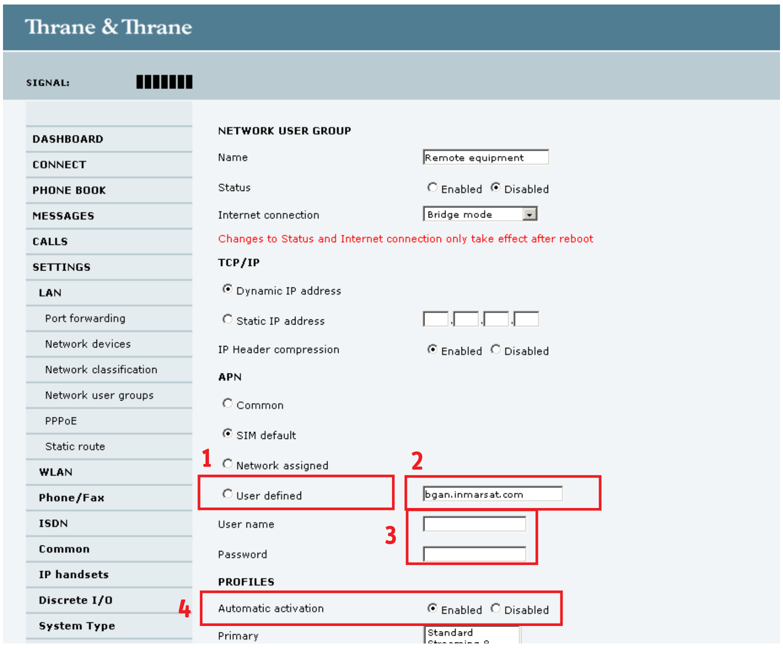


Figure 6-14: Basic configuration of the SBU, step 5/5 continued

6.4 Built-in web interface for the SBU

Use the built-in web interface of the SBU to access the SBU configuration settings in the CM of the SBU. A subset of the configuration settings are stored in a write-protected area of the CM. This subset contains the physical settings for the antenna, cabling and other external input.

Important To setup or change the settings of the write-protected area you must connect a PC to the connector marked **Maintenance** on the SBU front plate. You can view all SBU settings from any LAN or WLAN interface.

The CM also contains the SIM card for accessing the SwiftBroadband service. The settings that can only be changed when connected to the SBU maintenance connector are:

- **Discrete I/O** settings
- **System type**
- Cable loss data in **Settings, RF settings,**
- Input from navigational systems in **Settings, External systems**
- Enabling options (Router, WLAN) in **Settings, Flex**.

Note For information on daily use of the AVIATOR 700 system refer to the AVIATOR 700 User Manual.

No installation of software is necessary because the web interface is built into the SBU.

Browsers supported

The web interface is built into the terminal and is used for operating, setting up and configuring the system.

You can access the web interface from a computer with a standard Internet browser.

6.4.1 Topics in the SBU web interface

The following drawing shows the topics available in the web interface. The topics in grey are mainly used during daily use of the system, they are described in detail in the AVIATOR 700 User Manual.

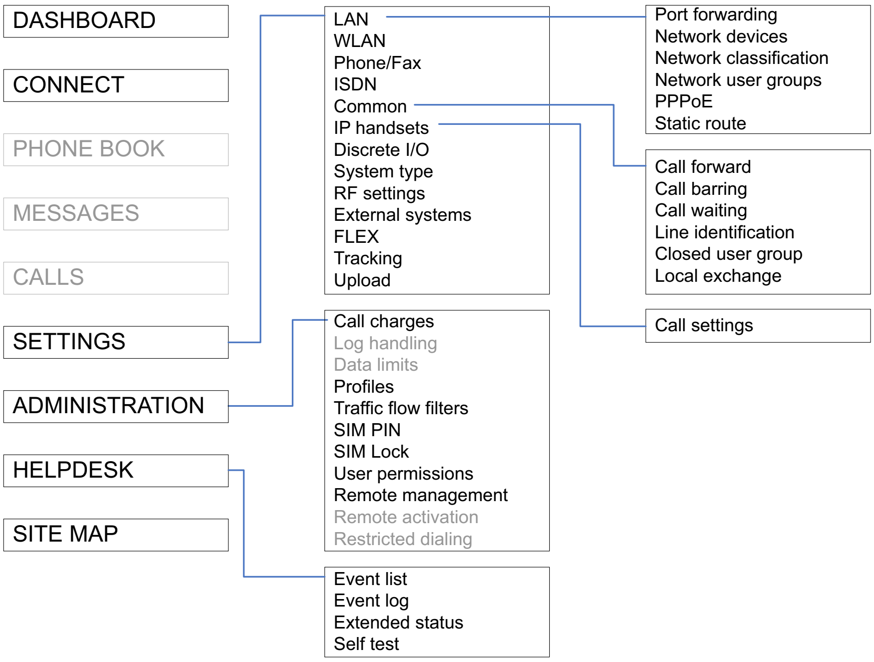


Figure 6-15: Topics in the SBU web interface

6.4.2 Checking the connection to the web interface

To check whether you can connect to the web interface of the SBU do as follows:

1. Power up the AVIATOR 700 system. Wait until the LEDs on the front plate show that the system is ready to be configured.
   - Power LED: Green, then wait for approximately one minute.
2. Connect a PC to the Maintenance interface (standard Ethernet) on the front plate of the SBU.
   If you want to change the setup of the user interfaces and change network usage you can use any of the terminal LAN interfaces (up to 6) installed in the aircraft cabin or the Wireless connection, if available. If you want to change the physical settings for the antenna, cabling and other external input you must use the SBU maintenance connector at the front of the SBU.

Important For systems without the built-in router option enabled, i.e. the basic version or the version with Wireless option only: To use the SBU Maintenance connector disconnect or switch off any PC connected to another LAN interface of the SBU.

Accessing the web interface

To access the web interface, do as follows:

1. Open your browser and enter the IP address of the SBU. The standard IP address is **192.168.0.1**.

   Note If the local IP address of the SBU has been changed and you do not have the new address, you can temporarily set the IP address to the default value by pressing the **Reset** button on the front plate of the SBU. For detailed instructions see ***How to reset the IP address or the terminal software to default settings*** on page 8-23.

   For further information on the Reset button, see ***IP Reset (Default) button on the SBU*** on page 8-22.

   For further information on IP addresses of the SBU see ***Setting up the LAN IP addressing*** on page 6-28.

2. The web interface opens directly with the **DASHBOARD** page.
   The web interface consists of the following sections:

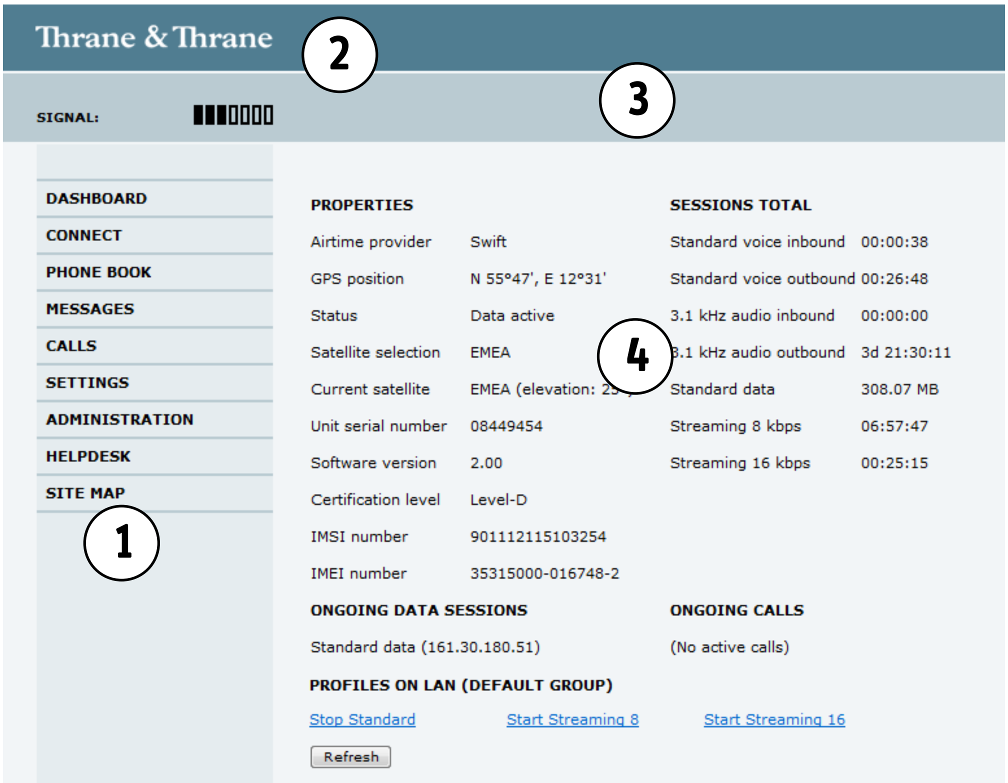


Figure 6-16: Sections of the web interface

1. The **navigation pane** holds the main menu. Clicking an item in the menu opens a submenu in the navigation pane or a new page in the contents section.

2. The **signal status field** shows the signal strength. The signal strength can vary during operation, depending on the current position relative to the Inmarsat satellite and the call or data session activity.
3. The **icon bar** shows icons for new SMS messages and for active events, when relevant. For explanations of the icons, see the next section, ***Icons in the icon bar***.
4. The **contents section** shows the page selected in the navigation pane. This section is used for viewing or changing settings, or for performing actions.

When the Dashboard is displayed you have verified that the connection to the SBU can be established. The web interface is ready for use. You can continue to configure the system.

If you cannot establish a connection to the SBU there might be problems with the Proxy server settings of your PC. See ***Proxy server settings in your browser*** on page 6-21 for further information.

Icons in the icon bar

The following icons may appear in the icon bar in the web interface:

Icon	Explanation
	A new SMS message, or information of Voice mail, has arrived. Click the icon to see new messages or information of Voice mail. For further information, see the AVIATOR 700 User Manual.
	An event is active. Click the icon to see a list of active events. For explanations of the event messages, see the AVIATOR 700 User Manual. Note that this icon will remain in the icon bar as long as the event is still active.

Table 6-3: Web interface: Icons

Navigating the web interface

- **To expand a menu**, click the menu in the navigation pane.
- **To access status and settings**, click the relevant subject in the navigation pane or click the relevant icon in the icon bar. The status or settings are displayed in the contents section.
- **To get an overview over the submenus available use the site map**, click **SITE MAP** in the navigation pane. Click on items in the site map to go directly to the relevant location.

Note You can limit access to some parts of the web interface for certain users. Then the parts are grayed out. For information on how to set up user permissions, see ***Setting up user permissions*** on page 6-89.

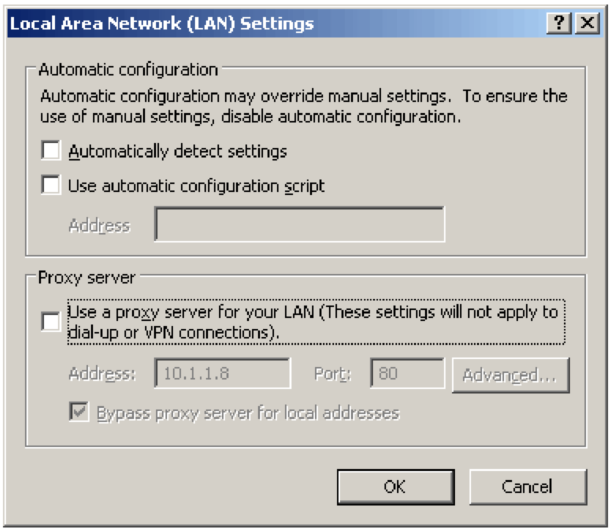
Proxy server settings in your browser

If you are connecting your computer using a LAN or WLAN interface, the **Proxy server** settings in your browser must be disabled before accessing the web interface. Most browsers support disabling of the Proxy server settings for one specific IP address, so you can disable Proxy server settings for the web interface only, if you wish. Consult your browser help for information.

To disable the use of a Proxy server completely, do as follows:

Note The following description is for **Microsoft Internet Explorer**. If you are using a different browser, the procedure may be different.

1. In Microsoft Internet Explorer, select **Tools > Internet Options > Connections > LAN Settings**.



2. Clear the box labeled **Use a proxy server for your LAN**.
3. Click **OK**.

When the proxy server settings are disabled, close and restart your browser.

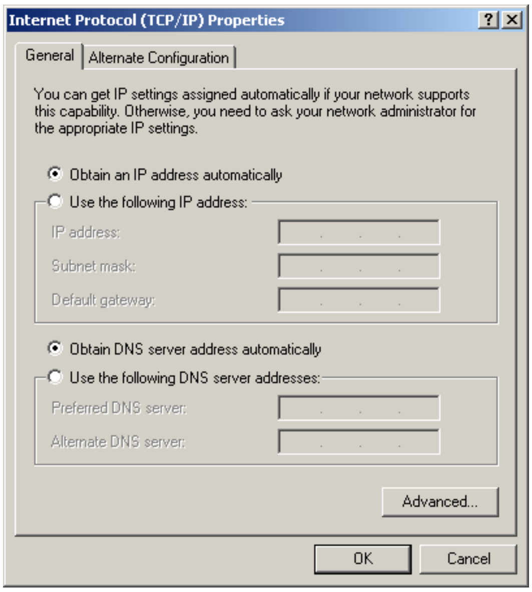
You may need to change this setting back on return to your Internet connection.

IP address and DNS server address setup

To check whether automatic IP address and DNS server address is obtained automatically for your computer, do as follows (example for Windows XP):

1. Go to **Start** > **Settings** > **Control Panel** > **Network Connections**.
2. Right-click on the **LAN connection** you want to use.
3. Select **Properties**, highlight **Internet Protocol (TCP/IP)**.

4. Click **Properties**.
5. Make sure that the following is selected:
   - Obtain an IP address automatically
   - Obtain DNS server address automatically



Allocating IP addresses and DNS server lookups are handled by the SBU.

6.4.3 Setting up the APN (Access Point Name)

If your service provider does not provision your system automatically to use PS services you must enter the APN provided by your service provider.

You need the following items from your service provider:

- APN name

For step-by-step instructions how to enter the APN see ***Setting the common interface settings of the SBU*** on page 6-37.

6.5 Using the Dashboard

6.5.1 Overview

The Dashboard is the first screen that is displayed when the user or administrator enters the IP address of the web interface. The Dashboard is used for control and inspection of ongoing communication and for viewing properties and status of the SBU and antenna.

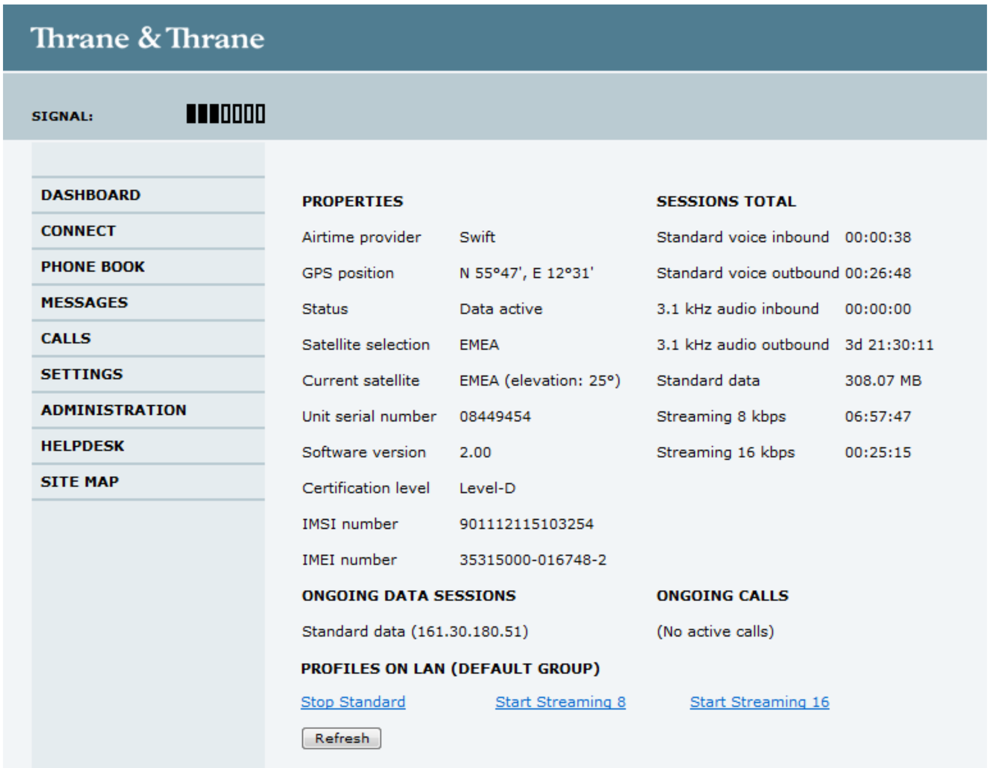


Figure 6-17: Web interface: Dashboard

6.5.2 Properties

The **PROPERTIES** section of the **DASHBOARD** shows the following information:

- **Airtime provider.** The name of your Airtime Provider.
- **GPS position.** The GPS position of your AVIATOR 700 system.

> Note: In some cases, the BGAN network does not allow the position to be displayed to the user. If this is the case, the display may just show **GPS acquired**. This means that the GPS position is received, but the user is not allowed to see it.
>
> This also applies if the AVIATOR 700 is not yet registered on the BGAN network, but the GPS position is received.

- **Status**. The status of the SBU and antenna.
  Examples of status information are: Scanning, Ready and Data active.
- **Satellite selection**. The satellite selected for logon.This is handled by the SDU.
- **Current satellite.** The currently used satellite and elevation angle.
- **Unit serial number**. The serial number of the SBU.
- **Software version**. The version of the software embedded in the SBU.
- **Certification level**. This field shows whether the system is Level-D or Level-E certified.

> Important: If **Inconsistent** is displayed, it means there is a mismatch with Level-D and Level-E certified units or software. This is not allowed.

- **IMSI number**. The IMSI number (International Mobile Subscriber Identity) of the SBU. This is a unique number that identifies the SIM card of your SBU.
- **IMEI number**. The IMEI number (International Mobile Equipment Identity) of the SBU. This is a unique number that identifies your SBU.

6.5.3 Viewing information on calls and data sessions

The following sections in the **Dashboard** show information on calls and data sessions.

- **ONGOING DATA SESSIONS** is a list of data profiles that are currently active, including the external IP address that is assigned to each profile.
- **ONGOING CALLS** is a list of calls that are currently active. The list shows the call type and the time connected for each call.
- **SESSIONS TOTAL** lists the totals for each session type. The list shows the session type with accumulated time for voice and Streaming data, and MB transferred for Standard data.

The counters show totals for sessions since the counters were last cleared. For information on how to clear the counters, see ***Log handling*** on page 6-80.

6.5.4 Profiles on the dashboard

There is also a section on the dashboard showing the network user group and the profile(s) available for the current user. Here you can start the connections allowed for the current network user group. For more information on network user groups and profiles see ***Managing LAN/WLAN network users*** on page 6-55.

Start or stop a standard data connection

On the Dashboard you can see under PROFILES ON LAN whether a standard connection is active or not.

To start or stop a Standard connection for your Network user group do as follows:

1. Open your Internet browser and enter the IP address of the AVIATOR 700 SBU (default: http://192.168.0.1) to access the Dashboard of the web interface.
2. Locate **PROFILES ON LAN** at the bottom of the page.
3. Click **Start <name of profile>**, in this case: **Start Standard**, or **Stop <name of profile>** to stop the connection.

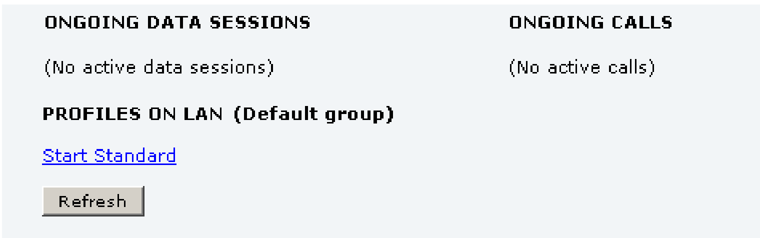


Figure 6-18: Web interface: Start a data connection

4. Click **Refresh** to update the current state of the connection(s). Note that there might be some latency when updating the connection status, you might have to wait and click **Refresh** again to update the Dashboard to the current state.

Note The PDP context for a data session is not activated before any unit in the LAN tries to communicate, e.g. sends a DHCP request. You can also remotely start a data connection, see ***Remote activation of a connection using SMS*** on page 6-92.

6.6 Using the phone book

6.6.1 General usage

The phone book is stored in the Configuration module. In the phone book you can:

- Add new names and phone numbers.
- Modify or delete existing names and phone numbers.
- Look up phone numbers.
- Look up short-dial numbers for easy dialing from a handset.

For information how to access the phone book and how to add, edit and delete phone book entries see the AVIATOR 700 User Manual.

6.6.2 Viewing and editing the mobile numbers

The mobile numbers are the phone numbers to use when making a call to the terminal.

Note These numbers are not listed at delivery. Enter the numbers received from the Service and Airtime Provider.

To view the mobile numbers

To view the mobile numbers of the SBU, select **PHONE BOOK > Mobile numbers** from the left navigation pane.

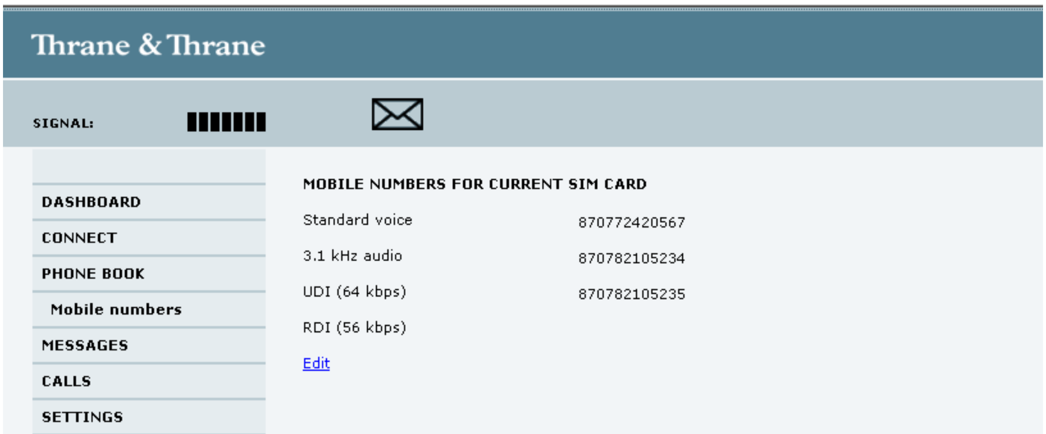


Figure 6-19: Web interface: Phone book, mobile numbers (example)

To enter or edit the mobile numbers

To enter or edit the mobile numbers, click **Edit** at the bottom of the page, type in the numbers received from your Airtime Provider and click **OK**.

6.7 Setting up the interfaces of the SBU

6.7.1 The SETTINGS page

From the **SETTINGS** page you have access to the submenus for system settings and configuration:

- **LAN** to configure the settings of the local area network.
- **WLAN** to configure the wireless network adapter.
- **Phone/Fax** to configure the phone and fax interfaces.
- **ISDN** to configure the ISDN interface.
- **Common** to configure settings that are common for all interfaces.
- **IP handsets** to configure connected IP handsets.
- **Discrete I/O** to configure the discrete inputs/outputs of the installation.
- **System type** to select the **AVIATOR 700** system
- **RF settings** to configure the cable losses between the satcom antenna and the SBU.
- **External systems** to configure the external navigational system.
- **FLEX** for system options.
- **Tracking** to send position information to a server
- **Upload** to upload new application software to the SBU.

A text message on the screen informs you if you need to reboot the system to activate a new setting or configuration.

To access this page, select **SETTINGS** from the left navigation pane.

Select a submenu to continue the system configuration.

6.7.2 Configuring the LAN interface of the SBU

Overview

The SBU has 6 LAN connectors plus 1 LAN maintenance connector on the SBU front plate.

The major part of the LAN parameters are set up in the network management pages, which require administrator password. For information on these settings, refer to ***Managing LAN/WLAN network users*** on page 6-55.

CAUTION! All connections to the LAN interface may be affected when you change the settings below. This also includes your own current connection.

This page is by default not protected by an admin password. You can limit access to this page for certain user groups, for further details see ***Setting up user permissions*** on page 6-89.

Setting up the LAN IP addressing

In the web interface you can set up the IP addressing between the SBU and devices connected to the SBU. The SBU has a built-in DHCP server which can be used to dynamically assign IP addresses to devices connected to the SBU.

You can also set up the local IP address used by the connected devices to access the SBU. The Local IP address is the IP address of the SBU. It is used for accessing the web interface. The IP address towards the BGAN network is assigned by Inmarsat and visible on the Dashboard when the connection is active.

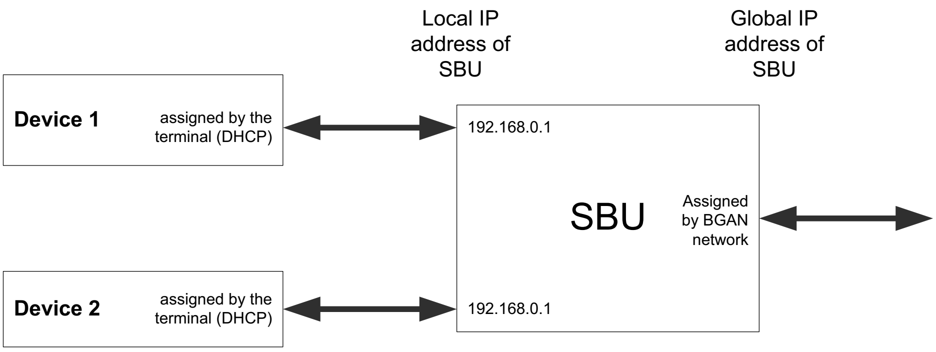


Figure 6-20: SBU IP addresses: Local and global IP addresses, default

Note

No router option: If the SBU does not have the router option and works in single-user mode, only one device can be connected to it. This device cannot have a static IP address, it must use the DHCP server of the SBU.

To change the local IP address of the SBU do as follows:

1. From the left navigation pane, select **SETTINGS > LAN**.

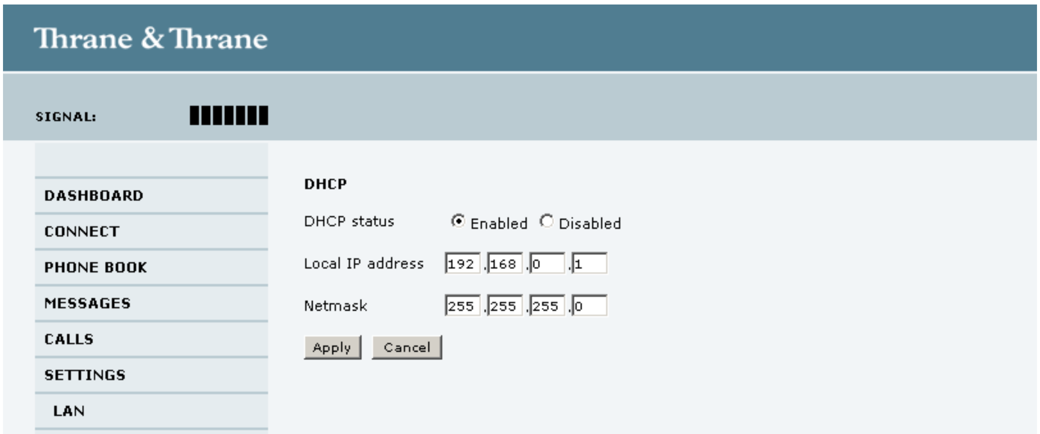


Figure 6-21: Web interface: Settings, LAN

2. At **DHCP status**, select **Enabled** (recommended), or **Disabled**.
   - If you select **Enabled**, the SBU assigns dynamic IP addresses to devices connected to the SBU.
   - If you select **Disabled**, you need to set up a static IP address in the connected device.
3. If you want to change the **Local IP address** and the **Netmask**, type in the new address and netmask. By default, the address is 192.168.0.1 and the netmask is 255.255.255.0.
4. Click **Apply**.

Port forwarding

Port forwarding enables you to set up a server connected to the SBU while the terminal is in Router mode. Without port forwarding it would not be possible to contact the server from the Internet. If you want to use port forwarding, the global IP address of the SBU should be a static IP address. Check with your service provider for availability of a static global IP address. Note that if not agreed otherwise, the global IP address of the SBU will be dynamically assigned as the SBU signs on to the BGAN network.

For information on how to set the terminal in Router mode, see ***Setting up the network user groups*** on page 6-57.

CAUTION! This page is by default not protected by an admin password. You can limit access to this page for certain user groups, for further details see ***Setting up user permissions*** on page 6-89.

The following example shows how to allow internet access to a mail server (smtp) connected to the terminal.

The mail server in this example has the IP address 192.168.0.100.

1. Select **SETTINGS > LAN > Port forwarding** in the left navigation pane.

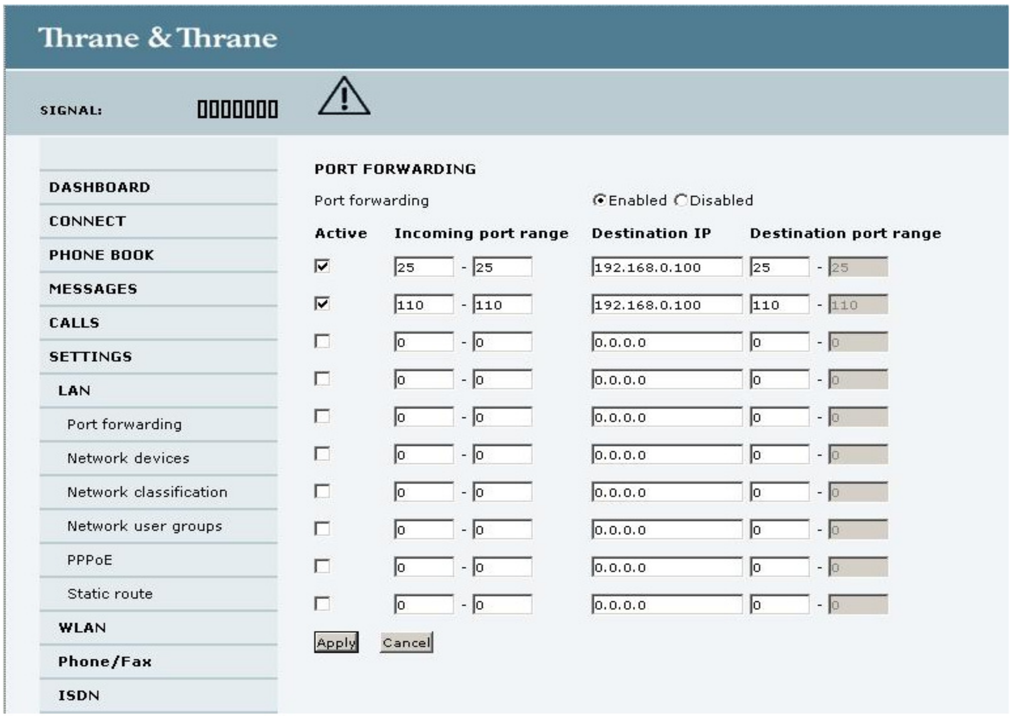


Figure 6-22: Web interface: Settings, LAN, Port forwarding

2. Select **Enabled** to generally enable port forwarding.
3. Type in the **Incoming port range**.
4. Type in the **Destination IP** address, which in this example is the IP address of the mail server: 192.168.0.100.
5. Type in the **Destination port range**.
6. Repeat step 3 to step 5 to set up port forwarding to additional servers.
7. In the **Active** column, select which ports should have port forwarding activated.
8. Click **Apply**.

You can now access the mail server from the Internet, using the external IP address of the SBU. For more information on setting an external IP address see step 6 in ***Editing a network user group*** on page 6-57.

6.7.3 WLAN interface of the SBU

Note that the settings from the LAN window, except Enabled/Disabled, also apply for the WLAN interface. See ***Configuring the LAN interface of the SBU*** on page 6-28.

Enabling or disabling the WLAN interface

To enable the WLAN interface, do as follows:

1. Make sure that the discrete input, i.e. **TP5 WLAN Enable** input, is wired correctly for WLAN enable. Read more about this in ***Pins for non-configurable discrete inputs on the SBU*** on page 5-71 and ***WLAN pins*** on page 5-44.
2. In the web interface on the page **SETTINGS > WLAN** select the status **Enabled**.

For systems without the built-in Wireless option (WLAN) the submenu will still be available in the web interface and the screen will show that the WLAN option is not enabled. To enable the WLAN option enter the FLEX key for this option in the submenu **Settings > FLEX**.

The WLAN interface functions properly if both of the above conditions are fulfilled.

Configuring the WLAN interface

To configure the WLAN interface, do as follows:

1. Select **SETTINGS** > **WLAN**.

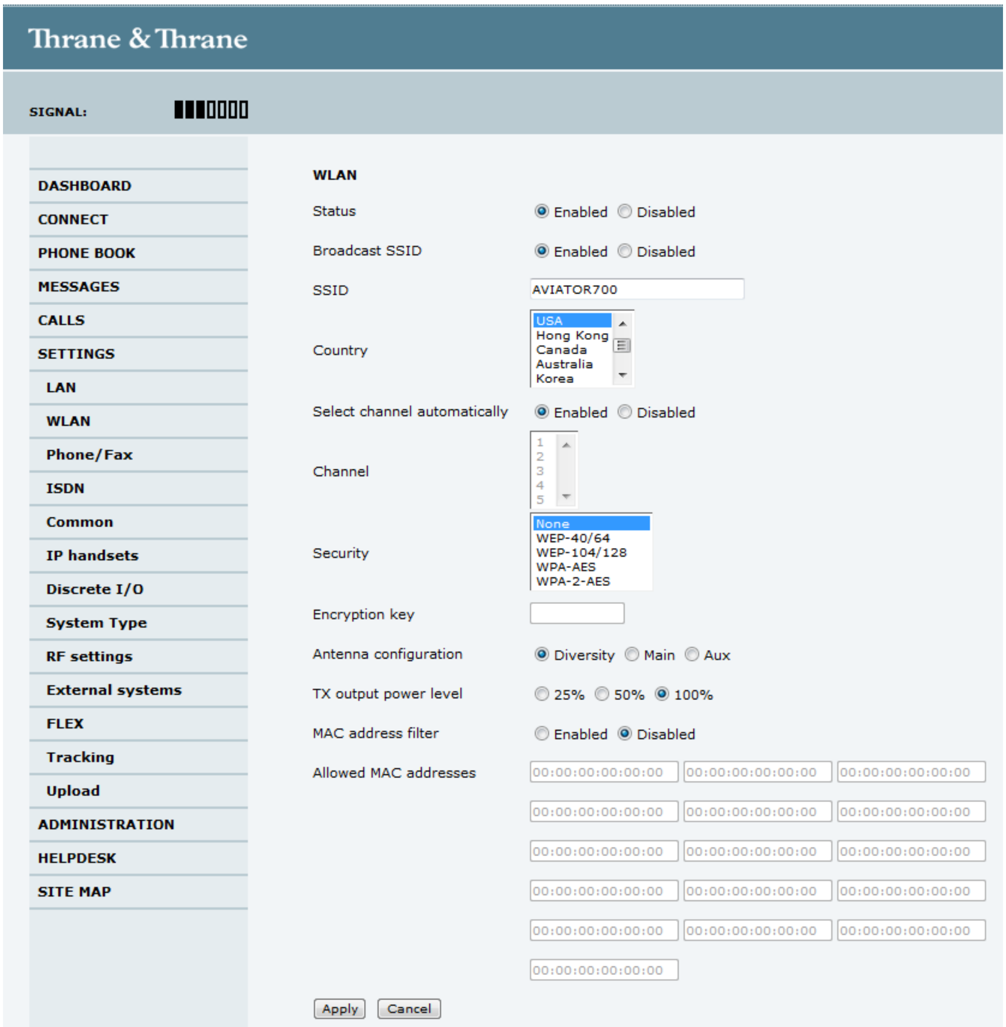


Figure 6-23: Web interface: Settings, WLAN

2. You can enable or disable the WLAN (default setting: **Enabled**).
3. For **Broadcast SSID,** select **Enabled** (default) or **Disabled.**
   Enabled: your WLAN access point is shown to other users.
   Disabled: your WLAN access point is hidden.
4. Type in the **SSID** of your choice or accept the default SSID, which is the name of the installed system: AVIATOR 700.
   The SSID (Service Set IDentifier) is the name of the wireless local area network. It is text with maximum 32 characters.
   All wireless devices on a WLAN must use the same wireless local area network in order to communicate with each other.

5. Select the **Country** for your present location. The default setting is USA. For a list of countries that can use WLAN with the setting USA see ***Countries where the "US" country code applies*** on page E-2.

6. If you want to let the system automatically find a channel set **Select channel automatically** to **Enabled**. Then the **Channel** list will be grayed out.

   If you have set **Select channel automatically** to **Disabled** you can set the **Channel** used for communication on the WLAN interface.

7. Select the **Security** standard. You may select one of the following encryption standards:
   - None (default)
   - WEP-40/64, enter the encryption key in hexadecimal format.
   - WEP-104/128, enter the encryption key in hexadecimal format.
   - WPA-TKIP, enter the encryption key in text format.
   - WPA2-AES, enter the encryption key in text format.

8. Type in the **Encryption key** for the selected Security standard. This is not applicable if you have selected **Security mode None**.

9. In **Antenna configuration** you set whether you have two or one WLAN antennas, and how a single WLAN antenna is connected to the SBU:
   - Diversity: 2 WLAN antennas are connected
   - Main: A single WLAN antenna is connected to SBU TP A4
   - Aux: A single WLAN antenna is connected to SBU TP A2

10. **TX output power level:** You can control the maximum transmitted output power from the SBU rear receptacle TP A2 or TP A4:
    - 100% – 20 dBm, 100 mW
    - 50% – 17 dBm, 50 mW
    - 25% – 14 dBm, 25 mW

11. Select **Enabled** or **Disabled** next to MAC address filters.

    If you select Enabled, you can set up a list of MAC addresses that are allowed access to your WLAN. Any device whose MAC address is not on the list will be denied access.

    If you select Disabled, there will be no restrictions on MAC addresses.

12. If you have enabled MAC address filters, type in the **Allowed MAC addresses**.

    The list may contain up to 16 MAC addresses.

13. Click **Apply**.

6.7.4 Configuring the Phone/Fax interface (2-Wire) of the SBU

Note By default all handsets connected to the system will ring on incoming calls. If you have connected a fax, set the incoming call type on that 2-wire interface to 3.1 kHz Audio to avoid that the fax rings and answers an incoming Standard call.

To configure this interface do as follows:

1. Select **SETTINGS** > **Phone/Fax** from the left navigation pane.

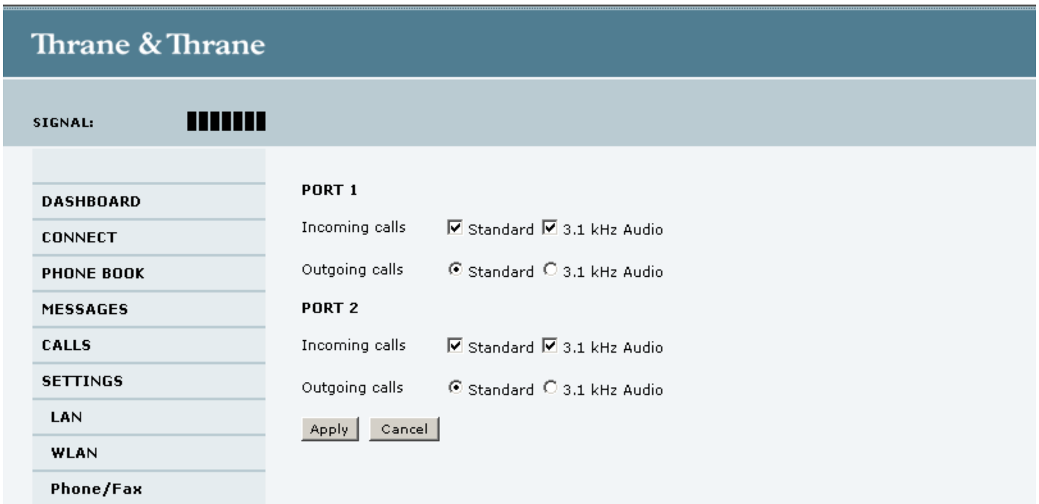


Figure 6-24: Web interface: Settings, Phone/Fax

2. For each Phone/Fax port, set the call type for incoming and outgoing calls.

   Note To identify Port 1 and Port 2 see the drawings of your specific installation. Mark the connectors in the air cabin accordingly.

   The call types are described in more detail in the AVIATOR 700 User Manual in the chapter Using a phone of fax machine.
   - For **Incoming calls**, you can check Standard or 3.1 kHz Audio or both.
     If you check both, any device connected to the Phone/Fax interface will react (ring) on incoming calls.
     If you select only Standard, the Phone/Fax interface will only react on calls made to the Standard phone number, and not on calls to the 3.1 kHz Audio number.
   - For **Outgoing calls**, you can select either Standard or 3.1 kHz Audio. The selected type will be used by default, if possible, for any outgoing call. Note, however, that fax machines and modems must use 3.1 kHz Audio.

   Note You can override the default setting for outgoing calls by dialing 1* (force the call to Standard) or 2* (force the call to 3.1 kHz Audio) before the number. For further information, see the AVIATOR 700 User Manual.

3. Click **Apply**.

6.7.5 Configuring the ISDN interface of the SBU

To configure the ISDN interface, do as follows:

1. Select **SETTINGS** > **ISDN**.

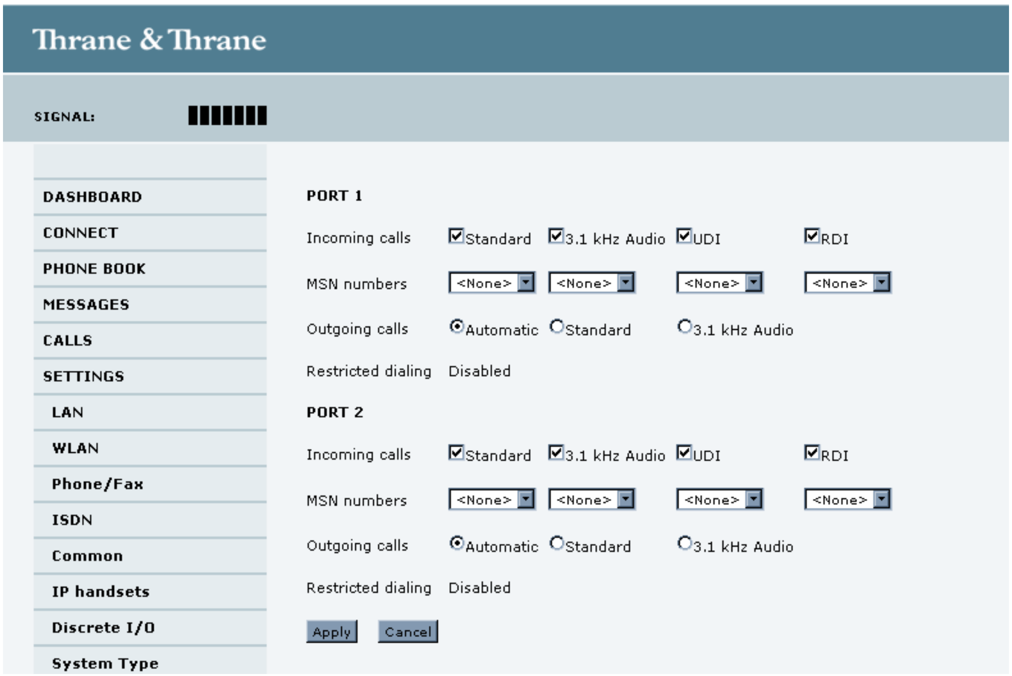


Figure 6-25: Web interface: Settings, ISDN

2. Set the call type(s) for incoming calls.
   You can select Standard, 3.1 kHz Audio, UDI and/or RDI.

   Note Connected devices will only receive incoming calls with the call types that are selected here. For example, if only Standard is selected, and a G4 fax call (using call type UDI) arrives, a fax connected to the ISDN port will not receive the incoming call.

3. Set the MSN (Multiple Subscriber Numbering) numbers that are to be assigned to each call type. In most pieces of ISDN equipment you can program multiple subscriber numbers. The number programmed into the equipment should be the dial-in number that you wish that piece of equipment to answer.

   Important If you set an MSN number to anything other than <None>, connected devices must be programmed with these MSN numbers.

   Note that this setting only applies to the call type selected above the MSN number, and only if the connected device supports the call type used.

   You have the following options with the MSN numbers:

   - **<None>**. No MSN numbers are used. An incoming call is accepted in all devices connected to this port.

- **1*, 2*, 3* or 4***: If, for example, you select 1* at Standard call type, an incoming Standard call is accepted by all devices that are programmed with the number 1* and connected to the ISDN interface.
- **0401, 0402:** These are local numbers for separate devices connected to the ISDN interface.
  An incoming call is accepted by devices that are programmed with the selected number and connected to the ISDN interface.

You can combine the MSN settings.

Example: You have two devices connected to the ISDN interface. One is programmed with the numbers 1* and 0401, the other is programmed with 1* and 0402.
In the web interface, you select the MSN number 1* under Standard.
If an incoming Standard call arrives, both devices will accept the call.
If you make a local call to one of the local numbers 0401 or 0402, only the called device will accept the call.

4. Set the call type for outgoing calls.
   - If you select **Automatic**, the call type will be determined by the calling device.
   - If you select **Standard**, all outgoing calls, except UDI/RDI, will use the call type Standard. If you make a 3.1 kHz Audio call it will be converted to a Standard call. Outgoing UDI or RDI sessions will be not be influenced by this setting.
   - If you select **3.1 kHz Audio**, all outgoing calls, except UDI/RDI, will use the call type 3.1 kHz Audio. If you make a Standard call it will be converted to a 3.1 kHz Audio call. Outgoing UDI or RDI sessions will be not be influenced by this setting.

Note: You can override the call type setting for outgoing calls by dialing one of the following prefixes before the number:

- 1* (force the call to Standard)
- 2* (force the call to 3.1 kHz Audio)

5. Click **Apply**.

6.7.6 Setting the common interface settings of the SBU

The settings under COMMON are common for all interfaces. Note, however, that in order to use the common Access Point Name for an interface, you must select **Common** for the APN setting when setting up the network user group.

Definition of Access Point Name (APN)

The APN is used by the network user to establish a connection to the required external network. This means that the SBU must know the APN in order to be able to connect to the external network. APNs are provided from the Airtime Provider. They may also be defined on the SIM card.

The common APN

The common APN setting is defined here and can be selected for each network user group. If you are using the same APN for many network user groups, it is easier to define it once, and then simply select it for the relevant network user groups. Also, if you change the common APN at a later stage, it is automatically updated for all network user groups where the Common setting is selected.

To set up the common interface settings

To set up the Common interface settings do as follows:

1. Select **SETTINGS** > **Common**.

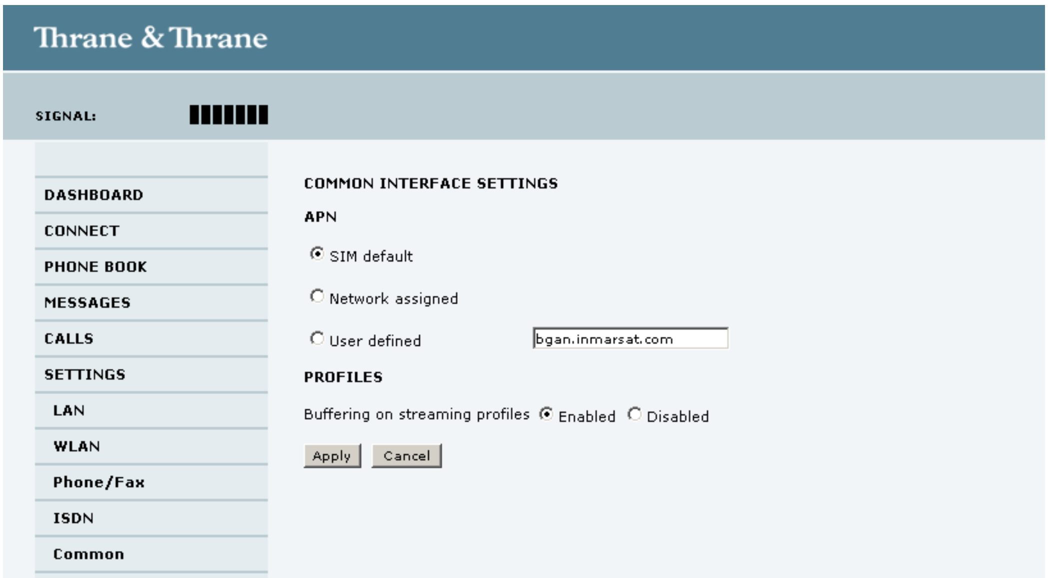


Figure 6-26: Web interface: Settings, Common

2. Select the **APN**. You have the following options:

- **SIM default**. The APN is taken from the SIM card. This is the recommended option, unless you have special requirements, i.e. your service provider does not automatically provision for PS services.
- **Network assigned**. The APN is assigned from the network.
- **User defined**. Type in the APN. APNs are provided from the service provider.

Note: Use User defined if your service provider does not automatically provision your SIM card. Contact your service provider for an APN or check the documentation received from the service provider for an APN.

3. At **Buffering on Streaming profiles**, select **Enabled** or **Disabled**.
   - If you select **Enabled**, your Streaming connection will be buffered. This means that the transmission is slightly delayed in order to ensure a precise and continuous data stream.
   - If you select **Disabled**, the Streaming connection will not be buffered. This means the data is delivered immediately, but may vary slightly in transmission speed.
4. Click **Apply**.

How to use the common APN

When you configure the APN for your individual network user group, select **Common** to use the setting from this page.

Where Common is selected in the individual network user groups, the setting will automatically be updated when the Common APN is changed.

6.7.7 Setting up call services

The setup of call services is also common for all interfaces.

Note: The SBU must be registered on the BGAN network before you can set up the call services in the web interface.

In the web interface you can set up the following supplementary services:

- ***Call forwarding***
- ***Call barring***
- ***Call waiting***
- ***Line identification***
- ***Closed user group***
- ***Local exchange***

Note that, depending on the network, some of these call service settings may prevent others from being activated.

The settings apply for all connected devices using a circuit-switched service.

Call forwarding

You can set up the SBU to automatically forward incoming calls to another phone number. To forward incoming calls do as follows:

1. Select **SETTINGS > Common > Call forward** from the left navigation pane.

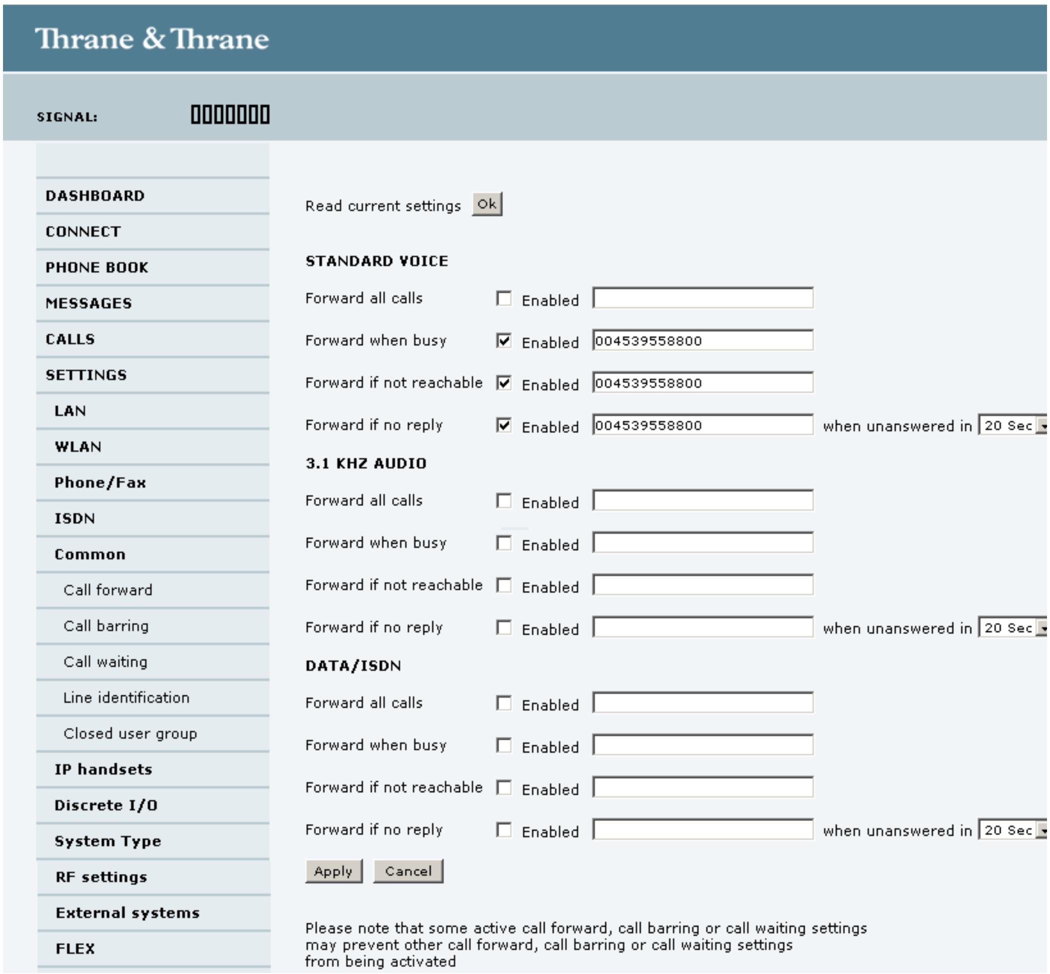


Figure 6-27: Web interface: Settings, Common, Call forward

2. Click **OK** next to **Read current settings** to display the phone numbers for call forwarding for the subscription. These numbers are operator controlled and come with your airtime subscription (default). A message saying **Operation in progress, please wait.** is displayed.

   Note Allow sufficient time for the system to read the current settings over the satellite connection.

3. For each call type, select **Enabled** next to the situation(s) in which you want to forward incoming calls.

4. Next to the enabled items, you can type in a phone number you want to forward the call to.
5. If you have selected **Forward if no reply**, select from the drop-down list the period of time the system should wait before forwarding the call.
6. Click **Apply**.

Call barring

Do as follows to bar incoming and/or outgoing calls to and from the SBU:

1. Select **SETTINGS > Common > Call barring** from the left navigation pane.

Figure 6-28: Web interface: Settings, Common, Call barring

2. Click **OK** next to **Read current settings.** A message saying **Operation in progress, please wait.** is displayed.

Note Allow sufficient time for the system to read the current settings over the satellite connection.

3. For each call type, select which calls should be barred.

4. In the **Barring PIN** field, type in a PIN for your call barring setup.

   Note This is **not** the SIM PIN entered at startup, but a network PIN. Contact your airtime provider for a Barring PIN.

5. Click **Apply**.

Call waiting

You can set up whether or not you want to receive notification of waiting calls while you are making a call or transmitting data.

To receive a notification of waiting calls do as follows:

1. Select **SETTINGS > Common > Call waiting** from the left navigation pane.

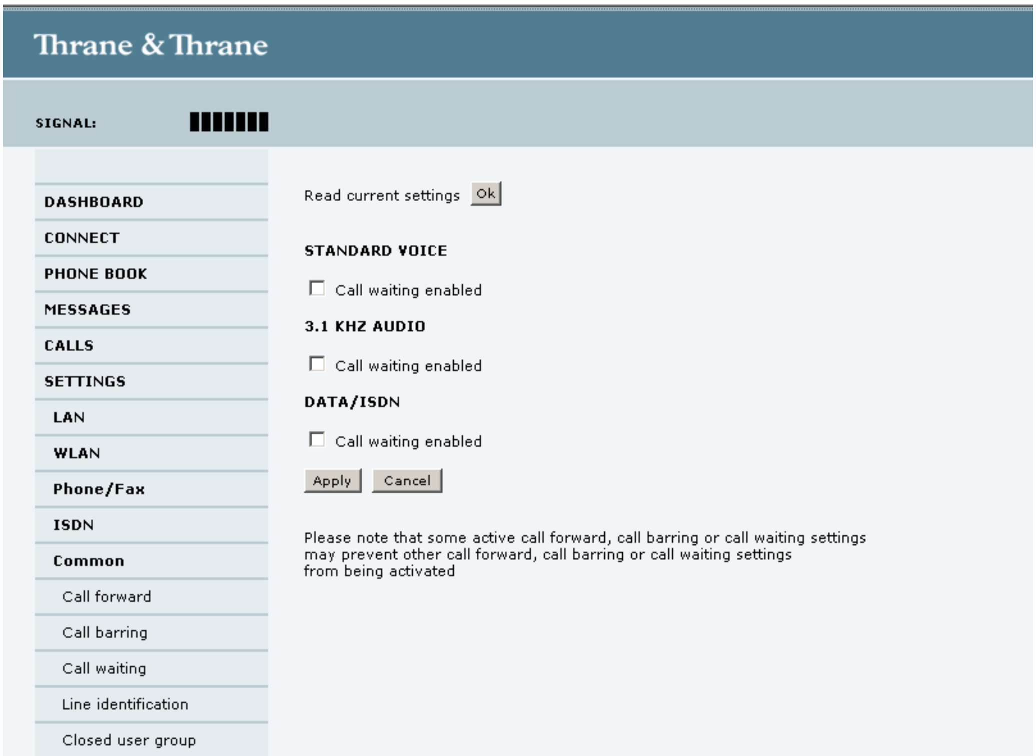


Figure 6-29: Web interface: Settings, Common, Call waiting

2. Click **OK** next to **Read current settings.** A message saying **Operation in progress, please wait.** is displayed.

   Note Allow sufficient time for the system to read the current settings over the satellite connection.

3. For each call type, select **Call waiting enabled** if you want to get notification of waiting calls while you are making a call or transmitting data.

4. Click **Apply**.

Line identification

You can set up the terminal to show your number when you are making a call or transmitting data. The number shown is the standard voice number of the airtime subscription.

To show the number when making a call or transmitting data do as follows:

1. Select **SETTINGS > Common > Line identification** from the left navigation pane.

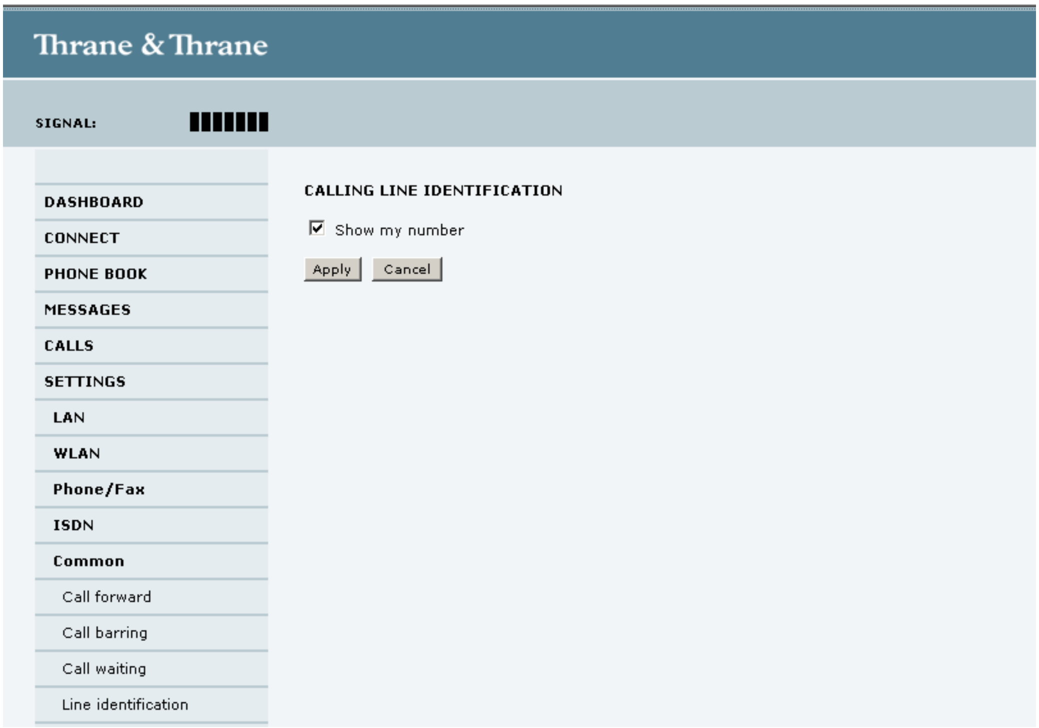


Figure 6-30: Web interface: Settings, Common, Line identification

2. Select **Show my number** and click **Apply**.

Closed user group

Your subscription may include one or more closed user groups. A closed user group is a group of users permitted to make calls to each other but not to users outside the group.

To define the settings for these user groups, do as follows:

1. Select **SETTINGS > Common > Closed user group** from the left navigation pane.

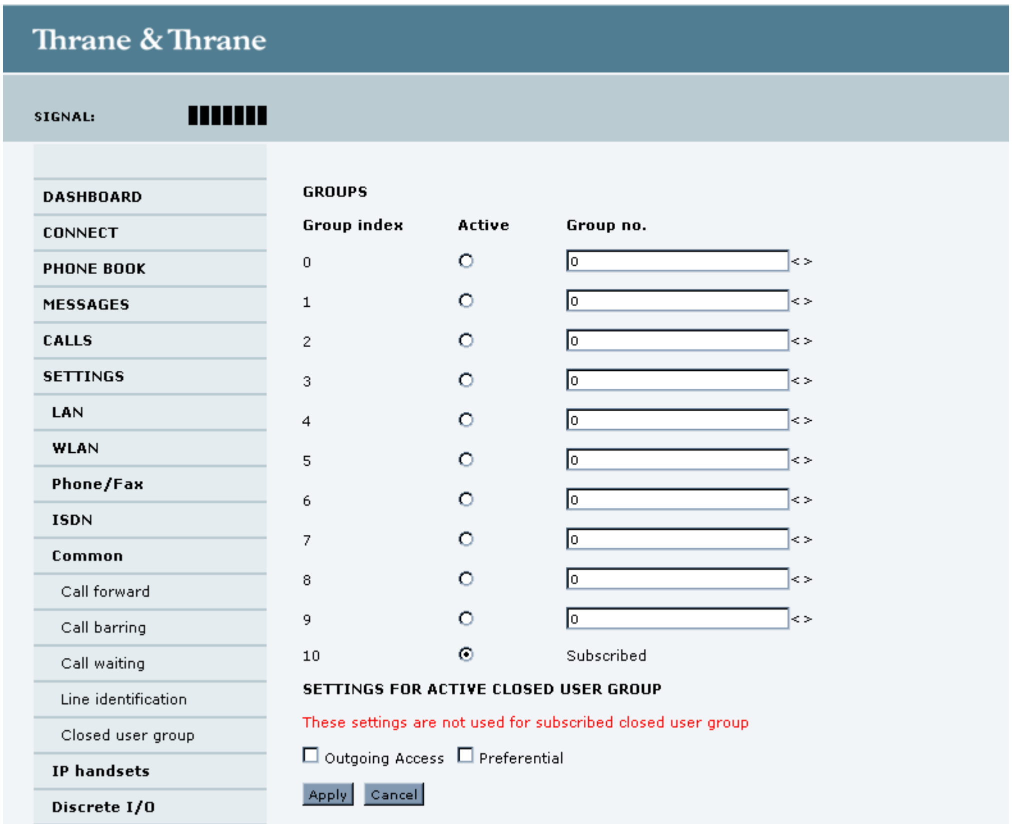


Figure 6-31: Web interface: Settings, Common, Closed user group

2. Type in your user group number(s) under **Group no.**
   Your airtime subscription lists your user group number(s).
3. Select which group(s) should be active.
   If you select **Active** for **Subscribed**, the group(s) included in your subscription will be active.
4. To allow outgoing access for the activated user group(s), select **Outgoing Access** under **SETTINGS FOR ACTIVE CLOSED USER GROUP**. Note that if you selected **Subscribed** above, this setting will not be used.
5. Select **Preferential** if you want the activated user group to be selected when a member of a user group does not specify the group number during call set up. Note that if you selected **Subscribed** above, this setting will not be used.
6. Click **Apply**.

Local exchange

If you want to call a specific phone connected to the terminal, use the local exchange function. With this function enabled, when you dial the mobile number of the terminal, a recorded message instructs you to dial the number for the local phone you want to call. Your call is then transferred to the requested phone and only the requested phone rings. If the local exchange is not used, incoming calls will per default cause all connected phones to ring.

For a detailed description how to set up the local exchange function of the SBU from a remote location see the AVIATOR 700 user manual.

6.7.8 Managing AVIATOR Wireless Handsets

Overview

The SBU uses WLAN to connect AVIATOR Wireless Handsets or other IP equipment. The AVIATOR 700 supports connection of up to 16 AVIATOR Wireless Handsets.

Each handset must have a local number in the range 0501 to 0516 as well as a unique password.

Note The handset with the local number 0501 is the master handset. This means you can start/stop data sessions from the SBU with this handset, if the function is allowed in the User permissions page. See the AVIATOR 700 User Manual for further information on user permissions.

Connecting a new AVIATOR Wireless Handset

To connect a new AVIATOR Wireless Handset, do as follows:

1. Connect the handset to the WLAN interface of the SBU. For a step-by-step procedure see the ***AVIATOR Wireless Handset and Cradle User Manual***, section ***Connecting the AVIATOR Wireless Handset to a wireless access point***.

2. In the web interface of the SBU, select **SETTINGS > IP handsets**.

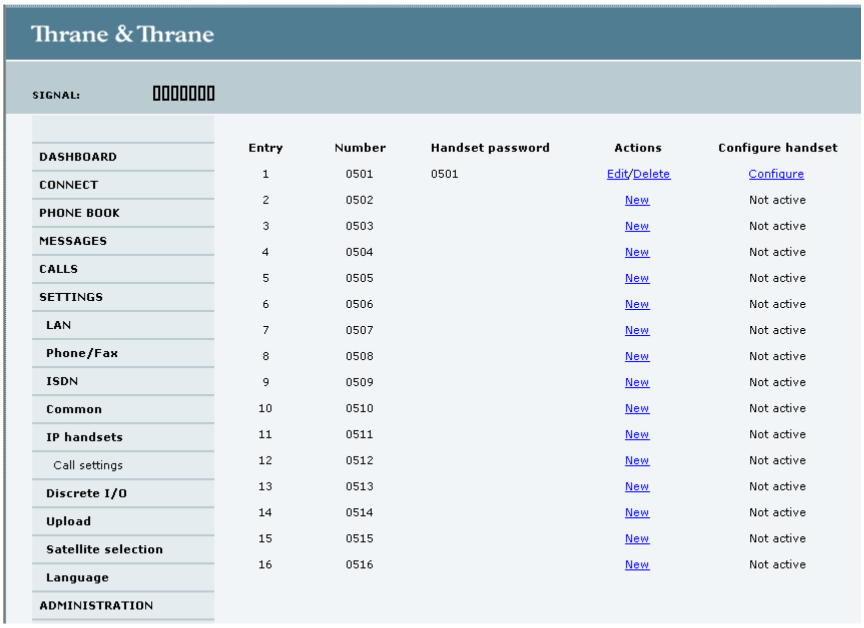


Figure 6-32: Web interface: Settings, IP handsets

3. Next to the local number you wish to use, click **New**.
4. Enter the password you want for the handset.
   Note that the AVIATOR Wireless Handset only supports numbers in the password.
5. In the handset, use the display menu system to enter the local number and the password you just entered in the web interface. Do as follows:
   1. Enter the menu system and select **SIP** to get the list of profiles.
   2. Select the **BGAN** profile and select **Options**.
   3. Select **Edit/View** and change the user name and password.
   Note that the user name is also the local number for the handset.

When the SBU and the handset have recognized each other, a **Configure** link appears next to the handset in the **IP handsets** page of the web interface. This link provides direct access to the built-in web interface of the AVIATOR Wireless Handset. For further information, refer to the ***AVIATOR Wireless Handset and Cradle User Manual***.

Setting up the AVIATOR Wireless Handset

To set up an AVIATOR Wireless Handset, do as follows:

1. Select **SETTINGS > IP handset**.
2. Select **Edit** next to a handset to change the password of the handset.
   Remember that you must enter the same password and local number (user name) in the handset.
3. Select **Delete** next to a handset to delete it from the list.

When a handset is deleted from the list, you can no longer access the SBU with this handset.

4. Select **Configure** next to a handset to access the built-in web interface of the AVIATOR Wireless Handset.

   The web interface of the handset opens. It is very similar to the web interface of the SBU, but has a handset icon in the top left corner.

   With the web interface of the IP handset you can access the internal settings of the handset. For further information, refer to the ***AVIATOR Wireless Handset and Cradle User Manual***.

Setting the call types for AVIATOR Wireless Handsets

To set the call types for AVIATOR Wireless Handsets, do as follows:

1. Select **SETTINGS > IP handsets > Call settings**.

Figure 6-33: Web interface: Settings, IP handsets, Call settings

2. For each handset, select the call types you want to enable for incoming and outgoing calls.

   The call types are described in more detail in the User Manual.

   - For **Incoming calls**, you can check Standard or 3.1 kHz Audio or both.
     If you check both, the handset will react (ring) on any incoming call.
     If, for example, you select Standard, the handset will only react on calls made to the Standard phone number.
   - For **Outgoing calls**, you can select either Standard or 3.1 kHz Audio. The selected type will be used by default, if possible, for any outgoing call.

3. Click **Apply**.

6.7.9 Configuring the discrete I/O interfaces of the SBU

Overview

The SBU has 4 annunciators, 1 chime/lamp inhibit and 5 non-configurable discrete inputs. The non-configurable discrete inputs are SBU nOn (remote on/off), SBU Enable, WLAN Enable and two for Automatic Test Equipment (ATE). The ATE inputs are only for factory use, do not connect them.

Each I/O pin that can be configured is displayed in the web interface. For more information on the pins TP (Top Plug) and BP (Bottom Plug) see ***Pin-out for SBU rear receptacle (top plug)*** on page 4-18 and ***Pin-out for SBU rear receptacle (bottom plug)*** on page 4-19.

The functions of the I/O pins are as follows:

- **Pin TP13: Input. Chime/Lamps Inhibit Input.**
  This discrete input is used to inhibit Satcom activation of the chime and call lights during take-off and landing.
- **Pin TP27: Output. Annunciator #3 "Service Available".**
  Default behavior: Active low when the SwiftBroadband Service is logged on
- **Pin TP28: Output. Annunciator #1 "Incoming call".**
  Default behavior: Active low when a handset is ringing.
- **Pin TP29: Output. Annunciator #2 "SBU Failed".**
  Default behavior: Active low whenever a BITE with severity essential or fatal is active on the SBU.
- **Pin BP1: Output. Annunciator #4 "Message received"**
  This discrete output can be used to indicate that there is an unread message in the SBU. Default behavior: Active low.

Setting the discrete I/O interfaces

You can enable and set some of the discrete I/Os in the web interface. To set these, do as follows:

1. Select **SETTINGS > Discrete I/O**.

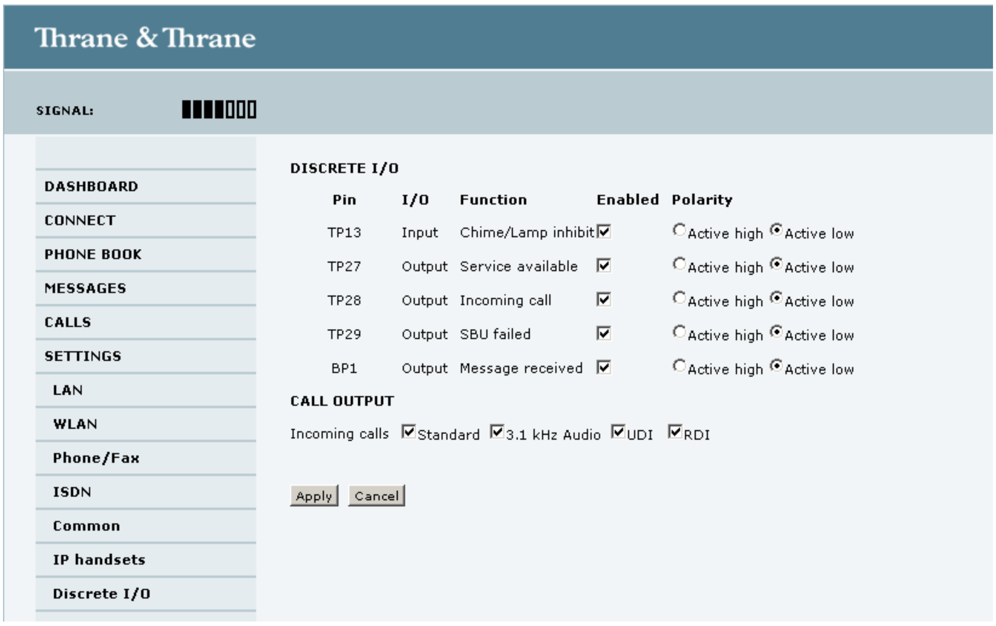


Figure 6-34: Web interface: Settings, Discrete I/O

2. For each pin you want to use, select **Enabled**.
3. For each pin, select if the pin should be **Active high** or **Active low**.
4. For Call output you can select which incoming calls will activate the external ringer (Discrete I/O TP28: Incoming call).
5. Click **Apply** to save the new settings.

6.7.10 Setting the System type

During the initial configuration of the system you must assign the system type, that is the AVIATOR 700 system that you have bought. You can typically only select the system type purchased.

To select the system type, do as follows:

1. Select **SETTINGS > System Type**.

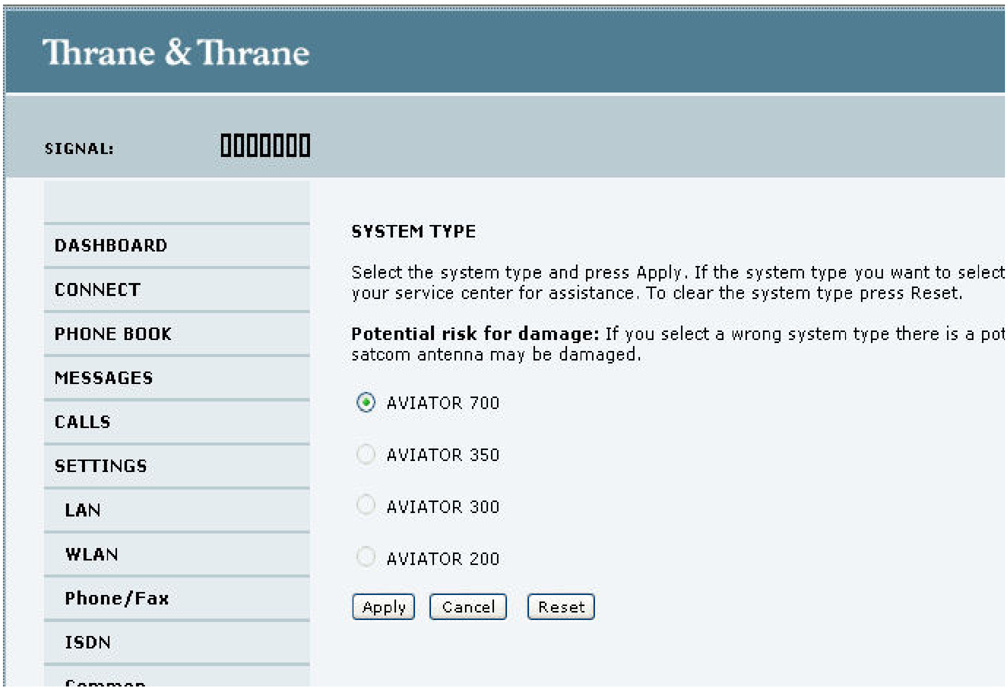


Figure 6-35: Web interface: Settings, System Type

2. Select the system type for the installation.

CAUTION! Selecting a wrong system type may cause damage to the satcom antenna or GPS antenna. If the system type purchased can not be selected, please contact the supplier of your AVIATOR 700 system.

Do not try to use a different system type!

3. Click **Apply** to save the new setting.

The **Reset** functionality is mainly used for support purposes.

6.7.11 Configuring RF settings of the SBU

Before you can configure the RF settings you must select the system type.

You must configure the AVIATOR 700 installation with the specific cable losses of the installation.

To configure the RF settings, do as follows:

1. Connect to the Maintenance connector on the front panel of the SBU and enter the web interface (default: http://192.168.0.1)
2. If prompted, confirm that the system is an AVIATOR 700 system.
3. From the left navigation pane select **SETTINGS > RF settings**.

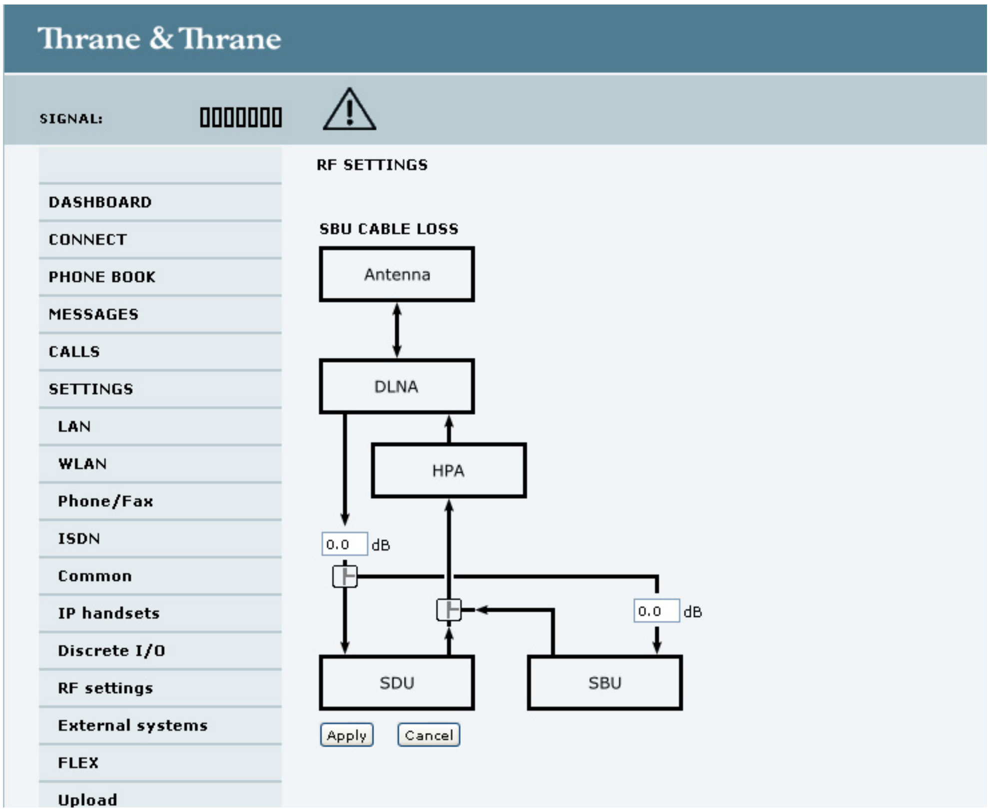


Figure 6-36: Web interface: RF settings

4. Below **CABLE LOSS** enter the cable loss for the cables between the
   - DLNA and the RX Power Splitter
   - RX Power Splitter and the SBU

   The sum of the two cable losses must be equal or less than 21.5 dB. These cable loss values are without losses from the RX splitter and TX combiner.
5. Click **Apply** to save the new settings.

6.7.12 Setting up the navigational input of the SBU

Before you can configure the navigational input you must select the system type.

The AVIATOR 700 supports IRS or GPS only.

For further information on supported navigational systems see ***About satcom antenna steering*** on page 5-6.

ARINC 429 Speed can individually be set to high or low speed on the primary and secondary input, depending on your configuration. For redundancy reasons the system supports a secondary source, in case the primary source fails.

To set up the navigational input, do as follows:

Note Make sure that you configure the primary and secondary IRS to the correct speed in your configuration. This is essential to provide the necessary navigation data needed.

1. Connect to the Maintenance connector on the front panel of the SBU and enter the web interface (default address: http://192.168.0.1)
2. If prompted, confirm that the system is an AVIATOR 700 system.
3. From the left navigation pane select **SETTINGS > External systems**.

Figure 6-37: Web interface: Settings, External systems

4. For **NAVIGATIONAL INPUT** select one option.
5. Only for IRS: For **Primary** and **Secondary** select **Connected** and **Speed**.

6. Only for IRS: If you do not have second navigational input source available you must set **Connected** of **SECONDARY** input to **No**.
7. **GPS Voltage**: If GPS only is selected and power to the GPS antenna is provided by the SBU - apply the correct GPS voltage.
8. Click **Apply** to apply the new settings.

6.7.13 Enabling system options with FLEX keys

On this page you can view the options for your system that are currently enabled or disabled. Enabling the purchased options is typically done at the factory. The following options are currently available:

- **405040A-002 Built-In Router Option**
- **405040A-003 Built-In Wireless Option**
- **405040A-005 SDU to SBU Software Interface**

You can also buy the options at later stage and open up for these options by entering a FLEX key sequence for the specific built-in option.

To enable a system option

To enable a built-in option, do as follows:

1. Connect to the Maintenance connector on the front panel of the SBU and enter the web interface (default: http://192.168.0.1).

2. From the left navigation pane select **SETTINGS > FLEX**.

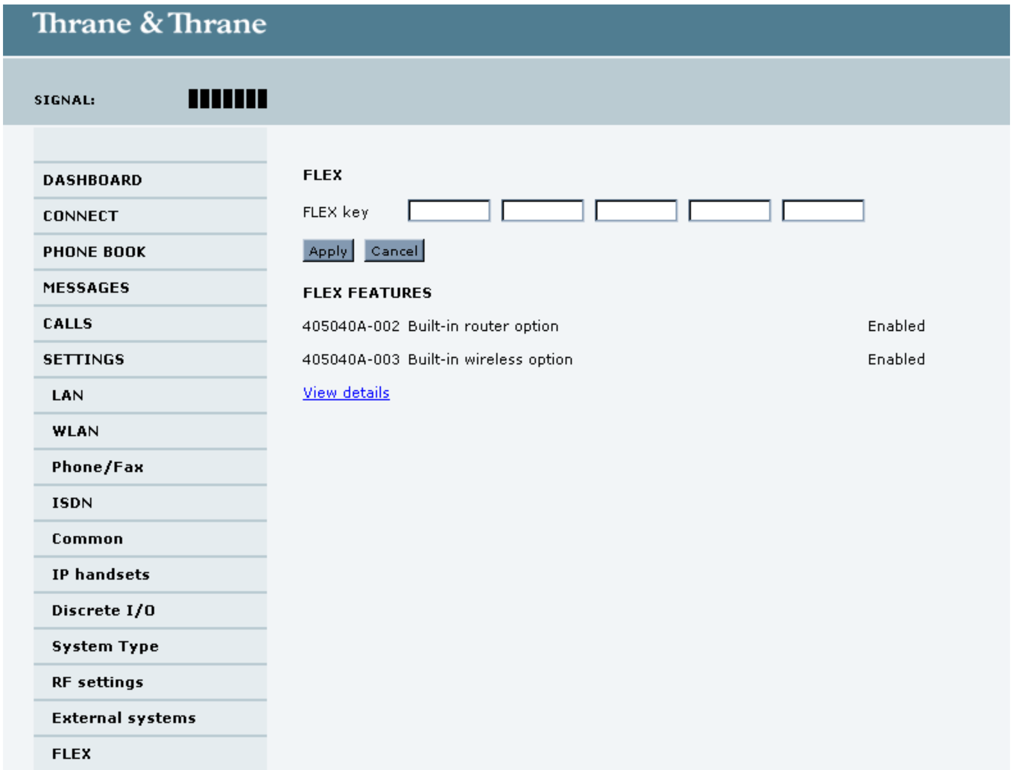


Figure 6-38: Web interface: Settings, FLEX

3. Have the FLEX key ready and enter it into the insert fields.
4. Click **Apply** to enable the new option.

You can click **View details** to display all options and their status (enabled or disabled).

To disable the WLAN interface

To disable the built-in WLAN interface, do as follows:

- Disable the WLAN interface using the **TP5 WLAN Enable** discrete input. Read more about this in ***Pins for non-configurable discrete inputs on the SBU*** on page 5-71 and ***WLAN pins*** on page 5-44.

or

- In the web interface go to **Settings > WLAN** and select **Disable**.

If the WLAN option is not enabled the page **Settings > WLAN** will still be available and the screen will show information that the WLAN option is not enabled.

6.7.14 Tracking

With tracking you can set the SBU to send reports with current position information at specified time intervals or distances to a server address. To setup tracking, do as follows:

1. Select **SETTINGS, Tracking**.

Figure 6-39: Web interface, Settings, Tracking

2. The information in the sections **SERVER CONNECTION** and **APN** must be provided by your airtime provider.
3. In **POSITION REPORTS** you can select among the following:
   - **Compressed**: Aircraft's position with latitude and longitude.
   - **Extended**: Aircraft's position latitude, longitude, heading, speed and UTC time.
   - **ECEF**: Aircraft's position in x,y,z coordinates and a velocity vector.
4. In **INTERVAL REPORT** and **DISTANCE REPORT** you can enable the respective report and set a report interval or distance.
5. Click **Apply** to save the settings.

6.8 Managing LAN/WLAN network users

6.8.1 Introduction

With the built-in router functionality the system offers a flexible use of the data channel of the BGAN service. You can configure the use of the data channel by defining network user groups and profiles. The following picture gives an overview of the parameters involved.

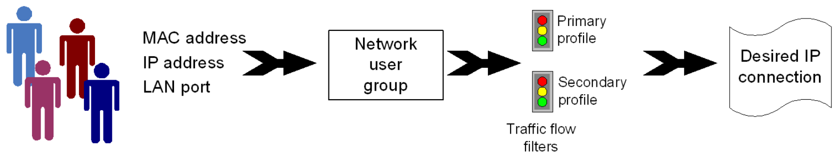


Figure 6-40: Overview over network user groups and traffic flow filters

The network user group you belong to is determined by one or more of the following:

- the IP address of the device you are using
- the MAC address of the device you are using
- the LAN port you connect to

A connected IP device will automatically be assigned to the default network user group, if it is not specified otherwise.

For specific purposes like video streaming, a server on the network, a fixed IP address on the connected device or changing the startup mode of a connection, you must set-up network groups with specific primary and/or secondary profiles. How to do this is described in the following sections.

Network user groups

The network management system divides the users of the SBU into network user groups. Each network user group has a profile which determines how the users connect to the Inmarsat BGAN network. The network user groups can allow or restrict certain services for different users.

For example, you may want to define:

- one network user group allowing both Standard and Streaming connections,
- one network user group for Internet, e-mail and VPN, allowing Standard connections,
- one network user group for Remote management of systems. This would be a direct Standard connection (Bridge mode).

You can have up to 11 network user groups and global IP addresses.

Necessary steps when managing network users

The steps necessary for managing network users include:

1. **Defining a network user group.** See ***Setting up the network user groups*** on page 6-57.

   The network user groups determine settings such as:
   - QoS (Standard/Streaming),
   - IP addressing (Static or Dynamic, this is decided by the SIM card setup and the service provider)
   - Internet access mode (Router Mode, Bridge Mode or No Internet Access)
2. **Identifying a network device.** See ***Managing network devices*** on page 6-62. The network devices are identified by their IP address, MAC address and (optionally) device name.
3. **Associating the network user group and the network device.** See ***Using the network classification table*** on page 6-63. The network classification table determines which devices should belong to which network user group. When a network device is connected, the SBU runs through the network classification table to check if the new connection matches any of the entries in the table. When a match is found, the SBU establishes a packet data connection (PDP context) with the settings determined for the belonging network user group, and the device is ready for use with the SBU.

Access to the network management settings

Access to the network management settings requires an administrator password. The default user name is **admin** and the default password is **1234**.

The administrator can create and manage network user groups and set up a network classification table defining priorities for devices, network user groups and LAN ports.

CAUTION! All user connections to the LAN interface may be affected when you change the settings below, including your own current connection.

6.8.2 Setting up the network user groups

Overview

A network user group, in this context, is a group of network users sharing the same Quality of Service profile and network parameters.

There are 11 configurable network user groups. For the Default network user group, certain settings are locked, to make sure there is always one functional network user group available. For example, the Default network user group does not allow you to select a Bridge mode connection.

Note: You cannot delete network user groups. If you do not want to use them, click **Edit** and select **Disabled** at **Status** in the **NETWORK USER GROUP** field.

Editing a network user group

The default setting of this network user group is a standard IP data connection with automatic IP address allocation and automatic activation of the connection.

Note: For further explanation of the terms used below, see ***Definitions for network terms*** on page 6-66.

To edit a network user group, do as follows:

1. Select **SETTINGS > LAN > Network user groups**.
   If prompted, enter the administrator user name and password. The default user name is **admin** and the default password is **1234**.

The following screen shows the 11 user groups available and their current status, Internet connection type, and whether automatic activation is enabled or disabled.

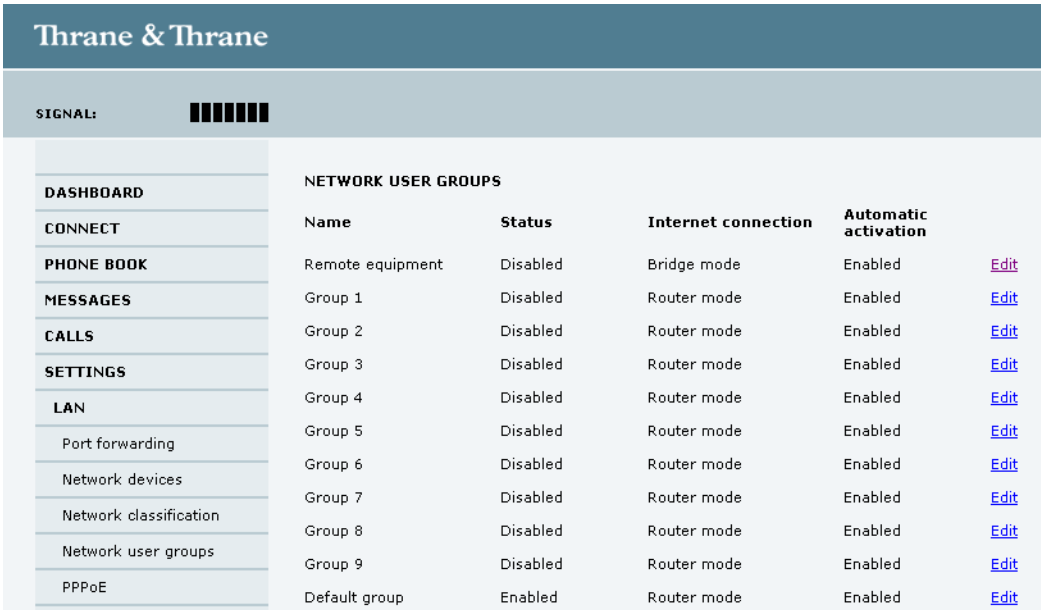


Figure 6-41: Web interface: Settings, LAN, Network user groups

2. Click **Edit** next to the network user group you want to set up.

Note Changes to the status and internet connection only take effect after reboot of the SBU. This is also valid if a user wants to change the network user group, then the SBU must be restarted before the user has access to the new network user group.

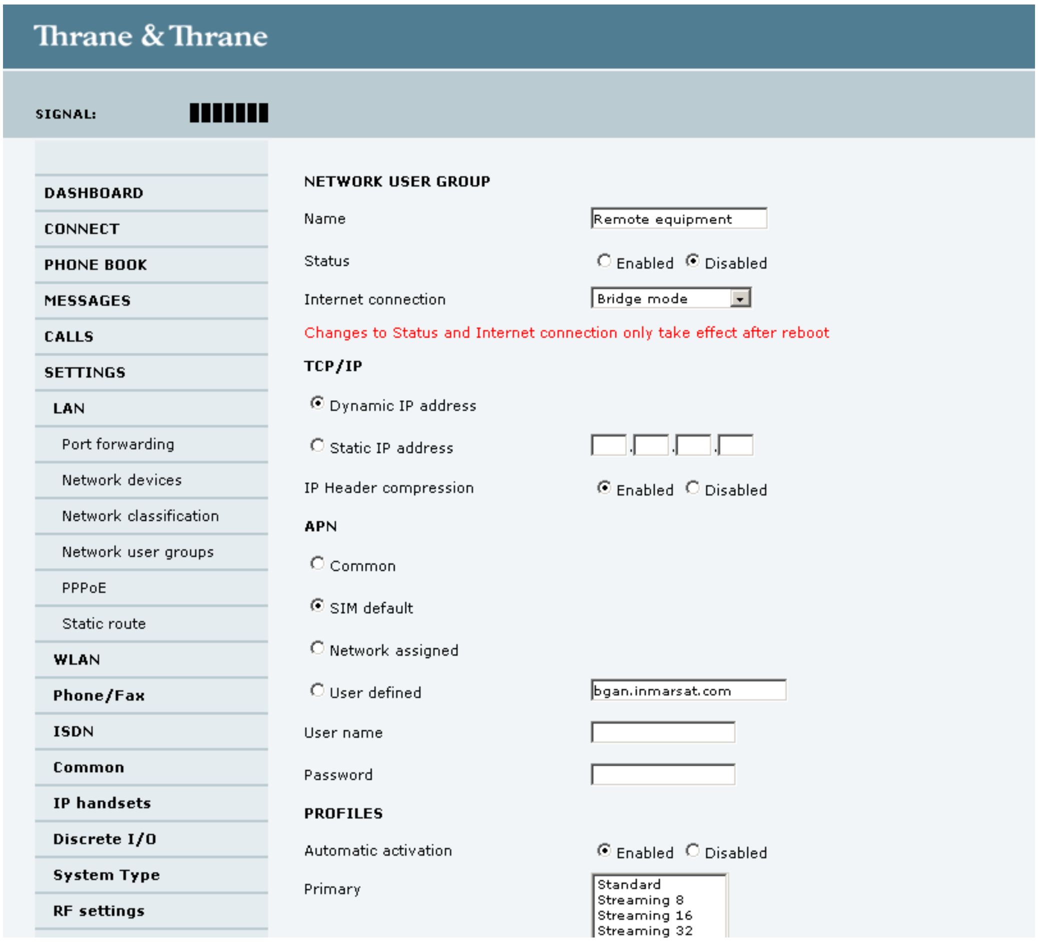


Figure 6-42: Web interface: Settings, LAN, Network user groups, Edit

3. Type in a name for the group.
4. Select **Enabled** or **Disabled**.
5. Select the type of **Internet connection**.
   - **Router mode** means the connection will be shared with other users, and the NAT module of the SBU will make the necessary address translations. Read more about NAT in ***NAT (Network Address Translation)*** on page 6-66. Use this mode if one or more computers are connected using the LAN interface, and the SBU should acts a router.
   - **Bridge mode** is an exclusive connection, it is not shared with other users and NAT is disabled. Use the Bridge mode together with a network classification entry that selects a single computer (see ***Using the network classification table*** on page 6-63). The SBU acts a a bridge for this network user group.
     This mode is not available in the Default network user group.
   - **No internet access** means no connection to the Internet is allowed. Use this setting e.g. for IP handsets, where an Internet connection is not required. The external voice connection is still available; this setting only affects communication over the Internet.
6. Select **Dynamic IP address**.

This is the IP address used externally on the satellite network.

If you want to use a **static IP address**, and your subscription allows it, you must still leave this setting at **Dynamic**. Then select **SIM default** in step 8 and type in the APN user name and password from your provider in step 9.

Your SBU will then use the static IP address set up for your SIM card.

Note Typing in a static IP address is currently not supported by the SwiftBroadband network.

7. Set **IP Header compression** to **Enabled** or **Disabled**.

   For information on IP Header compression, see ***Header compression*** on page 6-66.

8. Select the source of the **APN** (Access Point Name).

   You have the following options:

   - **Common**. The APN is taken from the Common APN defined under SETTINGS > Common. Refer to ***Setting the common interface settings of the SBU*** on page 6-37.
   - **SIM default**. The APN is taken from the SIM card. If you want to use a static IP address on the external network, select this option either here or in the Common setting.
   - **Network assigned**. The APN is assigned from the network.
   - **User defined**. **This is the preferred option.** Type in the APN. APNs are provided from the Airtime Provider. Use this option if there is no automatic provisioning for a static IP address from the service provider.

9. If your APN uses a password, type in the user name and password provided from the Airtime Provider.

   Note If you are going to use the static IP address from your SIM card, the user name and password are mandatory! See the documentation for the airtime subscription from the service provider. See step 6 above.

10. At **Automatic activation** select whether the profile selected in the next step should be activated automatically or manually.

    Note If the selected primary profile is a Streaming profile, this setting has no effect. Streaming profiles must always be activated manually from the Dashboard.

    - **Disabled** means you can activate/deactivate the profile from the Dashboard.
    - **Enabled** means the profile is activated automatically.

11. Select the **Primary profile**.

    Select a profile from the **Primary** scroll list. This profile is used by this network user group as a first choice, when possible.

There are several predefined profiles: Standard, Streaming 8, Streaming 16, Streaming 32, Streaming 64 and Streaming 128. Additionally, you can define your own custom profiles or any newer ones, Inmarsat defines.

Important If you have selected and started a Streaming connection as your primary profile, the LAN interface will be running a Streaming connection until you stop it or disconnect the interface.

For further information on profiles and traffic flow filters, see ***Using profiles*** on page 6-81 and ***Using traffic flow filters*** on page 6-85.

12. Select the **Secondary profile**.

    To select more than one secondary profile, press and hold **Ctrl** or **Shift** while selecting.

    Note If you have selected both a primary and one or more secondary profiles you must define a traffic flow filter before you can establish a valid connection.

    The Context Identifiers (CIDs) for the selected primary and secondary profiles are listed under **Profile CIDs**.

13. Click **Apply**.

Note that changes to the status and the Internet connection type of a network user group first take effect after rebooting the AVIATOR 700 SBU.

6.8.3 Managing network devices

Overview

A network device, in this context, is an Ethernet hardware device, identified by its unique MAC address.

When a network device with dynamic IP address is connected to the SBU, it is automatically listed in the Network devices list.

Viewing the list of network devices

To view the list of network devices, select **SETTINGS > LAN > Network devices**.

All network devices that have been connected to the SBU are listed here.

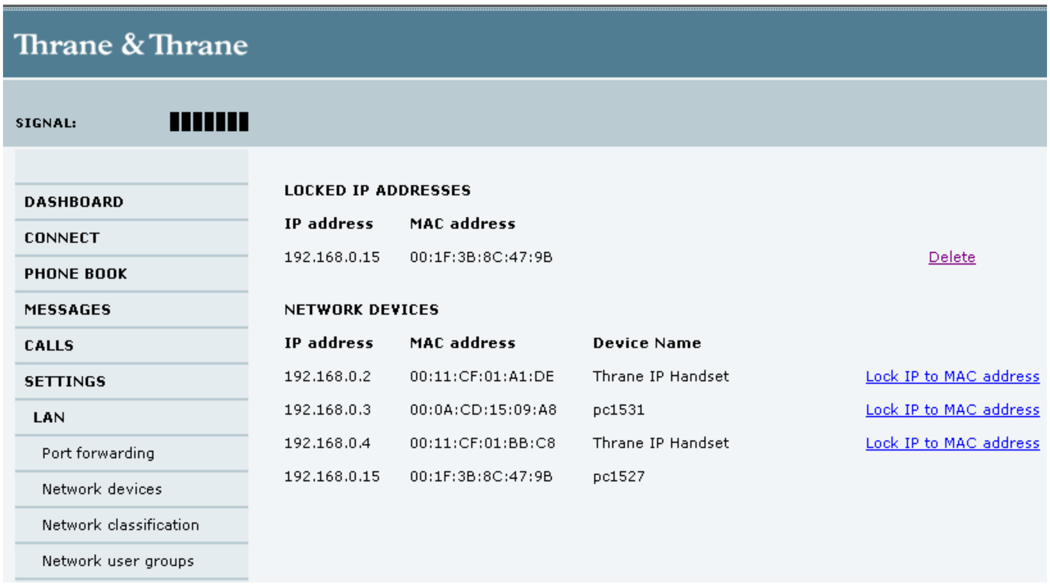


Figure 6-43: Web interface: Settings, LAN, Network devices

Locking an IP address to a MAC address

When the device is locked to an IP address, the SBU will always assign this IP address to the device with this MAC address (if DHCP is enabled and the Internet connection is in Router mode, and not a Bridge mode connection).

To lock an IP address to a MAC address, do as follows:

1. If prompted, log in as an administrator. The default user name and password are **admin** and **1234**.
2. To lock a device to its current IP address, click the link next to the device. The device is then locked to the current IP address and added to the list of locked IP addresses at the top of the page.
3. To unlock a device from the IP address, click **Delete** next to the device in the **LOCKED IP ADDRESSES** list.

6.8.4 Using the network classification table

Overview

The network classification table is used to define which network devices, IP addresses and/or LAN ports are associated with which network user groups.

Each entry in the table shows MAC address, IP address, LAN port and network user group.

When a network device is connected, the SBU runs through the network classification table to check if the new connection matches MAC address, IP address and LAN port in any of the entries in the table. When a match is found, the SBU establishes a PDP context with the settings of the network user group assigned in the matching entry. The device is now ready for use with the SBU.

Adding or editing an entry in the network classification table

The network classification table shows which devices are associated with which LAN ports and network user groups. An Asterisk (*) is a “wild card”, meaning that any value is accepted.

You can add, edit and delete entries in the network classification table.

To add a new entry to the table or to edit an existing entry, do as follows:

1. If prompted, log in as an administrator. The default user name and password are **admin** and **1234**.

2. Select **SETTINGS > LAN > Network classification table**.

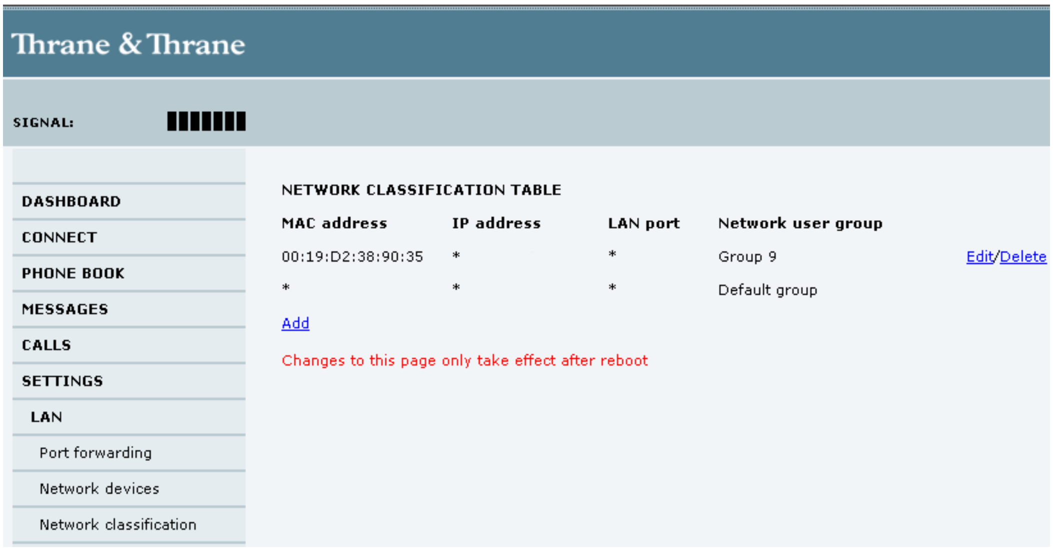


Figure 6-44: Web interface: Settings, LAN, Network classification table

3. Click **Edit** next to the entry you want to edit, or click **Add** at the bottom of the list.

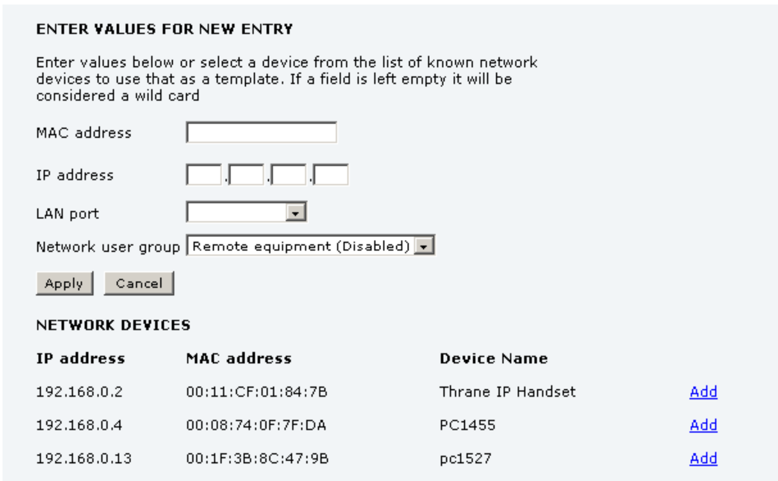


Figure 6-45: Web interface: Settings, LAN, Network classification table, Edit or Add

4. Click **Add** next to a network device you want to use, or type in the MAC address manually at the top of the page.

> **Note** If you leave a field empty, it is the same as a “wild card” and it will be shown as an Asterisk in the Network classification table.
>
> Unless you are using a Static IP address, the IP address field should always be left empty.

5. Select the **LAN port** and **Network user group** you want to associate with the device.
   Network user groups are created and defined in the Network user group page. See ***Setting up the network user groups*** on page 6-57.

6. Click **Apply**.

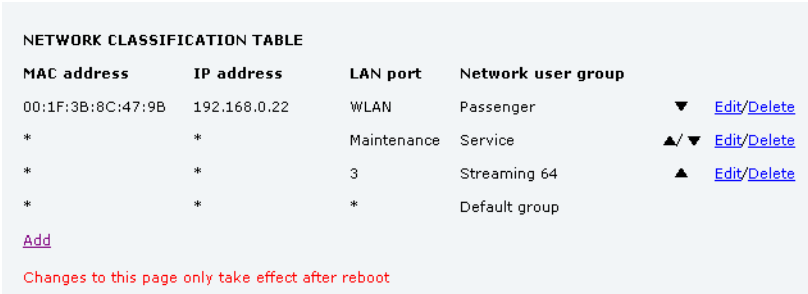
Removing an entry in the network classification table

In the **network classification table**, click **Delete** next to the entry you want to delete.

Changing the priority in the network classification table

Connections are evaluated in the order they are listed. The first entry (and **only** the first entry) that matches the properties of the connected device is applied, meaning that the connection will be using the settings of the network user group assigned to that entry.

To change the priority of an entry, click the up or down arrow next to the entry.



NETWORK CLASSIFICATION TABLE

MAC address	IP address	LAN port	Network user group		
00:1F:3B:8C:47:9B	192.168.0.22	WLAN	Passenger	▼	Edit/Delete
*	*	Maintenance	Service	▲/▼	Edit/Delete
*	*	3	Streaming 64	▲	Edit/Delete
*	*	*	Default group		

Add

Changes to this page only take effect after reboot

Figure 6-46: Web interface: Settings, LAN, Network classification table, change priority

The Default network user group is always last, so it is only used if none of the other entries match the properties of the connected device.

6.8.5 Definitions for network terms

Header compression

The header of a data packet contains control information belonging to that specific packet. The information in the header can take up a considerable amount of bandwidth. In order to use the bandwidth more efficiently, you can enable Header Compression, meaning the header information is compressed, leaving some of the information out. With disabled header compression the full header ist transmitted with each data packet. This takes up bandwidth and means a more reliable data transmission with less data loss.

You can select whether or not to use Header Compression for your data transmission.

- **Header Compression enabled**: More efficient use of the bandwidth available, recommended typically for Internet, e-mail, ftp applications etc.
- **Header Compression disabled**: More reliable data transmission. Recommended for time-critical applications like VoIP and streaming applications, as well as other applications where packet loss is to be minimized.

If there are problems with packet loss you might want to disable header compression and see whether the header compression is the reason for the packet loss.

NAT (Network Address Translation)

NAT enables a local-area network to use one set of private IP addresses for internal traffic and an assigned or static IP address for external traffic. The built-in NAT module in the SBU makes all necessary address translations between the local-area traffic and the external traffic.

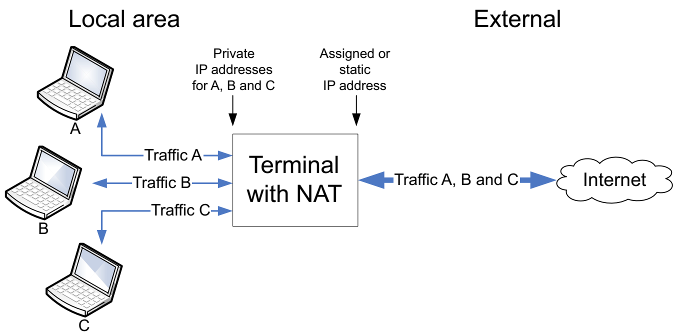


Figure 6-47: NAT (Network Address Translation)

If more than one user is connected, you must select a network user group with **Router mode** to use the NAT functionality of the SBU.

6.8.6 Starting and stopping any data session

The administrator can start and stop data sessions for all network user groups connected to the SBU.

To start or stop a data session, do as follows:

1. Select **CONNECT**.
   If prompted, enter the administrator user name and password. The default user name is **admin** and the default password is **1234**.
   Under ONGOING DATA SESSIONS at the top you can see which data sessions are currently active.

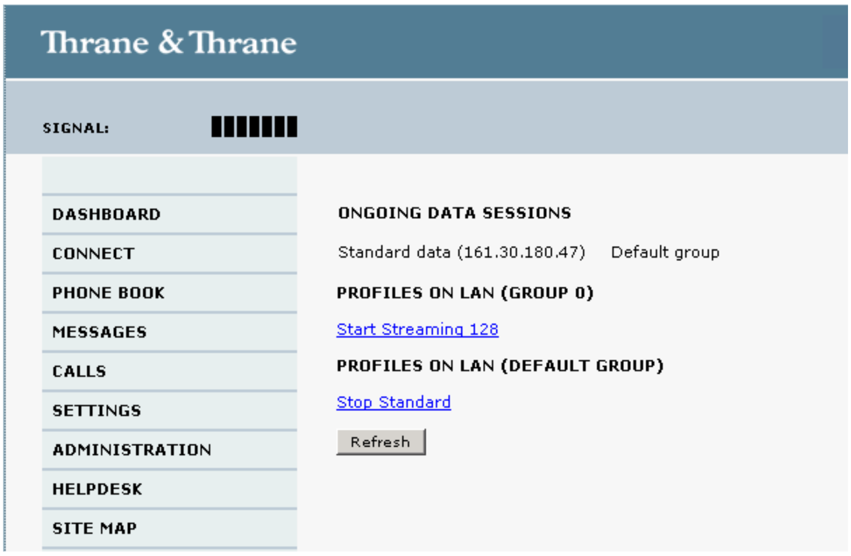


Figure 6-48: Web interface: Connect, to start and stop data sessions

   In the example above you can manually start the streaming 128 connection of GROUP 0 and stop the standard connection of the DEFAULT GROUP.

2. Click on the session you want to start or stop.
3. Click **Refresh** to update the current state of the connection(s). Note that there might be some latency when updating the connection status, you might have to wait and click **Refresh** again to update the Dashboard to the current state.

Note: The PDP context for the data session is not activated before any unit in the LAN tries to communicate, e.g. sends a DHCP request.

6.8.7 Establishing a PPPoE connection

Overview

You can establish a Point-to-Point-over-Ethernet (PPPoE) connection to the BGAN network using the AVIATOR 700 system. Use this connection type if you want to control start and stop of the connection independently from the built-in web interface of the SBU.

Possible applications for this type of connection are as follows:

- Connecting a router
- Connecting broadcast equipment, optionally through a PC
- Establishing a Picocell for the use of cell phones

Note Without the built-in Router option the AVIATOR 700 system is limited to one PPPoE connection.

The following drawing shows how the PPPoE connection and the built-in web interface handle connections to the SwiftBroadband network.

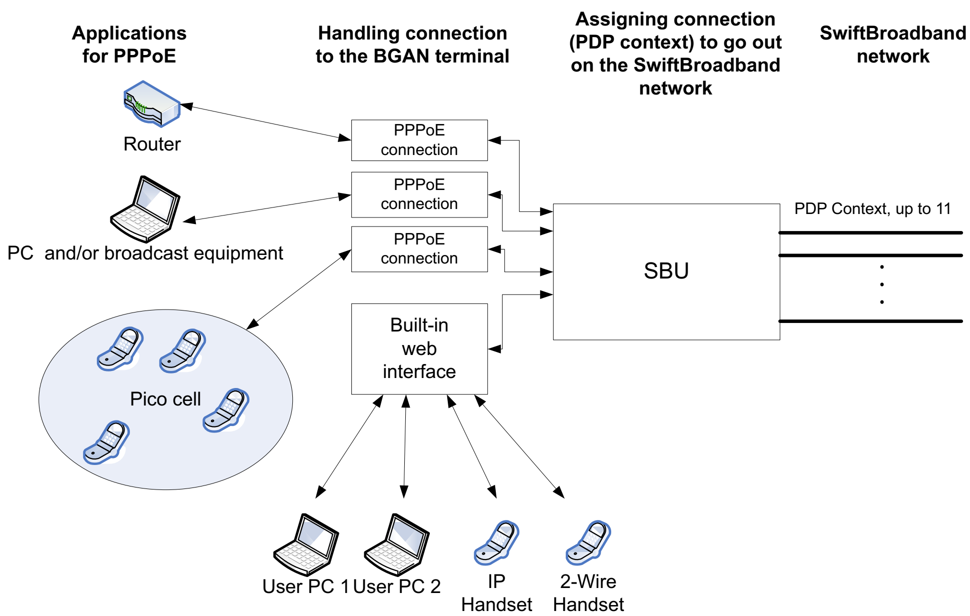


Figure 6-49: Example for PPPoE connections

Enabling PPPoE network connections in the AVIATOR 700 system

During the configuration of the system you can configure whether the system should allow and handle PPPoE network connections.

To enable or disable the system to support PPPoE network connections do as follows:

1. Select **SETTINGS > LAN > PPPoE**

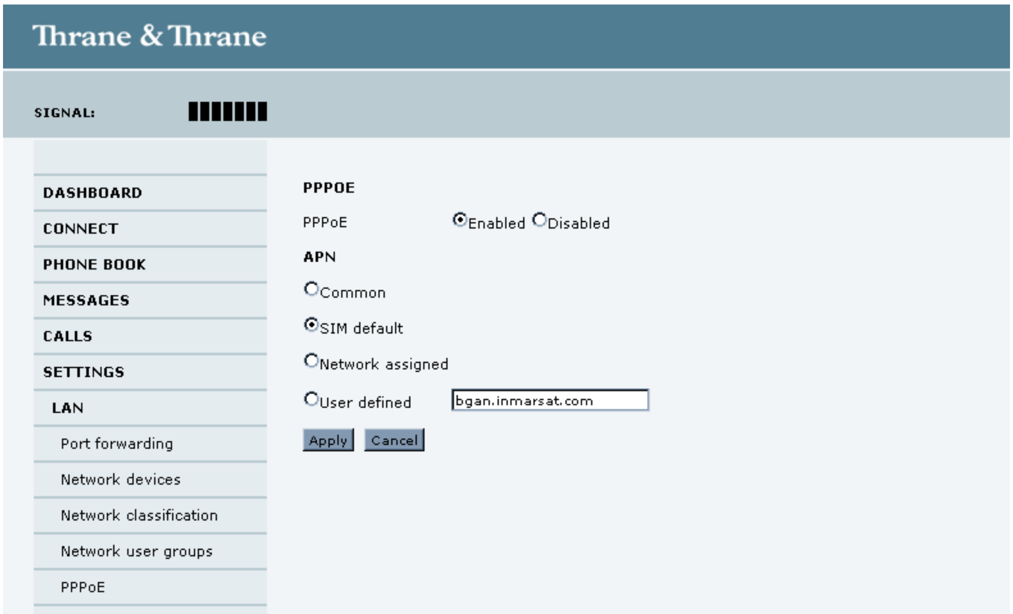


Figure 6-50: Web interface, Settings, LAN, PPPoE

2. Select **Enabled** or **Disabled (**default).
3. Check with your airtime provider what your **APN** is and select accordingly.
4. Click **Apply** to send the settings to the terminal.

How to configure the connected PC, router or other equipment

You must configure the equipment correctly to establish a network connection using PPPoE. How to set up a new network connection depends on the type of equipment, refer to the user documentation of the equipment.

You need the following parameters:

- **User name** and **password**
  The user name and password can be left blank. Then the registration on the APN is most commonly done in a way that the data connection will be established with a dynamic IP address from the airtime provider.
  To request a static IP (if subscribed to) from the APN you must type in the user name and password from your airtime subscription.
  Note for **MAC OS**: User name and password are required. Use user name void and password void. This works for some ISPs. Contact your airtime provider for further information.

- For setups that have a check box for **Enable LCP extensions**, deselect this.
- **Service name:** For certain services, i.e. a streaming class, you must type in a specified text string when asked for a service name. The following table shows the service names and descriptions that are supported by the terminal.

Service name	Description
Blank	default, primary standard IP data connection
XBB[a]:BACKGROUND	default, primary standard IP data connection
XBB:STREAM8K	primary streaming IP data connection 8 kbps
XBB:STREAM16K	primary streaming IP data connection 16 kbps
XBB:STREAM32K	primary streaming IP data connection 32 kbps
XBB:STREAM64K	primary streaming IP data connection 64 kbps
XBB:STREAM128K	primary streaming IP data connection 128 kbps
XBB:X-STREAM	primary streaming IP data connection up to 512 kbps.

Table 6-4: PPPoE connection, service names and descriptions

a. For SwiftBroadband the part of the service name “XBB” can be replaced by “SBB”.

PPPoE setup with a non-default APN

You can setup a network connection using PPPoE for another APN than the default APN. Check the documentation from the Service provider for the new APN name. Enter the following commands in the field **Service name** when setting up the network connection:

Service name for custom APN	Description
XBB[a]:AT+CGDCONT=1,ip,”<APN name>”;+CGEQREQ=1,3	Standard IP data connection
XBB:AT+CGDCONT=1,ip,”<APN name>”; +CGEQREQ=1,1,8,8,8,8,2,0,“0E0”,”0E0”,3,0,0	Streaming IP data connection 8 kbps
XBB:AT+CGDCONT=1,ip,”<APN name>”; +CGEQREQ=1,1,16,16,16,16,2,0,“0E0”,”0E0”,3,0,0	Streaming IP data connection 16 kbps
XBB:AT+CGDCONT=1,ip,”<APN name>”; +CGEQREQ=1,1,32,32,32,32,2,0,“0E0”,”0E0”,3,0,0	Streaming IP data connection 32 kbps
XBB:AT+CGDCONT=1,ip,”<APN name>”; +CGEQREQ=1,1,64,64,64,64,2,0,“0E0”,”0E0”,3,0,0	Streaming IP data connection 64 kbps
XBB:AT+CGDCONT=1,ip,”<APN name>”; +CGEQREQ=1,1,128,128,128,128,2,0,“0E0”,”0E0”,3,0,0	streaming IP data connection 128 kbps
XBB:AT+CGDCONT=1,ip,”<APN name>”; +CGEQREQ=1,1,512,512,512,512,2,0,“0E0”,”0E0”,3,0,0	streaming IP data connection X-Stream

Table 6-5: PPPoE connection, service names and descriptions for custom APN

a. For SwiftBroadband the part of the service name “XBB” can be replaced by “SBB”.

Example: To setup a standard background data connection using the APN “bgan.inmarsat.com” enter:
XBB:AT+CGDCONT=1,ip,”bgan.inmarsat.com”;+CGEQREQ=1,3

For more information about the command syntax see the standard 3GPP TS 27.007.

6.8.8 Setting up static routing

When you have an external gateway connected to your SBU, the SBU is not automatically able to “see” the network on the other side of the gateway. However, you can set up your SBU to communicate with a device on the other side of a gateway, by using Static routing.

To set up a new device for static routing, do as follows:

1. Select **SETTINGS > LAN > Static route.**

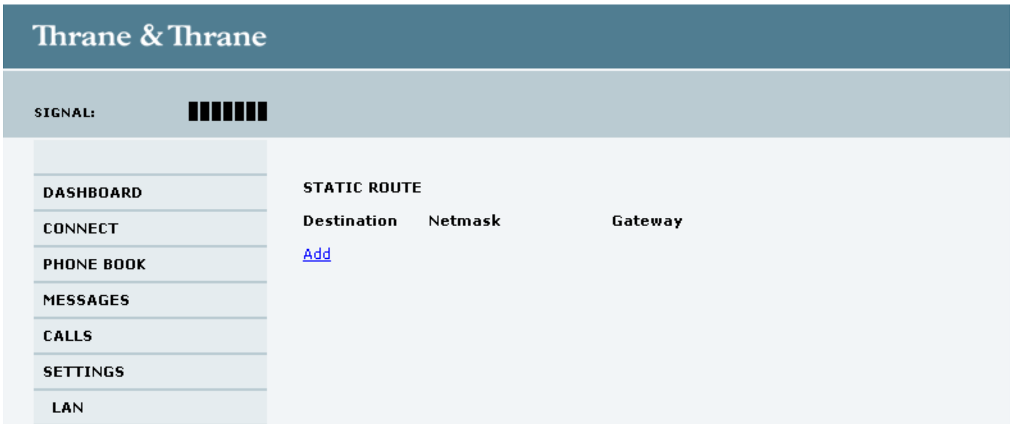


Figure 6-51: Web interface, Settings, LAN, Static route

2. Click **Add**.

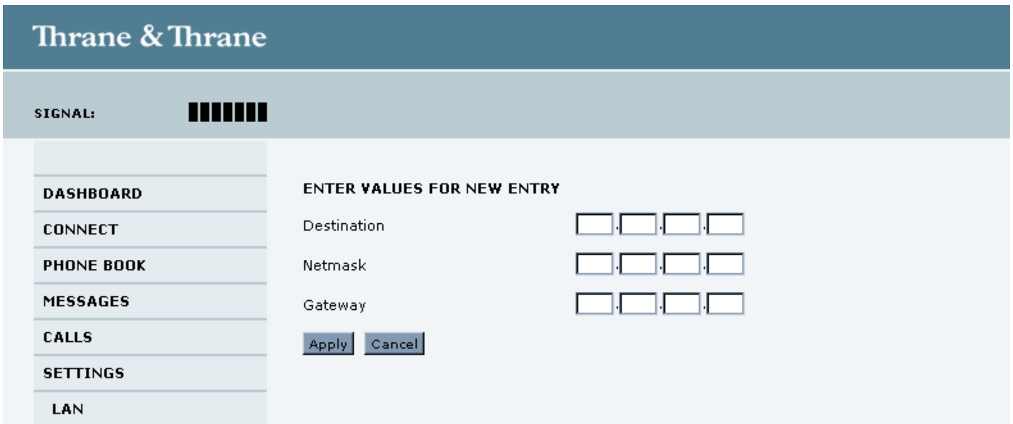


Figure 6-52: Web interface, Settings, LAN, Static route, add

3. Enter the values for your device.

- Destination: The IP address you want to route to.
- Netmask: The netmask you want to route to.
- Gateway: The gateway, e.g. the address of a wireless access point or router to which the destination device is connected.

4. Click **Apply**.
   The values for the new entry are now in the list. This means that the SBU can communicate with the destination IP address on the other side of the gateway.

6.8.9 SNMP interface

You can connect equipment to perform SNMP queries on the SBU. For information on the supported subsets of MIB files see ***Contact for support*** on page 8-1.

6.9 Administration of the SBU

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

- ***Accessing the administration settings***
- ***Saving and loading a configuration***
- ***Call charges***
- ***Log handling***
- ***Data limits***
- ***Using profiles***
- ***Using traffic flow filters***
- ***SIM card limitations: SIM PIN and SIM Lock***
- ***Setting up user permissions***
- ***Remote management***
- ***Remote activation of a connection using SMS***
- ***Restricted dialing***

6.9.1 Protecting the SBU against unintended configuration changes

You can protect the SBU against unintended changes of the setup:

1. Change the administrator password from user name: admin and password: 1234 to a user name and password of your choice. For further details see ***Changing the administrator password*** on page 6-76.
2. You can deny non-administrator users access to certain functions and make the respective pages in the web interface read-only. For further details see ***Setting up user permissions*** on page 6-89.

6.9.2 Accessing the administration settings

Logging on as administrator

The Administration settings require an Administration user name and password. You must also login as an administrator in the sections for **SETTINGS**, **LAN**, **Network Devices**, **Network classification**, **Network user groups** and **PPPoE**.

To log on as administrator, do as follows:

1. Select **ADMINISTRATION** from the left navigation pane.
2. Enter the Administration user name and password.
   The default user name is **admin** and the default password is **1234**.

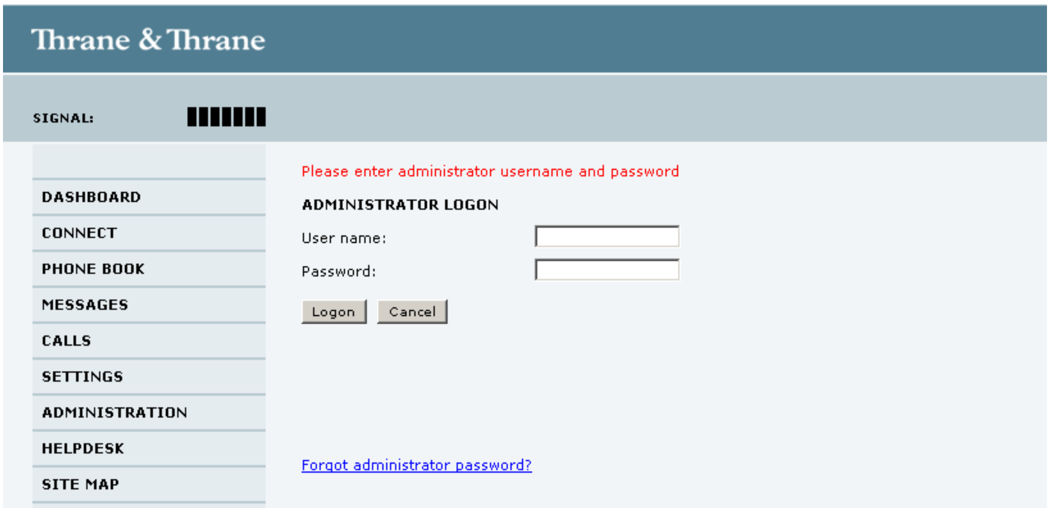


Figure 6-53: Web interface: Administration

   If you have forgotten the administrator password, you can reset the password by clicking the link at the bottom of the page.[1] For further information, see the next section ***Resetting the administrator password***.

3. Click **Logon**.
   The Administration page is now updated to let you change the user name and password, Save/load a configuration or log off Administration.

1. The link is only shown when the PC is connected to the Maintenance connector on the SBU front plate.

Resetting the administrator password

Important: To reset the administrator password you must connect the PC to the Maintenance connector on the SBU front plate. If not, the link **Forgot administsrator password?** on the **ADMINISTRATOR LOGON** page will not be visible.

If you have forgotten and need to reset the administrator password, do as follows:

1. Contact your supplier for a reset code.
   Please report the serial number and IMEI number of the terminal.
   You can find the serial number and IMEI number in the **Dashboard**.
2. Click the link **Forgot administrator password?** at the bottom of the **ADMINISTRATOR LOGON** page (see the previous section).

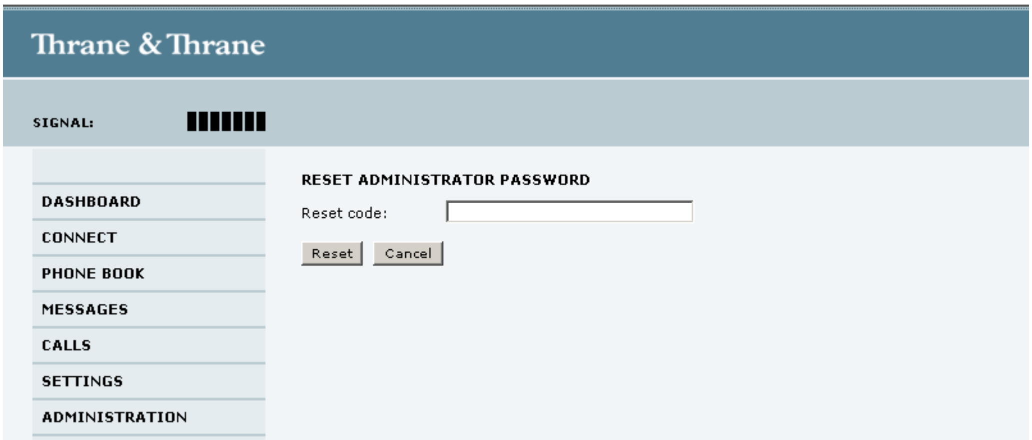


Figure 6-54: Web interface: Administration, Reset administrator password

3. Type in the reset code obtained from your supplier and click **Reset**.
4. Type in the user name **Admin** and the default password **1234**.
5. Click **Logon**.
   For information on how to change the password, see the next section ***Changing the administrator password***.

Changing the administrator password

To change the administrator password, do as follows:

1. After entering the administrator user name and password in the **ADMINISTRATION** page, locate the section **Change administrator logon**.

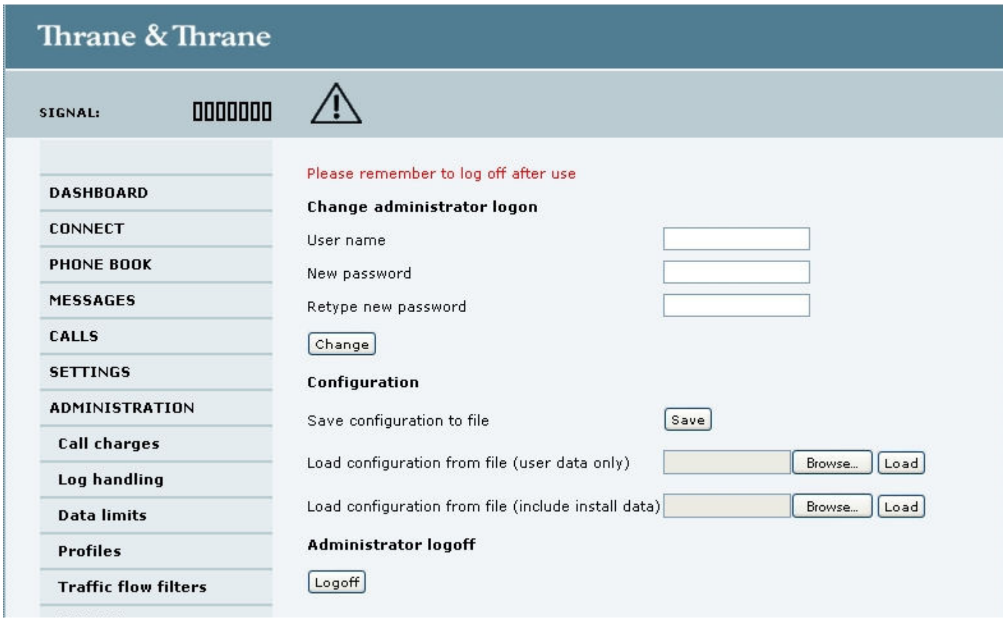


Figure 6-55: Web interface: Administration, change administrator logon

2. Type in the existing user name.
3. Type in the new password and retype it on the next line.
4. Click **Change**.
   At the next logon the new password is required.

Logging off administration

If you have not entered anything for 30 minutes under ADMINISTRATION, you are logged off automatically.

To log off manually, click **Logoff** under administrator logoff in the **ADMINISTRATION** page.

6.9.3 Saving and loading a configuration

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

Note Configuration files can only be exchanged between SBUs with the same software version!

Saving a configuration to a file

The settings from the following pages of the web interface are saved in the configuration file:

- SETTINGS
- ADMINISTRATION
- PHONE BOOK

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

1. In the **ADMINISTRATION** page, under **Configuration**, click **Save**.

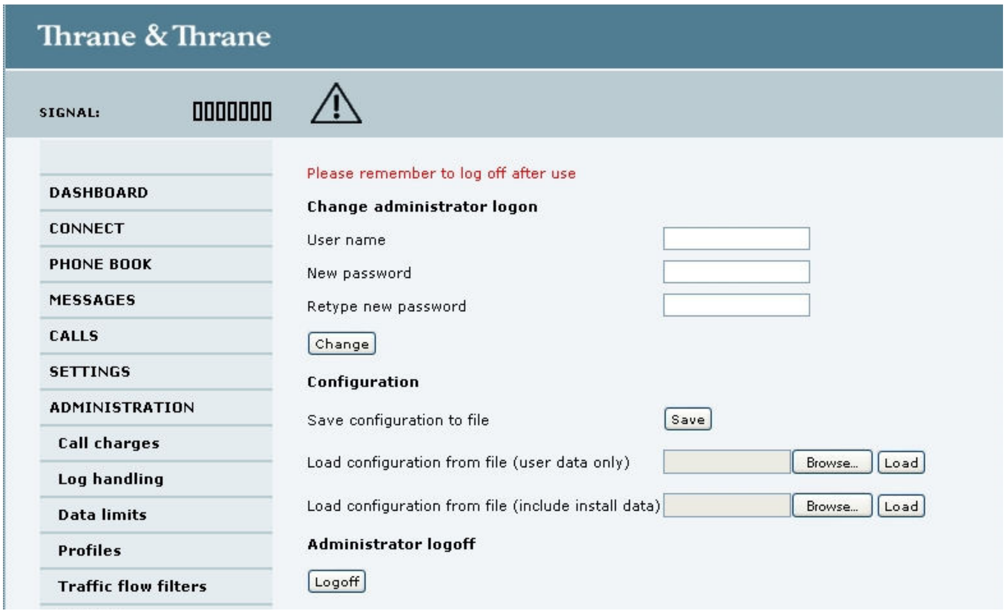


Figure 6-56: Web interface: Administration, saving a configuration file

2. Accept the default destination file name or type in the destination file name and location.
3. Click **OK**.
   The configuration is now saved to a file. This file is used to load the configuration into another SBU.

Loading a configuration from a file

In this example the PC is connected to the SBU front maintenance connector. To load a configuration from a file, do as follows:

1. In the **ADMINISTRATION** page, under **Configuration**, select the upload type:
   - **Load configuration from file (include install data)**, available when connected to the SBU front maintenance connector.
     The install data are the pages **Discrete I/O**, **RF settings** and **External systems**.

     Note: This feature can only be used with systems of the same system type, for example one AVIATOR 700 SBU to another AVIATOR 700 SBU.

     To use this upload type the PC must be connected to the SBU front maintenance connector.
   - **Load configuration from file (user data only)**. This upload type is available on any other LAN/WLAN interface of the SBU.

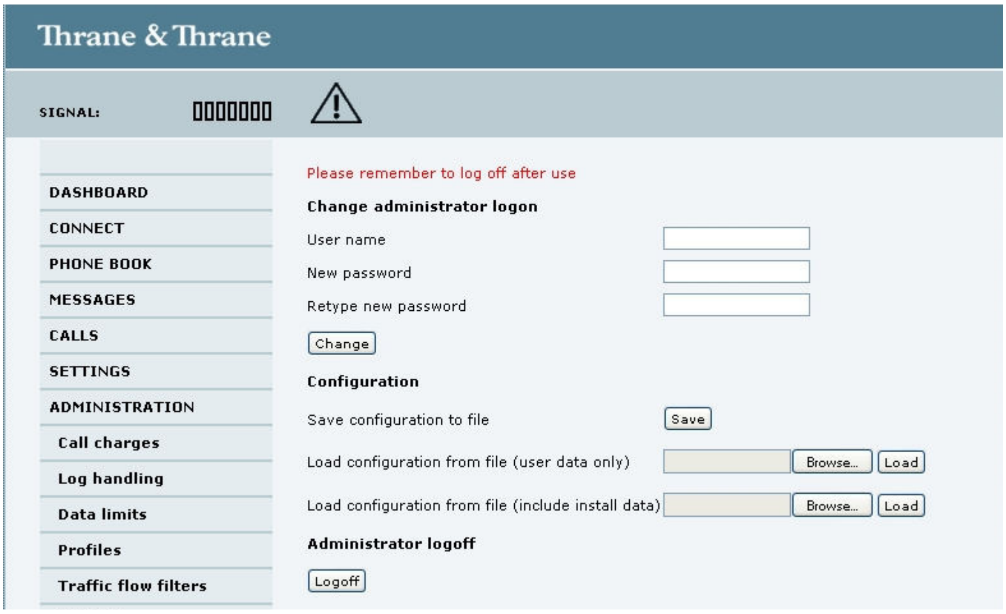


Figure 6-57: Web interface: Administration, saving a configuration file

2. Click **Browse...** to browse to the file you want to import. Then click **Open**.
3. Click **Load**.
   The new configuration is now loaded into your SBU.

   Note: Configuration files can only be exchanged between SBUs with the same software version!
4. Restart the SBU to activate the new configuration.

6.9.4 Call charges

In this section you can enter the call charges so you at all times can see the current charges for the services used. Consult the documentation from your service provider for the subscribed services, then enter these tariffs in the web interface. The system automatically calculates the charges for your calls and data sessions. The entered tariffs are used for estimating the charges for calls and data sessions. The estimated charge is listed for each call or data session in the call log. For further information, see the AVIATOR 700 user manual.

Note Thrane & Thrane does not take responsibility for the correctness of the estimated charges. This calculation is only a rough estimate of the charge, based on the tariff entered by the user. Also, the Airtime Provider may have different methods of calculating the charge.

To enter the call tariffs, do as follows:

1. From the left navigation pane, select **ADMINISTRATION** > **Call Charges.**

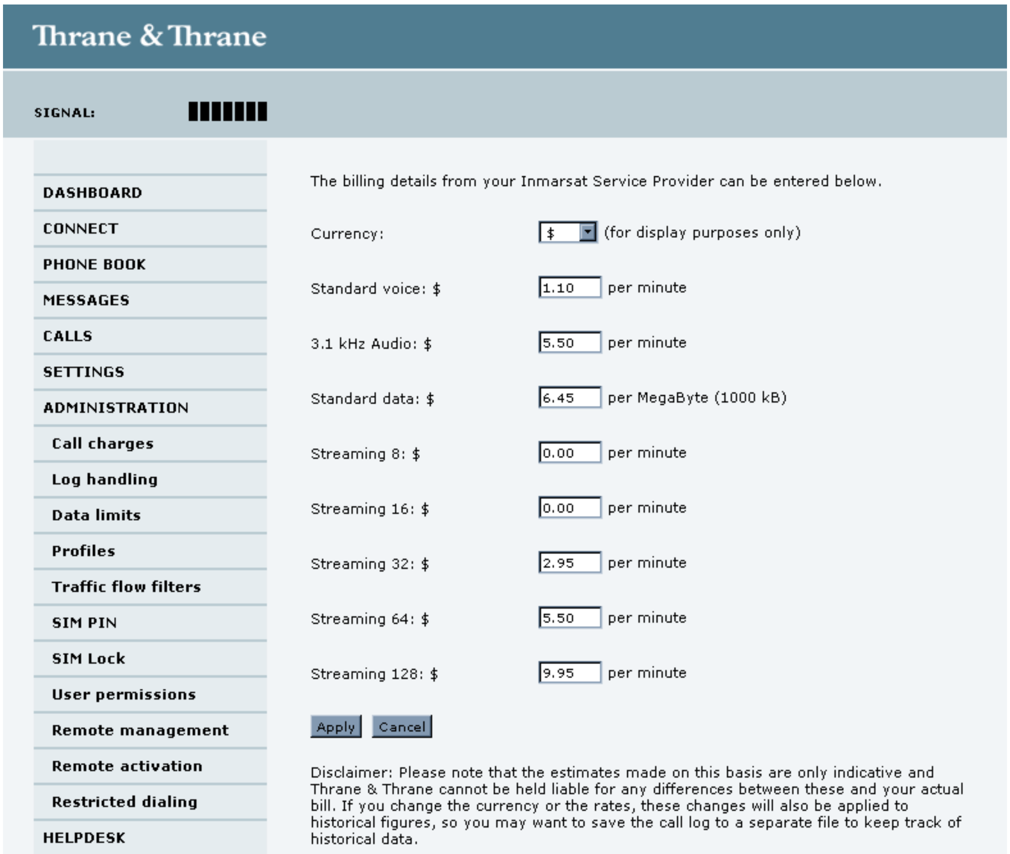


Figure 6-58: Web interface: Administration, Call Charges

2. Select the currency from the **Currency** drop-down list.
3. Enter the tariff for each of the services.
4. Click **Apply**.

6.9.5 Log handling

To clear the logs of the SBU and/or reset the counters for the time connected, do as follows:

1. From the left navigation pane in the **ADMINISTRATION** page, select **Log Handling**.

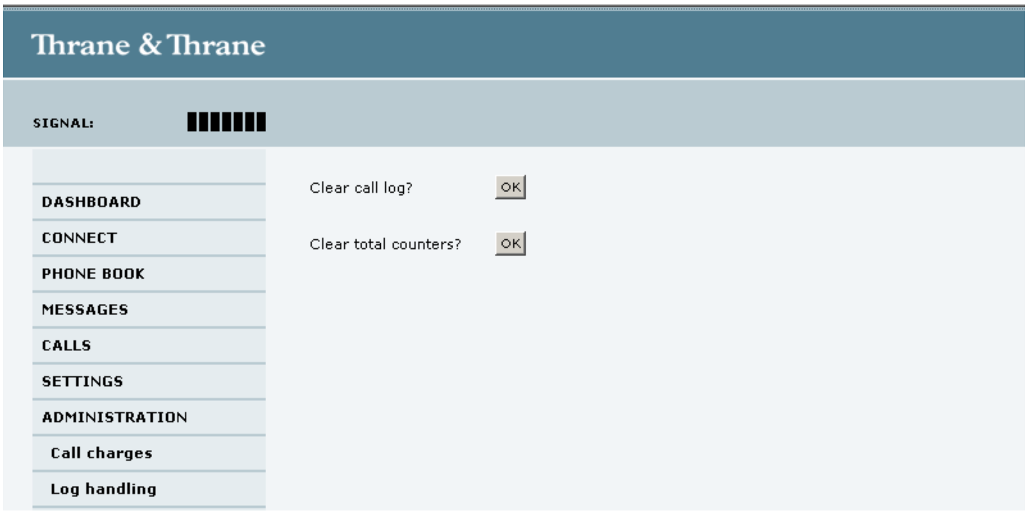


Figure 6-59: Web interface: Administration, Log Handling

2. To clear the Call log, click **OK** next to **Clear call log?**.
3. To clear the total counters, click **OK** next to **Clear total counters?**.
   This will reset the **Time connected** counters on the Calls page.

6.9.6 Data limits

You can set a limit for the use of data services that can be downloaded over the AVIATOR 700 system. You either specify a maximum number of MB for the standard data connection, and/or a time interval from start to end for a streaming connection.

For a detailed description how to access the SBU from a remote location see the AVIATOR 700 user manual.

6.9.7 Using profiles

The profiles are used in the network user groups. You select one or several profiles when setting up a network user group. You need an administrator password to define profiles and traffic flow filters.

Together with traffic flow filters the profiles are used as a tool to manage the traffic flow.

Note If you have selected more than one profile (one primary and one or more secondary profiles) for an interface, you must define traffic flow filter(s) before you can establish a valid connection.

What is a profile?

A profile is a collection of Quality of Service (QoS) settings and other settings defining the mode in which data is transmitted on an interface. For example, a profile is used to define whether the connection is a Streaming connection or a Standard connection.

You can select between a number of predefined profiles or define your own profiles for your data transmission. For further information on profiles, refer to the 3GPP standard TS 23.107 “Quality of Service (QoS) concept and architecture”.

Note If no traffic flow filters are defined, the Primary profile for a network user group is used for all traffic from that network user group. Then the secondary profile will not become active.

To learn more about traffic flow filters see ***What are traffic flow filters?*** in the next section.

Selecting the profiles for a network user group

When you set up a network user group, you typically select one of the predefined profiles to use as a Primary profile for that network user group. You select optionally one or more Secondary profiles.

For further information on how to select the profiles, see ***Managing LAN/WLAN network users*** on page 6-55.

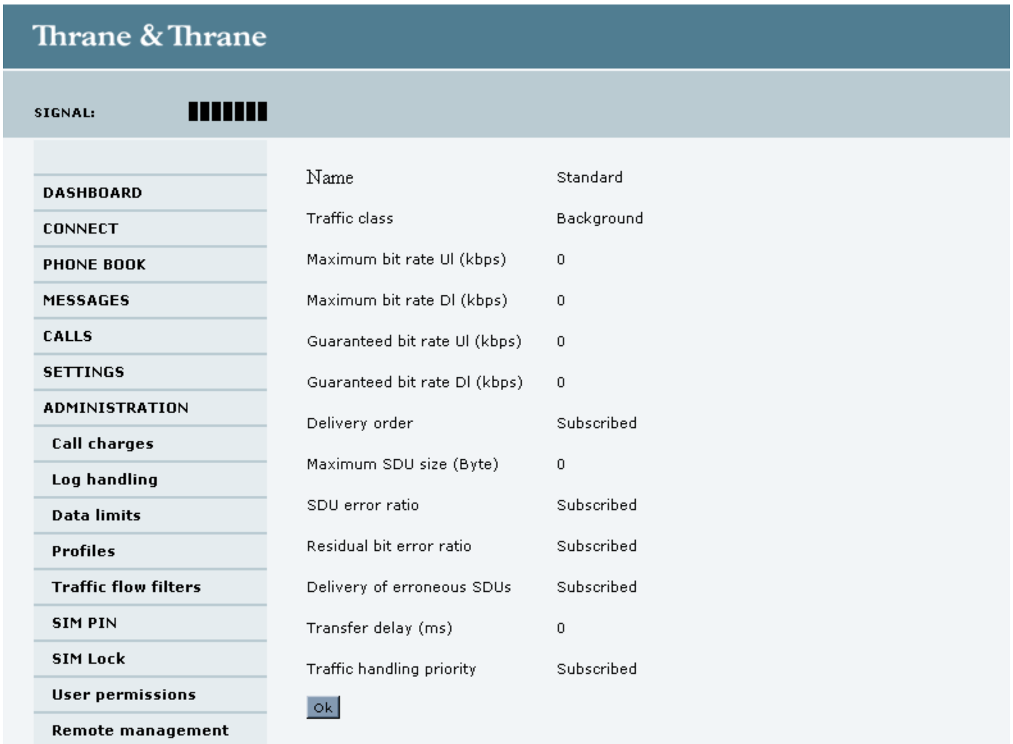


Figure 6-60: Web interface, Administration, Profiles, Example: Standard

You typically do not need to define new profiles, the predefined profiles cover the most common applications. You can customize a user profile and set-up several user-defined profiles.

Defining new profiles

When you define your profiles you can select **Subscribed** for many of the settings. If you select Subscribed, the value given in your Airtime subscription is automatically used.

Note For AVIATOR 700, the maximum Streaming bit rate is 128 kbps. It can also handle the X-Stream service.

To define a new profile, do as follows:

1. From the left navigation pane, select **ADMINISTRATION** > **Profiles**.

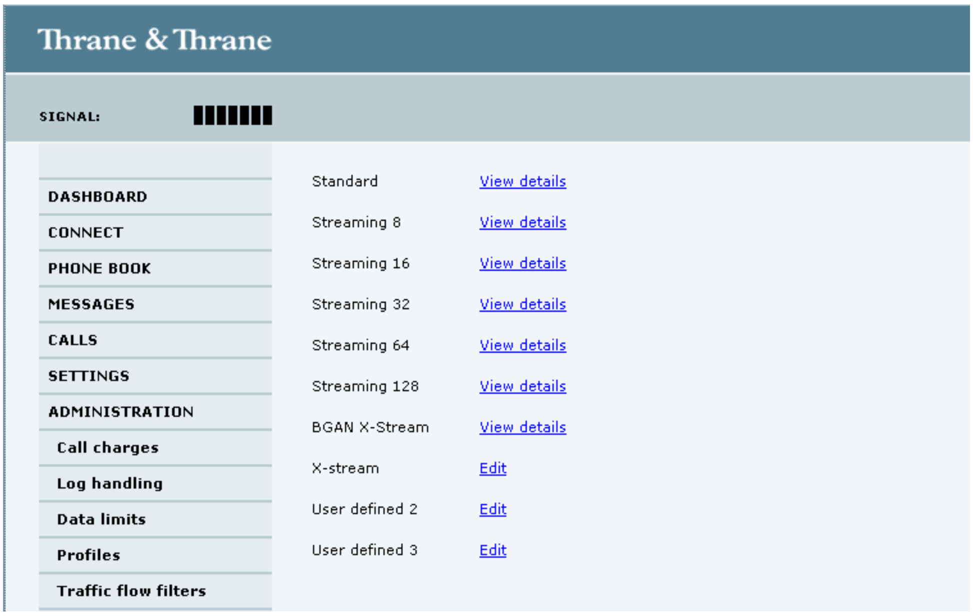


Figure 6-61: Web interface. Administration, Profiles, select profile

2. Click **Edit** for the profile you want to define.
3. Fill in the top field with the name for your profile.
4. In the **Traffic class** row of your new profile, select a class from the drop-down list.

Important For best performance, choose the right traffic class for your application. In general, Standard IP (Background) is best suited for TCP/IP applications, e.g. web browsing, e-mail, file transfer, VPN. Streaming IP is best suited for UDP traffic, e.g. live video or audio.

   You may select one of the following:
   - **Conversational** is real-time two-way conversation. It is primarily used for voice over IP and video conferences.
   - **Streaming** is real-time one-way communication. It is primarily used for video and audio.
   - **Interactive** is two-way communication (not real-time). It is used for communication that is not very delay-sensitive, such as web browsing, data base retrieval and server access. Examples of machines interaction with remote equipment are: polling for measurement records and automatic data base enquiries (tele-machines).
   - **Background** is used for data which is not delay-sensitive, such as E-mail, SMS, download of databases and reception of measurement records.

5. Type in the bit rates in kbps in the following rows:

- **Maximum bit rate Ul (kbps)** is the maximum upload bit rate allowed for this profile.
- **Maximum bit rate Dl (kbps)** is the maximum download bit rate allowed for this profile.
- **Guaranteed bit rate Ul (kbps)** is the guaranteed upload bit rate needed for this profile.
- **Guaranteed bit rate Dl (kbps)** is the guaranteed download bit rate needed for this profile.

Note: When you click Apply, the bit rate values you typed in may be rounded off because only certain values are allowed.

6. In the **Delivery order** row, select from the scroll list whether or not data should be delivered in the same order it was sent.
   - **Yes** means the data packets are delivered in the same order they were sent.
7. In the **Maximum SDU size (byte)** row, type in the maximum allowed packet size in Bytes (rounded off to nearest 10). The maximum packet size possible is 1520.
8. In the **Delivery of erroneous SDUs** row, select one of the following from the list:
   - **Yes** means packets are allowed to contain errors. This setting is suitable for delay-sensitive transmission, because the need for retransmission is limited. The SDU Error settings in step 9 and step 10 will apply.
   - **No** means packets are not allowed to contain errors, and the SDU Error setting in step 9 will **not** be applied. This setting is suitable where error-free transmission is important and delays are accepted.
   - **No detect** means that errors will not be detected, and the SDU Error setting in step 9 will **not** be applied.
9. If you selected **Yes** in step 8, select from the **SDU error ratio** drop-down list the fraction of a packet allowed to be lost or erroneous.
10. Select from the **Residual bit error ratio** drop-down list the undetected bit error ratio of a packet. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered packets.
11. In the **Transfer delay (ms)** row, type in the delay in ms. This is the delay from the time data is received in the SBU until it arrives at the receiving end.
    - If the Transfer delay is 500 ms, error correction is disabled.
    - If the Transfer delay is 4000 ms, error correction is applied.
12. In the **Traffic handling priority** row, select from the drop-down list which priority this connection should have.
13. Click **Apply**.

    The new profile is now added, and can be selected from the lists of primary and secondary profiles when you set up your interfaces.

6.9.8 Using traffic flow filters

Purpose of the traffic flow filters

The purpose of the traffic flow filters is to assign different priorities to different types of traffic, in order to optimize performance.

Example: When you are browsing the Internet, a Standard IP connection is normally sufficient. However, to have a video conference you may need a Streaming IP connection in order to obtain a direct connection without interruptions. Your traffic flow filters can define these priorities, so that your connection automatically switches to Streaming e.g. when you have a video conference. Note that you have to activate a streaming connection in the web interface.

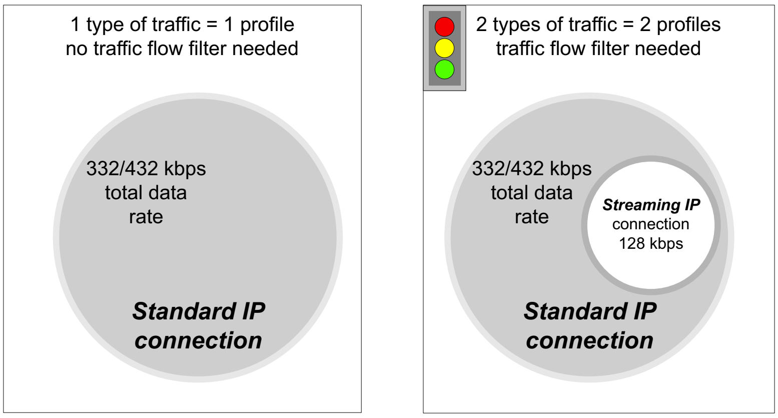


Figure 6-62: Traffic flow filters to filter traffic types

What are traffic flow filters?

When more than one type of traffic is needed, you must use both a primary and one or more secondary profiles. A traffic flow filter provides preferred treatment of a data packet. The traffic flow filter classifies data packets for the BGAN core network and the SBU received from the external network into the proper profile.

You can define up to eight traffic flow filters. Each packet filter has an evaluation precedence index that is unique within all traffic flow filters associated with the profiles that share the same PDP (Packet Data Protocol) address. The evaluation precedence index determines the order in which the filters are applied; 0 is applied first, then 1 and so forth. Information of source, destination, type of service etc. is combined in each packet filter in the list.

Defining traffic flow filters

To define the traffic flow filters, do as follows:

1. From the left navigation pane, select **ADMINISTRATION** > **Traffic flow filters**. The example below shows one traffic flow filter.

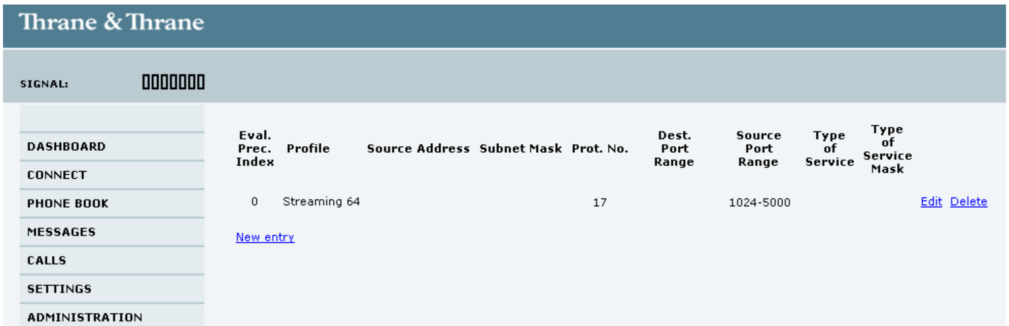


Figure 6-63: Web interface: Administration, Traffic flow filters

2. Click the link **New entry**.

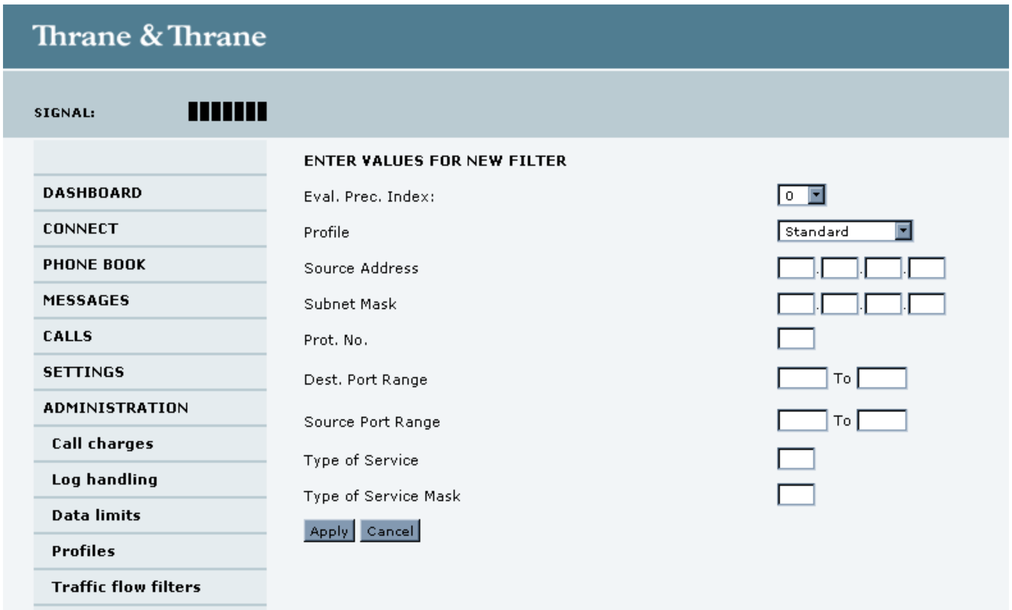


Figure 6-64: Web interface: Administration, Traffic flow filters, New entry

3. Select a number in the **Eval.Prec. Index** drop-down list.
   The evaluation precedence index defines the order in which the traffic flow filters are applied to packets. 0 is first, then 1, 2 etc.
4. Select the **Profile** from the drop-down list.
   The available profiles are the profiles listed under ADMINISTRATION > Profiles. The selected profile is applied to all traffic that matches the conditions entered in step 5.
5. Fill in one or more of the following fields to define the filter.
   The allowed ranges appear in hover text when you pass the mouse over the fields.

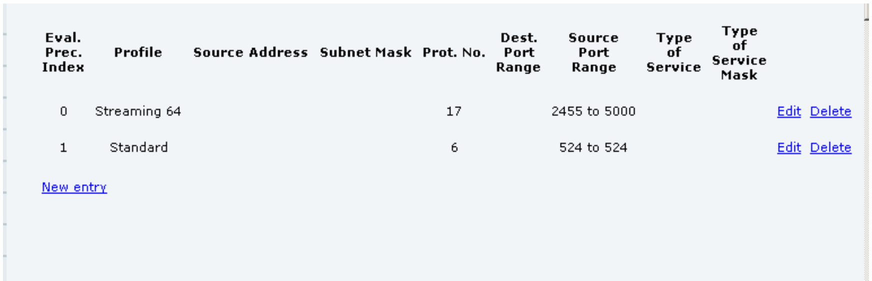
- **Source address + Subnet mask.**
  This is an IPv4 IP address and subnet mask. Only packets received from the specified source are accepted by the filter.
- **Protocol number**.
  This is uniquely assigned for the protocol being used. For TCP (typically Internet, e-mail, FTP) set this to 6, for UDP (typically streaming) to 17. The protocol number determines which protocol is used by the traffic flow filter.
- **Destination port range** (From and To). This parameter requires knowledge of ports being used by the selected applications. Note that Source and Destination are relative to the BGAN core network. This means that Destination is your SBU.
- **Source port range** (From and To). This parameter requires knowledge of ports being used by the selected applications. Note that you must fill in both From and To, even if there is only one port.
- **Type of Service** + **Type of Service mask**.
  Set this value to a number between 0 and 255.
  Type of Service (TOS) is an 8-bit field in a packet header, with associated mask, that is used to define Quality of Service.

For further information on the principles and parameters of the traffic flow filters, refer to the 3GPP standards TS27.007 V4.2.0 and TS 23.060 V4.7.0.

6. Click **Apply** at the bottom of the page.

Example of a list of traffic flow filters

Below is an example of a list with two traffic flow filters.



Eval. Prec. Index	Profile	Source Address	Subnet Mask	Prot. No.	Dest. Port Range	Source Port Range	Type of Service	Type of Service Mask	
0	Streaming 64			17		2455 to 5000			Edit Delete
1	Standard			6		524 to 524			Edit Delete

New entry

Figure 6-65: Web interface: Example of two traffic flow filters

In this example, data packets are filtered in the following order:

1. The filter with evaluation precedence index 0 checks for UDP packets (protocol number 17), in the port range 2455-5000. When these packets are identified, they are assigned a 64 kbps Streaming channel (the Streaming 64 profile).
2. The filter with evaluation precedence index 1 checks remaining packets for TCP packets (protocol number 6), on port 524. These packets are routed to the standard IP connection (the Standard profile).
3. Remaining traffic is routed to the standard IP connection.

6.9.9 SIM card limitations: SIM PIN and SIM Lock

Note There is typically no SIM PIN needed for the AVIATOR 700 system. The following functions might apply for special airtime subscriptions which come with a SIM PIN.

SIM PIN

To avoid unauthorized use of the system you can enable the SIM PIN. Then the user has to enter the SIM PIN before being able to use the system. The SIM PIN is disabled per default. You enable the SIM PIN in the web interface.

You can also specify a new SIM PIN in the web interface. To do this you have to enter the original SIM PIN and then specify a new one.

To manage the SIM PIN of the terminal do as follows:

1. From the left navigation pane, select **ADMINSTRATION > SIM PIN**.
2. If you want to protect the system with a system SIM PIN select **Enabled**.
3. You can enter a new PIN or change the existing PIN.
4. Click **Apply** to save the changes.

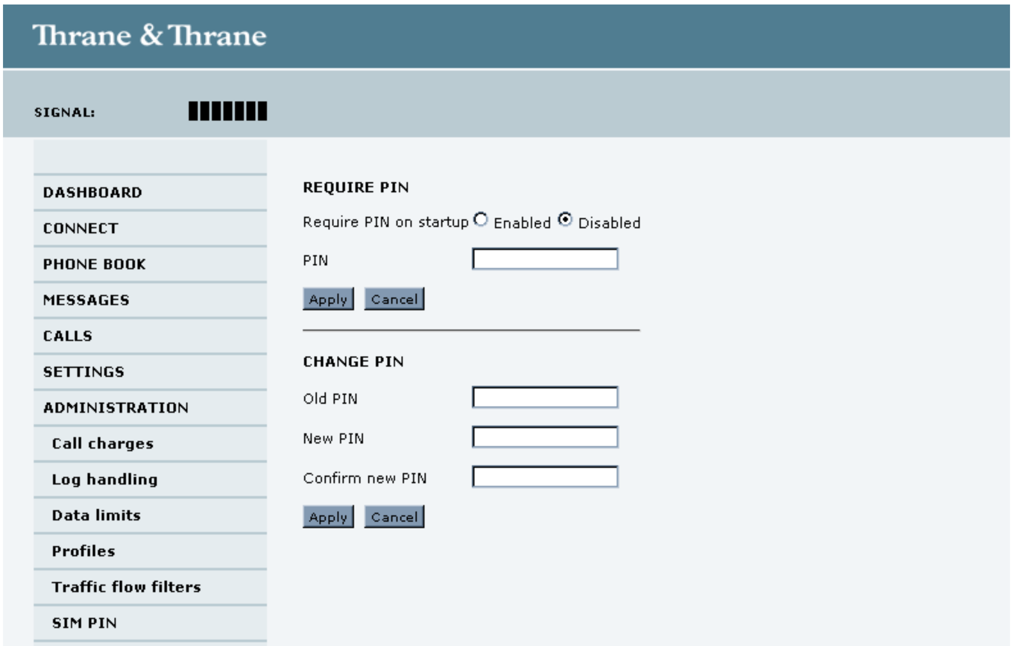


Figure 6-66: Web interface, Administration, SIM PIN

SIM Lock

The supplier may lock the SIM card of the terminal to a specific service provider. For further information contact your supplier. You can unlock the SIM lock.

To unlock the SIM lock of the SIM card from your airtime provider do as follows:

1. From the left navigation pane, select **ADMINSTRATION > SIM LOCK.**
2. Enter the SIM Lock Code.
3. Click **Apply**.

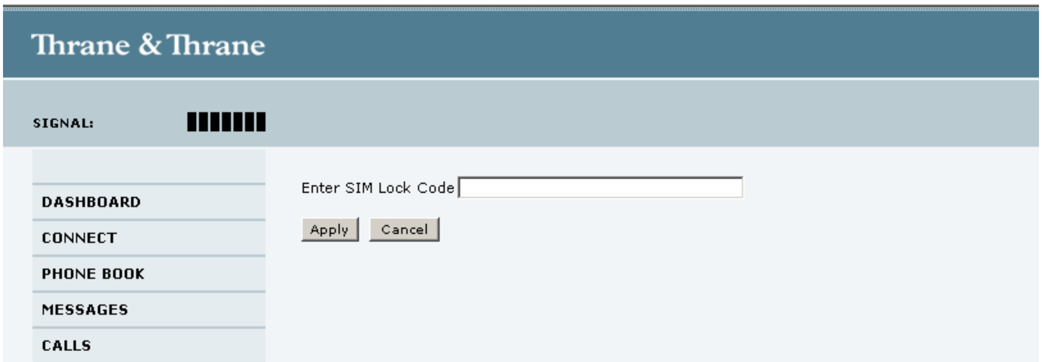


Figure 6-67: Web interface, Administration, SIM LOCK

6.9.10 Setting up user permissions

You can manage user access to certain functions of the AVIATOR 700 system. You can allow or deny users that are not administrators 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.

Important Protect the SBU against unintended change of setup. We recommend to study the following screen thoroughly and decide which areas of the AVIATOR 700 system you want to give non-administrator users access to.

To set up the user permissions, do as follows:

1. From the left navigation pane, select **ADMINISTRATION > User permissions**.

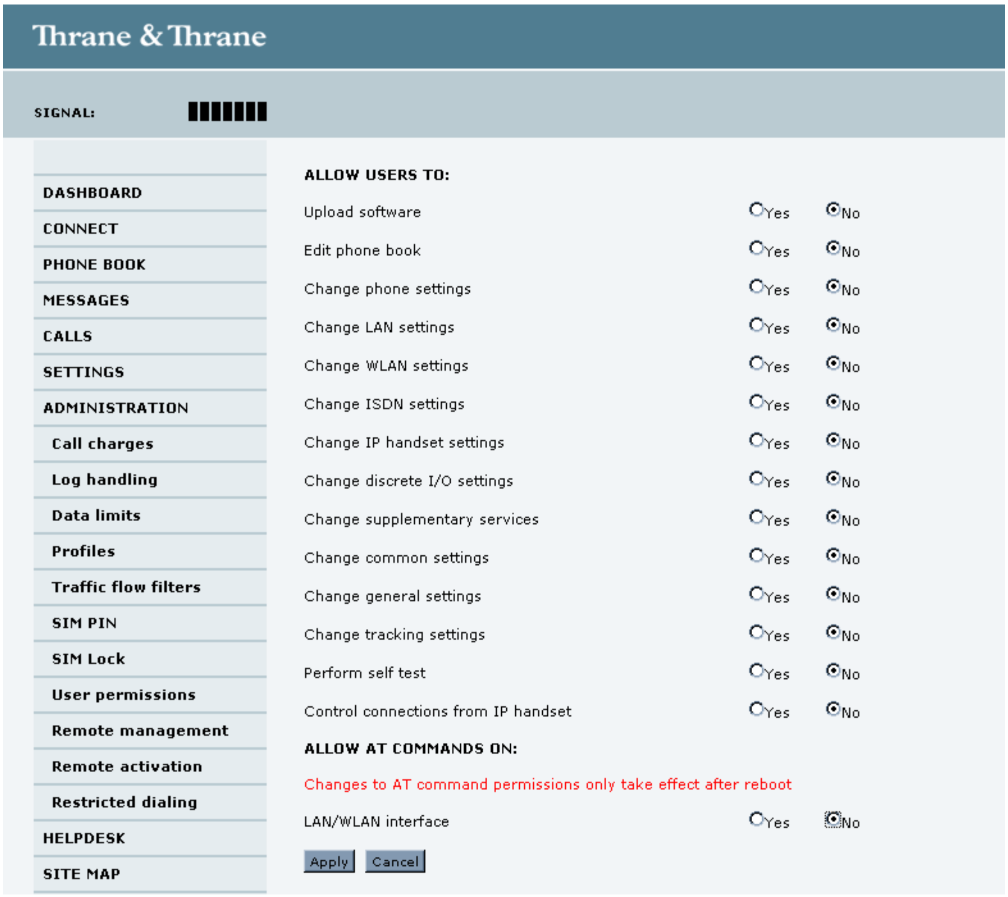


Figure 6-68: Web interface: Administration, User permissions

2. For each item under **ALLOW USERS TO:**, select
   - **yes** to allow access or
   - **no** to block access to the settings. Then the pages are read-only, changes cannot be made.
3. Under **ALLOW AT COMMANDS ON:**, select
   - **yes** to allow the use of AT commands on the LAN/WLAN interface, or
   - **no** to block the use of AT commands on the LAN/WLAN interface.

   AT commands are typically used during maintenance and service.

   Note This setting does not take effect until the SBU is restarted.
4. Click **Apply**.
   The settings to which access is denied are now greyed out for the non-administrator user.

6.9.11 Remote management

You can set up the SBU for control from a remote location.

Note If you want to remotely control the SBU, it must have activated a connection. This can be done in several ways:

- Automatic activation of a Standard data connection, see step 10 on page 6-60 in ***Editing a network user group***.
- Manual start of a data connection (Standard data or Streaming, see ***Start or stop a standard data connection*** on page 6-25)
- Remote start of a data connection with an SMS, see ***Remote activation of a connection using SMS*** on page 6-92.

To set up the SBU for remote management, do as follows:

1. From the left navigation pane, select **ADMINISTRATION > Remote management**.

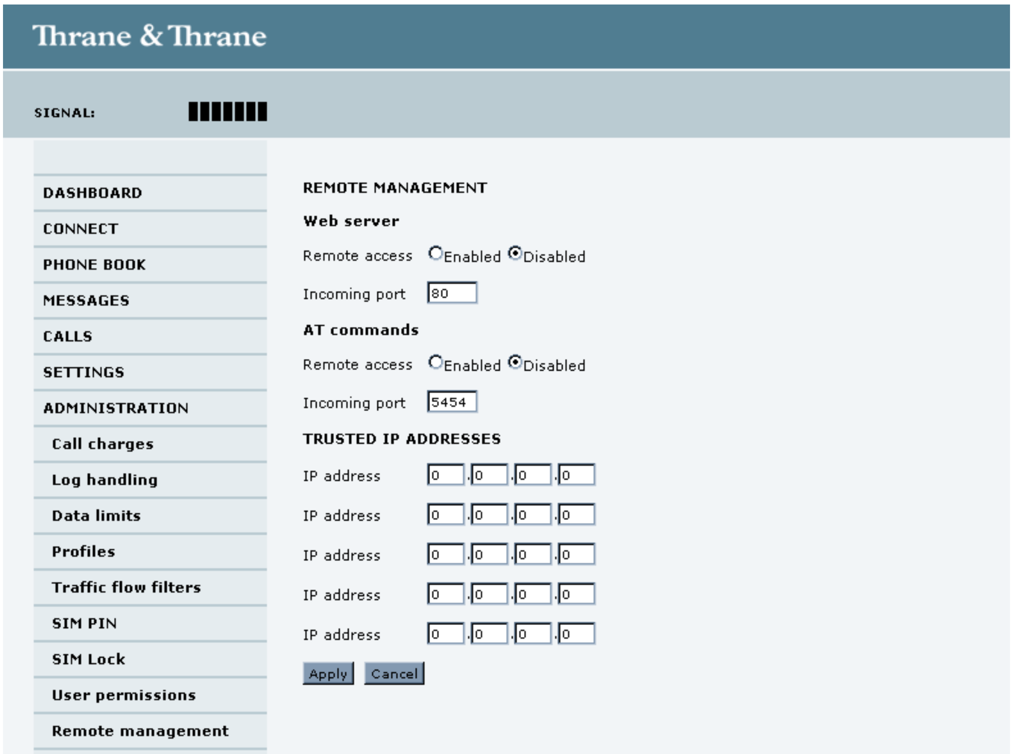


Figure 6-69: Web interface: Administration, Remote management

2. Select whether remote access using a web server should be **Enabled** or **Disabled** and enter the **Incoming port** number.
3. Select whether **AT commands** should be **Enabled** or **Disabled** and enter the **Incoming port** number.
4. Under **TRUSTED IP ADDRESSES**, type in the IP addresses of the devices you want to give access to the SBU.
5. Click **Apply** to save the new settings.

You can now access the SBU from one of the trusted IP addresses, using the incoming port defined in the **Incoming port** field.

For a detailed description how to access the SBU from a remote location see the AVIATOR 700 user manual.

6.9.12 Remote activation of a connection using SMS

If you want to remotely control the SBU, it must have activated a connection. You can do this by sending an SMS to the SBU. The SBU must be powered up and logged on to the satellite services to receive the SMS and then start the connection.

For a detailed description how to activate a connection using SMS see the AVIATOR 700 user manual.

Note The SBU must be logged on to the satellite services to receive and accept an activation SMS. If the SMS is considered too old or sent before the SBU has been switched on and has logged on, the SMS will be ignored.

6.9.13 Restricted dialing

In order to manage the use of the AVIATOR 700 system efficiently you can set up the SBU to limit all calls to allowed numbers or numbers in the phone book. This feature can be enabled for each connected handset separately.

For a detailed description how to restrict dialing see the AVIATOR 700 user manual.

6.10 Site map of the SBU web interface

The web interface offers a site map page. Use this page to get an overview over the menus, submenus and topics. The following drawing shows the site map.

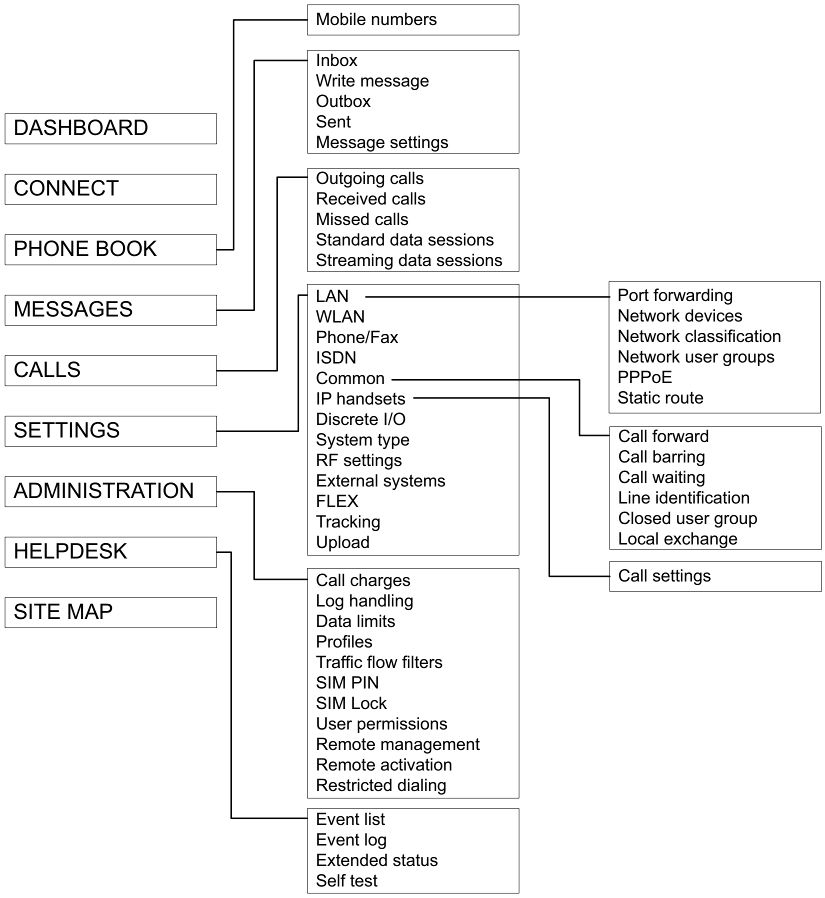


Figure 6-70: Web interface: Site map

To access the site map, select **SITE MAP** from the left navigation pane. You can click on each menu in the site map to go directly to the page or display the respective submenu.

6.11 Configuration of 3rd party phone systems

6.11.1 Sigma^7 setup

There are a few adjustments that are typically made at the time of installation testing. Normally it is necessary to set the ear volume of the handset initially, in order to obtain sufficient volume in the ear piece.

> **Note** The information in this section is only meant as a guideline. For complete information on the function of the Sigma^7 handset, refer to the Sigma^7 manual.

To set up the ear volume

To set up the ear volume of the handset, do as follows:

1. Take the handset out of the cradle and enter the menu system of the handset.
2. Use the volume control keys to scroll to the EARVOL setting.
3. Press the **Flash** key to select EARVOL.
4. Change the volume setting to **4** using the volume control keys.
5. Press **#** to store the setting.
   To adjust other settings, press **Flash** to return to the menu.
6. Place the handset back into the cradle.

For further information on the Sigma^7 handset, refer to the manual for the Sigma^7 handset.

6.11.2 ICG DECT Cordless Handset setup

It is sometimes necessary to adjust the volume of the ICG DECT Cordless Handset, in order to have sufficient volume in the ear piece. Also, you may want to change the setting of the handset from pulse to tone, if this is not already set.

Note: The information in this section is only meant as a guideline. For complete information on the function of the ICG DECT Cordless Handset phone, refer to the manual for your ICG DECT Cordless Handset phone.

Setting the volume

To change the volume setting, enter the handset menus and do as follows:

1. Scroll to **Audio Sett** and press **OK.**
2. Select **H/Set Vol** and press **OK**.
   The current volume is heard in the ear piece and the level is displayed.
3. Scroll to the desired volume and press **OK**.

To switch to Tone dialing

To change the dialing mode, do as follows:

1. Open the handset menu.
2. Scroll to **Temp Tone** and press **OK.**
   Tone dialing is now active.

6.11.3 Iridium Communication System, ICS-200

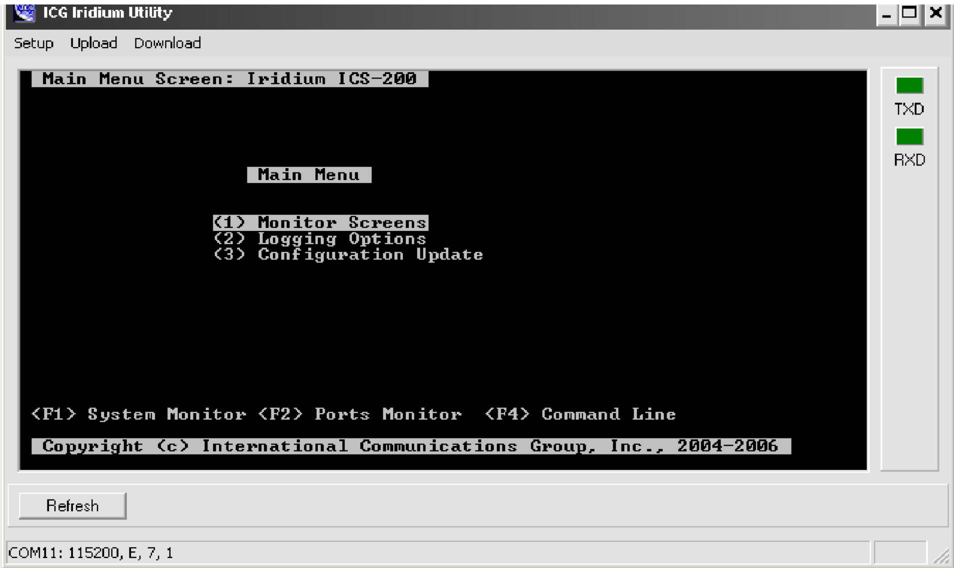
Overview

This section explains basic configuration of the ICS-200 system. Screen shots and instructions are given for **ICS-200 firmware revision F**, minor changes or variations may exist for newer firmware revisions.

For further information on the ICG configuration utility and the ICS-200 system in general, please refer to the ICS-200 Installation Manual available on ICG's homepage http://www.intcomgrp.com.

Important: When simultaneously operating the AVIATOR 700 over the Inmarsat network and the ICS-200 there is a potential risk of interference.

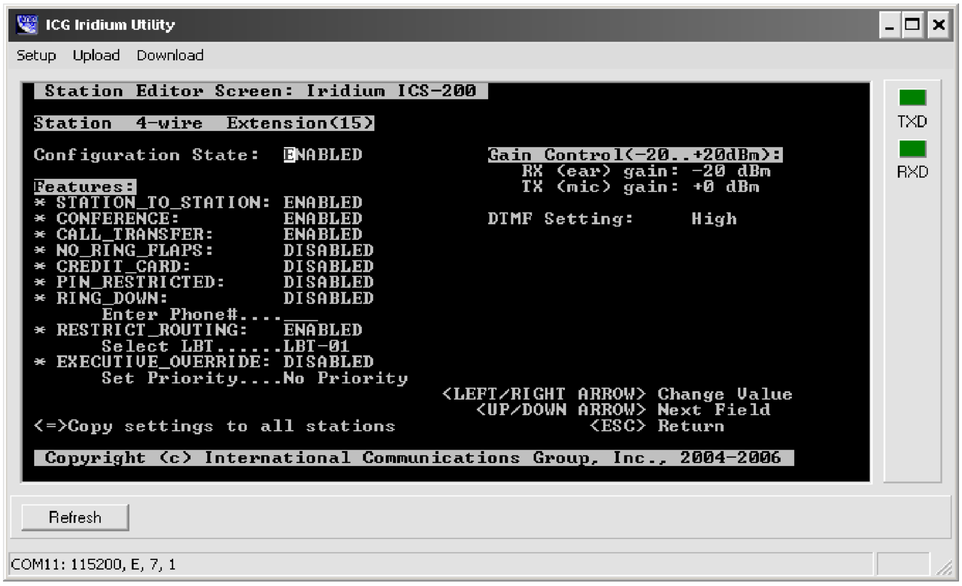
ICS-200 is configured from the ICG configuration utility. The main menu of this application is shown below.



Configuring audio levels and outgoing routing for the 4-wire ports

1. From the **Main Menu**, select **Configuration Update**.
2. Select **Configure Ports**.
3. In the **Ports Editor** menu, select the first 4-wire port, **Station 4 wire (15)**.
4. Change **RESTRICTED_ROUTING** to **ENABLED**, and select **LBT** as **LBT-01**.
5. Change **Rx (ear) gain** to **-20 dBm**. (See "Audio levels" information in ...)
6. Verify that **TX (mic) gain** is set to **+0 dBm** and that **DTMF** setting is **High**.

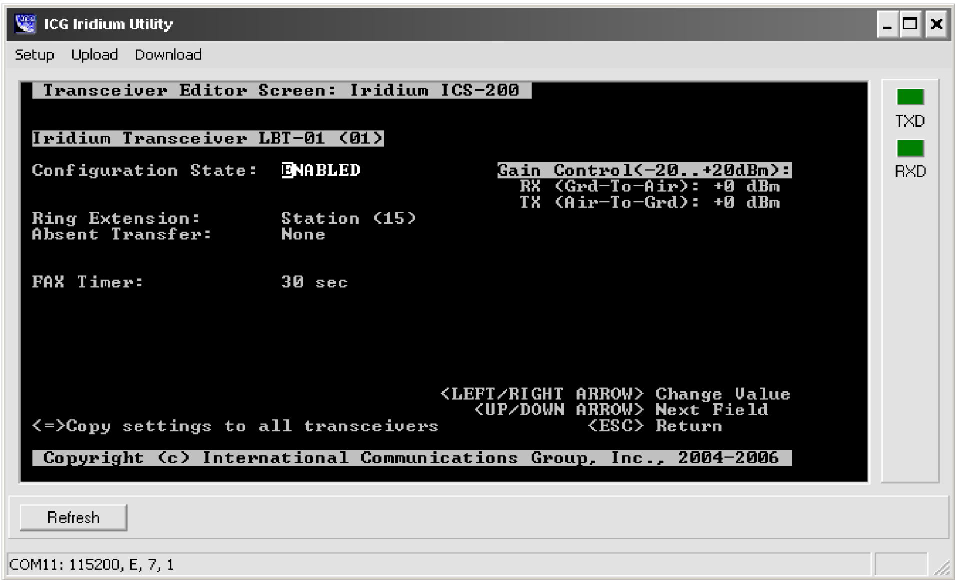
Configuration of extension 15 will then be as shown below.



7. Press **<Esc>** to return to the **Ports Editor** menu.
8. Repeat the same configuration for extension 16, but set the LBT to **LBT-02**.

Configuring incoming routing for the transceivers

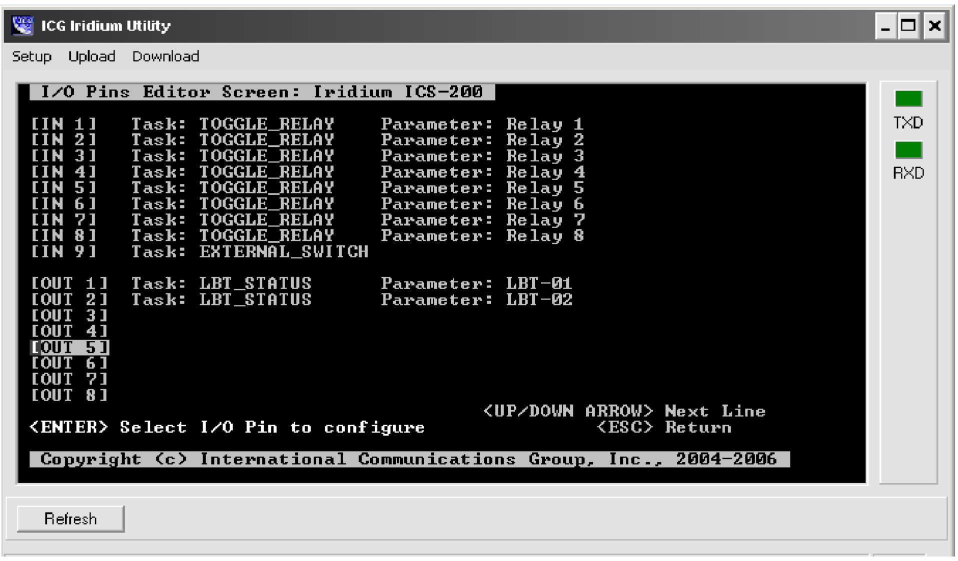
1. From the **Ports Editor** menu, select **Transceiver LBT-01 (01)**.
2. Configure **ring extension** to be **Station (15)**.
   Configuration of LBT-01 will then be as below



3. Press **<Esc>** to return to **Ports Editor** menu.
4. Repeat the same configuration for LBT-02, but set the ring extension to **Station (16)**.

Configuring I/O pins

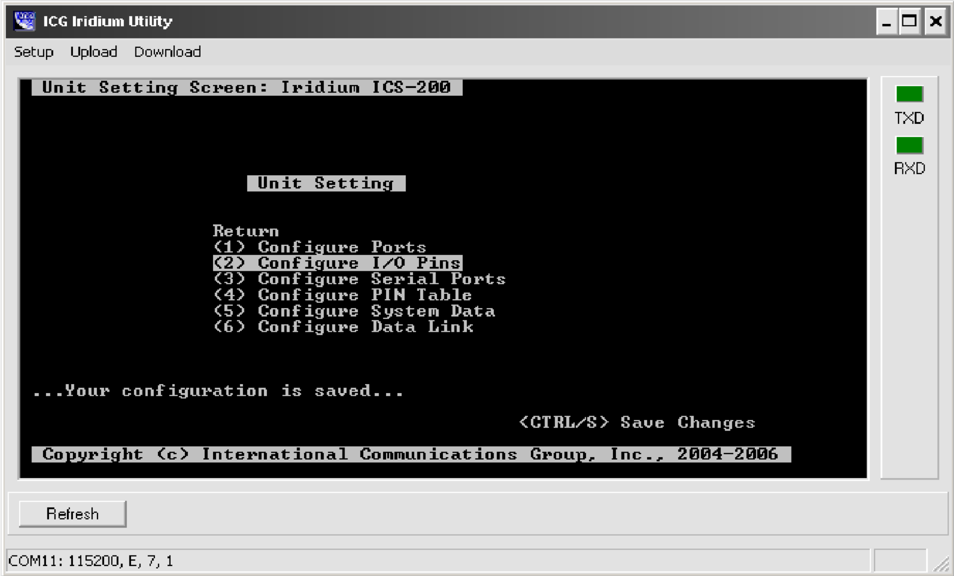
1. Press **<Esc>** until you are back in the **Unit Setting** menu.
2. Choose **Configure I/O pins**.
3. In the **I/O Pins Editor** menu, select **OUT 1** and then select **Task** as **LBT_AVAIL** and parameter as **LBT-01**.
4. In the **I/O Pins Editor** menu, select **OUT 2** and then select **Task** as **LBT_AVAIL** and parameter as **LBT-02**.
   The **I/O Pins Editor** menu should then look as below.



Saving settings and rebooting

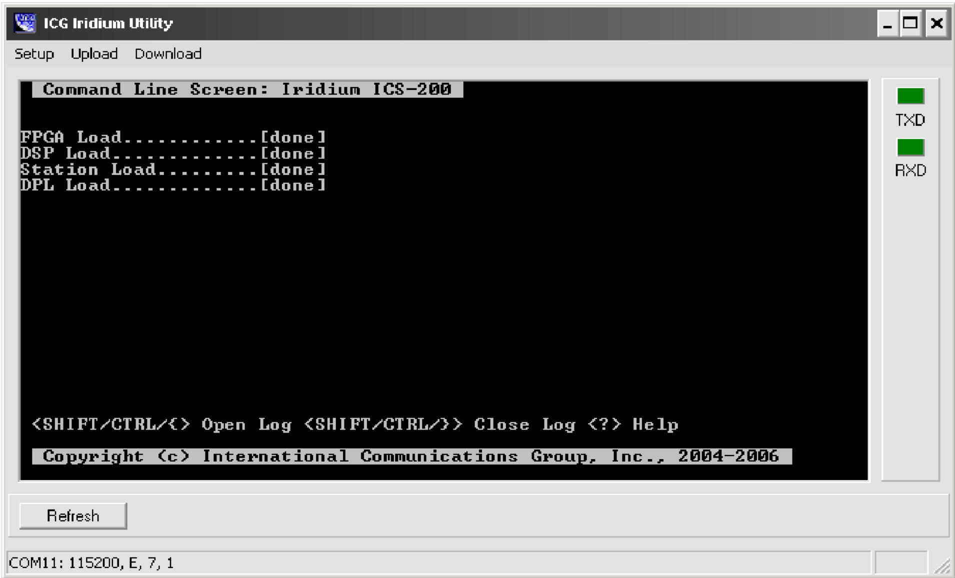
1. Press **<Esc>** to get back to the **Unit Setting** menu, and then use **CTRL-S** to save the settings.

ICS-200 then responds **Configuration is saved** as below.



2. Press **F4** to get a command prompt, then type **reset** and press **<Enter>** to reset the unit for the new settings to take effect.

   The response should be as shown below.



6.12 AVIATOR 700 system ready for use

Having installed the AVIATOR 700 system, activated the SIM card, entered the ICAO number and configured the system you can verify whether the system is fully operational. Check that all LEDs on the SDU and SBU front panel are green.

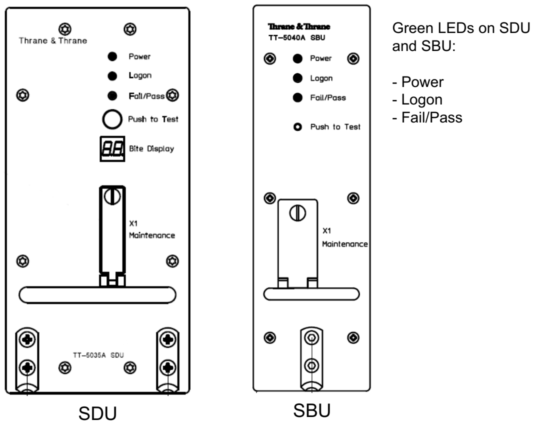


Figure 6-71: AVIATOR 700 system ready for use

Note

Line of sight during operation

Make sure that there is a line of sight between the Satcom antenna and the satellite in order to logon to and use the satellite service.

Check procedures

7.1 Basic check flow

Important None of the check procedures described in this chapter can serve as a replacement for any of the required approvals and certifications.

7.1.1 Check procedures

In order to ensure the correct function of the system, the below check flow should be followed.

1. **Pre-Installation Check.**
   Perform this check after wiring, but before inserting the LRUs.
   This is a check of the most important connections, the circuit breakers, cable losses etc. Refer to **Pre-Installation Check** on page 7-2.
2. **Configuration.**
   After performing the Pre-Installation Check, configure the system using the Aero-SDU Configuration Program and the SBU web interface.
   Refer to **Configuring the AVIATOR 700 system** on page 6-1.
3. **Functional Test, on Ground.**
   When the system is configured and activated, a functional test should be performed. The functional test should check all user interfaces, such as voice, fax, high speed data, annunciators, satcom on/off switch etc.
   Refer to **Functional Test, on Ground** on page 7-4.
4. **Interference Test.**
   After the functional test, an interference test should be performed. This test is to verify that transmission from the AVIATOR 700 system has no effect on the avionics of the aircraft, particularly navigation equipment.
   Refer to **Interference Test** on page 7-6.

   Note If additional avionics are installed in the aircraft at a later stage, the interference test should be performed again to ensure correct operation.
5. **Functional Test, Airborne.**
   After the interference test, a functional test should be performed while the aircraft is airborne. This test is basically the same as the functional test on ground. Refer to **Functional Test, Airborne** on page 7-7.

7.2 Pre-Installation Check

It is recommended to check the installation before inserting LRUs. The following list provides some of the most important issues, but other additional checks may be relevant for the specific installation.

Item	Description of Check	Reference Section	√	Value/ Comment
Mounting trays	Ensure service/maintenance accessibility.	5.2		
Coding of tray connectors	Check orientation of coding pins in SDU tray connector	4.1.3		
	Check orientation of coding pins in HPA tray connector	4.2		
	Check orientation of coding pins in SBU tray connector	4.3.3		
Quadrax insert orientation	Check that the Quadrax connector is oriented correctly in the SDU tray connector.	4.1.3		
	Check that the Quadrax connectors are oriented correctly in the SBU tray connector.	4.3.3		
Grounding stud	Check that the grounding stud on the DLNA is connected correctly to aircraft chassis.			
Circuit breaker rating	Check the SDU circuit breaker: 4 A	5.3.3		
	Check the HPA circuit breaker: 20 A	5.3.3		
	Check the SBU circuit breaker: 7.5 A	5.3.3		
Polarity of 28 V DC Power	Check 28 V DC polarity on SDU tray connector (TP1: +28 V DC Power and TP2: GND, Power Return)	4.1.3 5.3.3		
	Check 28 V DC polarity on HPA tray connector (BPA1: +28 V DC Power and BPA2: GND, Power Return)	4.2 5.3.3		

Table 7-1: Check Sheet: Installation Check Before Inserting LRUs.

Item	Description of Check	Reference Section	√	Value/ Comment
	Check 28 V DC polarity on SBU tray connector (TP1: +28 V DC Power and TP2: GND, Power Return)	4.3.3 5.3.3		
Handset power	Check power to the handsets on DB15 connector to be inserted in cradle	5.3.11 4.4.2		
SDU nON	Check that TP5 (nOn) on the SDU tray connector is connected to a switch or directly to Chassis GND (TP3).	5.3.3 4.1.3		
SBU nON	Check that TP3 (nOn) on the SBU tray connector is connected to a switch or directly to Chassis GND (BP3).	5.3.3 4.3.3		
Handset connections to Cradles	Check that 2-wire handsets are not connected to 4-wire cradles.	5.3.11		
RF cable losses	Measure and note the cable loss from SDU to DLNA	5.3.4 6.2.3		
	Measure and note the cable loss from SDU to HPA			
	Measure and note the cable loss from HPA to DLNA			
	Measure and note the cable loss from DLNA to Antenna			
	Measure and note the cable loss from SBU to Rx Power Splitter			
	Measure and note the cable loss from SBU to Tx Coupler			
Software version	Check the software version of the SDU.			
	Check the software version of the SBU.			

Table 7-1: Check Sheet: Installation Check Before Inserting LRUs. (Continued)

After a successful check of the installation, use the Aero-SDU Configuration Program and the built-in web interface of the SBU to configure the system. For further information, refer to **Configuring the AVIATOR 700 system** on page 6-1.

Note The cable loss values registered in the above table must be entered into the Aero-SDU Configuration Program during configuration.

7.3 Functional Test, on Ground

7.3.1 Before you start

The system must be activated before performing this test. For further details see **Activation of airtime services** on page 5-90.

7.3.2 Check list for functional test on ground

The following list provides some of the most important checks to perform after power-up, but other additional checks may be relevant for the specific installation.

If you already know that certain interfaces or services are not going to be used, it is not necessary to perform tests on these specific interfaces or services.

Item	Description of Check	Reference	√	Value/ Comment
SDU LEDs	Check that the SDU Power LED is green			
	Check that the SDU Fail/Pass LED is green			
	Check that the SDU Logon LED is green			
SBU LEDs	Check that the SBU Logon LED is green			
Voice handsets #1 to #6	Make an aircraft to ground call	AVIATOR 700 User Manual		
	Make a ground to aircraft call	AVIATOR 700 User Manual		
SDU - Fax	Send an H^+ fax from aircraft to ground	AVIATOR 700 User Manual		
	Send an H^+ fax from ground to aircraft	AVIATOR 700 User Manual		
	Send an HSD fax from aircraft to ground[a]	AVIATOR 700 User Manual		
	Send an HSD fax from ground to aircraft[a]	AVIATOR 700 User Manual		
SBU - Fax	Send a fax over SwiftBroadband from ground to aircraft.	AVIATOR 700 User Manual		

Table 7-2: Check Sheet: Functional Test, on Ground

Item	Description of Check	Reference	√	Value/ Comment
	Send a fax over SwiftBroadband from aircraft to ground.	AVIATOR 700 User Manual		
SBU - ISDN	Connect to the internet from a laptop, using the ISDN connection.	AVIATOR 700 User Manual		
SBU - Ethernet	Connect to the internet from a laptop, using the Ethernet connection.	AVIATOR 700 User Manual		
SBU- WLAN	Connect to the internet from a laptop, using the WLAN connection.	AVIATOR 700 User Manual		
ACARS / AFIS / CMU	Send test message and verify reply or request for weather data and verify the data is downloaded. Both is done from the CDU / MCDU.	CDU / MCDU Manual		

Table 7-2: Check Sheet: Functional Test, on Ground (Continued)

a. HSD fax available on I3 satellites.

7.4 Interference Test

7.4.1 Introduction

It is recommended to perform an interference test to ensure that transmission from the AVIATOR 700 system does not influence any of the primary avionics on the aircraft.

Important: This test is **not** a replacement for any EMC tests in connection with e.g. an STC, TC or Field Approval. It is only an additional practical test of the application.

7.4.2 Test

During the test, the aircraft must be on ground. A skilled person should be observing the instruments.

1. Log on to the satellite in the lowest possible elevation.
2. Place the aircraft in such a position that the satcom antenna transmits in the direction of the other antennas on the aircraft.

   Example: If the satcom antenna is tail-mounted, place the aircraft with the nose pointing in the direction of the satellite. The antenna will then transmit in the direction of the other antennas placed in front of it.
3. While transmission is ongoing, observe all primary navigation instruments, autopilot, VOR/ILS, ADF and DME etc. and make sure none of the instruments are influenced by the AVIATOR 700 transmission.
4. Check GPS signal-to-noise ratio.
5. Monitor all VHF communication and make sure squelch is not opened unintentionally.
6. To check that the SBU can send continuously at a high data rate over SwiftBroadband make a 3.1 kHz audio call from the SBU.
7. If TCAS/ACAS is installed, verify that it is not flagged “FAILED” during satcom transmission.

Note: If any additional avionics are installed at a later stage, the interference test should be performed again.

7.5 Functional Test, Airborne

The following list provides some of the most important checks to perform while the aircraft is airborne, after all on-ground tests are passed. Other additional checks may be relevant for the specific installation. If you already know that certain interfaces or services are not going to be used, it is not necessary to perform tests on these specific interfaces or services.

If any of the checks should fail, guidance is provided in the section **Initial troubleshooting** on page 8-26.

Item	Description of Check	Reference	√	Value/ Comment
SDU - Voice	Make an air to ground call and keep it up during a 360° turn. Monitor the C/No for any drops during the turn.	AVIATOR 700 User Manual		
	Make a ground to air call	AVIATOR 700 User Manual		
SBU - Voice	Make an air to ground call and keep it up during a 360° turn. Monitor the C/No for any drops during the turn.	AVIATOR 700 User Manual		
	Make a ground to air call	AVIATOR 700 User Manual		
SDU - Fax	Send an H^+ fax from air to ground	AVIATOR 700 User Manual		
	Send an H^+ fax from ground to air	AVIATOR 700 User Manual		
	Send an HSD fax from air to ground	AVIATOR 700 User Manual		
	Send an HSD fax from ground to air	AVIATOR 700 User Manual		
SBU - Fax	Send a fax over SwiftBroadband from ground to aircraft.	AVIATOR 700 User Manual		
	Send a fax over SwiftBroadband from aircraft to ground.	AVIATOR 700 User Manual		
SBU - ISDN	Connect to the internet from a laptop, using the ISDN connection.	AVIATOR 700 User Manual		
SBU - Ethernet	Connect to the internet from a laptop, using the Ethernet connection.	AVIATOR 700 User Manual		

Table 7-3: Check Sheet: Functional Test, Airborne

Item	Description of Check	Reference	√	Value/ Comment
SBU- WLAN	Connect to the internet from a laptop, using the WLAN connection.	AVIATOR 700 User Manual		
ACARS / AFIS / CMU	Send test message and verify reply or request for weather data and verify the data is downloaded. Both is done from the CDU / MCDU.	CDU / MCDU Manual		

Table 7-3: Check Sheet: Functional Test, Airborne (Continued)

Maintenance and troubleshooting

8.1 Continued Airworthiness

8.1.1 General

Maintenance

Maintenance requirements and instructions for continued airworthiness of the Thrane & Thrane units in the AVIATOR 700 System are restricted to the fact that the TT-5035A Satellite Data Unit requires replacement of an internal battery at a periodic scheduled service task of 7 years (Overhaul). The Overhaul period is defined as the recommended period from production date or last maintenance to next maintenance.

Note When replacing the **TT-5035A Satellite Data Unit (SDU)**, it is important to leave the TT-5035A-001 Configuration Module (CM) behind, attached to the airframe with a wire.

Note When replacing the **TT-5040A SwiftBroadband Unit (SBU)**, it is important to leave the TT-5040A-001 Configuration Module behind, attached to the airframe with a wire.

Contact for support

AVIATOR 700 **system purchased from a Thrane & Thrane distributor**: If you need assistance and you have purchased your system from a Thrane & Thrane distributor, contact the distributor's support line.

AVIATOR 700 **system purchased directly from Thrane & Thrane**: If you need assistance and you have purchased your system directly from Thrane & Thrane, you can contact Thrane & Thrane by telephone or send an e-mail to the Thrane & Thrane esupport.

Telephone numbers:

For urgent technical support please contact us at one of the following numbers:

- One Dial Phone: **+45 39 88 89 89**
- US, Virginia Beach office: **+1 757 463 9557 or +1 866 SATCOMS.**

The eSupport e-mail address is **aerosupport@thrane.com**.

8.1.2 Instructions

Documentation

Maintenance information for the AVIATOR 700 System is contained in this manual. Place the wiring diagram information in this manual in the aircraft operator's appropriate aircraft wiring diagram manuals.

Inoperative units

If a system component is inoperative, remove or replace the unit.

Important If a level-D certified system detects an inconsistent hardware unit (level E) or software image (level E), it enters failure mode and the system will not be operational. Inconsistency messages are displayed to clearly inform the service personnel about the reason for this failure mode.

If an inoperative SDU is removed, take out the TT-5035A-001 Configuration Module (CM) and fasten the CM and wiring. Secure all cables, collect applicable switches and circuit breakers, and label them inoperative. Revise the equipment list and weight and balance as applicable prior to flight and make a log book entry that the unit was removed.

Likewise, if an inoperative SBU is removed, take out the TT-5040A-001 CM and fasten the CM and wiring to the air frame. Secure all cables, collect applicable switches and circuit breakers, and label them inoperative. Revise the equipment list and weight and balance as applicable prior to flight and make a log book entry that the unit was removed.

For information on how to return a unit for repair, see ***Returning units for repair*** on page 8-31.

Once repaired, reinstall the unit in the aircraft in accordance with the instructions in this Installation and Maintenance Manual.

Scheduled Maintenance Program

The high-speed data system components are considered on-condition units and no additional maintenance is required other than a check for security and operation at normal inspection intervals.

Scheduled Maintenance Program tasks to be added to the aircraft operator's appropriate aircraft maintenance program are as follows:

Recommended Periodic Scheduled Servicing Tasks:

TT-5035A Satellite Data Unit (SDU)	7 years
TT-5040A SwiftBroadband Unit (SBU)	None required
TT-5035A-001 Configuration Module (CM)	None required
TT-5040A-001 Configuration module for SBU	None required
TT-5014A High Power Amplifier (HPA)	None required
TT-5620A 4-Wire Handset	None required
TT-5622A 4-Wire Cradle	None required
TT-5621B 2-Wire Handset	None required
TT-5622B 2-Wire Cradle	None required
TT-5013A Type-F DLNA (Original Manufacturer P/N: COMDEV 173628-101)	None required
TT-5624B AVIATOR Wireless Handset TT-5626B Cradle for AVIATOR Wireless Handset	See ***AVIATOR Wireless Handset and Cradle Installation & Maintenance Manual*** (***98-129600***).

Recommended Periodic Inspections:

TT-5035A Satellite Data Unit (SDU)	None required
TT-5040A SwiftBroadband Unit (SBU)	None required
TT-5035A-001 Configuration Module (CM)	None required
TT-5040A-001 Configuration module for SBU	None required
TT-5014A High Power Amplifier (HPA)	None required
TT-5620A 4-Wire Handset	None required
TT-5622A 4-Wire Cradle	None required
TT-5621B 2-Wire Handset	None required
TT-5622B 2-Wire Cradle	None required
TT-5013A Type-F DLNA (Original Manufacturer P/N: COMDEV 173628-101)	None required
TT-5624B AVIATOR Wireless Handset TT-5626B Cradle for AVIATOR Wireless Handset	See ***AVIATOR Wireless Handset and Cradle Installation & Maintenance Manual*** (***98-129600***).

Recommended Periodic Scheduled Preventative Maintenance Tests:
(Tests to determine system condition and/or latent failures)

TT-5035A Satellite Data Unit (SDU)	None required
TT-5040A SwiftBroadband Unit (SBU)	None required
TT-5035A-001 Configuration Module (CM)	None required
TT-5040A-001 Configuration module for SBU	None required
TT-5014A High Power Amplifier (HPA)	None required
TT-5620A 4-Wire Handset	None required
TT-5622A 4-Wire Cradle	None required
TT-5621B 2-Wire Handset	None required
TT-5622B 2-Wire Cradle	None required
TT-5013A Type-F DLNA (Original Manufacturer P/N: COMDEV 173628-101)	None required
TT-5624B AVIATOR Wireless Handset TT-5626B Cradle for AVIATOR Wireless Handset	See ***AVIATOR Wireless Handset and Cradle Installation & Maintenance Manual*** (***98-129600***).

8.2 Getting support: Service log and Helpdesk

If this manual does not provide the remedies to solve your problem, you may want to contact your Airtime Provider or your local distributor.

8.2.1 Airtime support

If you need assistance from your Airtime Provider, please call the help desk. If you have typed in the help desk number in the SBU web interface you can see it under **HELP DESK**. Otherwise check your Airtime subscription for a contact number.

8.2.2 System support

If you need assistance with problems caused by the SDU, SBU, and HPA or the antenna, please call a distributor in your area. A list of certified partners and distributors is available on Thrane & Thrane's web site: www.thrane.com. Select **SERVICE**, then **AERONAUTICAL**.

There are two tools available to help you troubleshooting the system.

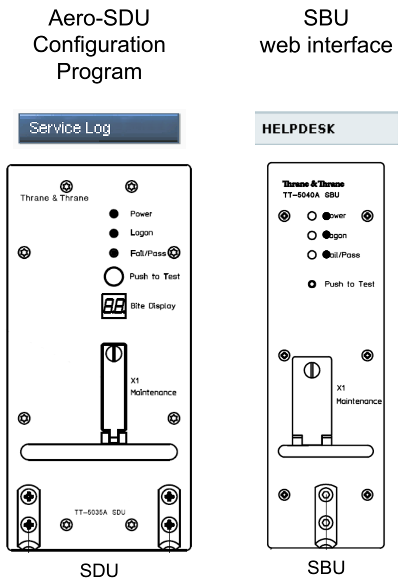


Figure 8-1: Support tools: Service log and Helpdesk

8.2.3 Service Log for the SDU

Generating a service log

When contacting your distributor for support, please include a service log. The service log contains information relevant for the service personnel during troubleshooting.

When contacting your distributor for support, please enclose the service log for the SDU and the diagnostic report for the SBU.

To generate a service log, do as follows:

1. In the Aero-SDU Configuration Program click the button **Service Log** on the start page.
2. Choose a location for the file and click **OK** to save it.
3. It may take several minutes to complete the service log, wait until the operation is completed.

The service log contains also BITE error codes from the SDU, including 2 general BITE codes from the SBU. These SBU BITE codes inform you that there are errors in the SBU. Use the SBU diagnostic report for further information on the SBU BITE errors.

8.2.4 Help desk and diagnostic report from the SBU

Accessing the Help desk

If you need help **with airtime-related issues** for the SwiftBroadband subscription you may call the Help desk. By default, the Help desk is the phone number for your Airtime Provider.

To access the Help desk, select **HELP DESK** from the left navigation pane in the SBU web interface.

Figure 8-2: Web interface: Help desk

If you have entered the Help desk number, it is displayed as a link. To change the number, click the link, change the number and click **Apply**. If you need help **with SBU- or antenna-related issues** call your local distributor.

Generating a diagnostic report from the SBU

When contacting your distributor for support, please include an SBU diagnostic report. The diagnostic report contains information relevant for the service personnel during troubleshooting. When contacting your distributor for support, please enclose the service log for the SDU and the diagnostic report for the SBU.

To generate a diagnostic report with valuable information for the service team, do as follows:

1. Reboot the system.
2. Establish the problem or situation in which the error occurred, or
3. Make a CS call (if possible), i.e. making a call with a handset connected to the SBU.
4. Make a PS call (if possible), i.e. establish a data connection.
5. Click **Generate report** from the **HELP DESK** page.
   In some browsers the file may open directly in your browser. If it does, choose **File > Save As** to save the file.
6. Choose a location for the file and save it on your computer.

Extended status

Click **Extended status** in the **HELP DESK** page to display further status information on logon status, ongoing data sessions and ongoing calls.

Figure 8-3: Web interface: Help desk, Extended status

8.3 Software update

The software upgrade procedure can be divided into 3 steps: SDU software upload, AVIATOR 700 startup and SBU software upload. In step 2 the HPA is updated and the system runs a POST (power on self test).

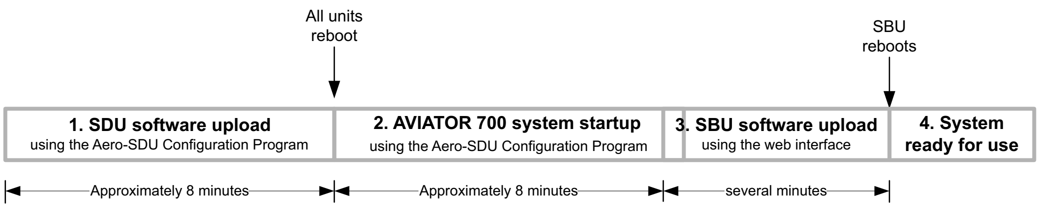


Figure 8-4: Software upgrade procedure for SDU and SBU

Important

Level-D and Level E consistency!

A level-D certified system detecting an inconsistent hardware unit or software image enters failure mode, and the system will not be operational. Inconsistency messages clearly inform the service personnel about the reason for this failure mode.

Pay great attention to selecting the correct software file: Level D or Level E for both SDU and SBU. **A mismatch of Level D and Level E software is not allowed and will result in a non-functioning system.** A mismatch will be displayed in the built-in web interface and as a BITE error.

Minimum Software Version required for AVIATOR 700 (Level E):

- SBU: AVIATOR 700: Swift_broadband-E_105.zip
  File: Swift_broadband-E_105.dl
- SDU: AVIATOR 700: Aero-HSD+_E_v114.zip
  File: HplusHsdHpa-E-318.swu
- Aero-SDU Configuration Program: Aero-SDU_CP_v114.zip
  File: setup.exe

Minimum Software Version required for AVIATOR 700D (Level D):

- SBU: AVIATOR 700D: Swift_broadband-D_200.zip
  File: Swift_broadband-D_200.dl
- SDU: AVIATOR 700D: Aero-HSD+_D_v200.zip
  File: HplusHsdHpa-D-318.swu
- Aero-SDU Configuration Program: Aero-SDU_CP_v114.zip
  File: setup.exe

Important When making a software update of the AVIATOR 700 system, you must always update the SBU and the SDU software because the two software versions must match as specified above.

A POST error (UU24) is displayed if there is a mismatch between the software versions or if the RS422 connection between the SDU and SBU is not working properly.

Hardware and software requirements

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

- One IBM compatible PC with a 9-pin serial COM port (or a 25-pin serial COM port with a 25-to-9 converter attached) and a standard Ethernet port available.
- Minimum PC requirements: Processor speed: 1 GHz, 512 MB RAM.
  Operating system: Windows 2000, Windows XP, Windows Vista or Windows 7.
  Note: To use online help or to print settings, Internet Explorer 4.0 or greater is required. 1024×768 or higher display resolution. The program is best viewed using small fonts.
- One serial maintenance cable 9-pin to 15-pin Sub-D, Thrane & Thrane part no. TT-37-112940. Refer to **Figure 5-35: TT 37-112940 maintenance cable for front connector on SDU and PC**.
- One straight LAN cable.
- The Thrane & Thrane Aero-SDU Configuration Program (Thrane & Thrane part no. 84-119958-114 or greater) installed on the PC. This program can be downloaded from Thrane & Thrane Self Service Center at http://extranet.thrane.com/Support.aspx or http://thrane.com/ssc for non-partners.
- An unzip program installed on the PC (e.g. WinZip)
- The zipped file containing the new software: 1 file for the SDU and 1 file for the SBU. The new software can be downloaded from Thrane & Thrane Self Service Center at http://extranet.thrane.com/Support.aspx or http://thrane.com/ssc for non-partners.

Important When making a software update of the AVIATOR 700 system, you must always update the SBU and the SDU software because the two software versions must match as specified above. Both update procedures are described in this chapter.

8.3.1 SDU

Preparing the software update

Note Software update should only be done by qualified service personnel.

1. On the PC, unzip the zip file containing the new software for the SDU. Remember or write down which folder you extracted the file to.
2. Connect the SDU front port to the PC COM port, using the interconnect cable.
3. Power on the AVIATOR 700 system.
4. Close all other applications on the PC.
5. Start the Aero-SDU Configuration Program.
6. Normally you will enter the program in the **Start Up** tab window. If not, then select **Window**, **Start up** from the top menu bar.
7. From the top menu bar select **View**, **Options**. Select the COM port that you connected to the SDU in step 2.
8. Click the button **SW Update**. A new tab window, **Software Update**, opens.
9. Click on the '**...**' button next to the **File Selection** box in order to find the software file to upload. Find the file extracted in 1. and open it.

Updating the software

1. Click the **Start** button in the field SW Update.
2. The software upload to the SDU is now in progress. You can follow the status in the progress bar. The upload will take about 8 minutes.
3. Should you experience a time-out failure during the upload, just wait 2 minutes and click **Start** again. The upload will then start over again.
4. When the upload has finished, wait 8 minutes while the SDU initializes and runs a self test. The Aero-SDU Configuration Program will guide you.
5. Do not start the upload of new software to the SBU before the SDU software update has finished successfully.

If software upload fails - how to recover

In rare cases the software upload may fail, leaving the software in the SDU corrupted. This will happen if the power to the SDU is interrupted during the first stage of the upload. If all 3 LEDs on the front stay orange after power up, the software is corrupted.

To recover from this, reload the software with the Aero-SDU Configuration Program as follows:

1. Turn **off** the SDU.
2. Open the Aero-SDU Configuration Program and click the **Software update** button.
3. Click the **Start** button and turn on the SDU a few seconds later.

8.3.2 SBU

Preparing the software update

Note: Software update should only be done by qualified service personnel.

1. On the PC, unzip the zip file containing the new software for the SBU. Remember or write down which folder you extracted the file to.
2. Connect the SBU to the PC LAN port, using the SBU maintenance connector and a straight LAN cable.
3. Power on the AVIATOR 700 system.
4. Open your browser and enter the IP address of the SBU. The standard IP address is **192.168.0.1**.

   Note: If the local IP address of the SBU has been changed and you do not have the new address, you can temporarily set the IP address to the default value by pressing the **Reset** button next on the front plate of the SBU. For detailed instructions see ***How to reset the IP address or the terminal software to default settings*** on page 8-23.

   For further information on the Reset button, see ***IP Reset (Default) button on the SBU*** on page 8-22.

   For further information on IP addresses of the SBU see ***Setting up the LAN IP addressing*** on page 6-28.
5. Wait until step 2 in the SDU upgrade procedure has finished.
6. In the start-up page of the Aero-SDU Configuration Program click the **SBU Maintenance** button.

Updating the software

1. In the web interface, select **SETTINGS** from the left navigation pane.

2. Click **Upload** from the left navigation pane.

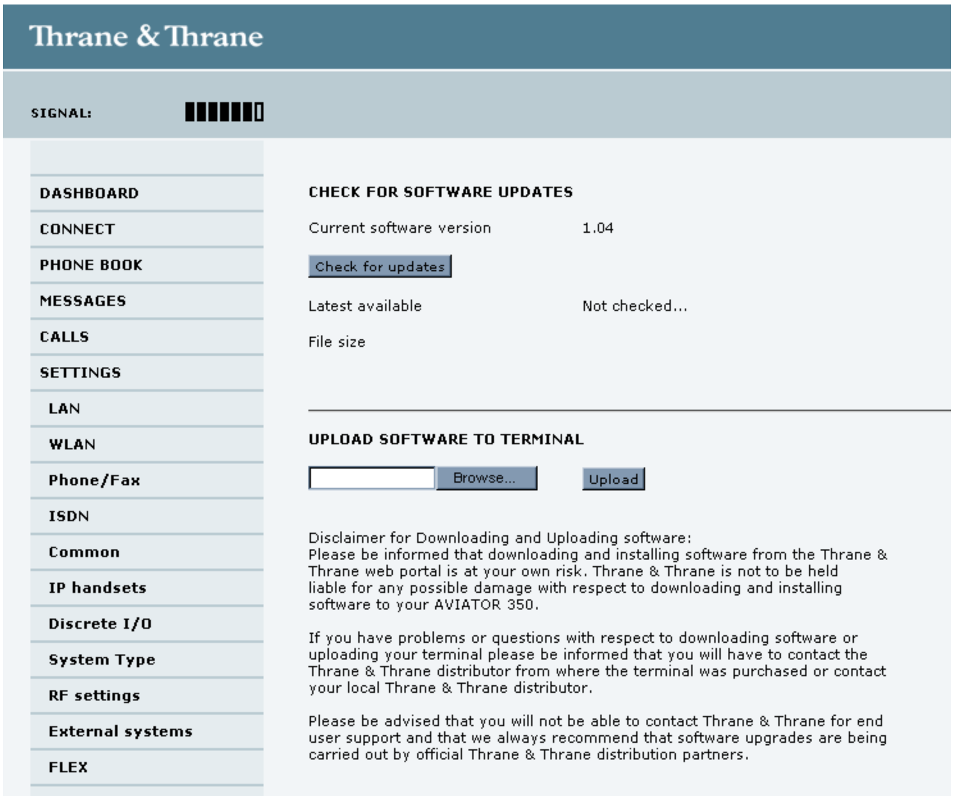


Figure 8-5: Web interface: Settings, Upload

3. The **Current software version** field shows the current software version.
4. Click **Browse...**
5. Browse to the new software version and accept it.
6. Click the **Upload** button.
   Note that the upload procedure takes a couple of minutes. Follow the instructions given in the Aero-SDU Configuration Program. When done, the SBU automatically restarts with the new software version.

If software upload fails - how to recover

To recover from a failed software upload, turn off the SBU and turn it on again. Then repeat the upload procedure as described in ***Updating the software*** on page 8-13.

If software upload still fails, use the IP Reset button as described in ***IP Reset (Default) button on the SBU*** on page 8-22 to initiate a software upload from an external server.

8.3.3 Verifying the software update

Testing procedure

1. Verify in the Aero-SDU Configuration Program (Button **Software update**, link: **Show more info**) that a green bar appears for the SDU in the SW status field, and that the version number in the same line is the new version number. The SBU software version can be viewed in the **DASHBOARD** window of the web interface.
2. After completing the software update procedure, the SDU and the SBU will perform a POST (Power On Self Test).
3. When the POST has finished, the green Pass/Fail LED on the front of the SDU and/or the SBU 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.
4. Verify that the software update has been completed successfully. You find the software version number in the **DASHBOARD** window of the web interface.

Software identification procedure

On the PartNumber / SerialNumber identification label make a cross mark in the **Software Ver.** field number according to the new software version. This applies to the SDU 405035A or 405035A-THD and the SBU 405040A or 405040A-THD in the AVIATOR 700 configuration.

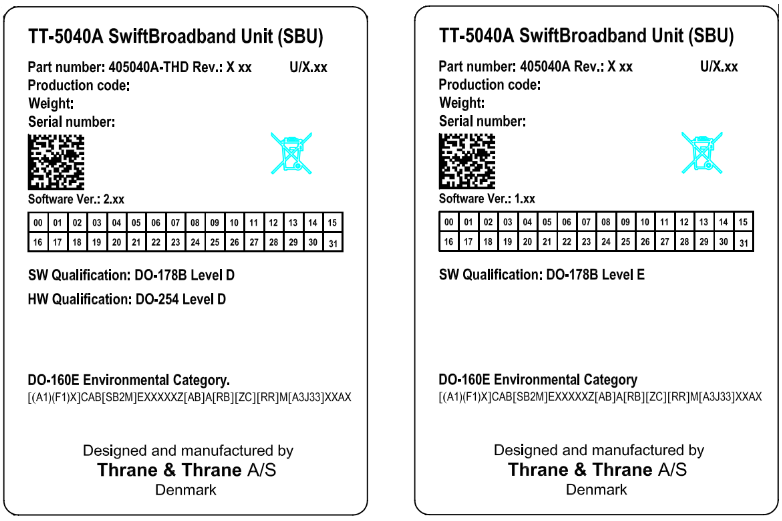


Figure 8-6: Software identification on the SBU label, Level D and Level E

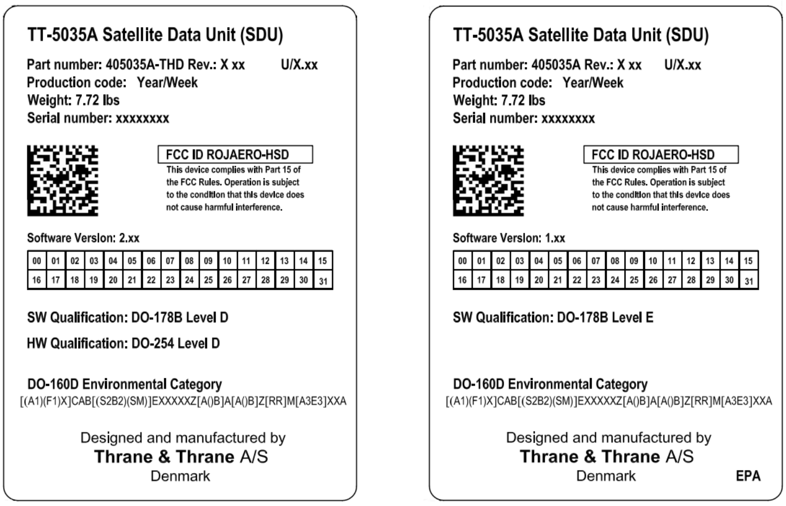


Figure 8-7: Software identification on the SDU label, Level D and Level E

8.4 Troubleshooting

8.4.1 Status signalling

Built-In Test Equipment

The SDU and the SBU both provide 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 pressing the Push To Test button on the SDU front panel.

Also, during operation a Continuous Monitoring BITE function is performed.

Each LRU in the AVIATOR 700 system has its own BITE function but they are all controlled and monitored by the SDU in the system.

Results from the BITE tests for the complete AVIATOR 700 system are shown as four digit error codes. The two most significant digits represent the main group and are displayed on the SDU front panel. The two least significant digits give further details. All four digits are displayed in the 4-wire handset display together with more detailed information. The SBU may report BITE error codes to the SDU. These SBU BITE codes inform you that there are errors in the SBU. Use the SBU diagnostic report for further information on the SBU BITE errors. To get further information about the BITE error codes relating to the SBU access the web interface of the SBU.

Details on error messages after a POST or PAST for the SBU can be found in the event list of the SBU, see ***Viewing the Event list, Event log and extended status of the SBU*** on page 8-24.

Means of signalling

The AVIATOR 700 system provides various methods for signalling the status of the system.

- **LEDs** on the front panel of the SDU, SBU and the HPA are used to signal:
  - Power on/off
  - Logon
  - Fail/Pass
- The **handset display** in the Thrane & Thrane 4-Wire Handset is used to display messages concerning:
  - information from the services

    - status information from the system to the user
    - equipment errors.
- The **MCDU display** shows the same messages as the 4-Wire Handset display.
- The **BITE display** on the SDU is used to display BITE error codes. Refer to ***System messages*** on page D-1.

Push to Test button on SDU and SBU

The SDU and SBU both have a hardware reset/test button placed on the front panel for BITE purposes. Use the button on the SDU to reset both SDU and SBU and to activate a self test (PAST).

Note | **Do not use the Push to Test button on the SBU**. The SBU is reset automatically when the SDU is reset.

Messages in the Thrane & Thrane 4-Wire Handsets

Two types of messages are displayed in the Thrane & Thrane 4-Wire Handsets.

- Cause codes are information from the services or status information from the system to the user.
- BITE codes are information about errors in the equipment.

BITE codes are also shown in the BITE display of the SDU and in the display of the 4-Wire Handset.

For further information and lists of the possible error codes, see the appendix ***System messages*** on page D-1.

Messages in the MCDU display

The MCDU display shows the same messages as the 4-Wire Handset display.

BITE display on SDU

The two-digit 7-segment BITE display (green) is used for displaying BITE codes. Only the two most significant digits of the four-digit BITE codes are shown in the SDU display.

For further information and a list of the BITE codes, refer to ***BITE Error codes*** on page D-15.

8.4.2 Status signalling with LEDs

LEDs on the SDU

During the power-up procedure all LEDs on the front plate are orange. If all 3 LEDs on the front stay orange after power up, the software is corrupted.

Power LED

The function of the Power LED on the SDU is:

LED Color	Description
Green	Power OK
Orange	Uploading software
Off	No power

Table 8-1: Function of SDU Power LED

Logon LED (H^+)

The Logon LED on the SDU shows the H^+ logon status. The HSD logon status is only signalled in the 4-Wire Handset.

The possible colors are listed below, with a short description of what they indicate:

LED Color	Description
Red	Acquiring satellite network
Orange	Network synchronization
Green	Network Logon
Off	No acquired satellite/logged off

Table 8-2: Function of SDU Logon LED

Fail/Pass LED, SDU

The function of the Fail/Pass LED on the SDU is:

Behavior	Description
Steady red	A fault which may degrade the system operation is present in the system.
Alternating: Short green / long pause	Power On Self Test (POST) or Person Activated Self Test (PAST) in progress.
Alternating: Long green/ short orange 0.5 Hz	No current failure, but a BITE failure / warning is logged in the error log
Steady green	No faults

Table 8-3: Function of SDU Fail/Pass LED

LEDs on HPA

Power LED

The function of the Power LED on the HPA is:

Behavior	Description
Green	Power OK
Off	No power

Table 8-4: Function of HPA Power LED

Fail/Pass LED

The function of the Fail/Pass LED on the HPA is:

Behavior	Description
Red	Fail
Off	No Faults

Table 8-5: Function of HPA Fail/Pass LED

LEDs on SBU

During the power-up procedure all LEDs on the front plate are orange. If all 3 LEDs on the front stay orange after power up, check that the wiring between the SDU BP 56 and SBU TP 8 is wired and that the system is configured as an AVIATOR 700 (see ***Setting the System type*** on page 6-49). If wiring is good and system is configured as an AVIATOR 700, the SBU software is corrupted. Contact your local distributor for instructions how to proceed.

Power LED on SBU

Behavior	Description
Green	Power OK
Orange	During upstart procedure
Off	No power

Table 8-6: Function of the SBU Power LED

Logon LED on SBU

Behavior	Description
Red	Acquiring satellite network
Orange	Network synchronization
Green	Network logon
Off	No acquired satellite/logged off

Table 8-7: Function of the SBU Logon LED

Fail/Pass LED on SBU

Behavior	Description
Steady red	A fault which may degrade the system operation is present in the SBU
Flashing: short green/ long pause	Power On Self Test (POST) or Person Activated Self Test (PAST) in progress
Flashing: long green/ short orange	No current failure, but a BITE failure / warning is logged in the error log
Steady green	No faults

Table 8-8: Function of the SBU Fail/Pass LED

LED on maintenance connector

The function of the LED on the maintenance connector is:

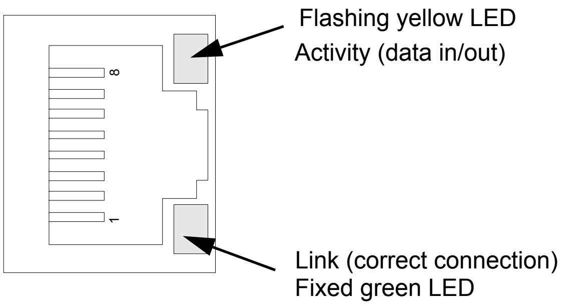


Figure 8-8: LEDs on front maintenance connector

8.4.3 IP Reset (Default) button on the SBU

The SBU has an IP Reset (Default) button next to the front LAN maintenance connector below the metal cover. The button has two functions: To reset the terminal's IP address and netmask to the default value, 192.168.0.1 and to reset the terminal to factory default settings.

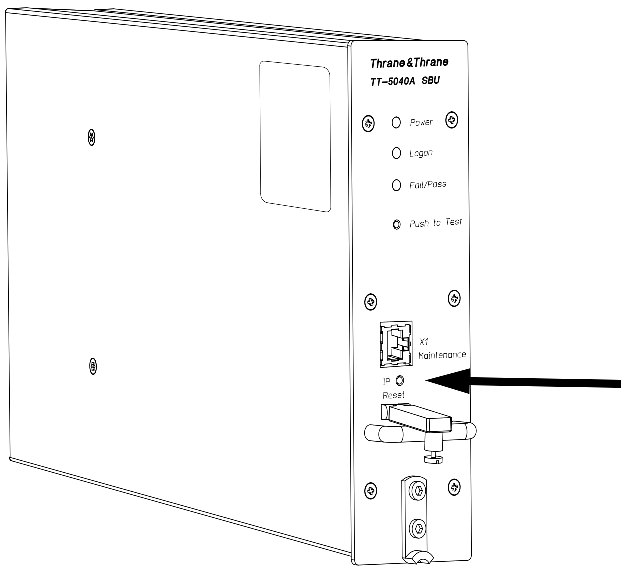


Figure 8-9: IP Reset (Default) button on SBU front

The following table describes how you can use the IP reset button.

Action	Function
With the SBU running, press the Reset button normally.	**Temporary reset to default values:** The SBU's IP address and IP netmask are temporarily set to the default value (default IP address: 192.168.0.1, default netmask: 255.255.255.0). With this function, even if the IP address has been changed and you do not remember the new IP address, you can still access the web interface and see your current configuration. The default value is not saved in the configuration, but is only valid until next reboot.
With the terminal running, press and hold the Reset button for 30 seconds, until the Power indicator on the SBU front plate flashes orange.	**Reset to factory settings:** The SBU restores factory settings and reboots the system.
While the terminal is booting, press and hold the Reset button.	**For service use only!** This firmware upload procedure is only to be used if the other procedures fail due to missing or corrupted firmware. This setup uploads software to the SBU from a TFTP server via the LAN connection. The procedure is as follows: 1. Activate or install a TFTP server on a PC. 2. Locate the correct software image (xxx.dl) for the SBU and place it in the TFTP server directory. 3. Rename the image to **ttexp.dl**. 4. Reconfigure the PC LAN interface to use the static address **192.168.0.2/255.255.255.0**. 5. Power off the SBU. 6. Connect the PC LAN Interface to the SBU, 7. Press and hold down the Reset button. 8. Keep the Reset button pressed while powering on the SBU, and through the next step. 9. Monitor the TFTP server window. When the upload starts you can release the Reset button. 10. When the TFTP upload finishes the SBU boots up using the new image.

Table 8-9: How to reset the IP address or the terminal software to default settings

8.4.4 Service log of the SDU

You use the Aero-SDU Configuration Program to generate a service log. The service log contains all data necessary for troubleshooting the SDU, HPA and the satcom antenna. Errors from the POST and PAST tests are recorded in the service log.

For instructions how to generate a service log see ***Generating a service log*** on page 8-6.

8.4.5 Viewing the Event list, Event log and extended status of the SBU

Overview

When an event is registered, the web interface shows an event icon ⚠ in the icon bar as long as the event is active. The **Event list** only shows events that are currently active, whereas the **Event log** shows the history of events that have occurred.

Event list

To view the event list, 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.

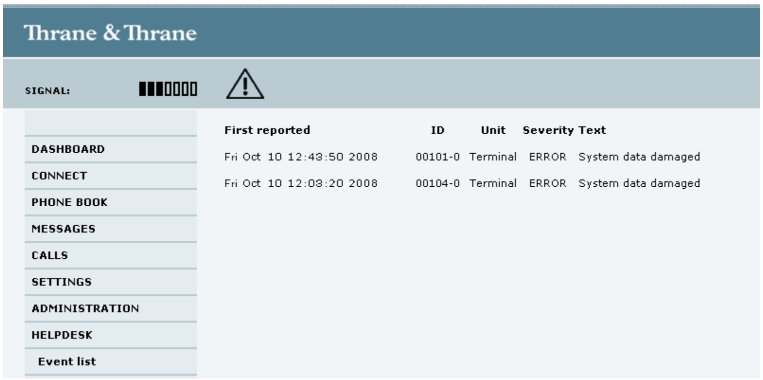


Figure 8-10: Web interface: Help desk, Event list

The Event list page shows a detailed list of active events including the time of the first occurrence, ID and severity of the event message, and a short text describing the error.

For a list of events with description, ID, explanation and remedy see ***List of SBU events*** on page D-23.

Event log

The **Event log** shows the same information as the Event list, but also includes events that occurred in the past and are no longer active. Additionally, it lists events of informational character, describing normal phases of operation for the SBU.

The event log holds information of events registered in the SBU or antenna. The same events are also indicated in the Antenna and Terminal LEDs on the SBU LED panel.

The log includes the time of the occurrence, a short description, location of the error etc. This information can help troubleshooting errors in the system. You can see the event log in the web interface.

To view the Event log, select **HELPDESK > Event log** from the left navigation pane.

Extended status

The Extended Status page shows the following information:

- The antenna Product ID.
- The status of the connection to the air interface (IAI-2). This field should normally show “Registered”, unless the system is still in the startup process.
- Ongoing data sessions (IP address) and connection status, e.g. Active or Suspended.
- Ongoing calls and their connection status.

To update the information on the **Extended status page**, click **Refresh**.

8.4.6 Self test of the SBU

The Self test performs system test on the AVIATOR 700 system, similar to the tests that are performed during the Power On Self Test (POST).

Important The SBU will reboot when performing the self test. All ongoing calls or data sessions will be terminated.

To activate a Self test, do as follows:

1. Select **HELPDESK > Self test**.

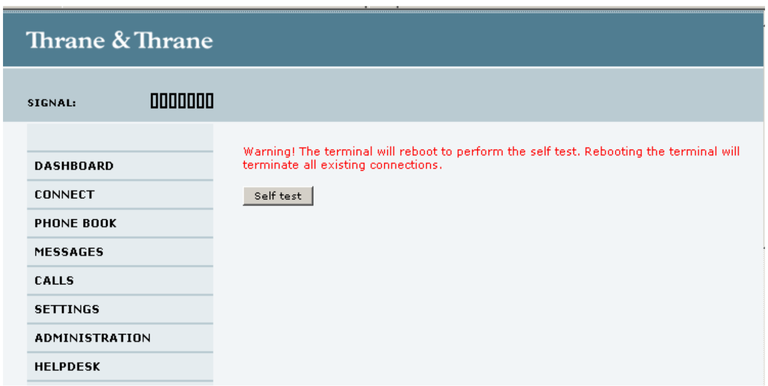


Figure 8-11: Web interface: Help desk, Self test

2. Click **Self test**.

3. Click **OK** in the Warning dialog.
   The SBU now performs a self test and resets the SBU.

8.4.7 Initial troubleshooting

Overview

This section describes an initial check of the primary functions of the AVIATOR 700 system, and provides some guidelines for troubleshooting, if one of the checks should fail.

Means available for troubleshooting

The following means are available for troubleshooting:

- **LEDs and BITE display**. Generally, if a fault occurs without any obvious reason, it is always recommended to observe the LEDs and the BITE display. For information on the function of the LEDs and the BITE display, refer to ***Status signalling*** on page 8-17. For a list of all the BITE codes and Cause codes, refer to the appendix ***System messages*** on page D-1.
- **Web interface**. For troubleshooting errors in the SBU, you may connect to the front LAN interface on the SBU and use the web interface to inspect any alarm messages. For information on the web interface refer to ***Built-in web interface for the SBU*** on page 6-17.
- **Low level commands.** It may sometimes be necessary to use terminal commands for debugging, using the front Maintenance port of the SDU.
  For information on how to use the front port for debugging, see ***Using terminal commands*** on page F-1.
- **Diagnostic report.** You can generate a diagnostic report that can be used for troubleshooting errors in the SBU of the AVIATOR 700 system. To generate the diagnostic report, access the web interface and select **HELPDESK**. then click **Generate report**. Save the report on your PC.
- To generate the service log, click the **Service log** button to the left in the Aero-SDU Configuration Program. For information see ***Aero-SDU Configuration Program for the SDU*** on page 6-2.
- Enclose the diagnostic report and the service log when requesting support.

Problem: No connection to the SBU maintenance connector

Depending on the options in your system you might experience limitations when using an Ethernet interface of the AVIATOR 700. For systems without the built-in router option enabled, i.e. the basic version or the version with Wireless option, note the following limitation:

- To use the SBU Maintenance connector disconnect or switch off any PC connected to another LAN interface of the SBU.

Problem: No GPS signal: Interference from satcom antenna on GPS antenna

If the existing GPS antenna on board the aircraft does not provide sufficient filtering of the satcom antenna signal to provide a usable GPS signal, you must replace the existing GPS antenna with a GPS antenna that has a satcom filter.

Problem: No registration for voice or data possible

In case the system cannot register properly for voice or data service, check with your Service provider that the SIM card in the Configuration module of the SBU is not blocked.

Check of LEDs

The below flow chart shows the initial check of the LEDs on the SDU, HPA and SBU.

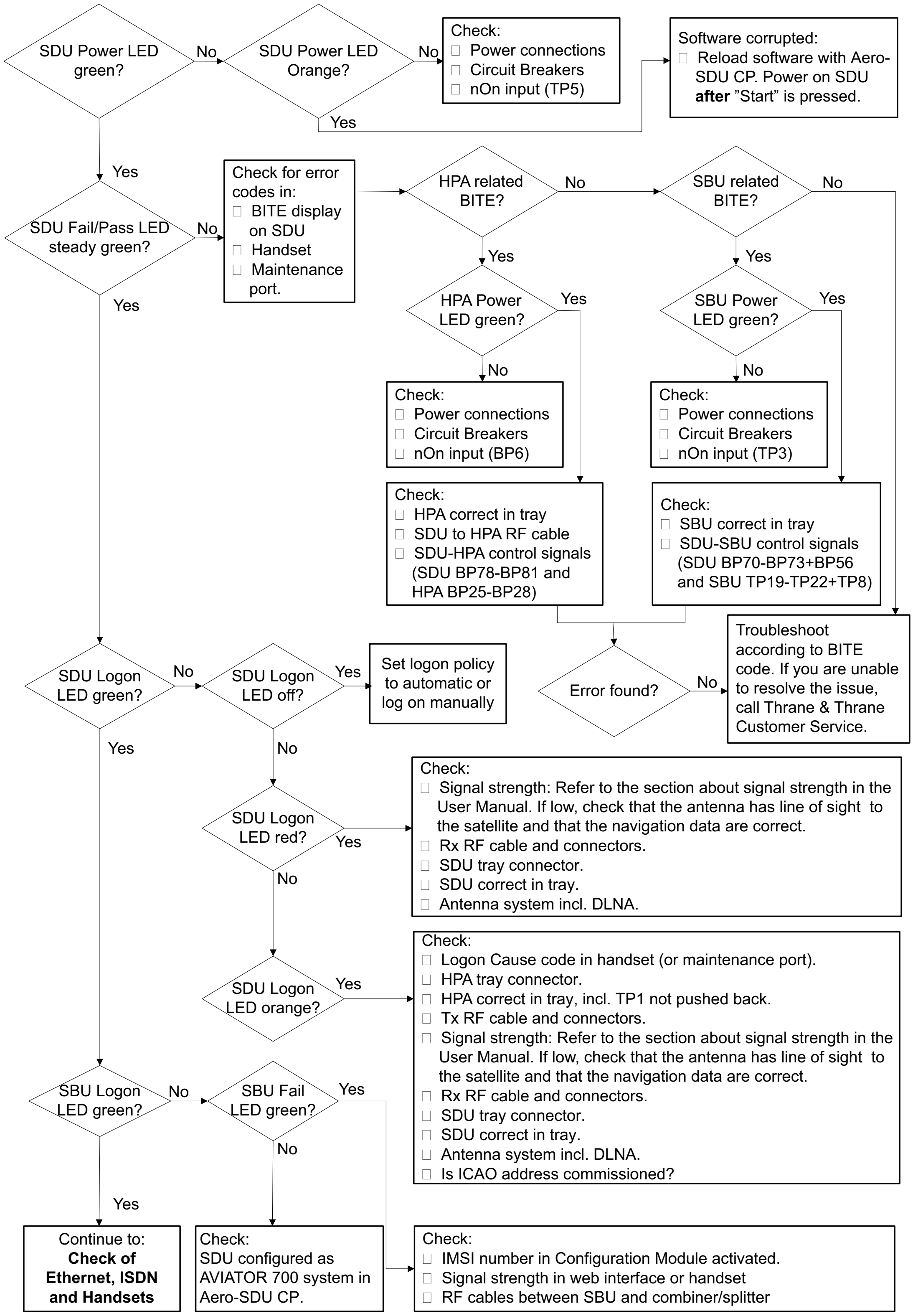


Figure 8-12: Initial check of LEDs (1/2)

Check of Ethernet, ISDN and handsets

After checking the LEDs, the user functions should be checked.
The below flow chart shows the initial check of Ethernet, ISDN and handsets.

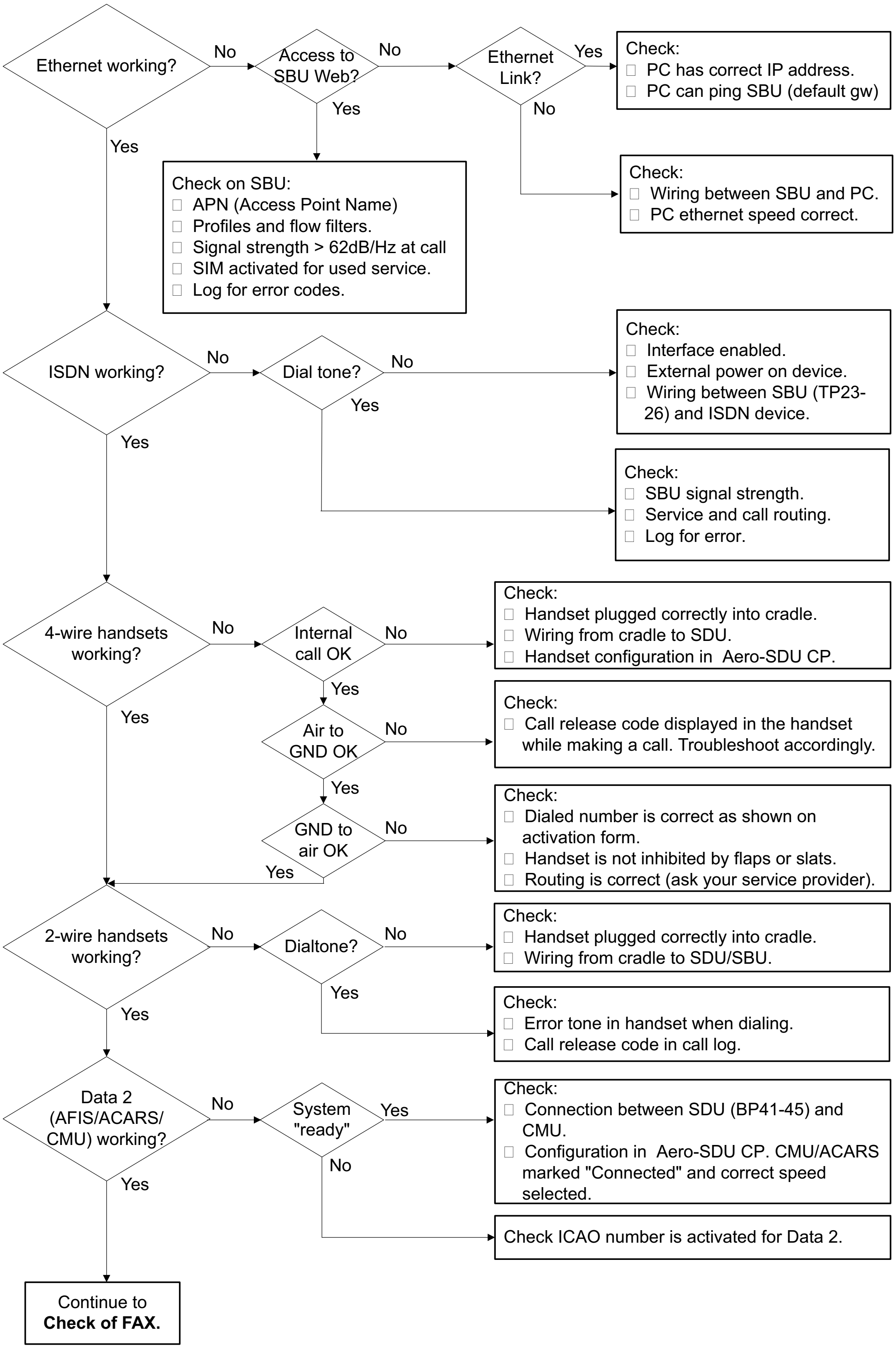


Figure 8-13: Initial check of Ethernet, fax, 4-Wire Handsets and ISDN

Check of fax

The below flow chart shows the initial check of the fax interfaces.

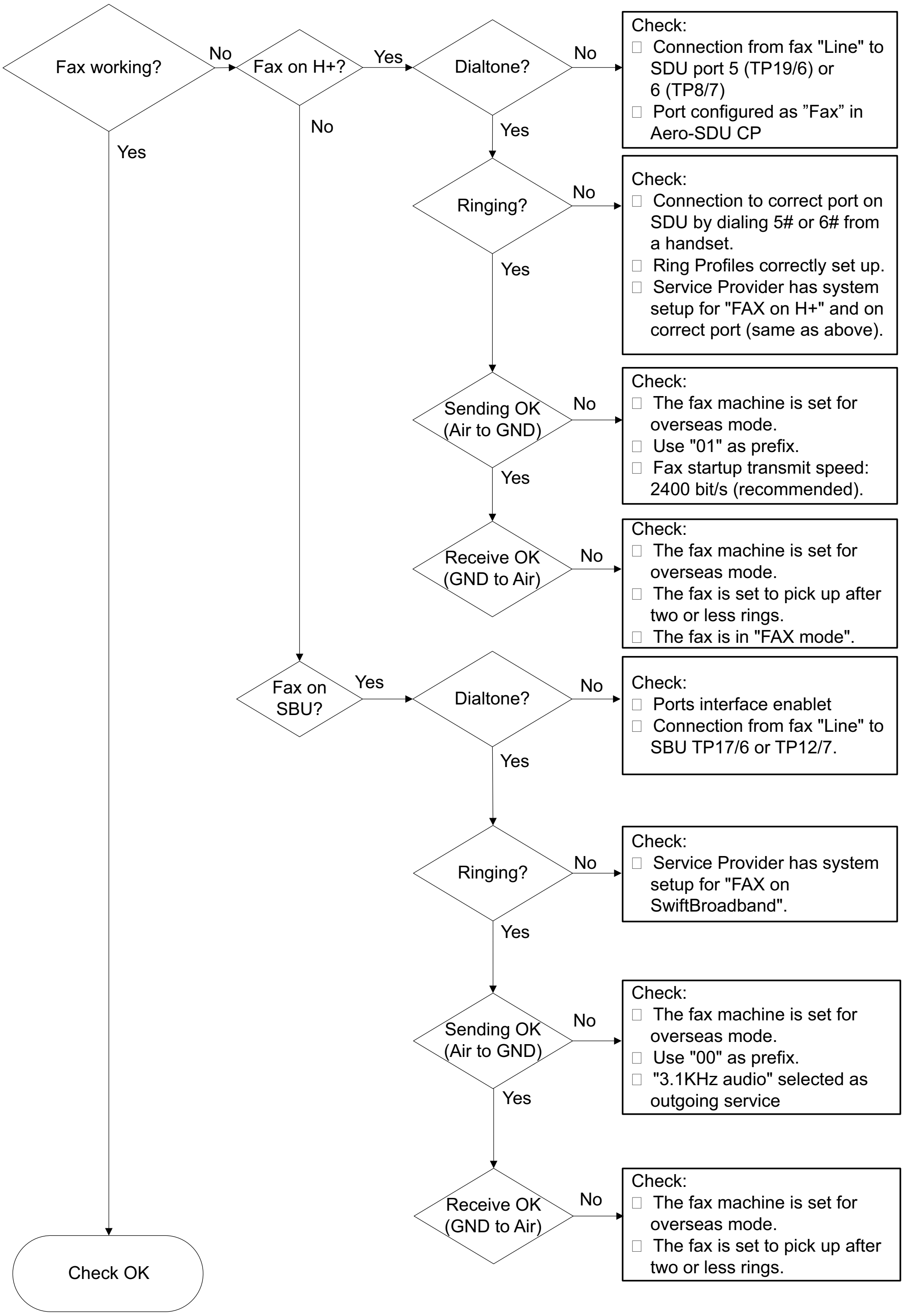


Figure 8-14: Initial check of Fax

8.5 Returning units for repair

8.5.1 Return Material Authorization (RMA)

To return equipment to Thrane & Thrane for repair this RMA procedure must be followed. Failure to comply with this procedure may cause shipping delays and additional charges.

All paperwork regarding repair returns must be made via a Thrane & Thrane Partner, and must be registered in the Thrane & Thrane eReport on-line portal in accordance with the Partner manual instructions.

Shipment can be made directly between Thrane & Thrane and any address specified in the eReport RMA documents.

Repairs - warranty as well as non warranty - will be handled in accordance with the Thrane & Thrane repair policies and procedures as outlined on the Thrane & Thrane Extranet (http://extranet.thrane.com/) and in the Partner manual.

Repackaging requirements

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

The shipping carton has been carefully designed to protect the AVIATOR 700 and its accessories during shipment. This carton and its associated packing material should be used when repacking for shipment. Attach a tag indicating the type of service required, return address, part number and full serial number. Mark the carton FRAGILE to ensure careful handling.

Note Correct shipment is the customer's own responsibility.

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

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

Failure to do so may invalidate the warranty.

RMA procedure for aircraft owners and operators (and other companies than Thrane & Thrane partners)

Before returning units for repair, please follow this procedure:

1. Have the following information ready before calling calling your Thrane & Thrane Partner:
   - T&T part number (example: 405035A SDU)
   - Serial number (example: 00443322).
   - A thorough description of the fault.
   - Aircraft serial number and/or tail number.
2. Contact the Customer Service Center of your Thrane & Thrane Partner or the company from whom you purchased the AVIATOR 700.
3. Describe the fault as thoroughly as possible and ask for assistance. In some cases, the error may be resolved over the phone.
4. If the unit has to be returned for repair, request an RMA number, or make agreement with the partner on how to proceed.
5. Request replacement/loan unit if required.
6. Pack the equipment or parts to be returned in approved shipping containers.
7. Write the RMA number on the outside of all shipping containers and ship to the following address:
   Thrane & Thrane A/S
   Porsvej 2
   DK-9200 Aalborg SV
   Denmark

RMA procedure for a Thrane & Thrane partner

In case you want loaner or replacement item(s) shipped in advance (i.e. before Thrane & Thrane have received the defective item), please follow this procedure:

1. Have the following information ready before contacting Thrane & Thrane or filling in the eSupport PIA ticket (see your Partner manual for details on eSupport):
   - T&T part number (example: 405035A SDU).
   - Serial number (example: 00443322).
   - A thorough description of the fault.
   - Aircraft serial number and/or tail number.
2. Contact Thrane & Thrane GTAC support team (see your Partner manual or Extranet for details).

3. Describe the fault as thoroughly as possible. In some cases, the error may be resolved over the phone.
4. If the unit has to be returned for repair, make the eReport registration and issue the eReport RMA documents (see your Partner manual and eReport manual for details).
5. Request replacement/loan unit if required, and confirm your request via the eSupport e-mail ticket.
6. Pack the equipment or parts to be returned in approved shipping Containers, and include the eReport RMA documents.
7. Write the RMA number on the outside of all shipping containers and ship to the following address:
   Thrane & Thrane A/S
   Porsvej 2
   DK-9200 Aalborg SV
   Denmark

8.6 Disposal of electrical and electronic equipment

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

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

Appendices

Equipment specifications

A.1 Introduction

Important note!

The information, drawings, and wiring diagrams contained in this manual are intended as a reference for engineering planning only. It is the installer's responsibility to compose installation drawings specific to the aircraft.

In this appendix you find equipment specifications for the following units:

- ***TT-5035A Satellite Data Unit (SDU)***
- ***TT-5014A High Power Amplifier (HPA)***
- ***TT-5040A SwiftBroadband Unit (SBU)***
- ***TT-5040A-004 WLAN antenna***
- ***TT-5038A-002 Tx Coupler***
- ***TT-5038A-003 Rx Power Splitter***
- ***TT-5620A 4-Wire Handset***
- ***TT-5622A 4-Wire Cradle***
- ***TT-5621B 2-Wire Handset***
- ***TT-5622B 2-Wire Cradle***

Note: Cables and connectors and DLNA are not included.

For specifications of the antenna please see the documentation provided with the antenna.

Note: For equipment drawings of the AVIATOR Wireless Handset and Cradle see ***AVIATOR Wireless Handset and Cradle Installation & Maintenance Manual*** (***98-129600***).

A.2 AVIATOR 700 system components

A.2.1 TT-5035A Satellite Data Unit (SDU)

Specification with TT-5035A-001 Configuration Module (CM) mounted.

Characteristics	Specification
Dimensions (L x W x H)	ARINC 404A 3/8 ATR short, 3 MCU 320.5 mm x 193.5 mm x 90.4 mm (12.62” x 7.62” x 3.56”)
Weight	3.5 kg ±0.1 kg (7.72 lbs ±0.22 lbs) incl. Configuration Module
Mounting	Mount in an ARINC 404A 3/8 ATR short tray in a temperature controlled location. Forced cooling is not recommended.
Supply Voltage	Nominal: +28.0 V DC Voltage range continuous operation: +20.5 V DC to 32.2 V DC short time operation: +18.0 V DC to 32.2 V DC
Power Hold-up	5 ms. fully operational, 200 ms. Power Save Mode.
Power Consumption	Absolute max power consumption[a]: 46.5 W (Heat dissipation: 27 W). Typical operating power consumption (3 channels transmitting, one 4-wire handset): 30 W (Heat dissipation: 25 W). Typical stand-by power consumption (no transmitting, one 4-wire handset): 25 W (Heat dissipation: 22 W). Inrush current: 0-2 ms: Iin < 28 A 2 ms: Iin < 26 A 5 ms: Iin < 17 A 10 ms: Iin < 5.5 A 50 ms: Iin < 4.4 A 50 ms ->: Normal operation

Table A-1: General specifications for SDU

Characteristics	Specification
Connectors	Rear: ARINC 404A Front: SUB-D 15 Female.
Operating Temperature	-25 °C to +55 °C
Ground Survival Temperature	-55 °C to +85 °C
Altitude	55000 ft
Environmental Categories	Refer to Environmental Qualification form in ***Satellite Data Unit*** on page B-2 in Appendix B.

Table A-1: General specifications for SDU

a. Includes 4 x 4-wire handsets, 2 x 2-wire handsets and 4 ISDN phones.

A.2.2 TT-5014A High Power Amplifier (HPA)

Characteristics	Specification
Dimensions (L x W x H)	ARINC 404A 3/8 ATR short, 3 MCU 320.5 mm x 193.5 mm x 93.0 mm (12.62” x 7.79” x 3.66”)
Weight	5.1 kg ±0.2 kg (11.24 lbs ±0.44 lbs)
Mounting	Can be installed in a non-temperature controlled location. The HPA is designed with built-in forced cooling. Do not block the cooling air holes. Minimum clearance top and bottom: 1” (25 mm) Mount in ARINC 404A 3/8 ATR short tray with oval cut-out as shown in **Figure 3-16: Outline Drawing: Tray for SDU and HPA.**.
Supply Voltage	Nominal: +28.0 V DC Voltage range, continuous operation: +20.5 V DC to 32.2 V DC short time operation: +18.0 V DC to 32.2 V DC
Power Hold-up	5 ms. fully operational, 200 ms. Power Save Mode.
Power Consumption	Absolute max power consumption: 235 W (Heat dissipation: 185 W). Typical operating power consumption (4 channels transmitting): 130 W (Heat dissipation: 110 W). Typical standby power consumption (no transmitting): 40 W (Heat dissipation: 40 W). Inrush current: 0-10ms: Iin < 55A 10ms: Iin < 6A 10-30ms: Iin < 20A 30ms: Iin < 15A 40ms: Iin < 10A 60ms: Iin < 4A 60ms ->: Normal operation
Composite Output Power	37.4 W (Burst Mode) 30.0 W (Continuous Mode)

Table A-2: General specifications for HPA

Characteristics	Specification
Connectors	Rear: ARINC 404A
Operating Temperature	-55 °C to +70 °C
Ground Survival Temperature	-55 °C to +85 °C
Altitude	55000 ft
Environmental Categories	Refer to Environmental Qualification form in ***High Power Amplifier*** on page B-5 in Appendix B.

Table A-2: General specifications for HPA

A.2.3 TT-5040A SwiftBroadband Unit (SBU)

Characteristics	Specification
Dimensions (L x W x H)	ARINC 404A 1/4 ATR short 320.5 mm x 193.5 mm x 57.15 mm (12.62” x 7.62” x 2.25”)
Weight	2.8 kg ±0.1 kg (6.2 lbs ±0.22 lbs) including TT-5040-001 CM
Mounting	Mount in an ARINC 404A 1/4 ATR short tray in a temperature controlled location. Forced cooling is not required and not recommended.
Supply Voltage	Nominal: +28.0 V DC Voltage range, continuous operation: +20.5 V DC to 32.2 V DC short time operation: +18.0 V DC to 32.2 V DC
Power Hold-up	200 ms. Fully operational: 5 ms.
Typical Power Consumption (idle) (SBU & CM)	17 W
Total Maximum Power Consumption (SBU & CM)	25 W
Maximum Heat Dissipation (SBU & CM)	<25 W
Connectors	Rear: ARINC 404A Front: RJ45 Female.
Operating Temperature	-25 °C to +55 °C
Ground Survival Temperature	-55 °C to +85 °C
Altitude	Non pressurized (Cat. F1): 55,000 ft Pressurized (Cat. A1): 15,000 ft Decompression (Cat. A1): 55,000 ft Overpressure (Cat. A1): -15,000 ft
Relative humidity	95% non-condensing at +50°C
Environmental Categories	Refer to Environmental Qualification form in ***SwiftBroadband unit (SBU)*** on page B-7 in Appendix B.

Table A-3: Equipment specifications for TT-5040A SBU

A.2.4 TT-5040A-004 WLAN antenna

Characteristics	Specification
Dimensions (L x W x H)	12 mm x 119 mm x 13 mm (0.48” x 4.7” x 0.5”)
Weight	28.3 g (1 ounce)
Mounting	For mounting instructions for WLAN antennas see **Figure 5-3: Mounting two WLAN antennas for optimum performance** in ***WLAN antennas*** on page 5-9.
Connector	Male TNC
Operating Temperature	-40 °C to +71 °C
Ground Survival Temperature	-55 °C to +85 °C
Altitude	Pressurized (Cat. A1): 15,000 ft Decompression (Cat. A1): 45,000 ft Overpressure (Cat. A1): -15,000 ft
Relative humidity	95% non-condensing at +50°C
Cable type	Plenum, RG-316U coaxial
Cable length (including connector)	7.5” ± 0.25” (190.5 ±6.4 mm)

Table A-4: Equipment specifications for WLAN antenna

A.2.5 TT-5038A-002 Tx Coupler

Characteristics	Specification
Dimensions (L x W x H)	106.6 mm x 57.1 mm x 22.4 mm (4.20” x 2.25” x 0.88”) including connectors.
Weight	230 g ±10 g (0.50 lbs ±0.02 lbs)
Mounting	Can be mounted in an unpressurized but temperature controlled location.
Connectors	3 x N-connector, Female.
Operating Temperature	-25 °C to +55 °C
Ground Survival Temperature	-55 °C to +85 °C
Altitude	55000 ft
Environmental Categories	Refer to Environmental Qualification form in ***Tx Coupler and Rx Power Splitter*** on page B-9 in Appendix B.

Table A-5: General specifications for Tx Coupler

A.2.6 TT-5038A-003 Rx Power Splitter

Characteristics	Specification
Dimensions (L x W x H)	86.8 mm x 50.8 mm x 19.1 mm (3.42” x 2.00” x 0.75”) including connectors.
Weight	146 g ±10 g (0.32 lbs ±0.02 lbs)
Mounting	If the Rx Power Splitter is to be mounted on a flat surface, mount it on a 3 mm mounting plate to provide enough space for mounting of the connectors. Can be mounted in an unpressurized but temperature controlled location.
Connectors	3 x N-connector, Female. Built-in DC-block on the HSU (SBU) port.
Operating Temperature	-25 °C to +55 °C
Ground Survival Temperature	-55 °C to +85 °C
Altitude	55000 ft
Environmental Categories	Refer to Environmental Qualification form in ***Tx Coupler and Rx Power Splitter*** on page B-9 in Appendix B.

Table A-6: General specifications for Rx Power Splitter

A.3 AVIATOR 700 handsets and cradles

Note For specifications of the AVIATOR Wireless Handset see ***AVIATOR Wireless Handset and Cradle Installation & Maintenance Manual*** (part number: ***98-129600***)

A.3.1 TT-5620A 4-Wire Handset

Characteristics	Specification
Dimensions (L x W x H)	200.0 mm x 52.0 mm x 31.5 mm (7.87” x 2.05” x 1.24”)
Weight	0.31 kg ±50 g (0.68 lbs ±0.11 lbs) incl. cable.
Mounting	Mount in a pressurized and temperature controlled location.
Supply Voltage	+28 V DC, provided by SDU via Handset Cradle.
Power Consumption	Max. 3.5 W for handset and cradle (included in SDU power consumption).
Operating Temperature	-25 °C to +55 °C
Ground Survival Temperature	-40 °C to +80 °C
Altitude	55000 ft
Environmental Categories	Refer to Environmental Qualification form in ***4-Wire Handset and 4-Wire Cradle*** on page B-11 in Appendix B.

Table A-7: General specifications for 4-Wire Handset

A.3.2 TT-5622A 4-Wire Cradle

Characteristics	Specification
Dimensions (L x W x H)	160.5 mm x 61.0 mm x 28.4 mm (6.30” x 2.40” x 1.12”)
Weight	0.27 kg ±50 g (0.60 lbs ±0.11 lbs) incl. connector cable.
Mounting	Mount in a pressurized and temperature controlled location.
Supply Voltage	+28 V DC, provided by SDU.
Power Consumption	See ***TT-5620A 4-Wire Handset*** on page A-10.
Operating Temperature	-25 °C to +55 °C
Ground Survival Temperature	-40 °C to +80 °C
Altitude	55000 ft
Environmental Categories	Refer to Environmental Qualification form in ***4-Wire Handset and 4-Wire Cradle*** on page B-11 in Appendix B.

Table A-8: General specifications for 4-Wire Cradle

A.3.3 TT-5621B 2-Wire Handset

Characteristics	Specification
Dimensions (L x W x H)	200.0 mm x 52.0 mm x 31.5 mm (7.87” x 2.05” x 1.24”)
Weight	0.22 kg ±50 g (0.49 lbs ±0.11 lbs) incl. cable.
Mounting	Mount in a pressurized and temperature controlled location.
Power consumption	Max. 750 mW for handset and cradle (included in SBU power consumption).
Operating Temperature	-25 °C to +55 °C
Ground Survival Temperature	-40 °C to +80 °C
Altitude	55,000 ft
Environmental Categories	Refer to Environmental Qualification form in ***2-Wire Handset and 2-Wire Cradle*** on page B-13 in Appendix B.

Table A-9: Equipment specifications for 2-Wire Handset

A.3.4 TT-5622B 2-Wire Cradle

Characteristics	Specification
Dimensions (L x W x H)	160.5 mm x 61.0 mm x 28.4 mm (6.30” x 2.40” x 1.12”)
Weight	0.20 kg ±50 g (0.43 lbs ±0.11 lbs) incl. connector cable.
Mounting	Mount in a pressurized and temperature controlled location.
Power consumption	See ***TT-5621B 2-Wire Handset*** on page A-12.
Operating Temperature	-25 °C to +55 °C
Ground Survival Temperature	-40 °C to +80 °C
Altitude	55,000 ft
Environmental Categories	Refer to Environmental Qualification form in ***2-Wire Handset and 2-Wire Cradle*** on page B-13 in Appendix B.

Table A-10: Equipment specifications for 2-Wire Cradle

DO-160 specifications

B.1 General

B.1.1 Certifying agency

Approval of the installation of the AVIATOR 700 system is not authorized by this installation manual. Acceptance for the installation and use of the AVIATOR 700 system and its associated components must be obtained through the appropriate offices of the FAA or other certifying agency. It is recommended that all proposed installations be coordinated with the local jurisdiction of the FAA or other certifying agency prior to performing the installation.

B.1.2 Environmental Qualification Forms

The Environmental Qualification Forms list the environmental categories under which all Thrane & Thrane components of the AVIATOR 700 system are approved.

Please refer to RTCA DO-160D/E for further details on the following Environmental Qualification Forms.

B.2 AVIATOR 700 system components

B.2.1 Satellite Data Unit

T&T Part Number: 405035A (AVIATOR 700) or 405035A-THD (AVIATOR 700D)

DO-160D string: [(A1)(F1)X]CAB[(S2B2)(SM)]EXXXXXZ[A()B]A[A()B]Z[RR]M[A3E3]XXA

RTCA/DO-160D Change Numbers			
Change Number	**Date of Issue**	**Title**	**Section**
Change No. 1	Dec. 14, 2000	Vibration	8.0
		Radio Frequency Susceptibility	20.0
Change No. 2	June 12, 2001	Power Input	16.0
		Audio Frequency Conducted Susceptibility - Power Inputs	18.0

Table B-1: RTCA/DO-160D Change Numbers, SDU

Conditions	DO-160D	Cat.	Comments
Temperature and Altitude	4.0	A1 and F1	Installation in controlled temperature locations and inside or outside pressurized locations.
Low Temperature	4.5.1		Min. operating low temperature: -25°C
High Temperature	4.5.2 & 4.5.3		Max. operating high temperature: +55°C
In-Flight Loss of Cooling	4.5.4	X	Forced cooling is not recommended.
Altitude	4.6.1		Max. altitude: 55000 ft
Decompression	4.6.2		Decompression at 55000 ft
Overpressure	4.6.3		Overpressure at -15000ft
Temperature Variation	5.0	C	Installation within controlled temperature locations: 2°/min.
Humidity	6.0	A	Standard Humidity: 95% relative humidity at 38°C to 50°C for 48 hours. Installation within environmentally controlled zones.
Operational Shocks and Crash Safety	7.0	B	Equipment tested to: Standard operational shocks and crash safety.

Table B-2: Environmental Qualification Form for SDU

Conditions	DO-160D	Cat.	Comments
Vibration	8.0	S2B2	Standard random vibration: Aircraft type: Fixed wing. Turbojet or turbofan engines.
		SM	Standard sinusoidal vibration: Aircraft type: Fixed wing. Reciprocating or turbo propeller engines. Aircraft zone: Instrument panel, console or equipment rack.
Explosion Proofness	9.0	E	
Waterproofness	10.0	X	No test required
Fluids Susceptibility	11.0	X	No test required
Sand and Dust	12.0	X	No test required
Fungus Resistance	13.0	X	No test required
Salt Spray	14.0	X	No test required
Magnetic Effect	15.0	Z	Magnetic deflection distance: < 0.3 m
Power Input	16.0	A()B	Power supply: +28 V DC. Reconnection of voice and data calls is not required, if a power interrupt less than 200 ms occurs during transfer of power sources.
Voltage Spike	17.0	A	
Audio Frequency Conducted Susceptibility - Power Inputs	18.0	A()B	
Induced Signal Susceptibility	19.0	Z	Equipment intended for operation in systems where interference-free operation is required.
Radio Frequency Susceptibility	20.0	RR	High Intensity Radiated Field (HIRF) associated with normal environment.
Emission of Radio Frequency Energy	21.0	M	

Table B-2: Environmental Qualification Form for SDU (Continued)

Conditions	DO-160D	Cat.	Comments
Lightning Induced Transient Susceptibility	22.0	A3E3	Equipment and wiring in moderately exposed environment in an all metal airframe. The Configuration Module is an integrated part of the SDU, and so the pin injection tests are not required for the Configuration Module interface.
Lightning Direct Effects	23.0	X	No test required
Icing	24.0	X	No test required
Electrostatic Discharge (ESD)	25.0	A	Operation, installation and repair in an aerospace environment.

Table B-2: Environmental Qualification Form for SDU (Continued)

B.2.2 Configuration Module for SDU

T&T Part Number: 405035A-001

DO-160D string: Please refer to the section ***Satellite Data Unit*** on page B-2, as the Configuration Module is an integral part of the SDU during normal operation and tests.

B.2.3 High Power Amplifier

T&T Part Number: 405014A (AVIATOR 700) or 405014A-THD (AVIATOR 700D)

DO-160D string: [(A2)(F2)Z]BBB[SCL]EXXXXXZ[A()B]A[A()B]Z[RR]M[A3E3]XXA

RTCA/DO-160D Change Numbers			
Change Number	**Date of Issue**	**Title**	**Section**
Change No. 1	Dec. 14, 2000	Vibration	8.0
		Radio Frequency Susceptibility	20.0
Change No. 2	June 12, 2001	Power Input	16.0
		Audio Frequency Conducted Susceptibility - Power Inputs	18.0

Table B-3: RTCA/DO-160D Change Numbers, HPA

Conditions	DO-160D	Cat.	Comments
Temperature and Altitude	4.0	A2 and F2	Installation in non-controlled temperature locations and inside or outside pressurized locations.
Low Temperature	4.5.1		Min. operating low temperature: -55°C
High Temperature	4.5.2 & 4.5.3		Max. operating high temperature: +70°C
In-Flight Loss of Cooling	4.5.4	Z	Continuous operation at 40°C, tested with internal fan turned off. Use the recommended tray and leave at least 1 inch (25 mm) of free space above and below the HPA, to allow free airflow. The HPA is overheat protected. External forced cooling is not recommended.
Altitude	4.6.1		Max. altitude: 55000 ft
Decompression	4.6.2		Decompression at 55000 ft
Overpressure	4.6.3		Overpressure at -15000 ft
Temperature Variation	5.0	B	Installation within non-temperature-controlled location: 5°C/min.
Humidity	6.0	B	Severe humidity: 95% relative humidity at 38°C to 65°C for 240 hours. Installation within non-environmentally controlled zones.

Table B-4: Environmental Qualification Form for HPA

Conditions	DO-160D	Cat.	Comments
Operational Shocks and Crash Safety	7.0	B	Equipment tested to: Standard operational shocks and crash safety.
Vibration	8.0	SCL	Standard sinusoidal and random vibration: Aircraft type: Fixed wing. Turbojet, turbofan, reciprocating or turbo propeller engines. Aircraft zone: Fuselage
Explosion Proofness	9.0	E	
Waterproofness	10.0	X	No test required
Fluids Susceptibility	11.0	X	No test required
Sand and Dust	12.0	X	No test required
Fungus Resistance	13.0	X	No test required
Salt Spray	14.0	X	No test required
Magnetic Effect	15.0	Z	Magnetic deflection distance: < 0.3 m
Power Input	16.0	A()B	Power supply: +28 V DC. Reconnection of voice and data calls is not required, if a power interrupt less than 200 ms occurs during transfer of power sources.
Voltage Spike	17.0	A	
Audio Frequency Conducted Susceptibility - Power Inputs	18.0	A()B	
Induced Signal Susceptibility	19.0	Z	Equipment intended for operation in systems where interference-free operation is required.
Radio Frequency Susceptibility	20.0	RR	High Intensity Radiated Field (HIRF) associated with normal environment.
Emission of Radio Frequency Energy	21.0	M	
Lightning Induced Transient Susceptibility	22.0	A3E3	Equipment and wiring in moderately exposed environment in an all metal airframe.
Lightning Direct Effects	23.0	X	No test required
Icing	24.0	X	No test required
Electrostatic Discharge (ESD)	25.0	A	Operation, installation and repair in an aerospace environment.

Table B-4: Environmental Qualification Form for HPA (Continued)

B.2.4 SwiftBroadband unit (SBU)

T&T Part Number: 405040A (AVIATOR 700) or 405040A-THD (AVIATOR 700D)

DO-160E string: [(A1)(F1)X]CAB[SB2M]ExxxxxZ[AB]A[RB][ZC][RR]M[A3]33]XXAX

Conditions	DO-160E	Cat.	Comments
Temperature and Altitude	4.0	A1, F1	Installation in temperature controlled areas and inside or outside pressurized locations.
Low Temperature	4.5.1 & 4.5.2		Short time operating low is -40°C. Unit is active, but inoperable until the unit temperature is > -30°C. Min. operational temperature is -25°C.
High Temperature	4.5.3 & 4.5.4		Short time operating high (30 min.): +70°C Max. operating high temperature is +55°C
In-Flight Loss of Cooling	4.5.5	X	Forced cooling is not required and not recommended.
Altitude	4.6.1		Max. altitude: 55000 ft
Decompression	4.6.2		Decompression test at 55000 ft
Overpressure	4.6.3		Overpressure at -15000 ft
Temperature Variation	5.0	C	Installation within temperature controlled areas: 2°C/min.
Humidity	6.0	A	Standard Humidity: 95% relative humidity at 38°C to 50°C for 48 hours. Installation within environmentally controlled zones
Operational Shocks and Crash Safety	7.0	B	Equipment tested to: Standard operational shock and crash safety.
Vibration	8.0	S, B2, M	Equipment tested without shock mounts to Category S, Curve B2 and Curve M.
Explosion Proofness	9.0	E	Not hermetically sealed equipment
Waterproofness	10.0	X	No test required
Fluids Susceptibility	11.0	X	No test required
Sand and Dust	12.0	X	No test required
Fungus Resistance	13.0	X	No test required
Salt Spray	14.0	X	No test required

Table B-5: Environmental Qualification Form for SBU

Conditions	DO-160E	Cat.	Comments
Magnetic Effect	15.0	Z	Magnetic deflection distance: < 0.3 m
Power Input	16.0	AB	Power supply: +28 V DC. Reconnection of voice and data calls is not required, if a power interrupt less than 200 ms occurs during transfer of power sources.
Voltage Spike	17.0	A	Power supply: +28 V DC.
Audio Susceptibility	18.0	RB	Power supply: +28 V DC.
Induced Susceptibility	19.0	ZC	Equipment intended for operation in systems where interference-free operation is required.
Radio Frequency Susceptibility	20.0	RR	High Intensity Radiated Field (HIRF) associated with normal environment.
Emission of Radio Frequency Energy	21.0	M	Installation in areas with significant electromagnetic apertures.
Lightning Induced Transient Susceptibility	22.0	A3J33	Equipment and wiring in moderately exposed environment in an all metal airframe. The Configuration Module is an integrated part of the SBU, and so the pin injection tests are not required for the Configuration Module interface.
Lightning Direct Effects	23.0	X	No test required
Icing	24.0	X	No test required
Electrostatic Discharge ESD	25.0	A	Operation, installation and repair in an aerospace environment.
Fire, Flammability	26.0	X	Equipment is tested according to FAR 25 Airworthiness Standards: Transport Category Airplanes, Paragraph 25.853(a) and Appendix F - Part I (a)(1)(ii) and Paragraph 25.869(a)(4) and Appendix F - Part I (a)(3).

Table B-5: Environmental Qualification Form for SBU (Continued)

B.2.5 Configuration Module (CM) for SBU

T&T Part Number: 405040A-001

DO-160E string: Please refer to the section ***SwiftBroadband unit (SBU)*** on page B-7, as the Configuration Module is an integral part of the SBU during normal operation and tests. However, the section 25 Category A test is performed on the Configuration Module as an individual LRU.

B.2.6 Tx Coupler and Rx Power Splitter

T&T Part Numbers: 405038A-002 and 405038A-003

DO-160D string: [(A1)(F1)X]CBB[SCL]EXXXXXZXXXZ[RR]M[A3E3]XXA

RTCA/DO-160D Change Numbers			
Change Number	**Date of Issue**	**Title**	**Section**
Change No. 1	Dec. 14, 2000	Vibration	8.0
		Radio Frequency Susceptibility	20.0
Change No. 2	June 12, 2001	Power Input	16.0
		Audio Frequency Conducted Susceptibility - Power Inputs	18.0

Table B-6: RTCA/DO-160D Change Numbers, Tx Coupler and Rx Power Splitter

Conditions	DO-160D	Cat.	Comments
Temperature and Altitude	4.0	A1 and F1	Installation in controlled temperature locations and inside or outside pressurized locations.
Low Temperature	4.5.1		Min. operating low temperature: -25°C
High Temperature	4.5.2 & 4.5.3		Max. operating high temperature: +55°C
In-Flight Loss of Cooling	4.5.4	X	Forced cooling is not recommended.
Altitude	4.6.1		Max. altitude: 55000 ft
Decompression	4.6.2		Decompression at 55000 ft
Overpressure	4.6.3		Overpressure at -15000 ft
Temperature Variation	5.0	C	Installation within controlled temperature locations: 2°/min.
Humidity	6.0	B	Severe humidity: 95% relative humidity at 38°C to 65°C for 240 hours. Installation within non-environmentally controlled zones.
Operational Shocks and Crash Safety	7.0	B	Equipment tested to: Standard operational shocks and crash safety.

Table B-7: Environmental Qualification Form for Tx Coupler and Rx Power Splitter

Conditions	DO-160D	Cat.	Comments
Vibration	8.0	SCL	Standard sinusoidal and random vibration: Aircraft type: Fixed wing. Turbojet, turbofan, reciprocating or turbo propeller engines. Aircraft zone: Fuselage
Explosion Proofness	9.0	E	
Waterproofness	10.0	X	No test required
Fluids Susceptibility	11.0	X	No test required
Sand and Dust	12.0	X	No test required
Fungus Resistance	13.0	X	No test required
Salt Spray	14.0	X	No test required
Magnetic Effect	15.0	Z	Magnetic deflection distance: < 0.3 m
Power Input	16.0	X	No test required
Voltage Spike	17.0	X	No test required
Audio Frequency Conducted Susceptibility - Power Inputs	18.0	X	No test required
Induced Signal Susceptibility	19.0	Z	Equipment intended for operation in systems where interference-free operation is required
Radio Frequency Susceptibility	20.0	RR	High Intensity Radiated Field (HIRF) associated with normal environment.
Emission of Radio Frequency Energy	21.0	M	
Lightning Induced Transient Susceptibility	22.0	A3E3	Equipment and wiring in moderately exposed environment in an all metal airframe.
Lightning Direct Effects	23.0	X	No test required
Icing	24.0	X	No test required
Electrostatic Discharge (ESD)	25.0	A	Operation, installation and repair in an aerospace environment.

Table B-7: Environmental Qualification Form for Tx Coupler and Rx Power Splitter (Continued)

B.3 AVIATOR 700 handsets and cradles

Note: For DO-160 specifications of the AVIATOR Wireless Handset see ***AVIATOR Wireless Handset and Cradle Installation & Maintenance Manual*** (part number: ***98-129600***)

B.3.1 4-Wire Handset and 4-Wire Cradle

T&T Part Number: 405620A-THW / 405620A-THR / 405622A-THW / 405622A-THR

DO-160C String: A1-BA[MNB]XXXXXXAXXXB[UR]ZXXE3XX

RTCA/DO-160C Change Numbers			
Change Number	**Date of Issue**	**Title**	**Section**
Change No. 2	June 19, 1992	Lightning Induced Transient Susceptibility	22.0
Change No. 3	May 13, 1993	Radio Frequency Susceptibility	20.0

Table B-8: RTCA/DO-160C Change Numbers, 4-Wire Handset and Cradle

Conditions	DO-160C	Cat.	Comments
Temperature and Altitude	4.0	A1	Installation in controlled temperature and pressurized location.
Low Temperature	4.5.1		Min. operating low temperature: -25°C
High Temperature	4.5.2 & 4.5.3		Max. operating high temperature: +55°C
In-Flight Loss of Cooling	4.5.4	-	No forced cooling required.
Altitude	4.6.1		Max. altitude: 55000 ft
Decompression	4.6.2		Decompression at 55000 ft
Overpressure	4.6.3		Overpressure at -15000 ft
Temperature Variation	5.0	B	Installation within partially or non-controlled temperature locations: 5°C/min.
Humidity	6.0	A	Standard Humidity: 95% relative humidity at 38°C to 50°C for 48 hours. Installation within environmentally controlled zones

Table B-9: Environmental Qualification Form for 4-Wire Handset and Cradle

Conditions	DO-160C	Cat.	Comments
Operational Shocks and Crash Safety	7.0	Yes	Equipment tested to: Standard operational shocks and crash safety.
Operational Shock	7.2	Yes	
Crash Safety	7.3	Yes	
Vibration	8.0	MB	Standard sinusoidal and random vibration: Aircraft type: Fixed wing. Turbojet, turbofan, reciprocating or turbo propeller engines.
		N	Aircraft type: Helicopter. Turbojet or reciprocating engines.
			Aircraft zone: Instrument panel, console or equipment rack.
Explosion Proofness	9.0	X	No test required
Waterproofness	10.0	X	No test required
Fluids Susceptibility	11.0	X	No test required
Sand and Dust	12.0	X	No test required
Fungus Resistance	13.0	X	No test required
Salt Spray	14.0	X	No test required
Magnetic Effect	15.0	A	Magnetic deflection distance: 0.3 m to 1 m
Power Input	16.0	X	No test required. DC power is provided by the SDU.
Voltage Spike	17.0	X	No test required
Audio Frequency Conducted Susceptibility - Power Inputs	18.0	X	No test required
Induced Signal Susceptibility	19.0	B	Installation where interference is controlled to a tolerable level.
Radio Frequency Susceptibility	20.0	UR	
Emission of Radio Frequency Energy	21.0	Z	Equipment intended for operation in systems where interference-free operation is required.
Lightning Induced Transient Susceptibility	22.0	XXE3	Cable Bundle Test: Equipment and wiring in moderately exposed environment in an all metal airframe.
Lightning Direct Effects	23.0	X	No test required
Icing	24.0	X	No test required

Table B-9: Environmental Qualification Form for 4-Wire Handset and Cradle (Continued)

B.3.2 2-Wire Handset and 2-Wire Cradle

T&T Part Number: 405621B-THW / 405621B-THR / 405622B-THW / 405622B-THR

DO-160C String: [A1X]CAB[(SMB2)(SM)(UFF1)]XXXXXXAXXXB[RR]M[A2E3]XXA

Conditions	DO-160D	Cat.	Comments
Temperature and Altitude	4.0	A1	Installation in controlled temperature and pressurized location.
Low Temperature	4.5.1		Min. operating low temperature: -25°C
High Temperature	4.5.2 & 4.5.3		Max. operating high temperature: +55°C
In-Flight Loss of Cooling	4.5.4	X	No forced cooling required.
Altitude	4.6.1		Max. altitude: 55000 ft
Decompression	4.6.2		Decompression at 55000 ft
Overpressure	4.6.3		Overpressure test at -15000 ft
Temperature Variation	5.0	C	Installation within controlled temperature locations: 2°/min.
Humidity	6.0	A	Standard Humidity: 95% relative humidity at 38°C to 50°C for 48 hours. Installation within environmentally controlled zones.
Operational Shocks and Crash Safety	7.0	B	Equipment tested to: Standard operational shocks and crash safety.
Vibration	8.0	S2B2	Standard random vibration: Aircraft type: Fixed wing. Turbojet or turbofan engines.
		SM	Standard sinusoidal vibration: Aircraft type: Fixed wing. Reciprocating or turbo propeller engines.
		UFF1	Robust Sine-on-Random vibration: Aircraft type: Helicopter. Turbojet or reciprocating engines.
			Aircraft zone: Instrument panel, console or equipment rack.
Explosion Proofness	9.0	X	No test required
Waterproofness	10.0	X	No test required

Table B-10: Environmental Qualification Form for 2-Wire Handset and Cradle

Conditions	DO-160D	Cat.	Comments
Fluids Susceptibility	11.0	X	No test required
Sand and Dust	12.0	X	No test required
Fungus Resistance	13.0	X	No test required
Salt Spray	14.0	X	No test required
Magnetic Effect	15.0	A	Magnetic deflection distance: 0.3 m to 1 m
Power Input	16.0	X	No test required
Voltage Spike	17.0	X	No test required
Audio Frequency Conducted Susceptibility	18.0	X	No test required
Induced Signal Susceptibility	19.0	B	Installation where interference is controlled to a tolerable level.
Radio Frequency Susceptibility	20.0	RR	High Intensity Radiated Field (HIRF) associated with normal environment.
Emission of Radio Frequency Energy	21.0	M	
Lightning induced Transient Susceptibility	22.0	A2E3	Cable bundle test: Equipment and wiring in moderately exposed environment in an all metal airframe.
Lightning Direct Effects	23.0	X	No test required
Icing	24.0	X	No test required
Electrostatic Discharge (ESD)	25.0	A	Operation, installation and repair in an aerospace environment.

Table B-10: Environmental Qualification Form for 2-Wire Handset and Cradle (Continued)

Upgrade from Aero-HSD+ to AVIATOR 700

C.1 Avionics hardware needed

Depending on your current HSD+ Level E installation you need the following items to upgrade your system to AVIATOR 700 (Level E) or AVIATOR 700D (Level D):

	AVIATOR 700 (Level E)		AVIATOR 700D (Level D)	
Items needed for existing Aero-HSD+ system	**Aero-HSD+ 4 channels**	**Aero-HSD+ 5 channels**	**Aero-HSD+ 4 channels**	**Aero-HSD+ 5 channels**
405040A SwiftBroadband Unit (SBU) [without CM]	yes	yes		
405040A-THD SwiftBroadband Unit (SBU) [without CM]			yes	yes
Connector kit for TT-5040A	yes	yes	yes	yes
New tray for TT-5040A SBU	yes	yes	yes	yes
405040A-001 Configuration Module (CM) for SBU	yes	yes	yes	yes
405040A-005 SDU to SBU Software Interface	yes	yes	yes	yes
405038A-002 TX-Coupler	yes		yes	
405038A-003 RX Power Splitter	yes		yes	
405035A-THD Satellite Data Unit (SDU) Level-D			yes	yes
405014A-THD High Power Amp (HPA) Level-D			yes	yes

Table C-1: Items needed for upgrading to AVIATOR 700 Level E or AVIATOR 700D (Level D)

	Satcom antenna system	
Item	**HGA-7000**	**Other**
405013A DLNA Type F	**yes**	**yes**
405007A-801 Cobham BSU-7100	yes	no

Table C-2: Items needed for upgrading for different antenna types

Important

Level-D and Level E consistency!

When upgrading to a Level-D or Level-E certified system you must pay great attention to secure consistency of the hardware units SDU, HPA and SBU – all units and software must be either Level D or Level E.

A mismatch of Level D and Level E units or software is not allowed and will result in a non-functioning system.

C.2 Mounting and wiring considerations

C.2.1 Overview

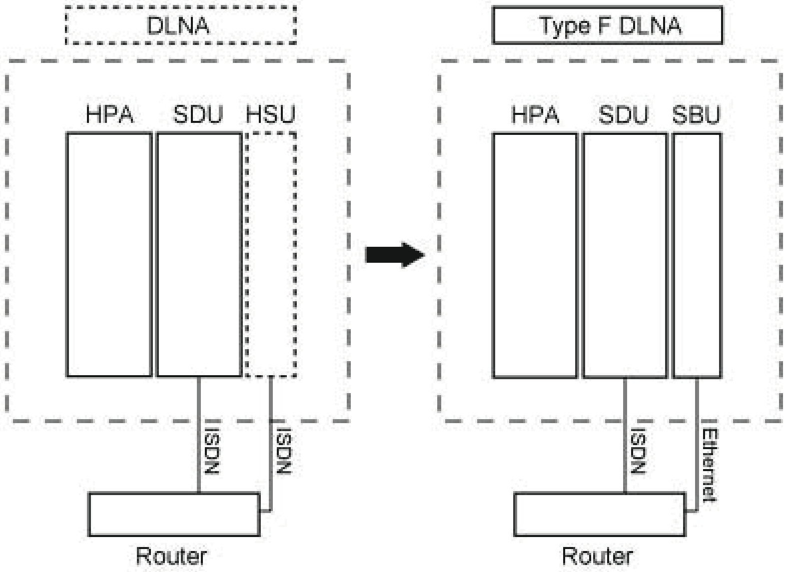


Figure C-1: Upgrade overview, exchange HSU with SBU

Items to mount and rewire	Description	More information
1. Tray for the SBU	The tray from an existing HSU can not be re-used. The SBU requires a tray that is more rigid.	3.12: ***SBU trays*** on page 3-14
2. Connectors HSU versus SBU	The connector of an HSU only uses the top plug. The SBU also uses the bottom plug, and most of the pins in the top plug have moved or have new functions.	4.3.3: ***SBU rear receptacle*** on page 4-14
3. Aircraft power	If the SBU is replacing an existing HSU, the power wiring and circuit breaker may be re-used, if it fulfills the slightly stricter requirements.	5.3.3 ***Wiring power supply**: **Wiring the SwiftBroadband Unit*** on page 5-16

Table C-3: Upgrade to AVIATOR 700, mounting and wiring considerations

Items to mount and rewire	Description	More information
4. Satcom antenna	For an existing AMT-50/HGA-6000 antenna, change only the diplexer to a Type F. For an existing HGA-7000 antenna in combination with a T&T 5012A Diplexer, the following changes must be made: • Change the diplexer to Type F, which is physically slightly different. • The Type F diplexer must be powered directly from the aircraft power. • The antenna, which was originally powered through the T&T 5012A diplexer, must now be powered through a Chelton BSU-7100. • Bring power wiring to the BSU. • A429 wires must connect the BSU to the HPA 5014A.	
5. WLAN	Optionally, mount the two WAN antennas and connect them to the SBU.	5.2.7 ***WLAN antennas*** on page 5-9 and 5.3.9 ***Wiring WLAN antenna interface*** on page 5-44
6. User interfaces	If the user interfaces (ISDN, RS-232) of an existing HSU is wired directly to the cabin, it is recommended to wire some of the Ethernet interfaces (i.e. Ethernet 1) from the SBU to the cabin. If the user interfaces (ISDN, RS-232) of an existing HSU is wired to a Cabin Router, which in turn provides the user connectivity, one of the Ethernet interfaces of the SBU needs to be wired to the Cabin Router. If the system is a 4 channel, a new Ethernet cable may be needed from the SBU to the router. There should be two in total, one for Ethernet WAN and one for ISDN fallback (Swift64 on I3). Also, route one or both of the 2-wire POTS interfaces of the SBU to the cabin.	5.3.8 ***Wiring Ethernet at the SBU*** on page 5-41

Table C-3: Upgrade to AVIATOR 700, mounting and wiring considerations (Continued)

C.2.2 Wiring navigational input IRS/AHRS

Even though the SDU has navigation data to feed to the SBU, the SBU also needs to receiver position, track and speed information.

If IRS is used, the ARINC 429 signal must be wired to both the SDU and SBU.

If AHRS/GPS is used (with HGA-7000), only GPS L-band RF coax needs to be wired to both the SDU and SBU. The cable to the SDU can be split with e.g. a 405038A-003 Power Splitter (see ***TT-5038A-003 Rx Power Splitter*** on page 3-8).

Installation	Existing SDU		Additional SBU	
Navigational input	**ARINC 429 input**	**GPS RF pin TP A4**	**ARINC 429 input**	**GPS RF pin BP A4**
IRS	√	–	√	–
AHRS/GPS	√	√	–	√

Table C-4: Upgrade, wiring navigational input

For more information see 5.3.5, ***Wiring ARINC 429 interfaces*** on page 5-32.

C.3 Upgrading the SDU

The following steps are required to update the SDU to function properly in an AVIATOR 700 system:

1. ***SDU software update to version 1.14 or higher***
2. ***Read the configuration from the SDU***
3. ***Select the correct product: AVIATOR 700***
4. ***Update the cable loss***
5. ***Update the GES list with I-4 satellites***
6. ***Update the known GES list***
7. ***Write the configuration to the SDU***

Note | Make sure you have the Aero-SDU Configuration Program v. 1.14 or higher.

C.3.1 SDU software update to version 1.14 or higher

1. Click the button **SW Update** to start the software update procedure.

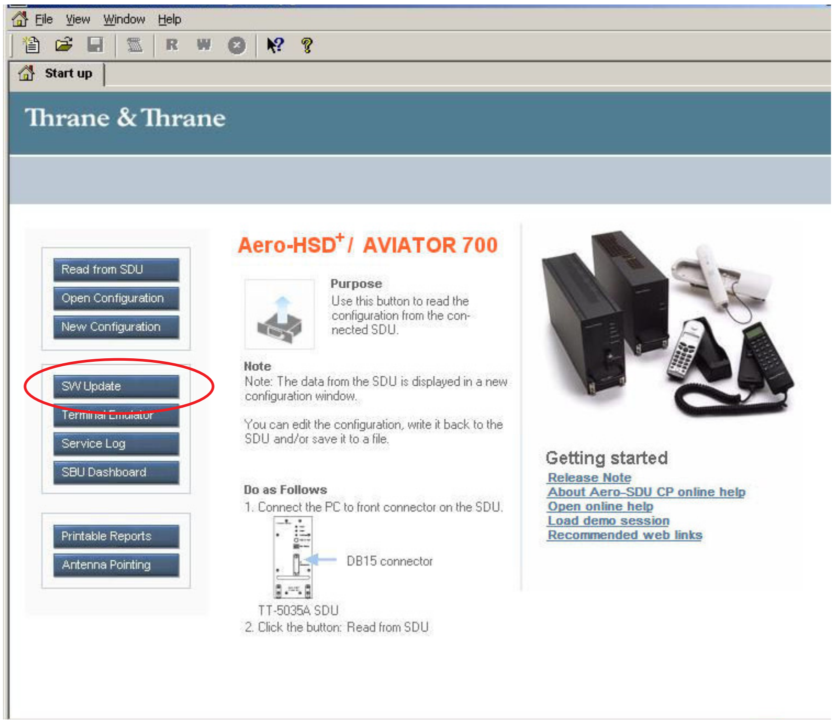


Figure C-2: Upgrading HSD$^+$ to AVIATOR 700, SDU, step 1/7

2. Download the software from www.thrane.com or for partners from http://extranet.thrane.com/Support.aspx. Select the .SWU file and click the button **Start**.

Important: Pay great attention to selecting the correct software file: Level D or Level E for both SDU and SBU. **A mismatch of Level D and Level E software is not allowed and will result in a non-functioning system.**

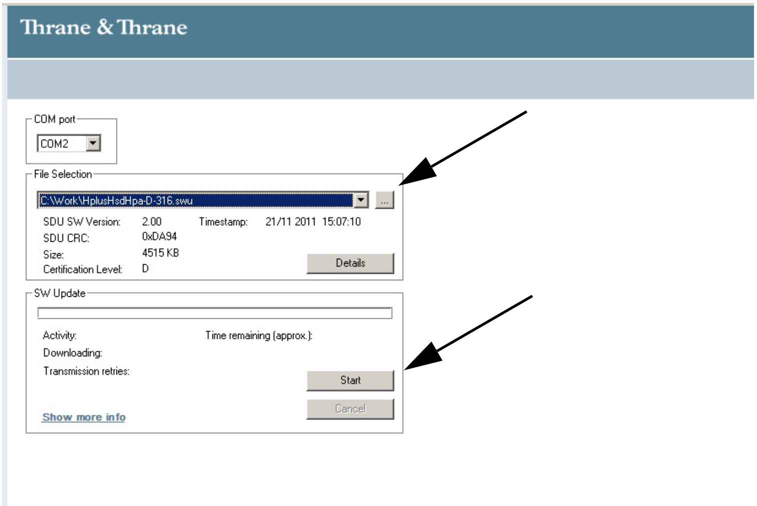


Figure C-3: Upgrading HSD$^+$ to AVIATOR 700, SDU, step 1/7, continued

C.3.2 Read the configuration from the SDU

Press the button **Read from SDU** to read the current setting.

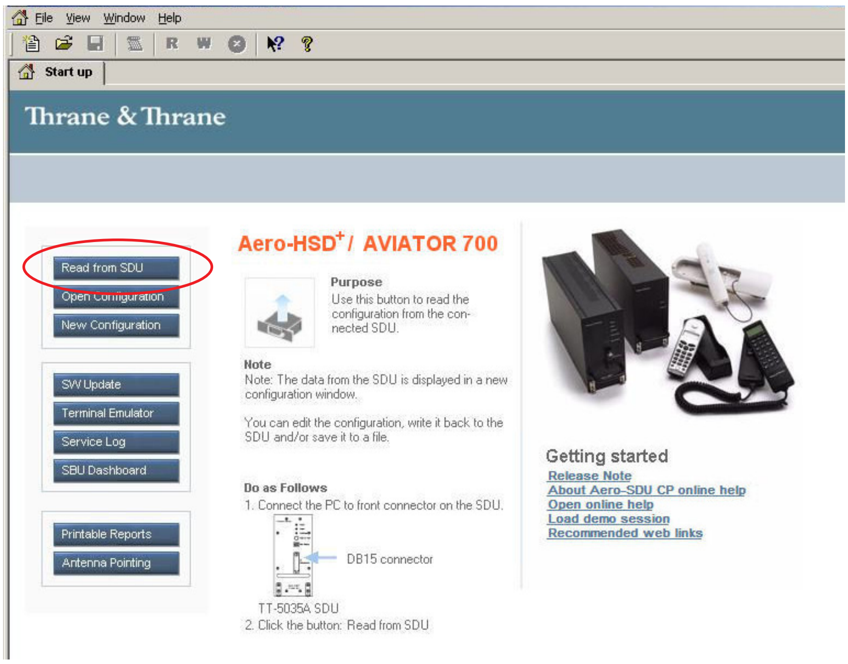


Figure C-4: Upgrading HSD$^+$ to AVIATOR 700, SDU, step 2/7

C.3.3 Select the correct product: AVIATOR 700

Select the product AVIATOR 700.

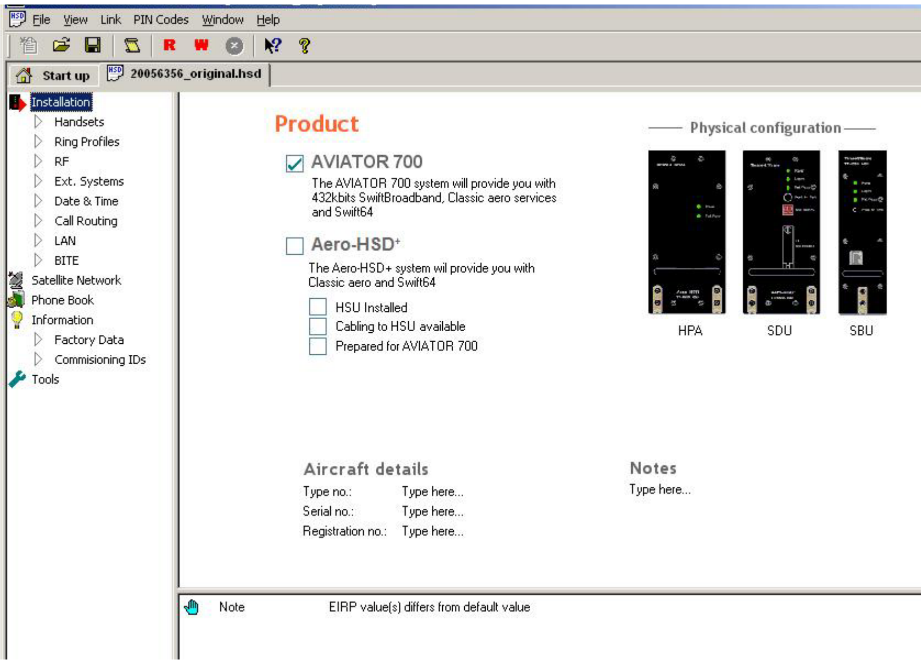


Figure C-5: Upgrading HSD+ to AVIATOR 700, SDU, step 3/7, continued

C.3.4 Update the cable loss

Enter the values for the cable losses for the SDU on the page **RF**.

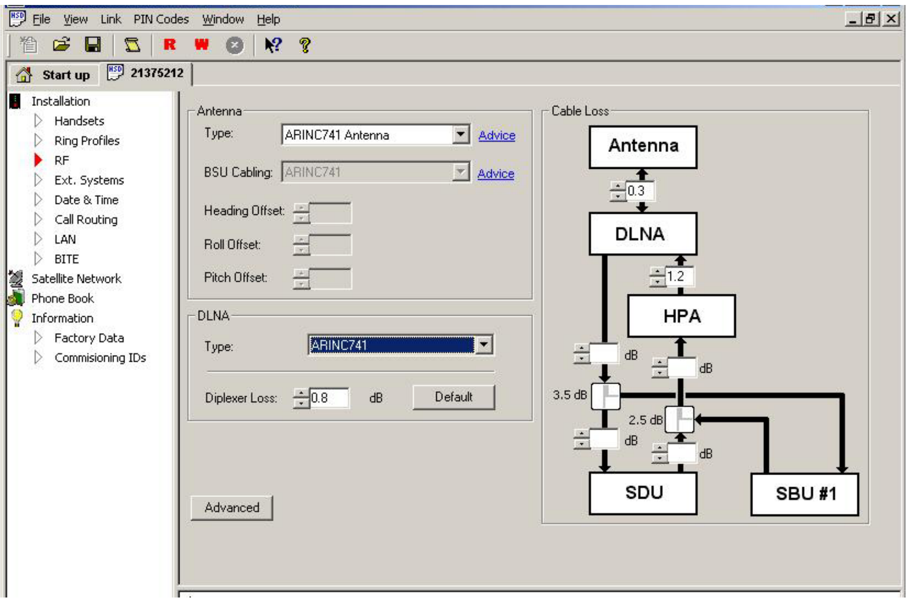


Figure C-6: Upgrading HSD+ to AVIATOR 700, SDU, step 4/7

C.3.5 Update the GES list with I-4 satellites

Add I-4 GESs on the page **Satellite Network**.

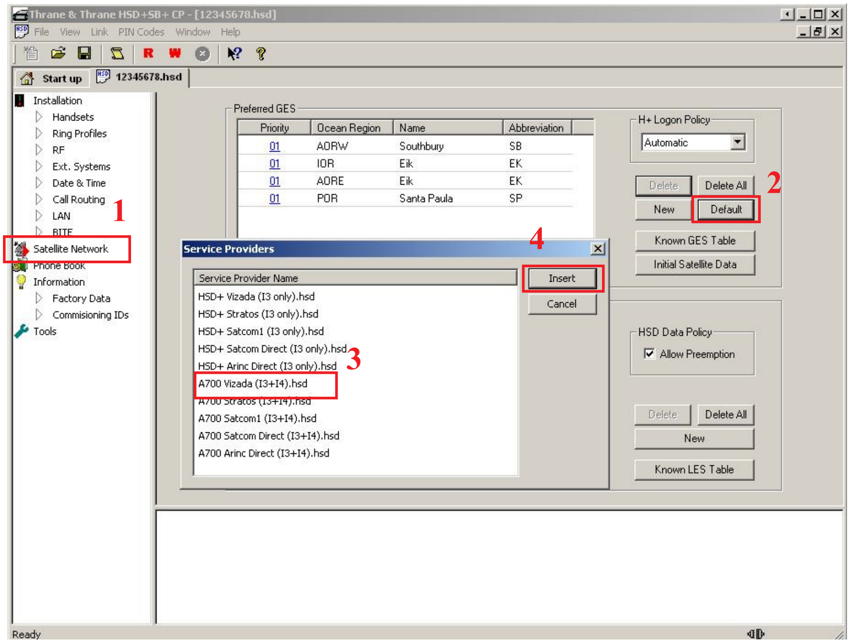


Figure C-7: Upgrading HSD+ to AVIATOR 700, SDU, step 5/7

C.3.6 Update the known GES list

1. Update the **Known GES Table** on the page **Satellite Network**.

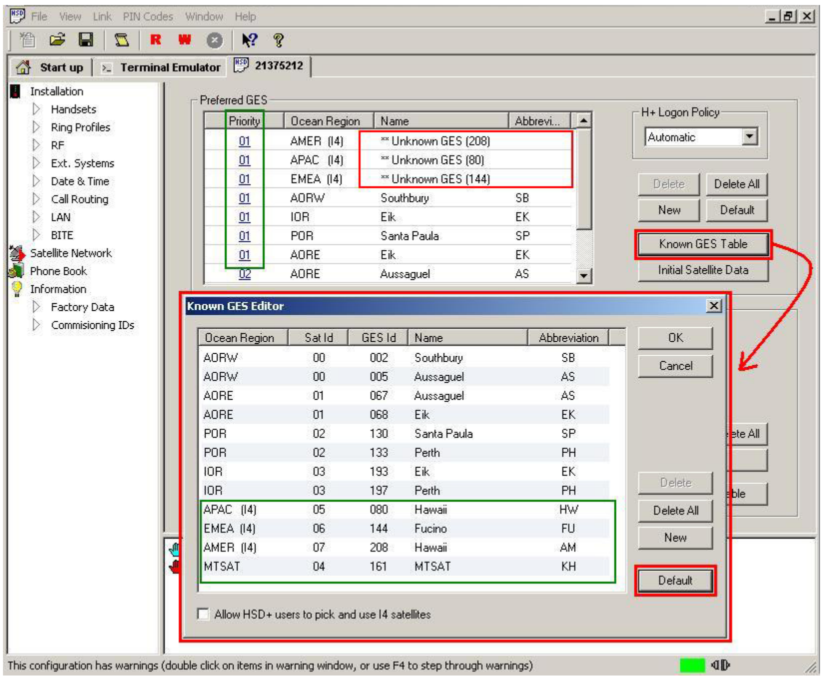


Figure C-8: Upgrading HSD+ to AVIATOR 700, SDU, step 6/7

C.3.7 Write the configuration to the SDU

Click the red button **W** to write the new configuration into the SDU.

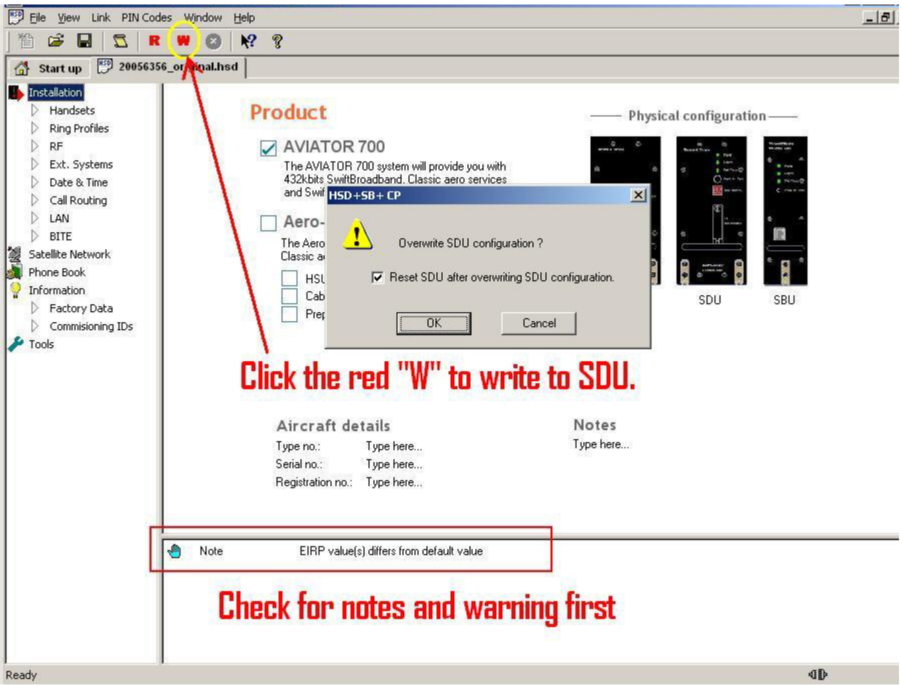


Figure C-9: Upgrading HSD$^+$ to AVIATOR 700, step 7/7

System messages

D.1 Types of messages

The AVIATOR 700 system announces messages in the4-Wire Handset and the MCDU display or in the built-in web interface of the SBU. In this appendix you find:

- H+ Cause Codes (information from I3 or I4 satellite)
- MPDS Cause Codes (from Swift64 coverage on I3)
- ISDN Cause Codes (SLCV, from Swift64 coverage on I3)
- List of BITE codes
- List of SBU events

Cause codes contain information from the satcom services or status information from the system to the user.

BITE codes contain information from the AVIATOR 700 system. This information is a result of a POST or PAST sequence or Continuous Monitoring performed by the Built-In Test Equipment.

D.2 Cause Codes

D.2.1 H+ Cause Codes (information from I3 or I4 satellite)

Logon Reject Cause Codes

Display Text	ID	Description	Guidance
ClassReject	0x88	Class rejected	The GES does not support this class.
GlobChanLoss	0x82	Global channel loss	Verify that there are no obstacles between the satellite and the AES antenna.
GlobCunavlb	0x09	Global C channel not available at GES	
ManualLogRej	0x89	Manual login rejected	Manual logon is not allowed when logon policy is automatic.
NetworkFail	0x03	Network Failure	
NoGesSignal	0x81	No GES signal	
NoInitData	0x86	No valid system table available	
NoSatSignal	0x80	No satellite signal	Verify that there are no obstacles between the satellite and the AES antenna.
NotAuthorizd	0x0F	AES not authorized	Verify that the ICAO address used is correct. Verify that the ICAO address is registered, by contacting the service provider.
OtherReason	0x0E	Other Reason	
OutsideCover	0x84	Outside spot beam coverage	The AES is not under a spot beam of the specified GES.
P/R/Tunavlb	0x07	Packet data channel unavailable	
PkdtaUnavlb	0x08	Packet data service unavailable	
SatHandover	0x8C	Satellite handover	
SDUfailure	0x8A	SDU failure	Check the current BITE errors.
SpotChanLoss	0x83	Spot channel loss	
TableFull	0x00	Table Full	

Table D-1: List of H+ Logon Reject Cause Codes

Display Text	ID	Description	Guidance
UserLogoff	0x87	User logoff	
VCC&dUnavlb	0x0A	Voice not available at GES	
VoiceUnavlb	0x01	Voice Unavailable	
WrongGES	0x85	GES not existing	Check GES ID validity.
WrongGESid	0x06	Wrong GES identifier	Check GES ID validity.
WrongParam	0x02	Wrong Parameter	
WrongSatID	0x05	Wrong Satellite identifier	Check satellite ID validity.

Table D-1: List of H^+ Logon Reject Cause Codes (Continued)

Call Reject Cause Codes

The SLCV codes refer to: S = coding Standard, L = cause Location, C = cause Class, V = cause Value.

Display text	Code				Description	Guidance
	S	L	C	V		
0 0 1 0	0	0	1	0	Normal clearing by called/calling party	
1 1 7 15	1	1	7	15	Undefined cause	
1 2 7 15	1	2	7	15	Undefined cause	
1 3 7 15	1	3	7	15	Undefined cause	
1 4 7 15	1	4	7	15	Undefined cause	
AddrComplete	1	3	0	1	Address complete signal sent to terrestrial network	
AddrComplete	1	6	0	1	Address complete signal received from terrestrial network	
AESabsent	1	3	7	3	Calling/called AES not logged-on to system	
AnalogFail	1	4	2	3	Analog data equipment not supported at GES	
AnalogRate	1	4	6	2	Analog data rate not supported by GES	
CallBarred	1	4	4	3	Called AES barred for incoming calls	

Table D-2: List of H^+ Call Reject Cause Codes

Display text	Code S	L	C	V	Description	Guidance
CallPreempt	1	1	1	1	Preemption by higher priority call at AES	The call is preempted, e.g. because you attempted to make an HSD call and HSD is barred in the FLEX configuration.
CardInvalid	1	3	6	1	Credit card type not supported by GES	
CardRejected	1	3	3	1	Credit card number rejected by GES	
DigitalFail	1	4	2	4	Digital data equipment not supported at GES	
DigitalRate	1	4	6	3	Digital data rate not supported by GES	
Handover	1	3	7	4	Spot beam handover	
InvalidAddr	1	2	3	2	Call Ann. / C-ch. Assign. not recd. from GES	
InvalidAddr	1	3	3	2	Incomplete called (AES) number	
InvalidAddr	1	4	3	2	Invalid called number format received from AES	
InvalidNumbr	0	4	1	12	Incomplete called number format from AES	
Network busy	1	2	5	1	C-channel continuity test failure at AES/ Connect acknowledge not received by AES	
Network busy	1	3	5	1	C-Channel continuity test failure at GES/AES not responding/ Incomplete call information received from AES/ Interruption in received AES carrier/ Connect acknowledge not received by GES	
NoAnswer	0	1	1	2	Expiry of answer time supervision at AES	
NoAnswer	0	4	1	2	Expiry of answer time supervision at the MSSC	

Table D-2: List of H^+ Call Reject Cause Codes (Continued)

Display text	Code S	L	C	V	Description	Guidance
`NoChanAvail`	1	3	2	1	C-channel frequency/power unavailable at GES	
`NoUnitAvail`	1	2	2	2	C-channel unit unavailable at AES	
`NoUnitAvail`	1	3	2	2	C-channel unit unavailable at GES	
`SatDestFail`	1	1	4	1	Called AES terminal not in service	
`ServiceType`	1	3	6	5	Service type not supported by GES	
`SwitchBusy`	0	2	2	10	GES equipment congestion	
`SwitchBusy`	0	4	2	10	GES equipment congestion/ No route to destination from GES/ Circuit to terrestrial network unavailable	
`UnassignedNo`	1	4	7	2	AES not authorized for service	
`Unauthorised`	1	3	4	2	Calling AES not authorized for service	
`UserBusy`	1	1	7	1	Called AES terminal busy	
`UserBusy`	1	3	7	1	Call reference number unavailable at GES	
`VoiceTypeErr`	1	2	6	4	Required voice channel characteristics not supported by AES	
`VoiceTypeErr`	1	3	6	4	Required voice channel characteristics not supported by GES	
`WrongNumber`	0	4	0	1	Unallocated called number received from AES	

Table D-2: List of H^+ Call Reject Cause Codes (Continued)

D.2.2 MPDS Cause Codes (from Swift64 coverage on I3)

Layer 2 Reason Codes

L2 Reason Number	Interpretation
690 (2B2)	Registration time-out
691 (2B3)	Service connection establishment time-out
692 (2B4)	Bearer time-out
693 (2B5)	Preempted by master unit
700	Reason Unspecified
701	L3 Release
702	L3 Deregister
703	L3 Reject
716	SAN Idle Timer Expiry
717	MAN Idle Timer Expiry
718	SAN Connect Timer
719	SAN Modify Timer
720	SAN Handover Timer
721	SAN Connection Timer
722	MAN Connection Timer
732	Insufficient operating system resources at MAN
733	Insufficient memory at MAN
748	Invalid L3 Call Ref in Establish SDU
749	Invalid L3 Call Ref in Modify SDU
764	Unsupported IPDS MAC version
765	Invalid Bearer Connection type in Establish SDU
766	Invalid Bearer Control type in Establish SDU
767	Invalid Bearer Connection ID in Establish SDU
768	Invalid Bearer Connection type in Modify SDU
769	Invalid Bearer Control type in Modify SDU
770	Invalid Bearer Connection ID in Modify SDU

Table D-3: List of MPDS Layer 2 Reason Codes

L2 Reason Number	Interpretation
771	Invalid Handover SDU
772	Invalid SDU type
773	SDU Incorrectly Formatted
780	Connection sub-layer protocol failure (MAN specific signalling)
781	Connection sub-layer protocol failure (HDLC signalling)
796	Control sub-layer protocol failure
812	Channel Unit failure
813	Hardware failure
814	MAN not responding to frequency corrections
815	MAN not responding to power corrections
816	MAN not responding to timing corrections
828	Internal SAN failure
829	SAN Shutting Down
844	Bearer Control - No satellite link
845	Bearer Control - No suitable contention slot
846	Bearer Control - Status Acknowledgement failure
847	Bearer Control - Incorrect SAN ID
860	No such MAN
861	Invalid L3 Call Reference

Table D-3: List of MPDS Layer 2 Reason Codes (Continued)

D.2.3 ISDN Cause Codes (SLCV, from Swift64 coverage on I3)

The SLCV codes refer to: S = Coding Standard, L = cause Location, C = cause Class, V = cause Value.

Code (Hex) S	L	C	V	Interpretation
1	0	0	1	MES is clearing the call as instructed by the relevant MES terminal equipment (i.e., normal clearing due to MES terminal “on-hook” etc.).
1	0	1	1	MES is rejecting the call because the specified MES terminal number is currently busy, and MES has not been authorized to divert calls which are addressed to that number.
1	0	1	2	MES is clearing the fixed-originated call because subsequent to the acceptance of the call and the signalling of the identity of the mobile terminal to which the call will actually be routed, that terminal has become busy and cannot be called.
1	0	2	1	MES is clearing the call because appropriate “off-hook” signalling has not been received from the addressed MES terminal (including any authorized diversions) within the allowed time limit.
1	0	8	1	MES is rejecting the call because the specified MES terminal number has not been installed, and MES has not been authorized to divert calls which are addressed to that number.
1	0	9	1	MES is rejecting the call because the specified MES terminal number is currently out-of-service, and MES has not been authorized to divert calls which are addressed to that number.
1	0	9	2	MES is clearing the fixed-originated call because subsequent to the acceptance of the call and the signalling of the identity of the mobile terminal to which the call will actually be routed, that terminal has become out-of-service and cannot be called.
1	1	4	3	MES is prematurely clearing the fixed-originated call which is in the process of being established because the MES user has initiated a call from a terminal which is authorized to automatically pre-empt an existing fixed-originated call.
1	1	4	4	MES is prematurely clearing the MES-originated call which is in the process of being established because the MES user has initiated a higher priority call.
1	1	4	5	MES is prematurely clearing the mobile-originated call which is in the process of being established because the MES user has initiated a call from a terminal which is authorized to automatically pre-empt an existing mobile-originated call.

Table D-4: List of ISDN Cause Codes (SLCV)

Code (Hex) S	L	C	V	Interpretation
1	1	4	6	MES is prematurely clearing the mobile-originated call which is in the process of being established because the MES user has abandoned the call (by placing the originating terminal “on-hook”).
1	1	D	1	LES is rejecting the call because the “Service Nature” and/or “Service Type” and/or “Channel parameter” information received from the MES is invalid (e.g., not currently defined in the SDM, mutually contradictory, or not applicable to a MES originated call).
1	1	D	2	LES is clearing the call because the “service address” information received from the MES is invalid (i.e., less than 2 digits).
1	1	D	3	LES is clearing the call because the “service address” information received from the MES is a 2-digit address which is either undefined or which is currently unavailable at this LES.
1	1	D	5	LES is clearing the call because the “service address” information received from the MES contains a country code which is regarded (by this LES) as invalid.
1	1	D	6	LES is clearing the call because the “PID” information received from the MES in the “scrambling vector” message (type 8D H) is not consistent with the PID information in the Fixed/MES Originated (PID) and PID/MES Registration Tables at the LES as it relates to this call.
1	2	0	2	(Spot Beam Handover): MES is ready to make the transition from the current beam to the next beam.
1	2	8	1	MES is rejecting the call because the MES is not equipped to provide the specified service.
1	2	9	1	MES is rejecting the call because although it is equipped to provide the specified service, it is not currently able to do so.
1	2	B	1	MES is rejecting or clearing the call for a reason which is not covered by any of the currently defined “Cause” events.
1	2	C	3	MES is clearing the call because a “LES Connect” message (type 8C H) has not been received by the MES within the allowed time limit.
1	2	C	4	MES is clearing the call because the “authentication query” ISU message (type B4 H) and/or the “authentication query” SSU message (type B5 H) have not been received by the MES within the allowed time limit.
1	2	C	5	MES is clearing the call because an expected supplementary services SU(s) has (have) not been received by the MES within the allowed time limit.

Table D-4: List of ISDN Cause Codes (SLCV) (Continued)

Code (Hex) S	L	C	V	Interpretation
1	2	C	6	MES is clearing the call because the “supplementary services interrogation” ISU (type B2 H), and/or “subscriber digits” SSU (type AD H) messages have not been received by the MES within the allowed time limit.
1	2	C	7	MES is clearing the call because a “SCPC channel release” SU (type 8A H) has not been received by the MES, in response to the transmission of a “notification acknowledge” message (type BA H) during the supplementary services call diversion information retrieval process, within the allowed time limit.
1	2	C	8	(Spot Beam Handover): MES is clearing the call session in the next beam because the MES did not detect the LESH carrier on the new frequency.
1	2	D	1	LES is rejecting the call because the “spot-beam ID” information received from the MES is invalid (i.e., ID is not allocated on satellite in use).
1	2	D	2	LES is clearing the call because the “Scrambling Vector” information received from the MES is invalid (i.e., 0000H, 6959H or 7FFFH).
1	3	6	2	MES is clearing the call because a long-term interruption in reception has occurred (the definition of a “long-term interruption” depends upon the service type, see Section B).
1	3	6	3	A Secondary Functional Centre of a Multi-channel MES is clearing the call because the Primary Functional centre has commanded the Above-decks equipment to re-point to a different Ocean Region. **Note:** The above text is specific to a Fleet system. However, for the AVIATOR 700 system this SLCV code is relevant when the H^+ sub-system is repointing the antenna from one ocean region to another. That will cause the Swift64 sub-system to be pre-empted with the SLCV 1363.
1	3	9	1	MES is clearing the call because the call has lasted more than 700 km in linear travelled distance.
1	3	9	2	MES is clearing the call because it has moved out of spot beam coverage.
1	3	9	3	MES in “cooperative mode” is clearing the call because of a pre-emption request from the master entity.
1	4	5	1	LES is rejecting the call because an appropriate terrestrial circuit is not currently available at this specific LES.
1	4	5	2	LES is rejecting the call because an appropriate channel unit and associated terrestrial circuit are not currently available at this LES. [This “cause” is only utilized when there is a permanent “one-to-one” connection between appropriate channel units and their terrestrial circuits].

Table D-4: List of ISDN Cause Codes (SLCV) (Continued)

Code (Hex) S	L	C	V	Interpretation
1	5	0	2	(Spot Beam Handover): LES is ready to make the transition from the current beam to the next beam and is clearing the call session in the current beam (normal clear).
1	5	5	1	LES is rejecting the call because an appropriate satellite channel is not currently available at this specific LES.
1	5	8	1	LES is rejecting the call because the requested service is not provided by this specific LES.
1	5	9	1	LES is rejecting the call because the requested service is temporarily not available at this specific LES.
1	5	A	1	LES is rejecting the call because the specified MES is not authorized for any service at this specific LES.
1	5	A	2	LES is rejecting the call because the specified MES is not authorized to use specific requested service via this specific LES.
1	5	A	3	LES is clearing the call because the “credit card data” information received from the MES has been rejected by the credit card authorization process.
1	5	A	4	LES is clearing the call because the data received from the MES in the “authentication reply” message (type B6 H) has been declared “invalid” by the LES authentication process.
1	5	A	5	LES is rejecting the call because the specified PID is not authorized for any service at this specific LES.
1	5	A	6	LES is rejecting the call because the specified PID is not authorized to use specific requested service via this specific LES.
1	5	A	7	LES is clearing the call because the service address received from the MES is not authorized for the requested priority.
1	5	B	1	LES is rejecting or clearing the call for a reason which is not covered by any of the currently defined “Cause” events.
1	5	C	1	LES is rejecting the call because an appropriate “Channel Assignment” message has not been received by the LES within the allowed time limit.
1	5	C	2	LES is clearing the call because the “service address” information has not been received by the LES within the allowed time limit.
1	5	C	3	LES is clearing the call because a “Scrambling Vector” message (type 8D H) has not been received by the LES within the allowed time limit.
1	5	C	4	LES is clearing the call because neither the “service address” information nor a “Scrambling Vector” message (type 8D H) has been received by the LES within the allowed time limit.

Table D-4: List of ISDN Cause Codes (SLCV) (Continued)

Code (Hex) S	L	C	V	Interpretation
1	5	C	7	LES is clearing the call because a “MES Connect” message (type 99 H) has not been received by the LES within the allowed time limit.
1	5	C	9	LES is clearing the call because a “authentication reply” message (type B6 H) has not been received by the LES within the allowed time limit.
1	5	C	A	LES is clearing the call because a “notification acknowledge” message (type BA H) has not been received by the LES within the allowed time limit.
1	5	C	B	LES is clearing the call because the request sequence number contained in the received “notification acknowledge” message (type BA) is not valid (i.e. either not ‘0’ or not the next value in the sequence).
1	5	C	C	(Spot Beam Handover): LES is terminating the procedure because it did not receive a response to the Handover Request from the NCS.
1	5	C	D	(Spot Beam Handover): LES is clearing the call session in the next beam because the MES did not indicate that it was ready to make the transition (possibly because the MES did not receive the Channel Assignment).
1	5	D	1	LES is rejecting the call because the “Channel Assignment” message received from the NCS contains inappropriate or conflicting information.
1	5	D	2	LES is clearing this MES ID and channel number in the busy lists at LES and NCS because a new call to/from this MES is being set-up (and thus any previous call to/from this MES must have cleared).
1	5	E	1	LES is attempting to clear an MES which has sent an SCPC channel release message but is found still to be transmitting 5.12 s later.
1	6	5	1	LES is rejecting the call because an appropriate channel unit is not currently available at this specific LES.
1	6	6	1	LES is clearing the call because of an interruption in reception of the MES carrier exceeding the allowed time limit.
1	6	C	2	LES is clearing the call because an appropriate SCPC MES carrier has not been received by the LES (at the commencement of the call) within the allowed time limit.
1	6	C	3	(Spot Beam Handover): LES is clearing the call session in the next beam because the LES did not detect the MESH carrier on the new frequency.
1	7	9	1	LES is clearing the call because of a malfunction in the authentication checking database or in the communications links thereto.
1	8	1	1	NCS is rejecting the call because the specified MES ID is in the “MES busy” list at the NCS.
1	8	1	2	NCS is rejecting the call because the specified MES is busy with an IPDS call at the NCS.

Table D-4: List of ISDN Cause Codes (SLCV) (Continued)

Code (Hex) S	L	C	V	Interpretation
1	8	1	3	NCS is rejecting the call because the specified MES is busy with an IPDS call at the NCS, and the call waiting notification was declined or timed out by the MES.
1	8	1	4	NCS is rejecting the call because the specified MES is busy with an IPDS call at the NCS, and call waiting notification is unavailable.
1	8	5	1	NCS is rejecting the call because an appropriate SCPC channel is not currently available.
1	8	5	2	NCS is rejecting the call because no SCPC channel exists at the NCS which matches the contents of the Channel Parameters, Service Nature, Service Type, MES Category, Spot Beam ID and Priority fields contained in the Request for Channel Assignment.
1	8	5	3	NCS is rejecting the call because no SCPC channel is currently available for the specified lease marked MES.
1	8	5	4	NCS is rejecting the call because the MES is outside the spot beam coverage area.
1	8	5	5	NCS is rejecting the call because an appropriate SCPC channel is not currently available and channel pre-emption failed.
1	8	5	6	NCS is rejecting the call because the requested spot beam indicates failed spot beam selection (“FF”) and an appropriate global SCPC channel is not currently available.
1	8	5	7	(Spot Beam Handover) NCS is rejecting the Handover Request because an appropriate SCPC channel is not available in the next beam.
1	8	A	1	NCS is rejecting the call because the specified MES ID was not found in the “Forward and Return MES ID” cross-reference table.
1	8	A	2	NCS is rejecting the call because the specified MES is not authorized for any service (except for Distress calls) at the NCS.
1	8	A	3	NCS is rejecting the call because the specified LES is not authorized for the requested service at the NCS.
1	8	B	1	NCS is rejecting or clearing the call for a reason which is not covered by any of the currently defined “Cause” events.
1	8	B	2	NCS is rejecting the call because the requested service variant is invalid.
1	8	C	1	NCS is rejecting the call because no message was received from the specified MES (in reaction to a Call Announcement message) within the allowed time limit.
1	8	C	3	NCS is rejecting the call because the specified MES was busy and the MES pre-emption failed (i.e. no response within the allowed time limit).

Table D-4: List of ISDN Cause Codes (SLCV) (Continued)

Code (Hex) S	L	C	V	Interpretation
1	8	D	1	NCS is rejecting the call because the Request for Call Announcement or Request for Channel Assignment contains invalid or inappropriate information.
1	8	E	1	NCS is rejecting the call because the specified MES ID is in the “MES busy” list at the NCS, and is listed as being busy with a call through the same LES as that now requesting a “call announcement” addressed to that MES.
1	8	E	2	NCS is rejecting the call because the specified MES is busy with an IPDS call through the same LES which is requesting the call announcement.
1	8	E	4	NCS is rejecting the call because the specified MES is busy with an IPDS call through the same LES which is requesting the call announcement, and the call waiting notification was declined or timed out by the MES.
1	8	E	5	NCS is rejecting the call because the specified MES is busy with an IPDS call through the same LES which is requesting the call announcement, and call waiting notification is unavailable.
1	F	0	1	LES is clearing the call because of the receipt of “on-hook” signalling from the relevant terrestrial circuit (i.e., normal clearing).
1	F	1	1	LES is clearing the call because the terrestrial called party is engaged (busy).
1	F	2	1	LES is clearing the call because appropriate “off-hook” signalling from the terrestrial called party has not been received by the LES within the allowed time limit.
1	F	6	1	LES is clearing the call because of the detection of a failure in the relevant terrestrial circuit.
1	F	6	2	The LES is clearing the call because the terrestrial calling party or the terrestrial network has cleared the call before the “MES connect” message has been received by the LES.

Table D-4: List of ISDN Cause Codes (SLCV) (Continued)

D.3 BITE Error codes

D.3.1 Definition of severity levels

Severity	Definition
Fatal	Total loss of service – Ongoing calls are terminated and no further calls are allowed.
Essential	Partial loss of service, action taken to isolate the fault – some services / calls may work.
Non-E	Non-Essential, no action taken, not displayed in handset – only stored in BITE log.

Table D-5: Definition of severity levels for BITE codes

The 4-Wire Handset, the MCDU display and the SDU BITE display show Fatal and Essential faults when possible.

Access to the full BITE log is only possible through the SDU Maintenance front connector. The BITE log is included in the service log.

There are two BITE codes coming from the SBU. To see more details on errors and warnings coming from the SBU you must use the built-in web interface of the SBU. It provides access to the event list using the SBU Maintenance front connector.

D.3.2 List of BITE codes

Code (Hex)	LRU	Description	Severity
A501	HGA	Fatal Antenna Failure	Fatal
A502	HGA	Essential Antenna Failure	Essential
A503	HGA	Antenna Warning	Non-E.
AA01	HGA	High Gain Antenna (Label 350 Bit 11)	Essential
AC01	ACU	Communication ACU-HPA	Essential
AC02	ACU	Communication HPA-ACU	Essential
AC03	ACU	Any Internal Parameter (Label 350 Bit 18)	Essential
AC04	ACU	Cross-talk Input	Non-E.
AC05	ACU	Control Bus Input (Label 350 Bit 13)	Non-E.
AC06	ACU	Internal RAM	Non-E.
AC07	ACU	Internal ROM	Non-E.
AC08	ACU	Internal Power Supply	Non-E.
AC09	ACU	Temperature	Non-E.
AC10	ACU	Parity Errors on ARINC429 Link	Non-E.
AL01	LNA	LNA/Diplexer	Essential
AP01	HPR	High Power Relay	Essential
C502	Cable	SDU-DLNA RF RX Cable broken	Essential
C503	Cable	SDU-DLNA RF RX Cable shorted	Essential
C601	Cable	SDU - HPA Cable Test	Fatal
C705	Cable	Communication Test with HGA-7000 Antenna	Fatal
C801	Cable	Communication Test with HPA	Fatal
C802	Cable	No GPS Signal to GPS Module	Fatal
C957	HPA	HPA Communication with PSM Module	Fatal
CA30	CM	Invalid ICAO Number	Fatal
CE01	SDU	The H+ board certification level is inconsistent	Fatal
CE02	SDU	The SDU unit certification level is inconsistent	Essential
CE03	HPA	The HPA unit certification level is inconsistent	Fatal

Table D-6: List of BITE codes

Code (Hex)	LRU	Description	Severity
CE04	SDU	The HSD/HSU unit certification level is inconsistent	Essential
CE05	SBU	The SBU unit certification level is inconsistent	Essential
CE06	SDU, HPA	The certification level between SDU and HPA is inconsistent	Fatal
CE07	SDU	The H+ boot code cannot find the OTP cert. HW tag	Fatal
CE08	System	The certification level between H+ and HSD, HSU or SBU is inconsistent	Essential
CE09	SDU	The HSD boot code cannot find the OTP cert. HW tag	Essential
E108	CM	Configuration Module Fitted Test	Fatal
H201	HPA	HPA Software Integrity	Fatal
H202	HPA	HPA Communication with Main Module EEPROM	Fatal
H203	HPA	HPA Essential Data Integrity	Fatal
H204	HPA	HPA Non-Essential Data Integrity	Non-E.
H401	HPA	HPA Communication with Main Module UART	Fatal
H502	HPA	HPA Communication with RFHP Module	Fatal
H701	HPA	HPA FPGA Version Conflict	Fatal
H803	HPA	HPA Gain Adjustment Limit	Fatal
H804	HPA	HPA Frequency Calibration	Fatal
H901	HPA	HPA Communication Failure	Fatal
HP01	HPA	HPA Thermal Safe Operational Limits	Fatal
HP02	HPA	RF power limit exceeded	Fatal
HP11	HPA	ARINC 429 Interface Voltage (-12 VD)	Fatal
HP13	HPA	HPA Internal Voltage (+5V1A)	Fatal
HP14	HPA	ARINC 429 Interface Voltage (+12 VD)	Fatal
HP15	HPA	HPA HGA-7000 Supply Voltage (+26 VA)	Fatal
HP17	HPA	HPA RFHP Module Voltage (+26 VC)	Fatal
HPF1	HPA	HPA Forced Cooling (FAN1, FAN2 and FAN3)	Essential
L101	DLNA	DLNA Current too high	Essential
L102	DLNA	DLNA Current too low	Essential
U402	SDU	HPLUS Files Existing Test	Fatal

Table D-6: List of BITE codes (Continued)

Code (Hex)	LRU	Description	Severity
U403	SDU	HPLUS Files CRC Test	Essential
U405	SDU	HPLUS Software Versions Inconsistency Test	Essential
U901	Cable	IRS/AHRS 1 Failure	Non-E.
U902	Cable	IRS/AHRS 2 Failure	Non-E.
U908	Cable	IRS/AHRS/GPS Data Invalid	Fatal
U915	SDU	SDU needs SW update to support HPA	Fatal
UA01	SDU	BITE Display Interface Data Loop Test	Non-E.
UC00	SDU	5.Lo Lock Detector Test	Essential
UC0G	SDU	5.Lo Lock Failure	Essential
UC0P	SDU	Interface to C-FDM DSP Channel 1 Test	Essential
UC0Q	SDU	Interface to TIF DSP Channel 1 Test	Essential
UC10	SDU	6.Lo Lock Detector Test	Essential
UC1G	SDU	6.Lo Lock Failure	Essential
UC1P	SDU	Interface to C-FDM DSP Channel 2 Test	Essential
UC1Q	SDU	Interface to TIF DSP Channel 2 Test	Essential
UC1R	SDU	SDU needs SW update (C-Channel)	Essential
UE01	SDU	HSD Rx Cable Test	Non-E.
UF01	SDU	1.Lo Lock Detector Test	Fatal
UF02	SDU	2.Lo Lock Detector Test	Fatal
UF03	SDU	3.Lo Lock Detector Test	Fatal
UF04	SDU	4.Lo Lock Detector Test	Fatal
UF30	SDU	RT Channel ALC Test	Fatal
UF51	SDU	1.Lo Lock Failure	Essential
UF52	SDU	2.Lo Lock Failure	Essential
UF53	SDU	3.Lo Lock Failure	Essential
UF54	SDU	4.Lo Lock Failure	Essential
UF71	SDU	GPS Communication Test	Fatal
UH01	SDU	1.LO Low Lock Detector Test	Essential
UH02	SDU	2.LO Low Lock Detector Test	Essential

Table D-6: List of BITE codes (Continued)

Code (Hex)	LRU	Description	Severity
UH03	SDU	3.LO Low Lock Detector Test	Essential
UH04	SDU	1.LO High Lock Detector Test	Essential
UH05	SDU	2.LO High Lock Detector Test	Essential
UH06	SDU	3.LO High Lock Detector Test	Essential
UH11	SDU	1.LO Minimum Frequency Test	Essential
UH12	SDU	2.LO Minimum Frequency Test	Essential
UH13	SDU	3.LO Minimum Frequency Test	Essential
UH18	SDU	1.LO Lock Time Test	Essential
UH19	SDU	2.LO Lock Time Test	Essential
UH20	SDU	3.LO Lock Time Test	Essential
UH21	SDU	1.LO Maximum Frequency Test	Essential
UH22	SDU	2.LO Maximum Frequency Test	Essential
UH23	SDU	3.LO Maximum Frequency Test	Essential
UH24	SDU	1.LO DDS Divider Test	Essential
UH25	SDU	3.LO DDS Divider Test	Essential
UH30	SDU	ALC Carrier off Test	Essential
UH31	SDU	ALC Carrier on Test	Essential
UH32	SDU	RF BER Loop Back Test	Essential
UH33	SDU	Average Amplitude Test	Non-E.
UH35	SDU	Step Attenuator Test	Non-E.
UH3B	SDU	Rx Tx frequency offset to big Test	Essential
UH3D	SDU	Loop Back Switch Test	Essential
UH51	SDU	1.LO Lock Failure	Essential
UH52	SDU	2.LO Lock Failure	Essential
UH53	SDU	3.LO Lock Failure	Essential
UH61	SDU	ALC Level to Low Test	Essential
UH62	SDU	ALC Level to High Test	Essential
UH63	SDU	Master Oscillator to low	Essential
UH64	SDU	Master Oscillator to high	Essential

Table D-6: List of BITE codes (Continued)

Code (Hex)	LRU	Description	Severity
UH70	SDU	Communication problem with H+ system	Essential
UH78	SDU	Position Unavailable	Essential
UH79	SDU	Velocity Unavailable	Essential
UH7D	SDU	Software Versions Consistency Test	Non-E.
UH7F	SDU	ATE pins connected. The ATE pins should not be connected, as they are only for test purposes.	Non-E.
UH7G	SDU	ATE pins connected. The ATE pins should not be connected, as they are only for test purposes.	Non-E.
UH82	SDU	Parameter Block Checksum Test HSD	Essential
UH83	SDU	CPU Application CRC Test	Essential
UH84	SDU	CPU RAM Test	Essential
UH85	SDU	Battery Check Test HSD	Non-E.
UH87	SDU	All Files Exist in Flash Test	Essential
UH88	SDU	Flash Files CRC Test	Essential
UH89	SDU	SDU needs SW update (HSD)	Essential
UH91	SDU	DSP Debug Port Test	Non-E.
UH95	SDU	Frame DSP Interface Test	Essential
UH96	SDU	Turbo FPGA Interface Failure	Essential
UH97	SDU	Frame DSP to VFC DSP interface	Essential
UH98	SDU	VFC DSP Interface Test	Essential
UHA1	SDU	Burst Duration Monitor Circuit Test	Non-E.
UHA4	SDU	TDM Burst Duration Test	Essential
UHA5	SDU	Carrier On Signals Test	Essential
UHA6	SDU	Turbo FPGA Load Test	Essential
UHA7	SDU	ISDN Transceiver Interface Test	Essential
UHA8	SDU	ISDN Supply Voltage Test	Essential
UHA9	SDU	ISDN Rx Voltage Test	Essential
UHAA	SDU	Turbo FPGA RAM Test	Essential
UHAB	SDU	Power Fail sensor false alarm	Essential

Table D-6: List of BITE codes (Continued)

Code (Hex)	LRU	Description	Severity
UHAC	SDU	ISDN 38 V shorted. The current limit on the 38V power output has been exceeded and the output power has therefore been turned off. Remove the device(s) connected and restart the system.	Essential
UHB0	SDU	Environment temperature to low	Non-E.
UHB1	SDU	Temperature Sensor Test	Non-E.
UHEE	SDU	EEPROM Essential Data Test	Essential
UHEU	SDU	EEPROM Test	Non-E.
UHP0	SDU	Communication Test with HSD-CPU	Essential
UHW2	SDU	Master Oscillator needs calibration	Non-E.
UU02	SDU	Parameter Block Checksum Test	Essential
UU10	SDU	PRT DSP Interface Test	Essential
UU16	SDU	UART Loop Back, CPDF (COM12) Test	Essential
UU19	SDU	SDU needs SW update (H^+)	Essential
UU1C	SDU	Temperature Sensor Test	Non-E.
UU1D	SDU	Environment Temperature Failure, H-Plus	Fatal
UU20	SDU	H^+ EEPROM Non Essential Data Test	Non-E.
UU21	SDU	H^+ EEPROM Essential Data Test	Fatal
UU23	SDU	H^+/HSD SW Version Inconsistency Test	Essential
UU24	SBU	H+/SBU SW Version Inconsistency Test	Essential
UU60	SDU	PBX DSP Interface Test	Essential
UU6H	SDU	Communication Problem with HSD CPU, H^+ Detected	Essential
UU6K	Cable	Calibration problem with HSU TX cable	Essential
UU6L	SBU	Essential error in SBU	Essential
UU6M	SBU	Non-essential error in SBU	Non-E.
UU6S	SBU	Communication Problem with H+/SBU CPU, H+ Detected	Essential
UUB1	SDU	Battery Check Test	Non-E.
UUC0	CM	System Configuration Test	Fatal
UUC1	CM	CM CRC Error	Essential

Table D-6: List of BITE codes (Continued)

Code (Hex)	LRU	Description	Severity
UUC2	CM	Config Module Needs Upgrade	Essential
UUCU	CM	Configuration Module Test	Fatal

Table D-6: List of BITE codes (Continued)

D.4 List of SBU events

The following list explains the events that may show in the web interface of the SBU.

Event ID	ID range	Severity	Description	Explanation	Remedy
0100	00100 to 00199	ERROR	System data damaged	Important system data is damaged	Do not use the terminal. Contact your Thrane & Thrane partner.
0210	00210 to 00219	ERROR	SIM module error	The SIM interface on the terminal cannot be used.	Contact your Thrane & Thrane partner.
0240	00240 to 00249	ERROR	Temperature sensor error	The terminal is in danger of overheating.	Do not use the terminal. Contact your Thrane & Thrane partner.
0260	00260 to 00269	ERROR	System error	The terminal cannot communicate on the satellite network.	Contact your Thrane & Thrane partner.
0300	00300 to 00309	ERROR	GPS module error	The GPS module is out of function. The terminal cannot obtain a valid GPS position.	Contact your Thrane & Thrane partner.
0310	0310	ERROR	WLAN module error	The WLAN access point failed initialization	Contact your Thrane & Thrane partner if the problem persists.
0330	00330 to 00339	ERROR	ISDN failure	The ISDN interface on the terminal cannot be used.	Contact your Thrane & Thrane partner.
0340	00340 to 00349	ERROR	2-wire failure	The Phone/Fax interface of the terminal cannot be used.	Contact your Thrane & Thrane partner.
0350	00350 to 00359	ERROR	AD9864 calibration data error	Internal error in the receiving part of the terminal.	Contact your Thrane & Thrane partner if the problem persists.
0380	0380	ERROR	SNMP agent initialization failed	The SNMP agent failed initialization	Contact your Thrane & Thrane partner if the problem persists.
1010	01010 to 01019	WARNING	Temperature too low (critical)	Low ambient temperature is causing the performance of the terminal to be degraded or halted.	Move the terminal to a warmer location. For information on ambient temperature limits, see the installation manual.
1020	01020 to 01029	WARNING	Too low temperature warning	Low ambient temperature is causing the performance of the terminal to be degraded or halted. The terminal will assume radio silence if the problem is in the HLD.	Move the terminal to a warmer location. For information on ambient temperature limits, see the installation manual.

Table D-7: SBU events

Event ID	ID range	Severity	Description	Explanation	Remedy
1110	01110 to 01119	WARNING	Temperature too high (critical)	Terminal: Critically high temperature is causing the terminal to shut down. HLD: Critically high temperature is causing the HLD to stop transmission.	If possible, move the failing unit to a cooler location. For information on ambient temperature limits, see the installation manual. Contact your Thrane & Thrane partner if the problem persists.
1120	01120 to 01129	WARNING	Too high temperature warning	High ambient temperature is causing the performance of the terminal to be degraded or halted. If the problem is in the terminal: All PoE ports are shut down, except port 1 and the bit rate for Standard data is reduced. If the problem is in the HLD: The bit rate is reduced.	Move the terminal to a cooler location. For information on ambient temperature limits, see the installation manual.
1400	01400 to 01409	WARNING	Satellite signal lost	The AVIATOR system no longer receives a signal from the satellite.	Make sure the antenna has a free line of sight to the satellite. Check the Rx cables W2 between the SBU and the HLD and W3 between the satcom antenna and the HLD.
1600	01600 to 01609	WARNING	SOS call only	The SIM card is not accepted by the network. Only emergency calls are allowed.	Enter the PIN and wait for network approval. If the problem persists, contact your Airtime Provider.
1700	01700 to 01709	WARNING	Registration for voice failed	The AVIATOR system has not yet been allowed to register for voice services (Circuit Switched).	Contact your Thrane & Thrane partner if the problem persists.
1800	01800 to 01809	WARNING	Registration for data failed	The AVIATOR system has not yet been allowed to register for data services (Packet Switched).	Contact your Thrane & Thrane partner if the problem persists.

Table D-7: SBU events (Continued)

Event ID	ID range	Severity	Description	Explanation	Remedy
2000	02000 to 02009	WARNING	Satellite signal weak	The signal from the satellite is weak.	Check the line of sight to the satellite. Check in the web interface under SETTINGS > Satellite selection that you have selected Auto, or a satellite covering your current position.
2700	2700	WARNING	Errorlog full	A great deal of system errors has been recorded in the systems error log and has to be reported.	The unit might still be operational but a system diagnostic report has to be initiated and reported for inspection.
2900	02900 to 02909	WARNING	Network failed authentication	The AVIATOR system does not accept the network as a valid BGAN network.	Restart the AVIATOR system. Contact your Thrane & Thrane partner if the problem persists.
3500	3500	ERROR	2-wire calibration failure	2-wire calibration failed on the Phone/Fax interface, because of: Common mode balance error. The phone is off hook. Wires are shorted to each other or shorted to ground.	Check the wires to your phone or fax. Put the phone on hook. Check the wires.
3600	03600 to 03609	ERROR	2-wire operational failure	The Phone/Fax interface fails to operate, for one of the following reasons: Ground shorted. Power overload. Temperature overload.	Check the wires. Wait until the event is cleared; then try again. Wait until the event is cleared; then try again.
3900	3900	ERROR	Air link error	Problems related to TX and Rx DSPs. Example: PLL out of lock.	Contact your Thrane & Thrane partner
801F	801F	WARNING	Power Hold-up - the input voltage has dropped	A power glitch was detected, the length of the glitch exceeds what the power supply can absorb. This event could have negative influence on ongoing connections.	Check external power connection.

Table D-7: SBU events (Continued)

Event ID	ID range	Severity	Description	Explanation	Remedy
8041	8041	ERROR	Flex key is missing or corrupt	The license system has detected a corrupt or missing Flex Key.	Re-install your Flex key. Please find your Flex key on the Certificate of Conformity (CoC) of the TT-5040A-001 Configuration Module.
8042	8042	ERROR	Can not read from Configuration Module	This error occurs when the TT-5040A-001 Configuration Module has not been inserted into the back of the TT-5040A SBU.	Insert the TT-5040A-001 Configuration Module into the back of the TT-5040A SBU.
8043	8043	ERROR	Flash on Configuration Module corrupt	The AVIATOR system has detected corrupt data on the TT-5040A-001 Configuration Module.	Please contact your Thrane & Thrane partner for further assistance.
8044	8044	ERROR	Flash on Configuration Module is getting worn out	The Configuration Module is aging and will have less that 10% of the expected lifetime left.	The Configuration Module still works but has to be replaceable in a timely manner
804A	804A	WARNING	Flash on Configuration Module is worn out	The Configuration Module is completely worn-out and will have to be replaced.	The Configuration Module might still be operational but can fail at any time since the expected lifetime has been exceeded.
804F	804F	WARNING	ARINC-429 Navigational Input from AHRS or IRS is missing or not yet ready	None of the navigational inputs receive valid data for one of the following reasons: Wiring is broken. The navigational source is not switched on or power-on sequence takes longer time than expected.	Check the wiring. Wait until power-on sequence has completed for the external navigational data source. Check if the external unit has been configured properly.
8053	8053	ERROR	SDU Communica-tion error	The communication between the SBU (TT5040A) and SDU (TT5035A is not working. This error applies to AVIATOR 700 systems only.	Check that the RS-422 connection between SBU and SDU is made correct. Check that the SDU has the correct SW and power up. Check that the SDU is configured to an AVIATOR 700 system.

Table D-7: SBU events (Continued)

Event ID	ID range	Severity	Description	Explanation	Remedy
8056	08056	WARNING	USIM rejected	The type of USIM card inserted in the terminal is not correct for your terminal.	Make sure you have the correct type of USIM card.
8075	08075	ERROR	DO-178B or DO-254 certification level is inconsistent	The system consists of mixed Level-E and Level-D units.	The system is not operational. Contact your Thrane & Thrane partner.

Table D-7: SBU events (Continued)

WLAN country codes

E.1 Restrictions in WLAN use

Not all countries allow full use of all channels. Also, some countries do not allow operation according to the 802.11g standard. Therefore the WLAN interface must be set up to the right country code.

By default, the SBU is set up to the US country code that allows the WLAN interface to operate according to the 802.11b and 802.11g standards on the channels 1 to 11. If the equipment is used in the countries listed in Table E-1 on page E-2, the default country code “US” can be used. In other countries the country code “other countries” must be used, allowing the interface to operate only according to the 802.11b standard on channels 4-9.

To set up the country code, use the WLAN page of the built-in web interface in the SBU. For further information see ***WLAN interface of the SBU*** on page 6-31.

E.2 Countries where the “US” country code applies

The below table shows the countries in which country code “US” applies.

Antigua and Barbuda	Estonia	Latvia	Singapore
Aruba	El Salvador	Kuwait	Saudi Arabia
Australia	EU Countries	Latin America	Serbia and Montenegro
Austria	Finland	Liechtenstein	Slovenia
Bahamas	France	Luxembourg	South Africa
Barbados	Germany	Malaysia	South Korea
Belgium	Greece	Malta	Spain
Bermuda	Guam	Mexico	Sweden
Bulgaria	Guatemala	Morocco	Switzerland
Canada	Haiti	Netherlands	Taiwan
Cayman Islands	Honduras	Netherlands Antilles	Thailand
China	Hong Kong	New Zealand	Turkey
Colombia	Hungary	Norway	UK
Costa Rica	Iceland	Oman	Ukraine
Cyprus	Indonesia	Peru	United Arab Emirates
Czech Republic	Ireland	Poland	US
Denmark	Israel	Portugal	Venezuela
Dominican Republic	Italy	Puerto Rico	Virgin Islands / British
Ecuador	Japan	Romania	Virgin Islands / US
Egypt	Jordan	Russia	XA[a]

Table E-1: Countries that accept the country code “US” for WLAN indoor operation

a. The two letter code XA is available for individual use and will not be allocated to countries. (ISO 3166-1, Codes for the representation of names of countries and their subdivisions – Part 1: Country codes)

Appendix F

Using terminal commands

F.1 Getting started

F.1.1 Connecting to the SDU

Hardware and software requirements

The following items are required to run terminal commands:

- One IBM compatible PC with a 9-pin serial COM port available (or a 25-pin serial COM port with a 25-to-9 converter attached).
- One serial interconnect cable 9-pin to 15-pin Sub-D, Thrane & Thrane part no. TT-37-112940. Refer to **Figure 5-35: TT 37-112940 maintenance cable for front connector on SDU and PC**.
- The terminal emulator included in the Aero-SDU Configuration Program or another terminal program, e.g. Windows HyperTerminal.

Preparing the terminal

Do as follows to set up the terminal:

1. Connect the SDU front connector to the PC COM port using the TT 37-112940 Data Cable.
2. Open the Aero-SDU Configuration Program. (Other terminal programs: Set the terminal program to 115200 baud, No parity, 8 bit symbols)
3. On the Start up page click **Terminal Emulator**. Press <Enter> a couple of times and confirm that the prompt “H+>” appears on the terminal monitor.
4. **Option:** If you need to communicate with another unit in the installation you can change the shell. Press **Ctrl+x**, then type in the number of the desired unit and press enter.

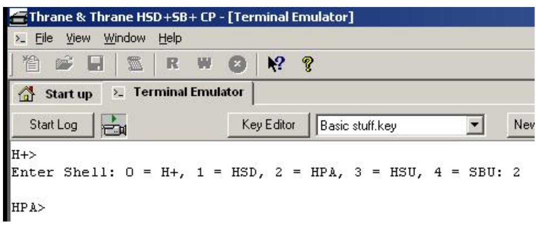


Figure F-1: How to change shells

F.1.2 Connecting to the SBU

Hardware and software requirements

The following items are required to run terminal commands:

- One IBM compatible PC with an Ethernet port available.
- One standard Ethernet cable. RJ-45<->RJ-45.
- A suitable Telnet client. In Windows XP and previous versions of Windows, you can use the included HyperTerminal. In Windows Vista and Windows 7 you can use the included DOS-based client, but this is not optimal. A 3rd party client that supports logging to a file is recommended.

Preparing the telnet client

Do as follows to set up the telnet client:

1. Connect the SBU front connector to the PC Ethernet port.
2. Open the Telnet client, and make a TCP/IP (winsock) connection to IP address (host) 192.168.0.1 and port 23 (default).
3. Login with **admin** and 1234 (default) and press <Enter> a couple of times and confirm that the SBU prompt **telnet:/$** appears.

Option: If you need to save the output from HyperTerminal, go to the **Transfer** menu and select **Capture text...** In other clients, the menus will be different.

F.2 Commands for troubleshooting the SDU

Introduction

In this section, some of the useful commands for troubleshooting are listed.

BITE List (“list” command)

To get a list of BITE errors, use the **list** command.

The following options are available with the list command:

Command to Type in (Followed by <Enter>)	Result/Explanation
`list`	Lists all errors for the current flight session.
`list a`	Lists all errors for all flight sessions.
`list <leg>`	Lists all errors for flight session number: leg[a].
`list <id> a`	Lists errors with error id: id, for all flight sessions.
`list <id><leg>`	Lists errors with error id: id, for flight session number: leg[a].

Table F-1: “list” Commands

a. In this context, a leg is defined as a session, that is the time from the system was turned on until it is turned off.

Response example:

The following example shows a response to the command “`list`”, that is a list of all errors for the current session. “Session number” corresponds to <leg>
“Error ID” corresponds to <id>, which is the BITE code for the error.

```
H+> list
H+>
LOGFILEMANAGER:Displaying contents of session 11
-------------------------------
Session number: 11  Severity: Fatal              Active
Error ID: C801-Communication Test with HPA
Error occurrence: 001            Found during:  CM
Additional Information: '      ' Location: Cabling
First error: 09:40:14-27/08  Last error: 09:40:14-27/08
```

System Log (“slog” command)

To access the system log, use the **slog** command. The following options are available with the slog command:

Command to Type in (Followed by <Enter>)	Result/Explanation
slog l <prio>...	Inserts text into the system log with priority <prio>[a].
slog t	Shows the priority thresholds.
slog tp <prio>	Sets the print threshold. Log entries with priority <prio>[a] or higher will be printed.
slog ts <prio>	Sets the store threshold. Log entries with priority <prio>[a] or higher will be stored.
slog v[arl] [-p<prio>] [-t<text>] [<count>]	Shows the system log as defined by the parameters. Explanation of parameters: a : All entries r : Reverse order l : Long time format (toggles between long/short time format) (sticky[b]) <prio>: [a] (See table footnote) <text>: Only entries containing <text> <count>: Max. number of entries shown (sticky[b])
slog R	Reset system log.

Table F-2: “slog” Commands

a. <prio> : Priority limit (one of {facewnid} or 0-7).
The priority parameters {facewnid} are defined as:
f: System is unusable.
a: Action must be taken immediately.
c: Critical conditions.
e: Error conditions.
w: Warning conditions.
n: Normal but significant condition.
i: Informational.
d: Debug-level messages.

b. “Sticky” means this setting is maintained during future command sessions until the setting is changed by the user.

Response example:

The following example shows a part of a response to the command “`slog va`”:

```
H+> slog va

H+>

    Time       Severity  Process   Info

09:15:05.661 WARNING:LogServe:0:System log invalid - reset

09:15:05.663 WARNING:LogServe:0:System log options invalid - reset

09:14:53.005 NOTICE:    Boot:0:Starting up

09:14:54.523 ERROR:  SATMGR:0:System table checksum failed

09:14:54.525 ERROR:Nav_Main:0:Static RAM failure!!

09:14:55.057 WARNING:FlashDis:0:PIT 1ms tick: Interrupts disabled
too long: 531058 us.

09:14:55.505 WARNING:FlashDis:0:PIT 1ms tick: Interrupts disabled
too long: 505840 us.
```

Call Log (“call_log” command)

To access the call log, use the **call_log** command.

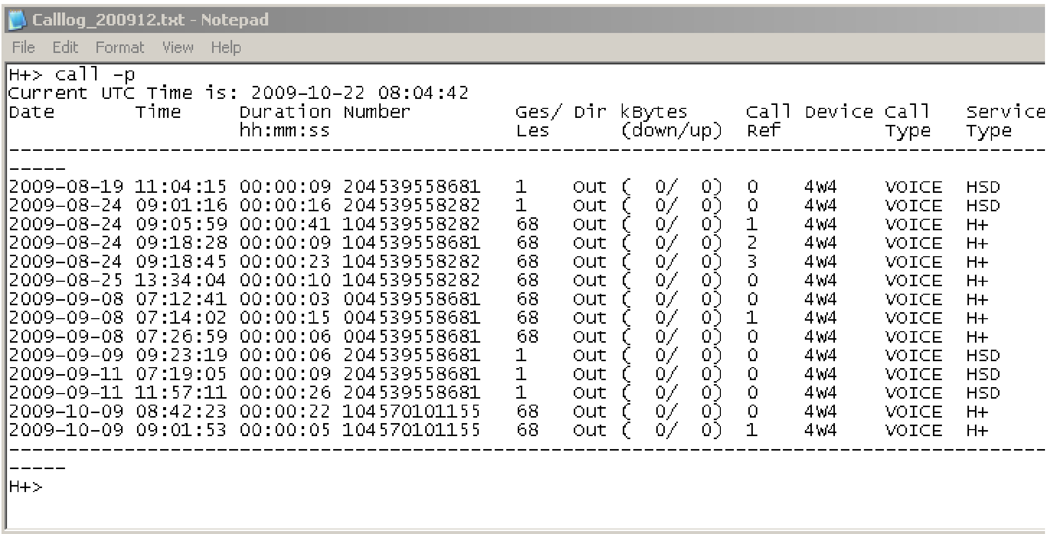
The following options are available with the call_log command:

Command to Type in (Followed by <Enter>)	Result/Explanation
`call_log -p`	Prints the call log.
`call_log -i <number> <device>`	Inserts a call into the call log, with the given phone number and device number.
`call_log -g <device>`	Returns the last call in the call log from the given device.
`call_log -d <device> <index>`	Deletes the call with index <index> from the given device in the call log.
`call_log -c`	Clears the call log.

Table F-3: “call_log” Commands

Response example:

The following example shows a part of a response to the command “`call -p`”:



```
Calllog_200912.txt - Notepad
File  Edit  Format  View  Help
H+> call -p
Current UTC Time is: 2009-10-22 08:04:42
Date       Time     Duration Number       Ges/ Dir kBytes      Call Device Call  Service
                    hh:mm:ss              Les      (down/up)   Ref         Type  Type
---------------------------------------------------------------------------------------
-----
2009-08-19 11:04:15 00:00:09 204539558681 1    Out (  0/   0)  0    4W4    VOICE HSD
2009-08-24 09:01:16 00:00:16 204539558282 1    Out (  0/   0)  0    4W4    VOICE HSD
2009-08-24 09:05:59 00:00:41 104539558282 68   Out (  0/   0)  1    4W4    VOICE H+
2009-08-24 09:18:28 00:00:09 104539558681 68   Out (  0/   0)  2    4W4    VOICE H+
2009-08-24 09:18:45 00:00:23 104539558282 68   Out (  0/   0)  3    4W4    VOICE H+
2009-08-25 13:34:04 00:00:10 104539558282 68   Out (  0/   0)  0    4W4    VOICE H+
2009-09-08 07:12:41 00:00:03 004539558681 68   Out (  0/   0)  0    4W4    VOICE H+
2009-09-08 07:14:02 00:00:15 004539558681 68   Out (  0/   0)  1    4W4    VOICE H+
2009-09-08 07:26:59 00:00:06 004539558681 68   Out (  0/   0)  0    4W4    VOICE H+
2009-09-09 09:23:19 00:00:06 204539558681 1    Out (  0/   0)  0    4W4    VOICE HSD
2009-09-11 07:19:05 00:00:09 204539558681 1    Out (  0/   0)  0    4W4    VOICE HSD
2009-09-11 11:57:11 00:00:26 204539558681 1    Out (  0/   0)  0    4W4    VOICE HSD
2009-10-09 08:42:23 00:00:22 104570101155 68   Out (  0/   0)  0    4W4    VOICE H+
2009-10-09 09:01:53 00:00:05 104570101155 68   Out (  0/   0)  1    4W4    VOICE H+
---------------------------------------------------------------------------------------
-----
H+>
```

Figure 6-2: Troubleshooting SDU, Call Log command: call -p

Flight Test (“flight” command)

To trace flight data, use the **flight** command. The flight test data comprises position data, signal strength and EIRP.

The following options are available with the flight command:

Command to Type in (Followed by <Enter>)	Result/Explanation
`flight -c <time>`	Change the update rate to <time>.
`flight -e`	End flight test traces.
`flight -s`	Start trace of flight test data with an update rate of 1 second.
`flight -s <time>`	Start trace of flight test data with an update rate of <time>. The unit for <time> is 10 ms, that is: <time>=2 corresponds to 20 ms.

Table F-4: “flight” Commands

Response example:

The following example shows a response to the command “`flight -s`”, that is flight test data with an update rate of 1 second. The command “`flight -e`” stops the tracing.

```
H+> flight -s


H+> Fri Aug 27 12:26:32 2004 H+Temp 44
NAV POS: Lon   9.13, Lat 55.73, Alt 117 m
NAV ATT: Roll  0.41, Pitch -0.97, Hea 135.71, Speed 0
m/s
DSP:     Azi  73.11, Ele 23.60, VDopp 0 m/s
PRT:     C/No 54.0 EIRP  09.1 FreqOff 006
C0:      C/No 45.1 EIRP  06.5
C1:      C/No 54.1 EIRP  18.5
HSD:     C/No 57.3 EIRP  22.5 FreqOff -01
--
flight -e
```

F.3 Commands for troubleshooting the SBU

F.3.1 Monitoring the ARINC interfaces on the SBU

Below is an example on how to get a status for the ARINC interfaces. After the debug command for getting the status report (first line, bold) the status report is shown.

```
stat -m arinc
STAT Report
Module: ARINC, Status: Ok, Message:
REPORT: SHORT
CONFIGURATION
Primary Receiver  : ARINC 704-7 Inertial Reference System (IRS), speed: High
Secondary Receiver: Disabled, speed: Low
Antenna Modem     : Disabled

STATUS ARINC DRIVER
Current Time      : Thu Jan 01 00:00:54 1970
Primary Receiver  : 6 RO_6_IRS_CONNECTED     Qualified    Forwarding forwardingPeriods:1
Secondary Receiver: 0 RO_0_NULL              Await-Label  Standby    forwardingPeriods:0
Antenna Modem     : 1 RT_1_INIT              Await-Label

Primary Receiver:
Label   Status         Error     Active        Age    Value             Name
  101 No Label          422          0          0 0.000000          HDOP
  150 No Label          422          0          0 00:00:00 gnss     UTC Time
  260 No Label          422          0          0 00/00/00          UTC Date
  273 Normal            353         69        158 Self Test         GNSS Sensor Status
  274 Normal            353         69        158 Self Test         GPIRS Status
  310 Normal            353         69        158 55.794067 N       Latitude
  311 Normal            353         69        158 12.523041 E       Longitude
  312 Normal            353         69        158 0.000000 Knots    Ground Speed
  313 Normal            353         69        158 0.000000 Deg      Track Angle True
  314 Normal            353         69        158 0.000000 E        True Heading
  324 Normal            353         69        158 0.010986 Deg      Pitch Angle
  325 Normal            353         69        159 0.120850 Deg      Roll Angle
  336 Normal            353         69        159 -0.015625 Deg/Sec    Inertial Pitch Rate
  337 Normal            353         69        159 0.000000 Deg/Sec     Inertial Roll Rate
  361 Normal            353         69        159 167.250000 Feet      Altitude Inertial
  377 Plus             353         69       159 0x004 IRS (704)      Equipment Identification
Details:
  273 Satellites-Tracked:0 Visible:0
  273 IRS/FMS : Present  Source: Primary
  273 DADC/FMS: Present  Source: Primary
  274 Satellites-Tracked: 0
  274 Primary GPSSU Validity: Valid
  274 Secondary GPSSU Validity: Valid
  274 GPSSU Source: Primary
  377 Source Identifier: Primary


COUNTERS ARINC-429:  Primary  Secondary     Ant-Rx     Ant-Tx
allocation              20          0          0
wordsA429             6752          0          0          0
discardError             0          0          0          0
framingError             0          0          0
parityError              0          0          0
overflowError            0          0          0
regStatusRead          422          0          0             FPGA Status Read
regTimeTagRead         422          0          0             FPGA TimeTag Read
regCtrlWrite             2          0          5             FPGA Control Write
interrupt                0          0          0             FPGA Interrupt
```

```
reset                       0          0          0          0  Debug only
clearCounters               0          0          0          0
```

F.3.2 Description of the status report

The status report consists of up to seven parts:

1. Report header
2. ARINC driver configuration
3. The overall status for the ARINC driver
4. Status for the Primary ARINC Receiver
5. Status for the Secondary ARINC Receiver, if configured
6. Status for the ARINC Antenna modem, if configured
7. Low level ARINC-429 counters

Below is a detailed description of each part of the status report.

STAT Report

The following lines are part of the standard system header, there is no information relevant for the ARINC interfaces present in the header, you may just ignore these lines:

```
STAT Report
Module: ARINC, Status: Ok, Message:
REPORT: SHORT
```

CONFIGURATION

The configuration part is a mirror of the ARINC information already available at ***Setting up the navigational input of the SBU*** on page 6-51, **SETTINGS > External systems** of the SBU.

STATUS ARINC DRIVER

Current Time: This is the current UTC time, if available. In this example the year 1970 indicates that the UTC time not yet is available.

Read the following overview information in the following way:

Interface	State number and name	Status	Source	Source Activations
Primary Receiver	6 RO_6_IRS_CONNECTED	Lost-Label	Forwarding	forwardingPeriods:1
Secondary Receiver	0 RO_0_NULL	Await-Label	Standby	forwardingPeriods:0
Antenna Modem	1 RT_1_INIT	Await-Label		

Table F-5: Status ARINC driver, overview

The states for receivers have the following purpose:

State name	Description
RO_0_NULL	The receiver is not configured and therefore not started
RO_1_INIT	The receiver is in the progress of starting up
RO_2_LOOPBACK	A loopback test command has been running and a power-cycle is needed
RO_4_AHRS_CONNECTED	The AHRS driver is running
RO_6_IRS_CONNECTED	The IRS driver is running

Table F-6: Purpose of the states for receivers

The states for the antenna modem can be used for the following purpose:

State name	Description
RT_0_NULL	The antenna modem is not configured and therefore not started
RT_1_INIT	Awaits the BSU (Beam Steering Unit) start sending the status word.
RT_2_LOOPBACK	A loopback test command has been running and a power-cycle is needed
RT_3_AMT50	The ARINC AMT-50 / HGA-6000 driver is running

Table F-7: Purpose of the states for the antenna modem

Status: This reflects the overall status considering all mandatory labels on the interface in question.

Status	Description
Await-Label	At least one mandatory label has never showed up on the interface
Lost-Label	A label previously received is now missing on the interface
Unreliable	May be used in the future for selecting between two channels where one of them is more degraded than the other.
Degraded	One or more of the labels is degraded.
Evaluation	All mandatory labels are operational and has to be stable for a period of time before they can be qualified.
Qualified	All mandatory labels are operational and this port can now be forwarded.

Table F-8: Status for all mandatory labels on the interface in question

Source:

Source	Description
Forwarding	This ARINC receiver is forwarding valid navigational date to the SBU. Forwarding means that the data on the interface is used by the system
Standby	This ARINC receiver is on standby and not forwarding data to the SBU. Standby means that the data on the interface are not used by the system

Table F-9: Status ARINC driver: Source

Forwarding Periods: The number of periods the interface has being forwarding data to the system.

RECEIVER

Header	Description
Label	The label number in octal number system.
Status	Take status of the label word according to bit 30 and 31 Sign/Status Matrix. See table directly below.
Error	The number of 100mS interval the label has not been operational.
Active	The number of 100mS interval the label has been operational.
Age	The age of the label in ms sampled every 100 ms.

Table F-10: Receiver: Header line for the table

Header	Description
Value	The decoded value of the label
Name	The name of the label according to ARINC-429

Table F-10: Receiver: Header line for the table (Continued)

The specific label type (BCD/BNR/DISC) can be looked up in the ARINC-429 Specification.

Status	BCD	BNR	DISC
0	Plus	Failure	Normal
1	No Data	No Data	No Data
2	Test	Test	Test
3	Minus	Normal	Failure

Table F-11: Status for label types

The underlined status is the operational state for the specific label type.

References

G.1 Applicable standards

[1] IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications. IEEE Std 802.3, 2000 Edition (Incorporating IEEE Std 802.3, 1998 Edition, IEEE Std 802.3ac-1998, IEEE Std 802.3ab-1999, and IEEE Std 802.3ad-2000) [Adopted by ISO/IEC and re-designated as ISO/IEC 8802-3:2000(E)].

[2] ISO/IEC 8877:1992 Information technology -- Telecommunications and information exchange between systems -- Interface connector and contact assignments for ISDN Basic Access Interface located at reference points S and T

[3] RTCA/DO-160C and RTCA/DO-160D. Environmental Conditions and Test Procedures for Airborne Equipment. RTCA Inc. July 29, 1997, incl. Change No. 1 (Dec. 14, 2000) and Change No. 2 (June 12, 2001)

[4] RTCA/DO-160E. Environmental Conditions and Test Procedures for Airborne Equipment . RTCA Inc. December 9, 2004

[5] Integrated Services Digital Network (ISDN). Basic User-Network Interface (UNI). ETSI EN 300 012-1 V1.2.2 (ITU I.430))

[6] Integrated Services Digital Network (ISDN). ISDN User Network Interfaces. ITU-T Recommendation I.420

[7] ARINC 429. Mark 33 Digital Information Transfer Systems (DITS)

[8] ARINC 404A. Air Transport Equipment Cases and Racking

[9] ARINC 404B-1. Connectors, Electrical, Rack and Panel, Rectangular, Rear Release Crimp Contacts.

[10] ARINC 702A-1. Advanced Flight Management Computer System. ARINC, January 31, 2000

[11] ARINC 741 P1-10. Aviation Satellite Communication System. Part 1, Aircraft Installation Provisions

[12] ARINC 741 P2-7. Aviation Satellite Communication System. Part 2, System Design and Equipment Functional Description

[13] RFC 1549: PPP in HDLC Framing. December 1993. (Obsoleted by RFC 1662)

[14] CCITT Rec. G.473. Standard US DTMF Telephone

[15] RTCA/DO-178B. Software Considerations in Airborne Systems and Equipment Certification, December 1, 1992

[16] RTCA/DO-254. Design Assurance Guidance for Airborne Electronic Hardware, April 19, 2000

[17] ARINC CHARACTERISTIC 704A. Inertial Reference System

[18] ARINC CHARACTERISTIC 705. Attitude and Heading Reference System

[19] ARINC CHARACTERISTIC 743A. GNSS Sensor

[20] ARINC CHARACTERISTIC 741P1. Aviation Satellite Communication System Part 1. Aircraft installation provisions

[21] ARINC CHARACTERISTIC 781. Mark 3 Aviation Satellite Communication Systems

[22] EIA/TIA-232-E: Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange (superseded by TIA-232-F) Published: January 1, 1900. Category: Telecommunications.

G.2 Other references

[23] AVIATOR 700 User Manual.

See also ***Related documentation*** on page 1-2.

A

ACARS	Airborne Communications Addressing and Reporting System
ACAS	Aircraft Collision Avoidance System. Early relative of the now operational TCAS (Traffic Alert and Collision Avoidance System) which warns pilots of potential conflicts with other aircraft.
ACP	Audio Control Panel
ACU	Antenna Control Unit
ADF	Automatic Direction Finder. A navigation receiver based on the AM radio band. A very simple device which literally points towards the station that is tuned in.
AES	Aircraft Earth Station
AFIS	Airborne Flight Information System
AHRS	Attitude and Heading Reference System
ALC	Automatic Level Control
AMBE	Advanced Multi-Band Excitation
AMER	Americas (Satellite coverage)
AMS	Audio Management System
AOC	Aeronautical Operational Control
AORE	Atlantic Ocean Region East (Satellite coverage)
AORW	Atlantic Ocean Region West (Satellite coverage)
APAC	Asia Pacific (Satellite Coverage)
APN	Access Point Name. The Access Point Name is used by the terminal operator to establish the connection to the required destination network.
APS	Aircraft Power Supply
ARINC	Aeronautical Radio, Incorporated. A provider of transport communications and systems engineering solutions
AT	AT commands are used for controlling modems.
ATS	Air Traffic Service

AWG	American Wire Gauge

B

BGAN	Broadband Global Area Network
BITE	Built-In Test Equipment. A BITE error is a hardware error detected by the automatic error detection system in the AVIATOR 700 System.
BP	Bottom Plug

C

C-FDM	C-channel Frame Demodulator/Modulator
CID	Context Identifier
CM	Configuration Module
CMU	Communications Management Unit
CP	Cockpit
CPU	Central Programming Unit
CRC	Cyclic Redundancy Check
CS	Circuit switched

D

DCE	Data Communication Equipment. Equipment that does not generate data, but only relays data generated by someone else.
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.
DME	Distance Measuring Equipment
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi Frequency. The signal to the phone company that is generated when you press an ordinary telephone’s touch keys. DTMF has generally replaced loop disconnect (pulse) dialing.

E

ECS	Electronic Cable Specialists, Inc., a Carlisle IT company
EEPROM	Electrically Erasable Programmable Read Only Memory
EIA	Electronic Industries Alliance. A US national trade organization that includes the full spectrum of U.S. manufacturers, representing more than 80% of the electronics industry. The alliance provides several standards for the electronics industry.
EIRP	Effective Isotropic Radiated Power
EMC	Electromagnetic Compatibility
EMEA	Europe, Middle East, Africa (Satellite coverage)
ETSI	European Telecommunication Standard Institute

F

FAA	Federal Aviation Administration
FNBDT	Future Narrowband Digital Terminal. A US Government standard for secure voice communication.
FPGA	Field Programmable Gate Array

G

GES	Ground Earth Station.
GND	Ground
GPS	Global Positioning System

H

HGA	High Gain Antenna
HPA	High Power Amplifier
HPR	High Power Relay
HS	High Speed
HSD	High Speed Data

I

I/O	Input/Output
IAI-2	Inmarsat Air Interface-2. The air interface used for BGAN. IAI-2 is an evolution of MPDS with new bearer types, which give a wide range of data rates from 16 kbps up to 492 kbps. By utilizing different modulation schemes, variable coding rate and power adjustment, it is possible to change the bearer type to give optimum throughput with efficient use of the satellite resources.
ICAO	International Civil Aviation Organization
IEEE	Institute of Electrical and Electronics Engineers
ILS	Instrument Landing System. A system of tightly focused transmitters located at the end of a runway that provides flight guidance information to flight crews.
IMEI	International Mobile Equipment Identity. A unique number identifying your terminal
IMSI	International Mobile Subscriber Identity
IOR	Indian Ocean Region (Satellite coverage)
IP	Internet Protocol
IRS	Inertial Reference System
ISDN	Integrated Services Digital Network
ISN	Inmarsat Serial Number
ISP	Internet Service Provider
ITU	International Telecommunication Union

K

kbps	kilobit per second, unit of data transfer rate

L

LAN	Local Area Network
LED	Light Emitting Diode
LES	Land Earth Station.

LRU	Line Replaceable Unit. A separate unit or module which can easily be replaced. Examples are the SDU and the HPA.
LS	Low Speed

M

MCDU	Multifunction Control and Display Unit. Part of the Flight Management System. ,
MES	Mobile Earth Station
MIB	Management Information Base
MOD	Modification
MSN	Multiple Subscriber Numbering. In most pieces of ISDN equipment you can program multiple subscriber numbers. The number programmed into the equipment should be the dial-in number that you wish that piece of equipment to answer.

N

NAT	Network Address Translation. An Internet standard that enables a local-area network to use one set of IP addresses for internal traffic and a second set of addresses for external traffic. A NAT module makes all necessary address translations.
NC	No Connect
NCS	Network Coordination Station
nON	Power-on control signal, active low
NT	Network Termination. A device connecting the customer’s data or telephone equipment to the local ISDN exchange carrier’s line. It provides a connection for terminal equipment (TE) and terminal adaptor (TA) equipment to the local loop.

P

PAST	Person Activated Self Test
PBX	Private Branch Exchange, telephone exchange that serves a particular business or office.
PC	Personal Computer

PDF	Portable Document Format, a file format created by Adobe Systems for document exchange
PDP	Packet Data Protocol. A network protocol used by external packet data networks that communicate with a GPRS network.
PID	Packet IDentifier
POR	Pacific Ocean Region (Satellite coverage)
POST	Power On Self Test. A system test that is activated each time the system is powered on.
POTS	Plain Old Telephony System. Traditional 2-wire system.
PS	Packet switched
PSM	Phase Shift Modulation
PTT	Push-To-Talk

Q

QoS	Quality of Service

R

RAM	Random Access Memory
RF	Radio Frequency
RFHP	Radio Frequency High Power
RMA	Return Material Authorization
RTCA	Radio Technical Commission for Aeronautics ,

S

SATCOM	Satellite Communications
SB	Swift Broadband, based on BGAN and offers similar services, simultaneous voice and broadband data.
SBU	SwiftBroadband Unit. Unit in the satcom system providing access to the aeronautical BGAN service, SwiftBroadband.
SCPC	Single Channel Per Carrier. A VSAT satellite transmission system that uses a separate carrier for each of its channels. In an SCPC system,

	transmissions are sent to the satellite continuously on a single satellite carrier.
SDM	System Definition Manual
SDU	Satellite Data Unit. The controlling unit of the AVIATOR 700 system.
SDU	Service Data Unit. Also known as a data packet.
SIM	Subscriber Identification Module
SIP	Session Initiation Protocol. An application-layer control (signaling) protocol for creating, modifying, and terminating sessions with one or more participants. Used e.g. for Internet telephony.
SLCV	S = coding Standard, L = cause Location, C = cause Class, V = cause Value
SNMP	Simple Network Management Protocol. An Internet-standard protocol for managing devices on IP networks. It is used mostly in network management systems to monitor network-attached devices for conditions that warrant administrative attention.
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.
STBO	Starboard
STC	Supplemental Type Certificate. FAA or EASA certification document issued to companies that perform significant modifications on an aircraft.
STE	Secure Terminal Equipment
STU	Secure Telephone Unit

T

TC	Type Certificate
TCAS	Traffic Alert and Collision Avoidance System. A system which warns pilots of potential conflicts with other aircraft.
TDM	Time Division Multiplex
TE	Terminal Equipment
TFTP	Trivial File Transfer Protocol. A very simple file transfer protocol, with the functionality of a very basic form of FTP. Since it is so simple, it is easy to implement in a very small amount of memory.

TIA	Telecommunications Industry Association. TIA is a U.S. non-profit trade association serving the communications and information technology industry. TIA provides several standards for these industries.
TP	Top Plug

V

VFC	Voice Fax Codec
VHF	Very High Frequency. 30-300 MHz, a "straight-line" signal used for communication and navigation.
VOR	VHF Omnidirectional Range

W

WLAN	Wireless Local Area Network
WOW	Weight On Wheels

Numerics

A

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