AVIATOR 700S

Installation Manual

AVIATOR 700S System

Installation Manual

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Disclaimer

Information in this document is subject to change without notice.

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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Manufacturer address

Cobham Aerospace Communications - Fullerton,
577 Burning Tree Road,
Fullerton, CA 92833
USA

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	Name	Signature	Date
Edited	Ludovic LEGEAY		11/10/2023
Approved Engineering Manager	Rabah BOUDA		16/11/2023
Approved System Engineering	Bo DYSSEGARD		Nov 21 2023
Approved Program Management	Kim HARDER		Nov 15 2023
Approved Engineering	Dave HOLLOWAY		11/21/23
Approved QA	Nathaniel HAYES		11/21/23

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About this manual

1.1 Purpose

The purpose of this manual is to provide information for installation of the AVIATOR 700S system.

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

The chapters of this Installation Manual have the following information:

- **Introduction**
  An overview of the AVIATOR 700S system and services.
- **Equipment drawings**
  Outline drawings of the units, trays and connectors of the AVIATOR 700S system.
- **Installation**
  Wiring drawings, installation instructions and wiring requirements.
- **Configuration**
  A description of how to set up the AVIATOR 700S system.
- **Verification with check procedures.**
  An overview of the recommended check procedures and checklists.
- **Service and maintenance**
  Service information, initial troubleshooting
- **Appendices**
  Equipment specifications, DO-160 Forms, list of error messages (BITE) and a list of applicable standards.

1.3 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.

WARNING! Make sure that system power is off before you disconnect the LRU mating connectors.

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

Weights and measurements

Weights and measurements are in metric values (SI) with imperial metrics in parentheses.

Introduction

This chapter has the following sections:

- *General description*
- *Part numbers*

2.1 General description

This installation manual provides the general installation instructions and setup of the AVIATOR 700S System. Please see separate Installation Manual [8] for the HGA antenna and DLNA which forms part of the AVIATOR 700S System.

The installer must derive specific installation details for each different aircraft type, using this manual as a guideline, while adhering to standard aircraft practices. Refer to [1], or its equivalent.

CAUTION! The material in this manual is subject to change. Before you start with the installation you must verify that the complete and up-to-date publication is used.

2.1.1 The AVIATOR 700S System

System overview

The AVIATOR 700S System is an Inmarsat aeronautical SATCOM system, which provides Inmarsat SwiftBroadband services and safety services (Class 6), using a standard ARINC 781/741 compliant High Gain Antenna (HGA). It delivers secure ACARS services over a robust IP data link together with dual cockpit voice channels. The AVIATOR 700S System is a dual-channel system for cockpit and cabin use and complies with ARINC Characteristic 781 Mark 3 Aviation Satellite Communication Systems. The system provides services in the L-band (1525 to 1559 MHz for the receive channel and 1626.5 to 1660.5 MHz for the transmit channel).

The AVIATOR 700S System provides the following classes of communication services:

- Air Traffic Service (ATS)
- Airline Operational Control (AOC)
- Aeronautical Administrative Communications (AAC)
- Aeronautical Passenger Communication (APC)

The services include cockpit voice with two voice channels, IP data (Internet), ACARS over IP and Electronic Flight Bag (EFB) services for direct satellite communication in the Inmarsat BGAN Satellite Network, using the Inmarsat 4th and 6th generation satellites.

The following figure shows the AVIATOR 700S System.

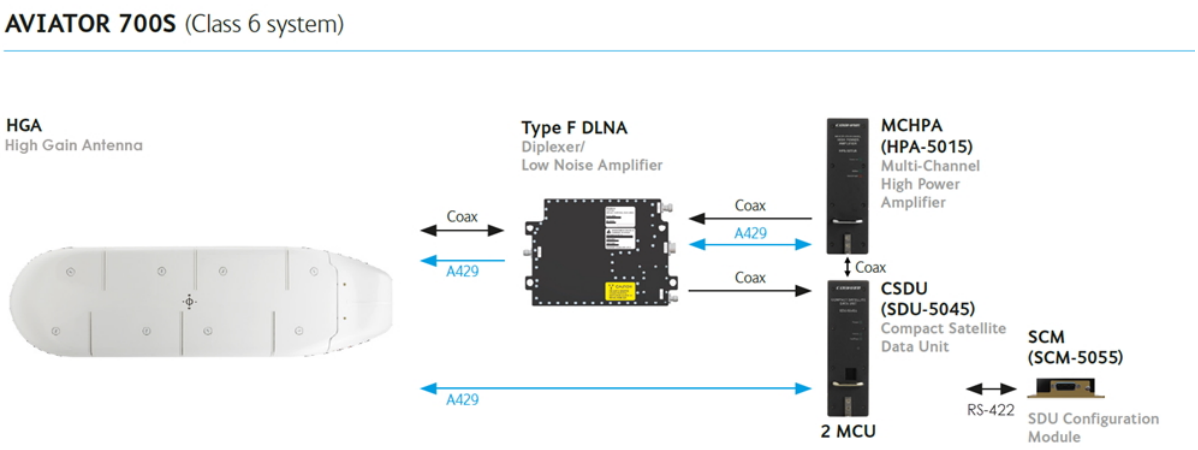


Figure 2-1: AVIATOR 700S System, dual channel (Class 6)

The AVIATOR 700S System consists of:

- SDU-5045 Compact Satellite Data Unit (CSDU)
- SCM-5055 Compact SDU Configuration Module (SCM)
- HPA-5015 Multi-Carrier High Power Amplifier (MCHPA)
- Diplexer/Low Noise Amplifier (DLNA) Type F
- ARINC 781/741 compliant with High Gain Antenna (HGA)

The CSDU is the master of the AVIATOR 700S System and controls the associated units in the system. The SCM is powered by the CSDU.

The AVIATOR 700S System has the following features:

- Complete aircraft network segregation with priority for the Aircraft Control Domain (ACD) over the Aircraft Information Services Domain (AISD) and also the Passenger Information Entertainment Services Domain (PIESD).
- ARINC 781-7 compliant network security
- Approved FANS 1/A services, including CPDLC, ADS-C and ACARS.
- Enhanced ACARS (with IPSEC VPN) and Secure Cockpit Voice.
- Media for aircraft monitoring systems and continuous positioning reporting.
- Background IP data for AISD (e.g. EFB) applications.
- Two cockpit voice over 4-wire connections, with three MCDU ARINC 429 interfaces for SATCOM and voice management
- Two CMU/AFIS ARINC 429 interfaces for ACARS.
- Cabin IP data up to 432 kbps and higher data rate streaming HDR on the dedicated 2nd channel.

Compact Satellite Data Unit (CSDU)

The AVIATOR 700S Compact Satellite Data Unit (CSDU) is a 2 MCU LRU with an ARINC 600 connector. It is a highly secure system with complete aircraft network segregation for the Aircraft Control Domain (ACD) over the Aircraft Information Service Domain (AISD) and also Passenger Information and Entertainment Services Domain (PIESD). The aircraft network segregation between ACD and AISD ensures highest data security and meets all data communications specifications of ARINC 781-7, Attachment 8 [3] requirements. The system also meets requirements for Future Air Navigation System (FANS) 1/A operations. PIESD interfaces and services are physically segregated from the other Cockpit interfaces through a dedicated radio module.

The domain specific interface groups and the external interfaces of the CSDU are listed in the following table.

Domain	Interface Group	Description
ACD	Cockpit User Interfaces	Interfaces to avionics equipment used by the flight crew
ACD	Internal SATCOM Interfaces	Interfaces between units in the SATCOM system
ACD	Aircraft Interfaces	Interfaces to Avionics equipment used by the SATCOM system
ACD	Maintenance Interfaces	Interfaces intended for maintenance staff
ACD	System Configuration inputs	Discrete configuration pins
ACD	Power Supply inputs	Power supply inputs
AISD	Cockpit User Interfaces for EFB services	Interfaces dedicated for EFB devices
PIESD	Passenger Inetrfaces	Interfaces for Passengers (Voice + data)

Table 2-1: Domain specific interface groups

The following table lists the external interfaces of the CSDU, grouped after system functions.

Cockpit interfaces	
System function	Interfaces
Flight Deck	3x ARINC 429 inputs, for MCDU/WSC/RMP/TCP 1x ARINC 429 output, for MCDU/WSC/RMP/TCP 1x ARINC 429 output, for FWC/FWS/EICAS

Table 2-2: System function, cockpit interfaces

Cockpit interfaces	
System function	Interfaces
Cockpit Voice	2x 4-Wire DO-214A, for Cockpit Audio for AMS 1x Discrete input ARINC 781, for Mic-on for/PTT for ACP 1x Discrete input ARINC 781, for Call Place/End for ACP 1x Discrete input ARINC 781, for Cockpit Voice Go Ahead Chime reset for ACP 1x Discrete output, for Call Light for ACP 2x Discrete *relay* contacts ARINC-781, for Chime signal for ACP
Cockpit Data	1x Ethernet AISD#1, for EFB 1x Ethernet Priority IP ACD#1 (provisioned) 1x Ethernet AISD#2 Spare 1x Ethernet ACD#2 Spare
ACARS	1x Discrete output, hardware provisioned for ACARS Service Available 2x ARINC 429 Input for 2x CMU/ATSU/ACR 1x ARINC 429 Output for CMUs/ATSU/ACR

Table 2-2: System function, cockpit interfaces (Continued)

Product interfaces	
System function	Interfaces
Inmarsat Radio	2x HS ARINC 429 input for IRS/GNSS 1x ARINC 429 input for GNSS 1x Discrete input, ARINC 781, for Tx Mute 1x Modem control + DC 210 kHz Modem Control 1x ARINC 429 output for Multi-Control 1x ARINC 429 input for Antenna BITE 1x Discrete output, ARINC 781, for LNA On/Off 1x Discrete input, ARINC 781, for LNA BITE 1x Coaxial cable from DLNA 1x RF TX coxial cable for MCHPA
Configuration	1x ARINC 429 input for AES ID 1x Discrete input, ARINC 781, for SDU Number 1x Discrete input, ARINC 781, for SCM Fitted 1x Discrete input, ARINC 781, for Program Pin Parity 1x Discrete output, ARINC 781, for 0V Common

Table 2-3: System functions, product

Maintenance interfaces	
System function	Interfaces
BITE	1x ARINC 429 output for CFDS 1x ARINC 429 input for CFDS 1x Discrete ARINC 781 output, hardware provisioned for System Fail
Data Loading	1x Ethernet for Data Loader A615A 1x Discrete input ARINC 781 for Data Loader Link A 1x ARINC 429 output for Data Loader A615 1x ARINC 429 input for Data Loader A615
Support	1x USB for Local Maintenance 1x Ethernet for Shop Maintenance

Table 2-4: System functions, interfaces

Aircraft interfaces	
System functions	Interfaces
Environment	1x Power AC input 115 VAC 360 to 800 Hz 1x Discrete input, for External Reset 1x Discrete input, ARINC 781, for WoW 1x Discrete input for Dual System Disable 1x Discrete I/O output for Dual System Select I/O 1x Discrete output, hardware provisioned for Fallback SDU Reset 1x Discrete output, hardware provisioned for Slave Tx Mute 1x ARINC 429 output, hardware provisioned for Crosstalk 1x ARINC 429 input, hardware provisioned for Crosstalk 1x ARINC 429 input, hardware provisioned spare 1x ARINC 429 output, hardware provisioned spare 4x Discrete input, ARINC 781, hardware provisioned spares 2x Discrete output, ARINC 781, hardware provisioned spares

Table 2-5: System functions, aircraft

Passenger Interface	
Passenger Voice	1x Ethernet for audio calls and data

Table 2-6: Passenger interface

SDU Configuration Module (SCM)

The SCM contains non-volatile memory for storing the Secure Owner Requirement Table (ORT) and the User ORT, which hold the system settings. The SCM contains a write-protected area for storing installation data (system configuration, RF cable losses, antenna system etc.) that are only updated during installation, and a user non-write-protected area for storing a phone book and the customer-specific configuration parameters.

The SCM is an external module for the CSDU, making it easier to replace the CSDU while retaining all system and user settings in the SCM. If the CSDU must be replaced, the SCM remains installed in the aircraft. When the replacement CSDU is installed and connected to the SCM the system user settings are available again.

The SCM, contains four Inmarsat BGAN USIM cards and one security SmartCard. In the AVIATOR 700S System system, two USIM cards are used to access the Inmarsat SwiftBroadband services and the remaining two USIM cards are reserved for future use. The Security SmartCard contains integrity/ciphering keys and authentication algorithms and is used by the Aircraft ACARS Gateway (AAGW). The SCM is delivered with all five cards installed and these cannot be replaced in the field.

Multi-Carrier High Power Amplifier (MCHPA)

The CSDU interfaces directly to a MCHPA. The Multi-Carrier High Power Amplifier is defined in Attachment 7 of ARINC 781-8 as a Line Replaceable Unit (LRU) that amplifies the RF transmit signal to the correct high power levels required by a compact aeronautical SATCOM system

MCHPA is connected to the CSDU via a RF coaxial interface, over which it receives its RF input signal, a local oscillator reference signal and control signals. It is also connected to the DLNA via a second RF coaxial interface, over which it transmits the RF output signal.

The physical interface for the RF input and output signals and for the 115 V AC power supply to the HPA 5015 is an ARINC 600 connector.

Operation with an MCDU and headset

You can operate the AVIATOR 700S system via the following user interfaces:

- Headset and MCDU connected to the CSDU to make and answer calls
- MCDU to display system messages (Information and BITE codes)
- Headset connected to the audio control panel to make and answer calls

Up to 3 MCDUs can be connected. System status and BITE messages of the AVIATOR 700S system can be displayed in the MCDU display.

Other user interfaces

The AVIATOR 700S system has a dedicated AISD Ethernet interface for EFB or other cockpit application requiring IP data communication services. It has also a dedicated PIESD Ethernet interface for voice and data communications for passengers.

Configuration files for the AVIATOR 700S system

The configuration files (Secure ORT and User ORT) for the AVIATOR 700S system are uploaded to the CSDU with an ARINC 615A (Ethernet) or ARINC 615-3 (ARINC 429) compliant data loader. Refer to the ORT Tool User Guide [9]. There are two configuration files:

- Secure ORT with all necessary system settings for the correct functioning of the system
- User ORT with phone book and other non-critical user-specific data.

2.1.2 Maintenance interfaces (ACD)

The following interfaces belong to the ACD and are controlled by it. These interfaces are all located on the front panel of the CSDU.

- 1x Ethernet maintenance interface (shop maintenance)
- 1x Micro USB maintenance interface (on-ground aircraft maintenance)
- 3x Status LEDs
- 1x button for push-to-test

2.1.3 Power supply input

The system is designed for the following power supply input:

- 115 VAC, 360 to 800 Hz

2.1.4 Interface to the SCM

The SCM is connected to the CSDU via the following interface:

- 1x ARINC-781 compliant power and RS-422 communications interface [3]

2.1.5 Interface to the DLNA

The DLNA interface is part of the internal SATCOM interfaces and listed below:

- 1x Coax RF RX to CSDU

2.1.6 Electrical interfaces - overview

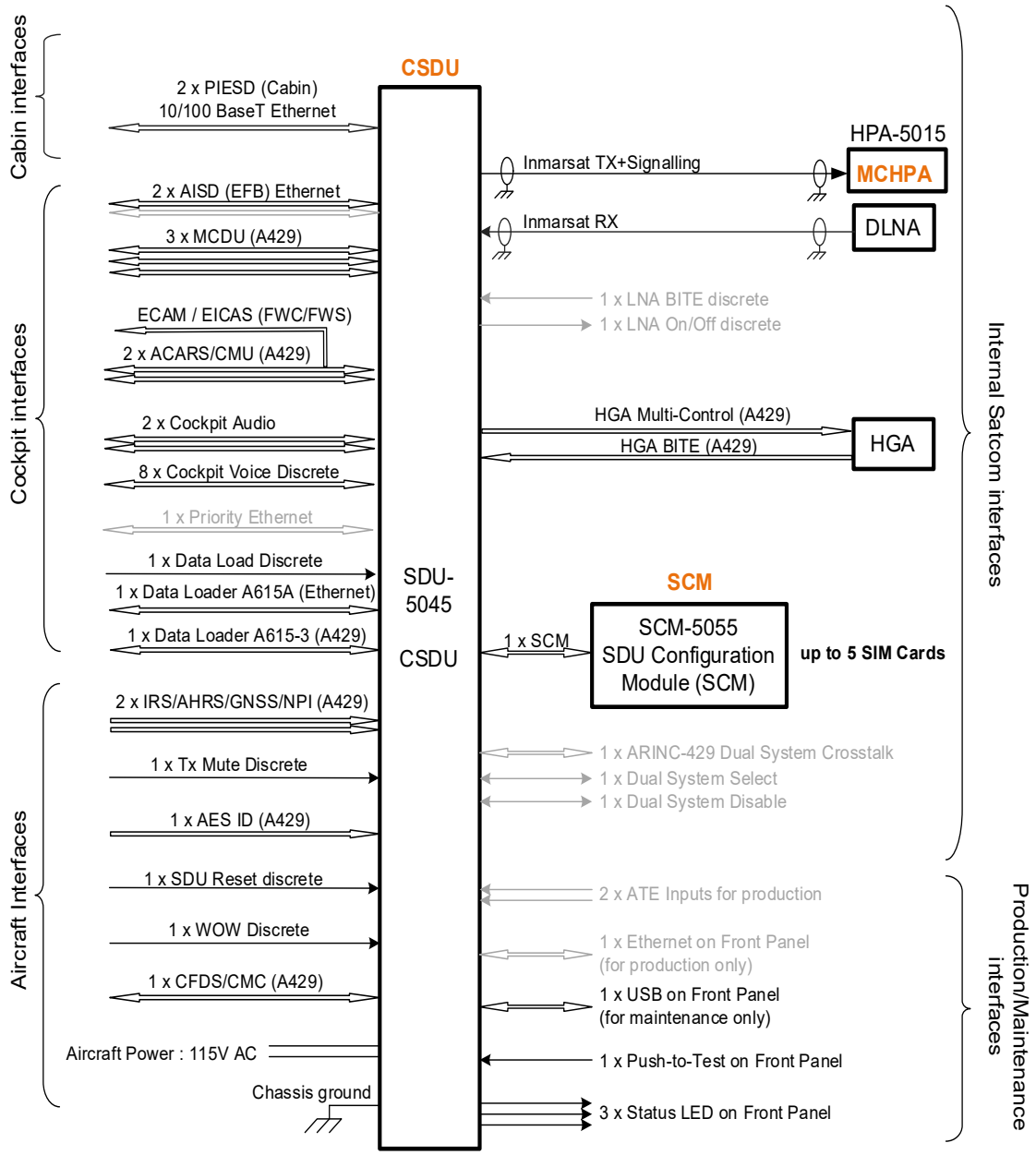


Figure 2-2: Electrical interfaces - overview

Note

The interfaces greyed out are disabled or not in use in the AVIATOR 700S software. This can be due to interfaces not being supported or reserved for future use.

Interfaces marked in black are supported in the AVIATOR 700S software.

For interfaces marked in black showing support of 2 interfaces, at least one will be implemented. This is the case for AISD EFB Ethernet, e.g. picture shows 2xEFB, but only one EFB interface is available. The second AISD Ethernet is reserved for test or maintenance use.

2.2 Part numbers

This installation manual is for the AVIATOR 700S system and is applicable to the type and part numbers below:

Type number	Part number	Component name
SDU-5045	405045-vvccc[a]	Compact Satellite Data Unit (CSDU)
SCM-5055	405055-vvccc	Compact SDU Configuration Module (SCM), external
HPA-5015	405015-vvccc	Multi-Carrier High Power Amplifier.

Table 2-7: Type and part numbers for the AVIATOR 700S system

a. The part number suffix vvccc is variable and consists of the fields vv = main variant and ccc = minor variant.

The system also needs Field Loadable Software (FLS) containing:

- User ORT
- Secure ORT
- SDU or CSDU and HPA FLS
- ORT tool

Circuit breakers

Part number	Recommended circuit breakers
2TC2-2	Klixon 2TC series, 2 A current rating (AC input) for CSDU
2TC2-4	Klixon 2TC series, 5 A current rating (AC input) for MCHPA

Table 2-8: Part numbers for Klixon circuit breaker

Trays and connectors

Part number	Recommended tray and connector
ECS 6L02S1C1C20	Tray assembly, 2 MCU (for forced air flow cooling)
AD2-203CF-30081510 CU	CSDU tray ARINC 600 connector (Amphenol)
NSXN2P221X0008	MCHPA tray ARINC 600 connector (Radiall)

Table 2-9: Part numbers for trays and connectors

Equipment drawings

This chapter has the following sections.

- *SDU-5045 Compact Satellite Data Unit*
- *SCM-5055 SDU Configuration Module*
- *HPA-5015 Multi-Carrier High Power Amplifier*
- *DLNA Type F*
- *CSDU/MCHPA tray*
- *CSDU tray connector*
- *MCHPA tray connector*

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

3.1 SDU-5045 Compact Satellite Data Unit

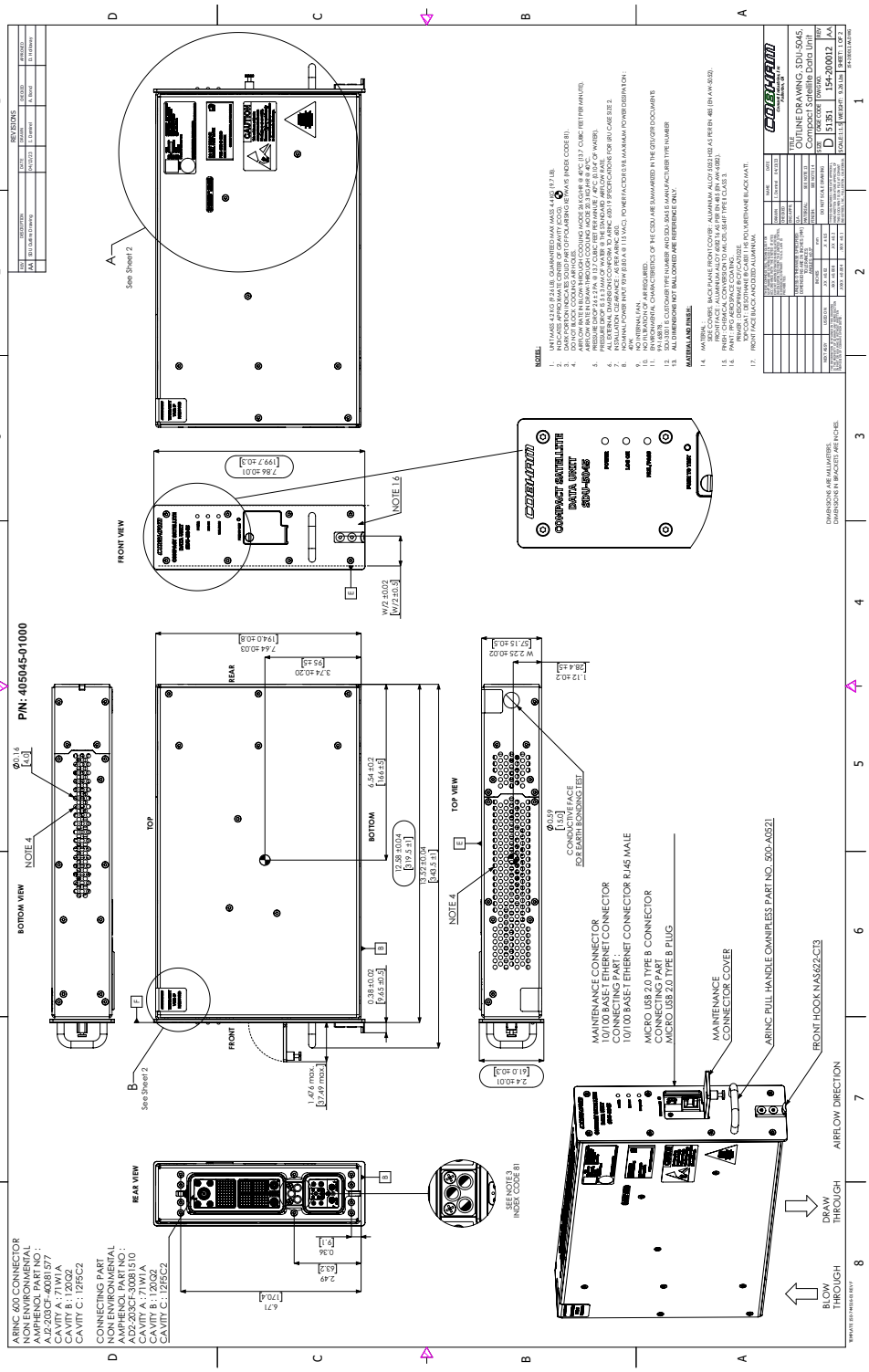


Figure 3-1: Outline Drawing: CSDU (1/2)

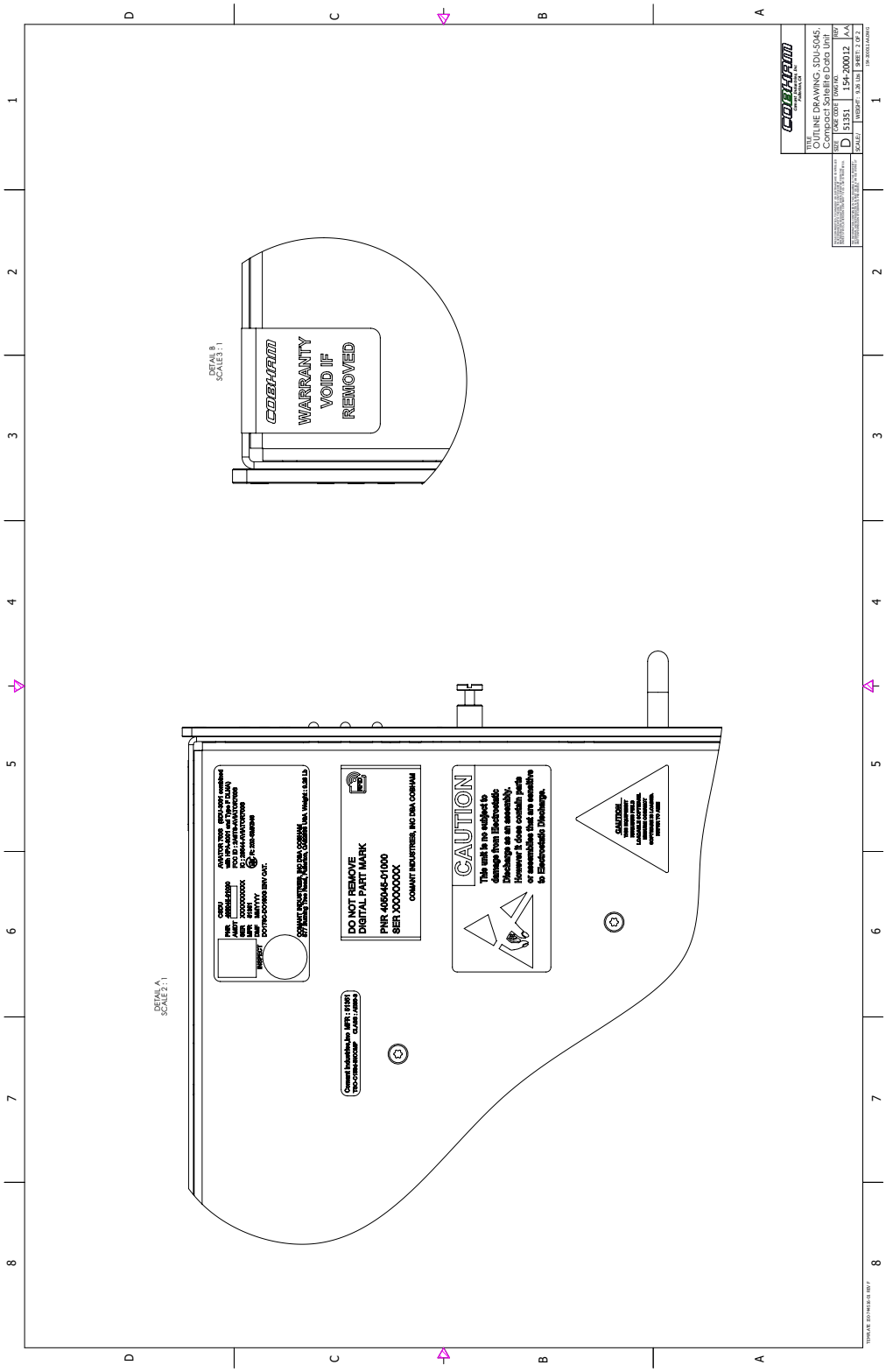


Figure 3-2: Outline Drawing: CSDU (2/2)

3.2 SCM-5055 SDU Configuration Module

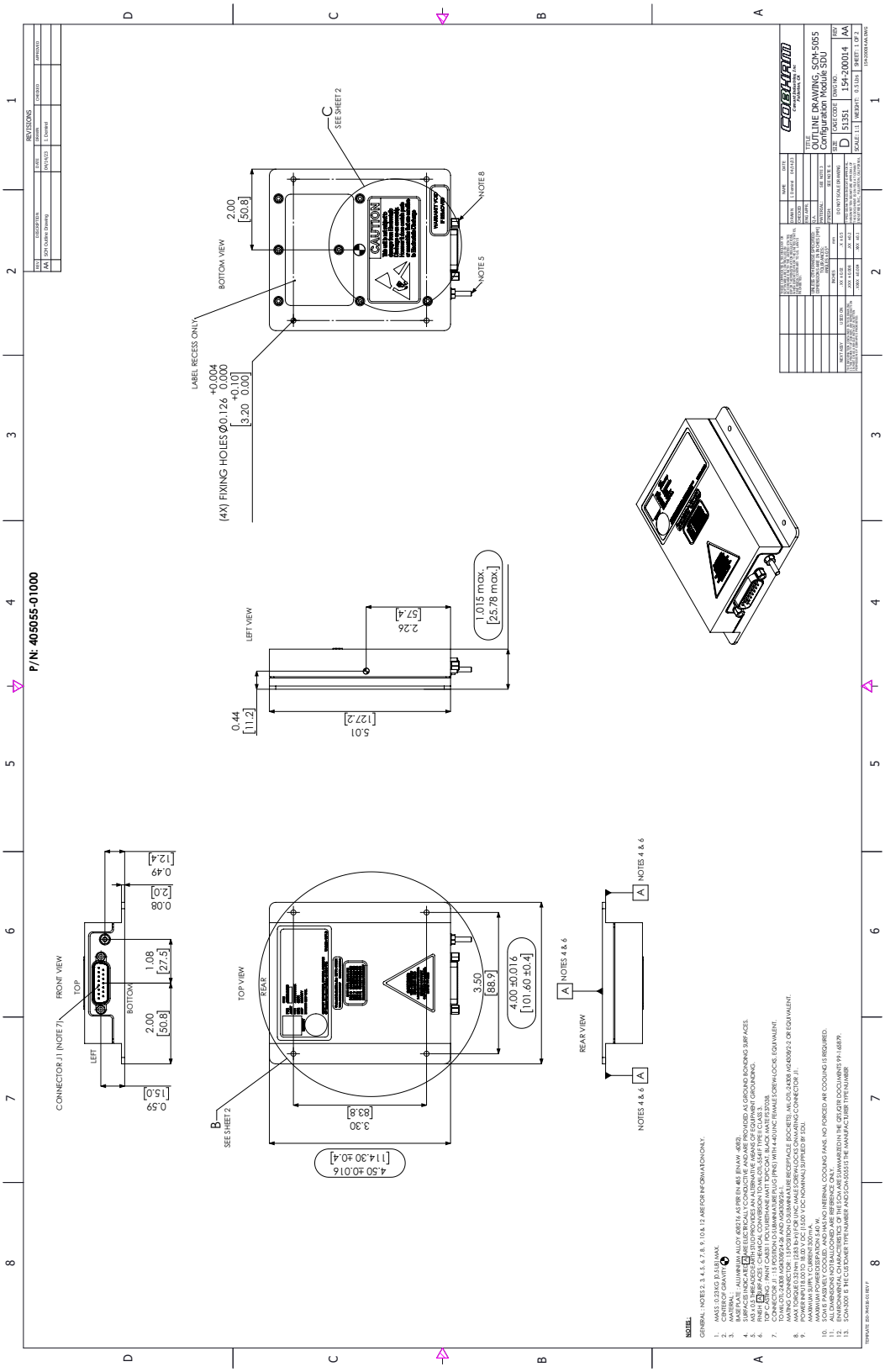


Figure 3-3: Outline drawing SCM-5055 (1/2)

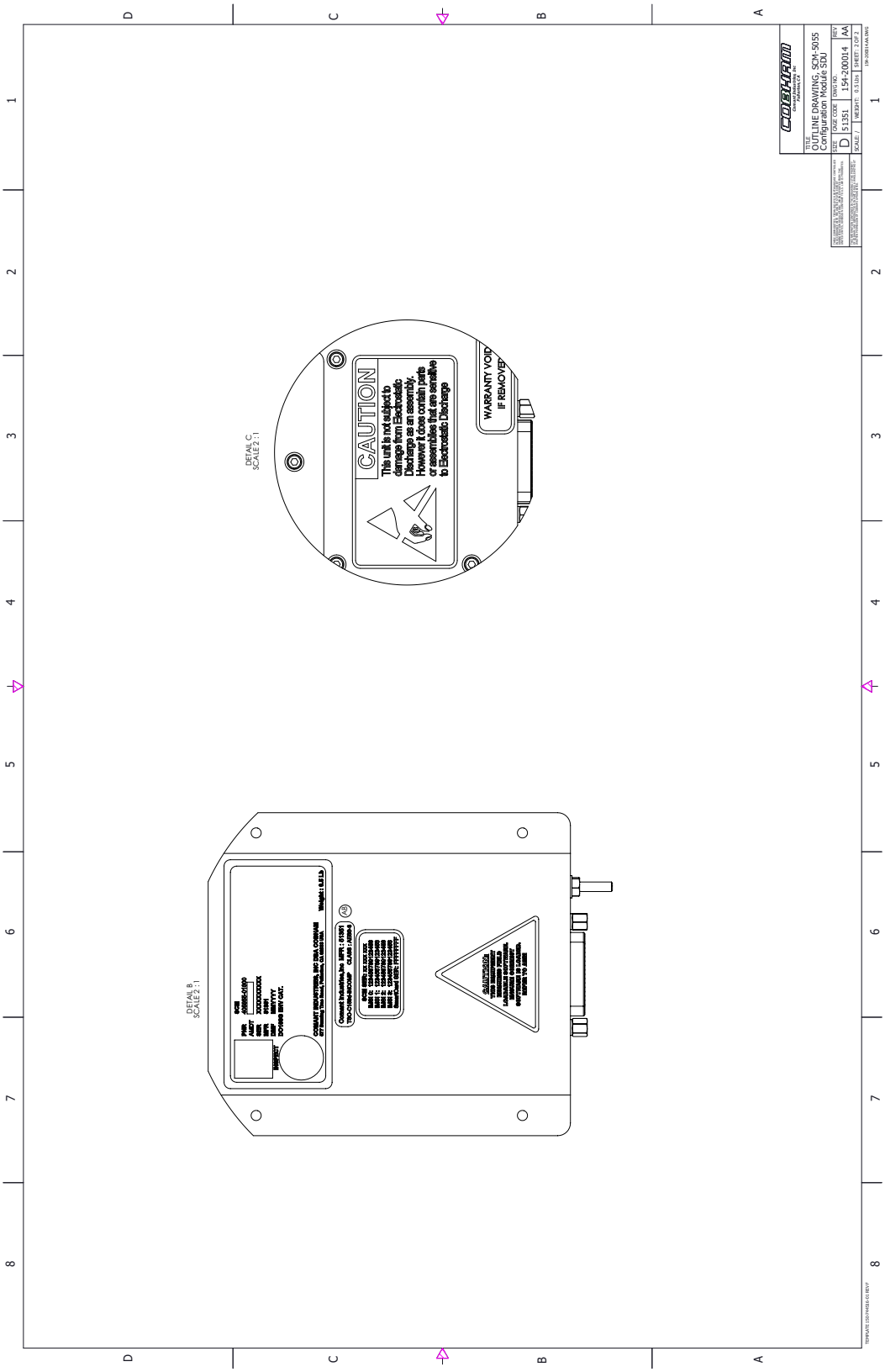


Figure 3-4: Outline drawing SCM-5055 (2/2)

3.3 HPA-5015 Multi-Carrier High Power Amplifier

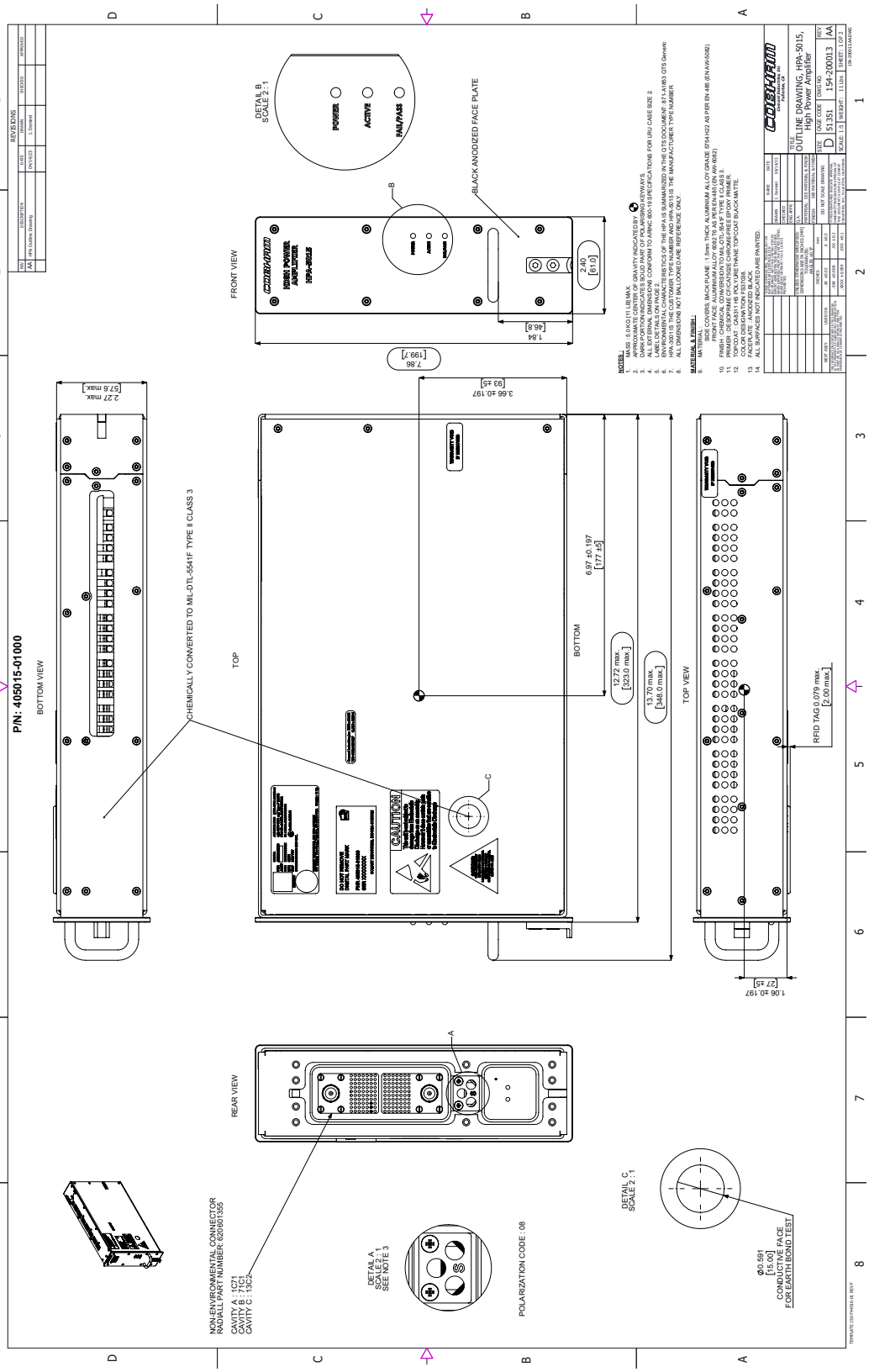


Figure 3-5: Outline Drawing: MCHPA (1/2)

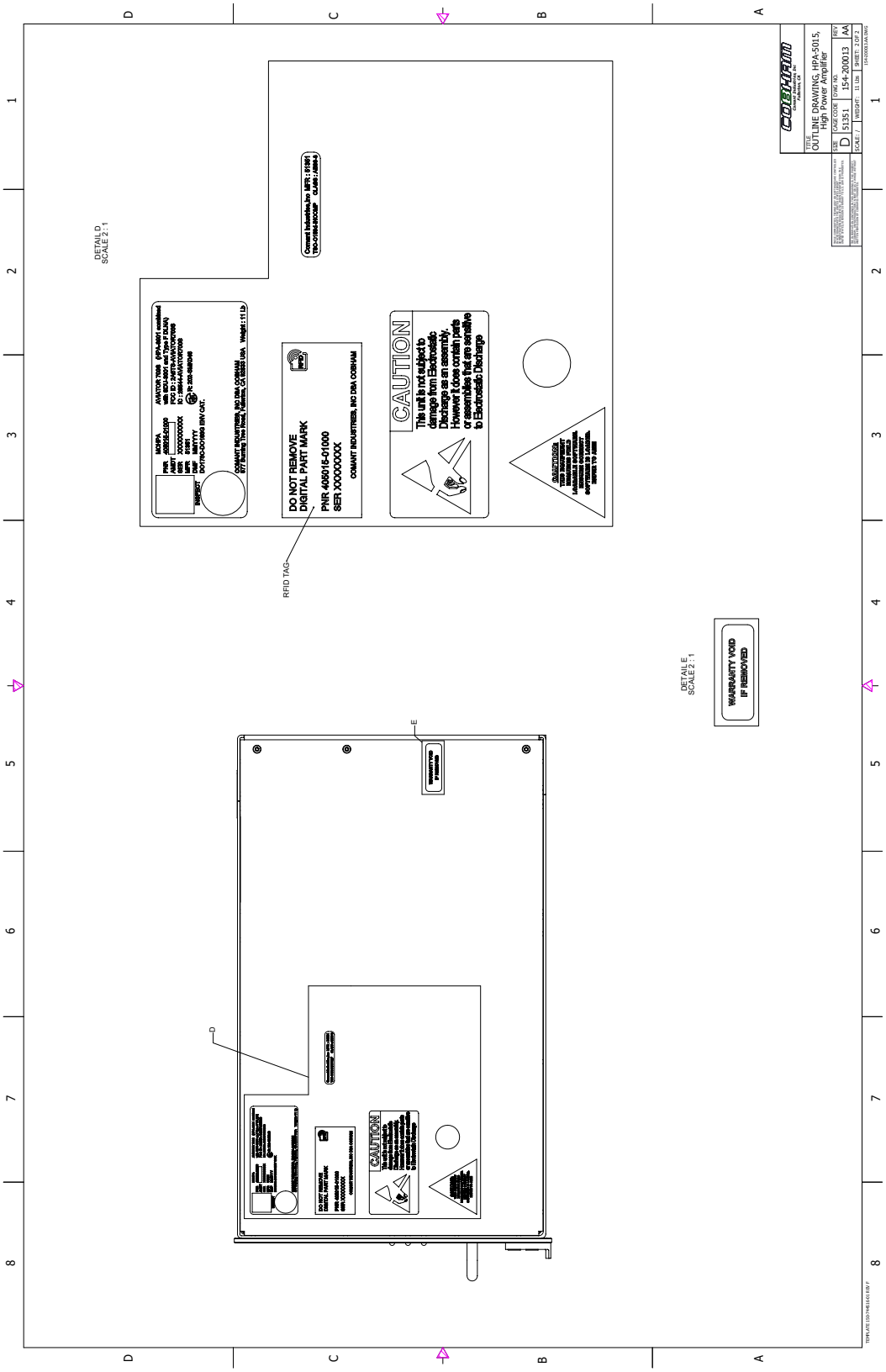


Figure 3-6: Outline Drawing: MCHPA (2/2)

3.4 DLNA Type F

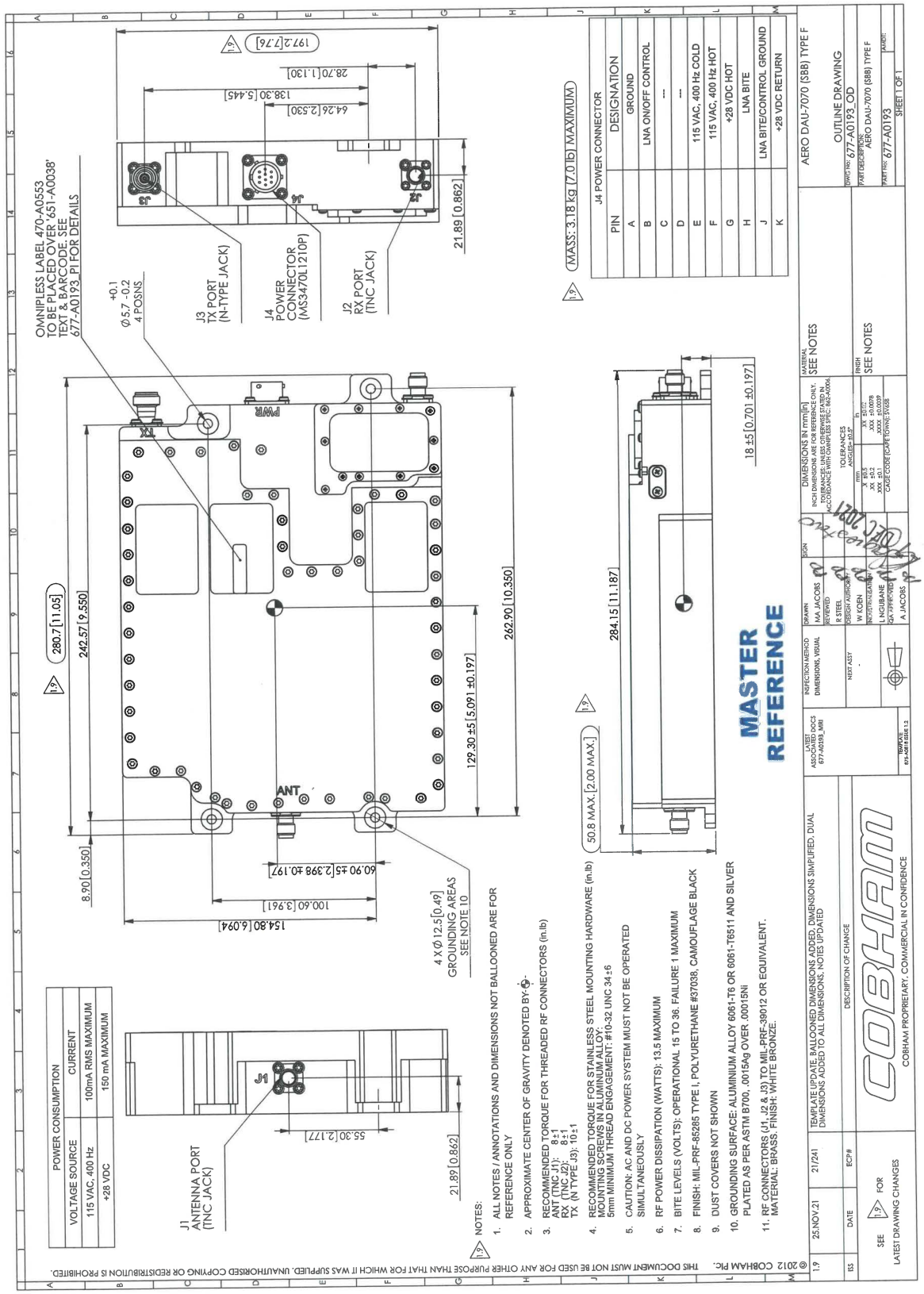


Figure 3-7: Outline Drawing: DLNA

3.5 CSDU/MCHPA tray

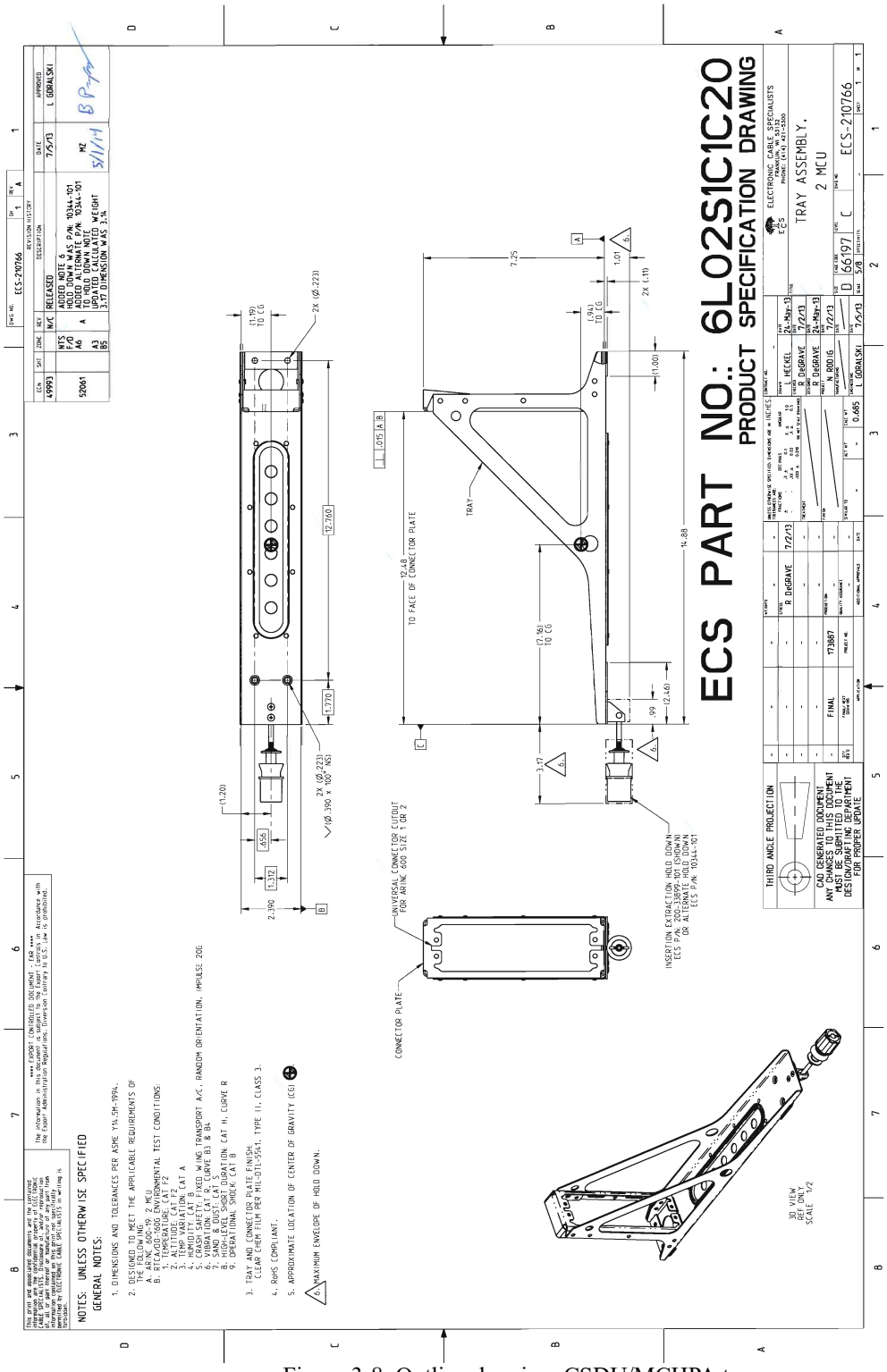


Figure 3-8: Outline drawing: CSDU/MCHPA tray

3.6 CSDU tray connector

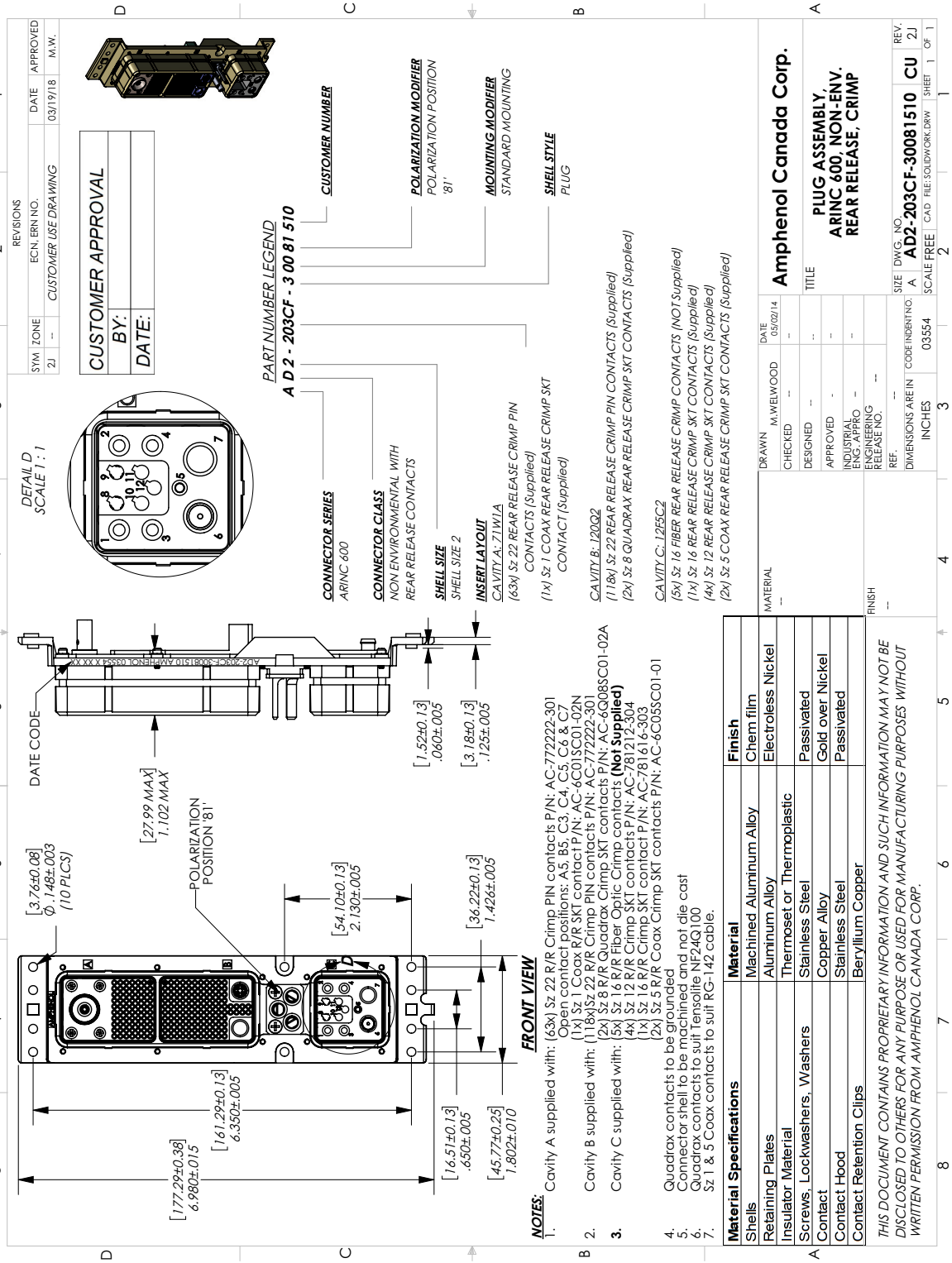


Figure 3-9: CSDU ARINC 600 tray connector

3.7 MCHPA tray connector

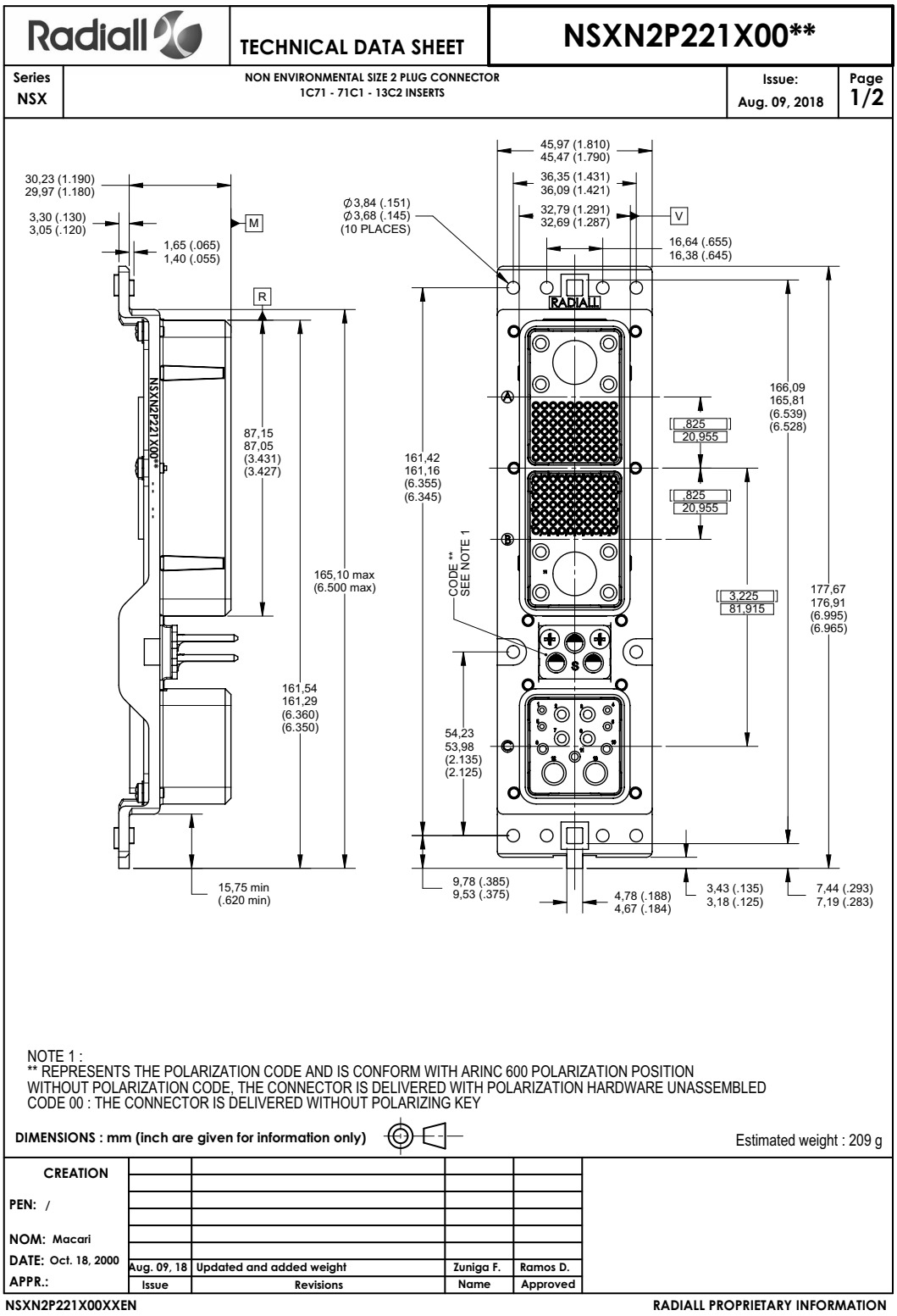


Figure 3-10: MCHPA ARINC 600 tray connector

Installation

This chapter has the following sections:

- *General installation information*
- *Mounting considerations*
- *Electrical installation and wiring*
- *Recommended cables*
- *Verifying the installation*
- *Activation of airtime services*

4.1 General installation information

4.1.1 Overview

This chapter contains considerations and recommendations for the installation of the AVIATOR 700S System. Interconnect harness wiring and physical mounting must satisfy all applicable regulations. Also see the accompanying HGA Installation Manual [8] for the antenna and also DLNA Installation Manual, which is part of the AVIATOR 700S system.

The information, drawings and wiring diagrams 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 For optimal performance from the AVIATOR 700S system you must strictly follow the installation guidelines in this chapter.

4.1.2 System components

A working system consists of:

- 1 SDU-5045 CSDU
- 1 SCM-5055 SCM
- 1 HPA-5015 MCHPA
- 1 DLNA type F
- 1 HGA for more information, refer to [8]

The SCM is powered by the CSDU. The following drawing shows the minimum installation.

Minimum system drawing

This drawing shows which units to connect as a minimum for the system to function.

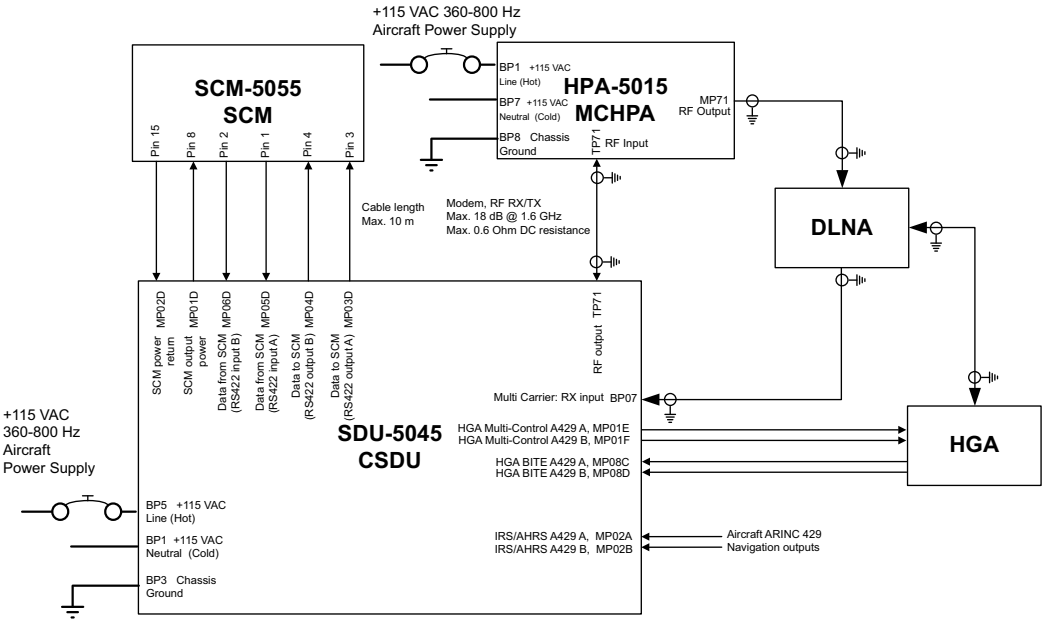


Figure 4-1: AVIATOR 700S system (minimum, AC powered)

4.2 Mounting considerations

4.2.1 Overview

For optimum system performance you must follow some guidelines on where to install the components of the AVIATOR 700S system. Installation and placement details are included in this section.

For information on requirements to cables refer to the individual sections in *Electrical installation and wiring* on page 4-6. For information on recommended cable types and lengths refer to *Recommended cables* on page 4-37.

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

4.2.2 SDU-5045 CSDU

Installation

Install the CSDU in one of the locations described below:

- Temperature/Non-temperature controlled locations and forced airflow cooling (Tray with fan/plenum)
- Temperature/Non-temperature controlled location and supplied airflow cooling (Tray integrated onto a shelf rack system)
- Pressurized/Non-pressurized locations.

Mount the CSDU in a suitable tray, refer to **Figure 3-8: Outline drawing: CSDU/MCHPA tray** and **Figure 3-9: CSDU ARINC 600 tray connector**.

Coolant air pressure drop through the CSDU (ARINC 600 Equipment Level 1)

Install the CSDU in a location with forced cooling.

The CSDU dissipates approximately 40 W and requires air at a flow rate of 26 kg/hr at a maximum of 70°C. This leads to a pressure drop of roughly 20 Pa (2 mm water, within the 5 ±3 mm of water specification of ARINC 600 [4], Level 1).

Ground bonding[1]

1. Make the grounding wires shorter than 150 mm from grounding start at cable to crimp terminal lugs.
2. Make the grounding wires as short as possible.

When you combine ground wires it is necessary that the combined wires are as short as possible.

Requirements for combined grounding wire for cockpit audio

1. Crimp with: Contact size: #22, R/R Crimp PIN contacts P/N: AC-772222-301

1. Source: 97-146191.

2. Mount according to Amphenol ARINC 600 Document SL-379-3.
3. Mount ground PIN to MP04G on ARINC 600 Connector

Chassis Ground: ARINC 600 pin BP3

Amphenol contact part number: AC-781212-304. Fit to wire AWG12 & AWG14

Total max resistance: 25 mOhm.

Shield from fluid drippage

To fulfill DO-160G Waterproofness Cat. Y, the equipment must be shielded from fluid drippage.

4.2.3 SCM-5055 SCM

Installation

1. Install the SCM in temperature controlled/non-controlled Temperature areas and inside or outside pressurized locations (e.g. avionics bay).
2. Forced flow air cooling is not required.
3. To prevent fluids from entering the SCM through the connector, select the SCM mounting orientation such that its connector is not oriented upwards
4. Mount the SCM to the aircraft structure using four fasteners through its mounting flange. Refer to **Figure 3-3: Outline drawing SCM-5055 (1/2)**. The flange thickness is 2 mm.
5. Insert the D-sub connector of the SCM cable harness into the mating connector on the SCM.
6. Torque the cable harness D-sub connector screw-locks to 0.32 Nm.
7. You may add a drip loop to the cable harness to prevent water from flowing along the cable harness and towards the SCM connector.

Ground bonding

1. Use an electrically conductive back shell for the DB15 connector.
2. Terminate the cable shields to the electrically conductive back shell.
3. Bond the SCM to the aircraft structure via the top and bottom surfaces of the SCM mounting flange. These are electrically conductive and are designated as the equipment's ground bonding points. Refer to **Figure 3-3: Outline drawing SCM-5055 (1/2)**.
4. The M3 threaded stud provides an alternative means for bonding the SCM and may be used at the installer's discretion by fitting a suitable ground bonding strap. Refer to Figure 3-2.

4.2.4 HPA-5015 MCHPA

Installation

Install the MCHPA in one of the locations described below:

- Temperature/Non-temperature controlled locations and forced airflow cooling (Tray with fan/plenum)
- Temperature/Non-temperature controlled location and supplied airflow cooling (Tray integrated onto a shelf rack system)
- Pressurized/Non-pressurized locations.

Mount the MCHPA in a suitable tray, refer to **Figure 3-8: Outline drawing: CSDU/MCHPA tray** and **Figure 3-10: MCHPA ARINC 600 tray connector**.

Coolant air pressure drop through the MCHPA (ARINC 600 Equipment Level 1)

Install the MCHPA in a location with forced cooling.

The MCHPA requires air at a flow rate of 43.9 kg/hr at a maximum of 70°C, with a maximum allowed pressure drop of 50±30 Pa (5±3 mm of water). (ARINC 600 [4] Level 1).

Ground bonding[1]

1. Make the grounding wires shorter than 150 mm from grounding start at cable to crimp terminal lugs.
2. Make the grounding wires as short as possible.

When you combine ground wires it is necessary that the combined wires are as short as possible.

Chassis Ground: ARINC 600 pin BP8

Radiall contact part number: 620 341. Fit to wire AWG18-20-22-24

Total max resistance: 25 mOhm.

Shield from fluid drippage

To fulfill DO-160G Waterproofness Cat. Y, the equipment must be shielded from fluid drippage.

1. Source: 97-146191.

4.3 Electrical installation and wiring

4.3.1 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.

4.3.2 Wiring – overview

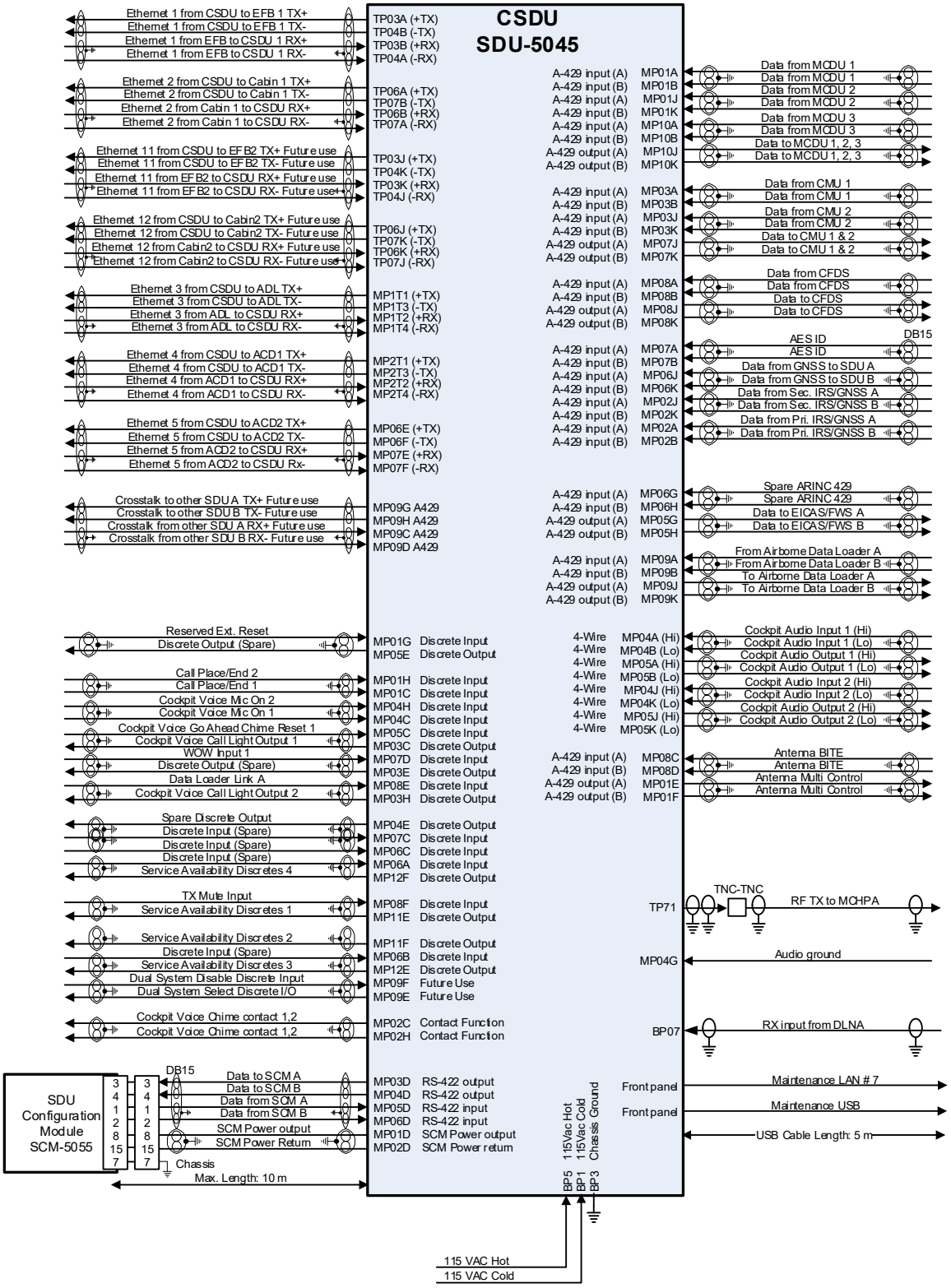


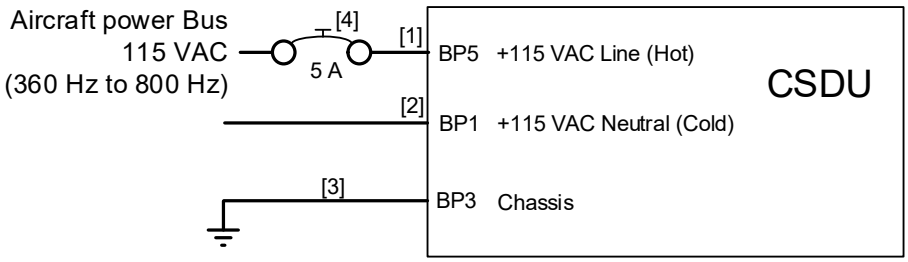
Figure 4-2: Wiring – overview

4.3.3 To wire the CSDU with AC input

ARINC-781 compliant.

The aircraft power bus provides the electric power required to operate the CSDU, and a chassis connection to the aircraft chassis and the installation tray. The +115 VAC 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 CSDU AC power supply. Requirements to the wiring are stated in the notes on the drawing and in the section *To wire the MCHPA with AC input* on page 4-10.



[1] + [2] Total resistance (Hot and cold) max. 1 Ohm incl. circuit breaker.
[3] Directly to installation tray and aircraft chassis, max. 25 mOhm resistance.
[4] Compatible with an aircraft circuit breaker of the following characteristics: 115VAC / 5A Solid state power controllers (SSPC)

Figure 4-3: Wiring AC power

The COLD does not need to go through a breaker.

The COLD must not be connected to chassis ground. Connect the COLD to the aircraft power bus as stated in the following table.

Pins for AC power

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

CSDU pin	Name	Description
BP5	+115 VAC Line (Hot)	+115 VAC Line (Hot) power input from aircraft power bus.
BP1	+115 VAC Neutral (Cold)	+115 VAC Neutral (Cold) return from aircraft power bus.
BP3	Chassis Ground	Chassis connection, connect to the installation tray and Aircraft chassis.

Table 4-1: CSDU pins (AC input)

Description of the CSDU power supply

+115 VAC Power (BP1, BP5)

The target line impedance should be as low as possible; 1 Ohm preferred maximum; should not exceed 4 Ohms.

Required current capability for the Circuit Breaker: 99 W @ 90 VAC which equals 1.1 A at the required environmental conditions. A suitable circuit breaker is **Klixon 2TC series** with 2 A current rating.

Important Use a separate 2 A circuit breaker for the AC input.

Chassis Ground (BP3)

The chassis connection makes sure that the cabinet and the installation tray has the same potential, and that there is a connection from the wiring shields to the cabinet for EMC (ElectroMagnetic Compatibility) purposes.

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

Cable requirements, CSDU power supply (AC)

Cable[a]	Maximum resistance	Other Requirements
[1] 115 VAC Line and neutral	1 Ω, incl. circuit breaker	
[2] Chassis Ground	25 mΩ	Connect directly to the aircraft chassis.

Table 4-2: Requirements to CSDU power cables (AC input)

a. The cable numbers refer to the numbers stated on the wiring drawing in the section *To wire the CSDU with AC input* on page 4-8.

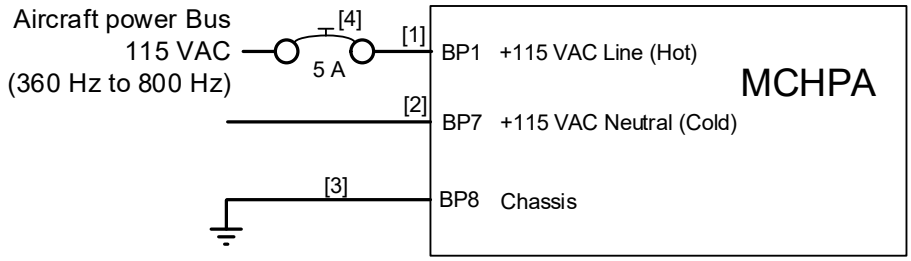
Note Maximum cable lengths are calculated and listed in the section *Allowed cable lengths for power cables* on page 4-37.

4.3.4 To wire the MCHPA with AC input

ARINC-781 compliant.

The aircraft power bus provides the electric power required to operate the MCHPA, and a chassis connection to the aircraft chassis and the installation tray. The +115 VAC 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 MCHPA AC power supply.



[1] + [2] Total resistance (Hot and cold) max. 1 Ohm incl. circuit breaker.
[3] Directly to installation tray and aircraft chassis, max. 25 mOhm resistance.
[4] Compatible with an aircraft circuit breaker of the following characteristics: 115VAC / 5A Solid state power controllers (SSPC)

Figure 4-4: Wiring AC power

The COLD does not need to go through a breaker.

The COLD must not be connected to chassis ground. Connect the COLD to the aircraft power bus as stated in the following table.

Pins for AC power

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

CSDU pin	Name	Description
BP1	+115 VAC Line (Hot)	+115 VAC Line (Hot) power input from aircraft power bus.
BP7	+115 VAC Neutral (Cold)	+115 VAC Neutral (Cold) return from aircraft power bus.
BP8	Chassis Ground	Chassis connection, connect to the installation tray and Aircraft chassis.

Table 4-3: MCHPA pins (AC input)

Description of the MCHPA power supply

+115 VAC Power (BP1, BP7)

The target line impedance should be as low as possible; 1 Ohm preferred maximum; should not exceed 4 Ohms.

Required current capability for the Circuit Breaker: 300 W @ 90 VAC which equals 3.33 A at the required environmental conditions. A suitable circuit breaker is **Klixon 2TC series** with 5 A current rating.

Important Use a separate 5 A circuit breaker for the AC input.

Chassis Ground (BP8)

The chassis connection makes sure that the cabinet and the installation tray has the same potential, and that there is a connection from the wiring shields to the cabinet for EMC (ElectroMagnetic Compatibility) purposes.

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

Cable requirements, MCHPA power supply (AC)

Cable[a]	Maximum resistance	Other Requirements
[1] 115 VAC Line and neutral	1 Ω, incl. circuit breaker	
[2] Chassis Ground	25 mΩ	Connect directly to the aircraft chassis.

Table 4-4: Requirements to CSDU power cables (AC input)

a. The cable numbers refer to the numbers stated on the wiring drawing in the section *To wire the MCHPA with AC input* on page 4-10.

Note Maximum cable lengths are calculated and listed in the section *Allowed cable lengths for power cables* on page 4-37.

4.3.5 To wire the SCM

Wiring diagram

The following drawing shows the wiring of the SCM to the CSDU. The SCM connector pin-out is compliant with ARINC-781.

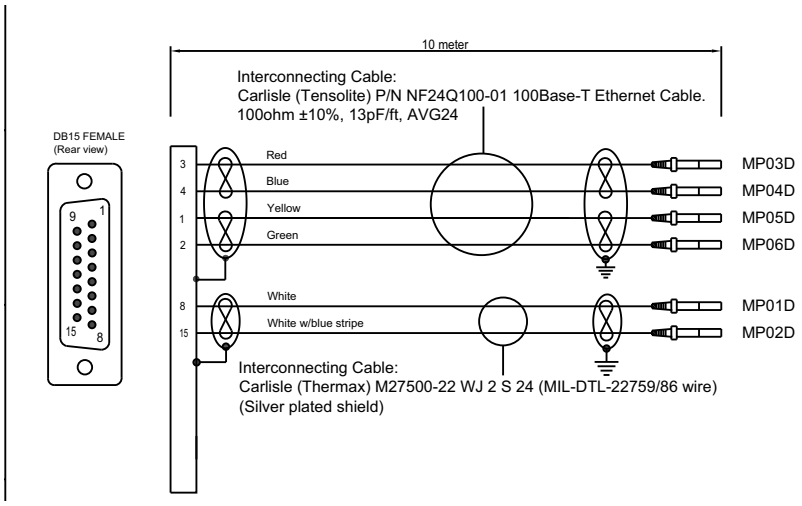


Figure 4-5: To wire the SCM

Maximum cable length: 10 m (ARINC-781)

Pins for the SCM

CSDU pin	Description
MP01D	SCM Power, +8 to 18 V
MP02D	SCM Power return 0V
MP03D	CSDU data to SCM A
MP04D	CSDU data to SCM B
MP05D	SCM data to CSDU A
MP06D	SCM data to CSDU A

Mating connector

The mating connector for use on the SCM cable harness is a 15 position D-subminiature receptacle (sockets), MIL DTL-24308 M24308/2-2 or equivalent.

4.3.6 To wire the MCHPA

ARINC-781 compliant.

There is only one coaxial cable between CSDU and MCHPA.

Cable losses

Note During installation, measure and write down the cable loss of the RF cables. See section 4.3 for the maximum loss requirement at 1.6 GHz.

Wiring diagram

See **Figure 4-1: AVIATOR 700S system (minimum, AC powered)** for the wiring for an AVIATOR 700S System with the HPA-5015 MCHPA

For the requirements to RF cable see *Recommended RF cables* on page 4-38 on pin TP71.

Pins for the MCHPA/CSDU

From	To	Description
CSDU-TP71	MCHPA-TP71	MCHPA RF input from CSDU
MCHPA-MP71	DLNA	MCHPA RF output to DLNA

4.3.7 To wire the MCDU 1, 2 and 3

ARINC-781 compliant.

The CSDU has interfaces for three high or low speed ARINC-429 interfaces for communication with MCDU #1, MCDU #2 and MCDU #3. For cable requirements see *Recommended cables for ARINC 429* on page 4-38.

Description

The Multi Control and Display Unit (MCDU) interfaces allow the CSDU to be managed from a cockpit control panel. The CSDU uses MCDU protocol standards defined in ARINC Characteristic 739 or WSCI (see ARINC 741, Part 2, Attachment 2F-42.1). Display and control details may be manufacturer-specific.

Wiring diagram

See *Wiring – overview* on page 4-7.

Pins for MCDU 1, 2 and 3

CSDU pin	Description
MP10J	Data to MCDU 1,2,3. A. (A429 output)
MP10K	Data to MCDU 1,2,3. B. (A429 output)
MP01A	Data from MCDU 1. A. (A429 input)
MP01B	Data from MCDU 1. B. (A429 input)
MP01J	Data from MCDU 2. A. (A429 input)
MP01K	Data from MCDU 2. B. (A429 input)
MP10A	Data from MCDU 3. A. (A429 input)
MP10B	Data from MCDU 3. B. (A429 input)

4.3.8 To wire the CMU 1 and 2

ARINC-781 compliant.

Description

The Communications Management Unit (CMU) or equivalent is responsible for integrating data communications or datalinks on the aircraft. The CMU manages communication across multiple subnetworks, including VHF and SATCOM networks.

Wiring diagram

See *Wiring – overview* on page 4-7.

Pins for CMU 1 and 2

CSDU pin	Description
MP07J	Data to CMU 1 and 2. A. (A429 output)
MP07K	Data to CMU 1 and 2. B. (A429 output)
MP03A	Data from CMU 1. A. (A429 input)
MP03B	Data from CMU 1. B. (A429 input)
MP03J	Data from CMU 2. A. (A429 input)
MP03K	Data from CMU 2. B. (A429 input)

4.3.9 To wire aircraft AES ID

ARINC-781 compliant.

Description of the aircraft AES ID

AES ID input for reception of a unique aircraft identification code.

Wiring diagram

See *Wiring – overview* on page 4-7

Pins for aircraft AES ID

CSDU pin	Description
MP07A	Data from AES ID. A. (A429 input)
MP07B	Data from AES ID. B. (A429 input)

4.3.10 To wire cockpit audio 1 and 2

ARINC-781 compliant.

See also the wiring of the cockpit audio discrete interfaces in section 4.3.13.

Description of the cockpit audio 1 and 2

There are two 4-wire interfaces to be connected to a headset.

Wiring diagram

See *Wiring – overview* on page 4-7

Pins for cockpit audio 1 and 2

CSDU pin	Description
MP04A	Cockpit audio input 1. High.
MP04B	Cockpit audio input 1. Low.
MP05A	Cockpit audio output 1. High.
MP05B	Cockpit audio output 1. Low.
MP04J	Cockpit audio input 2. High.
MP04K	Cockpit audio input 2. Low.
MP05J	Cockpit audio output 2. High.
MP05K	Cockpit audio output 2. Low.

4.3.11 To wire IRS/GNSS

Wiring diagram

See *Wiring – overview* on page 4-7.

Pins for IRS/GNSS

CSDU pin	Description
MP02A	Data from primary IRS/GNSS A
MP02B	Data from primary IRS/GNSS B
MP02J	Data from secondary IRS/GNSS A
MP02K	Data from secondary IRS/GNSS B
MP06J	Data from GNSS to CSDU A
MP06K	Data from GNSS to CSDU B

4.3.12 To wire antenna BITE

ARINC-781 compliant.

Description of the antenna BITE

CSDU receives antenna BITE data on this arinc 429 input.

Wiring diagram

See *Wiring – overview* on page 4-7

Pins for antenna BITE

CSDU pin	Description
MP08C	Data from antenna BITE. A. (A429 input)
MP08D	Data from antenna BITE. B. (A429 input)

4.3.13 To wire EICAS/FWS

ARINC-781 compliant.

Description of the EICAS/FWS

CSDU sends data for ECAM/FWS alert.

Wiring diagram

See *Wiring – overview* on page 4-7

Pins for EICAS/FWS

CSDU pin	Description
MP05G	Data to EICAS/FWS. A. (A429 output)
MP05H	Data to EICAS/FWS. B. (A429 output)

4.3.14 To wire discrete inputs and outputs

ARINC-781 compliant.

Description

Various discrete interfaces are available, as listed here.

Wiring diagram

See *Wiring – overview* on page 4-7

Pins for discrete inputs and outputs

CSDU Pin	Description
MP01C	Call Place End Discrete Input 1, Cockpit Voice discrete input
MP01H	Call Place End discrete Input 2. Cockpit Voice discrete input
MP01G	External reset Discrete Input
MP02C	Cockpit Voice Chime signal contact 1. Discrete "relay" contact
MP02H	Cockpit Voice Chime Signal Contact 2. Discrete "relay" contact

CSDU Pin	Description
MP03C	Cockpit Voice Call Light output 1. Cockpit Voice discrete output
MP03E	ACARS Service Available discrete output (spare)
MP03H	Cockpit Voice Call Light output 2. Cockpit Voice discrete output
MP04C	Cockpit Voice Mic On input 1. Cockpit Voice discrete input
MP04E	Spare
MP04H	Cockpit Voice Mic On input 2. Cockpit Voice discrete input
MP05C	Cockpit Voice Go Ahead Chime reset 1. Cockpit Voice discrete input
MP05E	Spare discrete output #3
MP06A	Chime/Lamps Inhibit Discrete Input (generic input)
MP07C	Spare discrete input #4
MP07D	WOW input1
MP08E	Data loader link A. Discrete input
MP08F	TX mute input. Discrete input
MP09E	Dual System Select Discrete I/O (provision)
MP09F	Dual System Disable Discrete I/O (provision)
MP11E	Service Availability Discretes 1 - Cockpit Service Available (spare)
MP11F	Service Availability Discretes 2 - Cabin Service Available (spare)
MP12E	Service Availability Discretes 3 - Cabin Incoming Call (spare)
MP12F	Service Availability Discretes 4 - System FAIL (spare)

4.3.15 To wire airborne data loader

ARINC-781 compliant.

Description of the data loaded

Supports ARINC 429 data loaders compliant to ARINC 615-3.

Wiring diagram

See *Wiring – overview* on page 4-7

Pins for airborne ARINC 429 (ARINC 615-3) data loader

CSDU pin	Description
MP09A	From airborne data loader A
MP09B	From airborne data loader B
MP09J	To airborne data loader A

CSDU pin	Description
MP09K	To airborne data loader B

4.3.16 To wire Antenna multi control

ARINC-781 compliant.

Description of the antenna multi control

Arinc 429 output to control High Gain Antenna.

Wiring diagram

See *Wiring – overview* on page 4-7

Pins for antenna multi control

CSDU pin	Description
MP01E	Data to HGA. A. (A429 output)
MP01F	Data from HGA. B. (A429 output)

4.3.17 To wire fault/health reporting (CFDS)

ARINC-781 compliant.

Description of the fault/health reporting

The CSDU communicates Built-In Test Equipment (BITE) reporting to the aircraft Centralized Fault Display System (CFDS) or Central Maintenance Computer (CMC).

Wiring diagram

See *Wiring – overview* on page 4-7

Pins for fault/health reporting

CSDU pin	Description
MP08A	Data from CFDS A
MP08B	Data from CFDS B
MP08J	Data to CFDS A
MP08K	Data to CFDS B

4.3.18 To wire Ethernet 1 (AISD#1 or EFB 1)

ARINC-781 compliant.

- Ethernet Port Definition: Electronic Flight Bag 1
- Security Domain: Airline Information Services Domain (AISD)

Ethernet 11 (AISD#2):

Description of Ethernet 1 (AISD#1 or EFB 1)

The EFB 1 interface is for cockpit (AISD) applications which require an IP data connection, for example for EFB connectivity.

Wiring diagram

See *Wiring – overview* on page 4-7

Pins for Ethernet 1 (AISD#1 or EFB 1)

CSDU pin	Description
TP03A	Ethernet 1 from CSDU to User + (AISD#1)
TP03B	Ethernet 1 from User to CSDU + (AISD#1)
TP04B	Ethernet 1 from CSDU to User - (AISD#1)
TP04A	Ethernet 1 from User to CSDU - (AISD#1)

4.3.19 To wire Ethernet 11 (AISD#2 or EFB2)

The Ethernet 11 interface is ARINC-781 compliant, but reserved for flight test use only and disabled for general use.

- Ethernet Port Definition: Electronic Flight Bag 2
- Security Domain: Airline Information Services Domain (AISD)

Description of Ethernet 11 (AISD#2 or EFB 2)

This interface is for test purposes only and is only accessible when the aircraft is in flight test mode.

Wiring diagram

See *Wiring – overview* on page 4-7

Pins for Ethernet 11 (AISD#2 or EFB 2)

CSDU pin	Description
TP03J	Ethernet 11 from CSDU to User + (AISD#2)
TP03K	Ethernet 11 from User to CSDU + (AISD#2)
TP04K	Ethernet 11 from CSDU to User - (AISD#2)
TP04J	Ethernet 11 from User to CSDU - (AISD#2)

4.3.20 To wire Ethernet 3 (ADL in ACD)

ARINC-781 compliant.

Description

- Ethernet Port Definition: Airborne Data Loader
- Security Domain: Aircraft Control Domain (ACD)

Wiring diagram

See *Wiring – overview* on page 4-7

Pins for Ethernet 3 (ACD) Quadrax connector

CSDU pin	Description
MP 1T 1	Ethernet 3 from CSDU to ADL +
MP 1T 2	Ethernet 3 from ADL to CSDU +
MP 1T 3	Ethernet 3 from CSDU to ADL -
MP 1T 4	Ethernet 3 from ADL to CSDU -

4.3.21 To wire Ethernet 2 (PIESD#1 or Cabin1)

- Ethernet Port Definition: Cabin 1
- Security Domain: Passenger Information Entertainment Services Domain (PIESD)

Description of Ethernet 2 (PIESD#1)

This interface is for cabin (PIESD) applications.

Wiring diagram

See *Wiring – overview* on page 4-7

Pins for Ethernet 2 (PIESD#1)

CSDU pin	Description
TP06A	Ethernet 2 from CSDU to User + (PIESD#1)
TP06B	Ethernet 2 from User to CSDU + (PIESD#1)
TP07B	Ethernet 2 from CSDU to User - (PIESD#1)
TP07A	Ethernet 2 from User to CSDU - (PIESD#1)

4.3.22 To wire Ethernet 12 (PIESD#2 or Cabin2)

The Ethernet 12 interface is ARINC-781 compliant, but reserved for flight test use only and disabled for general use.

- Ethernet Port Definition: Cabin 2

- Security Domain: Passenger Information Entertainment Services Domain (PIESD)

Description of Ethernet 12 (PIESD#2)

This interface is for cabin (PIESD) applications. Future use of the Cabin 2 interface is Crosstalk master/slave interface to other CSDU.

Wiring diagram

See *Wiring – overview* on page 4-7

Pins for Ethernet 12 (PIESD#2)

CSDU pin	Description
TP06J	Ethernet 12 from CSDU to User + (PIESD#2)
TP06K	Ethernet 12 from User to CSDU + (PIESD#2)
TP07K	Ethernet 12 from CSDU to User - (PIESD#2)
TP07J	Ethernet 12 from User to CSDU - (PIESD#2)

4.3.23 To wire Ethernet 4 (ACD#1)

ARINC-781 / ARINC-771 compliant, 10/100BASE-TX, Cabin 2.

Description of Ethernet 4 (ACD#1)

This interface is software disabled and reserved for future use.

- Ethernet Port Definition: Cockpit Priority Data 1
- Security Domain: Aircraft Control Domain (ACD)

Wiring diagram

See *Wiring – overview* on page 4-7

Pins for Ethernet 4 (ACD#1) Quadrax connector

CSDU pin	Description
MP 2T 1	Ethernet 4 from CSDU to User +
MP 2T 2	Ethernet 4 from User to CSDU +
MP 2T 3	Ethernet 4 from CSDU to User -
MP 2T 4	Ethernet 4 from User to CSDU -

4.3.24 To wire Ethernet 5 (ACD#2)

The Ethernet 5 interface is ARINC-781 compliant, but reserved for flight test use only and disabled for general use.

Description

This interface is test purposes only and is only accessible when the aircraft is in Flight Test mode.

Wiring diagram

See *Wiring – overview* on page 4-7

Pins for Ethernet 5 (ACD#2)

CSDU pin	Description
MP06E	Ethernet 5 (Spare) from CSDU to User + (ACD#2)
MP07E	Ethernet 5 (Spare) from User to CSDU + (ACD#2)
MP06F	Ethernet 5 (Spare) from CSDU to User - (ACD#2)
MP07F	Ethernet 5 (Spare) from User to CSDU - (ACD#2)

4.3.25 To wire the Maintenance interfaces

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

SDU-5045 Compact Satellite Data Unit

The CSDU Front Panel Ethernet interface is for shop maintenance use only and disabled for general use.

The following drawing shows the wiring of the Maintenance PC connection on the CSDU front via Micro USB.

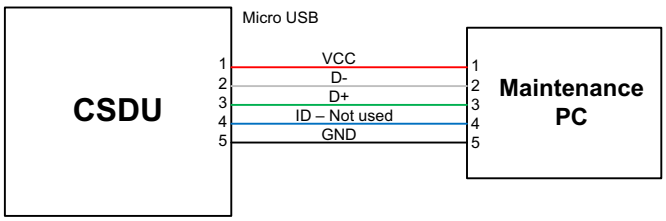


Figure 4-6: Wiring Maintenance PC via Micro USB

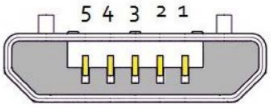


Figure 4-7: Micro USB maintenance connector of the CSDU, face view of engaging end

The following list shows the pins used for the Micro USB interface (Front connector on the CSDU).

Pin	Pin Name	Description
1	VCC	+5 VDC
2	D-	Data -
3	D+	Data +
4	ID	Not Used
5	GND	Signal ground

Description of the maintenance interfaces on the CSDU

Use the maintenance interface on the front of the CSDU or the AISD 1/EFB 1 (Ethernet 11) interface for maintenance purposes. These interfaces are only accessible for maintenance when the aircraft is on the ground. The interfaces can be accessed from a PC with Ethernet interface or a Micro USB connector.

The maintenance interface has the following characteristics:

- Ethernet 11 (AISD 1 / EFB 1):100 Base-T /10 Base-T Ethernet / IEEE 802.3
- Front Panel Micro USB (115200 bps)

Person Activated Self Test (PAST) Push-To-Test button

The CSDU resets the system and initiates a Person Activated Self-Test "PAST" when the Push-To-Test button on the front panel is pressed for at least 2 seconds and less than 20 seconds and while in Maintenance Allowed mode (i.e. a PC is connected via the Micro USB maintenance interface on the front of the CSDU or via the AISD 1 / EFB 1 Ethernet interface).

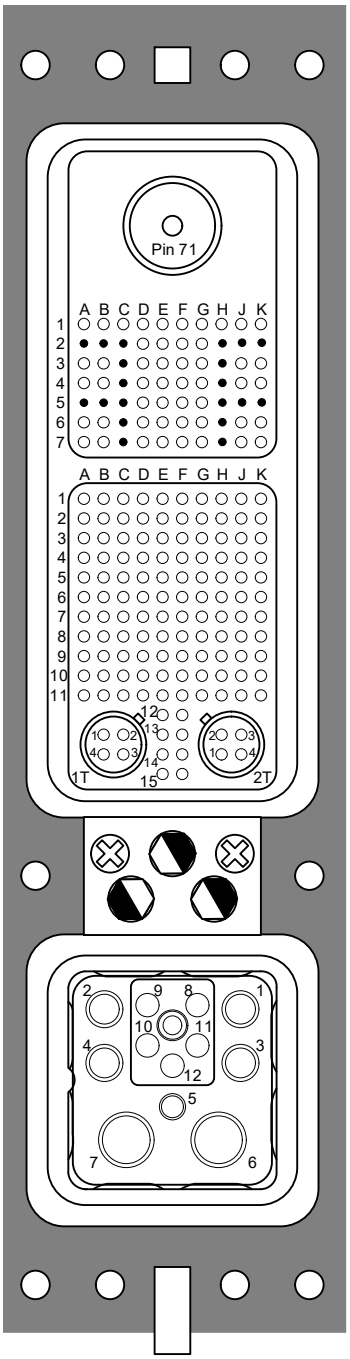
Figure 4-8: SDU-5045 Front plate

The front panel status LEDs (see *Status signalling with LEDs* on page 7-8) will display the following:

- Steady red: A fault, which may degrade the system operation, is present in the CSDU.
- Flashing short green/long pause: Power On Self-Test (POST) or Person Activated Self-Test (PAST) is in progress.
- Flashing long green/short orange: No failure, but a BITE failure/warning is logged in the BITE log, severity ERROR.
- Steady green: No faults.
- Off->orange->off->red->off->green->off: Indicator Test
- When powering up the initial color of the 3 LEDs is orange.

4.3.26 CSDU ARINC 600 connector block

ARINC 600 connector drawing - overview



Size 2 Shell receptacle

Top Plug (TP):
Insert arrangement 08
Receptacles
1 Size 1 Coax cavity
50 Size 22 sockets
• = empty cavity

Middle Plug (MP):
Insert arrangement 120Q2
Receptacles
2 Size 8 Quadrax cavities
118 Size 22 sockets

Index pin code 81 (5,2,2)
Light areas are key holes in receptacle.

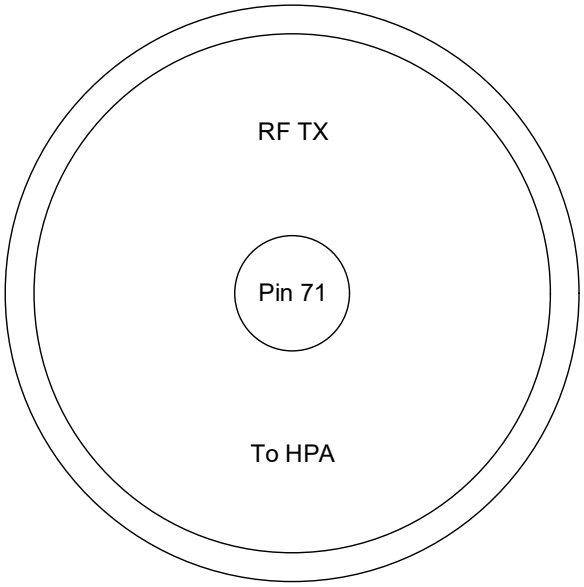
Bottom Plug (BP):
Insert arrangement 12F5C2
Receptacles
4 Size 12 pins
1 Size 16 pin,
2 Size 5 coax cavities
5 Size 16 optical cavities (not used)

Figure 4-9: CSDU ARINC 600 connector specifications

ARINC 600 connector drawings with functions

The following drawing shows the top plug, middle plug and bottom plug of the SDU rear receptacle with pin functions. For wiring details of this connector see *Electrical installation and wiring* on page 4-6.

Note The pins in ***grey*** colour are not used or empty cavity and not connected inside CSDU.



	A	B	C	D	E	F	G	H	J	K
1	ATE Pin 1 (5V on BP6 Discrete Input)	ATE Pin 2 (26V on BP6 Discrete Input)	ATE Pin 3 (Remote WLU GND)	ATE Pin 4 (Cabin Domain disable Discrete Input)	ATE Pin 5 (Slave CSDU Reset Discrete Output)	ATE Pin 6 (Fall-back SDU Reset Discrete Output)	ATE Pin 7 (ATE pin A)	ATE Pin 8 (ATE pin B)	ATE Pin 9 (28V DC Fan Power)	ATE Pin 10 (Fan Return)
2	ATE Pin 11 (Empty Cavity)	ATE Pin 12 (Empty Cavity)	ATE Pin 13 (Empty Cavity)	ATE Pin 14 (Remote WLU Status Discrete Input)	ATE Pin 15 (Remote WLU PSU Status Discrete Input)	ATE Pin 16 (Remote WLU Spare Control Discr. Output)	ATE Pin 17 (Remote WLU PSU Control Discr. Output)	ATE Pin 18 (Empty Cavity)	ATE Pin 19 (Empty Cavity)	ATE Pin 20 (Empty Cavity)
3	Ethernet 1 from CSDU to EFB1 + (AISD)	Ethernet 1 from EFB1 to CSDU + (AISD)	Empty Cavity	Config Pin 1 (0V Common)	Config Pin 2	Config Pin 3	Config Pin 4 SCM installed	Empty Cavity	Ethernet 11 From CSDU to EFB 2 + (AISD)	Ethernet 11 From EFB 2 to CSDU + (AISD)
4	Ethernet 1 from EFB1 to CSDU - (AISD)	Ethernet 1 from CSDU to EFB1 - (AISD)	Empty Cavity	Config Pin 5 SDU Number	Config Pin 6	Config Pin 7	Config Pin 8	Empty Cavity	Ethernet 11 From EFB 2 to CSDU - (AISD)	Ethernet 11 From CSDU to EFB 2 - (AISD)
5	Empty Cavity	Empty Cavity	Empty Cavity	Config Pin 9	Config Pin 10	Config Pin 11	Config Pin 12	Empty Cavity	Empty Cavity	Empty Cavity
6	Ethernet 2 from CSDU to Cabin 1 + (PIESD)	Ethernet 2 from Cabin 1 to CSDU + (PIESD)	Empty Cavity	Config Pin 13 [SPARE]	Config Pin 14 [SPARE]	Config Pin 15 [SPARE]	Config Pin 16 [SPARE]	Empty Cavity	Ethernet 12 From CSDU to Cabin 2 + (PIESD)	Ethernet 12 From Cabin 2 to CSDU + (PIESD)
7	Ethernet 2 from Cabin 1 to CSDU - (PIESD)	Ethernet 2 from CSDU to Cabin 1 - (PIESD)	Empty Cavity	Config Pin 17 [SPARE]	Config Pin 18 [SPARE]	Config Pin 19 [SPARE]	Config Pin 20 [SPARE]	Empty Cavity	Ethernet 12 From Cabin 2 to CSDU - (PIESD)	Ethernet 12 From CSDU to Cabin 2 - (PIESD)

Figure 4-10: CSDU Top Plug in rear receptacle with pin functions

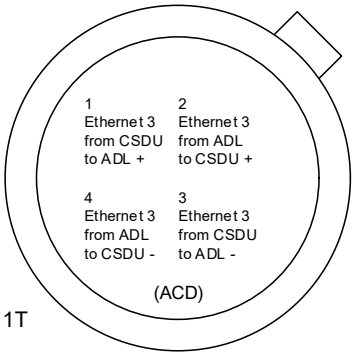
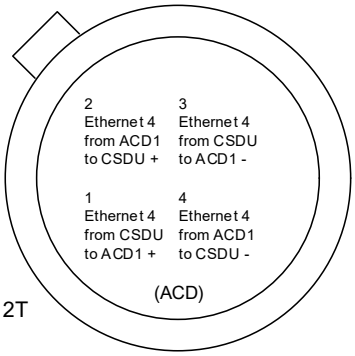
	A	B	C	D	E	F	G	H	J	K
1	Data from MCDU 1 A	Data from MCDU 1 B	Call Place/End Discrete Input 1	SCM Pwr +8 to 15V	Multi-Control Output A	Multi-Control Output B	Resv Ext Reset Discrete Input	Call Place/End Discrete Input 2	Data from MCDU 2 A	Data from MCDU 2 B
2	Data from Primary IRS/GNSS A	Data from Primary IRS/GNSS B	Cockpit Voice Chime Signal Contact 1	SCM Pwr Return 0V	BITE Input From HPA A	BITE Input From HPA B	Rsvd Mfr-Specific 0-28V Discrete Output	Cockpit Voice Chime Signal Contact 2	Data from Secondary IRS A	Data from Secondary IRS B
3	Data from CMU 1 A	Data from CMU 1 B	Cockpit Voice Call Light Output 1	SDU Data to SCM A	Spare/ACARS Service Avail. Discrete Output	Spare Discrete Input	SPARE	Cockpit Voice Call Light Output 2	Data from CMU 2 A	Data from CMU 2 B
4	Cockpit Audio Input 1 High	Cockpit Audio Input 1 Low	Cockpit Voice Mic-On Input 1	SDU Data to SCM B	Spare/Slave TX Mute Discrete Output	Spare Discrete Input	AUDIO GND	Cockpit Voice Mic-On Input 2	Cockpit Audio Input 2 High	Cockpit Audio Input 2 Low
5	Cockpit Audio Output 1 High	Cockpit Audio Output 1 Low	Cockpit Voice Go Ahead Chime Reset 1	SCM Data to SDU A	Spare Discrete Output	Spare Discrete Input	Data to EICAS/FWS A	Data to EICAS/FWS B	Cockpit Audio Output 2 High	Cockpit Audio Output 2 Low
6	Spare or Chime/Lamps Inhibit Discrete Input	Spare or Wifi Disable Discrete Input	Spare or LSWD Discrete Input	SCM Data to SDU B	Ethernet 5 10 Ethernet T from CSDU to Prio. Data + (ACD2)	Ethernet 5 10 Ethernet T from CSDU to Prio. Data - (ACD2)	Spare ARINC 429 Input A	Spare ARINC 429 Input B	Data from GNSS to SDU A	Data from GNSS to SDU B
7	AES ID Input A	AES ID Input B	Spare Discrete Input	WOW Input 1	Ethernet 5 10 Ethernet T from Prio. Data to CSDU + (ACD2)	Ethernet 5 10 Ethernet T from Prio. Data to CSDU - (ACD2)	Spare ARINC 429 Output A	Spare ARINC 429 Output B	Data to CMU 1 & 2 A	Data to CMU 1 & 2 B
8	Data from CFDS A	Data from CFDS B	BITE Input Top/Port BSU/Ant A	BITE Input Top/Port BSU/Ant B	Data Loader Link A	TX Mute Input	BITE Input STBD BSU A	BITE Input STBD BSU B	Data to CFDS A	Data to CFDS B
9	From Airborne Data Loader A	From Airborne Data Loader B	Crosstalk from other SDU A	Crosstalk from other SDU B	Dual System Select Discrete I/O	Dual System Disable Discrete I/O	Crosstalk to other SDU A	Crosstalk to other SDU B	To Airborne Data Loader A	To Airborne Data Loader B
10	Data from MCDU 3 A	Data from MCDU 3 B	Port BSU HPA Mute Input A	Port BSU HPA Mute Input B	LGA LNA On/Off Control	BITE Input from LGA LNA	STBD BSU HPA Mute Input A	STBD BSU HPA Mute Input B	Data to MCDU 1, 2, 3 A	Data to MCDU 1, 2, 3 B
11	POTS 1 A	POTS 1 B	Cabin CEPT-E1 Data Output A	Cabin CEPT-E1 Data Output B	Service Availability Discretes 1	Service Availability Discretes 2	Cabin CEPT-E1 Data Input A	Cabin CEPT-E1 Data Input B	POTS 2 A	POTS 2 B
12					Service Availability Discretes 3	Service Availability Discretes 4				
13					Service Availability Discretes 5	Service Availability Discretes 6				
14					Service Availability Discretes 7	Service Availability Discretes 8				
15					Service Availability Discretes 9	Service Availability Discretes 10				

Figure 4-11: CSDU Middle Plug in rear receptacle with pin functions

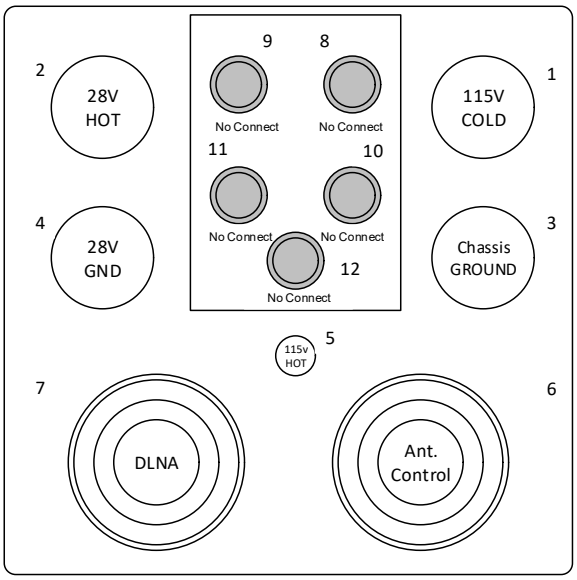


Figure 4-12: CSDU Bottom Plug in rear receptacle with pin functions

Pin-out for CSDU rear receptacle (top plug)

Pin	Pin name
TP71	RF TX or RX/TX, to HPA
TP01A	ATE pin 1
TP01B	ATE pin 2
TP01C	ATE pin 3
TP01D	ATE pin 4
TP01E	ATE pin 5
TP01F	ATE pin 6 (Spare Discrete Output #5)
TP01G	ATE pin 7 (ATE Pin A Discrete Input)
TP01H	ATE pin 8 (ATE Pin B Discrete Input)
TP01J	ATE pin 9
TP01K	ATE pin 10
TP02A	Empty Cavity
TP02B	Empty Cavity
TP02C	Empty Cavity
TP02D	ATE pin 14
TP02E	ATE pin 15
TP02F	ATE pin 16
TP02G	ATE pin 17
TP02H	ATE pin 18: Empty Cavity
TP02J	ATE pin 19: Empty Cavity
TP02K	ATE pin 20: Empty Cavity
TP03A	Ethernet 1 from CSDU to User + (AISD#1)
TP03B	Ethernet 1 from User to CSDU + (AISD#1)
TP03C	Empty cavity
TP03D	Config Pin 1 (0V Common)
TP03E	No Connect
TP03F	No Connect
TP03G	Config Pin 4 (SCM Presence)
TP03H	Empty Cavity
TP03J	Ethernet 11 from CSDU to EFB2+ (AISD#2)
TP03K	Ethernet 11 from EFB2 to CSDU+ (AISD#2)
TP04A	Ethernet 1 from EFB1 to CSDU - (AISD#1)
TP04B	Ethernet 1 from CSDU to EFB1 - (AISD#1)
TP04C	Empty cavity!
TP04D	Config Pin 5 (SDU Number)
TP04E	No Connect

Pin	Pin name
TP04F	No Connect
TP04G	No Connect
TP04H	Empty Cavity
TP04J	Ethernet 11 from EFB2 to CSDU- (AISD#2)
TP04K	Ethernet 11 from CSDU to EFB2- (AISD#2)
TP05A	Empty Cavity
TP05B	Empty Cavity
TP05C	Empty Cavity
TP05D	No connect
TP05E	No connect
TP05F	No connect
TP05G	No connect
TP05H	Empty Cavity
TP05J	Empty Cavity
TP05K	Empty Cavity
TP06A	Ethernet 2 from CSDU to User+ (PIESD#1)
TP06B	Ethernet 2 from User to CSDU+ (PIESD#1)
TP06C	Empty Cavity
TP06D	No connect
TP06E	No connect
TP06F	No connect
TP06G	No connect
TP06H	Empty Cavity
TP06J	Ethernet 12 from CSDU to User+ (PIESD#2)
TP06K	Ethernet 12 from User to CSDU+ (PIESD#2)
TP07A	Ethernet 2 from User to CSDU- (PIESD#1)
TP07B	Ethernet 2 from CSDU to User- (PIESD#1)
TP07C	Empty cavity
TP07D	No connect
TP07E	No connect
TP07F	No connect
TP07G	No connect
TP07H	Empty Cavity
TP07J	Ethernet 12 from User to CSDU- (PIESD#2)
TP07K	Ethernet 12 from CSDU to User- (PIESD#2)

Table 4-5: Pin allocation for the CSDU top plug

Pin-out for CSDU rear receptacle (middle plug)

Pin	Pin name and description
MP01A	Data from MCDU 1 A
MP01B	Data from MCDU 1 B
MP01C	Call Place End Discrete Input 1
MP01D	SCM Power output 15 V
MP01E	Multi Control output A429 High
MP01F	Multi Control output A429 Low
MP01G	Ext Reset Discrete Input
MP01H	Call Place End discrete Input 2.
MP01J	Data from MCDU 2 A
MP01K	Data from MCDU 2 B
MP02A	Data from Primary IRS/ GNSS A
MP02B	Data from Primary IRS/ GNSS B
MP02C	Cockpit Voice Chime signal contact 1
MP02D	SCM Power return 0 V
MP02E	No Connect
MP02F	No Connect
MP02G	No Connect
MP02H	Cockpit Voice Chime Signal Contact 2
MP02J	Data from Secondary IRS A
MP02K	Data from Secondary IRS B
MP03A	Data from CMU 1 A
MP03B	Data from CMU 1 B
MP03C	Cockpit Voice Call Light output 1
MP03D	Data to SCM A
MP03E	ACARS Service available discrete output
MP03F	No Connect
MP03G	No Connect
MP03H	Cockpit Voice Call Light output 2
MP03J	Data from CMU 2 A
MP03K	Data from CMU 2 B
MP04A	Cockpit audio input 1 High

Pin	Pin name and description
MP04B	Cockpit audio input 1 Low
MP04C	Cockpit Voice Mic On Input 1
MP04D	SDU Data to SCM B
MP04E	Spare
MP04F	No Connect
MP04G	Audio Ground
MP04H	Cockpit Voice Mic On input 2
MP04J	Cockpit audio input 2 High
MP04K	Cockpit audio input 2 Low
MP05A	Cockpit audio output 1High
MP05B	Cockpit audio output 1Low
MP05C	Cockpit Voice Go Ahead Chime reset 1
MP05D	SCM Data to SDU A
MP05E	Spare discrete output #3
MP05F	No Connect
MP05G	Spare ARINC 429 Output #1 A
MP05H	Spare ARINC 429 Output #1 B
MP05J	Cockpit Audio Output 2 High
MP05K	Cockpit Audio Output 2 Low
MP06A	Chime/Lamps Inhibit Discrete input
MP06B	Spare
MP06C	Spare
MP06D	SCM Data to SDU B
MP06E	Ethernet 5 Ethernet F from SDU to User+ (ACD2)
MP06F	Ethernet 5 Ethernet F from SDU to User- (ACD2)
MP06G	Spare ARINC 429 Input A.
MP06H	Spare ARINC 429 Input B.
MP06J	Data from GNSS to SDU A
MP06K	Data from GNSS to SDU B

Table 4-6: Pin allocation for the CSDU middle plug 1/2

Pin	Pin name and description
MP07A	AES ID input A
MP07B	AES ID input B
MP07C	Spare discrete input #4
MP07D	WOW input 1
MP07E	Ethernet 5, Ethernet T from User to SDU+ (ACD2)
MP07F	Ethernet 5, Ethernet T from User to SDU- (ACD2)
MP07G	Spare ARINC 429 Output #2 A - Not Used
MP07H	Spare ARINC 429 Output #2 B - Not Used
MP07J	Data to CMU 1 & 2. A
MP07K	Data to CMU 1 & 2. B
MP08A	Data from CFDS A
MP08B	Data from CFDS B
MP08C	BITE Input Top/Port BSU/Ant A
MP08D	BITE Input Top/Port BSU/Ant B
MP08E	Data loader link A
MP08F	TX mute input
MP08G	Spare Arinc input A
MP08H	Spare Arinc input B
MP08J	Data to CFDS A
MP08K	Data to CFDS B
MP09A	From airborne data loader A.
MP09B	From airborne data loader B
MP09C	Crosstalk from other SDU A
MP09D	Crosstalk from other SDU B
MP09E	Dual System Select Discrete I/O
MP09F	Dual System Disable Discrete Input
MP09G	Crosstalk to other SDU A
MP09H	Crosstalk to other SDU B
MP09J	To airborne data loader A
MP09K	To airborne data loader B
MP10A	Data from MCDU 3 A
MP10B	Data from MCDU 3 B
MP10C	Data from BSU HPA Mute A

Pin	Pin name and description
MP10D	Data from BSU HPA Mute B
MP10E	LGA LNA On/Off Control discrete output
MP10F	BITE Input from LGA LNA
MP10G	Data from STBD BSU HPA Mute A
MP10H	Data from STBD BSU HPA Mute B
MP10J	Data to MCDU 1, 2, 3 A
MP10K	Data to MCDU 1, 2, 3 B
MP11A	POTS1 A (TIP) (Spare-Not used)
MP11B	POTS1 B (RING) (Spare-Not used)
MP11C	No Connect
MP11D	No Connect
MP11E	Service Availability Discretes 1
MP11F	Service Availability Discretes 2
MP11G	No Connect
MP11H	No Connect
MP11J	POTS 2. A (TIP) (Spare-Not used)
MP11K	POTS 2 B (RING) (Spare-Not used)
MP12E	Service Availability Discretes 3
MP12F	Service availability discretes 4. Discrete output. System fail.
MP13E	No Connect
MP13F	No Connect
MP14E	No Connect
MP14F	No Connect
MP15E	No Connect
MP15F	No Connect
MP1T 1	Ethernet 3 from CSDU to ADL + (ACD)
MP1T 2	Ethernet 3 from ADL. to CSDU + (ACD)
MP1T 3	Ethernet 3 from CSDU to ADL - (ACD)
MP1T 4	Ethernet 3 from ADL to CSDU - (ACD)
MP2T 1	Ethernet 4 from CSDU to ACD1 + (ACD1)
MP2T 2	Ethernet 4 from ACD1 to CSDU + (ACD1)
MP2T 3	Ethernet 4 from CSDU to ACD1 - (ACD1)
MP2T 4	Ethernet 4 from ACD1 to CSDU - (ACD1)

Table 4-7: Pin allocation for the CSDU middle plug 2/2

Pin-out for CSDU rear receptacle (bottom plug)

Pin	Pin name and description
BP1	115 V COLD. 115 VAC power return
BP2	28 V HOT. 28 VDC power (No Connect - Provision only)
BP3	Chassis Ground
BP4	28 V GND. 28 VDC power return (No Connect - Provision only)
BP5	115V HOT. 115 VAC power
BP6	No Connect
BP7	DLNA
BP8 BP9 BP10 BP11 BP12	No Connect

4.3.27 MCHPA ARINC 600 connector block

ARINC 600 connector drawing - overview

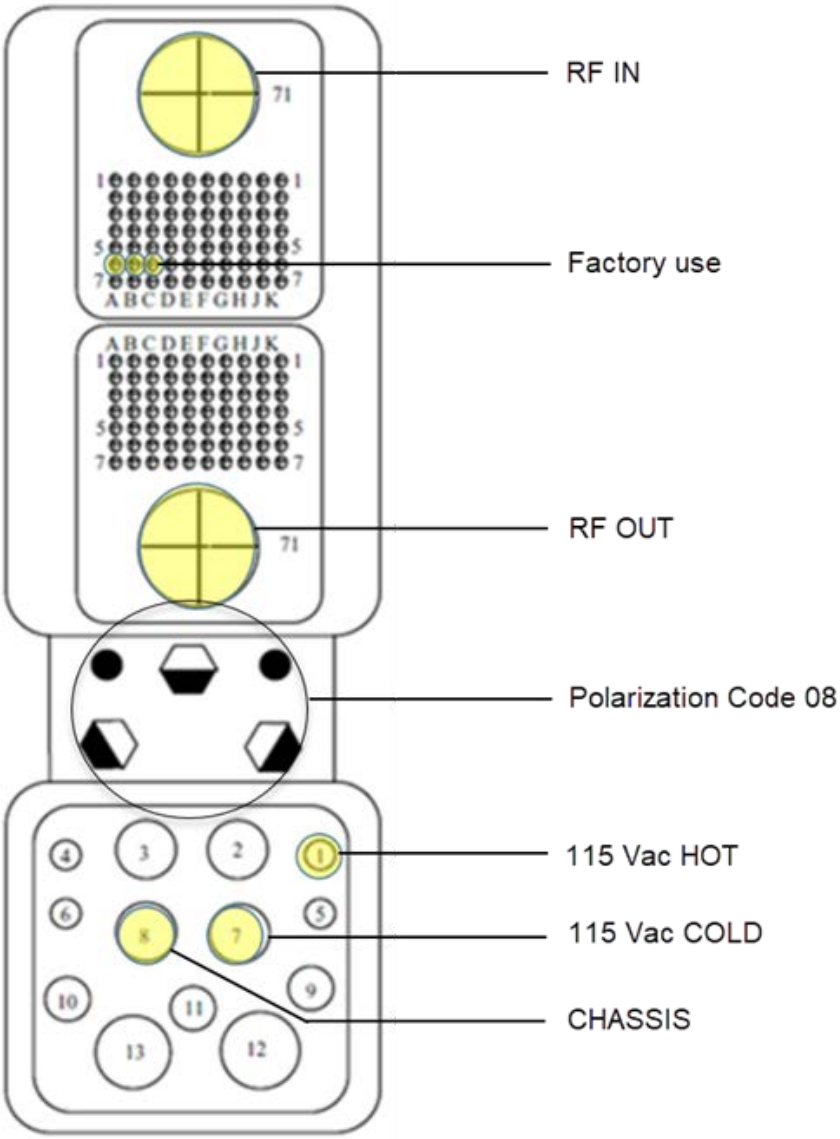


Figure 4-13: MCHPA ARINC 600 connector specifications

Note Other pins are not used by MCHPA.

Pin-out for MCHPA rear receptacle (top plug)

Pin	Pin name
TP71	RF IN from CSDU
TP01A	No connect
TP01B	No connect
TP01C	No connect
TP01D	No connect
TP01E	No connect
TP01F	No connect
TP01G	No connect
TP01H	No connect
TP01J	No connect
TP01K	No connect
TP02A	No connect
TP02B	No connect
TP02C	No connect
TP02D	No connect
TP02E	No connect
TP02F	No connect
TP02G	No connect
TP02H	No connect
TP02J	No connect
TP02K	No connect
TP03A	No connect
TP03B	No connect
TP03C	No connect
TP03D	No connect
TP03E	No connect
TP03F	No connect
TP03G	No connect
TP03H	No connect
TP03J	No connect
TP03K	No connect
TP04A	No connect
TP04B	No connect
TP04C	No connect
TP04D	No connect
TP04E	No Connect

Pin	Pin name
TP04F	No Connect
TP04G	No Connect
TP04H	No connect
TP04J	No connect
TP04K	No connect
TP05A	No connect
TP05B	No connect
TP05C	No connect
TP05D	No connect
TP05E	No connect
TP05F	No connect
TP05G	No connect
TP05H	No connect
TP05J	No connect
TP05K	No connect
TP06A	Factory use only
TP06B	Factory use only
TP06C	Factory use only
TP06D	No connect
TP06E	No connect
TP06F	No connect
TP06G	No connect
TP06H	No connect
TP06J	No connect
TP06K	No connect
TP07A	No connect
TP07B	No connect
TP07C	No connect
TP07D	No connect
TP07E	No connect
TP07F	No connect
TP07G	No connect
TP07H	No connect
TP07J	No connect
TP07K	No connect

Table 4-8: Pin allocation for the MCHPA top plug

Pin-out for MCHPA rear receptacle (middle plug)

Pin	Pin name
MP71	RF OUT to DLNA
MPMP01A	No connect
MP01B	No connect
MP01C	No connect
MP01D	No connect
MP01E	No connect
MP01F	No connect
MP01G	No connect
MP01H	No connect
MP01J	No connect
MP01K	No connect
MP02A	No connect
MP02B	No connect
MP02C	No connect
MP02D	No connect
MP02E	No connect
MP02F	No connect
MP02G	No connect
MP02H	No connect
MP02J	No connect
MP02K	No connect
MP03A	No connect
MP03B	No connect
MP03C	No connect
MP03D	No connect
MP03E	No connect
MP03F	No connect
MP03G	No connect
MP03H	No connect
MP03J	No connect
MP03K	No connect
MP04A	No connect
MP04B	No connect
MP04C	No connect
MP04D	No connect
MP04E	No Connect

Pin	Pin name
MP04F	No Connect
MP04G	No Connect
MP04H	No connect
MP04J	No connect
MP04K	No connect
MP05A	No connect
MP05B	No connect
MP05C	No connect
MP05D	No connect
MP05E	No connect
MP05F	No connect
MP05G	No connect
MP05H	No connect
MP05J	No connect
MP05K	No connect
MP06A	Factory use only
MP06B	Factory use only
MP06C	Factory use only
MP06D	No connect
MP06E	No connect
MP06F	No connect
MP06G	No connect
MP06H	No connect
MP06J	No connect
MP06K	No connect
MP07A	No connect
MP07B	No connect
MP07C	No connect
MP07D	No connect
MP07E	No connect
MP07F	No connect
MP07G	No connect
MP07H	No connect
MP07J	No connect
MP07K	No connect

Table 4-9: Pin allocation for the MCHPA middle plug

Pin-out for MCHPA rear receptacle (bottom plug)

Pin	Pin name and description
BP1	115 V HOT. 115 VAC power
BP7	115 V COLD. 115 VAC power return
BP8	Chassis Ground
BP2 BP3 BP4 BP5 BP6 BP9 BP10 BP11 BP12 BP13	No Connect

4.4 Recommended cables

4.4.1 Introduction

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

Important For specific cable requirements see the applicable section in **4.3 Electrical installation and wiring**.

4.4.2 Allowed cable lengths for power cables

Cable type: unshielded

Allowed cable lengths for CSDU

The following table can be used to calculate the allowed CSDU cable lengths for selected AWG types.

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

Description	Pin	Contact size	Total maximum resistance (Hot and cold)	mΩ/m (at 70°C)				
				AWG12	AWG14	AWG16	AWG18	AWG20
115 VAC Line	BP1	16	650 mΩ 1 Ω-350 mΩ in circuit breaker	x	x	14.3	22.9	36.3
115 VAC Neutral	BP5	12		5.7	9	x	x	x
Chassis	BP3	12	25 mΩ (Max. 1 m)	5.7	9	x	x	x
x = not suitable for this contact size.								

Example

Requirement for maximum total resistance: 650 mΩ

Selected wire for Line: AWG 16 (14.3 mΩ/m)

Selected wire for Neutral: AWG 12 (5.7 mΩ/m)

$$\text{Maximum length} = \frac{650m\Omega}{(14,3m\Omega + 5,7m\Omega)/\text{m}} = 32{,}5\text{m}$$

4.4.3 Recommended power cables

The cable types must meet the following standards:

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

AC Power:

Single unshielded wire 18 AWG (Hot) & 12 AWG (Cold)

Manufacturer: Carlisle (Thermax) MIL-DTL-22759/86-18

Manufacturer: Carlisle (Thermax) MIL-DTL-22759/86-12

4.4.4 Recommended RF cables

Recommended cables for AVIATOR 700S must be compliant with ARINC Characteristic 781-7 [3].

4.4.5 Recommended cables for ARINC 429

The cables for the ARINC 429 interfaces must be twisted and shielded. They must conform to the standards for aeronautical use. Use a cable that meets the following standard:

- M27500 for shielded wire

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

ARINC-429 Data Bus Cable 2 Conductor 24AWG shielded

Manufacturer: Carlisle (ECS) P/N 522402

4.4.6 Recommended cables for Ethernet

Use an Ethernet cable that meets one of the following standards:

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

The following cable types meet the requirements:

100ohm +-10%, 13pF/ft, 24 AWG shielded

Manufacturer: Carlisle (Tensolite) P/N NF24Q100-01 100Base-T Ethernet Cable

4.4.7 Recommended cables for discrete signals

Use cables for discrete wiring that meet the following standard:

- M27500 for shielded wire

2 Conductor Cable 22 AWG shielded

Manufacturer: Carlisle (Thermax) M27500-22 WJ 2 S 24

4.4.8 Recommended cable between the SCM and the CSDU

Use the following cables to connect the SCM to the CSDU:

- Communication cable (LAN). Data to and from the SCM: Carlisle (Tensolite) 100Base-T Ethernet Cable, 100 Ohm ±10%, 13 pF/ft, AVG24
  Part number: NF24Q100-01
- Twisted pair shield cable for power source and power return: Carlisle (Thermax) M27500-22 WJ 2 S 24 (MIL-DTL-22759/86 wire), silver plated shield

4.5 Verifying the installation

You must perform certain check procedures during and after installation of the AVIATOR 700S system. The first check procedures are performed after wiring, but before inserting LRUs.For information on the required and recommended check procedures, refer to *Verification* on page 6-1.

4.6 Activation of airtime services

Before the AVIATOR 700S system becomes operational, the aircraft owner or operator must establish 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.

4.6.1 ID numbers for the AVIATOR 700S system

ICAO address / AES ID

The ICAO address (International Civil Aviation Organization) is unique and 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 address is normally noted in Oct (octal), but in some cases Hex is also used. The CSDU has an ARINC-429 compliant AES ID input for reception of a unique aircraft identification code.

- ARINC 600 connector, rear receptacle, middle plug: MP07A, MP07B.
- Label 275 and 276

The ICAO address can also be received from the CMU (label 214 and 216).

IMSI

The IMSI (International Mobile Subscriber Identity) is the ID for the SwiftBroadband service and is tied to the SDU Configuration Module (SCM).

SwiftBroadband USIM cards

The AVIATOR 700S system is delivered with four USIM cards permanently installed in the SCM. The USIM cards are pre-authenticated by Inmarsat and identified by their unique IMSI (International Mobile Subscriber Identity) number. The length of the IMSI is 15 digits. The SCM is delivered with the USIM cards not yet activated for SwiftBroadband services. For details how to activate the USIM cards contact your airtime provider. The IMSI number is needed to activate the satellite communication service.

A fifth card is a Security SmartCard. The SCM is delivered with all five cards installed and these cannot be replaced in the field.

The contract for SwiftBroadband services with your airtime provider contains among other items the following phone number: Direct phone numbers that is associated with the IMSI numbers of the installation.

Typically the service provider provisions the USIMs for both circuit switched and packet switched services.

Service providers

You find a list of Service providers on Inmarsat's web site under Aviation, Aviation Connectivity services ((https://www.inmarsat.com/aviation/complete-aviation-connectivity/).

To retrieve the USIM card ID (IMSI number)

With the system you receive the IMSI numbers of the USIM cards that are installed in the SCM.

Important The USIM cards are permanently installed in the SCM. Do not remove or replace the USIM cards.

Note The IMSI numbers are printed on a label on the SCM enclosure and printed on the Certificate of Conformity letter belonging to the SCM.

Setup of the system

This chapter has the following sections:

- *Software upload*
- *SATCOM system ready for use*

Note

Line of sight

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 register and use the satellite service.

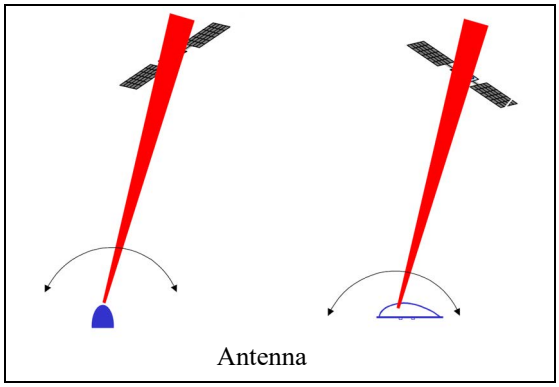


Figure 5-1: Line of sight when communicating with the satellite

5.1 Software upload

5.1.1 Overview

After the physical installation of the system it must be loaded with the following files:

- Software image for the system, i.e. CSDU, SCM and MCHPA (typically factory loaded)
- Secure ORT (Owner Requirements Table)
- User ORT

Software image files should only be loaded via Ethernet (ARINC 615A) data loader as an ARINC 429 data loader (A615-3) would require more than 2 hours. All ORT files are loaded using an ARINC 429 or Ethernet (A615A) data loader.

The software image makes the system ready for configuration to the specific aircraft installation and application requirements. The ORT files contain the settings for the individual aircraft. The Secure ORT contains all aircraft specific settings. The User ORT contains user data, e.g. a telephone directory.

Secure ORT

The Secure ORT contains all settings for the connected units, including the antenna setup, cable losses and navigational input, interfaces to connected avionics equipment (e.g. CMU, MCDU, audio management panels etc.). This file is locked and cannot be edited. The Secure ORT file is generated with an ORT tool and loaded using an ARINC 429 (ARINC 615-3) or Ethernet (ARINC 615A) compliant data loader.

User ORT

The User ORT can be edited using the ORT tool (refer to *ORT Tool User Guide (99-168498)* [9]), you can add a telephone directory. The User ORT file is loaded using an ARINC 429 (ARINC 615-3) or Ethernet (ARINC 615A) compliant data loader.

5.1.2 Uploading software

Note Before you start loading the software files, make sure that the SCM is connected to the CSDU.

Note Software upload should only be done by qualified personnel.

To upload software, do as follows:

1. Make sure you have access to the following files:
   - Software image for each LRU, i.e. CSDU and MCHPA (typically factory loaded)
   - Secure ORT (Owner Requirements Table)
   - User ORT
2. Upload the files using a compliant data loader, see the data loader's instruction manual.

5.2 SATCOM system ready for use

Having installed the AVIATOR 700S system and loaded the necessary software, verify that the system is fully operational.

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 SATCOM service.

To verify the system, refer to chapter 6, *Verification*.

Verification

This chapter has the following sections:

- *Basic check flow*
- *Pre-Installation Check*
- *Functional Test, on Ground*
- *Interference Test*
- *Functional test, airborne*

6.1 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.

6.1.1 Check procedures

In order to ensure the correct function of the system, follow the below check flow.

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 6-2.
2. **Configuration.**
   After performing the Pre-Installation Check, load the Secure ORT and the User ORT files. Refer to *Setup of the system* on page 5-1.
3. **Functional Test, on Ground.**
   When the system is configured and activated, make a functional test on ground. The functional test should check all user interfaces, such as voice, data, annunciators, etc. Refer to *Functional Test, on Ground* on page 6-3.
4. **Interference Test.**
   After the functional test, make an interference test. This test is to verify that transmission from the AVIATOR 700S system has no effect on the avionics of the aircraft, particularly navigation equipment. Refer to *Interference Test* on page 6-4.

   Note If additional avionics are installed in the aircraft at a later stage, repeat the interference test to ensure compatibility.
5. **Functional Test, Airborne.**
   After the interference test, do a functional test while the aircraft is airborne. This test is basically the same as the functional test on ground. Refer to *Functional test, airborne* on page 6-5.

6.2 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.			
Coding of tray connectors	Check orientation of coding pins in both CSDU and MCHPA tray connectors			
Grounding stud	Check that the grounding stud on both CSDU and MCHPA are connected correctly to the aircraft chassis.			
Circuit breaker rating	Check the circuit breaker.			
AC power	Check AC power on CSDU tray connector BP5: +115 VAC Line (Hot) BP1: +115 VAC Neutral (Cold)			
	Check AC power on MCHPA tray connector BP1: +115 VAC Line (Hot) BP7: +115 VAC Neutral (Cold)			
RF cable losses	Measure and note the cable loss for all coaxial cables. See section 4.4.4.			
Software version	Check the software version of the CSDU and the MCHPA.			

Table 6-1: Check Sheet: Installation Check before inserting LRUs.

After a successful check of the installation, you must load the secure ORT and the user ORT with a data loader. For further information, refer to *Setup of the system* on page 5-1.

6.3 Functional Test, on Ground

6.3.1 Before you start

The system must be activated before performing this test. For further details see *Activation of airtime services on page 5-49*.

6.3.2 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
CSDU LEDs	Check that the Power LED is green			
	Check that the Fail/Pass LED is green			
	Check that the Logon LED is green			
MCDU headsets #1 to #3	Make an aircraft to ground call	AVIATOR 700S User Manual [7]		
	Make a ground to aircraft call	AVIATOR 700S User Manual [7]		
Ethernet	Connect to the Internet from a laptop, using the Ethernet AISD 1 / EFB 1 connection. .	AVIATOR 700S User Manual [7]		
	Connect to the Internet from a laptop, using the Ethernet PIESD 1 / Cabin 1 connection. .	AVIATOR 700S User Manual [7]		
ACARS / AFIS / CMU	Send a test message and verify the reply or request for weather data and verify the data is downloaded. Both is done from the CDU / MCDU.	CDU / MCDU Manual [7]		

Table 6-2: Check Sheet: Functional test, on Ground

6.4 Interference Test

6.4.1 Introduction

It is recommended to do an interference test to ensure that transmission from the AVIATOR 700S 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 (Supplemental Type Certificate), TC (Type Certificate) or Field Approval. It is only an additional practical test of the application.

6.4.2 Test procedure

During the test, the aircraft must be on ground. A skilled person should be observing the instruments.

Important Make sure that all possible avionics/equipment are powered on when A/C in ground state.

1. Determine the approximate location and direction towards the relevant satellite to be used.
2. Position the aircraft so 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 located in front of it.
3. You can establish a transmission by, for example, making a video call or sending a large file via a laptop that is connected to the EFB 1 Ethernet interface.
4. 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 700S transmission.
5. Check aircraft GPS signal-to-noise ratio.
6. Monitor all VHF communication and make sure squelch is not opened unintentionally.
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, do the interference test again.

6.5 Functional test, airborne

The following list provides some of the most important checks to do while the aircraft is airborne, after all on-ground tests are passed. Other additional checks may be relevant for the specific installation.

6.5.1 Before you start

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.

6.5.2 Check list for functional test, airborne

Item	Description of Check	Reference	√	Value/ Comment
MCDU headsets #1 to #2	Make an air to ground call and keep it up during a 360° turn.	AVIATOR 700S User Manual [7]		
	Make a ground to air call	AVIATOR 700S User Manual [7]		
Ethernet	Connect to the Internet from a laptop, using the Ethernet connection.	AVIATOR 700S User Manual [7]		
ACARS / AFIS / CMU	Send a 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 [7]		

Table 6-3: Check Sheet: Functional test, Airborne

Maintenance and troubleshooting

This chapter has the following sections:

- *Continued Airworthiness*
- *Helpdesk*
- *Software update*
- *To exchange an LRU*
- *Troubleshooting*
- *Returning units for repair*
- *Disposal of electrical and electronic equipment*

7.1 Continued Airworthiness

7.1.1 General

Maintenance

Maintenance requirements and instructions for continued airworthiness of the Cobham Aerospace Communications units in the AVIATOR 700S System are defined here.

The AVIATOR 700S System (CSDU, SCM and MCHPA) requires no periodic scheduled servicing tasks.

Note When replacing the CSDU, it is important to leave the SCM installed in the aircraft, because the SCM contains the aircraft-specific configuration data.

The CSDU is a Line-Replaceable Unit (LRU) and constructed for factory repair only. Defective units must be returned to the factory for investigation, repair and test.

The SCM is a Line-Replaceable Unit (LRU) and constructed for factory repair only. Defective units must be returned to the factory for investigation, repair and test.

The MCHPA is a Line-Replaceable Unit (LRU) and constructed for factory repair only. Defective units must be returned to the factory for investigation, repair and test.

See also the installation manual of the HGA and DLNA, refer to [8].

Technical support

Web address: https://www.cobhamaerospacecommunications.com/en/contact-us/

E-mail to Cobham technical support: CAC.Customersupport@cobham.com.

Telephone numbers for technical support:

- EMEA: +27(78) 458 7412 or +33(0) 6 75 79 20 15 (8am to 4 pm, European Time Zone)
- Americas: +1 (757) 753-2098 (8am to 5 pm, Eastern Time)

Technical Training

E-mail to Cobham technical support: CAC.Customersupport@cobham.com.

AOG desk

OEM Services

Telephone: +33 1 72 02 23 23

E-mail: aog@oemservices.aero

7.1.2 Maintenance instructions

Documentation

Maintenance information for the AVIATOR 700S 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.

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 7-10. Once repaired, reinstall the unit in the aircraft in accordance with the instructions in this Installation and Maintenance Manual.

Scheduled Maintenance Program

The AVIATOR 700S 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.

The recommended periodic scheduled maintenance tasks to be added to the aircraft operator's appropriate aircraft maintenance program are as follows:

CSDU	Not required

Table 7-1: Periodic scheduled maintenance tasks

SCM	Not required
MCHPA	Not required

Table 7-1: Periodic scheduled maintenance tasks

The recommended periodic scheduled inspection tasks to be added to the aircraft operator's appropriate aircraft maintenance program are as follows:

CSDU	Not required
SCM	Not required
MCHPA	Not required

Table 7-2: Periodic scheduled inspection tasks

The recommended periodic scheduled preventative maintenance tasks to be added to the aircraft operator's appropriate aircraft maintenance program are as follows:

(Tests to determine system condition and latent failures)

CSDU	Not required
SCM	Not required
MCHPA	Not required

Table 7-3: Periodic scheduled preventative maintenance tasks

7.2 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.

7.2.1 System support

If you need assistance with problems caused by the CSDU, SCM or MCHPA, call a distributor in your area. See *Technical support* on page 7-2.

7.2.2 Security log and system log files

For instructions how to retrieve security and system log files, see the AVIATOR S Operational User Guidance [10].

7.3 Software update

See *Software upload* in chapter 5.

7.4 To exchange an LRU

This document describes the procedures for removal and re-installation of the AVIATOR 700S LRUs:

- CSDU (*405045-vvccc*).
- SCM (*405055-vvccc*).
- MCHPA (*405015-vvccc*).

7.4.1 Time required

The time required for removal and re-installation of an LRU is estimated to 15 minutes.

7.4.2 Tools required

- CSDU: No tools required.
- SCM: No special tools required. Screw driver if fixed with a screw or bolt.

7.4.3 Removal and re-installation of the CSDU (SDU-5045)

Removal

To remove the CSDU do as follows:

1. Ensure that power is removed from the SATCOM system before removing any LRU.
2. Pull and turn to loosen the knurled knob(s) that retain(s) the LRU in the tray.
3. Pull the LRU straight out from the tray by the handle. Be careful not to drop the unit.

Re-installation

To re-install the CSDU do as follows:

1. Insert the LRU straight in the tray by the handle. Be careful not to drop the unit.
2. Make sure that the LRU is completely seated against the mating connector.
3. Pull and turn to fasten the knurled knob(s) that retain(s) the LRU in the tray.

7.4.4 Removal and re-installation of the SCM (SCM-5055)

Removal

1. Ensure that power is removed from the SATCOM system before removing the SCM.
2. Release the screw-locks on the D-sub connector and remove the 15 pin D-sub connector from the SCM.
3. Remove the four fasteners holding the SCM in place through its mounting flange.

Re-installation

1. Mount the SCM to the aircraft structure with the four fasteners through its mounting flange.SCM.
2. Connect the 15 pin D-sub connector to the SCM and tighten the connector screw-locks to 0.32 Nm.

7.4.5 Removal and re-installation of the MCHPA (HPA-5015)

Removal

To remove the MCHPA do as follows:

1. Ensure that power is removed from the SATCOM system before removing any LRU.
2. Pull and turn to loosen the knurled knob(s) that retain(s) the LRU in the tray.
3. Pull the LRU straight out from the tray by the handle. Be careful not to drop the unit.

Re-installation

To re-install the MCHPA do as follows:

1. Insert the LRU straight in the tray by the handle. Be careful not to drop the unit.
2. Make sure that the LRU is completely seated against the mating connector.
3. Pull and turn to fasten the knurled knob(s) that retain(s) the LRU in the tray.

7.5 Troubleshooting

7.5.1 Status signalling

Built-In Test Equipment (BITE)

The CSDU provides a Built-In Test Equipment (BITE) function in order to make fault diagnostics easy during service and installation.

The BITE test is done 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 front panel of the CSDU.

Also, during operation a Continuous Monitoring BITE function is performed.

Each LRU in the AVIATOR 700S system has its own BITE function but they are all controlled and monitored by the CSDU in the system.

Results from the BITE tests for the complete AVIATOR 700S system are shown as four digit error codes. The two most significant digits represent the main group. The two least significant digits give further details. The CSDU BITE codes inform you that there are errors in the CSDU. Use the CSDU diagnostic report for further information on the BITE errors.

Means of signalling

The AVIATOR 700S System provides various methods for signalling the status of the system.

- **LEDs** on the front panel of the CSDU are used to signal:
  - Power on/off
  - Logon
  - Fail/Pass
- Connected display units (e.g. **MCDU)** display messages concerning:
  - information from the services
  - status information from the system to the user
  - equipment errors.
- Security and system log files: In Maintenance allowed mode.

Messages in the MCDU display

Two types of messages are displayed:

- 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.

For further information and lists of the possible error codes, refer to the appendix *System messages* on page B-1.

7.5.2 Status signalling with LEDs

LEDs on CSDU

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 the AC supply of the CSDU. If the wiring is good, the CSDU software may be corrupted. If the wiring is good, the CSDU software is corrupted. Contact your local distributor for instructions how to proceed.

Logon LED on CSDU	
Behaviour	Description
Red	Acquiring satellite network
Orange	Network synchronization
Green	Network logon
Off	No acquired satellite/logged off

Table 7-4: Function of the CSDU Logon LED

Fail/Pass LED on CSDU	
Behaviour	Description
Steady red	A fault which may degrade the system operation is present in the SDU
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 7-5: Function of the CSDU Fail/Pass LED

7.5.3 Initial troubleshooting

Overview

This section describes an initial check of the primary functions of the AVIATOR 700S 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 messages**. Generally, if a fault occurs without any obvious reason, it is always recommended to observe the LED behaviour. For information on the function of the LEDs refer to *Status signalling* on page 7-7. For a list of all the BITE codes and Cause codes, refer to the appendix *System messages* on page B-1.
- **Maintenance interface**. For troubleshooting errors in the CSDU, connect to the Micro USB maintenance port on the front plate of the CSDU and extract the relevant log files. Refer to the Operational User Guidance [10] for instructions how to extract and analyze the log files.

Problem	What to do
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.
Registration for voice or data on the BGAN network not possible	In case the system cannot register properly for voice or data service, check with your Service provider that the USIM cards in the SCM are not blocked.

Table 7-6: Initial troubleshooting

7.6 Returning units for repair

7.6.1 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 700S 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.

Note The packaging must meet at least ATA 300 CATEGORY III.

1. Protect the connectors of the CSDU, MCHPA and SCM with plastic connector protection.
2. 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.
3. Use a strong shipping container, e.g. a double walled carton.
4. 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.
5. Seal the shipping container securely.
6. Mark the shipping container FRAGILE to ensure careful handling.

Failure to do so may invalidate the warranty.

7.7 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.

Equipment specifications

A.1 Introduction

This appendix has the following sections:

- *SDU-5045 Compact Satellite Data Unit*
- *SCM-5055 Configuration Module*
- *HPA-5015 Multi-Carrier High Power Amplifier*

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.

Cables and connectors are not included.

For specifications of the antenna see the documentation provided with the antenna.

A.2 SDU-5045 Compact Satellite Data Unit

Characteristics	Specification
Dimensions (L x W x H)	2 MCU ARINC 600 enclosure 319.50 mm x 61.00 mm x 199.70 mm (12.58" x 2.40" x 7.86")
Weight	4.2 kg (9.26 lbs) Guaranteed weight max 4.4 kg (9.7 lbs)
Mounting	Mount in an ARINC 600 2 MCU tray. • Controlled-temperature locations and convection airflow cooling • Non-controlled-temperature locations and forced airflow cooling (Tray with fan/plenum) • Non-controlled-temperature location and supplied airflow cooling (tray integrated onto a shelf racking system) • Non-pressurized locations. • Pressurized locations.
Supply voltage	Nominal AC supply: 115 VAC (360 - 800Hz) Continuous operation: +90 V to 134 V Short time operation: +70.0 V - 170 V (30ms)
Transparency time	200 ms
Typical Power Consumption: CSDU alone in a Class 6 system (AVIATOR 700S)	AC: 44 W Power provided for SCM: 4.5 W
Maximum heat dissipation	<50 W
Connectors	Rear: ARINC 600 Attachment 11 Front: micro USB (for maintenance).
Operating temperature Convection airflow cooling Forced airflow cooling Supplied airflow cooling	 -40° to +40° C (+40°C/20 hours; +55°C/30 minutes) -40° to +70° C -40° to +70° C
Ground survival temperature	-55° to +85° C
Shelf life	Max. 7 years at max. 35° C

Table A-1: CSDU specifications

Characteristics	Specification
Maximum resistance, AC input	< 1.0 Ohm
Altitude	For installation in non-pressurized locations: Max. 55000 ft (Cat-F2)
Decompression	For installation in pressurized locations: 55000 ft (Cat. A2)
Overpressure	For installation in pressurized locations: -15000 ft (Cat. A2)
Relative humidity	95% non-condensing at +50°C
Environmental categories	See appendix C, *DO-160G specifications*, *Compact Satellite Data Unit (CSDU)* on page C-2.

Table A-1: CSDU specifications

A.3 SCM-5055 Configuration Module

Characteristics	Specification
Dimensions (L x W x H)	114.30 mm x 101.60 mm x 25.78 mm (4.50" x 4.00" x 1.015")
Weight	200 ± 30 g
Mounting	• Controlled and Non-controlled temperature locations with convection airflow cooling • Non-pressurized locations. • Pressurized locations.
Supply voltage	The SCM is connected to and powered by the CSDU.
Connectors	15 position D-subminiature plug (pins) with 4-40 UNC female screw-locks, equivalent to MIL-DTL-24308 M24308/24-26 and M24308/26-115 (ARINC 781 compliant)
Operating temperature	-40° to +70° C
Ground survival temperature	-55° to +85° C
Shelf life	Max. 7 years at max. 35° C
Altitude	For installation in non-pressurized locations: Max. 55000 ft (Cat. F2)
Decompression	For installation in pressurized locations: 55000 ft (Cat. A2)
Overpressure	For installation in pressurized locations: -15000 ft (Cat. A2)
Environmental categories	See appendix C, *DO-160G specifications*, *Configuration Module (SCM)* on page C-5.

Table A-2: SCM specifications

A.4 HPA-5015 Multi-Carrier High Power Amplifier

Characteristics	Specification
Dimensions (L x W x H)	2 MCU ARINC 600 enclosure 323.00 mm x 61.00 mm x 199.70 mm (12.72" x 2.40" x 7.86")
Weight	The maximum weight of the MCHPA is 5.0 kg (11 lbs)
Mounting	Mount in an ARINC 600 2 MCU tray. • Non-controlled-temperature location and supplied airflow cooling, with tray integrated onto a shelf rack system • Non-pressurized locations. • Pressurized locations.
Supply voltage	Nominal AC supply: 115 VAC (360 - 800Hz) Continuous operation: +90 V to 134 V Short time operation: +70.0 V - 170 V (30ms)
Transparency time	200 ms
Typical Power Consumption	AC: 240 W
Connectors	Rear: ARINC 600 Attachment 11
Operating temperature Convection airflow cooling Forced airflow cooling Supplied airflow cooling	 -40° to +40° C (+40°C/20 hours; +55°C/30 minutes) -40° to +70° C -40° to +70° C
Ground survival temperature	-55° to +85° C
Shelf life	Max. 7 years at max. 35° C
Maximum resistance, AC input	< 1.0 Ohm
Altitude	For installation in non-pressurized locations: Max. 55000 ft (Cat-F2)
Decompression	For installation in pressurized locations: 55000 ft (Cat. A2)
Overpressure	For installation in pressurized locations: -15000 ft (Cat. A2)

Table A-3: MCHPA specifications

Characteristics	Specification
Relative humidity	95% non-condensing at +50°C
Environmental categories	See appendix C, *DO-160G specifications*, *Multi-Carrier High Power Amplifier (MCHPA)* on page C-8.

Table A-3: MCHPA specifications

System messages

This appendix has the following sections:

- *BITE error codes*

The AVIATOR 700S system shows system messages in connected display units (e.g. MCDU) or in the security and system log files of the CSDU when extracted in maintenance-allowed mode.

B.1 BITE error codes

BITE error codes contain information from the AVIATOR 700S system. This information is a result of a POST or PAST sequence or Continuous Monitoring performed by the Built-In Test Equipment. BITE error codes and explanation is shown in the MDCU display.

B.1.1 List of BITE error codes

Fault message code	Fault message subject	Failure cause	Consequences on the system	FDCE type 1
1	SDU1(5RV1)	Faulty SDU	One or more system functions will be significantly degraded, possibly to the extend of being unable to communicate with other A/C LRUs, unable to log onto Inmarsat network or unable to support cockpit and/or cabin voice/data calls depending on the failure	SATCOM Fault
2	SDU1(5RV1)	Faulty SDU	One or more system functions may suffer minor degradations, depending on the specific failure cause.	Loss of AISD or PIESD Communication
4	SDU1(5RV1)	Faulty SDU	Loss of all communications	SATCOM Fault
7	SCM1(78RV1)	SCM failure	Probable loss of all communications	SATCOM Fault

Table B-1: BITE error codes

Fault message code	Fault message subject	Failure cause	Consequences on the system	FDCE type 1
8	MCDU1 (2CA1)	SATCOM system receives an ARINC 429 message from MCDU1 with a SSM set to NCD/FW/FT	MCDU1 is unusable for control/status of the SATCOM system. If available, MCDU2 or MCDU3 may be used if their SDU interfaces have not failed.	Loss of HMI
9	MCDU2 (2CA2)	SATCOM system receives an ARINC 429 message from MCDU2 with a SSM set to NCD/FW/FT	MCDU2 is unusable for control/status of the SATCOM system. If available, MCDU1 or MCDU3 may be used if their SDU interfaces have not failed.	Loss of HMI
10	MCDU3 (2CA3)	SATCOM system receives an ARINC 429 message from MCDU3 with a SSM set to NCD/FW/FT	MCDU3 is unusable for control/status of the SATCOM system. If available, MCDU1 or MCDU2 may be used if their SDU interfaces have not failed.	Loss of HMI
11	ATSU1 (1TX1)	SATCOM system receives an ARINC 429 message from ATSU1 with a SSM set to NCD/FW/FT which lead to the Loss of Labels 214 and 216	Probable loss of all communications	SATCOM Fault
12	ATSU2 (1TX2)	SATCOM system receives an ARINC 429 message from ATSU1 with a SSM set to NCD/FW/FT which lead to the Loss of Labels 214 and 216	Probable loss of all communications	SATCOM Fault
13	ADIRU1 (1FP1)	SATCOM system receives an ARINC 429 message from ADIRU1 with a SSM set to NCD/FW/FT	The SDU will attempt to obtain all inertial data from its other IRS input, resulting in loss of all satellite communications only if an independant and healthy second ADIRU is unavailable.	Loss of Communication
14	ADIRU2 (1FP2)	SATCOM system receives an ARINC 429 message from ADIRU2 with a SSM set to NCD/FW/FT	The SDU will attempt to obtain all inertial data from its other IRS input, resulting in loss of all satellite communications only if an independant and healthy second ADIRU is unavailable.	Loss of Communication
18	ATSU1(1TX1)/SDU1(5RV1)/WRG	SATCOM system receives an ARINC 429 message from ATSU1 with a SSM set to SILENT	Probable loss of all communications	SATCOM Fault
19	MCDU1(2CA1)/SDU1(5RV1)/WRG	SATCOM system receives an ARINC 429 message from MCDU1 with a SSM set to Silent	MCDU1 is unusable for control/status of the SATCOM system	Loss of HMI

Table B-1: BITE error codes (Continued)

Fault message code	Fault message subject	Failure cause	Consequences on the system	FDCE type 1
20	MCDU2(2CA2)/SDU1(5RV1)/WRG	SATCOM system receives an ARINC 429 message from MCDU2 with a SSM set to Silent	MCDU2 is unusable for control/status of the SATCOM system	Loss of HMI
21	ATSU2(1TX2)/SDU1(5RV1)/WRG	SATCOM system receives an ARINC 429 message from ATSU2 with a SSM set to SILENT	Probable loss of all communications	SATCOM Fault
24	HPA-HI GAIN(7RV1)/SDU1(5RV1)/WRG(41RV)	No data from HPA to CSDU	Probable loss of communications	SATCOM fault
25	SDU1(5RV1)/SCM1(78RV1)/WRG	No data from SCM to the CSDU	Loss of communications	SATCOM fault
26	MCDU3(2CA3)/SDU1(5RV1)/WRG	SATCOM system receives an ARINC 429 message from MCDU3 with a SSM set to Silent	MCDU3 is unusable for control/status of the SATCOM system	Loss of HMI
27	ATSU1(1TX1)	Loss of label 270	None	NONE
28	ATSU2(1TX2)	Loss of label 270	None	NONE
41	WRG (42RV)	Failure in the DLNA-CSDU Coaxial Cable	Loss of communications	SATCOM Fault
45	POWER SUPPLY INTERRUPT	Power interrupt	Loss of communications	Loss of Communication
90	ADIRU1(1FP1)/SDU1(5RV1)/ WRG	SATCOM system receives an ARINC 429 message from ADIRU1 with a SSM set to Silent	Probable loss of all communications	Loss of Communication
91	ADIRU2(1FP2)/SDU1(5RV1)/ WRG	SATCOM system receives an ARINC 429 message from ADIRU2 with a SSM set to Silent	Probable loss of all communications	Loss of Communication
94	AUTO RESET		Loss of communications during the reset	Loss of Communication
95	MANUAL RESET		Loss of communications during the reset	Loss of Communication
96	HI GAIN ANTENNA-TOP (16RV1)	HGA Failure	Probable loss of all communications	SATCOM Fault

Table B-1: BITE error codes (Continued)

Fault message code	Fault message subject	Failure cause	Consequences on the system	FDCE type 1
97	SCM1 (78RV1)/ OVER TEMPERA	The SCM is overheated	Probable loss of communications	SATCOM Fault
98	HPA-HI GAIN(7RV1)/ OVER TEMPERA	The HPA is overheated	Probable loss of communications	SATCOM Fault
99	SDU1(5RV1)/ OVER TEMPERA	The SDU is overheated	Loss of AISD and/or PIESD communication	Loss of AISD and/or PIESD Communication
101	WRG: CONFIG PIN PROG/SDU1(5RV1)	Configuration HPP Parity error, Configuration HPP combination not plausible, ATE HPP parity error	Probable loss of communications	SATCOM Fault
102	SDU1(5RV1)	Faulty SDU	Loss of AISD or PIESD communication	Loss of AISD or PIESD Communication
103	SCM1(78RV1)	AISD/PIESD user ORT failure	Loss of AISD or PIESD communication	Loss of AISD or PIESD Communication
104	SCM1(78RV1) SOFTWARE COMP	SCM Failure	Probable loss of all communications	SATCOM Fault
105	HPA-HI GAIN(7RV1) SOFTWARE COMP	MCHPA Failure	Probable loss of all communications	SATCOM Fault
107	SCM1(78RV1)	Cabin USIM interface Failure	Loss of Cabin communications	Loss of PIESD Communication
108	SCM1(78RV1)	SECURE ORT/ ACD user ORT failure	Loss of all communications	SATCOM Fault

Table B-1: BITE error codes (Continued)

Fault message code	Fault message subject	Failure cause	Consequences on the system	FDCE type 1
109	SDU1(5RV1)/WRG	Discrete Output failure	No light indication of incomming call on channel 2 or No light indication of incomming call on channel 1	No light indication of incoming call on channel 2 or No light indication of incoming call on channel 1
110	SCM1(78RV1) SOFTWARE COMP	SCM Failure	Loss of Cabin Communications	Loss of AISD or PIESD communication
111	SCM1(78RV1)/REGISTRATION	SCM Registration Failure	Probable loss of all communications	SATCOM Fault
112	XPDR-1(1SH1)	SATCOM system receives an ARINC 429 message from XPDR1 with a SSM set to NCD/FW/FT	Probable loss of all communications	SATCOM Fault
113	XPDR-1(1SH1)/SDU1(5RV1)/WRG	SATCOM system receives an ARINC 429 message from XPDR1 with a SSM set to Silent	Probable loss of all communications	SATCOM Fault

Table B-1: BITE error codes (Continued)

DO-160G specifications

This appendix has the following sections:

- *General DO-160 information*
- *Compact Satellite Data Unit (CSDU)*
- *Configuration Module (SCM)*
- *Multi-Carrier High Power Amplifier (MCHPA)*

Refer to HGA-7001 and DLNA installation manual [8] for DO-160 specifications of the antenna.

C.1 General DO-160 information

C.1.1 Certifying agency

Approval of the installation of the AVIATOR 700S system is not authorized by this installation manual. Acceptance for the installation and use of the AVIATOR 700S 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.

C.1.2 Environmental Qualification Forms

The Environmental Qualification Forms list the environmental categories under which all Cobham SATCOM components of the AVIATOR 700S system are approved.

Please refer to RTCA DO-160G for further details on the following Environmental Qualification Forms.

C.2 Compact Satellite Data Unit (CSDU)

Part Number: SDU-5045

Environmental variable	DO160 G section (Unless otherwise specified)	Category and requirements
Temperature and Altitude	4	[(A2F2)Z]
Ground Survival Low Temperature Test -55°C	4.5.1	A2
Short-Time Operating Low Temperature Test -40°C	4.5.1	A2
Operating Low Temperature Test -40°C	4.5.2	A2
Ground Survival High Temperature Test +85°C	4.5.3	A2
Short-Time Operating High Temperature Test +70°C	4.5.3	A2
Operating High Temperature Test +70°C	4.5.4	A2
In Flight Loss of Cooling	4.5.5	Z
Altitude Test +55.000ft	4.6.1	F2
Decompression Test	4.6.2	A2F2
Overpressure Test	4.6.3	A2
Temperature Variation (-40°C to +70°C)	5	B
Humidity	6	A
Operational Shocks and Crash Safety	7	-
Operational Shocks	7.2	E / B
Crash Safety (Impulse)	7.3.1	E / B
Crash Safety (Sustained)	7.3.3	Aircraft Type 5, Orientation: Random
Bench Handling Shocks	MIL-STD 810G, Method 516.6, Proc. VI	MIL-STD 810G, Method 516.6, Proc. VI
Vibration	8	-
Standard Random Vibration	8.5	S(B3)

Table C-1: Common environmental conditions and tests (DO160G) for CSDU

Environmental variable	DO160 G section (Unless otherwise specified)	Category and requirements
High-Level, Short Duration Vibration	8.6	H(R)
Explosion Atmosphere	9	E
Waterproofness	10	Y
Fluids Susceptibility	11	F
Sand & Dust	12	D
Fungus Resistance	13	F
Salt Fog	14	X
Magnetic Effect	15	Z
Power Input	16	A(WF)HLPI
Voltage Spike	17	A
Audio Frequency Conducted Susceptibility	18	
AC Power	18.3.2	R(WF)
Induced Signal Susceptibility	19	
Magnetic Fields Induced into Equipment.	19.3.1	CWX
Magnetic Fields Induced into Interconnecting Cables	19.3.3	CWX
Electrical Fields Induced into Interconnecting Cables	19.3.4	CWX
Spikes Induced into Interconnecting Cables	19.3.5	CWX
Radio Frequency Susceptibility (Conducted & Radiated)	20	-
Conducted	20.4	T
Radiated	20.5	T
Radio Frequency Emission	21	-
Conducted	21.4	M
Radiated	21.5	M
Lightning Induced Transient Susceptibility	22	AZZZLZ

Table C-1: Common environmental conditions and tests (DO160G) for CSDU (Continued)

Environmental variable	DO160 G section (Unless otherwise specified)	Category and requirements
Lightning Direct Effects	23	X
Icing	24	X
Electrostatic Discharge	25	A
Fire, Flammability	26	C
Federal Aviation Regulation	FAR 25.853(a) & Appendix F, part I, §(a)(1)(ii) FAR 25.853(a) & Appendix F, part I, §(a)(1)(v) FAR 25.869 (a)(1) & Appendix F, part I	

Table C-1: Common environmental conditions and tests (DO160G) for CSDU (Continued)

C.3 Configuration Module (SCM)

Part Number: SCM-5055

Environmental variable	DO160 G section (Unless otherwise specified)	Category and requirements
Temperature and Altitude	4	-
Ground Survival Low Temperature Test -55°C	4.5.1	A2
Short-Time Operating Low Temperature Test -40°C	4.5.1	A2
Operating Low Temperature Test -40°C	4.5.2	A2
Ground Survival High Temperature Test +85°C	4.5.3	A2
Short-Time Operating High Temperature Test +70°C	4.5.3	A2
Operating High Temperature Test +70°C	4.5.4	A2
In Flight Loss of Cooling	4.5.5	X
Altitude Test +55.000ft	4.6.1	F2
Decompression Test	4.6.2	A2
Overpressure Test	4.6.3	A2
Temperature Variation (-40°C to +70°C)	5	B
Humidity	6	A
Operational Shocks and Crash Safety	7	-
Operational Shocks	7.2	B, E
Crash Safety (Impulse)	7.3.1	B, E
Crash Safety (Sustained)	7.3.3	Aircraft Type 5 (Helicopter and All Fixed-Wing) Orientation: Random Functional Test before and after, not during

Table C-2: Common environmental conditions and tests (DO160G) for SCM

Environmental variable	DO160 G section (Unless otherwise specified)	Category and requirements
Bench Handling Shocks	MIL-STD 810G, Method 516.6, Proc. VI	
Vibration	8	-
Standard Random Vibration	8.5	S(B3)
High-Level, Short Duration Vibration	8.6	H(R)
Explosion Atmosphere	9	X
Waterproofness	10	Y
Fluids Susceptibility	11	F
Sand & Dust	12	S
Fungus Resistance	13	F
Salt Fog	14	X
Magnetic Effect	15	Z
Induced Signal Susceptibility	19	
Magnetic Fields Induced into Equipment.	19.3.1	-
Magnetic Fields Induced into Interconnecting Cables	19.3.3	CWX
Electrical Fields Induced into Interconnecting Cables	19.3.4	CWX
Spikes Induced into Interconnecting Cables	19.3.5	CWX
Radio Frequency Susceptibility (Conducted & Radiated)	20	-
Conducted	20.4	T
Radiated	20.5	T
Emission of Radio Frequency Energy	21	-
Conducted	21.4	M (modified)[a]
Radiated	21.5	M
Lightning Induced Transient Susceptibility	22	A3 (Level 3, WF3 & WF4)

Table C-2: Common environmental conditions and tests (DO160G) for SCM (Continued)

Environmental variable	DO160 G section (Unless otherwise specified)	Category and requirements
Electrostatic Discharge (DO-160)	25	A
Fire, Flammability (DO-160)	26	C
Federal Aviation Regulation	FAR 25.853(a) & Appendix F, part I, §(a)(1){ii) FAR 25.853(a) & Appendix F, part I, §(a)(1)(v) FAR 25.869 (a)(1) & Appendix F part I	

Table C-2: Common environmental conditions and tests (DO160G) for SCM (Continued)

a. Category M modified by testing up to 200 MHz (instead of 152 MHz) and with a more severe level.

C.4 Multi-Carrier High Power Amplifier (MCHPA)

Part Number: HPA-5015

Environmental variable	DO160 G section (Unless otherwise specified)	Category and requirements
Temperature and Altitude	4	[(A2F2)Z]
Ground Survival Low Temperature Test -55°C	4.5.1	A2
Short-Time Operating Low Temperature Test -40°C	4.5.1	A2
Operating Low Temperature Test -40°C	4.5.2	A2
Ground Survival High Temperature Test +85°C	4.5.3	A2
Short-Time Operating High Temperature Test +70°C	4.5.3	A2
Operating High Temperature Test +70°C	4.5.4	A2
In Flight Loss of Cooling	4.5.5	Z
Altitude Test +55.000ft	4.6.1	F2
Decompression Test	4.6.2	A2F2
Overpressure Test	4.6.3	A2
Temperature Variation (-40°C to +70°C)	5	B
Humidity	6	A
Operational Shocks and Crash Safety	7	-
Operational Shocks	7.2	E / B
Crash Safety (Impulse)	7.3.1	E / B
Crash Safety (Sustained)	7.3.3	Aircraft Type 5, Orientation: Random
Bench Handling Shocks	MIL-STD 810G, Method 516.6, Proc. VI	MIL-STD 810G, Method 516.6, Proc. VI
Vibration	8	-
Standard Random Vibration	8.5	S(B3)

Table C-3: Common environmental conditions and tests (DO160G) for MCHPA

Environmental variable	DO160 G section (Unless otherwise specified)	Category and requirements
High-Level, Short Duration Vibration	8.6	H(R)
Explosion Atmosphere	9	E
Waterproofness	10	Y
Fluids Susceptibility	11	F
Sand & Dust	12	D
Fungus Resistance	13	F
Salt Fog	14	X
Magnetic Effect	15	Z
Power Input	16	A(WF)HLPI
Voltage Spike	17	A
Audio Frequency Conducted Susceptibility	18	
AC Power	18.3.2	R(WF)
Induced Signal Susceptibility	19	
Magnetic Fields Induced into Equipment.	19.3.1	CWX
Magnetic Fields Induced into Interconnecting Cables	19.3.3	CWX
Electrical Fields Induced into Interconnecting Cables	19.3.4	CWX
Spikes Induced into Interconnecting Cables	19.3.5	CWX
Radio Frequency Susceptibility (Conducted & Radiated)	20	-
Conducted	20.4	T
Radiated	20.5	T
Radio Frequency Emission	21	-
Conducted	21.4	M
Radiated	21.5	M
Lightning Induced Transient Susceptibility	22	AZZZLZ

Table C-3: Common environmental conditions and tests (DO160G) for MCHPA (Continued)

Environmental variable	DO160 G section (Unless otherwise specified)	Category and requirements
Lightning Direct Effects	23	X
Icing	24	X
Electrostatic Discharge	25	A
Fire, Flammability	26	C
Federal Aviation Regulation	FAR 25.853(a) & Appendix F, part I, §(a)(1)(ii) FAR 25.853(a) & Appendix F, part I, §(a)(1)(v) FAR 25.869 (a)(1) & Appendix F, part I	

Table C-3: Common environmental conditions and tests (DO160G) for MCHPA (Continued)

References

D.1 Applicable standards

[1] AC 43.131B/2B; Acceptable Methods, Techniques, and Practices - Aircraft Inspection Repair and Alterations, U.S. Department of Transportation, FAA

[2] ARINC Characteristic 743-A GNSS sensor

[3] ARINC Characteristic 781-7 Mark3 Aviation Satellite Communication Systems, August 9, 2017

[4] ARINC 600-19 Air Transport Avionics Equipment Interfaces

[5] RTCA DO-160G: Environmental Conditions and Test Procedures for Airborne Equipment, December 8, 2010

[6] ARINC 429P1-19 Digital Information Transfer System (DITS), Part 1, Functional Description, Electrical Interfaces, Label Assignments and Word Formats, January 22, 2019

D.2 Other references

[7] AVIATOR 700S User Manual*

[8] HGA-7001 Installation Manual (862-A0089_IM)

[9] ORT Tool User Guide*

[10] AVIATOR Operational User Guidance (99-157303)

*: Contact your supplier for a copy of the User Manual

A

AAC	Aeronautical Administrative Communications
ACARS	Aircraft Communications Addressing And Reporting System
ACAS	Aircraft Collision Avoidance System..
ACD	Aircraft Control Domain
ACP	Audio Control Panel
ACR	Avionics Communication Router
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.
ADIRU	Air Data Inertial Reference Unit
ADL	Airborne Data Loader
ADS-C	Automatic Dependent Surveillance - Contract
AES	Aeronautical Earth Station
AFIS	Airborne Flight Information System
AISD	Aircraft Information Services Domain
AMS	Audio Management System
AMU	Audio Management Unit
AOC	Airline Operational Control
AOG	Aircraft On Ground
APC	Airline / Aeronautical Passenger Communication
ARINC	Aeronautical Radio Incorporated
ATS	Aircraft Traffic Service
ATSU	Air Traffic Service Unit
AWG	American Wire Gauge

B

BGAN	Broadband Global Area Network
BITE	Built-In Test Equipment

C

CDU	Control Display Unit
CFDS	Central Fault and Display System
CMC	Central Maintenance Computer
CMU	Communications Management Unit
CPDLC	Controller to Pilot Data Link Communications
CSDU	Compact Satellite Data Unit

D

DME	Distance Measuring Equipment

E

ECAM	Electronic Centralized Aircraft Monitor
EFB	Electronic Flight Bag
EICAS	Engine-Indicating and Crew-Alerting System
ELGA	Enhanced Low Gain Antenna
EMC	Electro Magnetic Compatibility

F

FAA	Federal Aviation Administration
FANS	Future Air Navigation System
FDCE	Flight Deck and Cabin Effect
FWC	Flight Warning Computer
FWS	Flight Warning System

H

HELGA	HLD Enhanced Low Gain Antenna
HLD	High Power Amplifier, Low Noise Amplifier and Diplexer

I

ICAO	International Civil Aviation Organization
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.
IMSI	International Mobile Subscriber Identity
IPSEC	Internet Protocol Security

L

LGA	Low Gain Antenna
LGCIU	Landing Gear Control and Interface Unit
LGERS	Landing Gear Extension and Retraction System
LRU	Line Replaceable Unit. A separate unit or module which can easily be replaced.

M

MCDU	Multi-Function Control Display Unit
MCU	Modular Component Unit

O

ORT	Owners Requirements Table

P

PAST	Person Activated Self Test
PIESD	Passenger Information and Entertainment Services Domain
PTT	Push To Talk

R

RF	Radio Frequency (signal)
RMA	Return Material Authorization
RMP	Radio Management Panel
Rx	Receive (signal)

S

SATCOM	Satellite Communications
SB	Swift Broadband
SCDU	Satellite Control/Display Unit
SCM	SDU Configuration Module
SDU	Satellite Data Unit
SSPC	Solid State Power Controller
STC	Supplemental Type Certificate.

T

TC	Type Certificate
TCAS	Traffic Alert and Collision Avoidance System. A system which warns pilots of potential conflicts with other aircraft.
TCP	Tuning Control Panel
TX	Transmit (signal)

U

USB	Universal Serial Bus
USIM	Universal Subscriber Identity Module

V

VHF	Very High Frequency. 30-300 MHz.
VOR	VHF Omnidirectional Range
VPN	Virtual Private Network

W

WoW	Weight on Wheels
WSC	Williamsbrug SDU Controllers

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