AVIATOR 200S

User Manual

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1 INTRODUCTION

1.1 GENERAL

1.1.1 Purpose

This document provides a guide for users intending to make voice calls or data connections via the AVIATOR 200S SATCOM System.

The use of voice and data services as well as the use of advanced data features is demonstrated by means of examples.

An installed and configured Aeronautical Earth Station (AES) is assumed throughout.

1.1.2 Scope

This document is scoped to the items defined in Table 1-1.

Table 1-1: Document Scope

Equipment	Part Number	Description
CSDU-5045	405045-02000	Compact Satellite Data Unit 405045
SCM-5055	405055-02000	SDU Configuration Module 405055
LGA-5005	405005-02000	Low Gain Antenna 405005

1.2 GLOSSARY

1.2.1 Acronyms

Table 1-2: List of Acronyms

Acronym	Description
A2G	Air-to-Ground
AAC	Airline Administrative Control
ACARS	Aircraft Communications, Addressing and Reporting System
ACD	Aircraft Control Domain
ACP	Audio Control Panel
ADL	Airborne Data Loader
AES	Aircraft Earth Station
AISD	Airline Information and Services Domain
AMER	Americas
AOC	Aeronautical Operational Control
APAC	Asia-Pacific
APN	Access Point Name
ATA	Air Transport Association
ATC	Air Traffic Control
AUTO	Automatically

Table 1-2: List of Acronyms	
Acronym	**Description**
CFDS	Central Fault Display System
CHAP	Challenge Handshake Authentication Protocol
CID	Context ID
CMU	Communication Management Unit
CSDU	Compact Satellite Data Unit
CSP	Communication Service Provider
CSR	Certificate Signing Request
CTTIC	China Transport Telecommunications & Information Centre
dB	Decibels
DL	Downlink
DLNA	Diplexer/Low Noise Amplifier
EFB	Electronic Flight Bag
EMEA	Europe, Middle East and Africa
FDS	Fault Display Specification
FWS	Flight Warning System
G2A	Ground-to-Air
GES	Ground Earth Station
HELGA	HLD and Enhanced Low Gain Antenna
HDR	High Data Rate
HLD	HPA/LNA/Duplexer
HMI	Human Machine Interface
HPA	High Power Amplifier
Hz	Hertz
IANA	Internet Assigned Numbers Authority
ICAO	International Civil Aviation Organisation
ID	Identity
IFE	In-Flight Entertainment
IM	Installation Manual
IMSI	International Mobile Subscriber Identity
INOP	Inoperable
IP	Internet Protocol
IPCP	Internet Protocol Control Protocol
LGA	Low Gain Antenna
LNA	Low Noise Amplifier
LRU	Line Replaceable Unit
LSK	Line Select Key

Table 1-2: List of Acronyms	
Acronym	**Description**
MB	Megabyte
MCDU	Multi-purpose Control and Display Unit
MEAS	Middle East and Asia
MIB	Management Information Base
NAT	Network Address Translation
ORC	Ocean Region Change
OID	Object ID
OPS	Operational Program Software
ORT	Owner Requirements Table
PAP	Password Authentication Protocol
PDL	Portable Data Loader
PDP	Packet Data Protocol
PKI	Public Key Infrastructure
QoS	Quality of Service
SAT	Satellite
SATCOM	Satellite Communication
SB / SBB	SwiftBroadband
SB-S	SwiftBroadband-Safety
SCM	SDU Configuration Module
SDU	Satellite Data Unit
SNMP	Simple Network Management Protocol
SPI	Security Parameter Index
TCP	Tuning Control Panel
TFT	Traffic Flow Template
UHF	Ultra High Frequency
UL	Uplink
UM	User Manual
UMTS	Universal Mobile Telecommunications System
VHF	Very High Frequency
VPN	Virtual Private Network

1.3 REFERENCES

1.3.1 External References

Table 1-3: List of External References			
Reference Tag	**Document**	**Revision**	**Document Title**
[3GPP_TS27]	3GPP TS 27.007	10.3.0	Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); AT command set for User Equipment (UE)
[A781]	ARINC 781	7	ARINC Characteristic 781 - Mark 3 Aviation Satellite Communication Systems
[ITU-T_V.250]	ITU-T	V.250	Serial asynchronous automatic dialing and control
[PKI_CON]	PKI CONOPS	0.3	SwiftBroadband Safety 2.0 Overview and PKI Concept of Operations
[PKI_OPS]	PKI INMARSAT	0.9	Inmarsat SB-S Service - Airline Ops Handbook
[GOLD]	ICAO GOLD	Second Edition	International Civil Aviation Organization (ICAO) - Global Operational Data Link Document (GOLD)
[SVGM]	ICAO SVGM	First Edition	International Civil Aviation Organization (ICAO) - Satellite Voice Guidance Material (SVGM)
[A739]	ARINC 739	1	ARINC Characteristic 739 - Multi-purpose Control and Display Unit
[A739A]	ARINC 739A	1	ARINC Characteristic 739A - Multi-purpose Control and Display Unit
[A615]	ARINC 615	4	Airborne Computer High Speed Data Loader
[A615A]	ARINC 615A	2	Software Data Loader Using Ethernet Interface
[A665]	ARINC 665	2	Loadable Software Standards

1.3.2 Internal References

Table 1-4: List of Internal References			
Reference Tag	**Document**	**Revision**	**Document Title**
[200S_IM]	98-145168	Latest	AVIATOR 200S Installation Manual
[SORT_UG]	99-173001	Latest	AVIATOR 200S ORT Tool - Secure & User Guide
[UORT_UG]	99-173000	Latest	AVIATOR 200S ORT Tool - User Guide

2 REGULATORY INFORMATION

2.1 RADIOFREQUENCY RADIATION EXPOSURE INFORMATION

2.1.1 AVIATOR 200S

This equipment complies with FCC and IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 50 cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 50 cm de distance entre la source de rayonnement et votre corps.

Ce transmetteur ne doit pas être placé au même endroit ou utilise simultanément avec un autre transmetteur ou antenne.

2.2 FEDERAL COMMUNICATIONS COMMISSION (FCC)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

NOTICE:

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

NOTICE:

This device complies with Part 15 of the FCC Rules and with Industry Canada license-exempt RSS standard(s).

Operation is subject to the following two conditions:

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

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et

(2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

2.3 JAPANESE RADIO LAW AND JAPANESE TELECOMMUNICATIONS BUSINESS LAW COMPLIANCE

This device is granted pursuant to the Japanese Radio Law (*電波法*)
and the Japanese Telecommunications Business Law (*電気通信事業法*).

This device should not be modified (otherwise the granted designation number will become invalid).

3 SWIFTBROADBAND SAFETY SYSTEM OVERVIEW

3.1 INMARSAT SATELLITE NETWORK

3.1.1 SwiftBroadband-Safety (SB-S) for the Cockpit

SB-S is a comprehensive upgrade of the Classic Aero service, which is a voice and data safety service, used by more than 200 major airlines, jet operators and government agencies, onboard over 13,000 aircraft, processing over 50 million position reports annually.

Classic Aero has been the gold standard for aviation safety communications for the past three decades. However, technology has evolved and SB-S promises to revolutionise the safe flight of airplanes through the skies.

SB-S has global coverage, abundant capacity, full redundancy, unrivalled cybersecurity, and over 99.9% availability worldwide, meeting International Civil Aviation Organisation (ICAO) GOLD communications and surveillance performance requirements.

Refer to the INMARSAT website for further information: https://www.inmarsat.com/

3.1.2 SwiftBroadband Satellites and Coverage Map

The INMARSAT Satellite Network provides near-global coverage between +/-76 degrees latitude from four satellites in geostationary orbit. The satellites are 4th generation (I-4) Inmarsat satellites, nominally located at the following longitudes:

- Europe, Middle East and Africa (EMEA) 25 degrees East
- Middle East and Asia (MEAS) 64 degrees East
- Asia-Pacific (APAC) 143.5 degrees East
- Americas (AMER) 98 degrees West

Each satellite provides a large number of overlapping beams (similar to cells) on the earth for users to access the network, similar in operation to terrestrial cellular networks.

The part of the earth's surface covered by each satellite is termed its "footprint".

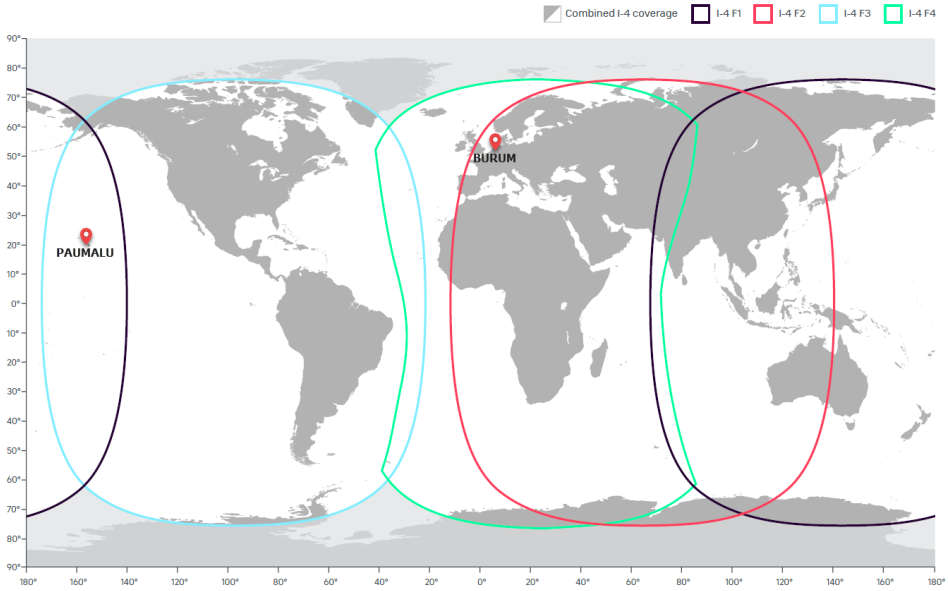

Figure 3-1: INMARSAT SwiftBroadband Coverage

3.2 AVIATOR S SATCOM SYSTEM FUNCTIONS AND FEATURES

3.2.1 System Overview - AVIATOR 200S

The AVIATOR 200S System services the Cockpit by providing SB-S (refer to section 3.1.1) voice and data connectivity to keep the aircraft connected, even in areas with a high concentration of aircraft:

- Two simultaneous voice calls supported by multiple aircraft audio configurations.
- ACARS Data capability for secure message exchanges between Air Traffic Control (ATC), Aeronautical Operational Control (AOC) and Airline Administrative Control (AAC).
- Cockpit Data connectivity (up to 200 kbps) for Electronic Flight Bag (EFB) applications keeping the crew informed and up-to-date at all times.

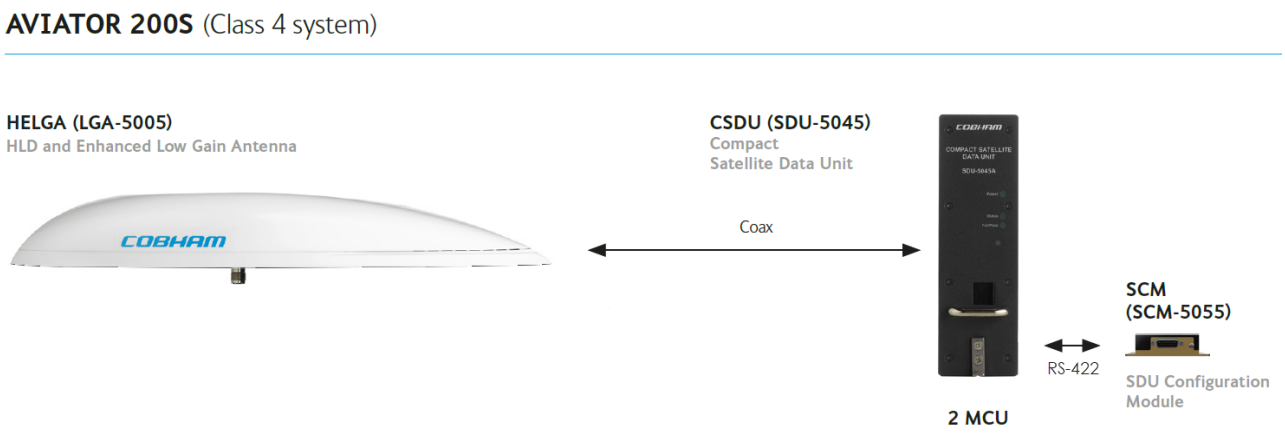

Figure 3-2: AVIATOR 200S SATCOM System - Block Diagram

3.2.2 Configuration

The AVIATOR S System configuration is managed by loading Owner Requirement Tables (ORT) via the Airborne Data Loader (ADL) or Portable Dataloader (PDL).

The configuration is made up of two parts (separate ARINC 665 **[A665]** Media):

- Secure ORT
- User ORT

The Secure ORT is typically managed by the aircraft manufacturer and forms part of the certified installation. The Secure ORT configures the AVIATOR S System for a specific aircraft configuration.

The User ORT is typically managed by the airline or aircraft operator. The User ORT does not form part of the certified aircraft configuration, but is often important in ensuring the system operates in the desired way. Changes to the User ORT may be frequent, potentially based on aircraft route or charter.

The User ORT also defines the phonebook/directory available to the crew with a list of pre-programmed numbers with associated call priority (refer to section 3.3.1).

A laptop computer with an installation of the ORT Tool may be used to modify and create ARINC 665 **[A665]** media for use with the ADL/PDL. Refer to the ORT Tool User Guides **[SORT_UG][UORT_UG]** for further guidance.

3.3 SAFETY VOICE SERVICES

3.3.1 Call Priorities - Ground-to-Air (G2A)

In order to keep communication towards the aircraft (including voice calls) controlled and secure, a particular Aircraft (identified by its ICAO address) may be reached by placing a call through a 'two-stage dialer' managed by SITA or ARINC (CSP). In order to access these services, the caller (or organization) must be registered (for billing purposes) with the selected Communication Service Provider (CSP) in order to be granted access in the form of a unique pin code(s).

Calls placed over the SB-S network require a call priority[1] and is selected by the calling parting at the time of dialing. In some cases, a unique pin code may be linked to a particular call priority.

Table 3-1: Call Priorities

Description	Priority Level	Priority Number
Emergency / Distress	Highest	P1/Q15
High / Safety		P2/Q12
Low / Company / Non-Safety		P3/Q10
Public	Lowest	P4/Q9

Public priority calls may not be permitted to reach the cockpit and may be disabled through User ORT configuration (refer to section 3.2.2).

3.3.2 Call Priorities - Air-to-Ground (A2G)

Calls initiated by the crew on-board the aircraft are assigned a call priority (refer to Table 3-1), typically selected on the MCDU/TCP before initiating the call. The default MCDU/TCP call priority is configured by Secure ORT configuration.

Outgoing Public priority calls may not be permitted and may be disabled through User ORT configuration (refer to section 3.2.2).

3.3.3 Pre-emption

Four levels of call priority (described in section 3.3.1) allows for call pre-emption[2], where an incoming call may only reach and alert the crew when all the available channels are in-use and the incoming call priority is higher than the current active calls. When a lower priority call is pre-empted, the MCDU/TCP will display the updated incoming call information.

[1] Refer to the ICAO document **[SVGM]** for further clarification of the call priority definition.
[2] Refer to the ICAO document **[SVGM]** for further clarification on call pre-emption.

3.4 SAFETY DATA SERVICES

3.4.1 ACARS Data

One of the fundamental communication systems in the aircraft is the Aircraft Communications, Addressing and Reporting System (ACARS). This messaging system, managed by the Communication Management Unit (CMU), is key to the efficient and safe operation of the aircraft on the ground as well as in the air.

The CMU may select between various communication systems on-board in order to send ACARS messages, one of those being the AVIATOR S SATCOM System.

The benefit of the INMARSAT SB-S network is the improved speed, availability and reliability over the legacy VHF, UHF and Classic Aero systems.

The ACARS data connection is connected to the AVIATOR S Aircraft Control Domain (ACD) which segregates this and all other secure data streams from the AISD (EFB) data traffic. All ACARS data exchanged with the ground network is secured via a Virtual Private Network (VPN).

Refer to **[GOLD]** for further information regarding data link operations and capabilities.

3.5 NON-SAFETY DATA SERVICES

3.5.1 Electronic Flight Bag (EFB)

The EFB data connection is connected to the AVIATOR S Airline Information and Services Domain (AISD) Ethernet port, which segregates AISD (EFB) data traffic from the secure data streams (ACD).

AISD Clients are required to have a known static IPv4 configuration (defined by User ORT) for its Ethernet interface in order to access a routed and network address translated (NAT) Background Class data connection.

A Simple Network Management Protocol (SNMP) interface provides the capability for retrieving AVIATOR S system and operational status information as well as link status and history (refer to Appendix A).

4 SERVICE ACTIVATION

In order to access the INMARSAT SB-S/SBB Network, an active service agreement is required between the aircraft owner/operator and a Communication Service Provider (CSP):

- SwiftBroadband-Safety (SB-S) | Flight Deck Services:
  - Primary
    - ARINC DIRECT
      - https://www.arincdirect.com
    - SITA
      - https://www.sita.aero
  - Regional
    - China Transport Telecommunications & Information Centre (CTTIC)

- SwiftBroadband (SBB) | Passenger Services
  - Primary
    - ARINC DIRECT
      - https://www.arincdirect.com
    - SITA
      - https://www.sita.aero
  - Regional
    - China Transport Telecommunications & Information Centre (CTTIC)

The CSP and the appointed Airline Designator/Device Sponsor (See section 4.2) will require the following information during the activation process:

- AVIATOR S Information
  - System Type
    - AVIATOR 200S (Class 4)
  - SIM Card Information
    - International Mobile Subscriber Identity (IMSI)
      - IMSI 0 is for Cockpit Voice and Data | ACD + AISD
      - IMSI 1 is reserved for future use
      - IMSI 2 is reserved for future use
      - IMSI 3 is reserved for future use
  - Smart Card Information
    - The smart card serial number for the PKI Security Certificate | ACD
- Aircraft or Owner Information
  - International Civil Aviation Organization (ICAO) Address
  - Registered Aircraft Identity | Tail Number
  - Billing information

As an outcome of the activation process, the CSP must provide the permitted Access Point Name (APN) for the AVIATOR S EFB (AISD) connection. The APN provided by the CSP must be configured in the User ORT (refer to section 3.2.2).

4.1 IMSI AND SMART CARD INFORMATION

The IMSI and smart card information is typically available through the following methods:

- Documentation included with the Satellite Data Unit (SDU) Configuration Module (SCM)
- Label information on the SCM itself (see Figure 4-1)
- SATCOM->MCDU/TCP Screens reflecting the IMSI and Smart Card information

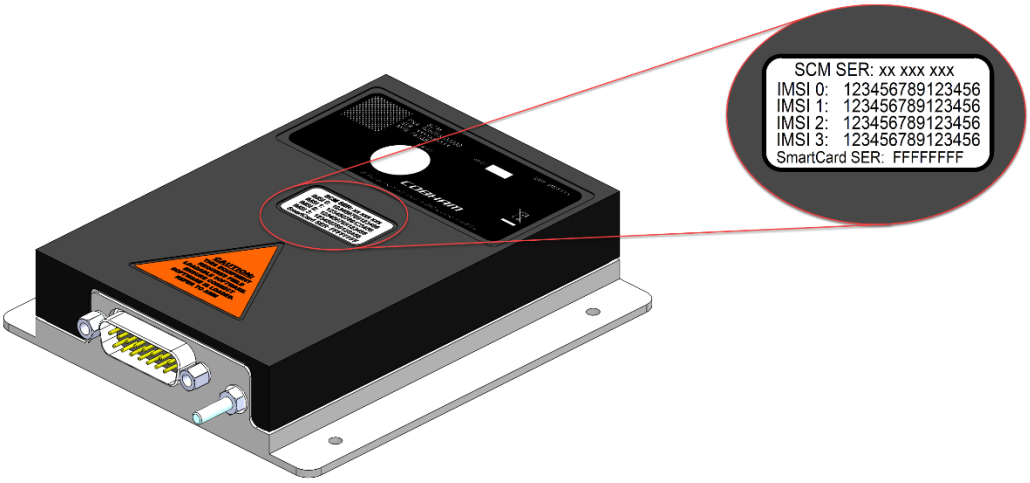

Figure 4-1: AVIATOR S SCM | IMSI & Smart Card Identification

4.2 PUBLIC KEY INFRASTRUCTURE (PKI) SECURITY CERTIFICATE

SwiftBroadband Safety security measures include a smart card inserted into each SCM, used to authenticate the AVIATOR S system when connecting to the INMARSAT SB-S network.

A valid digital public key infrastructure (PKI) security certificate is required before SB-S connectivity is available. The User ORT configured "Airline Designator" (See section 3.2.2) will receive a certificate signing request (CSR) when the AVIATOR S system has successfully acquired the satellite and attempts to authenticate SB-S services.

The Airline Designator will appoint a "Device Sponsor" who is responsible for the issuing of the PKI certificate.

Once the Device Sponsor has issued the certificate, the AVIATOR S system will automatically retrieve the certificate, allowing SB-S services to proceed.

Refer to the INMARSAT PKI - Airline Ops Handbook **[PKI_OPS]** and the INMARSAT PKI Concept of Operations **[PKI_CON]** for more details regarding PKI activation and usage.

5 INTERPRETING THE SYSTEM STATUS

This User Manual provides operational descriptions to allow flight crew to manage the AVIATOR S system. Depending on the aircraft configuration, the control & display unit installed may be either an MCDU (Figure 5-1) or TCP (Figure 5-2):

Multi-purpose Control and Display Unit

Figure 5-1: ARINC 739A MCDU

Tuning Control Panel

Figure 5-2: ARINC 739 TCP

The SAT-PHONE pages are accessed by pressing the <SAT (LSK-L3) from the MCDU main menu (Figure 5-1).

The SAT PHONE-X pages are accessed by pressing the SAT button on the TCP (Figure 5-2). The "X" field is reserved to display the active SATCOM partition (L vs. R) from which the menu is being displayed.

Refer to Figure 5-3 for the MCDU/TCP display unit menu tree.

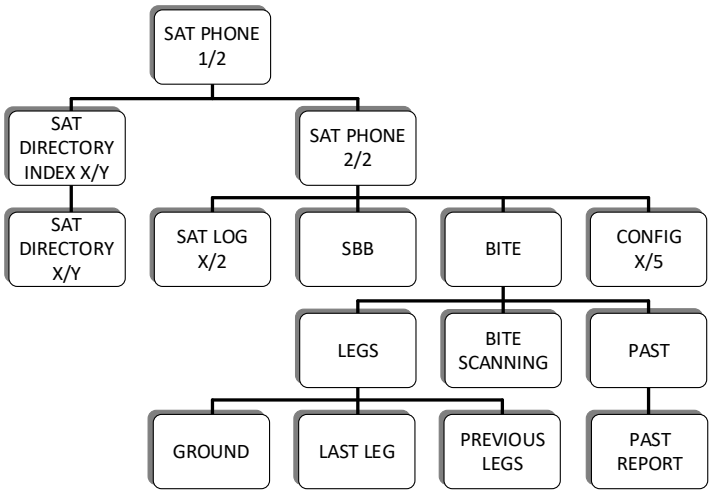

Figure 5-3: SATCOM Page Layout

5.1 VOICE AVAILABILITY

The AVIATOR S voice availability status indicates when the system is able to initiate a voice call. The availability status is associated to the voice channel number:

MCDU: SAT-PHONE page 1 of 2, SAT-1 for the first[3] voice channel, and SAT-2 for the second voice channel.

TCP: SAT PHONE-R[4] page 1 of 2, SAT-1 for the first[3] voice channel, and SAT-2 for the second voice channel.

5.1.1 Not Ready

When the AVIATOR S system and/or other aircraft systems (e.g. navigation data) are initialising or unable to provide service:

MCDU: SAT-PHONE page 1 of 2, SAT-1 and SAT-2 status indicates NOT READY (See Figure 5-4).

TCP: SAT PHONE-R page 1 of 2, SAT-1 and SAT-2 status indicates NOT READY (See Figure 5-5).

Figure 5-4: MCDU - SAT-PHONE 1/2 - NOT READY

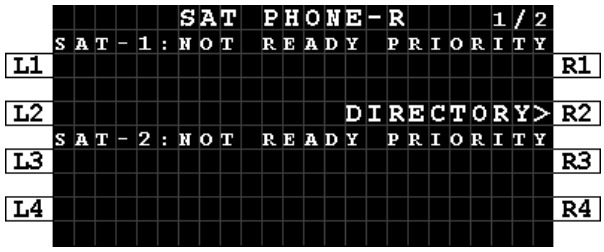

Figure 5-5: TCP - SAT PHONE-R 1/2 - NOT READY

To establish a cause for the NOT READY state, navigate to the pages described further in the following sections:

MCDU: Press NEXT/PREV PAGE key on the MCDU to display the SAT-PHONE page 2 of 2 (See Figure 5-6).

TCP: Press NEXT/PREV PAGE key on the TCP to display the SAT PHONE-R page 2 of 2 (See Figure 5-7).

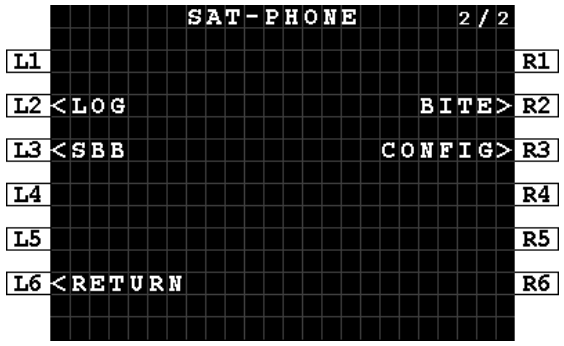

Figure 5-6: MCDU - SAT-PHONE 2/2

Figure 5-7: TCP - SAT PHONE-R 2/2

[3] The preferred Cockpit Audio Channel is Secure ORT configurable. Refer to **[SORT_UG]** for further configuration guidance.

[4] In a Dual SATCOM configuration, the CSDU position is indicated by the nomenclature –L (Left) or –R (Right) position. The examples used are for the Right position.

5.1.2 Safety Voice Services - Ready

When the AVIATOR S system has successfully acquired and registered on the INMARSAT network:

MCDU: SAT-PHONE page 1 of 2 SAT-1 and SAT-2 status indicates READY (See Figure 5-8).

TCP: SAT PHONE-R page 1 of 2 SAT-1 and SAT-2 status indicates READY (See Figure 5-9).

The AVIATOR S system is now able to make or receive safety voice calls.

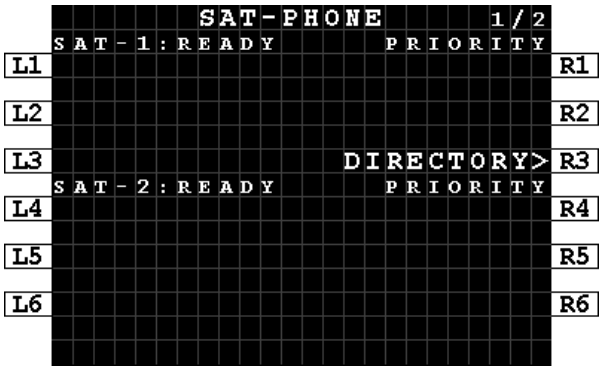

Figure 5-8: MCDU - SAT-PHONE - Ready

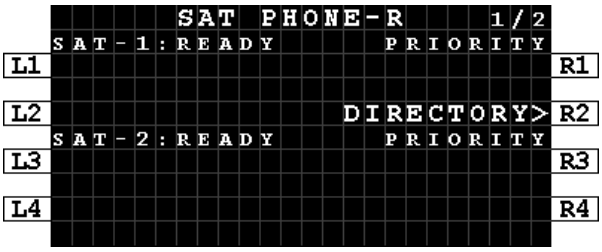

Figure 5-9: TCP - SAT-PHONE-R - Ready

5.1.3 Safety Data Services - Available

When the AVIATOR S system has created the virtual private network (VPN) (described in section 3.4.1), the Ground Earth Station (GES) assigned[5] by the INMARSAT network is displayed on the:

MCDU: Press LSK-L2 on SAT-PHONE page 2 of 2 (Figure 5-6)→SAT-LOG page 1 of 2 at position LSK-L4 (Figure 5-10).

TCP: Press LSK-L1 on SAT PHONE-R page 2 of 2 (Figure 5-7)→SAT LOG page 1 of 2 at position LSK-L3 (Figure 5-11).

Refer to section 8.1 for further information.

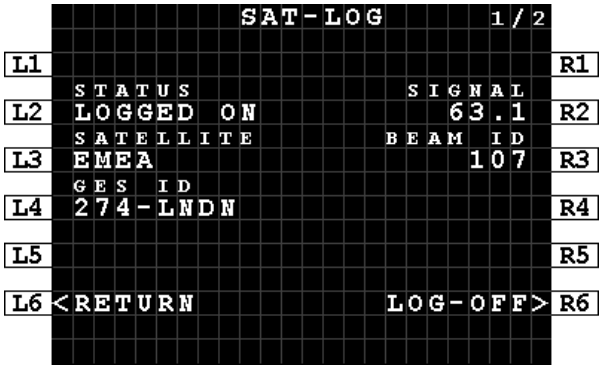

Figure 5-10: MCDU - SAT-LOG 1/2 - Safety Data Available

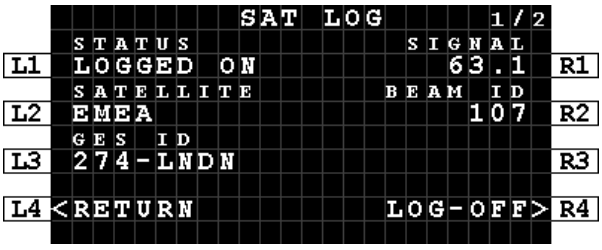

Figure 5-11: TCP - SAT LOG 1/2 - Safety Data Available

[5] The SwiftBroadband GES is not user selectable as in Classic Aero systems.

5.2 SWIFTBROADBAND (SBB) SERVICE AVALABILITY

When the AVIATOR S system has successfully acquired and registered on the INMARSAT network the current status and SwiftBroadband services may be reviewed by navigating to the:

MCDU: SAT-PHONE page 2 of 2→SBB page (See Figure 5-12) by pressing LSK-L3 (see Figure 5-6).

TCP: SAT PHONE-R page 2 of 2→SBB (See Figure 5-13) by pressing LSK-L2 (see Figure 5-7).

Figure 5-12: MCDU - SBB - Service Availability

Figure 5-13: TCP - SBB - Service Availability

- **CS Voice:**
  - NOT AVAILABLE — Circuit Switched voice service is currently not available. Ensure the system is Logged On to the Satellite. Refer to the SATCOM Log page, section 5.3.
  - AVAILABLE — Circuit Switched voice service is available.

- **PS Voice:**
  - NOT AVAILABLE — Packet Switched voice service is currently not available. Ensure the system is Logged On to the Satellite and the SEC GW is LOGGED ON. Refer to the SATCOM Log page, section 5.3.
  - AVAILABLE — Packet Switched voice service is available.

- **ACARS:**
  - IDLE — ACARS service is not active. Ensure the system is Logged On to the Satellite. Refer to the SATCOM Log page, section 5.3.
  - WAITING CMU — No CMU is detected. For further troubleshooting, refer to BITE, section 10.1.
  - WAITING VPN — A logon request has been sent. Waiting for the response from ground.
  - LOGGED OFF — ACARS Data service is currently not available. Ensure the system is Logged On to the Satellite. Refer to the SATCOM Log page, section 5.3.
  - LOGGED ON — ACARS data service is available.

- **SEC GW:**
  - LOGGED OFF — Security Gateway service is currently not available. Ensure the system is Logged On to the Satellite. Refer to the SATCOM Log page, section 5.3.
  - ENROLLING — Security Gateway has initiated a request for the initial PKI certificate. Refer to section 4.2, Public Key Infrastructure (PKI) Security Certificate.
  - LOGGING ON — Security Gateway service is establishing the connection.
  - LOGGED ON — Security Gateway service is available.

5.3 SATCOM LOG

Navigate to the SATCOM LOG page for further satellite network status and management functions:

MCDU: SAT-PHONE page 2 of 2→SAT-LOG page by pressing LSK-L2 (Figure 5-6).

TCP: SAT PHONE-R page 2 of 2→SAT LOG page by pressing LSK-L1 (Figure 5-7).

5.3.1 Logging On/Logged On/Logged Off/Standby/Rejected

View the status of the connection to the INMARSAT satellite shown at LSK-L2 on MCDU, LSK-L1 on TCP. The system will perform an automatic (AUTO) log on after initial power on (Figure 5-14, Figure 5-15, Figure 5-18, Figure 5-19).

By pressing LOG-OFF (LSK-R6 on MCDU, LSK-R4 on TCP), the SATCOM system will disconnect from the INMARSAT network, and all services are unavailable (Figure 5-16, Figure 5-20). This is termed a "manual log off".

Press AUTO LOG-ON (LSK-R5 on MCDU, LSK-R3 on TCP) to reconnect to the INMARSAT network. The system status will indicate LOGGING ON while reconnecting, followed by the LOGGED ON status when complete.

Refer to section 6 for additional guidance relating to a "manual log on" procedure.

In dual SATCOM configuration, the STANDBY status indicates that the system is inactive and that the other SATCOM is currently is operational use (Figure 5-21).

If the IMSI is not activated with a Communication Service Provider (CSP), the SATCOM is unable to register on the satellite network. The status REJECTED is displayed (Figure 5-17, Figure 5-22).

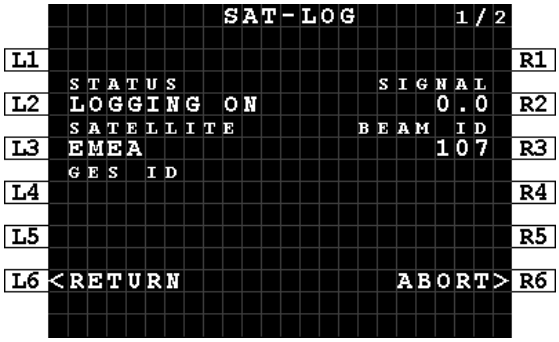

Figure 5-14: MCDU - SAT-LOG 1/2 - Status - Logging On

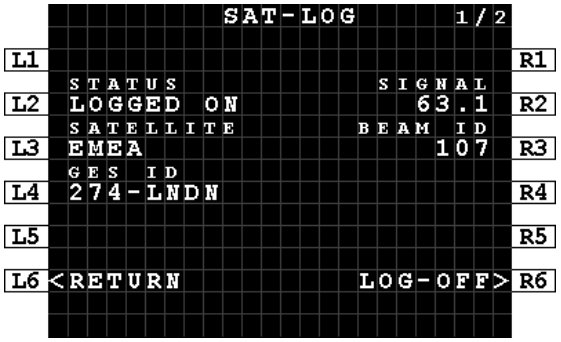

Figure 5-15: MCDU - SAT-LOG 1/2 - Status - Logged On

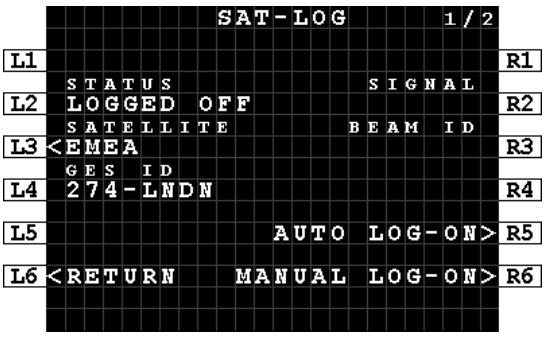

Figure 5-16: MCDU - SAT-LOG 1/2 - Status - Logged Off

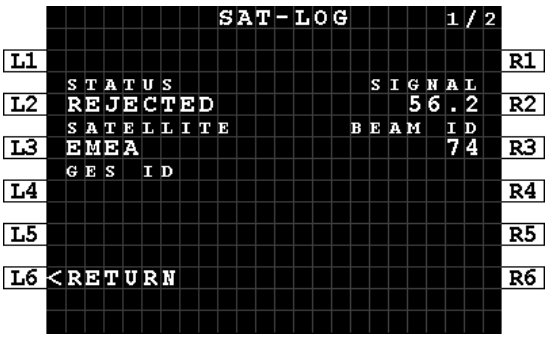

Figure 5-17: MCDU - SAT-LOG 1/2 - Status - Rejected

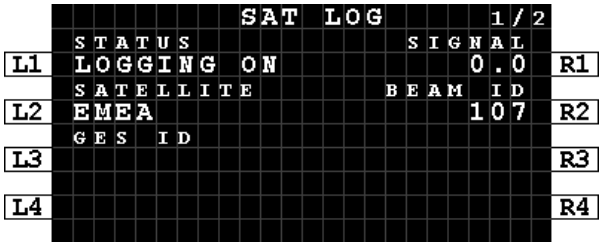

Figure 5-18: TCP - SAT LOG 1/2 - Status - Logging On

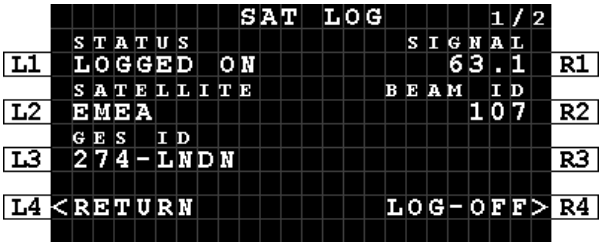

Figure 5-19: TCP - SAT LOG 1/2 - Status - Logged On

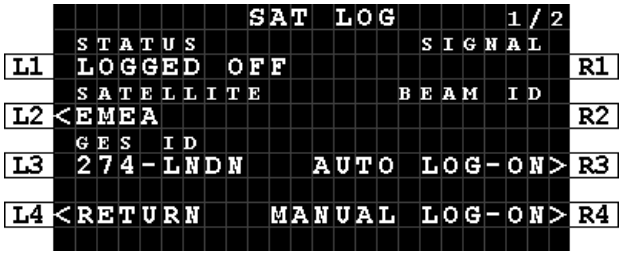

Figure 5-20: TCP - SAT LOG 1/2 - Status - Logged Off

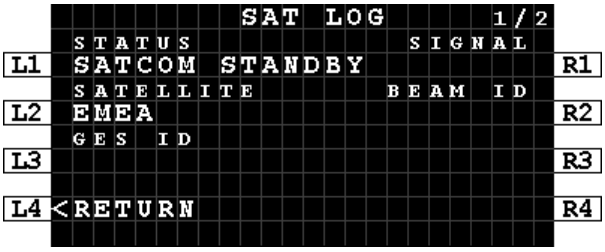

Figure 5-21: TCP - SAT LOG 1/2 - Status - Standby

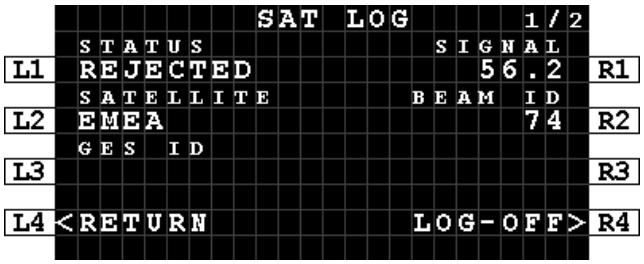

Figure 5-22: TCP - SAT LOG 1/2 - Status - Rejected

5.3.2 SATCOM INOP

When the AVIATOR S system has an error and unable to provide service, the voice channel status will indicate that calls are not possible (refer to section 5.1.1).

By accessing the SATCOM Log page, the system will indicate if it is attempting to log on or has declared a fault condition with the status "SATCOM INOP" (See Figure 5-23 and Figure 5-24).

Further troubleshooting to determine the failure related to the SATCOM INOP state may be performed via the BITE pages as per section 10.1.

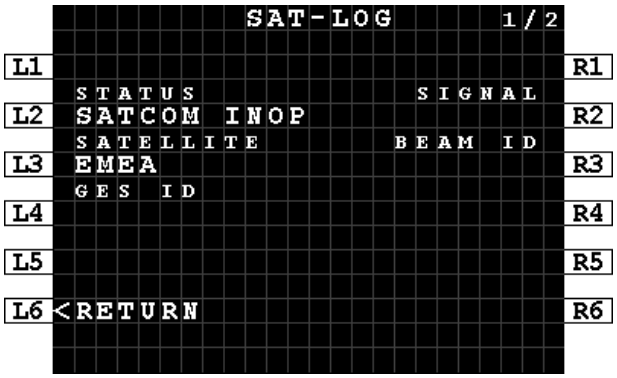

Figure 5-23: MCDU - SAT-LOG 1/2 - Status - SATCOM INOP

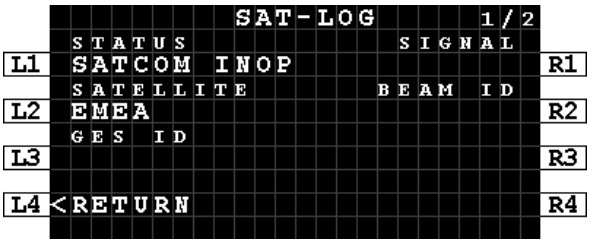

Figure 5-24: TCP - SAT LOG 1/2 - Status - SATCOM INOP

5.3.3 ICAO

The SATCOM Log page 2 of 2 provides the active ICAO address for activation or troubleshooting purposes (See Figure 5-25 and Figure 5-26):

MCDU: Press NEXT/PREV PAGE key on the MCDU to display the SAT-LOG page 2 of 2 (See Figure 5-25).

TCP: Press NEXT/PREV PAGE key on the TCP to display the SAT LOG page 2 of 2 (See Figure 5-26).

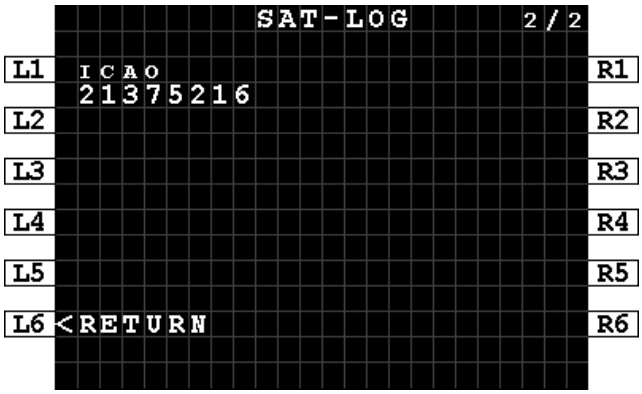

Figure 5-25: MCDU - SAT-LOG 2/2 - ICAO

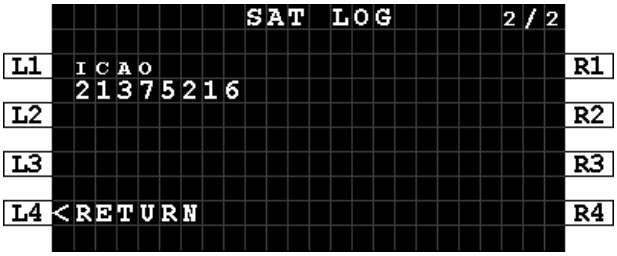

Figure 5-26: TCP - SAT LOG 2/2 - ICAO

6 SATELLITE SELECTION

6.1.1 Log Off & Auto/Manual Log On

The INMARSAT satellite used by the AVIATOR S system can be automatically or manually selected through the SATCOM Log page. Typical system configuration is to perform automatic (AUTO) logon.

When the aircraft is operating in a region where more than one satellite may be used, a situation may arise where the current satellite is not the preferred satellite. An example of this would be a known flight path where a particular satellite's footprint does not provide full coverage, and switching to an alternate satellite may provide extended coverage without the need for changing satellites, termed an ocean region change (ORC), mid-flight or at an inconvenient time or position.

The selected satellite may be modified through the following sequence:

1. LOG-OFF from the SAT-LOG 1/2 page for MCDU or SAT LOG 1/2 page for TCP (Figure 5-15, Figure 5-19).
2. Once in the LOGGED OFF state, modify the selected satellite page by pressing LSK-L3 on MCDU, LSK-L2 on TCP.
3. Once the desired satellite is displayed, the decision must be made to perform an AUTO or MANUAL LOG-ON on by one of the following:
    a. Pressing AUTO LOG-ON from the SAT-LOG 1/2 page for MCDU or SAT LOG 1/2 page for TCP (Figure 5-16, Figure 5-20).
        i. The AVIATOR S system will select the INMARSAT satellite.
    b. Pressing MANUAL LOG-ON from the SAT-LOG 1/2 page for MCDU or SAT LOG 1/2 page for TCP (Figure 5-16, Figure 5-20).
        i. The crew must select the desired INMARSAT satellite.

6.1.2 Ocean Region Change (ORC)

An ocean region change (ORC) occurs when the AVIATOR S system transitions from one satellite coverage area into another. This action may be performed manually or automatically as described in section 6.1.1.

In both cases, voice and data services are disconnected for the duration of time the AVIATOR S system requires to complete the ORC.

When the aircraft flight path or position has left the coverage area of the current satellite, the system will experience a loss of signal scenario and automatically search for alternate satellites that may be in view, or attempt to re-acquire the satellite that was 'lost' in order to resume communications. When the AVIATOR S system experiences loss of coverage (no signal), the MCDU display will indicate "NOT READY" as described in section 5.1.1. In a typical ORC scenario, voice and data services may be restored in under 5 minutes.

7 SAFETY VOICE SERVICES

The AVIATOR S system supports up to two simultaneous voice calls (incoming/outgoing/mixed) and various aircraft audio configurations:

1) Audio via the Audio Control Panel (ACP) and call management functions performed via the Multi-purpose Control and Display Unit (MCDU). Refer to section 7.1.
2) Audio via the Audio Control Panel (ACP) and call management functions performed via the Tuning Control Panel (TCP). Refer to section 7.2.

7.1 MCDU INTERFACE

7.1.1 Outgoing Calls - Air-to-Ground (A2G)

In order to place an outgoing call, often referred to as an air-to-ground call, the crew can choose between:

- Manual Entry - a phone number[6] or short code[7] may be entered via the MCDU (Figure 7-1, Figure 7-2),
- Directory Dial - select the identity from the directory list defined by User ORT (see section 3.2.2 for ORT Configuration).

7.1.1.1 Manual Entry

1. From the SAT-PHONE page 1 of 2 enter the destination number into the scratchpad (max 18 digits) and press LSK-L1 to pre-select the number to SAT-1 or LSK-L4 to SAT-2:
   a) International number - must begin with the prefix "00" followed by the country code (Figure 7-1)
   b) Short code (Figure 7-2)
2. The default call priority HIGH is applied each time a new manual entry is performed. To modify the call priority, press LSK-R1/R4 to toggle through the available[8] call priorities.

Refer to section 7.1.1.3 for guidance on dialing/initiating the call.

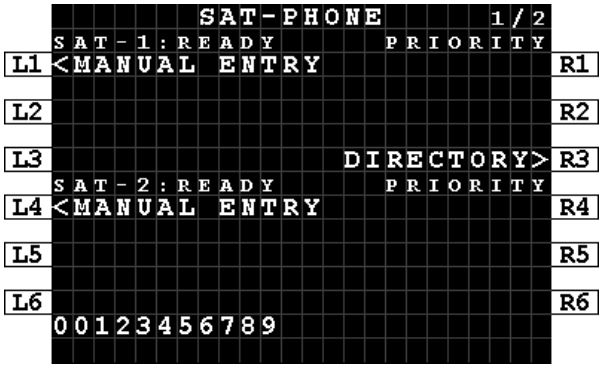

Figure 7-1: MCDU - SAT-PHONE 1/2 - Manual Entry - International Number - Scratchpad

Figure 7-2: MCDU - SAT-PHONE - Manual Entry - Short Code - Pre-selected

[6] User ORT configuration may limit manual dialing to short codes only.
[7] A short code number is defined as between 2 and 6 digits.
[8] Outgoing Public priority calls may be disabled by User ORT configuration.

7.1.1.2 Directory Dial

NOTE: The directory group names and entries are User ORT configurable and may differ from the examples.

1. From the SAT-PHONE page 1 of 2, press LSK-R3 to enter the SAT DIRECTORY INDEX page 1 of 2 (Figure 5-8).
2. Press the LSK matching the group name to be accessed.
    a. For example, press LSK-L2 to access the HIGH group (Figure 7-3).
3. Browse the directory using the NEXT/PREV PAGE keys to display the various pages of the directory.
    a. The current page / total page count is shown in the top right corner of the display.
4. Once the desired entry name is displayed on the screen press the corresponding LSK-L to pre-select the entry to SAT-1, or LSK-R to SAT-2.
    a. For example, press LSK-L3 to pre-select the third entry in the list to SAT-1 (Figure 7-4).

Refer to section 7.1.1.3 for guidance on dialing/initiating the call.

Figure 7-3: MCDU - SAT DIRECTORY INDEX 1/2

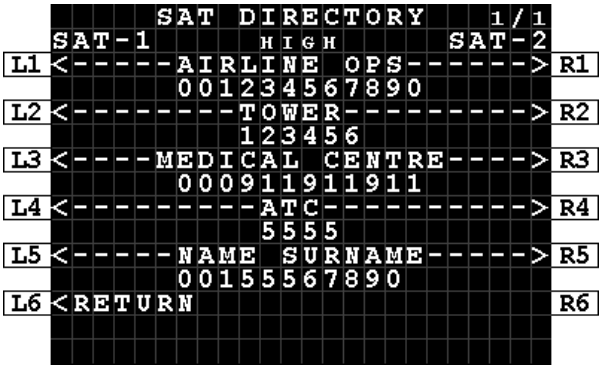

Figure 7-4: MCDU - SAT DIRECTORY n/N

7.1.1.3 Initiating an Outgoing Call

Once the outgoing calling information has been pre-selected (Figure 7-5) as described in sections 7.1.1.1 the call can be initiated by pressing the associated audio channel MAKE CALL button on the MCDU, LSK-L1 for SAT-1 or LSK-L4 for SAT-2.

In order to hear the SATCOM audio, the appropriate SAT audio channel must also be selected on the ACP.

Once the call has been initiated, the SAT-PHONE page 1 of 2 will display the call progress:

- DIALING (Figure 7-6)
  - The number has been dialed and a connection to the called party is being attempted.
- RINGING (Figure 7-7)
  - Ringing may be heard by the crew before the call is answered.
  - The call may be cancelled by pressing the associated audio channel END CALL button on the MCDU, LSK-L1 for SAT-1 or LSK-L4 for SAT-2.
- ANSWERED (Figure 7-8)
  - The connection to the called party has been established.
  - Voice communication between the two parties is now possible using the ACP to control the audio path and volume functions.

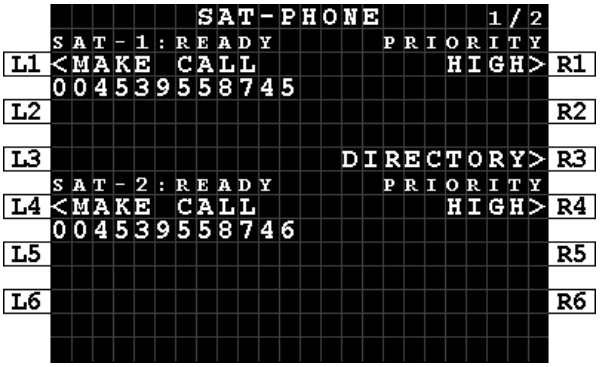

Figure 7-5: MCDU - SAT-PHONE 1/2 - Outgoing Call - Make Call

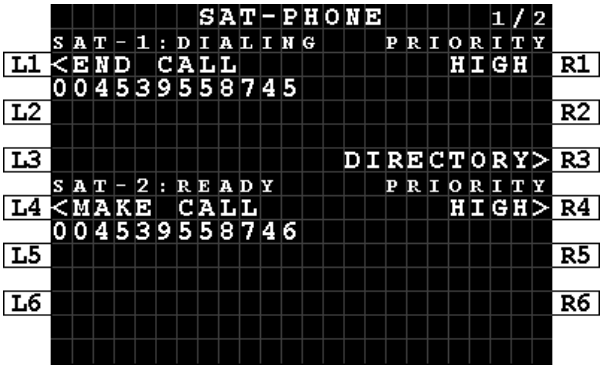

Figure 7-6: MCDU - SAT-PHONE 1/2 - Outgoing Call - Dialing

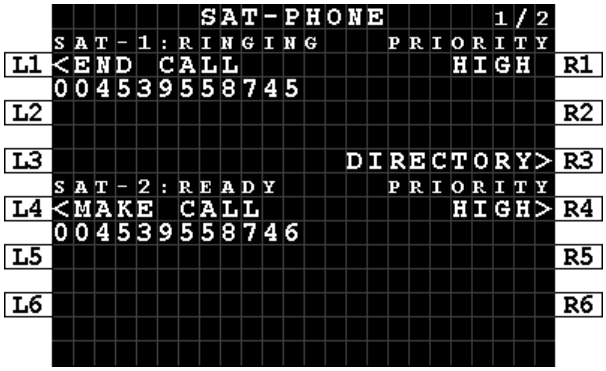

Figure 7-7: MCDU - SAT-PHONE 1/2 - Outgoing Call - Ringing

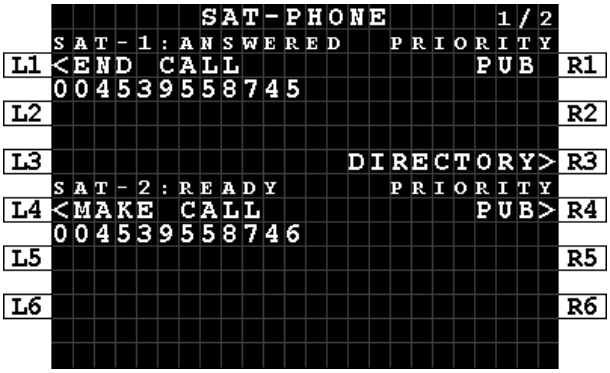

Figure 7-8: MCDU - SAT-PHONE 1/2 - Outgoing Call - Answered

In some instances, the call may not be connected and the SAT-PHONE page 1 of 2 SAT channel will display CALL FAILED (Figure 7-9). Ensure the number entered is correct and press MAKE CALL to redial.

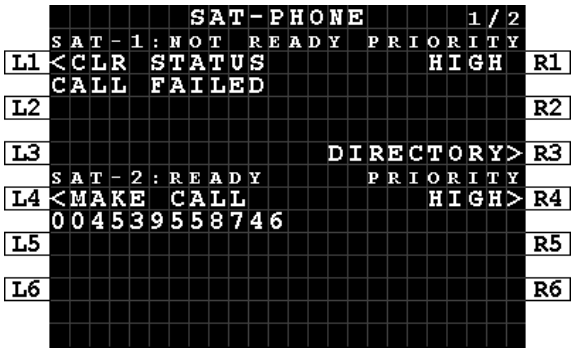

Figure 7-9: MCDU - SAT-PHONE 1/2 - Outgoing Call - Call Failed

7.1.1.4 Ending an Outgoing Call

Calls may be ended (terminated) by either the calling party (airborne side) or the called party (ground side):

- To release the call from the airborne side using the MCDU press the associated audio channel (SAT-1/2) END CALL button on the MCDU, LSK-L1 for SAT-1 or LSK-L4 for SAT-2 (Figure 7-10).
  - Call ended side tone may be heard by the crew.
  - The SAT-PHONE page 1 of 2 SAT channel will return to READY, with an additional status line indicating CALL ENDED. This status will automatically clear after 20 seconds, but may also be cleared by pressing CLR STATUS at LSK-L1 for SAT-1 or LSK-L4 for SAT-2 (Figure 7-11).

- To release the call from the airborne side using the ACP press the END CALL button on the ACP[9].
  - Call ended side tone may be heard by the crew.
  - The SAT-PHONE page 1 of 2 SAT channel will return to READY, with an additional status line indicating CALL ENDED. This status will automatically clear after 20 seconds, but may also be cleared by pressing CLR STATUS at LSK-L1 for SAT-1 or LSK-L4 for SAT-2 (Figure 7-11).

- When released from the ground side:
  - Call ended side tone may be heard by the crew.
  - The SAT-PHONE page 1 of 2 SAT channel will return to READY, with an additional status line indicating CALL ENDED. This status will automatically clear after 20 seconds, but may also be cleared by pressing CLR STATUS at LSK-L1 for SAT-1 or LSK-L4 for SAT-2 (Figure 7-11).

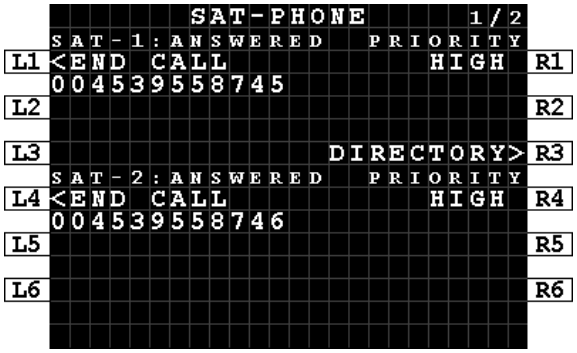

Figure 7-10: MCDU - SAT-PHONE - Ending a call

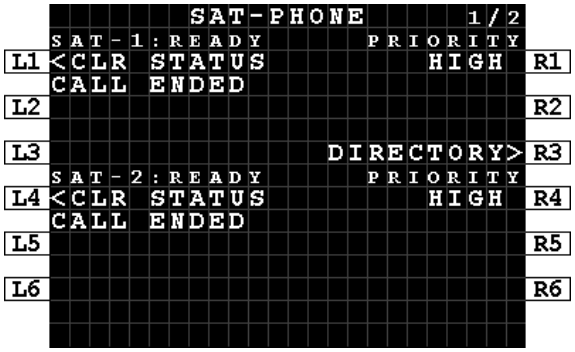

Figure 7-11: MCDU - SAT-PHONE - Call ended

[9] Secure ORT Configuration Option. Refer to the **[SORT_UG]** for additional configuration guidance.

7.1.2 Incoming Calls - Ground-to-Air (G2A)

7.1.2.1 Cockpit Alerting

As described in section 3.3.1, calls towards the aircraft may only be placed through controlled access measures. When a call reaches the aircraft, it may alert the crew:

1. Audibly - though a single stroke chime[10]
2. Visually - Call information displayed on the SATCOM->MCDU page (Figure 7-12).
   - The audio channel (SAT-1/2) call indication on the ACP.
   - Aircraft fitted with an Engine Indication and Crew Alerting System (EICAS), Failure Warning System (FWS) or similar function will receive notification relevant to the call priority.

7.1.2.2 Identifying the calling party and priority

When an incoming call (G2A) is in the alerting (ringing) phase, the SAT-PHONE page 1 of 2 will display the incoming call priority and the identity of the calling party:

- Call Priority
  - Refer to section 3.3.1, Table 3-1.

- Caller Identity
  - The calling parties' phone number is displayed when the number does not exist in the directory.
  - When the calling parties' number is in the directory, the associated identity is displayed in place of the number.
  - If the calling party has disabled their phone number presentation, the caller identity line is blank.

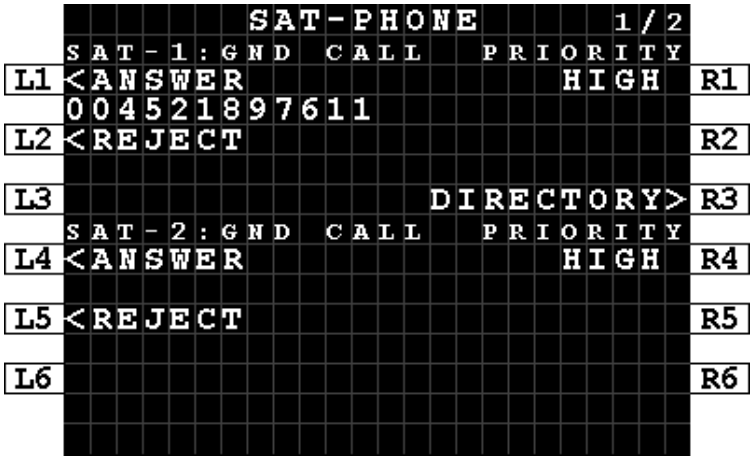

Figure 7-12: MCDU - SAT-PHONE - Incoming Call - Caller Identity

[10] In some aircraft, the chime alert (managed external to the AVIATOR S system) may be inhibited during critical phases of flight.

7.1.2.3 Answering an Incoming Call

An incoming call may be answered in multiple ways:

1. To answer the call, press the associated audio channel (SAT-1/2) ANSWER button on the MCDU, LSK-L1 for SAT-1 or LSK-L4 for SAT-2 (Figure 7-13).
   - In order for the calling party (ground side) to hear the SATCOM audio, the appropriate SAT audio channel must also be selected on the ACP.
   - Voice communication between the two parties is now possible using the ACP to control the audio path and volume functions.
   - The SAT-PHONE page 1 of 2 status will show ANSWERED (Figure 7-14).

2. Press the associated audio channel (SAT-1/2) on the ACP.
   - The ACP SAT call button will stop flashing and show steady state indicating the SAT channel is active and connected.
   - Voice communication between the two parties is now possible using the ACP to control the audio path and volume functions.
   - The SAT-PHONE page 1 of 2 status will show ANSWERED (Figure 7-14).

3. If the SAT-1/2 channel that is being alerted (as per 7.1.2.1) is already selected on the ACP, the incoming call is automatically answered[11].
   - Voice communication between the two parties is now possible using the ACP to control the audio path and volume functions.
   - The SAT-PHONE page 1 of 2 status will show ANSWERED (Figure 7-14).

Figure 7-13: MCDU - SAT-PHONE - Incoming Call - Answer

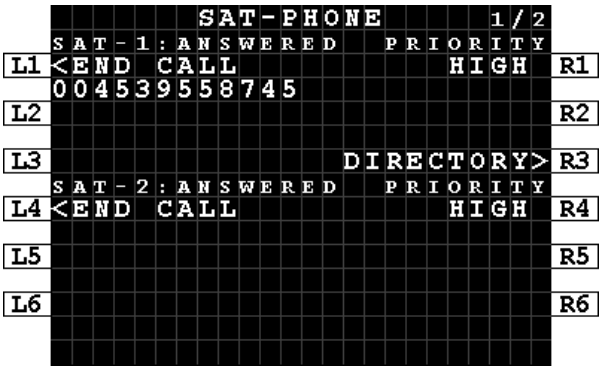

Figure 7-14: MCDU - SAT-PHONE - Incoming Call - Answered

[11] Secure ORT Configuration Option. Refer to the **[SORT_UG]** for additional configuration guidance.

7.1.2.4 Rejecting an Incoming Call

An incoming call may be rejected by pressing the associated audio channel (SAT-1/2) REJECT button on the MCDU, LSK-L2 for SAT-1 or LSK-L5 for SAT-2 (Figure 7-13).

- The SAT-PHONE page 1 of 2 SAT channel will return to READY, with an additional status line indicating CALL ENDED. This status will automatically clear after 20 seconds, but may also be cleared by pressing CLR STATUS at LSK-L1 for SAT-1 or LSK-L4 for SAT-2.

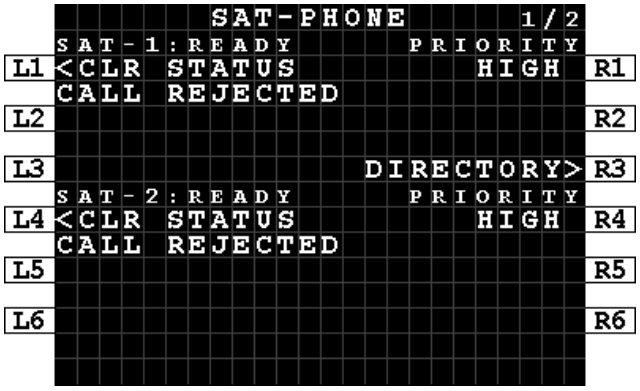

Figure 7-15: MCDU - SAT-PHONE - Incoming Call - Rejected

7.1.2.5 Ending an Incoming Call

Refer to section 7.1.1.4, Ending an Outgoing Call.

7.1.2.6 Preemption

When pre-emption occurs (see section 3.3.3), one of the active calls is disconnected and the SAT-PHONE page 1 of 2 SAT-1/2 channel status will briefly show PREEMPTED (Figure 7-16) followed by presentation of the caller identity (Figure 7-17).

Answering a preempted call is as per section 7.1.2.3, Answering an Incoming Call.

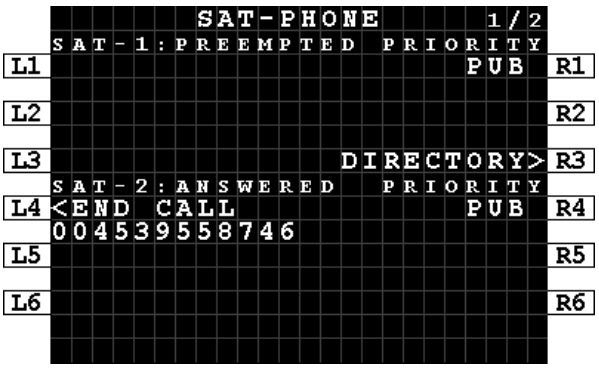

Figure 7-16: MCDU - SAT-PHONE - Incoming Call - Preempted

Figure 7-17: MCDU - SAT-PHONE - Incoming Call - Preemption Caller ID

7.2 TCP INTERFACE

7.2.1 Outgoing Calls - Air-to-Ground (A2G)

In order to place an outgoing call, often referred to as an air-to-ground call, the crew can choose between:

- Manual Entry - a phone number[12] or short code[13] may be entered via the TCP (Figure 7-18, Figure 7-19)
- Directory Dial - select the identity from the directory list defined by User ORT (see section 3.2.2 for ORT Configuration).

7.2.1.1 Manual Entry

1. From the SAT PHONE-R page 1 of 2 enter the destination number into the scratchpad (max 18 digits) and press LSK-L1 to pre-select the number to SAT-1 or LSK-L3 to SAT-2:
   a) International number - must begin with the prefix "00" followed by the country code (Figure 7-18)
   b) Short code (Figure 7-19)
2. The default call priority HIGH is applied each time a new manual entry is performed. To modify the call priority, press LSK-R1/R3 to toggle through the available[14] call priorities.

Refer to section 7.2.1.3 for guidance on dialing/initiating the call.

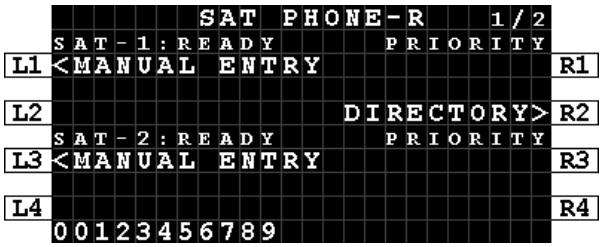

Figure 7-18: TCP - SAT PHONE-R 1/2 - Manual Entry - International Number - Scratchpad

Figure 7-19: TCP - SAT PHONE-R - Manual Entry - Short Code - Pre-selected

[12] User ORT configuration may limit manual dialing to short codes only.
[13] A short code number is defined as between 2 and 6 digits.
[14] Outgoing Public priority calls may be disabled by User ORT configuration.

7.2.1.2 Directory Dial

NOTE: The directory group names and entries are User ORT configurable and may differ from the examples.

1. From the SAT PHONE-R page 1 of 2, press LSK-R2 to enter the SAT DIRECTORY INDEX page 1 of 4 (Figure 5-9).
2. Press the LSK matching the group name to be accessed.
    a. For example, press LSK-L2 to access the HIGH group (Figure 7-20).
3. Browse the directory using the NEXT/PREV PAGE keys to display the various pages of the directory.
    a. The current page / total page count is shown in the top right corner of the display.
4. Once the desired entry name is displayed on the screen press the corresponding LSK-L to pre-select the entry to SAT-1, or LSK-R to SAT-2.
    a. For example, press LSK-L3 to pre-select the third entry in the list to SAT-1 (Figure 7-21).

Refer to section 7.2.1.3 for guidance on dialing/initiating the call.

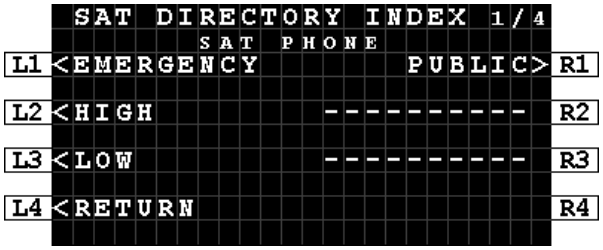

Figure 7-20: TCP - SAT DIRECTORY INDEX 1/4

Figure 7-21: TCP - SAT DIRECTORY

7.2.1.3 Initiating an Outgoing Call

Once the outgoing calling information has been pre-selected (Figure 7-22) as described in sections 7.2.1.1 the call can be initiated by pressing the associated audio channel MAKE CALL button on the TCP, LSK-L1 for SAT-1 or LSK-L3 for SAT-2.

In order to hear the SATCOM audio, the appropriate SAT audio channel must also be selected on the ACP.

Once the call has been initiated, the SAT PHONE-R page 1 of 2 will display the call progress:

- DIALING (Figure 7-23)
  - The number has been dialed and a connection to the called party is being attempted.
- RINGING (Figure 7-24)
  - Ringing may be heard by the crew before the call is answered.
  - The call may be cancelled by pressing the associated audio channel END CALL button on the TCP, LSK-L1 for SAT-1 or LSK-L3 for SAT-2.
- ANSWERED (Figure 7-25)
  - The connection to the called party has been established.
  - Voice communication between the two parties is now possible using the ACP to control the audio path and volume functions.

Figure 7-22: TCP - SAT PHONE-R 1/2 - Outgoing Call - Make Call

Figure 7-23: TCP - SAT PHONE-R 1/2 - Outgoing Call - Dialing

Figure 7-24: TCP - SAT PHONE-R 1/2 - Outgoing Call - Ringing

Figure 7-25: TCP - SAT PHONE-R 1/2 - Outgoing Call - Answered

In some instances, the call may not be connected and the SAT PHONE-R page 1 of 2 SAT channel will display CALL FAILED (Figure 7-26). Ensure the number entered is correct and press MAKE CALL to redial.

Figure 7-26: TCP - SAT PHONE-R 1/2 - Outgoing Call - Call Failed

7.2.1.4 Ending an Outgoing Call

Calls may be ended (terminated) by either the calling party (airborne side) or the called party (ground side):

- To release the call from the airborne side using the TCP press the associated audio channel (SAT-1/2) END CALL button on the TCP, LSK-L1 for SAT-1 or LSK-L3 for SAT-2 (Figure 7-27).
  - Call ended side tone may be heard by the crew.
  - The SAT PHONE-R page 1 of 2 SAT channel will return to READY, with an additional status line indicating CALL ENDED. This status will automatically clear after 20 seconds, but may also be cleared by pressing CLR STATUS at LSK-L1 for SAT-1 or LSK-L3 for SAT-2 (Figure 7-28).

- To release the call from the airborne side using the ACP press the END CALL button on the ACP[15].
  - Call ended side tone may be heard by the crew.
  - The SAT PHONE-R page 1 of 2 SAT channel will return to READY, with an additional status line indicating CALL ENDED. This status will automatically clear after 20 seconds, but may also be cleared by pressing CLR STATUS at LSK-L1 for SAT-1 or LSK-L3 for SAT-2 (Figure 7-28).

- When released from the ground side:
  - Call ended side tone may be heard by the crew.
  - The SAT PHONE-R page 1 of 2 SAT channel will return to READY, with an additional status line indicating CALL ENDED. This status will automatically clear after 20 seconds, but may also be cleared by pressing CLR STATUS at LSK-L1 for SAT-1 or LSK-L3 for SAT-2 (Figure 7-28).

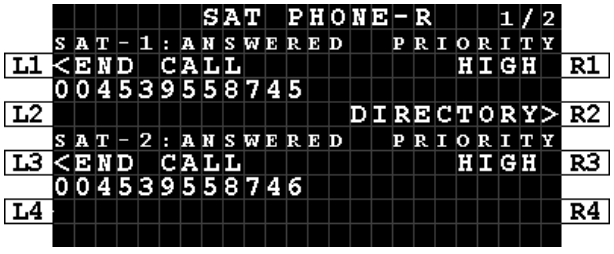

Figure 7-27: TCP - SAT PHONE-R - Ending a call

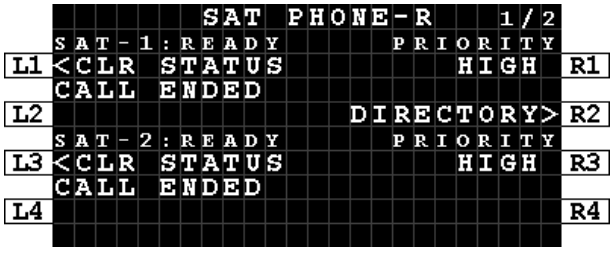

Figure 7-28: TCP - SAT PHONE-R - Call ended

[15] Secure ORT Configuration Option. Refer to the **[SORT_UG]** for additional configuration guidance.

7.2.2 Incoming Calls - Ground-to-Air (G2A)

7.2.2.1 Cockpit Alerting

As described in section 3.3.1, calls towards the aircraft may only be placed through controlled access measures. When a call reaches the aircraft, it may alert the crew:

1. Audibly - though a single stroke chime[16]
2. Visually - Call information displayed on the SATCOM->TCP page (Figure 7-29).
   - The audio channel (SAT-1/2) call indication on the ACP.
   - Aircraft fitted with an Engine Indication and Crew Alerting System (EICAS), Failure Warning System (FWS) or similar function will receive notification relevant to the call priority.

7.2.2.2 Identifying the calling party and priority

When an incoming call (G2A) is in the alerting (ringing) phase, the SAT PHONE-R page 1 of 2 will display the incoming call priority and the identity of the calling party:

- Call Priority
  - Refer to section 3.3.1, Table 3-1.

- Caller Identity
  - The calling parties' phone number is displayed when the number does not exist in the directory.
  - When the calling parties' number is in the directory, the associated identity is displayed in place of the number.
  - If the calling party has disabled their phone number presentation, the caller identity line is blank.

Figure 7-29: TCP - SAT PHONE-R - Incoming Call - Caller Identity

[16] In some aircraft, the chime alert (managed external to the AVIATOR S system) may be inhibited during critical phases of flight.

7.2.2.3 Answering an Incoming Call

An incoming call may be answered in multiple ways:

1. To answer the call, press the associated audio channel (SAT-1/2) ANSWER button on the TCP, LSK-L1 for SAT-1 or LSK-L3 for SAT-2 (Figure 7-30).
   - In order for the calling party (ground side) to hear the SATCOM audio, the appropriate SAT audio channel must also be selected on the ACP.
   - Voice communication between the two parties is now possible using the ACP to control the audio path and volume functions.
   - The SAT PHONE-R page 1 of 2 status will show ANSWERED (Figure 7-31).

2. Press the associated audio channel (SAT-1/2) on the ACP.
   - The ACP SAT call button will stop flashing and show steady state indicating the SAT channel is active and connected.
   - Voice communication between the two parties is now possible using the ACP to control the audio path and volume functions.
   - The SAT PHONE-R page 1 of 2 status will show ANSWERED (Figure 7-31).

3. If the SAT-1/2 channel that is being alerted (as per 7.2.2.1) is already selected on the ACP, the incoming call is automatically answered[17].
   - Voice communication between the two parties is now possible using the ACP to control the audio path and volume functions.
   - The SAT PHONE-R page 1 of 2 status will show ANSWERED (Figure 7-31).

Figure 7-30: TCP - SAT PHONE-R - Incoming Call - Answer

Figure 7-31: TCP - SAT PHONE-R - Incoming Call - Answered

[17] Secure ORT Configuration Option. Refer to the **[SORT_UG]** for additional configuration guidance.

7.2.2.4 Rejecting an Incoming Call

An incoming call may be rejected by pressing the associated audio channel (SAT-1/2) REJECT button on the TCP, LSK-L2 for SAT-1 or LSK-L4 for SAT-2 (Figure 7-30, Figure 7-32).

- The SAT PHONE-R page 1 of 2 SAT channel will return to READY, with an additional status line indicating CALL ENDED. This status will automatically clear after 20 seconds, but may also be cleared by pressing CLR STATUS at LSK-L1 for SAT-1 or LSK-L3 for SAT-2.

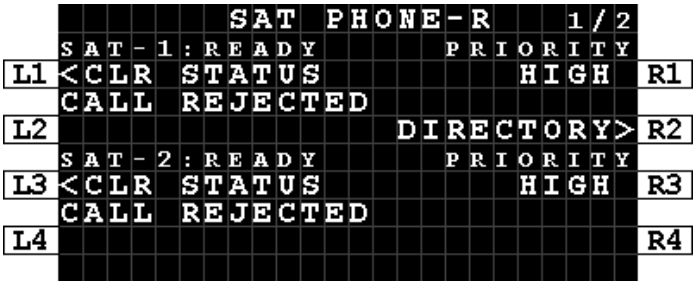

Figure 7-32: TCP - SAT PHONE-R - Incoming Call - Rejected

7.2.2.5 Ending an Incoming Call

Refer to section 7.2.1.4, Ending an Outgoing Call.

7.2.2.6 Preemption

When pre-emption occurs (see section 3.3.3), one of the active calls is disconnected and the SAT PHONE-R page 1 of 2 SAT-1/2 channel status will briefly show PREEMPTED (Figure 7-33) followed by presentation of the caller identity (Figure 7-34).

Answering a preempted call is as per section 7.2.2.3, Answering an Incoming Call.

Figure 7-33: TCP - SAT PHONE-R - Incoming Call - Preempted

Figure 7-34: TCP - SAT PHONE-R - Incoming Call - Preemption Caller ID

8 SAFETY DATA SERVICES

8.1 ACARS DATA

This messaging system is automatically managed by the Communication Management Unit (CMU) and requires no crew interaction through the MCDU/TCP SATCOM pages[18] provided that:

1. The system is Logged On (Auto or Manual) as described in section 6.1.1,
2. The Ground Earth Station (GES) assigned by the INMARSAT network is displayed on the SATCOM LOG page at position LSK-L4 for MCDU (Figure 8-1) and LSK-L3 for TCP (Figure 8-2):
   a. XXX-BRM (BURUM)
   b. XXX-PMLU (PAUMALU)
   c. XXX-LNDN (LONDON[19])

NOTE: XXX is the octal GES ID number (e.g. 274).

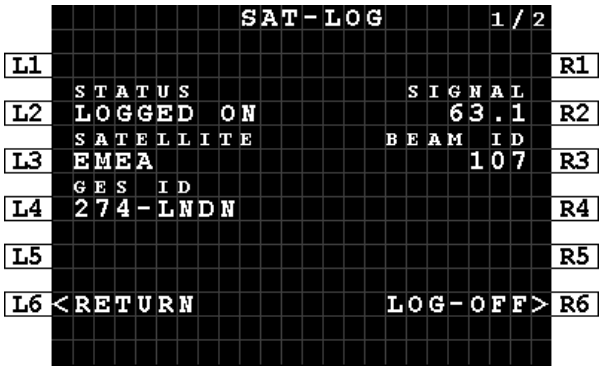

Figure 8-1: MCDU - SAT-LOG - ACARS Data Available

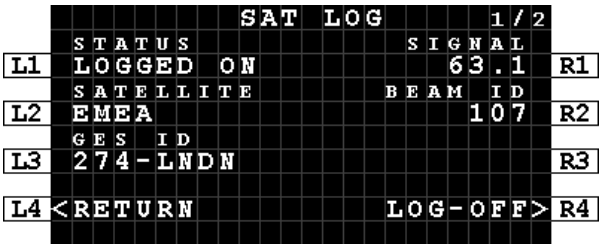

Figure 8-2: TCP - SAT LOG - ACARS Data Available

[18] The CMU may be accessed by its own dedicated MCDU pages or HMI.
[19] The London site is restricted for test purposes only. Operational aircraft will use Burum and Paumalu.

9 NON-SAFETY DATA SERVICES

9.1 ELECTRONIC FLIGHT BAG (EFB) CONNECTIVITY

The AVIATOR S Airline Information and Services Domain (AISD) provides a routed Ethernet interface with access to a Background Class connection that is managed by the Aircraft Control Domain (ACD).

When enabled by Secure ORT (see section 3.2.2), this domain provides segregated data capability to the cockpit for EFB applications via a dedicated Ethernet interface.

ACD Voice and data traffic has a higher priority than AISD data traffic, ensuring that all SB-S functions are not impacted by AISD data requests.

The AISD/EFB data connection availability is linked to the ACD connectivity state:

- When the AVIATOR S ACD is "logged on" the AISD data connection is active.
- Similarly, when the AVIATOR S ACD is "logged off" the AISD data connection is inactive.

Refer to section 6.1.1 for further guidance regarding logging off/on.

The AISD/EFB Ethernet interface provides read only access to a Simple Network Management Protocol (SNMP) for retrieving AVIATOR S system and operational status information as well as link status and history. Refer to Appendix A for the list of available Object Identifiers (OID's).

For further guidance, refer to the **[UORT_UG]** for configuration of the AISD/EFB data connection.

10 TROUBLESHOOTING

10.1 BITE

In order to troubleshoot the AVIATOR S SATCOM system, navigate to the BITE pages:

MCDU: SAT-PHONE page 2 of 2, LSK-R2 (Figure 10-1)

TCP: SAT PHONE-R[20] page 2 of 2, LSK-R1 (Figure 10-2)

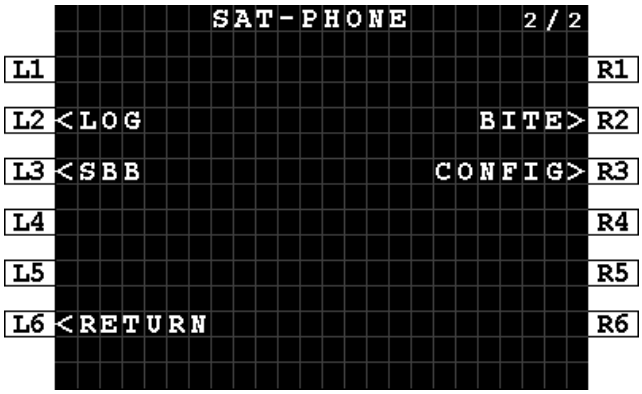

Figure 10-1: MCDU - SAT-PHONE 2/2

Figure 10-2: TCP - SAT PHONE-R 2/2

Review the BITE summary status displayed on row 2 & 3 (Figure 10-3, Figure 10-4, Figure 10-5, Figure 10-6):

- **CURRENT BITE:**
  - OK — No active BITE faults are present. See Figure 10-3, Figure 10-5.
  - FAIL — There is an active fault in the BITE SCANNING page. See Figure 10-4, Figure 10-6. Refer to section 10.1.1 for further detail on BITE SCANNING and troubleshooting.

- **STRAPPING PARITY:**
  - OK — Parity check is OK (ODD)
  - FAIL — Parity check is FAIL and a wiring fault is present. (EVEN)

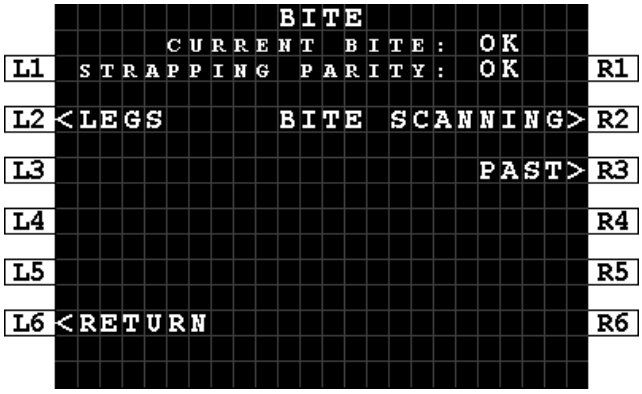

Figure 10-3: MCDU - BITE - OK

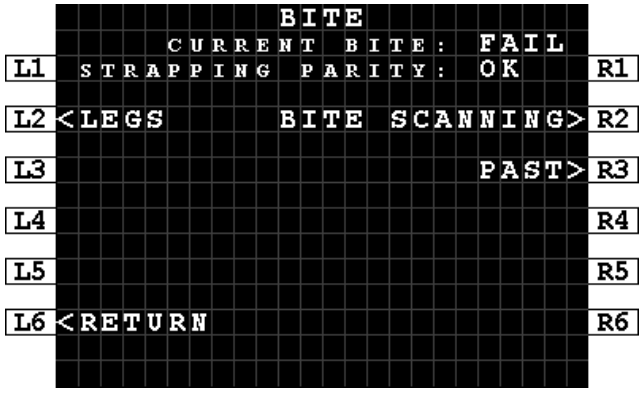

Figure 10-4: MCDU - BITE - FAIL

[20] In a Dual SATCOM configuration, the CSDU position is indicated by the nomenclature –L (Left) or –R (Right) position. The examples used are for the Right position.

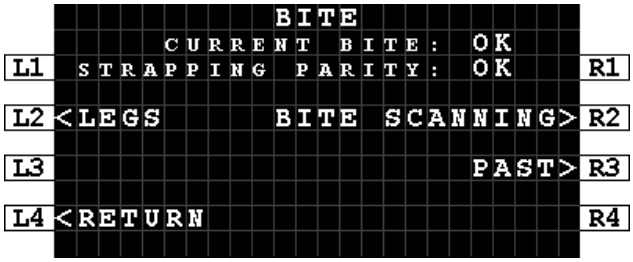

Figure 10-5: TCP - BITE - OK

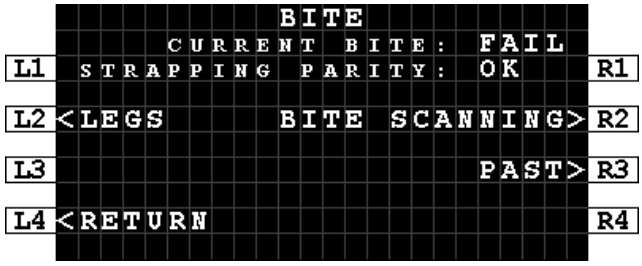

Figure 10-6: TCP - BITE - FAIL

The MCDU and TCP BITE pages are similar and only the MCDU example pages are presented.

The MCDU can display two BITE events per page, where the TCP is limited to one BITE event per page due to reduced number of lines.

10.1.1 BITE Scanning - Troubleshooting Code

Access BITE SCANNING by pressing LSK-R2 to review active faults:

- The ATA code, failure description (accused LRU or Wiring) and severity is shown for each failure (Figure 10-7).
    - The Air Transport Association (ATA) code identifies the Line Replaceable Unit (LRU) or wiring (WRG) that is affected by the fault condition. Refer to Appendix D.1 for the list of ATA codes and fault descriptions.
- Use the NEXT/PREV PAGE keys to navigate multiple pages.
- View the BITE SCANNING DETAILS page for each fault by pressing LSK-R2 or LSK-R4 (Figure 10-7).
    - Note the UTC date and time information as well as troubleshooting code (Figure 10-8).
    - Refer to Appendix D, Troubleshooting & Maintenance Actions to review the fault description and determine appropriate maintenance action(s) for each troubleshooting code.

For example, pressing LSK-R4 will show the detailed information for the LOW severity failure in Figure 10-7.

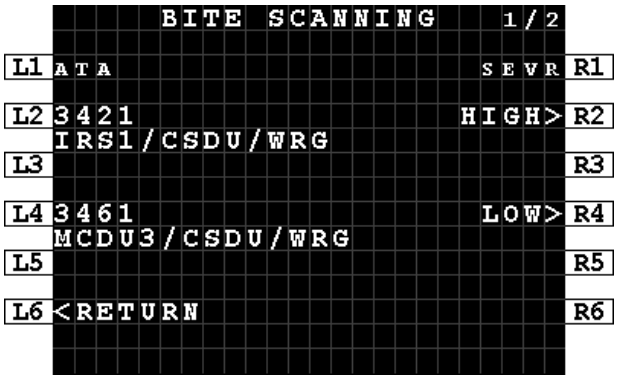

Figure 10-7: MCDU - BITE - BITE SCANNING

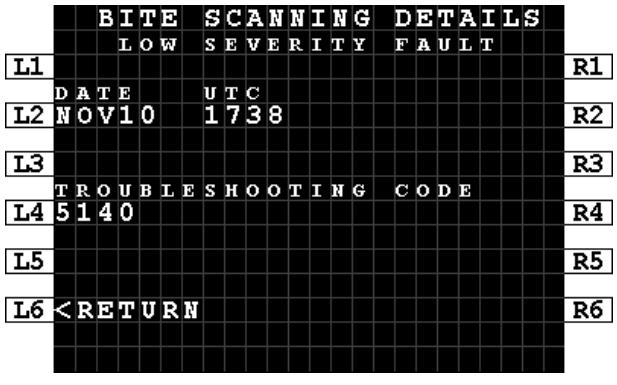

Figure 10-8: MCDU - BITE - BITE SCANNING DETAILS

10.1.2 Legs

Access the LEGS page (Figure 10-9) by pressing LSK-L2 from the BITE page (Figure 10-3 or Figure 10-4) to review historical data:

- GROUND — All system internal BITE events that are active or have occurred for the current "on ground" state (Figure 10-10).
- LAST LEG — All BITE events that occurred in the most recent flight leg (Figure 10-11).
- PREVIOUS LEG — Review the High Severity (Class 1) events that occurred in previous legs (Figure 10-12).

NOTE: A complete flight leg is the transition from "on ground" to "in air" and back to "on ground". The transition from "in air" to "on ground" initiates a new flight leg.

Figure 10-9: MCDU - BITE - LEGS

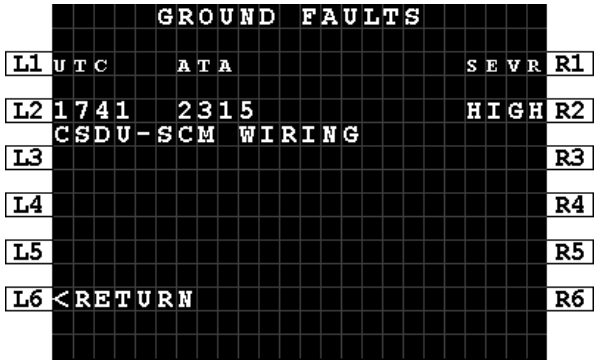

Figure 10-10: MCDU - BITE - LEGS - GROUND FAULTS

Figure 10-11: MCDU - BITE - LEGS - LAST LEG

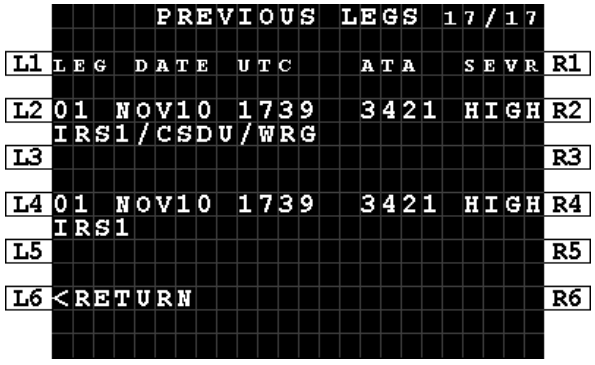

Figure 10-12: MCDU - BITE - LEGS - PREVIOUS LEGS

10.1.3 PAST

To initiate a Person Activated Self-Test (PAST) from the BITE page (Figure 10-3), navigate to the PAST page by pressing LSK-R3:

- Press START to initiate the test (Figure 10-13).

- The PAST STARTED page indicates that the test is now in progress (Figure 10-14).
  - If the test could not be activated a page indicating "TEST NOT POSSIBLE" and a reason is displayed (Figure 10-19).

- The AVIATOR S system will reboot as part of the test sequence. Once the SATCOM is available on the MCDU/TCP return to the PAST page to access the PAST REPORT.
  - If PAST has not been executed in the current power cycle, the PAST REPORT page will indicate that the self-test has not been run (Figure 10-15).
  - If PAST is still executing, the "TEST IN PROGRESS" page is presented (Figure 10-16).
  - When the PAST is completed the PAST REPORT will either state "TEST PASSED" (Figure 10-17) or "TEST FAILED" (Figure 10-18), and present the PAST REPORT failure information.

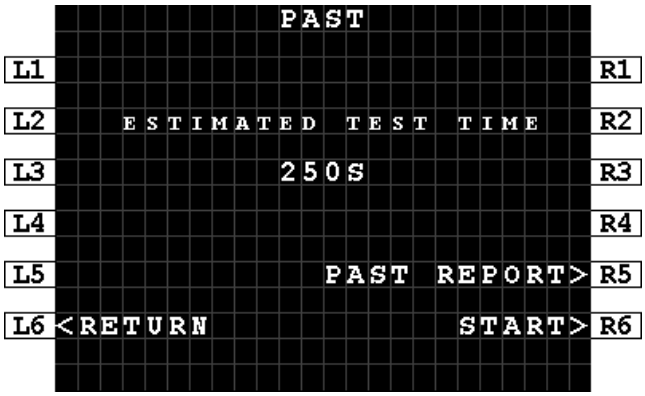

Figure 10-13: MCDU - BITE - PAST

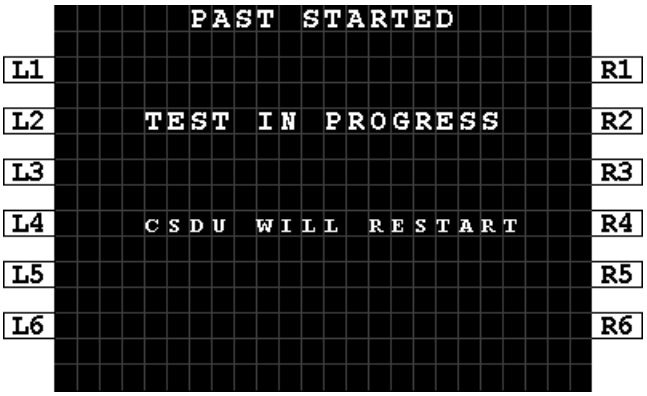

Figure 10-14: MCDU - BITE - PAST STARTED

Figure 10-15: MCDU - BITE - PAST REPORT - Not Run

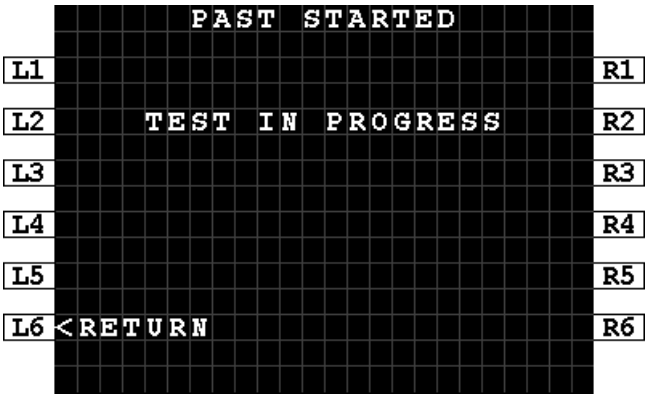

Figure 10-16: MCDU - BITE - PAST IN PROGRESS

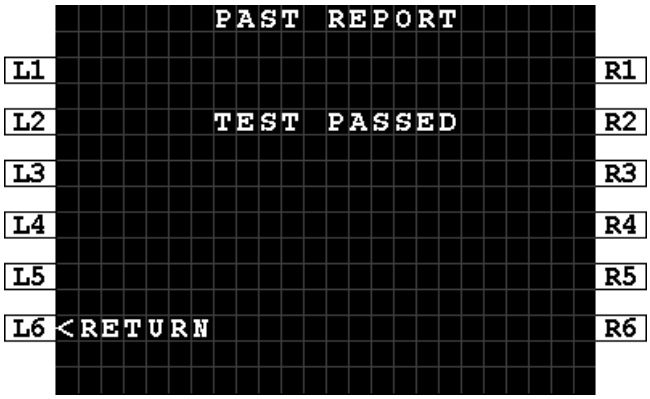

Figure 10-17: MCDU - BITE - PAST REPORT - Passed

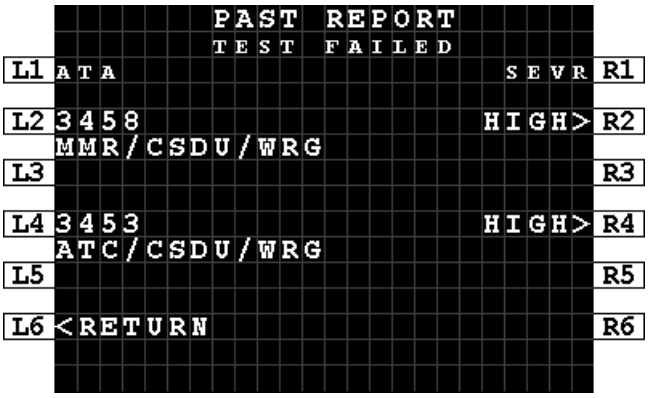

Figure 10-18: MCDU - BITE - PAST REPORT - Failed

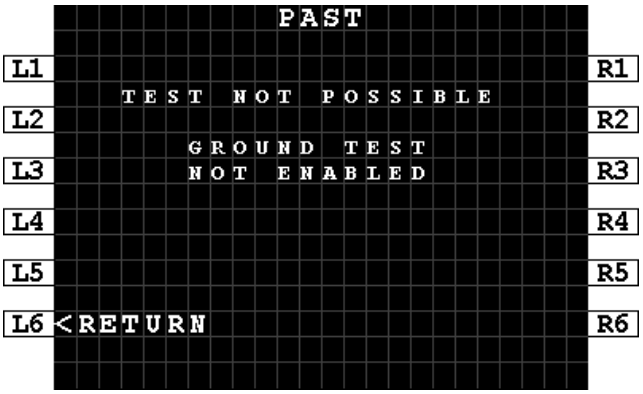

Figure 10-19: MCDU - BITE - PAST - Not Possible

10.2 SATCOM CONFIG

In order to review the AVIATOR S SATCOM system configuration, navigate to the CONFIG pages:

MCDU: SAT-PHONE page 2 of 2, LSK-R3 (Figure 10-1)

TCP: SAT PHONE-R[21] page 2 of 2, LSK-R2 (Figure 10-2)

The MCDU and TCP CONFIG pages are similar and only the MCDU example pages are presented.

- **Page 1/5** (Figure 10-20):
  - SW LOCATION — SAT-L or SAT-R determined by the SDU Config Strapping
  - SW LOCATION ID — SW Location Identity determined by the SDU Config Strapping
  - SW P/N OPS — Part Number of the SDU Operational Program Software (OPS)

- **Page 2/5** (Figure 10-21):
  - SW SDU SORT — Part Number of the SDU Secure Owner Requirements Table (SORT)
  - SD SDU UORT — Part Number of the SDU User Owner Requirements Table (UORT)

- **Page 3/5** (Figure 10-22):
  - SDU P/N — Part Number of the SDU hardware
  - SDU S/N — Serial Number of the SDU hardware
  - SCM P/N — Part Number of the SDU Configuration Module (SCM) hardware
  - SCM S/N — Serial Number of the SDU Configuration Module (SCM) hardware

- **Page 4/5** (Figure 10-23):
  - ANT P/N — Part Number of the Antenna hardware
  - ANT S/N — Serial Number of the Antenna hardware
  - ANT SW — Part Number of the Antenna Operational Program Software

- **Page 5/5** (Figure 10-24):
  - IMSI — International Mobile Subscriber Identity number.
  - SMART CARD S/N — Serial Number of the Smart Card.

[21] In a Dual SATCOM configuration, the CSDU position is indicated by the nomenclature –L (Left) or –R (Right) position. The examples used are for the Right position.

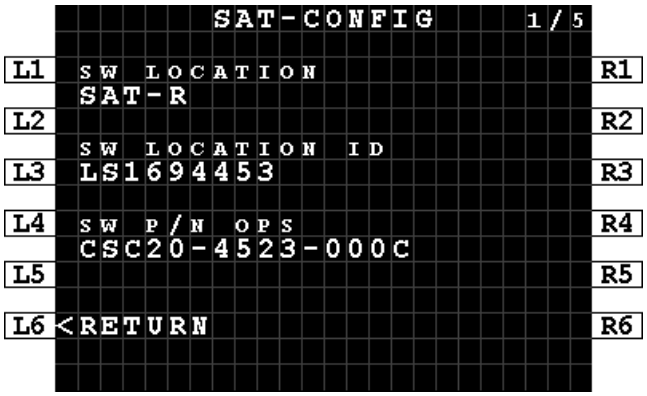

Figure 10-20: MCDU - SAT-CONFIG 1/5

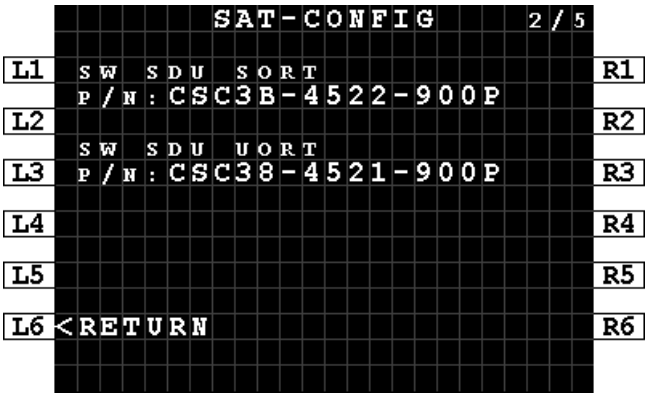

Figure 10-21: MCDU - SAT-CONFIG 2/5

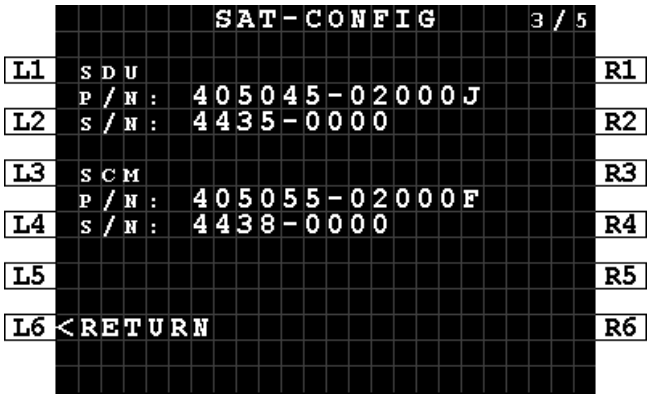

Figure 10-22: MCDU - SAT-CONFIG 3/5

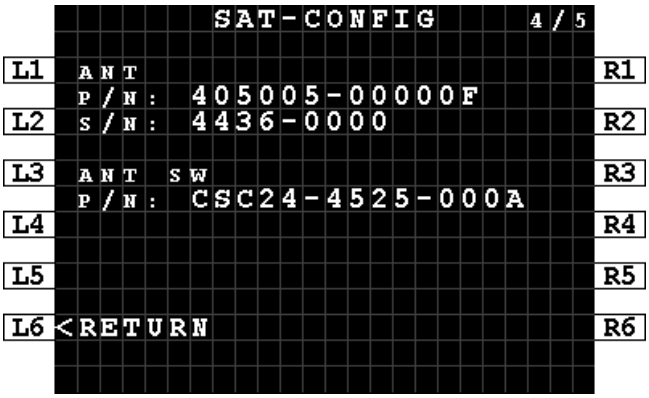

Figure 10-23: MCDU - SAT-CONFIG 4/5

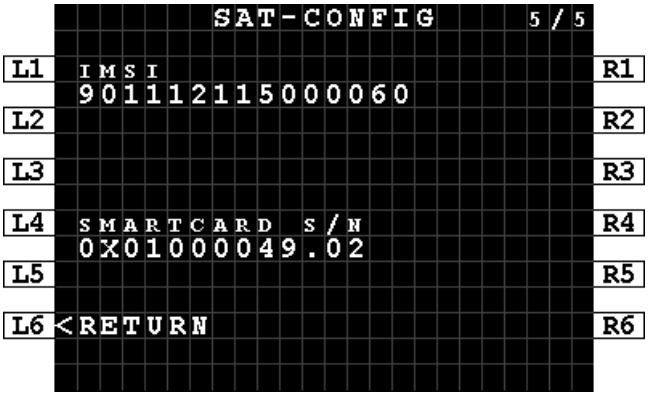

Figure 10-24: MCDU - SAT-CONFIG 5/5

10.3 LOG FILE EXTRACTION VIA THE ETHERNET DATALOADER INTERFACE

The AVIATOR S log files may be retrieved via the Ethernet dataloader interface using the ARINC 615A **[A615A]** Operator Defined Download Protocol.

Log file extraction via the Ethernet dataloader interface is only permitted when Data Load mode has been activated.

Further guidance with respect to aircraft maintenance system functions and operation is beyond the scope of this document.

10.4 LOG FILE EXTRACTION VIA THE MAINTENANCE USB

For AVIATOR S log file extraction, refer to Appendix C.

10.5 SYSTEM TEST - FLASHING CALL LIGHTS

While performing a System Test, the call lights are 'flashed'. When the test has completed, additional crew action may be required to clear the call lights before the system can return to the operational state:

Clear the ACP call lights by pressing the SAT-1 and SAT-2 call buttons.

Appendix A. AISD SNMP Interface

Table 10-1: AISD SNMP MIB OID Support

Level 1	Level 2	Level 3	Level 4	Level 5	Description
.asLinks(2)	.aslServices(1)	.aslsNumbers(1)			The number of data services types available. Integer = 1
		.aslsTable(2)	.aslsIndex(1)		Index number to each service. Integer = 1
			.aslsName(2)		Name for each index. Index 1 = "SBB:BACKGROUND"
			.aslsInUse(3)		Number of instances of this service currently in use. Integer [0..1]
			.aslsAvailable(4)		Number of instances of this service currently available. Integer [0..1]
			.aslsMaxChannels(5)		Max number of instances of this service available. Integer = 1
	.aslInfos(2)	.asliSatState(1)			This object shows, if the satellite is locked or not. The type is an enumerated integer value. 1 = Connected to Sat, 2 = Not connected.
		.asliSatID(2)			This object shows, which satellite is connected by the satcom system: " "EMEA" "MEAS" "AMER" "APAC" String [0..32]

		.asliSatIDNum(3)			Unique numeric identifier for the connected satellite: 3 (MEAS) 6 (EMEA) 5 (APAC) 7 (AMER) Integer [0..63]
		.asliActLinkEntryNumbers(4)			Indicates the number of the entries in the first table and has a range from 0 to 50. Integer [0..50]
		.asliActLinkTable(5)	.asliActLinkIndex(1)		This object is a unique identifier for the current link entry and can be considered a handle for the session. With each new link, this number is to be incremented by one, wrapping around (but avoiding conflicts). Integer [1..32767]
			.asliActLinkReleaseType(2)		This object shows the release type of the current link as numeric codes as described in **[A781]** Attachment 5, Section 6. Integer [1..32767]
			.asliActLinkReleaseReason(3)		Variable string based on asliActLinkReleaseType String [0..128]
			.asliActLinkStatus(4)		This object shows if the current link is up or not. Because entries are only removed 30 seconds after going down, it is important to check this field while reading the active link table.
			.asliActLinkChanNo(5)		This object shows which channel is being used by the current link: Integer = 1 (AISD)
			.asliActLinkContextID(6)		Virtual context ID specific to that user session (tied to a primary PDP). Integer [0..255]

			.asliActLinkActualContextID(7)		The NSAPI used over the air. This ID is unique per channel card in the system while it is active. The association between a ContextID and the ActualContextID remains for the duration of the primary PDP. Integer [0..255]
			.asliActLinkConnectionID(8)		Variable string used when creating the PPPoE session. String [0..128]
			.asliActLinkNegotiatedBW(9)		Integer = 0 (Best effort connection)
			.asliActLinkIpAddress(10)		This object contains the IP-Address of the current link. E.g. aaa.bbb.ccc.ddd.
			.asliActLinkTxTrafficVol(11)		This object contains the information about the total transmitted bytes over this link in kBytes
			.asliActLinkRXTrafficVol(12)		This object contains the information about the total received bytes over this link in kBytes
			.asliActLinkBeamID(13)		This object shows, which beam ID is connected by the current link. Integer [0..255]
			.asliActLinkSigQual(14)		This object shows the Quality in dBHz*10 of the current link. Integer [0..32767]
			.asliActLinkMaxSigQual(15)		Expected maximum values for Link Signal Quality in dBHz*10. 64 dBHz BGAN Global Beam 68 dBHz BGAN Regional Beam 80 dBHz BGAN Narrow Beam Integer [0..32767]
			.asliActLinkMainIndex(16)		Integer = 0 (No secondary PDP contexts)
			.asliActLinkStartTime(20)		UTC Time at which the link was brought up. AS_Datetime [RFC3339]

			.asliActLinkEndTime(21)		UTC Time at which the link was brought down. AS_Datetime [RFC3339]
			.asliActLinkPPPoEID(22)		PPPoE Session ID which started the call. Integer [0..32767]
			.asliActLinkNegotiatedBWUp(25)		Integer = 0 (Best effort connection)
			.asliActLinkNegotiatedBWDown(26)		Integer = 0 (Best effort connection)
			.asliActLinkPeerIP(27)		This object contains the IP-Address of the current link. E.g. aaa.bbb.ccc.ddd.
			.asliActLinkDNS1(28)		This object contains the IP-Address of the first DNS Server. E.g. aaa.bbb.ccc.ddd.
			.asliActLinkDNS2(29)		This object contains the IP-Address of the second DNS Server. E.g. aaa.bbb.ccc.ddd.
			.asliActLinkRequestSource(30)		The manner and interface through which this link was brought up. E.g. NAT, AISD
		.asliHistLinkEntryNumbers(6)			Indicates the number of the entries in the second table. Integer [0..250]
		.asliHistLinkTable(7)	.asliHistLinkIndex(1)		This object is a unique identifier for the link entry and can be considered a handle for the session. With each new link, this number is to be incremented by one, wrapping around (but avoiding conflicts). Integer [0..32767]
			.asliHistLinkReleaseType(2)		This object shows the release type of the link as numeric codes as described in **[A781]** Attachment 5, Section 6. Integer [1..32767]
			.asliHistLinkReleaseReason(3)		Variable string based on asliHisLinkReleaseType String [0..128]
			.asliHistLinkStatus(4)		This object shows if the link is up or not.

			.asliHistLinkChanNo(5)		This object shows which channel is being used by the link: Integer = 2 (AISD)
			.asliHistLinkContextID(6)		Virtual context ID specific to that user session (tied to a primary PDP). Integer [0..255]
			.asliHistLinkActualContextID(7)		The NSAPI used over the air. This ID is unique per channel card in the system while it was active. The association between a ContextID and the ActualContextID remains for the duration of the primary PDP. Integer [0..255]
			.asliHistLinkConnectionID(8)		Variable string used when creating the PPPoE session. String [0..128]
			.asliHistLinkNegotiatedBW(9)		Integer = 0 (Best effort connection)
			.asliHistLinkIpAddress(10)		This object contains the IP-Address of the link. E.g. aaa.bbb.ccc.ddd.
			.asliHistLinkTxTrafficVol(11)		This object contains the information about the total transmitted bytes over this link in kBytes
			.asliHistLinkRXTrafficVol(12)		This object contains the information about the total received bytes over this link in kBytes
			.asliHistLinkBeamID(13)		This object shows, which beam ID is connected by the link. Integer [0..255]
			.asliHistLinkSigQual(14)		This object shows the Quality in dBHz*10 of the link. Integer [0..32767]
			.asliHistLinkMaxSigQual(15)		Expected maximum values for Link Signal Quality in dBHz*10. 64 dBHz BGAN Global Beam 68 dBHz BGAN Regional Beam 80 dBHz BGAN Narrow Beam

					Integer [0..32767]
			.asliHistLinkMainIndex(16)		Integer = 0 (No secondary PDP contexts)
			.asliHistLinkStartTime(20)		UTC Time at which the link was brought up. AS_Datetime [RFC3339]
			.asliHistLinkEndTime(21)		UTC Time at which the link was brought down. AS_Datetime [RFC3339]
			.asliHistLinkPPPoEID(22)		PPPoE Session ID which started the call. Integer [0..32767]
			.asliHistLinkNegotiatedBWUp(25)		Integer = 0 (Best effort connection)
			.asliHistLinkNegotiatedBWDown(26)		Integer = 0 (Best effort connection)
			.asliHistLinkPeerIP(27)		This object contains the IP-Address of the historic link. E.g. aaa.bbb.ccc.ddd.
			.asliHistLinkDNS1(28)		This object contains the IP-Address of the first DNS Server. E.g. aaa.bbb.ccc.ddd.
			.asliHistLinkDNS2(29)		This object contains the IP-Address of the second DNS Server. E.g. aaa.bbb.ccc.ddd.
			.asliHistLinkRequestSource(30)		The manner and interface through which this link was brought up. E.g. NAT, AISD
		.asliSatHandoverPending(8)			Set if the system believes it will need to do a handover soon: 1 ~ True 2 ~ False
		.asliSatNetworkName (9)			Indicates to which satellite network the SDU is connected. E.g. SBB
.asSystem(3)	. assInfos(2)	assiHealthStatus(1)			System Overall Status: 1 ~ Passed 2 ~ Failed 3 ~ Absent (Initial)
.asUnits(4)	.asuSDU(2)	.asuSduInfo(1)	.asuSduInfoTableNumbers(1)		Indicates the number of entries in the table. Integer [1]

			.asuSduInfoTable(2)	.asuSduInfoIndex(1)	This object describes the unique identifier for the current unit. Integer [1..2]
				.asuSduInfoOverallStatus(8)	CSDU Overall Status: 1 ~ Passed 2 ~ Failed 3 ~ Absent (Initial)
				.asuSduInfoFailureCode(11)	CSDU overall status failure code - see Appendix B. Integer [0..32767]
				.asuSduInfoFailureReason(12)	CSDU overall status failure group based on the failure code - see Appendix B. String [0..255]
				.asuSduInfoCC1Status(15)	Cockpit Channel Card overall status: 1 ~ Passed 2 ~ Failed 3 ~ Absent (initial value)
				.asuSduInfoCC2Status(16)	Cabin Channel Card overall status: Integer [3] (Absent)
				.asuSduInfoUTCDateTime(35)	Current UTC date and time in RFC3339 format.
	.asuAntenna(8)	.asuAntInfo(1)	.asuAntInfoTableNumbers(1)		Indicates the number of entries in the table. Integer [1]
			.asuAntInfoTable(2)	.asuAntInfoIndex(1)	This object describes the unique identifier for the current antenna. Integer [1]
				.asuAntInfoOverallStatus(8)	Overall Antenna status 1 ~ Passed 2 ~ Failed 3 ~ Absent (initial value)
				.asuAntInfoGain(10)	The antenna gain (dB/10) currently utilized from 0.0 to 31.5 dB. ("-1" indicates invalid data). Integer [-1..315]

Appendix B. SNMP Object ID Definitions

Appendix B.1. asliActLinkStatus(4)

asliActLinkStatus shows if the current link is up or not. The values are:

- Up(1)
- Down(2)
- Unconnected(3)

Appendix B.2. asliHistLinkEntryNumbers(6)

asliHistLinkEntryNumbers(6) indicates the number of the entries in the second table and has an open range. The value is maximum 250.

Appendix B.3. asuSduInfoVendor(2)

asuSduInfoVendor is the name of the AVIATOR S supplier and has the value "Cobham Aerospace".

Appendix B.4. asuSduInfoFailureCode(11)

asuSduInfoFailureCode indicates a unique failure code. The failure code consists of a fault group and a fault bit to indicate individual faults. The value range of the failure code determines the fault group as listed in Table 10-2.

Table 10-2: Failure group of asuSduInfoFailureCode

Failure Code	Fault Group (in prioritized order)
1000 - 1999	No Power
2000 - 2999	Critical Temperature
3000 - 3999	No SATCOM
4000 - 4999	External Interface Failed
5000 - 5999	No ACARS
6000 - 6999	No Cockpit Voice
7000 - 7999	No Cockpit Data
8000 - 8999	Reserved for future use

For the "*No Power*" fault group the following fault bits are defined:

- DegradedPowerHoldUp (Bit 0)

For the "*Critical Temperature*" fault group the following fault bits are defined:

- DegradedACDTemperatureCriticalHigh (Bit 0)
- DegradedACDTemperatureShutdownHigh (Bit 1)
- DegradedCockpitRMTempCriticalHigh (Bit 2)
- DegradedPSMTemperatureCriticalHigh (Bit 3)
- DegradedAISDTemperatureCriticalHigh (Bit 4)
- Reserved for future use (Bit 5)
  DegradedHPATemperatureCriticalHigh (Bit 6)

For the "*No SATCOM*" fault group the following fault bits are defined:

- DegradedNoSATCOM (Bit 0)
- DegradedPosLost (Bit 1)
- DegradedNO_ORT (Bit 2)

For the "*External Interface Failed*" fault group the following fault bits are defined:

- DegradedNo615-3 (Bit 0)
- Degraded615-3Lost (Bit 1)
- DegradedCMULost (Bit 2)
- DegradedMCDULost (Bit 3)
- DegradedCFDSLost (Bit 4)
- DegradedFWSLost (Bit 5)
- DegradedMCDUFailure (Bit 6)

For the "*No ACARS*" fault group the following fault bits are defined:

- DegradedNoACARS (Bit 0)

For the "*No Cockpit Voice*" fault group the following fault bits are defined:

- DegradedCockpitVoiceFailure (Bit 0)

For the "*No Cockpit Data*" fault group the following fault bits are defined:

- DegradedAISDNotWorking (Bit 0)
- DegradedAISDFailure (Bit 1)
- DegradedNoCockpitData (Bit 2)

As an example:

If the CMU and MCDU are lost, it will set the fault bits "2" and "3" in the "External Interface Failed" fault group to combine into failure code "400C".

Appendix B.5. asuSduInfoFailureReason(12)

asuSduInfoFailureReason is a failure message equal to the failure code in asuSduInfoFailureCode(11).

Appendix C. USB Log File Extraction

This section describes how to collect System, Security logs and Diagnostic reports from the AVIATOR S CSDU. The system and security logs are collected in system log files (up to 1 Gigabyte) and security log files (up to 1 Gigabyte) that are captured per concluded flight leg; one per Air segment and one per Ground segment.

A snapshot of the troubleshooting data is captured per System Emergency Event in diagnostic reports (up to 1 Gigabyte).

Appendix C.1. Prerequisites

1. To collect the log files connect a PC to the USB connector under the lid on the front of the AVIATOR S CSDU using an USB connection cable type A."

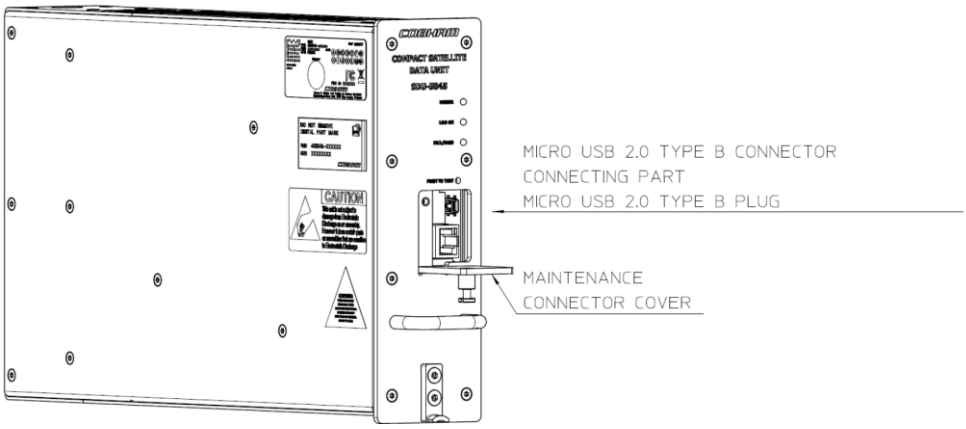

Figure 10-25: USB connector under the maintenance connector cover

NOTE: Due to the gap between USB connector and front face cut out, MAKE SURE that USB Cable is well connected to CSDU Front USB.

In normal operation, no log retrieval is needed. Airframe manufacturer will request log extraction (system logs, security logs and diagnostic reports) to the airline in case of issues.

2. Use a standard laptop PC with Microsoft Windows and a serial terminal program such as Microsoft HyperTerm, TeraTerm or similar to extract the log files. It might be necessary to install UART drivers.
3. To find a UART driver refer to: WWW.FTDIchip.com.
4. Select a VCP driver for your operating system.
5. You can configure TeraTerm in the TeraTerm.ini to auto receive via Zmodem

```
; ZMODEM auto receive
ZmodemAuto=on
; ZMODEM parameters for sending
ZmodemDataLen=1024
ZmodemWinSize=32767
; Escape all control characters in ZMODEM
ZmodemEscCtl=off
; ZMODEM log
ZmodemLog=off
; ZMODEM receive command
ZmodemRcvCommand=rz
; ZMODEM Timeout value(v1,v2,v3,v4) by seconds
; v1=Timeout value for serial port
; v2=Timeout value for TCP/IP port
; v3=Timeout value for initial packet
; v4=Timeout value for final packet
ZmodemTimeouts=10,0,10,3
PrnConvFF=off
```

Log files are extracted from each of the two (AVIATOR 200S) domain processors (ACD, AISD) located in the CSDU.

6. When the PC is connected to the CSDU USB port, four new serial ports will appear.
7. Connect an instance of the terminal program to each of the serial ports using 115.200 baud, 8 databits, 1 stopbit, no parity.
8. Press `enter` to display a command prompt.

The following commands are supported on each command prompt:

`<help>`	: Shows available commands.
`<{log} -h>`	: Shows available commands for {log} in {system, security, diagnostic}.
`<{log} -d>`	: dir: lists all files available for {log} in {system, security, diagnostic}.
`<{log} -p [name]>`	: prints file with [name] for {log} in {system, security, diagnostic}.
`<{log} -x dir.txt>`	: Extracts the file list in a file with the name dir.txt for {log} in {system, security, diagnostic} by starting a file transfer using Z-Modem protocol.

NOTE: The size of the dir.txt files can be large, approx. 100-200 kB for a CSDU with full log system.

System and security log files are not compressed.

Only completed log files can be extracted. Current System and Security Log files cannot be extracted.

Appendix C.2. Procedure to extract the log files via USB

Follow the steps below:

1. Make sure that the CSDU is in Normal Operating Mode (on wing).
2. Plug in the USB cable (connected to a PC) at the front of the CSDU.
3. Using the terminal program on your PC, open a command shell to ACD and AISD.
4. Press `enter` in both shells.
5. Check that the prompt "`CSDU MAINTENANCE:/$`" is displayed.
6. Type "`help`" in the ACD shell.
7. Check that only these commands are listed: diagnostic, security, system, help, debug, loggen and `reboot`.
8. Type "`help`" in the AISD shell.
9. Check that only these commands are listed: `diagnostic`, `security`, `system`, `securityMirror`, `help`, `debug`, `loggen` and `reboot`.

NOTE: Connecting USB cable while on ground triggers the CSDU to enter Maintenance mode.

Appendix C.2.1 Find system log entries on the LRU unit

Use "`system -d 6`" command to displays the last 6 system log files.

```
CSDU MAINTENANCE:/$ system -d 6

ACD_sys_log_19700101_0004_1319_OY-3TC_ground.txt
ACD_sys_log_19700101_0003_1319_OY-3TC_ground.txt
ACD_sys_log_20200131_0801_OY-3TC_ground.txt
ACD_sys_log_20200131_0801_OY-3TC_air.txt
ACD_sys_log_19700101_0000_1316_NA_ground.txt
ACD_sys_log_19700101_0000_1314_NA_air.txt

CSDU MAINTENANCE:/$ system -x
```

Figure 10-26: Find System log entries on the LRU unit - Maintenance phase

Appendix C.2.2 Select file and export

Select a file (highlight the file name) and use the command "`system -x `" and add filename (paste in).

(with TeraTerm configured to auto receive and save into default directory).

```
ACD_sys_log_19700101_0003_1320_OY-3TC_ground.txt

CSDU MAINTENANCE:/$ system -x ACD_sys_log_19700101_0003_1320_OY-3TC_ground.txt
[ZMODEM] Waiting to send file ...
**
[ZMODEM] File was transferred successfully
Press <ENTER> key to return to shell ...

CSDU MAINTENANCE:/$
```

Figure 10-27: Select file and export - Maintenance phase

NOTE: If TeraTerm has not been configured for auto z-modem reception, user has to select Transfer/ZMODEM/Receive.

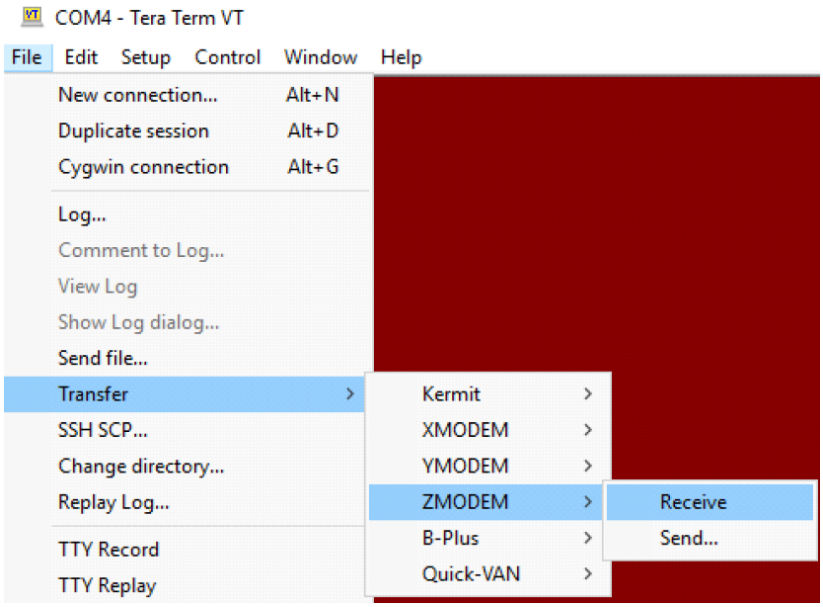

Figure 10-28: Reception via Z-Modem - Manual Receive

Appendix C.3. Further Examples in Maintenance Phase

The same commands are used for system log, security log and diagnostic log/report.

Appendix C.3.1 List of commands available

```
CSDU MAINTENANCE:/$ system
System log command
help            : Show help
status          : Show current status
-c              : Close the active file
-d              : List files in log
-l [text]       : Write to current log file
-m              : Toggle mirroring of log
-n [file_name]  : Close and create a new file named [file_name] or auto generated name if empty.
-o              : Toggle printing output from log
-p [file_name]  : Print log file [file_name] or current open if empty.
-s [file cn]    : Show last [cn] files.
-t [number]     : Change rate limit to [number] blocks of 4k size (0 i no limit). Empty is reset
-u [number]     : Resize NVM area to [number] blocks of 4k size. Empty is reset
-v [number]     : Change file size to [number] blocks of 4k size (0 i no limit). Empty is reset
-x [file_name]  : Export log file on USB port using ZMODEM protocol
-y [i1] [i2]    : List blocks [i1...i2] in Log
-z [index]      : Delete blocks [0...index] in Log

CSDU MAINTENANCE:/$ diagnostic
Diagnostic Report command
help            : Show help
status          : Show current status
-d              : List files in log
-k              : Toggle Diagnostic Report Always allow flag
-p [file_name]  : Print log file [file_name] or current open if empty.
-s [file cn]    : Show last [cn] files.
-x [file_name]  : Export log file on USB port using ZMODEM protocol
-y [i1] [i2]    : List blocks [i1...i2] in Log
-z [index]      : Delete blocks [0...index] in Log
```

Figure 10-29: List of commands available - Maintenance phase

System log and Maintenance phase have the same command set.

Appendix C.3.2 Make new log file

Use the command "`system -n filename`" to save the current log in filename and start new logfile.

If file name is not provided in the entered command (e.g "`system -n`"), a new log file name is auto generated.

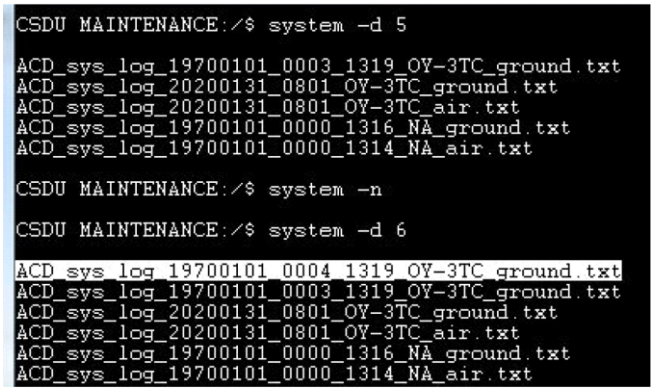

Figure 10-30: Make new log file - Maintenance phase

Appendix C.3.3 Add a text line in current log

Use command "`system -l text`" to add a comment in the current logfile.

Figure 10-31: Add a text line in current log - Maintenance phase

The result is a new line in the log without log level <-> and with process ACD13, see example below:

```
<->1 1970-01-01T00:07:30.814Z - ACD 13 - - (55.793896,12.523556,39.014400)
Screendump_test
<4>1 1970-01-01T00:07:30.814Z CSDU ACD 13 1003 - (55.793896,12.523556,39.014400)
Log Entry was truncated: ID:0
```

Appendix D. Troubleshooting & Maintenance Actions

Each fault detected by the AVIATOR S System is identified by a unique troubleshooting code (Figure 10-32). Refer to section 10.1.1, BITE Scanning - Troubleshooting Code for guidance in obtaining the troubleshooting code for events detected and listed in the BITE Scanning page.

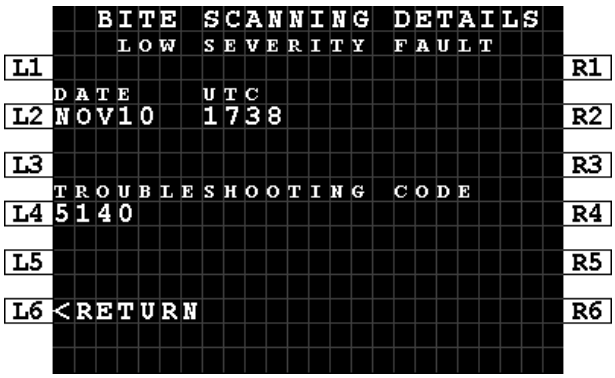

Figure 10-32: MCDU - BITE - Troubleshooting Code

Using the troubleshooting code as a reference, refer to Table 10-3 in Appendix D.1 to determine the recommended maintenance action.

Identification	Reported to CMS			Recommended maintenance action		
Troubleshooting Code	Maintenance Message			First step	Second Step	Third Step
	List of Accused Elements (LRU/WRG)	Severity	ATA			
5140	MCDU3/CSDU/WRG	LOW	3461	Replace CSDU	Replace MCDU 3	Check Wiring

Figure 10-33: BITE - FDS - Troubleshooting Code Example

Appendix D.1. Fault Display System (FDS)

Table 10-3: Troubleshooting codes and recommended maintenance actions						
Identification	**Reported to CMS**			**Recommended maintenance action**		
Troubleshooting Code	**Maintenance Message**			**First step**	**Second Step**	**Third Step**
	List of Accused Elements (LRU/WRG)	**Severity**	**ATA**			
5101	CSDU FAULT	HIGH	2315	Reload CSDU SW	Replace CSDU	
5102	CSDU FAULT	LOW	2315	Reload CSDU SW	Replace CSDU	
5104	CSDU FAULT	HIGH	2315	Reload CSDU SW	Replace CSDU	
5105	CSDU FAULT	LOW	2315	Reload CSDU SW	Replace CSDU	
5107	CSDU FAULT	HIGH	2315	Reload CSDU SW	Replace CSDU	
5108	CSDU FAULT	HIGH	2315	Reload CSDU SW	Replace CSDU	
510A	HELGA SW COMP	HIGH	2315	Reload HELGA and/or CSDU SW	Replace HELGA	
510D	CSDU FAULT	HIGH	2315	Reload CSDU SW	Replace CSDU	
510E	SCM SORT INTEG	HIGH	2315	Reload Secure ORT	Replace SCM	
510F	SCM SORT INTEG	HIGH	2315	Reload USER ORT	Replace SCM	
5110	SCM SORT COMP	HIGH	2315	Reload SECURE ORT	Replace SCM	
5111	SCM SORT COMP	HIGH	2315	Reload USER ORT	Replace SCM	
5112	CSDU CONFIG PIN PROG WIRING	HIGH	2315	Check wiring	Replace CSDU	
5113	CSDU CONFIG PIN PROG WIRING	HIGH	2315	Check wiring	Replace CSDU	
5114	CSDU CONFIG PIN PROG WIRING	HIGH	2315	Check wiring	Replace CSDU	
5115	CSDU FAULT	HIGH	2315	Replace CSDU		
5116	CSDU FAULT	HIGH	2315	Replace CSDU		
5117	CSDU FAULT	HIGH	2315	Replace CSDU		
5175	CSDU FAULT	HIGH	2315	Replace CSDU		
5176	CSDU FAULT	HIGH	2315	Replace CSDU		
5178	CSDU FAULT	HIGH	2315	Replace CSDU		
5179	CSDU FAULT	HIGH	2315	Replace CSDU		
511A	CSDU FAULT	LOW	2315	Replace CSDU		
511C	CSDU FAULT	HIGH	2315	Replace CSDU		
5303	CSDU FAULT	LOW	2315	Replace CSDU		
511D	CSDU FAULT	HIGH	2315	Replace CSDU		
5304	CSDU FAULT	LOW	2315	Replace CSDU		
511E	CSDU FAULT	HIGH	2315	Replace CSDU		
5305	CSDU FAULT	LOW	2315	Replace CSDU		
511F	CSDU FAULT	HIGH	2315	Replace CSDU		
5120	CSDU FAULT	HIGH	2315	Replace CSDU		

Table 10-3: Troubleshooting codes and recommended maintenance actions						
Identification	**Reported to CMS**			**Recommended maintenance action**		
Troubleshooting Code	**Maintenance Message**			**First step**	**Second Step**	**Third Step**
	List of Accused Elements (LRU/WRG)	**Severity**	**ATA**			
5122	CSDU FAULT	HIGH	2315	Replace CSDU		
5901	CSDU FAULT	HIGH	2315	Replace CSDU		
5902	CSDU FAULT	HIGH	2315	Replace CSDU		
5903	CSDU FAULT	HIGH	2315	Replace CSDU		
5904	CSDU FAULT	HIGH	2315	Replace CSDU		
5905	CSDU FAULT	HIGH	2315	Replace CSDU		
5906	CSDU FAULT	HIGH	2315	Replace CSDU		
5907	CSDU FAULT	HIGH	2315	Replace CSDU		
5908	CSDU FAULT	HIGH	2315	Replace CSDU		
5801	CSDU FAULT	HIGH	2315	Replace CSDU		
5802	CSDU FAULT	HIGH	2315	Replace CSDU		
5803	CSDU FAULT	HIGH	2315	Replace CSDU		
512D	IRS1	HIGH	3421	Replace ADIRU 1		
512E	IRS1	HIGH	3421	Replace ADIRU 1		
512F	IRS1	HIGH	3421	Replace ADIRU 1		
5130	IRS1/CSDU/WRG	HIGH	3421	Replace CSDU	Replace ADIRU 1	Check Wiring
5131	IRS2	HIGH	3421	Replace ADIRU 2		
5132	IRS2	HIGH	3421	Replace ADIRU 2		
5133	IRS2	HIGH	3421	Replace ADIRU 2		
5134	IRS2/CSDU/WRG	HIGH	3421	Replace CSDU	Replace ADIRU 2	Check Wiring
5138	MCDU1/CSDU/WRG	LOW	3461	Replace CSDU	Replace MCDU 1	Check Wiring
513C	MCDU2/CSDU/WRG	LOW	3461	Replace CSDU	Replace MCDU 2	Check Wiring
5140	MCDU3/CSDU/WRG	LOW	3461	Replace CSDU	Replace MCDU 3	Check Wiring
5144	TCP1/CSDU/WRG	LOW	2312	Replace CSDU	Replace TCP 1	Check Wiring
5148	TCP2/CSDU/WRG	LOW	2312	Replace CSDU	Replace TCP 2	Check Wiring
514C	TCP3/CSDU/WRG	LOW	2312	Replace CSDU	Replace TCP3	Check Wiring
5151	CMU1	HIGH	2327	Replace CMU1		
5152	CMU1	HIGH	2327	Replace CMU1		
5153	CMU1	HIGH	2327	Replace CMU1		
5154	CMU1/CSDU/WRG	HIGH	2327	Replace CSDU	Replace CMU1	Check Wiring
5155	CMU2	HIGH	2327	Replace CMU2		
5156	CMU2	HIGH	2327	Replace CMU2		
5157	CMU2	HIGH	2327	Replace CMU2		
5158	CMU2/CSDU/WRG	HIGH	2327	Replace CSDU	Replace CMU2	Check Wiring
5159	IRS1	HIGH	3421	Replace ADIRU1		

Table 10-3: Troubleshooting codes and recommended maintenance actions						
Identification	**Reported to CMS**			**Recommended maintenance action**		
Troubleshooting Code	**Maintenance Message**			**First step**	**Second Step**	**Third Step**
	List of Accused Elements (LRU/WRG)	**Severity**	**ATA**			
515A	IRS2	HIGH	3421	Replace ADIRU2		
515D	IRS1	HIGH	3421	Replace ADIRU1		
515E	IRS2	HIGH	3421	Replace ADIRU2		
5162	CSDU FAULT	HIGH	2315	Replace CSDU		
5909	CSDU FAULT	HIGH	2315	Replace CSDU		
590B	SCM FAULT	HIGH	2315	Replace SCM		
5163	CSDU OVER TEMP	LOW	2315	Replace CSDU		
5164	CSDU OVER TEMP	LOW	2315	Replace CSDU		
5166	CSDU OVER TEMP	LOW	2315	Replace CSDU		
5169	CSDU OVER TEMP	LOW	2315	Replace CSDU		
516A	CSDU OVER TEMP	LOW	2315	Replace CSDU		
516B	CSDU OVER TEMP	LOW	2315	Replace CSDU		
516C	CSDU OVER TEMP	LOW	2315	Replace CSDU		
516D	CSDU FAULT	HIGH	2315	Replace CSDU		
516E	CSDU FAULT	HIGH	2315	Replace CSDU		
516F	CSDU FAULT	HIGH	2315	Replace CSDU		
5170	SCM ACTIVATION	HIGH	2315	Replace SCM		
5171	POWER SUPPLY INTERRUPT	HIGH	2315	N\A		
5172	MANUAL RESET	HIGH	2315	N\A		
5173	AUTO RESET	HIGH	2315	N\A		
7201	HELGA FAULT	HIGH	2315	Replace HELGA		
7202	CSDU/HELGA/WRG	HIGH	2315	Replace CSDU	Replace HELGA	Check Wiring
7203	HELGA OVER TEMP	HIGH	2315	Replace HELGA		
7204	HELGA FAULT	HIGH	2315	Replace HELGA		
7205	HELGA FAULT	HIGH	2315	Replace HELGA		
7206	HELGA FAULT	HIGH	2315	Replace HELGA		
7207	HELGA FAULT	HIGH	2315	Replace HELGA		
7208	HELGA FAULT	HIGH	2315	Replace HELGA		
7209	HELGA FAULT	HIGH	2315	Replace HELGA		
720A	HELGA FAULT	HIGH	2315	Replace HELGA		
720B	HELGA FAULT	HIGH	2315	Replace HELGA		
720C	HELGA FAULT	HIGH	2315	Replace HELGA		
720D	HELGA FAULT	HIGH	2315	Replace HELGA		
720E	HELGA FAULT	HIGH	2315	Replace HELGA		
8101	CSDU-SCM WIRING	HIGH	2315	Replace CSDU	Replace SCM	Check Wiring

Table 10-3: Troubleshooting codes and recommended maintenance actions						
Identification	**Reported to CMS**			**Recommended maintenance action**		
Troubleshooting Code	**Maintenance Message**			**First step**	**Second Step**	**Third Step**
	List of Accused Elements (LRU/WRG)	**Severity**	**ATA**			
8102	CSDU/HELGA/WRG	HIGH	2315	Replace CSDU	Replace HELGA	Check Wiring
6201	SCM FAULT	HIGH	2315	Replace SCM		
6101	SCM FAULT	HIGH	2315	Replace SCM		
6002	CSDU-SCM WIRING	HIGH	2315	Replace CSDU	Replace SCM	Check Wiring
6003	SCM OVER TEMP	HIGH	2315	Replace SCM		
5306	CSDU FAULT	LOW	2315	Replace CSDU		
6104	SCM FAULT	HIGH	2315	Replace SCM		
6105	SCM ACTIVATION	HIGH	2315	Replace SCM		
517A	CMU1	LOW	2327	Replace CMU1		
517B	CMU1	LOW	2327	Replace CMU1		
517C	CMU1	LOW	2327	Replace CMU1		
517D	CMU2	LOW	2327	Replace CMU2		
517E	CMU2	LOW	2327	Replace CMU2		
517F	CMU2	LOW	2327	Replace CMU2		
6106	CSDU FAULT	HIGH	2315	Replace CSDU		
6107	CSDU FAULT	HIGH	2315	Replace CSDU		
6108	CSDU FAULT	HIGH	2315	Replace CSDU		
6109	CSDU FAULT	HIGH	2315	Replace CSDU		
6110	CSDU FAULT	LOW	2315	Replace CSDU		
6111	CSDU FAULT	LOW	2315	Replace CSDU		
5160	ATC	HIGH	3453	Replace AESID		
5168	ATC/CSDU/WRG	HIGH	3453	Replace CSDU	Replace AESID	Check Wiring
8105	CFDS	HIGH	4511	Replace CFDS		
8106	CFDS/CSDU/WRG	HIGH	4511	Replace CSDU	Replace CFDS	Check Wiring
9001	MMR	HIGH	3458	Replace GNSS		
9002	MMR/CSDU/WRG	HIGH	3458	Replace CSDU	Replace GNSS	Check Wiring
9003	OCA FAULT	HIGH	2312	Replace TCPs		
9101	AID/CSDU/ETH1	LOW	2315	Check wiring	Replace Aircraft Interface Device	Replace CSDU
9103	ONS/CSDU/ETH3	LOW	2315	Check wiring	Replace Ethernet Dataloader	Replace CSDU
9004	TCP1	LOW	2312	Replace TCP#1		
9005	TCP2	LOW	2312	Replace TCP#2		
9006	TCP3	LOW	2312	Replace TCP#3		
9007	CSDU/HELGA/WRG	HIGH	2315	Check Wiring		