

pilot's guide

SAT-906/906B Satellite Communications System

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Avionics Glossary

The abbreviations used in this manual are defined as follows:

<u>ACRONYM</u>	<u>DEFINITION</u>
ACARS	Aircraft Communications Addressing and Reporting System
ACK	Acknowledge
ACP	Audio Control Panel
AES	Aircraft Earth Station
AES Class 1	Installation provides low rate packet-mode data only, using a low gain antenna.
AES Class 2	Installation provides telephone, using a high gain antenna
AES Class 3	Installation provides telephone and packet-mode data service using a high gain antenna
AES Class 4	Installation provides packet-mode data services only, using a high gain antenna
AMU	Audio Management Unit
AORE	Atlantic Ocean Region East
AORW	Atlantic Ocean Region West
APC	Aeronautical Public Communications
BITE	Built-In Test Equipment
BSU	Beam Steering Unit
CEPT	Conference Européenne des Postes et Télécommunications
CFDS	Central Fault Display System
CLR	Clear

<u>ACRONYM</u>	<u>DEFINITION</u>
CMC	Central Maintenance Computer
CODEC	Coder/Decoder
CPDF	Cabin Packet Data Function
CTU	Cabin Telephone Unit
DTMF	Dual Tone Multifrequency
ECAM	Electronic Caution Alert Module
EICAS	Engine Indication and Crew Alert System
EIRP	Effective Isotropic Radiated Power
EMEA	Europe, Middle East, and Africa
GES	Ground Earth Station
HCM	High Speed Data Configuration Module
HGA	High Gain Antenna
HPA	High Power Amplifier
HPR	High Power Relay
HSDU	High Speed Data Unit
HSR	High Stability Reference
HST	High Speed Transceiver
ID	Identification
IDU	Interactive Display Unit
INMARSAT	International Maritime Satellite Organization
IOR	Indian ocean region
IRS	Inertial Reference System
LES	Land Earth Station
LGA	Low Gain Antenna

<u>ACRONYM</u>	<u>DEFINITION</u>
LNA	Low Noise Amplifier
LRU	Line Replaceable Unit
LSK	Line Select Key
MCDU	Multipurpose Control Display Unit
MIC	Microphone
MIDU	Multipurpose Interactive Display Unit
NCD	No Computed Data
OPNL	Operational
ORT	Owner's Requirements Table
POR	Pacific Ocean Region
PSTN	Public Switched Telephone Network
PTT	Push-To-Talk
REQ	Request
RFU	Radio Frequency Unit
RTN	Return
SAT	Satellite
SATCOM	Satellite Communications
SDU	Satellite Data Unit
SEL	Select
SELCAL	Selective Calling
T/P	Top or Port
VSWR	Voltage Standing Wave Ratio

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Introduction

This pilot's guide describes the operation of the SAT-906/906B Satellite Communications System and provides a basic understanding of satellite communications.

Once installed and set up for individual airline operation, most of the SDU-906 Satellite Data Unit operation is automatic. Control of the SAT-906/906B Satellite Communications System for cockpit voice calls or for selection of operating options is performed through a Multifunction Control Display Unit (MCDU) in the cockpit of the aircraft.

The equipment required for this operation is described in the following paragraphs.

The major units are:

- SDU-906 (Satellite Data Unit) - The main unit of the Satellite Communications Aircraft Earth Station (SATCOM AES) system. It interfaces with the other aircraft systems and the other AES equipment.
- RFU-900 (Radio Frequency Unit) — Translates signals to and from the required RF frequencies for the AES.
- HPA-901/901A/901B (High Power Amplifier) — Is capable of handling several signals at one time and can radiate up to 60 watts of signal power.
- HPA-900 (High Power Amplifier) — Is capable of transmitting only a single channel at a time. It may be used as a backup amplifier should the HPA-901 fail.
- HGA (High Gain Antenna) subsystem — A directional antenna that is continually aimed at one of the satellites regardless of aircraft position and attitude. Steering commands are sent from the SDU-906 to the antenna BSU, or Beam Steering Unit(s), which actually controls the antenna pointing direction. HGA subsystems may be in the form of a pair of low-drag conformal side-mount or a single top-mounted antenna.
- LGA (Low Gain Antenna) subsystem - A non-directional antenna for use with single channel low-speed data operation.
- HST-900 (High Speed Data Transceiver) - Is capable of supporting personal computers with dial up modem speeds of up to 64 Kbps through the satellite communication system.
- HST-2100 (High Speed Data Transceiver) - is capable of supporting one channel of Swift64 (M4 or MPDS mode).
- HST-2110 (High Speed Data Transceiver) - is capable of supporting one channel Swift64 or one channel of SwiftBroadband data communications.

- HST-2120 (High Speed Data Transceiver) - is capable of supporting two channels of Swift64.

NOTE

The HST-2110, is SwiftBroadband hardware capable and require SwiftBroadband software in order to operate in SwiftBroadband mode. Once loaded, it would be referred to as HST-2110B.

- HST-2110B (High Speed Data Transceiver) is capable of supporting one channel of Swift64 or one channel of SwiftBroadband data communications.
- HCM-2100B (High Speed Data Configuration Module) is intended to be airframe mounted close to the HST and contains one or more SIM cards. These SIM cards are necessary for SBB operation. The SIM cards contain the identity and encryption algorithms unique to each aircraft.

SATCOM Display Screens

The following paragraphs define the MCDU display formats and functions.

MCDU pages are arranged in a hierarchical fashion. General functions are identified at the highest level. Functions are organized into categories that allow for quick identification and location of a desired selection. The hierarchy of the pages is identified in the figure 2-1. Note the normal entry for an installed SDU is from the main MCDU menu. Selection of SATCOM from the MCDU MAIN menu will result in display of the SATCOM-MAIN menu. The in-flight mode pages are not available when the SDU is in the maintenance mode.

Text that is located adjacent to the left or right margin of the MCDU display generally indicates fields that are available for user entry. Text offset by one character indicates a field that is display only and cannot be modified.

When multiple MCDUs are used to control the system, all MCDUs have simultaneous access to all in-flight user pages.

Line Selects

The 12 line select keys L1 - L6 and R1 - R6 are used for selecting new menus to be displayed, activating functions, selecting messages, handling advisories, and inputting data. Both the alphanumeric set and the character set ;, <, >, *, [, and] on the display adjacent to the line select key and data fields constitute valid selections. Selection of a line select key not matching these criteria result in a momentary blanking of the screen, acknowledging the key push, and indicating that no action is possible.

Line Select Symbols

The following symbols when used within the MCDU displays provide the information described. An Owner's Requirements Table (ORT) programmable option (<> PROMPT OVERRIDE) is available that allows the < and > symbols to be used in place of the * or : symbols. If the single prompt ORT option is enabled, the < symbol will overwrite the * or : symbols when displayed adjacent to the left line keys and the > symbol will overwrite the * or : symbols when displayed adjacent to the right line select keys.

<u>Symbol</u>	<u>Usage</u>
< >	This symbol appears next to a line select key that causes a different page to be displayed. The new page name is displayed next to the symbol.
*	This symbol appears next to a line select key if pushing that key causes either a change to parameters which

<u>Symbol</u>	<u>Usage</u>
	affect the active situation of the aircraft ORT the asterisk is only shown when a function is available. If the single prompt override option is enabled, the < or > are used in place of the * symbol.
[]	This symbol indicates that the user may optionally enter data in this location. The field size is indicated by the total space occupied by brackets and blanks.
:	This symbol indicates that the entry has multiple (two or more) predefined states. Depression of the line select key displays the next entry in the select list. The symbol is only displayed when the change of state is available. If the single prompt option is enabled, the < or > symbols are used in place of the * symbol.
□	This symbol indicates that this data is required input for performing the specified function. The field size is indicated by the number of squares.
-	This symbol indicates the NO COMPUTED DATA (NCD) condition exists for filling a display-only field.
/	This symbol is used to separate multiple data fields on a single line.

Data Line

The data line may have varied attributes depending upon data type and function. A data field may be characterized as display only, modifiable, or selectable.

Fields which are modifiable or selectable are justified with the right most or left most margins. Fields which are displayed only shall be offset from the right most or left most margin by a space.

In general, large alphanumeric font is used for the data line. The small font is used for the following:

- Units of measurement following a data value
- Computer predicted data which may or must be validated by an operator
- Display of a default data
- Data of a low priority, informational nature.

Display Only Data Fields

Display only fields are indicated by being offset from the right most or left most MCDU column by a space. Data characterized as display only cannot be overwritten by data from the scratchpad and cannot be selected to the scratchpad. Selection of the adjacent line select key has no effect and the key push is ignored.

Data/Text Entry

SATCOM options are displayed on menu pages and selected by pushing the appropriate line select key.

Data is entered on the scratchpad line and then moved to the appropriate data line upon acceptance by the user as indicated by the depression of the appropriate line select key.

Data/text entry rules are enforced as follows:

- / (slash) must be entered where specified
- All numeric entries are assumed to be positive unless - or + is entered as the first character
- Entry of – (minus) anywhere but as the first character of a numeric entry produces a format error. Entry of + (plus) will not be accepted and produces a format error for numeric entry
- . (period) entry is optional.

Scratchpad Line

The scratchpad is used for data entry. This includes new data entry and editing data from data fields. A variable number of up to 24 characters of data can be entered in the scratchpad. All characters displayed on the scratchpad line are in the large character font.

Scratchpad Data Entry Via Keyboard

Starting with a blank scratchpad, the first character entered is displayed in column one. Each subsequent character entered must appear to the right of the last character already in the scratchpad. The last character on the right of the scratchpad entry is removed when the Clear (CLR) key is pushed again and so on.

Scratchpad Data Entry Via Line Select

If the scratchpad is clear, pushing the line select key adjacent to a selectable data field causes the data in that field to be duplicated in the scratchpad, left

adjusted. Once in the scratchpad, it is treated just as though it had been entered via the keyboard. Characters can be added on the right and/or cleared from the right of the entry field.

Scratchpad Transfer to Data Field

If the scratchpad contains data, pushing a line select key causes the SDU to do the following:

1. Check the data entry is permissible for the adjacent data field.
2. Check the validity of the data for use in the adjacent field.
3. Transfer valid data from the scratchpad to the data field, replacing previous contents and clearing the scratchpad.

Scratchpad Messages

When data is entered in the MCDU scratchpad, the SATCOM SDU does not know into what field the data will be transferred. However when the operator makes a field selection, certain data type checks are performed. The scratchpad field may be replaced temporarily with an advisory message defined as follows:

NOTE

All advisory messages are displayed using the SCRATCHPAD ADVISORY color type.

<u>Error Message</u>	<u>Trigger / Description</u>
NOT ALLOWED	• Attempt to move data from scratchpad to non-data field • Select data field with empty field and empty scratchpad • Select data field with data and no * (asterisk) associated with an empty scratchpad
BUTTON PUSH IGNORED	• Pushing a Line Select Key (LSK) with no function assigned • Scratchpad full
ENTRY OUT OF RANGE	• Range check failed
FORMAT ERROR	• Numeric data entered, alpha required • Alpha data entered, numeric required • Too many characters for field selected • Too few characters for field selected

<u>Error Message</u>	<u>Trigger / Description</u>
CLR	• CLR key pushed (with empty scratchpad) (Non-Boeing aircraft only)
ENTRY NOT IN TABLE	• An attempt was made to enter a value which is not in the present Ground Earth Station (GES) table. (SATID GESID selection during on-only)
DELETE	• DEL key pushed
INVALID DELETE	• An attempt was made to delete a field which is required to contain a valid entry
DATA TRUNCATED	• The data entered was longer than the data field, the data was truncated, and then accepted
INVALID TEST CMND	• The test command entered does not exist or is not allowed
NOT FOUND	• Appears under the Airbus format numbers page as the result of the FIND function process, when no entry matches the desired text entered to the function

Error messages are cleared automatically from the display when the set logic no longer is satisfied. Any displayed message must be cleared and associated message set logic reset when the CLR key is pushed. Any previously entered scratchpad data should then be displayed. Holding the CLR key down does not cause the error message to be displayed and causes the displayed data to be cleared in a continuous sequence.

The first key push results in the error message being cleared. Continued holding of the CLR key has no effect. A new depression of the key following a release is then treated as a new key push. Cleared messages are not redisplayed until appropriate again.

Function Keys

MCDU Menu Key

Pushing the MCDU MENU key suspends SATCOM display capabilities with the MCDU, however normal communications will continue. The MCDU menu is displayed immediately showing SAT <SEL> (Satellite Select). If a new subsystem is selected, the MCDU logs off SATCOM. If SATCOM is selected, a page refresh is requested by the MCDU and operation continues.

Only one MCDU can be in communications with the SDU when the SDU is operating in Maintenance mode. Selection of SATCOM by a second MCDU while in Maintenance mode displays the SATCOM Selected menu.

Next Page Key

This key is used in multi-screen pages to display the next sequential page. If displaying the last page when pushed, the display advances to the first page.

Prev Page Key

This key (when provided) is used in multi-screen pages to display the previous sequential page. If the first page is displayed when pushed, the display changes to the last page.

Arrow Key

The ↑ and ↓ keys (when provided) are not supported by SATCOM. The only exception is the Manual Dial page.

CLR Key

The CLR key is used to clear individual characters or all characters currently displayed on the scratchpad line. If the CLR key is pushed and released (held down for less than one second), the right most character displayed on the scratchpad line is removed. This process continues on subsequent CLR key pushes until all characters have been removed.

If the CLR key is pushed when messages are in the Scratchpad, the message is removed and any previously entered data is displayed in the scratchpad.

If the CLR key is pushed and held when messages are in the scratchpad, the message is removed and any previously entered data is also removed.

If the Central Fault Display System (CFDS) type as defined by rear strapping is Boeing, and the CLR key is pushed while no data is present in the scratchpad, the screen blanks momentarily to indicate button push has been processed and no further action takes place.

If the CFDS type as defined by rear strapping is other than Boeing, and the CLR key is pushed while no data is present in the scratchpad, CLR is displayed in the scratchpad. When CLR is displayed in the scratchpad from use of the CLR key, data may be cleared from entry fields by use of the appropriate select key. The following rules apply after selection of the indicated items:

NOTE

Unless otherwise noted, the CLR scratchpad message is removed following selection of any other key.

<u>Item Selected</u>	<u>Result</u>
Entered Mandatory	Boxes will reappear

<u>Item Selected</u>	<u>Result</u>
Data	
Entered data	Default data on page entry will reappear
Null Data (dashes)	Screen will blank momentarily to indicate button push has been processed
Page Change Prompt	Page change occurs, CLR remains in scratchpad
Un-Entered Data	Screen will blank momentarily to indicate button push has been processed

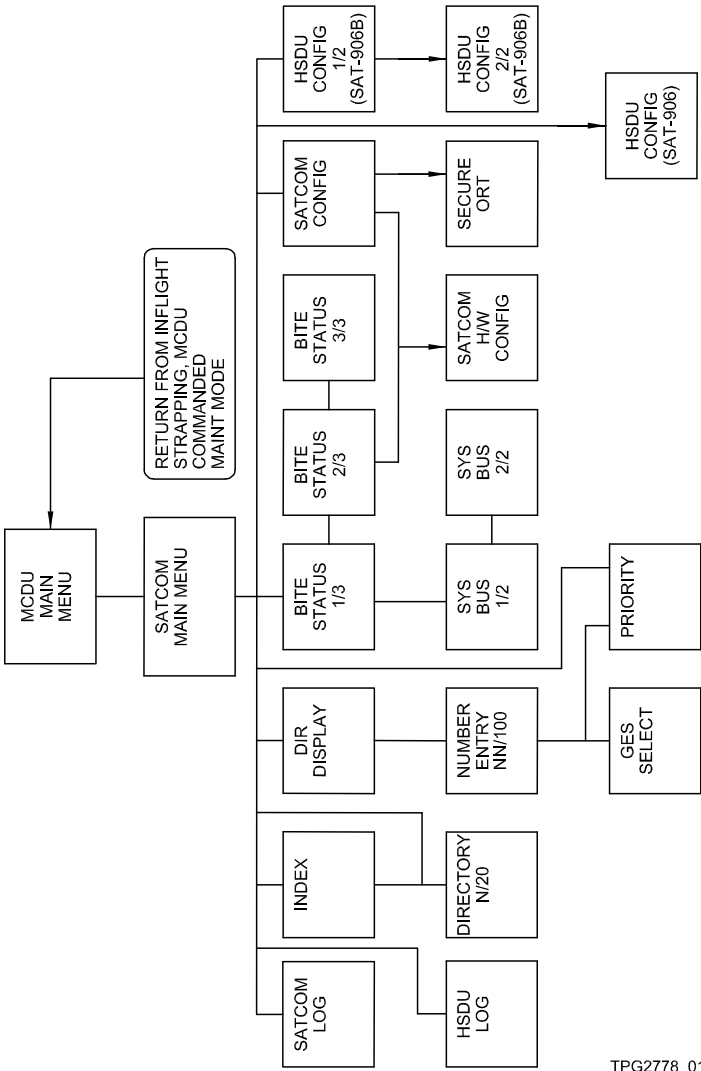
DEL Key

The DEL key, when present on the MCDU, is used to cause DELETE to appear in the scratchpad. When DELETE is displayed in the scratchpad from use of the DEL key, data may be cleared from entry fields by the use of the appropriate line select key. The following rules apply after selection of the indicated items:

NOTE

Unless otherwise noted, the DELETE scratchpad message is removed following selection of any other key.

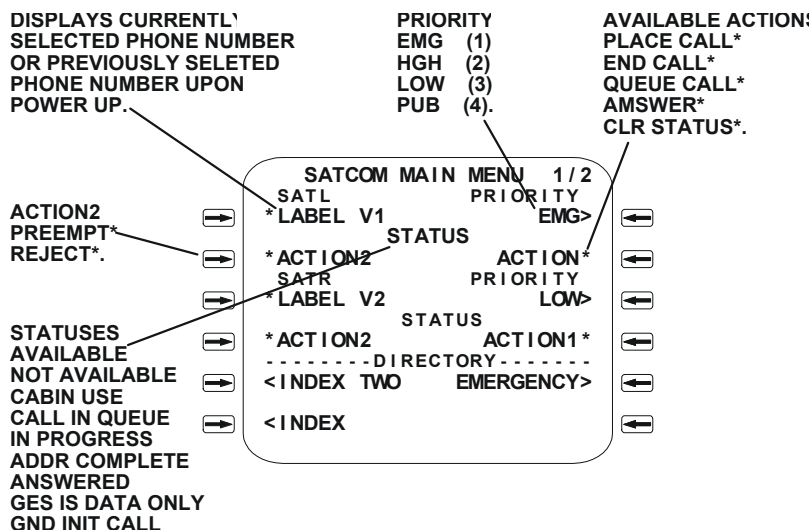
<u>Item Selected</u>	<u>Result</u>
Entered Mandatory Data	Boxes will reappear
Entered Data	Default data on page entry will reappear
Null Data (dashes)	Screen will blank momentarily to indicate button push has been processed
Page Change Prompt	Page change occurs, DELETE remains in scratchpad
Un-Entered Data	Screen will blank momentarily to indicate button push has been processed



TPG2778_01

SATCOM PAGE HIERARCHY (IN-FLIGHT MODE)
FIGURE 2-1

SATCOM MAIN MENU Pages



TPG9436_01

SATCOM MAIN MENU 1/2
FIGURE 2-2

- **LABEL (1L)** — Selecting 1L will place the call to the phone number associated with the displayed label, using voice channel 1. Selecting 1L with a telephone number entered in the scratchpad, causes that number to be displayed as currently selected label with the priority set to the lowest priority.
- **ACTION2 (2L)** — Selecting 2L causes the indicated action to be performed for voice 1 channel.
- **Priority (1R)** — The voice 1 channel call priority is displayed next to 1R. When the voice channel is not in use, selecting 1R will cause the display of the SATCOM PRIORITY page.
- **ACTION (2R)** — Selecting 2R causes the indicated action to be performed for the voice 1 channel.
- **LABEL (3L)** — Selecting 3L will place the call to the phone number associated with the displayed label, using voice channel 2. Selecting 3L with a telephone number entered in the scratchpad, causes that number to be displayed as currently selected label with the priority set to the lowest priority.

- **Priority (3R)** — The voice 2 channel call priority is displayed next to 3R.
- **ACTION2 (4L)** — Selecting 4L causes the indicated action to be performed for voice 2 channel.
- **INDEX TWO (5L)** — Selecting 5L will display the first SATCOM DIRECTORY page from the displayed index group and allow the user to select a new number. This prompt will indicate the last index group accessed, other than EMERGENCY.
- **EMERGENCY (5R)** — The name of the first index entry is always displayed next to 5R, and is normally reserved for emergency phone numbers. Selecting 5R will display page 1 of the SATCOM DIRECTORY pages.
- **INDEX (6L)** — Selecting 6L displays the SATCOM DIR INDEX page, allowing the user to select from the list of directory index names.

SATCOM SYS BITE STATUS

BITE OK - ALL LRU PASS, ALL CHANNELS ACTIVE

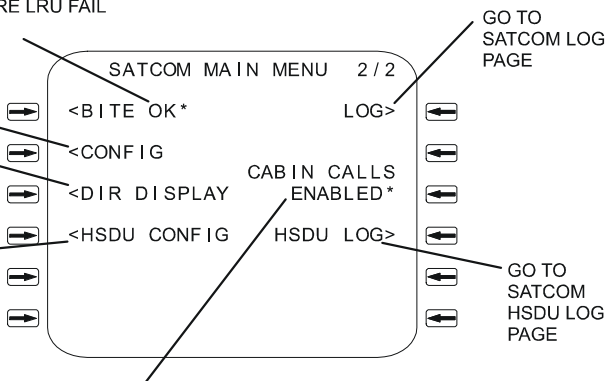
BITE OK* - ALL LRU PASS, NOT ALL CHANNELS ACTIVE

BITE FAIL - 1 OR MORE LRU FAIL

GO TO
SATCOM
CONFIG PAGE

GO TO
SATCOM
DIRECTORY
PAGE

GO TO
SATCOM
HSDU CONFIG
PAGE



CABIN CALLS - ENABLED SELECTED - (CABIN CALLS WILL BE ALLOWED)

CABIN CALLS - DISABLED SELECTED - (ALL CALLS TERMINATED)

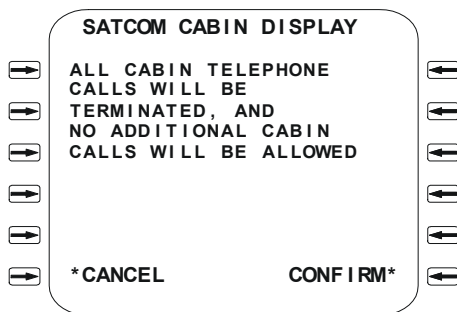
TPG2778_02

SATCOM MAIN MENU 2/2
FIGURE 2-3

- **BITE OK (1L)** — Selecting 1L will display the SATCOM BITE STATUS 1/3 page.
- **LOG (1R)** — Selecting 1R will display the SATCOM LOG menu.
- **CONFIG (2L)** — Selecting 2L will display the SATCOM CONFIG page.

- **DIR DISPLAY (3L)** — Selecting 3L will display the SATCOM DIRECTORY menu. DIR DISPLAY will not be shown if neither Voice 1 nor Voice 2 is available.
- **HSDU CONFIG (4L)** — Selecting 4L will display the SATCOM HSDU CONFIG page.
- **HSDU LOG (4R)** — Selecting 4R will display the SATCOM HSDU LOG page.
- **CABIN CALLS (3R)** — Selecting 3R will determine whether passenger air-to-ground calls will be allowed from the Cabin Telephone Unit (CTU). If not allowed, new cabin calls will be rejected and any cabin calls in progress will be terminated. Selecting 3R will alternate display between ENABLED* or DISABLED*.

The SATCOM CABIN DISABLE page will be displayed when ENABLED prompt is selected. Selecting CONFIRM will terminate any cabin telephone call. New telephone calls will not be accepted.



TPG9436_02

**SATCOM CABIN DISABLE PAGE
FIGURE 2-4**

- **CANCEL (6L)** — Selecting 6L will return display to the MAIN SATCOM MENU page 2/2.
- **CONFIRM (6R)** — Selecting 6R will return display to the MAIN SATCOM MENU page 2/2.

Advisories

Advisories are automatic prompts and warnings generated by the SATCOM SDU and are displayed at the bottom center of the SATCOM MAIN MENU. Advisories that are informational in nature are called inactive advisories. Advisories associated with a crew response are called active advisories. The advisories are ranked by priority within their class. In the event of more than one advisory of a class being active at the same time, the highest priority advisory will be displayed. If no advisories of a class are active, the display area will be blank. All advisories, when triggered, will display for a minimum of one second.

TEXT	COND	DESCRIPTION
DISABLED	SET	This advisory will be shown on an SDU which has been disabled via the other SDU while in the dual SDU mode.
MAINT	SET	Upon user entry of the protected entry pass code via the MCDU.
		<u>NOTE:</u> The protected level code can only be entered when the AES is not logged on to a GES and is for use by ground maintenance personnel only.
	CLR	This indication is cleared upon selection of 6R. RESUME>.
SAT INOP	SET	The SAT INOP will be set under the following conditions: 1. system failures, 2. log-on is halted, awaiting valid aircraft identification (ID), 3. all channel modules show a failure or if only one channel module is active in a voice only system, 4. a transmit fault condition has been encountered for ten seconds or more, 5. an RFU warm-up fault exists.

INACTIVE ADVISORIES
TABLE 2-1 (SHEET 1 OF 2)

TEXT	COND	DESCRIPTION
PWR	SET	Following a system cold start.
	CLR	This indication will be shown for approximately 20 seconds following a power-up from a cold start.
WARMING	SET	High Stability Reference (HSR) is cold.
	CLR	Upon HSR reaching stable temperature.
LOGGED	SET	(SAT-906) Following successful log-on to a GES. (SAT-906B) Following successful log-on to available satellite services.
	CLR	Ten seconds following successful log-on.
SEARCH	SET	Upon initiation of the log-on search.
	CLR	(SAT-906) Upon successful selection of a SAT ID and GES ID. (SAT-906B) Upon successful log-on to available satellite services. NOTE: After successfully logging onto a GES, the SDU then attempts to log onto the high-speed services as appropriate. The SEARCH inactive advisory would continue to be displayed until all services are logged onto.
WAITING	SET	While in the WAITING USER INPUT state at log-on. This advisory indicates that the SDU is awaiting user input to proceed with the log-on process.
	CLR	Upon entry of a SAT ID/GES ID or selection of AUTO LOG* from the WAITING USER INPUT state.
LOW GAIN	SET	Low gain antenna is in use, in dual HGA/LGA installation.
	CLR	High gain antenna is in use, or AES not configured as a dual HGA/LGA installation.
NO CABIN	SET	While cabin calls are disabled due to SATCOM MAIN MENU 2/2 selection of 3R.
	CLR	When cabin calls are enabled due to selection of 3R (MAIN MENU 2/2) at power-up.

**INACTIVE ADVISORIES
TABLE 2-1 (SHEET 2)**

Active advisories inform the operator of a condition requiring attention or that a function is available. The active advisories are displayed adjacent to 6R and pushing that key will perform the action listed in the following table. There are four active advisory messages that can be composed of up to seven characters.

In the event that the conditions causing the setting of an active advisory are detected while the SDU is not active on any MCDU, the indication SATCOM<REQ> (SATCOM required) will appear on the MCDU main menu.

The active advisories listed in Table 2-2 are in descending order of precedence (with RESUME* having the highest priority).

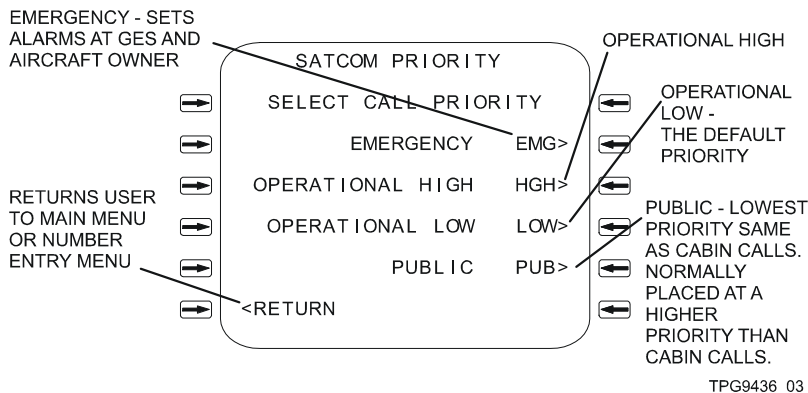
NOTE

Active advisories may overwrite existing selections in 6R.

TEXT	COND	DESCRIPTION
RESUME*	SET	Shown in conjunction with the MAINT inactive advisory if the SDU has been placed in maintenance mode.
	SEL	Selection of RESUME* will cause the display to show CONFIRM*.
	CLR	Selection clears advisory.
LOG-ON>	SET	The log-on search process is awaiting operator command to continue log-on.
	SEL	Displays the SATCOM LOG MENU.
	CLR	Selection of LOG-ON> or entry onto the LOG menu clears the advisory.
CALL>	SET	Ground initiated voice call received by the SDU awaiting cockpit crew answer.
	SEL	Causes the SATCOM MAIN MENU to be displayed so that the call may be answered.
	CLR	Upon answer or rejection of ground initiated call.
		<u>NOTE</u> : CALL> advisory is never displayed on the SATCOM MAIN MENU.
CONFIRM*	SET	Upon selection of RESUME* when in maintenance mode (not shown in flight mode).
	SEL	Causes the SDU to end maintenance mode operation and transition to in-flight mode operations. The SATCOM MAIN MENU will be displayed upon resumption.
	CLR	Selection clears advisory. Any key push other than the selection of 6R will cause the advisory RESUME* to appear.

**ACTIVE ADVISORIES
TABLE 2-2**

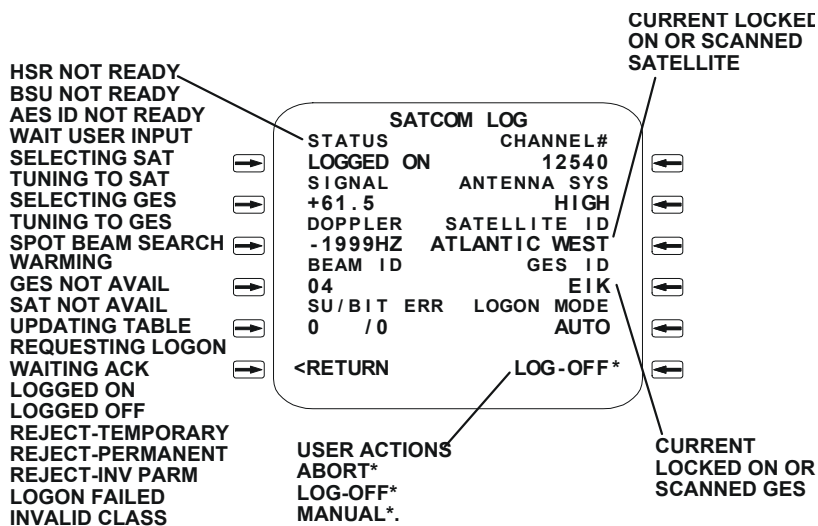
SATCOM PRIORITY Page



SATCOM PRIORITY PAGE
FIGURE 2-5

- **EMG (2R)** — Selecting 2R will cause the emergency (1) priority to be associated with the call label on the MAIN MENU or the NUMBER ENTRY page if the priority page is entered from the NUMBER ENTRY page. The priority is temporary if the PRIORITY page is entered from the MAIN MENU.
- **HGH (3R)** — Selecting 3R will cause the operational high (2) priority to be associated with the call label on the MAIN MENU or the NUMBER ENTRY page if the priority page is entered from the NUMBER ENTRY page. The priority is temporary if the PRIORITY page is entered from the MAIN MENU.
- **LOW (4R)** — Selecting 4R will cause the operational low (3) priority to be associated with the call label on the MAIN MENU or the NUMBER ENTRY page if the priority page is entered from the NUMBER ENTRY page. The priority is temporary if the PRIORITY page is entered from the MAIN MENU.
- **PUB (5R)** — Selecting 5R will cause the public (4) priority to be associated with the call label on the MAIN MENU or the NUMBER ENTRY page if the priority page is entered from the NUMBER ENTRY page. The priority is temporary if the PRIORITY page is entered from the MAIN MENU.
- **RETURN (6L)** — Selecting 6L will return the user to the menu that the priority page was selected from, either the SATCOM MAIN MENU or the NUMBER ENTRY page.

SATCOM LOG Page



TPG9436_04

SATCOM LOG PAGE
FIGURE 2-6

- **ACTION (6R)** — Selecting 6R will cause the displayed action to be performed.

ABORT*

This action is displayed during the search portions of log-on. Selection of 6R while ABORT* is displayed will result in the AES aborting the search. The AES will go to the WAIT USER INPUT state.

LOG-OFF*

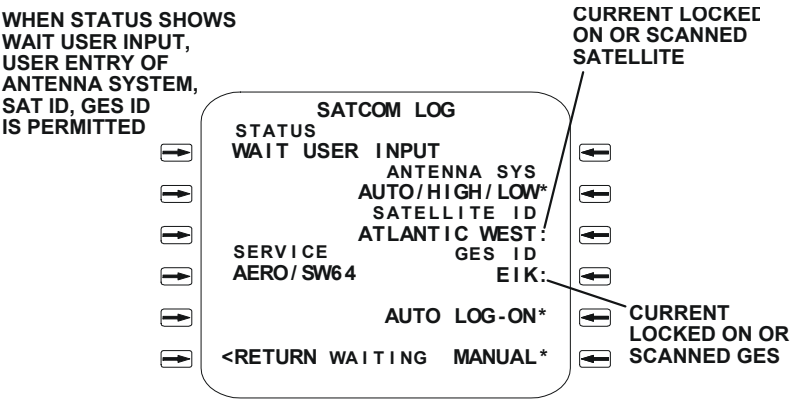
This action is possible from the REQUESTING LOGON, WAITING ACK (acknowledge), or LOGGED ON state. Selection of 6R while LOG-OFF* is displayed will cause the AES to go to the WAIT USER INPUT state. If the AES was in the LOGGED ON state at time of selection, the AES will perform a log-off to the GES.

CAUTION

PRIOR TO POWER DOWN OF THE AES, THE USER SHOULD LOG-OFF THE CURRENT GES.

MANUAL*

This action is displayed while the SDU is in the WAIT USER INPUT state. Selection of 6R will start a manual log-on using the displayed SATID, GESID, and antenna selection.



TPG9436_05

SATCOM LOG MENU (WAITING USER INPUT STATE)
FIGURE 2-7

- **STATUS (1L)** – Log-on status is displayed next to 1L. The following status messages are displayed under the conditions described.

HSR NOT READY

Displayed while the log-on process is being delayed due to the high stability reference (HSR), of the RFU, indicating a warm-up condition.

BSU NOT READY

This status is shown if the log-on process is delayed due to the BSU being in self-test. This is only shown if the HSR is warm.

AES ID NOT READY

This status is shown if the AES is awaiting a valid aircraft ID.

WAIT USER INPUT

This status is shown while the AES is awaiting input from the user and is shown with the WAITING inactive advisory. The WAIT USER INPUT state is entered under any of the following conditions: (1) if the log-on policy in the owner's preference table is USER COMMANDED at power up, (2) if a user commanded log-on has failed for any reason, (3) if the AES receives a log-on reject due to a permanent unavailability, or (4) if the user has selected LOG OFF* or ABORT*.

When in this state, the Satellite/GES field adjacent to 3R can be edited by the user. Also, AUTO LOG-ON* will be displayed adjacent to 5R, and MANUAL* is displayed next to 6R. For SAT-906, the user may manually select a Satellite/GES for manual log-on or may select AUTO LOG-ON* (5R) which causes the AES to select a GES according to preferences entered in the GES preference table. For SAT-906B, the user may manually select a Satellite/GES for manual log-on or may select AUTO LOG-ON* (5R) which causes the AES to select the most preferred satellite per the Service Selection Priorities (from the Owner's Requirements Table) and then the preferred Satellite/GES per the GES preference table. As the user selects the satellite (3R), the services associated with that satellite are displayed adjacent to 4L. Antenna selection is available in both manual and automatic log-on modes, if both high- and low-gain antenna systems are installed.

SELECTING SAT

Displayed while the AES selects a satellite.

TUNING TO SAT

Displayed while the AES tunes to and scans reception from the selected satellite.

SELECTING GES

Displayed while the AES selects a GES.

TUNING TO GES

Displayed after the selected satellite has been proven acceptable and while the AES tunes to the selected GES.

SPOT BEAM SEARCH

Displayed while the SDU is determining the optimal spot beam for log-on.

GES NOT AVAIL

Displayed if the AES is in USER COMMANDED mode and the user selected GES is not referenced in the GES data table.

WARMING

This status is shown for a few seconds after power up until the readiness of the HSR can be determined.

SAT NOT AVAIL

Displayed if the AES is in USER COMMANDED mode and the user selected satellite cannot be received.

UPDATING TABLE

Displayed while the AES is updating system tables.

REQUESTING LOGON

Displayed after the AES has selected a GES and sent a log-on request. The AES will wait for a log-on confirm from the GES.

WAITING ACK

Displayed after the AES has received the log-on confirm (plus any additional P/R/T-Channel control signal units), and has sent a log-on acknowledge to the GES. The AES is waiting for log-on acknowledge from the GES.

LOGGED ON

Displayed after the AES has successfully logged onto a GES. While in the LOGGED ON state, the LOG-OFF* actions will be available. For the SAT-906B systems, after successfully logging onto a GES, the AES then attempts to log onto the high-speed services as appropriate. The SEARCH inactive advisory would continue to be displayed until all services are logged onto.

LOGGED OFF

Displayed after the AES has begun the log-off process and before going to the WAIT USER INPUT state.

REJECT-TEMPORARY

REJECT-PERMANENT

REJECT-INV PARM

These statuses are shown to indicate the cause of a rejected log-on attempt. If the attempt was to a manually selected GES, the AES will go to the WAIT USER INPUT state and continually display the cause. If the attempt was to an automatically selected GES, and the type of reject is permanent, the log-on process will continue with the next selected GES and the failed GES will not be attempted again for one hour. If the reject type was temporary or invalid parameters, the GES may be tried again on the ensuing log-on attempt.

LOGON FAILED

Displayed if log-on to a user selected Satellite/GES has failed and no cause code is available for display (for instance, if the failure was due to signal loss). The cause codes for a failure to establish a call are generated by the GES. If the log-on fails and it is not possible to receive messages from the GES, no cause codes are available.

INVALID CLASS

Displayed if insufficient resources are available to the system to support any of the four International Maritime Satellite Organization (INMARSAT) defined AES classes.

- **SIGNAL (2L)** — Signal quality is displayed next to and below 2L. The signal quality range is 00.0 to 99.9. Typical values are within the 10.0 to 60.0 range. Under normal flight conditions if the value is below 38, some degradation of the quality of voice communications may be heard. The number 38 is an approximation. Degradation of the quality of voice

communications may occur at values greater than 38 due to edge of coverage or low altitude flight conditions. If the value is below 23, low speed data will continue to be received but may require additional time to get acknowledgement through the Aircraft Communications Addressing and Reporting System (ACARS). The number 23 is also an approximation. If no P-Channel is being received, this field shows 00.0. Signal quality is based on the ratio of the signal plus noise to the estimated noise of the received P-Channel. Signal quality is not displayed while in the WAIT USER INPUT state.

The signal quality number must be equal to or greater than 35 for voice communications and when it is above 35 voice calls may be made. The higher the signal quality number, the more calls will be available. A good signal quality number is 50 - 60. If signal quality is below 35, only ACARS communications will be possible. A signal quality value below 35 would indicate a failure of the high gain HPA, or antenna system, or no Inertial Reference System (IRS) data available. If during the log-on process, a signal quality number of 50 or greater is observed, and the signal quality drops to 35 or less after log-on, then the GES may have assigned a low power P-channel or high-speed P-channel (10.5 kbps) at log-on. This will not affect the number of voice calls that may be made but reduces the power that is used for ACARS communications. This change in signal quality does not affect the ability to make voice calls. This number is only a monitor of the P-channel signal. Also, the signal quality and operation of P-channel is within design specifications, so no reduction in ACARS data operation should be seen.

- **DOPPLER (3L)** — Doppler correction in Hz is displayed next to 3L. Doppler correction is not displayed while in the WAIT USER INPUT state.
- **BEAM ID (4L)** — The Beam ID is a decimal representation, range 0-63 as displayed next to 4L. This item is not displayed while in the WAIT USER INPUT state.
- **SU/BIT ERRORS (5L)** — The number of raw bit errors is displayed adjacent to 5L. This number is normally 0 (zero) during conditions that can support voice operations. Low-speed communications will continue should this number increase to as high as 200. The raw bit error number is not displayed while in the WAIT USER INPUT state.

NOTE

The active advisory LOG-ON> will appear adjacent to 6R when the log-on status is WAIT USER INPUT and the MCDU is displaying another page. Selection of 6R in those cases will display the SATCOM LOG ON menu. A GES may be selected from the SATCOM LOG ON menu.

- **CHANNEL# (1R)** — The channel number locked onto or being scanned by the SDU is displayed adjacent to 1R. Display is a decimal representation in

the range 8 000 – 19 600. Channel number is not displayed while in the WAIT USER INPUT state.

- **ANTENNA SYS (2R)** — The antenna subsystem in use is displayed next to 2R. In a high gain only installation, this display will always indicate the high gain antenna is selected. Similarly, in a low gain only installation, this display will always indicate the low gain antenna is selected.

When both high and low gain antenna systems are installed and the system is in the WAIT USER INPUT state, the user is allowed to select the antenna subsystem mode. The available modes are high gain only, low gain only, or automatic selection. These modes are displayed as AUTO/HIGH/LOW with the current selection in the large font. Selecting 2R will cause the next antenna subsystem selection mode to be selected.

When only one antenna system (high or low) is installed and the system is in the WAIT USER INPUT state, the label above 2R and the antenna subsystem display will be suppressed. The label and subsystem installed will be displayed in all other log-on states.

Antenna selection mode will be initialized to automatic at power-up.

In all other log-on modes, the display will reflect the current system in use. If the antenna selection mode is automatic, the word auto will be displayed. The potential displays, during all log-on modes, except WAIT USER INPUT, are HIGH, LOW, AUTO HIGH, and AUTO LOW.

- **SATELLITE ID (3R)** — SAT ID, as currently locked onto or being scanned by the SDU, is displayed adjacent to 3R. Satellite ID is displayed as the name of the satellite region. Table 2-3 shows the satellite region name and an octal representation, range 00 - 76, with labels assigned to octal 0 through 3 (00 - Atlantic west, 01 - Atlantic East, 02 - Pacific, 03 - Indian, 04 - MTSAT, 05 - AsiaPac, 06 - EMEA, 07 - Americas). When in the WAIT USER INPUT state, a colon (:) prompt is displayed and selecting 3R will cycle through the available satellite regions. This will also cause the GES displayed next to 4R to be set to the first GES available in that satellite region. Selection 6R (MANUAL*) will start a manual log-on to the specified satellite and GES. When in any other state, the satellite ID numbers will be displayed without the colon (:) prompt, and will not be available for user entry.
- **GES ID (4R)** — GESID, as currently locked onto or being scanned by the SDU, is displayed next to 4R. The GESID is represented in octal, range 00 - 376 or by a text label. The GESID is displayed as a text label, unless the label is unknown. If the GESID label is unknown, then the GESID is displayed as an octal value. Refer to table 2-3. While the AES is in the TUNING TO SAT portion of the log-on process, the GESID is displayed as dashes. While in the WAIT USER INPUT state, a colon (:) prompt is displayed and selecting 4R will cycle through the available GESIDs within

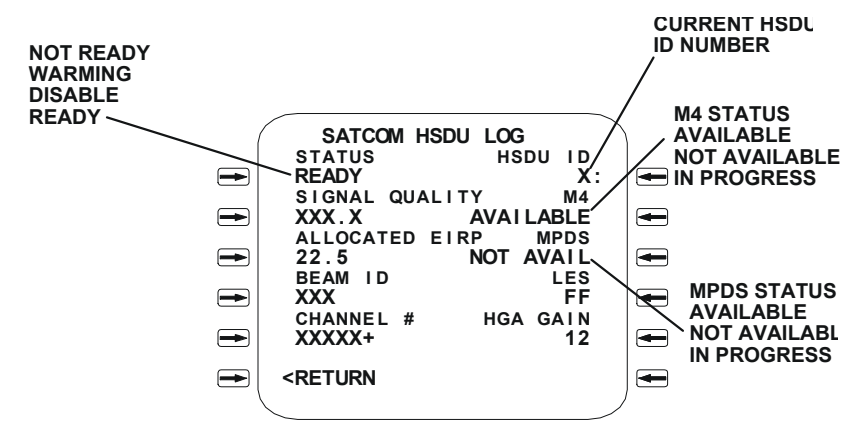
the selected satellite region. Selecting 6R (START MANUAL) will start a manual log-on to the specified satellite and GES. When in any other state, these numbers will be displayed without the colon (:) prompt and will not be available for user entry. The user may select a GES other than the currently logged-on GES to place a call. In effect, this selection allows the user to log-on to a second GES through the currently logged-on GES.

- **LOGON MODE (5R)** — In SAT-906, the log-on mode is displayed adjacent to 5R, except when the log-on status is WAIT USER INPUT. Mode is displayed as either AUTO or USER COMMANDED. Log-on mode is initialized per the owner's preference table. When log-on mode is AUTO, the AES will select the most preferred Satellite/GES per the GES preference table. In SAT-906B, when the log-on mode is AUTO, the AES will select the most preferred satellite per the Service Selection Priorities (from the Owner's Requirements Table) and then the preferred Satellite/GES per the GES preference table.
- **RETURN (6L)** — Selection of 6L will return the MCDU to display the page shown previous to entering the log-on page. The log-on page can be selected from the SATCOM MAIN MENU 2/2 page.

SATELLITE REGION	GES ID
ATLANTIC WEST (00)	002 - EIK 005 - AUSSAGUEL
ATLANTIC EAST (01)	103 - AUSSAGUEL 104 - EIK
PACIFIC (02)	202 - SANTA PAULA 205 - PERTH
INDIAN (03)	301 - EIK 305 - PERTH
MTSAT (04)	161 - KOBE
ASIA-PAC (05)	120 - PAMAULU
EMEA (06)	220 - FUCINO
AMERICAS (07)	320 - PAMAULU

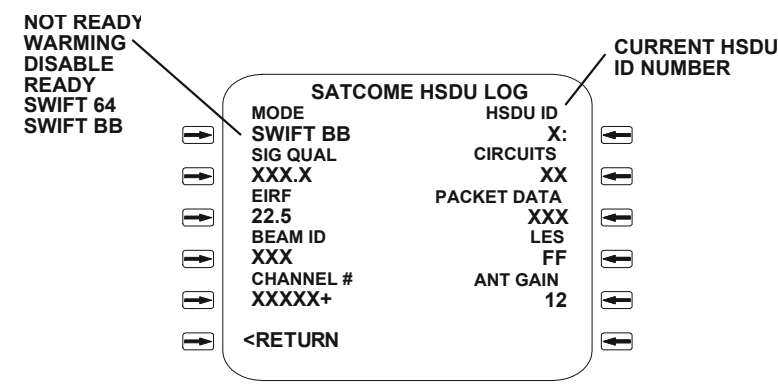
**GESID AND SATELLITE REGION
TABLE 2-3**

SATCOM HSDU LOG Page



TPH0029_01

SATCOM HSDU LOG PAGE (SAT-906)
FIGURE 2-8



TPK3730_01

SATCOM HSDU LOG PAGE (SAT-906B)
FIGURE 2-9

- SAT-906 STATUS (1L)** – Log-on status is displayed next to 1L. The following status messages are displayed under the conditions described.

- **SAT-906B MODE (1L)** — Log-on mode is displayed next to 1L. The following mode messages are displayed under the conditions described.

NOT READY

Displayed when High Speed Data Unit (HSDU) is connected but no services are available and it is not in a warming condition.

WARMING

This status is shown when HSDU is in the warming up.

DISABLE XXXX

This log-on status is displayed when the SDU indicates that the HSDU is disabled, and where xxxx is the reason code. If the reason for the HSDU being disabled is unknown the code shown is 0000. The HSDU reason codes are listed below.

<u>Code</u>	<u>Reason</u>	<u>Code</u>	<u>Reason</u>
0000	No error this HSDU	0100	HPA no HST power
0001	Crosstalk bus inactive (HSDU-to-SDU)	0200	Burst count no HST power
0002	Crosstalk bus inactive (SDU-to-HSDU)	0400	HST reported greater than allocated
0004	Data transmission failure	0800	HPA no HST activity
0008	Single HPA increase	1000	Zero attenuation adjust
0010	Multiple HPA increase	2000	Max attenuation adjust
0080	Invalid HST configuration		

READY

This status is shown when HSDU is ready for use.

SWIFT 64 (SAT-906B)

This status is displayed when the HSDU is SwiftBroadband capable, the Operating Mode indicates Swift64 In Use, and is not set to any of the states that follow – WARMING, NOT READY, or DISABLE.

SWIFT BB (SAT-906B)

This status is displayed when the HSDU is SwiftBroadband capable, the Operating Mode indicates SwiftBroadband In Use, and is not set to any of the states that follow – WARMING, NOT READY, or DISABLE.

- **SIGNAL (2L)** – Signal quality is displayed next to and below 2L. The signal quality range is 0 to 102.3 in dBHz. If no signal quality estimate is available this field shows 0.
- **ALLOCATED EIRP (3L)** – The field indicates the amount of EIRP allocated to the HSDU in dBw. The range is 0 to 31.5 dBw.
- **BEAM ID (4L)** – The beam ID is a decimal representation, range 0-255 as displayed next to 4L.

- **CHANNEL # (5L)** — The channel number displayed is a decimal representation of the frequency number. The display range is from 0 to 32767, but the HSDU normally limits the range to 8000-19 600.
- **HSDU ID Select (1R)** — The HSDU ID is displayed adjacent to R1. If more than one HSDU is installed a colon is displayed and selection of R1 displays data for the next HSDU.
- **M4 Status (2R) (SAT-906)** — M4 status is displayed next to 2R. The following status messages are displayed under the conditions described.

AVAILABLE

This indicates that the HSDU is logged on to the M4 network and there is enough EIRP available to the system to place or receive M4 calls, or an M4 circuit is currently established.

IN PROG

This indicates that a M4 call is in progress.

NOT AVAIL

This indicates that M4 service is not available.

- **CIRCUITS (2R) (SAT-906B)** – The number of circuit mode connections currently in use, including Swift64 MISDN connection and SBB Circuit Switch connections, displayed adjacent to 2R.
- **MPDS Status (3R) (SAT-906B)** – MPDS status is displayed next to 3R. The following status messages are displayed under the conditions described.

AVAILABLE

This indicates that the HSDU is registered with the ground network and there is enough Effective Isotropic Radiated Power (EIRP) available to the system to support MPDS traffic, or an MPDS circuit is currently established.

IN PROG

This indicates that a MPDS call is in progress.

NOT AVAIL

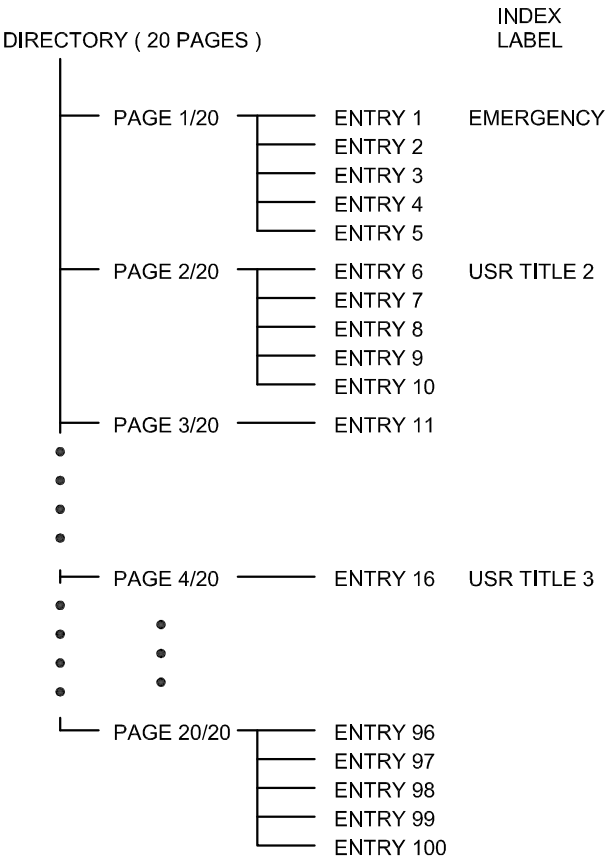
This indicates that MPDS service is not available.

- **Packet Data (SAT-906B) (3R)** – The number of packet mode connections currently in use, including Swift64 MPDS connections and SBB primary and secondary PDP contexts, is displayed adjacent to 3R.
- **LES Number (4R)** – The Land Earth Station (LES) number is displayed next to 4R and it represents the LES ID number. The value is displayed as a hexadecimal number with a range of 00 to FF.
- **HGA GAIN (5R)** – HGA antenna gain is displayed next to 5R.
- **RETURN (6L)** – Selection of 6L will return the MCDU to display the page shown before entering the Log-on page.

SATCOM Directory Pages

The directory pages provide selection and entry of telephone numbers and priorities for SATCOM call placement. The directory index provides a user defined title for selected pages of the directory and quick access to those pages. Refer to figure 2-9.

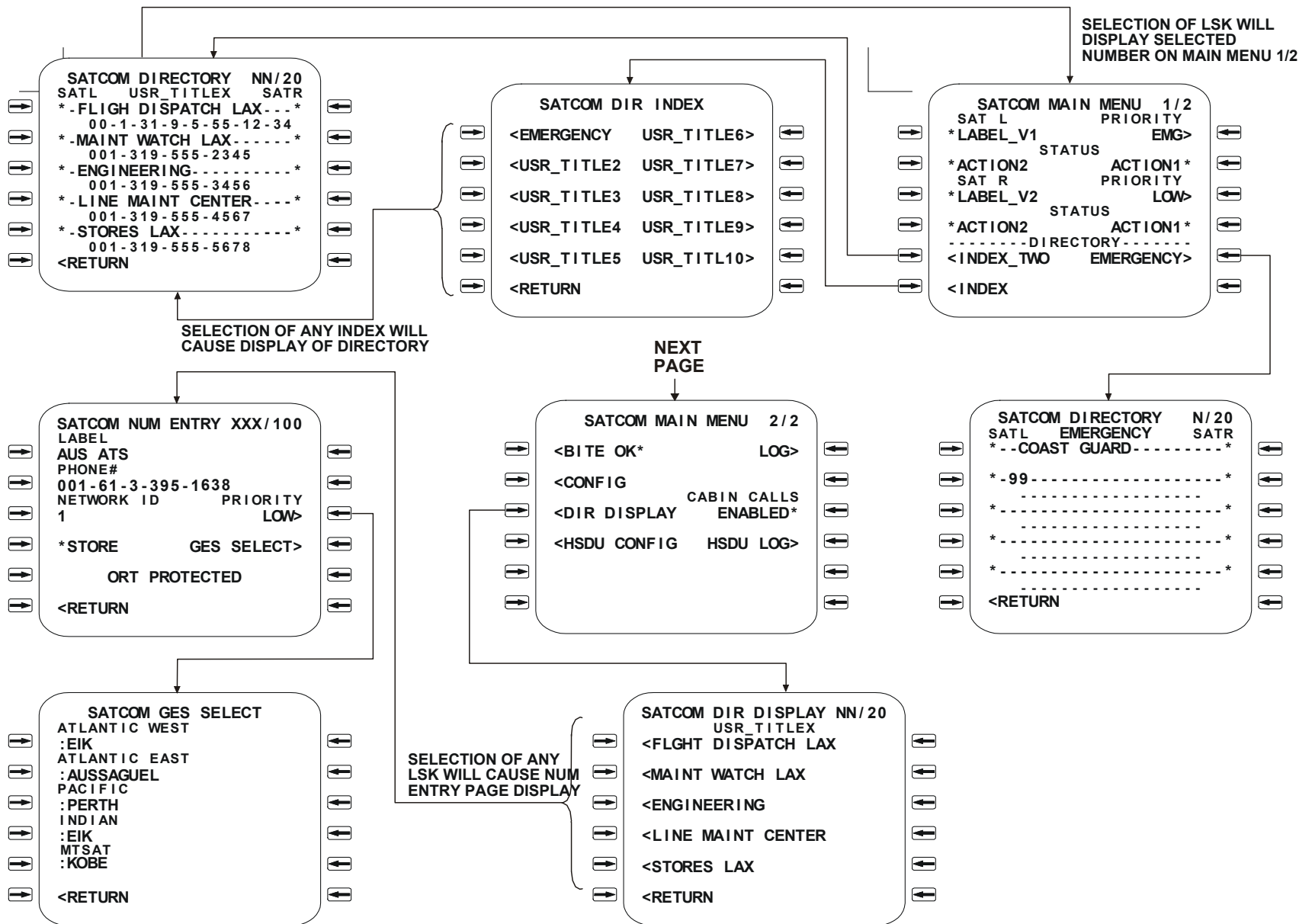
In multiple MCDU installations, calls can be initiated (or answered) on any MCDU.



TPG9696_01

DIRECTORY PAGES
FIGURE 2-10

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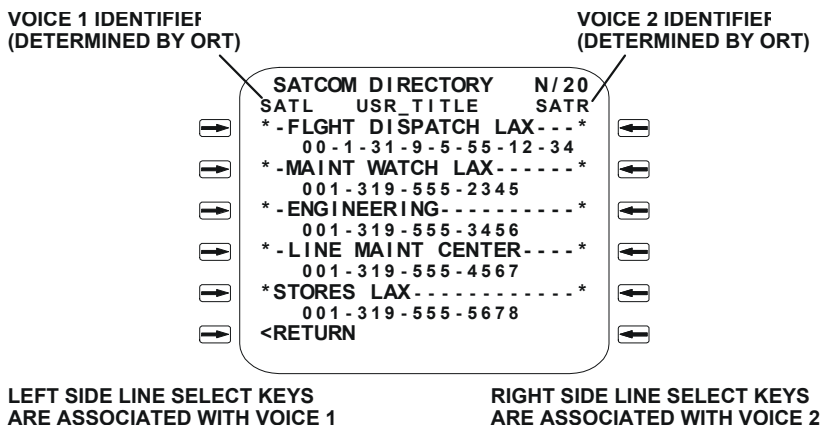
TPG9463_01

DIRECTORY MENU MAP
FIGURE 2-11

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SATCOM DIRECTORY N/20 Page

This page displays the labels for each of the phone numbers entered in the SATCOM Directory. Five labels are shown on this page. As many as 100 labels/numbers may be stored in the SATCOM directory. When functions consisting of multiple pages are displayed, the current page and total number of pages are displayed on the first line as N/X. Where N is the current page number and X is the total number of pages (for example, 1/20=page 1 of 20). Selection of NEXT PAGE via the MCDU will increment the value of N and will display the next SATCOM directory page.



TPG9436_06

SATCOM DIRECTORY N/20
FIGURE 2-12

- **1L THRU 5L** — Selection of line select keys 1L through 5L will cause the selection of the associated label for use on voice 1. Selection of any line select key will cause the display of the SATCOM MAIN MENU 1/2 page.
- **1R THRU 5R** — Selection of line select keys 1R through 5R will cause the selection of the associated label for use on voice 2. Selection of any line select key will cause the display of the SATCOM MAIN MENU 1/2 page.
- **RETURN (6L)** — Selection of 6L will return the display to the page shown before entering the SATCOM DIRECTORY page. No call actions are taken other than updating the index displays next to 5L on the SATCOM MAIN MENU. The last accessed index name is remembered for each MCDU.

If a particular directory entry is in the process of being edited (by a different MCDU), then the line below the label will display ENTRY BEING EDITED instead of the telephone number.

If a voice channel is not in use (does not have a call in progress and one of the incomplete call cause codes is not displayed), then a star prompt (*) will be displayed and selection of a line select key will cause the MCDU to display the SATCOM MAIN MENU with the indicated call label selected for possible call placement. An ORT option (IMMEDIATE CALL ON SELECTION ENABLE) allows the call to be initiated immediately when a new label is selected. If this option is selected and the voice channel is in use, the voice channel star prompts (*) will not be displayed.

Selection of NEXT PAGE or PREV PAGE on the MCDU will display the next or previous sequential SATCOM DIRECTORY page, respectively. If the new directory page is associated with a different index area than the previous displayed page, the index name will be updated. The new index name will also be updated on the SATCOM MAIN MENU next to 5L, if the new index name is not the first index name. The first index name is already displayed next to 6L. Selection of 5L from the SATCOM MAIN MENU will cause the display of the first directory page associated with that index name.

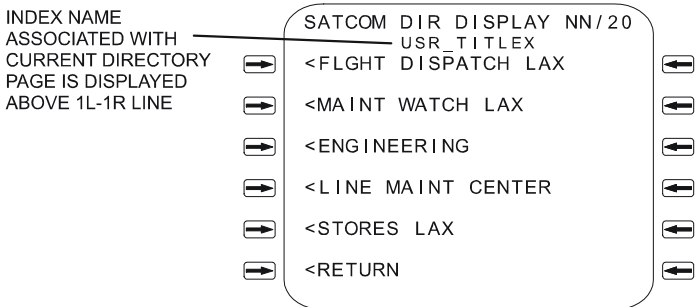
Uninitialized numbers will be displayed as dashes.

SATCOM DIR DISPLAY NN/20 Page

This page displays the labels for each of the phone numbers entered in the SATCOM directory. Five labels are shown on this page. As many as 100 labels may be stored in the SDU.

Selection of NEXT PAGE will display the next sequential SATCOM DIRECTORY DISPLAY page. The index name will change if the displayed page is from a different index area. The index name displayed next to 5L on the SATCOM MAIN MENU page is not affected by operations from the SATCOM DIRECTORY DISPLAY page or SATCOM NUMBER ENTRY pages.

- **1L THRU 5L** — Selection of 1L through 5L will cause the display of the SATCOM NUMBER ENTRY page containing the entry selected. Uninitialized labels will be displayed as dashes.
- **RETURN (6L)** — Selection of 6L will return the display to the SATCOM MAIN MENU 2/2 page. The index name of the last SATCOM DIRECTORY DISPLAY page displayed will be remembered for each available MCDU.

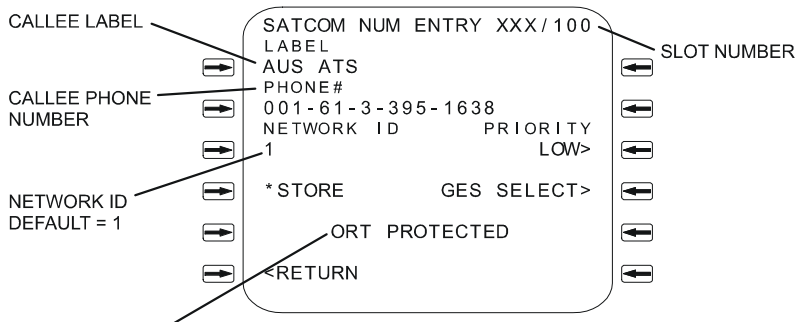


TPG9436_07

SATCOM DIR DISPLAY NN/20 PAGE
FIGURE 2-13

SATCOM NUM ENTRY Page

This page provides entry of call address labels and phone numbers. If an uninitialized label is selected, the appropriate number of dashes will be displayed in each field.



ORT PROTECTED-PAGE FIELDS ARE PROTECTED.
ENTRY BEING EDITED - PAGE FIELDS ARE NOT PROTECTED.

TPG9436_08

SATCOM NUMBER ENTRY PAGE
FIGURE 2-14

- **LABEL (1L)** — The label for the callee is displayed adjacent to 1L. Labels may contain as many as 18 characters. Prior to entry, this field will display dashes.
- **PHONE# (2L)** — The phone number associated with the callee is displayed adjacent to 2L and is kept in the directory table. The phone number consists of the international call prefix (00), the country code, a city or area code, and the telephone number. Characters, for example dashes and spaces, may be used to separate fields in the number. Maximum field length will be 20 characters and may contain as many as 17 numeric characters.
- **NETWORK ID (3L)** — The network ID for the callee is entered via 3L. Network ID is displayed in decimal range 0-15. The default value is 1.
- **PRIORITY (3R)** — Selection of 3R will cause the display of the SATCOM - PRIORITY page. Priority will be displayed in either numeric or alphabet text depending upon the option selection. Operational Low (OPNL LOW) is the default priority and should generally be used. Cockpit calls are placed at a higher priority than cabin calls. A call placed at an EMERGENCY priority will set off alarms at the GES. The owner of the aircraft will be called and told of an aircraft in emergency priority.

- **STORE (4L)** — Selection of 4L when *STORE is shown will enter the call information as displayed into the number table. When data is modified for an entry, *STORE will be displayed. *STORE will continue to be displayed until the modification data has been entered into nonvolatile memory. Prior to modification, DELETE will be displayed.
- **DELETE (4L)** — Selection of 4L when *DELETE is shown will cause the display of *CONFIRM next to 5L. Selection of 5L (*CONFIRM) will delete the call information from the number table.
- **GES SELECT (4R)** — GES preferences for call placement are entered via 4R. Selection of 4R will cause the display of the SATCOM GES SELECT page. Call placement will be attempted using the entered GES when logged on in the associated satellite region.
- **RETURN (6L)** — Selection of 6L will return the display to the SATCOM DIRECTORY page that contains the entry for the number last accessed.

Selection of NEXT PAGE or PREV PAGE on the MCDU will display the next or previous sequential SATCOM DIRECTORY page, respectively.

The fields displayed on the SATCOM NUMBER ENTRY page are considered protected if any of the following conditions exist.

- The ORT protection level applied to the telephone directory table is set to protected.
- The SDU is in the in-flight mode, and the mode of operation selected via the SATCOM OPTIONS page is label only.
- The selected number entry is already being edited by another MCDU.

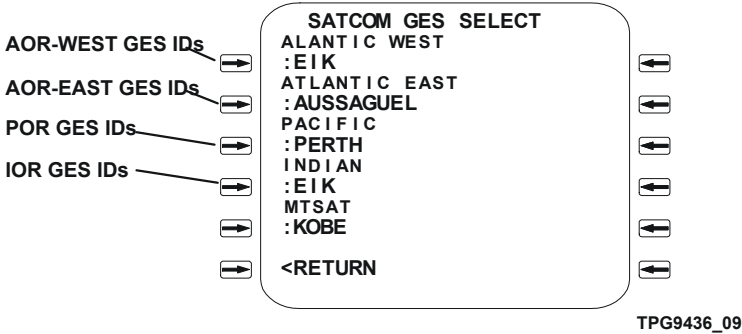
If the ORT telephone table protection level is set to protected/modifiable, the entry or deletion of data will cause the word MOD to be displayed on the SATCOM CONFIG menu next to the ORT part number.

When protected, the fields will be displayed one column indented and will not be available for user entry. One of the following messages will be displayed between 5L and 5R, informing the user of the reason the entry is protected.

- ORT PROTECTED
- ENTRY BEING EDITED.

SATCOM GES SELECT Page

This page is selected from the NUMBER ENTRY page, and allows the user to enter the preferred GES for the call to be placed. Call placement will be attempted using the entered GES when logged on in the associated satellite region.



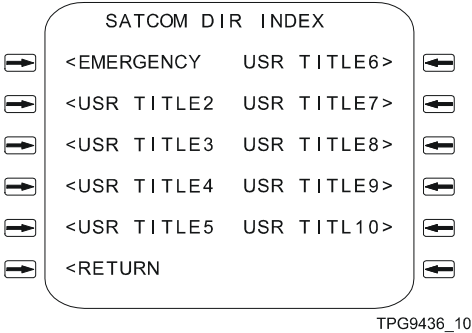
SATCOM GES SELECT PAGE
FIGURE 2-15

- **ATLANTIC WEST (1L)** — Selecting 1L will sequentially toggle through the list of Atlantic Ocean Region WEST (AORW) associated GES IDs contained in the system tables. Also included in the list is the selection LOG ON GES, which indicates the log-on GES will be used.
- **ATLANTIC EAST (2L)** — Selecting 2L will sequentially toggle through the list of Atlantic Ocean Region EAST (AORE) associated GES IDs contained in the system tables. Also included in the list is the selection LOG ON GES, which indicates the log-on GES will be used.
- **PACIFIC (3L)** — Selecting 3L will sequentially toggle through the list of Pacific Ocean Region (POR) associated GES IDs contained in the system tables. Also included in the list is the selection LOG ON GES, which indicates the log-on GES will be used.
- **INDIAN (4L)** — Selecting 4L will sequentially toggle through the list of Indian Ocean Region (IOR) associated GES IDs contained in the system tables. Also included in the list is the selection LOG ON GES, which indicates the log-on GES will be used.
- **MTSAT (5L)** — Selecting 5L will sequentially toggle through the list of MTSAT Region Associated GES IDs contained in the system tables. Also included in the list is the selection LOG ON GES, which indicates the log-on GES will be used.

- **RETURN (6L)** — Selection of 6L will return the display to the NUMBER ENTRY page. The last GES preference displayed will be the GES selected for use on the NUMBER ENTRY page.

SATCOM DIR INDEX Page

This page displays the user defined index names and allows quick access to those pages of the directory. Selection of the line select key next to the one of the index names will cause the MCDU to display the first directory page associated with that index name. If an entry has not been initialized, no display will appear next to the appropriate line select key.



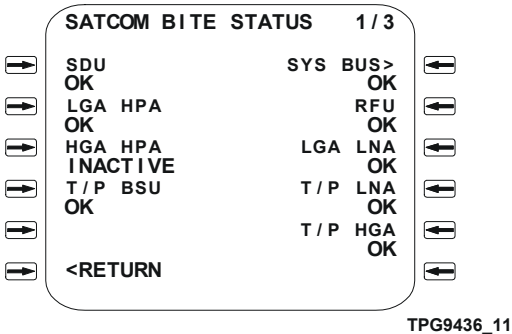
SATCOM DIR INDEX PAGE
FIGURE 2-16

SATCOM BITE STATUS

The Built-in Test Equipment (BITE) status menus provide display of built-in test results from each of the individual Line Replaceable Units (LRU) and subassemblies of the SATCOM system.

SATCOM BITE STATUS 1/3 Page

The three BITE STATUS pages provide indication of the fault status of the SATCOM LRU. Fault status is determined from the fault summary words sent to the Central Maintenance Computer (CMC).

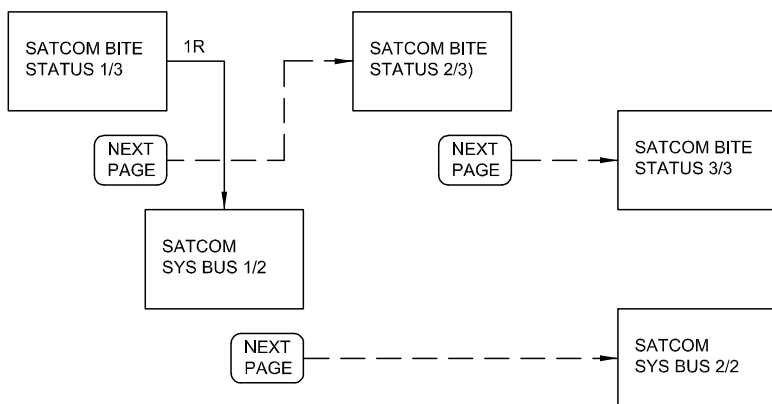


SATCOM BITE STATUS 1/3 MENU
FIGURE 2-17

- SDU (1L)** — SDU status is reported adjacent to and below 1L. Status is reported as either OK or FAULT.
- LGA HPA (2L)** — LGA HPA status is displayed adjacent to and below 2L. Status is reported as OK, FAULT, INACTIVE, or NONE.
- HGA HPA (3L)** — HGA HPA status is displayed adjacent to and below 3L. Status is reported as OK, FAULT, INACTIVE, or NONE.
- T/P BSU (4L)** — Top/Port BSU status is displayed adjacent to and below 4L. Status is displayed as OK, FAULT, TEST, INACTIVE, or NONE.
- SYS BUS (1R)** — Selection of 1R will display the SATCOM SYS BUS 1/2 menu. The status of system buses is displayed adjacent to and below 1R. Status is reported as OK or INACTIVE.
- RFU (2R)** — RFU status is reported adjacent to and below 2R. Status is reported as OK, FAULT, INACTIVE, or NONE.

- **LGA LNA (3R)** — Low Gain Antenna Low Noise Amplifier (LGA LNA) status is displayed adjacent to and below 3R. Status is reported as OK, FAULT, or NONE.
- **T/P LNA (4R)** — Top/port LNA status is displayed adjacent to and below 4R. Status is displayed as OK, FAULT, or NONE.
- **T/P HGA (5R)** — Top/port HGA status is displayed adjacent to and below 5R. Status is reported as OK, FAULT, or NONE.
- **RETURN (6L)** — Selection of 6L will return display to the SATCOM MAIN MENU.

Selection of the NEXT page function key on the MCDU will display the SATCOM BITE STATUS 2/3.

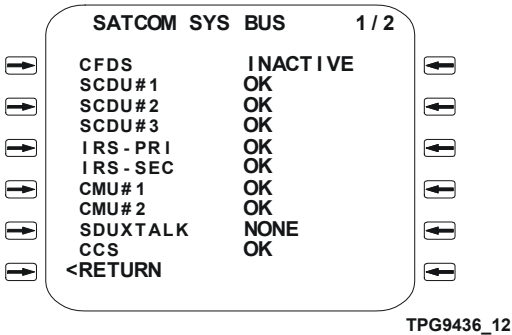


TPG9462_01

**SATCOM BITE STATUS MENU MAP
FIGURE 2-18**

SATCOM SYS BUS 1/2 Page

The bus activity status of LRU communicating to/from the SATCOM system is provided by this page. Bus activities are indicated as OK, INACTIVE, or NONE. The status OK versus INACTIVE is determined according to the criteria used for the fault summary words sent to the CMC. NONE will be shown when the rear connector strapping options indicate a unit is not installed.



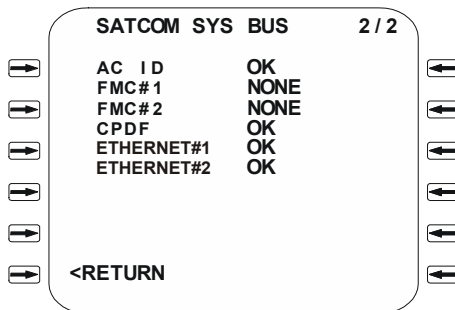
SATCOM SYS BUS 1/2 PAGE
FIGURE 2-19

IRS bus status will be declared as OK, NO DATA, INACTIVE, or NONE. OK will be indicated if all required IRS data is present on the bus with sign/status matrix of NORMAL. INACTIVE will be indicated according to the criteria used for bus activity words to the On-Board Maintenance System (OMS). NO DATA will be indicated if the bus is considered active but not all required data is present with sign/status matrix of NORMAL. NONE is shown when the rear connector strapping options indicate the unit is not installed. Selection of the NEXT PAGE function key will display the SATCOM SYS BUS 2/2 page. CCS is Cabin Communication System.

- RETURN (6L)** — Selection of 6L will return display to the SATCOM BITE STATUS 1/3 page.

SATCOM SYS BUS 2/2 Page

The bus activity status of LRUs communicating to/from the SATCOM system is provided by this page. Bus activities are indicated as OK, INACTIVE, or NONE. OK versus INACTIVE is determined according to the criteria used for the bus activity words sent to the OMS. The status NONE will be shown when the rear connector strapping options indicate a unit is not installed. Selection of the NEXT PAGE function key will display the SATCOM SYS BUS 1/2 page.



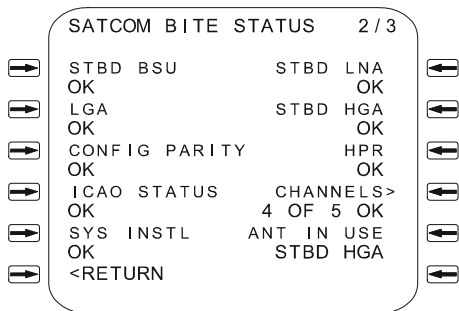
TPG9436_13

SATCOM SYS BUS 2/2 PAGE
FIGURE 2-20

The CPDF (Cabin Packet Data Function) activity shown between 2L and 3L will indicate OK only if the SDU is receiving the proper bus words from the CPDF and the CPDF is receiving the proper bus words from the SDU.

- **RETURN (6L)** — Selection of 6L will return display to the SATCOM BITE STATUS 1/3 page.

SATCOM BITE STATUS 2/3 Page



TPG9436_14

SATCOM BITE STATUS 2/3 PAGE
FIGURE 2-21

- **STBD BSU (1L)** — Starboard BSU status is displayed adjacent to and below 1L. Starboard BSU status is reported as OK, FAULT, TEST, INACTIVE, NO DATA, or NONE.
- **LGA (2L)** — Low gain antenna status is displayed adjacent to and below 2L. LGA Status is reported as OK, FAULT, or NONE. LGA status is determined via LGA HPA Voltage Standing Wave Ratio (VSWR) status.
- **CONFIG PARITY (3L)** — Rear connector configuration parity status is displayed adjacent to and below 3L. If parity of pins is odd, OK is reported, otherwise, FAULT is displayed.
- **ICAO STATUS (4L)** — ICAO address status is displayed adjacent to and below 4L. ICAO address status will be displayed as INVALID or OK.
- **SYS INSTL (5L)** — Status of the following system faults determine the fault state displayed next to 5L: TX RFU/HPA CABLE FAULT, TX RFU/LGA HPA CABLE FAULT, SDU TX COMB/CABLE FAULT, and RFU/SDU/RX CABLE FAULT. If no system faults are detected, OK is reported, otherwise FAULT is displayed.
- **STBD LNA (1R)** — Starboard LNA status is displayed adjacent to and below 1R. Starboard LNA status is reported as OK, FAULT, or NONE.
- **STBD HGA (2R)** — Starboard HGA status is displayed adjacent to and below 2R. Starboard HGA status is reported as OK, FAULT, or NONE.
- **HPR (3R)** — High power relay status is displayed adjacent to and below 3R. HPR status is reported as OK, FAULT, or NONE.

- **CHANNELS (4R)** — Channel module status is indicated adjacent to and below 4R. Selection of 4R will display the SATCOM H/W CONFIG page. The line below 4R will display the number of functional channel modules and the total number of installed modules.
- **ANT IN USE (5R)** — The currently selected antenna subsystem is displayed adjacent to and below 5R. Possible selections displayed are LGA, STBD HGA, T/P HGA, and NONE. NONE is displayed if the AES cannot be made operational with either antenna. This could be due to a detected failure or if the configuration program pins are wired to indicate an invalid combination of available antennas and supported services.
- **RETURN (6L)** — Selection of 6L will return the display to the SATCOM MAIN menu. Selection of the PREV page function key, on the MCDU, will display the BITE STATUS menu 1/3.

SATCOM BITE STATUS 3/3 Page

Status of the data loaded in the Owner's Requirements Table (ORT) is reported adjacent to and beneath 1L. The following are valid status messages:

Default	No ORT loaded using default values.
OK	ORT is valid.
Invalid	The ORT must be reloaded.

The calculated cable loss between the RFU and HGA HPA is displayed adjacent to and below 2L.

NOTE

The cable loss value is estimated at power-up and is updated to reflect the calculated loss only after the system has transmitted.

- **RFU/HPA (2L)** The calculated cable loss between the RFU and HGA HPA is displayed next to 3L.

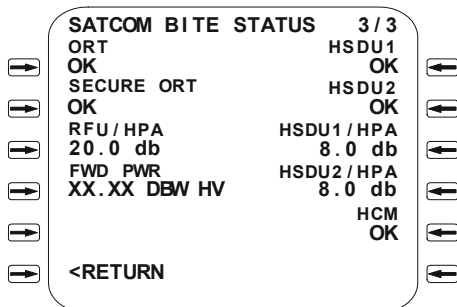
NOTE

This value is estimated at power up and will be updated to reflect the calculated loss only after the system has transmitted.

- **FWD PWR (4L)** – The current or most recently transmitted reported HPA power is displayed next to 4L. The displayed units are reported in dB Watts. If the unit is not transmitting any carriers, an H is displayed indicating held power. If one or more antennas are indicating a VSWR fault, then V will be displayed.
- **HSDU1** – Status of High Speed Data Unit (HSDU) 1 is reported adjacent to and beneath 1R. The status is reported as OK, FAULT, TX PATH, DISCRETE, RX PATH, DISABLE, OVER TEMP or INACTIVE.
- **HSDU2** – Status of High Speed Data Unit (HSDU) 2 is reported adjacent to and beneath 2R. If HSDU2 is not installed, the line adjacent to and below R2 will be blank. The status is reported as OK, FAULT, TX PATH, DISCRETE, RX PATH, DISABLE, OVER TEMP or INACTIVE.
- **HSDU1/HPA** – The calculated cable loss between the HST and HPA is displayed adjacent to and below 3R.
- **HSDU2/HPA** – The calculated cable loss between the HST and HGA HPA is displayed adjacent to and below 4R.

- **(SAT-906B) HCM** - Status of the HCM is displayed adjacent to and below 5R. When HSDU1 is installed, the 5R label HCM and status is displayed. Otherwise, the R5 label and status is blank. The status is reported as FAULT, INACTIVE, NONE, OK, or - - (two dashes).
- **RETURN (6L)** — Selection of 6L will return the display to the SATCOM MAIN menu.

Selection of PREV PAGE function key, on the MCDU, will cause the display of the SATCOM BITE STATUS 2/3 menu.

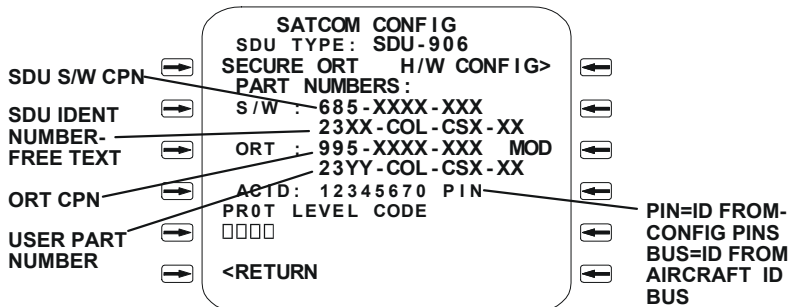


TPG2778_03

**SATCOM BITE STATUS 3/3 PAGE
FIGURE 2-22**

SATCOM CONFIG Page

This page provides system configuration information for the SDU-906.



* SECURE ORT (1L) - IF AVAILABLE SELECTION OF 1L WILL DISPLAY THE SECURE ORT PAGE.

TPG9436_15

SATCOM CONFIG PAGE
FIGURE 2-23

- **H/W CONFIG (1R)** — Selection of 1R will result in the SATCOM H/W CONFIG page being displayed.
- **PROT LEVEL CODE (5L)** — Protected level code and the entry boxes will only be displayed when the SDU is not logged on. Selection of 5L will display the SATCOM RESET page, when the protected level code is in the scratchpad and when entry is allowed.

NOTE

The protected level code can only be entered when the AES is not logged on to a GES and is for use by ground maintenance personnel only.

CAUTION

ENTERING THE PROTECTED LEVEL WILL DISRUPT NORMAL OPERATION OF THE SATCOM SYSTEM.

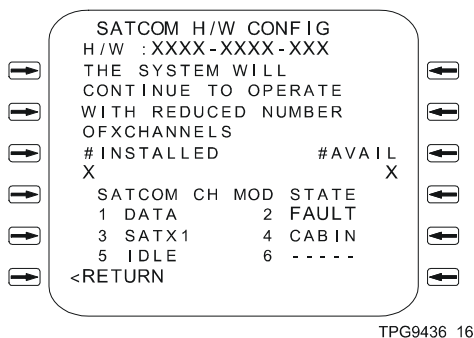
- **RETURN (6L)** — Selection of 6L will return display to the SATCOM MAIN MENU.

SATCOM H/W CONFIG Page

This page is used to identify the hardware configuration of the SDU. The page is entered via the selection of 1R from the SATCOM CONFIG page. The top level hardware part number of the SDU is displayed above 1L. The number of SATCOM channels installed is displayed below 3L. The number of SATCOM channels available is displayed below 3R.

The status of each channel module is displayed. The possible statuses are:

- IDLE – channel module ready, but not in use
- VOICE 1/SAT 1/VOICE L/SAT L – in use by audio channel 1
- VOICE 2/SAT 2/VOICE R/SAT R – in use by audio channel 2
- DATA – channel module in use for P/R/T channel
- CABIN – channel module in use by cabin
- FAULT – channel module failure has been detected
- - - - - - – channel module has not been installed.



**SATCOM H/W CONFIG PAGE
FIGURE 2-24**

The text appearing between 1L and 1R and above 3L and 3R will only be displayed when one or more of the channel modules have a displayed status of FAULT.

- **RETURN (6L)** — Selection of 6L will return the display to the SATCOM CONFIG page.

SATCOM HSDU CONFIG Page 1/2

SATCOM HSDU CONFIG 1/2
HSDU ID

PART NUMBERS

T/L: XXXXXXXXXXXX

S/N: XXXXXXXXXXXXXXXX

S/W: XXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXX

ORT: XXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXX

FID: XXXXXXXX

FID: XXXXXXXX

<RETURN

TPK4090_01

SATCOM HSDU CONFIG Page 1/2

This page provides system configuration for the HSDU.

- **PART NUMBERS (1L)** The 12 digit (including 2 dashes) HSDU top level (T/L) Collins part number shall be displayed adjacent and below 1L.
- **S/N (2L)** The 15 digit HSDU serial number shall be displayed adjacent to 2L.
- **S/W (below 2L)** The 12 digit (including 2 dashes) HSDU software Collins part number is displayed adjacent and below 2L.
- **3L** The 15 digit HST-2110B software Collins part number is displayed adjacent to 3L.
- **ORT (below 3L)** The 12 digit (including 2 dashes) HSDU ORT Collins part number shall be displayed adjacent and below 3L.
- **4L** The 15 digit HSDU ORT ARINC 665 part number is displayed adjacent to 4L.
- **FWID (below 4L and 5L)** The 7 digit FWID is displayed adjacent and below 4L.

If the HSDU is a single channel unit, the 7 digit FWID is displayed adjacent and below 4L.

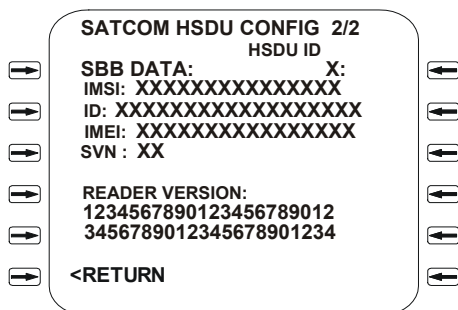
If the HSDU is a dual channel unit, the 7 digit FWID of the first channel is displayed adjacent and below 4L.
The 7 digit FWID of the second channel is displayed

adjacent to 5L.

- **HSDU ID (1R)** The HSDU ID is displayed adjacent to 1R. If more than 1 HSDU is installed, a colon is displayed and selection of the 1R shall display data for the next HSDU, or the first HSDU (if currently viewing information about the last HSDU).
- **RETURN (6L)** select 6L will return to the SATCOM MAIN Menu.

SATCOM HSDU CONFIG Page 2/2

This page (figure 28) provides system configuration information for the USIM of the SwiftBroadband capable HSDU.



TPK4091_01

SATCOM HSDU CONFIG Page 2/2

- **SBB DATA (1L)** The 15 digit USIM IMSI number is displayed adjacent and below 1L.
- **ID (2L)** The 18 digit USIM ID part number is displayed adjacent to 2L.
IMEI The 16 digit HSDU Channel Card IMEI number is displayed adjacent and below 2L.
- **SVN (3L)** The 2 digit HSDU Channel Card SVN number is displayed adjacent to 3L.
- **READER VERSION (4L)** The 44 digit USIM reader version number is displayed adjacent and below 4L and shall wrap to the next line below it.
- **HSDU ID (1R)** HSDU ID/HSD CHANNEL is displayed

adjacent to 1R.

If more than 1 HSDU is installed or a Single HSDU/Dual SDI HSDU is installed, a colon shall be displayed and selection of 1R shall display data for the next HSDU/CHANNEL, or the first HSDU/CHANNEL (if currently viewing information about the last HSDU/CHANNEL).

NOTE: The part numbers USIM IMSI, USIM ID, and USIM Reader Version on this page shall be filled with dashes if the HSDU indicates HCM inactivity.

- **RETURN (6L)** select 6L will return to the SATCOM MAIN Menu.

Multipurpose Interactive Display Unit

The Multipurpose Interactive Display Unit (MIDU) is a Rockwell Collins DLC-800 Interactive Display Unit (IDU) programmed to emulate a two-port MCDU. As far as the SATCOM unit is concerned, the MIDU is no different from an MCDU. Since the MIDU has a touch-screen, the user interface is slightly different.

MIDU Operation

The MIDU DLC-800 has a touch sensitive display screen. All items that may be selected are indicated by inverse video on the screen. When making a selection, the area that is active is slightly larger than the inverse video block and changes to normal video with an inverse border when touched. The actual selection of the touched item does not occur until the finger is removed from the screen.

- Alpha, numeric, or other required characters are accessed from individual keyboards that appear when the selected function warrants.

Touch the NEXT or PREV page select in the bottom section of the screen to access multiple pages on SATCOM functions.

- As data is keyed, it will appear in the scratchpad at the top left of the data entry page.
- Selecting Return (RTN) at the bottom of the data entry page returns the display to the previously selected menu page. The data that is now displayed in the scratchpad display line may be moved to the appropriate data line by touching the corresponding line select key.

This page intentionally left blank.

Cockpit Voice Operation

The SDU-906 is connected to the existing cockpit audio system through the Audio Management Unit (AMU). The pilot and copilot can use existing headphone/microphone sets for placement of cockpit voice audio calls.

The cockpit audio controls may have provisions for SATCOM-1 (or SATCOM-L) and SATCOM-2 (or SATCOM-R) depending on ORT options. SATCOM voice procedures will be similar to other audio communication systems on board the aircraft. Call control will be performed using one of the cockpit MCDUs.

The MCDU provides the method to tune the radio. The pilot selects an available cockpit voice channel (VOICE-1 or VOICE-2) and the desired service (agency) using the MCDU controls. The selection is made from the SATCOM-DIRECTORY (maintained in the SDU-906 nonvolatile memory).

Currently, there are two standard cockpit audio interfaces offered for the SAT-906/906B Satellite Communications System. One interface uses the Audio Control Panel (ACP) to place a call, the second interface uses the MCDU to place a call. The interface chosen typically depends on the aircraft audio system capabilities, and is selected by the SDU configuration strapping.

Call Placement (Using The ACP)

Air-To-Ground

To place an air-to-ground call, the crew is expected to select SATCOM-1 or SATCOM-2 (if available) on the Audio Control Panel (ACP) so the progress of the call can be monitored. The SATCOM menu is then selected from the MCDU.

From the SATCOM menu, the directory entry corresponding to the desired callee is chosen. The directory entry contains the following information.

- Name of called party or organization (up to ten characters)
- Network ID
- Called address (telephone number up to 17 decimal digits)
- Preferred GES (three digits or don't-care)
 - Four entries, one for each satellite region
- Call priority - one of the following:
 - PUBLIC (4 or PUB)
 - OPERATIONAL LOW (3 or LOW)
 - OPERATIONAL HIGH (2 or HIGH)
 - EMERGENCY (1 or EMG).

The low priority level of PUBLIC is optional and is enabled from either the strapping of the SDU rear connector, or set by owner's requirements table parameters.

If a new directory entry is not selected for a particular voice channel, then the last entry selected (for that channel) will be used.

The call is initiated by selecting the desired SATCOM channel on the audio control panel. The call will be placed immediately, even if preemption is necessary.

The GES requested for the call is based on the preferred GES (if any) corresponding to the Satellite Region to which the AES is currently logged on.

If the call is established successfully, the AES will:

1. Enable the voice Coder/Decoder (CODEC).
2. Enable the audio sidetone.
3. Activate the call light for the associated channel.
4. Activate the chime (if the owner's requirements table parameters are set to activate the chime on successful call placement).

If the call is completed, the crew will hear the ringing signal generated by the ground network. No further crew action is necessary for the duration of the call.

The crew may acknowledge the call by letting ten seconds elapse since the call was established. When the call is acknowledged, the SDU-906 cancels the repetitive chimes (if necessary), and changes the flashing CALL light to continuous (if necessary).

If the called party is busy or if the ground network cannot complete the call due to network congestion, the AES will:

1. Disable the voice CODEC.
2. Generate a busy signal or network congestion signal.
3. Activate the chime if the owner's requirements table is set to activate the chime when a failure occurs.
4. Indicate the reason for call failure on the MCDU.

When a ground-to-air call is received, the SDU-906 verifies the call is destined for the cockpit crew. The AES then alerts the crew to the incoming call by:

1. Activating the call light.
2. Activating the chime.
3. Indicating a ground initiated call is available on the MCDU.

The crew may then answer the call by selecting the appropriate SATCOM MIC select on the audio control panel.

When the call is answered, the SDU will:

1. Cancel the chime (if still active).
2. Leave the CALL light on continuously.
3. Enable the voice CODEC.
4. Enable the sidetone.

The crew may also reject the call by selecting REJECT on the MCDU or by taking no action. The call will be rejected if it is not acknowledged in 120 to 240 seconds.

Call Placement (Using The MCDU)

Air-To-Ground

To place an air-to-ground call, the crew is expected to select SATCOM-1 or SATCOM-2 (if available) on the Audio Control Panel (ACP) so the progress of the call can be monitored. The SATCOM menu is then selected from the MCDU.

From the SATCOM menu, the directory entry corresponding to the desired callee is chosen. If the LABEL mode of operation is chosen, then stars (*) will be displayed next to each label. Selection of the appropriate line select will cause the MCDU to display the SATCOM MAIN MENU and the indicated call label will be selected for possible call placement. If the LABEL+# mode of operation is chosen, the indicated call label will be selected for possible call placement and will be displayed adjacent to the symbol < or >. Selection of the appropriate line select (for the desired number) will display the SATCOM NUMBER ENTRY page for the indicated callee. The directory entry contains the following information.

- Name of called party or organization (up to ten characters)
- Network ID
- Called address (telephone number up to 17 decimal digits)
- Preferred GES (three digits or don't-care)
 - Four entries, one for each satellite region.
- Call priority - one of the following:
 - PUBLIC (4 or PUB)
 - OPERATIONAL LOW (3 or LOW)
 - OPERATIONAL HIGH (2 or HGH)
 - EMERGENCY (1 or EMG).

The low priority level of PUBLIC is optional and is enabled from either the strapping of the SDU rear connector or set by the owner's requirements table parameters.

If a new directory entry is not selected, for a particular voice channel, then the last entry selected (for that channel) will be used.

The call is initiated by one of the following methods.

If sufficient system resources are available:

Push the PLACE CALL line select key on the MCDU.

OR

If sufficient system resources are not available to place the call (e.g., insufficient channel modules or HPA headroom), the MCDU will display two options: (1) PREEMPT and (2) QUEUE CALL. If the crew selects the QUEUE CALL option, the call will be placed only when sufficient resources become available. The call request will be terminated if the CALL IN QUEUE condition exists for more than ten minutes.

If the PREEMPT option is selected, a call with the lowest priority is disconnected to make sufficient resources available. The lowest priority call terminated is usually a cabin call.

The GES requested for the call is based on the preferred GES (if any) corresponding to the Satellite Region to which the AES is currently logged on.

If the call is established successfully, the AES will:

1. Enable the voice CODEC.
2. Enable the audio sidetone.
3. Activate the call light for the associated channel.
4. Activate the chime (if the owner's requirements table parameters are set to activate the chime on successful call placement).

If the call is completed, the crew will hear the ringing signal generated by the ground network. No further crew action is necessary for the duration of the call.

The crew may cancel repetitive light indicators and chimes for the call by keying the Microphone (MIC) once or by letting ten seconds elapse since the call was established. When the call is acknowledged, the SDU-906 cancels the repetitive chimes (if necessary), and changes the flashing CALL light to continuous (if necessary).

If the called party is busy or if the ground network cannot complete the call due to network congestion, the AES will:

1. Disable the voice CODEC
2. Generate a busy signal or network congestion signal.
3. Activate the chime if the owner's requirements table is set to activate the chime when a failure occurs.
4. Indicate the reason for call failure on the MCDU. The crew can acknowledge the call failure by selecting CLEAR STATUS on the MCDU.

Ground-To-Air

When a ground-to-air call is received, the SDU-906 determines the call routing (voice 1, voice 2, or cabin telecom unit). If the call is for the cockpit, the AES alerts the crew to the incoming call by:

1. Activating the call light.
2. Activating the chime.
3. Indicating a ground initiated call is available on the MCDU.

The crew may then answer the call by selecting ANSWER on the MCDU. In addition, the call may be answered by one of the following (aircraft dependent) methods.

For Boeing 777 - The call may be answered by selecting SAT MIC on the audio control panel.

For Boeing 767 - The call may be answered by selecting SATCOM MIC on the audio control panel and pushing Push-To-Talk (PTT).

For Boeing 747 aircraft, the call will be answered automatically.

When the call is answered, the SDU will:

1. Cancel the chime (if still active).
2. Leave the CALL light on continuously.
3. Enable the voice CODEC, and (4) enable the sidetone.

The crew may also reject the call by selecting REJECT on the MCDU or by taking no action. The call will be rejected if it is not acknowledged in 120 to 240 seconds.

Example (Cockpit Air-To-Ground Call)

1. From the SATCOM MAIN menu, select <DIRECTORY for Voice1 or Voice2.
2. If the desired number is seen on the directory page adjacent to a caret (<) or star (*), select the associated line select key.

NOTE

Go to step 4 if desired number is not shown.

3. From the SATCOM NUMBER ENTRY page, select the line select key associated with the message *SELECT FOR USE.
4. If the desired number is not available on the directory page, select an unused entry line (dashes displayed).
5. At the SATCOM NUMBER ENTRY page, enter an alphanumeric label for the number (ten characters maximum).

NOTE

This label will be used on the SATCOM DIRECTORY page to identify the entered number.

6. Enter the phone number using the following pattern (maximum of 20 characters).

00-CC-NNN-NUMBER

Where 00 is used as the access code for international calls, CC is the country code, and NNN is the city or area code.

NOTE

For example, country code for USA is 1, for Australia 61 and for Great Britain 44. In addition to public numbers, the operator may be accessed by entering the two digit code 92. Other short code numbers and series may be available at different GESSs.

NOTE

Spaces and dashes may be entered along with the numbers to identify the fields. The AES will ignore the spaces and dashes and send only the numbers.

7. Select the priority for the call. Cockpit calls are placed at 1 of 4 priorities: APC-CABIN (Aeronautical Public Communications-Cabin), OPNL LOW, OPNL HIGH, and EMERGENCY. OPNL LOW is the default priority and should generally be used. The low priority level of APC-CABIN is optional and is enabled from either the strapping of the SDU rear connector or set by the owner's requirements table parameters. Cockpit calls are placed at a higher priority than cabin calls. Pushing the line select key next to the current priority will scroll through the available priorities.

CAUTION

BE CAREFUL WITH SELECTING THE EMERGENCY PRIORITY. A CALL PLACED AT EMERGENCY PRIORITY WILL SET OFF ALARMS AT THE GES. THE OWNER OF THE AIRCRAFT WILL BE CALLED AND TOLD OF AN AIRCRAFT IN EMERGENCY PRIORITY.

8. Enter the network ID. The network ID defaults to 1 and should remain at 1 unless special GES services are required.
9. Select the line select key associated with the STORE message to store the number for future use. Push the line select key associated with the message *SELECT FOR USE to return to the MAIN MENU and use the number entered.
10. From the SATCOM MAIN MENU, select the line select key associated with the PLACE CALL* annunciation.
11. Select END CALL* to end the call.

Call Interruption

If a cockpit voice call is interrupted due to loss of signal, the sidetone will remain enabled. But the receive audio will be muted during the signal outage. If the call must be abandoned (because the signal is not reestablished within 40 seconds) the SDU will:

1. Disconnect the C-Channel.
2. Disable the sidetone.
3. Extinguish the CALL light.
4. Indicate the cause of the failure on the MCDU.

Call Answering

When the SATCOM system receives a ground-to-air call, the following flight deck effects occur:

- The SATCOM call light is lit,
- The chime sounds,
- A Select Calling (SELCAL) message is displayed on Engine Indication Crew Alert System (EICAS).

The cockpit crew selects the HF/SAT MIC/AUDIO pushbuttons (left or right) on the audio selector panels and selects SAT on the overhead HF/SAT XFER panel. The cockpit crew then pushes PTT to answer the call. Alternatively, the call can be answered via the MCDU, although the HF/SAT XFER and MIC/AUDIO selections still must be made.

Call Termination - AES Initiated

The crew can terminate a call or call request at any time. This includes during camp-on or call establishment, when a call is in progress, or after a call failure.

For systems using the MCDU, the call can be terminated by selecting END CALL on the MCDU or momentarily grounding the cockpit voice channel release.

For systems using the ACP, the call can be terminated by releasing the MIC ON input.

When a call is terminated, the SDU-906 will:

1. Disable any busy or network congestion tones.
2. Disable the CODEC (muting the audio).
3. Disable the sidetone.
4. Signal a disconnect to the GES.
5. Clear any repetitive chime.

The call light will be extinguished after the C-Channel has been released and the channel unit is available for a new call.

Call Termination - GES Initiated

If the GES signals a call termination, the AES will:

1. Disable the CODEC (mute the audio).
2. Disable the sidetone.
3. Complete the normal CALL DISCONNECT procedure.
4. Display the cause for call termination on the MCDU.
5. Reset any associated SATCOM and EICAS/Electronic Caution Alert Module (ECAM) display.
6. Extinguish the CALL light when the channel unit becomes available for a new call.

Cabin Voice Operation

Cabin telephone services are provided by a pair of C-Channels (transmit and receive) for each call. The SDU-906 is connected to a Cabin Telecom Unit (CTU). The SDU voice system will interface to the CTU via a Conference Européenne des Postes et Télécommunications (CEPT) E1 bus. The calling procedure allows passengers and cabin crew to set up a telephone call or receive a telephone call within the international telephone network through any GES offering telephony service.

The CTU will provide the SDU with the required information needed to set up and complete a call. To initiate an air-to-ground call, the CTU will send a SETUP message to the SDU. The SETUP message will contain called party number and credit card information, to allow the SDU to process the call.

When an air-to-ground call is considered complete, the SDU will send a CONNECT and enter the active state. Then ringing from the ground will be heard on the audio channel. In the case of a user busy event, the SDU will enter the clearing initiated by the network state and send a disconnect to the CTU. No busy tones are generated by the SDU.

If a passenger voice call is interrupted due to loss of signal, the receive audio will be muted during the outage. If the call must be abandoned (because the signal is not reestablished within 40 seconds) the SDU will disconnect the C-Channel and initiate the call clearing procedure.

Ground-to-air calling is supported by the SATCOM system, but it is not supported by all CTUs.

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Appendix A: Cause Codes

The following codes have been established to indicate to the user reasons for calls not being established. The DTMF CODE is the numbered code heard over the handset when a cause code is reported in systems using the Dual Tone Multifrequency (DTMF) telephone cockpit audio interface.

MCDU/MIDU ABBREVIATION	FUNCTION	DTMF CODE	ACTION
UNASSIGNED NUM	Unassigned number	001	The GES or Public Switched Telephone Network (PSTN) was unable to place a call with the given number. Make sure the number is entered correctly. Make sure the network ID is set correctly (1 for PSTN or as required for private network).
NO ROUT TO DSTN	No route to destination	0011 or 141	The GES or PSTN was unable to place a call with the given number. Make sure the number is entered correctly. Make sure the network ID is set correctly (1 for PSTN or as required for private network).
NORM CLEARING	Normal clearing	010 or 155 or 156	Seen at end of call. No error was detected in call termination. The user may have hung up before the AES user began talking.
USER BUSY	User busy	011 or 171	The line is busy. Call again later.
NO ANSWER	No user responding	012	The called party did not answer within a timeout from call initiation. The timeout period is typically four minutes. Try again later.
CALL REJECTED	Call rejected	015	The GES or PSTN was unable to place a call with the given number. Make sure the number is entered correctly. Make sure

MCDU/MIDU ABBREVIATION	FUNCTION	DTMF CODE	ACTION
			the network ID is set correctly (1 for PSTN or as required for private network).
DEST OUT SERV	Destination out of service	0111 or 1510	The PSTN was unable to place a call with the given number. Make sure the number is entered correctly. Make sure the network ID is set correctly (1 for PSTN or as required for private network).
INVLD FORMAT	Invalid number format	0112	The GES or PSTN was unable to place a call with the given number. Make sure the number is entered correctly. Make sure the network ID is set correctly (1 for PSTN or as required for private network).
NORM UNSPECIF	Normal, unspecified	0115 or 1511	Seen at end of call. No error was detected in call termination. The user may have hung up before the AES user began talking.
NO CHAN AVAIL	No circuit/channel available	022	This may be seen if a higher priority call is already in place that is consuming all available HPA power, or if the GES has all channel units in use. Try call again later.
NTK OUT OF ORD	Network out of order	026	This would be due to a GES failure. Try call again. If still no call placement, log-on to another GES.
EQUIP CONGEST	Switching equipment congestion	0210 or 154	The GES has all lines in use, or the GES is not assigning a channel for operation while the AES is requesting. Try call again. If still no call placement, log-on to another GES.
CHTYP NOT IMPL	Channel type	042	The GES does not support the

MCDU/MIDU ABBREVIATION	FUNCTION	DTMF CODE	ACTION
	not implemented		type of call being made. Make sure the number is entered correctly. Make sure network ID is set correctly (1 for PSTN or as required for private network). If all appear OK, log-on to another GES.
NO CHAN AVAIL	No channel available	121	Shown if the GES has all channels in use or if a channel module fails during the call. Try call again.
NO UNIT AVAIL	No channel unit available	122	Shown if the GES has all channels in use or if a channel module fails during a call. Try call again. Failed module will be removed from operation.
EQP NOT AVAIL	Data equipment not available	123 or 124	Message should not be seen in cockpit. Try call again. If still no call placement, log-on to another GES.
CT CRD NUM REJ	Credit card number rejected	131	Message should not be seen in cockpit. Try call again. If still no call placement, log-on to another GES.
INVALID ADDR	Invalid/incomplete address	132	The PSTN was unable to place a call with the given number. Make sure the number is entered correctly. Make sure the network ID is set correctly (1 for PSTN or as required for private network).
AES NOT AUTHOR	AES not authorized	142	The AES does not appear in the GES tables. Log-on to another GES.
CALLS BARRED	Incoming calls barred	143	The AES does not appear in the GES tables. Log-on to another GES.
SIGNAL LOST	Continuity	151 or	The transmitted or received

MCDU/MIDU ABBREVIATION	FUNCTION	DTMF CODE	ACTION
	failure	153 or 157 or 158 or 159	signal has been lost. Try call again.
BAD CARD TYPE	Credit card type not supported	161	Message should not be seen in cockpit. Try call again. If still no call placement, log-on to another GES.
RATE NOT SUPPT	Required rate not supported	162 or 163	Message should not be seen in cockpit. Try call again. If still no call placement, log-on to another GES.
TYPE NOT SUPPT	Voice channel type not supported	164	Message should not be seen in cockpit. Try call again. If still no call placement, log-on to another GES.
TYPE NOT SUPPT	Service type not supported	165	Message should not be seen in cockpit. Try call again. If still no call placement, log-on to another GES.
AES ABSENT	AES absent		The AES does not appear in the GES tables. Log-on to another GES.
UNDEFINE CAUSE	Undefined cause	1715	Message sent by GES when call is terminated abnormally. Try call again.
CALL ENDED	Normal Clearing		Will be shown for ten seconds following a normally ended call.
CALL PREEMPTED	Resource issue		The call was preempted due to insufficient resources at either GES or AES. Try call again.

Appendix B: Satellite Regions and GES Locations

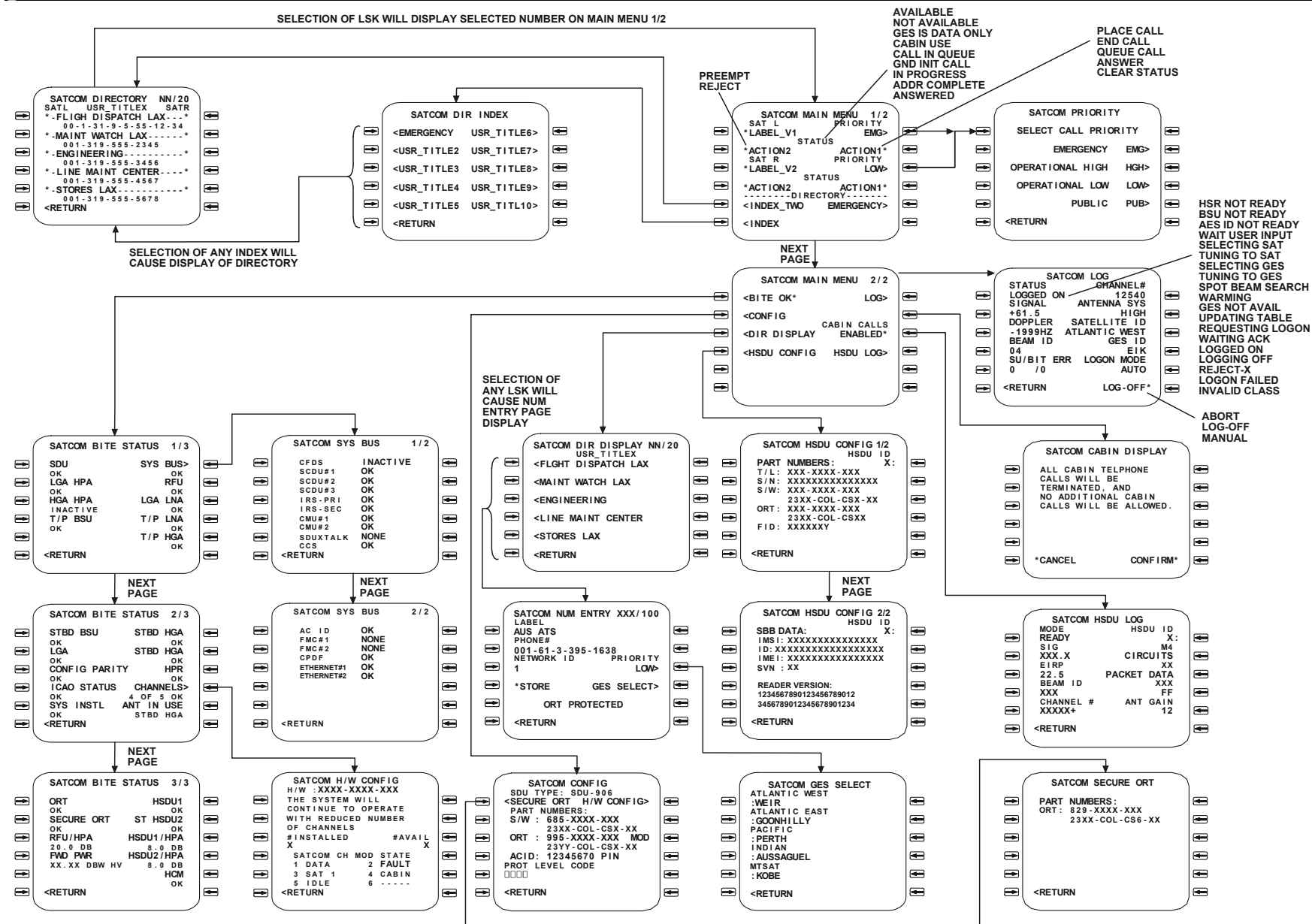
The following table shows the satellite and GES IDs at the time of publication.

SATELLITE			GES	
REGION	ID	LONGITUDE (DEG)	ID	LOCATION
AORW	00	-54	002	Eik
			005	Aussaguel
AORE	01	-15	103	Aussaguel
			104	Eik
POR	02	178	202	Santa Paula
			205	Perth
IOR	03	64	301	Eik
			305	Perth
MTSAT	04	142	161	Kobe
ASIAPAC	05	144	120	Pamaulu
EMEA	06	25	220	Fucino
AMERICAS	07	-98	320	Pamaulu

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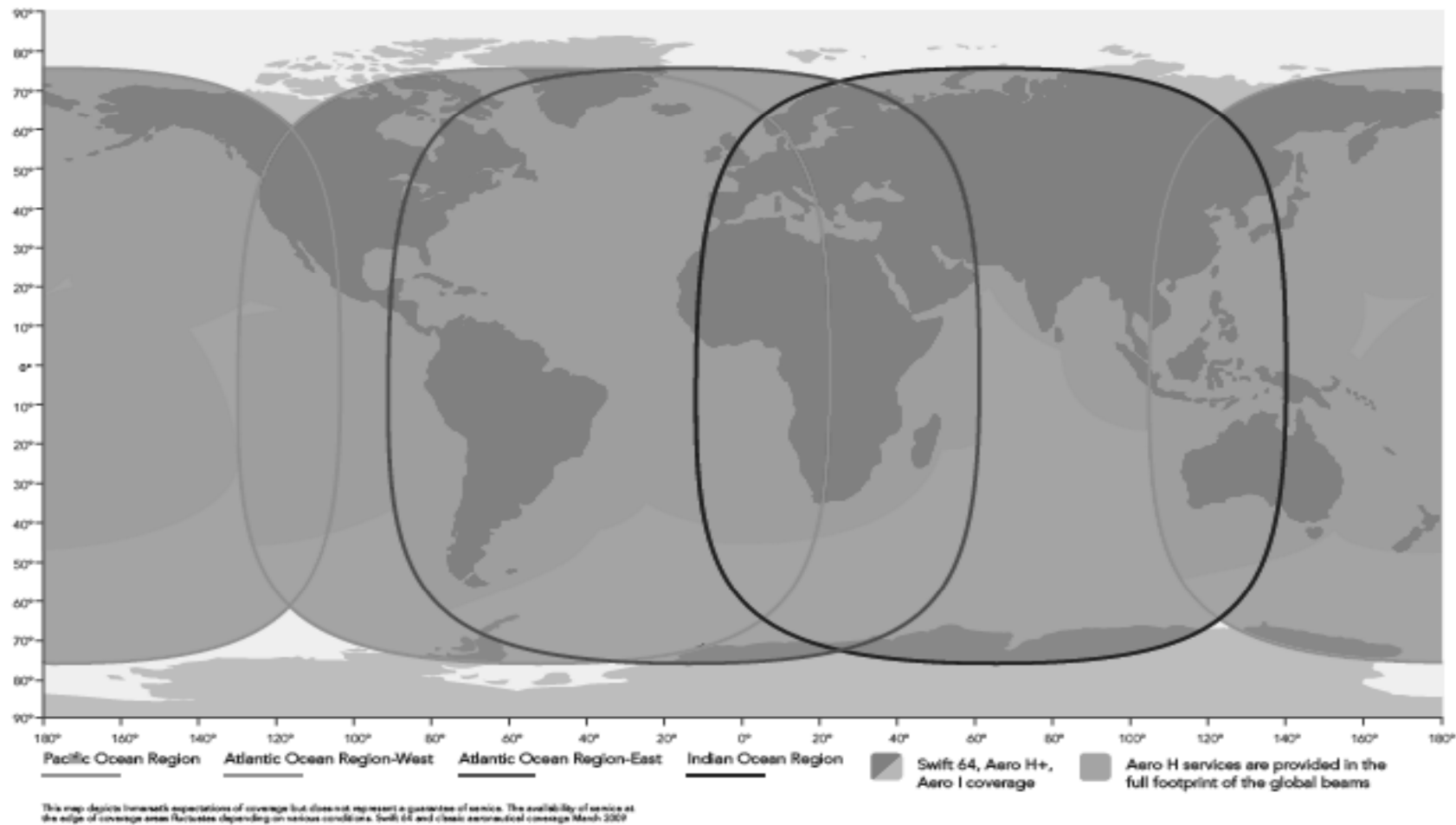


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SAT-906B

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Appendix D: Satellite Coverage Map

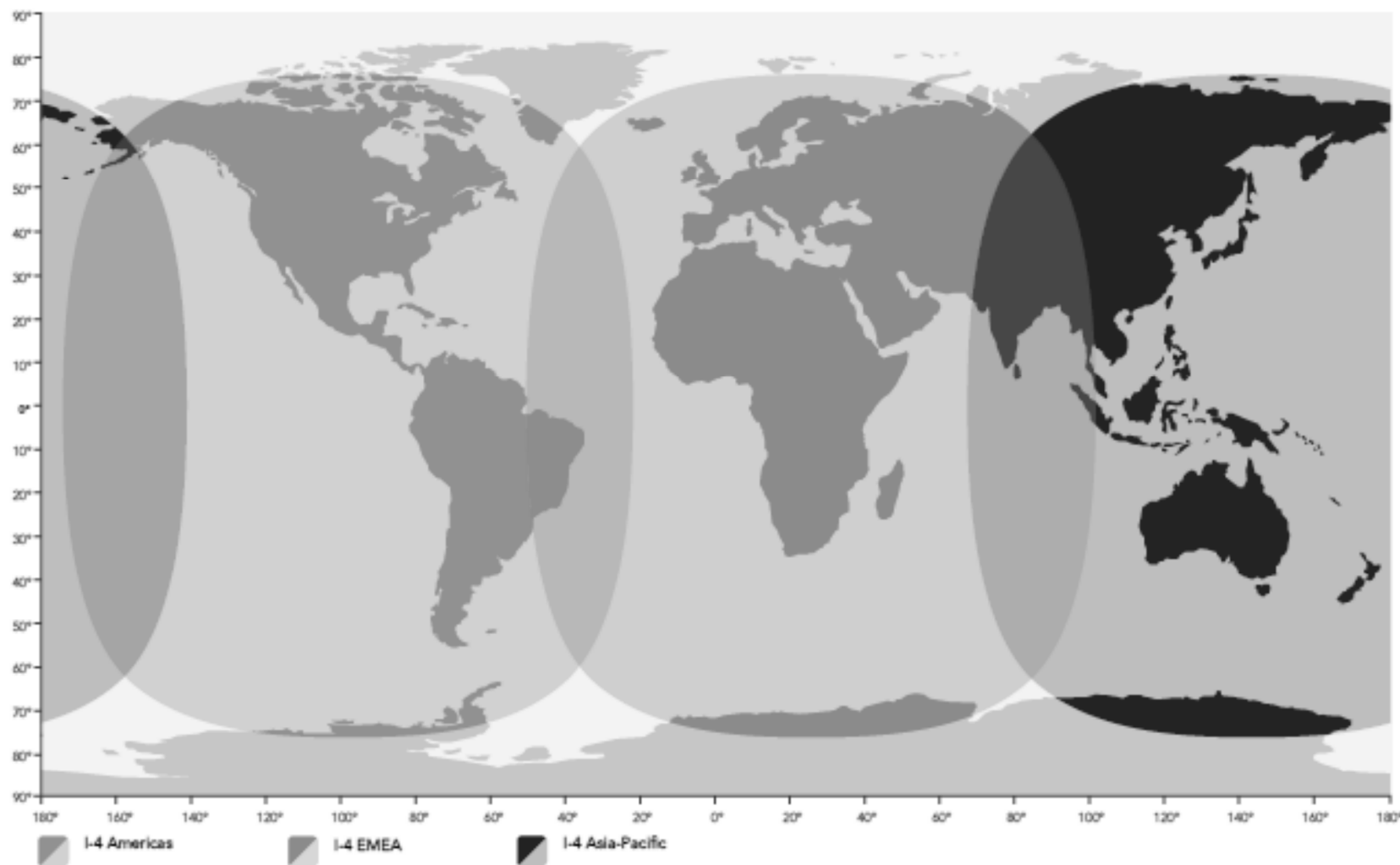


TPK3732_01

INMARSAT Swift64 & Classic Aeronautical Services Coverage

NOTE: For more information regarding Satellite location/ID and GES ID, refer to Appendix B.

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This map depicts Inmarsat's expectations of coverage, but does not represent a guarantee of service.
The availability of service at the edge of coverage areas fluctuates depending on various conditions.
SwiftBroadband coverage February 2009.

TPK3732_02

INMARSAT SwiftBroadband Coverage

NOTE: For more information regarding Satellite location/ID and GES ID, refer to Appendix B.

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Appendix E: Quick Reference Guide

Placing A Call Air-To-Ground (Using MCDU)

1. Select SATCOM-1 or SATCOM-2 (if available) on Audio Control Panel (ACP).
2. Select SATCOM menu from MCDU.
3. If the callee label is already displayed adjacent to 1L and the available action is PLACE CALL, selecting 2R will initiate the call.
4. If the desired callee label is not displayed, select <INDEX from the SATCOM MAIN MENU 1/2. From the SATCOM DIR INDEX page, select the DIR INDEX that contains the desired callee label. Upon selection of an INDEX, the SATCOM DIRECTORY page will be displayed.
5. From the SATCOM DIRECTORY page, select the name or label of the callee. If the callee is not present on one of the DIRECTORY pages, refer to quick reference procedure for adding a number to the DIRECTORY.

NOTE

If a new DIRECTORY entry is not selected, then the last entry selected (for that channel) will be used.

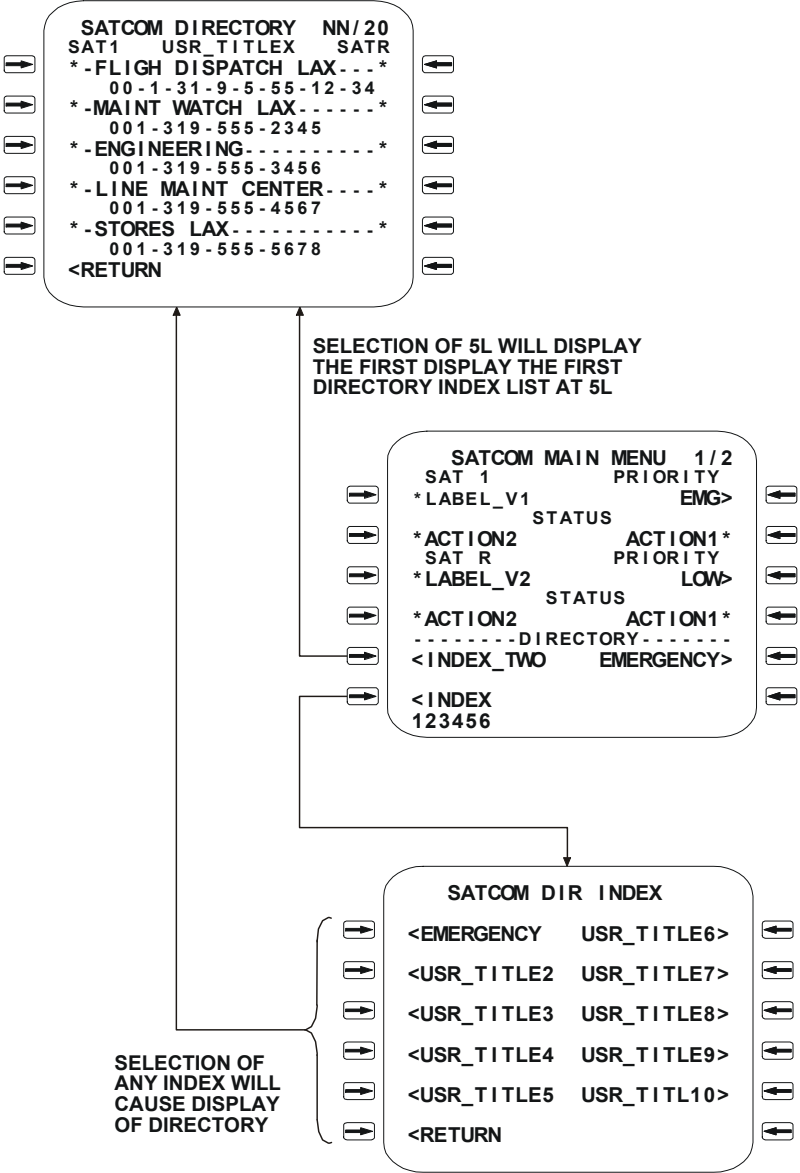
6. After selecting the label of the callee, the display will return to the SATCOM MAIN MENU. The available action (2R) displayed will be either PLACE CALL or QUEUE CALL. PLACE CALL will be displayed if resources are available. Selecting PLACE CALL (2R) will initiate the call.

If QUEUE CALL is displayed, the call will be placed only when sufficient resources become available.

NOTE

A second action is displayed at 2L. If PREEMPT* is displayed, the user can select 2L to disconnect the call with the lowest priority (usually a cabin call) to make the resources available for the cockpit call.

7. If the call is completed, the crew will hear the ringing signal generated by the ground network. No further crew action is necessary for the duration of the call.
If the call in process fails, the crew can select the action CLEAR STATUS at 2R, to acknowledge the call failure.



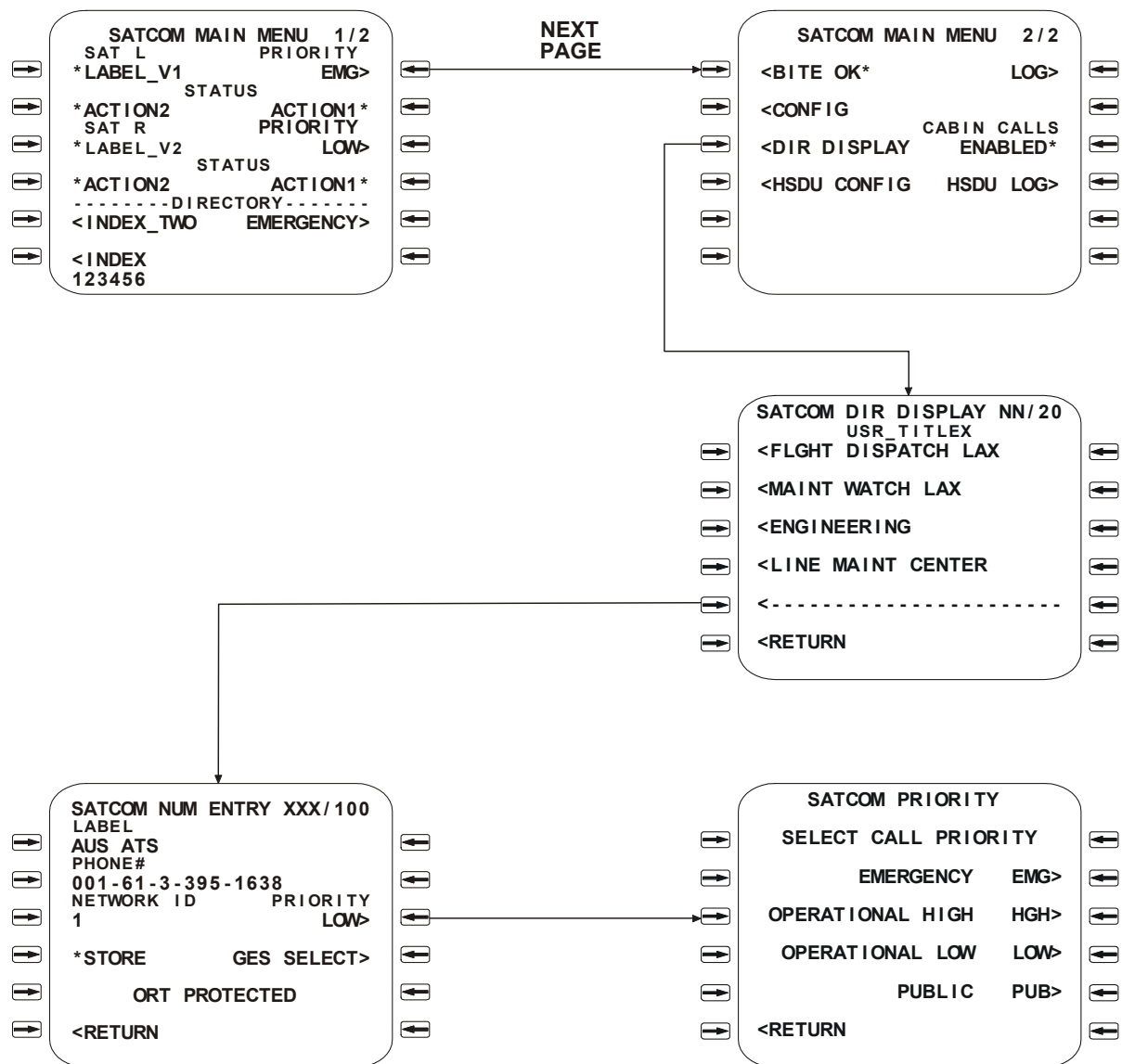
TPG9463_02

PLACING AN AIR-TO-GROUND CALL (USING MCDU)
FIGURE E-1

Adding A Phone Number To The Directory (Using MCDU)

1. Select SATCOM menu from MCDU.
2. Select <DIR DISPLAY from SATCOM MAIN MENU 2/2.
3. Select an uninitialized number (dashes displayed) from a DIRECTORY page within the desired index group.
4. Enter the phone number label or callee name into the scratchpad.
5. Select 1L to place the label or name into the label field.
6. Enter the phone number associated with the callee into the scratchpad. The number entered into the scratchpad will contain (in this order): the international prefix (00), country code, city or area code, and the number of the callee. Characters such as dashes and spaces may be used to separate the fields in the number.
7. Select 2L to place the phone number, for the callee, into the phone number field.
8. Enter the network ID for the callee in the scratchpad and place the network ID into the associated field by selecting 3L. Use a network ID of 1 for calls using the public telephone network.
9. Selecting 3R will display the SATCOM PRIORITY page. Select the priority from the list of priorities. OPERATIONAL LOW (LOW>) is the default priority.
10. If there is a preferred GES for call placement, select 4R to display the SATCOM GES SELECT page. The preferred GES in each satellite region can be selected from the SATCOM GES SELECT page. If no GES is preferred, the user may select the log-on GES and the call will be placed over the log-on GES.
11. Select 4L when *STORE is displayed to store the phone number and callee information into the DIRECTORY table.

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ADDING A PHONE NUMBER TO THE DIRECTORY (USING MCDU)
FIGURE E-2

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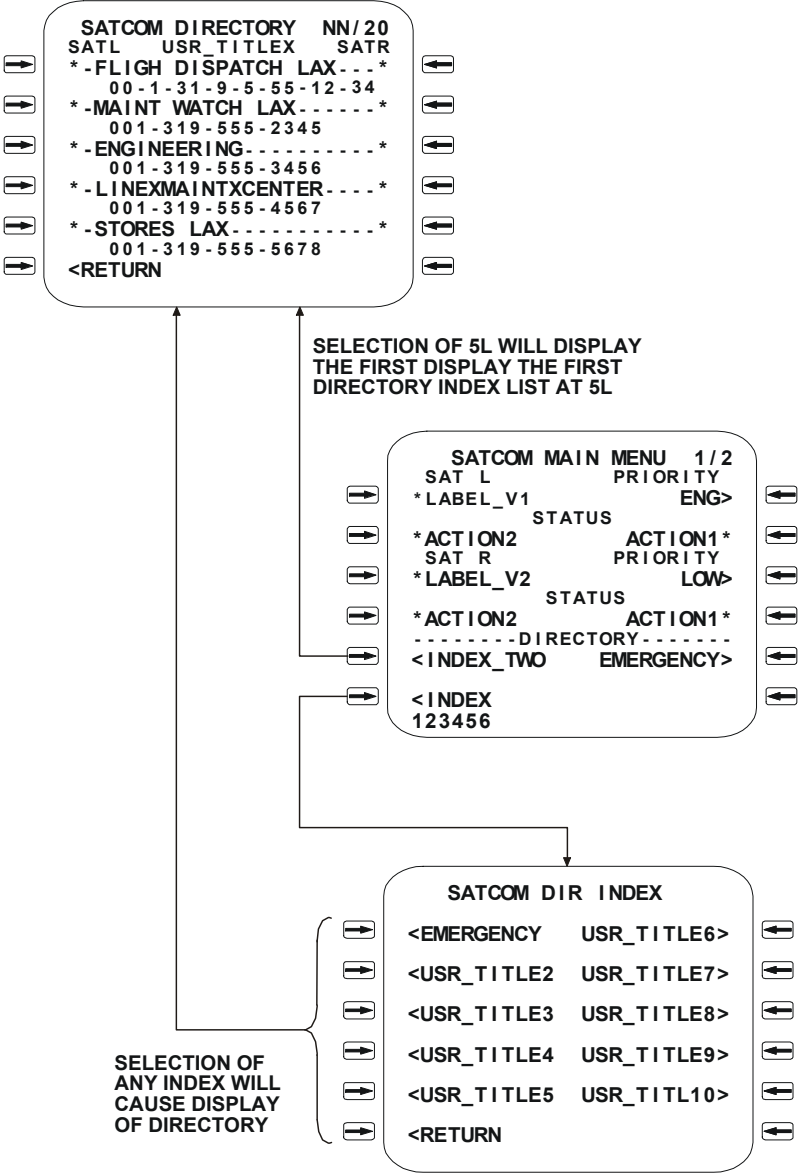
Placing A Call Air-To-Ground (Using ACP)

1. Select SATCOM-1 or SATCOM-2 (if available) on Audio Control Panel (ACP).
2. Select SATCOM menu from MCDU.
3. If the callee label is already displayed adjacent to 1L and the available action is PLACE CALL, selecting 2R will initiate the call.
4. If the desired callee label is not displayed, select <INDEX from the SATCOM MAIN MENU. From the SATCOM DIR INDEX page, select the appropriate USR TITLE index. The SATCOM DIRECTORY page will be displayed.
5. From the SATCOM DIRECTORY page, select the name or label of the callee. If the callee is not present on one of the DIRECTORY pages, refer to quick reference procedure for adding a number to the DIRECTORY.

NOTE

If a new DIRECTORY entry is not selected, then the last entry selected (for that channel) will be used.

6. The call is initiated by selecting the desired SATCOM channel on the Audio Control Panel (ACP).
7. If the call is established, the audio sidetone is enabled and the call light for the associated channel is activated.



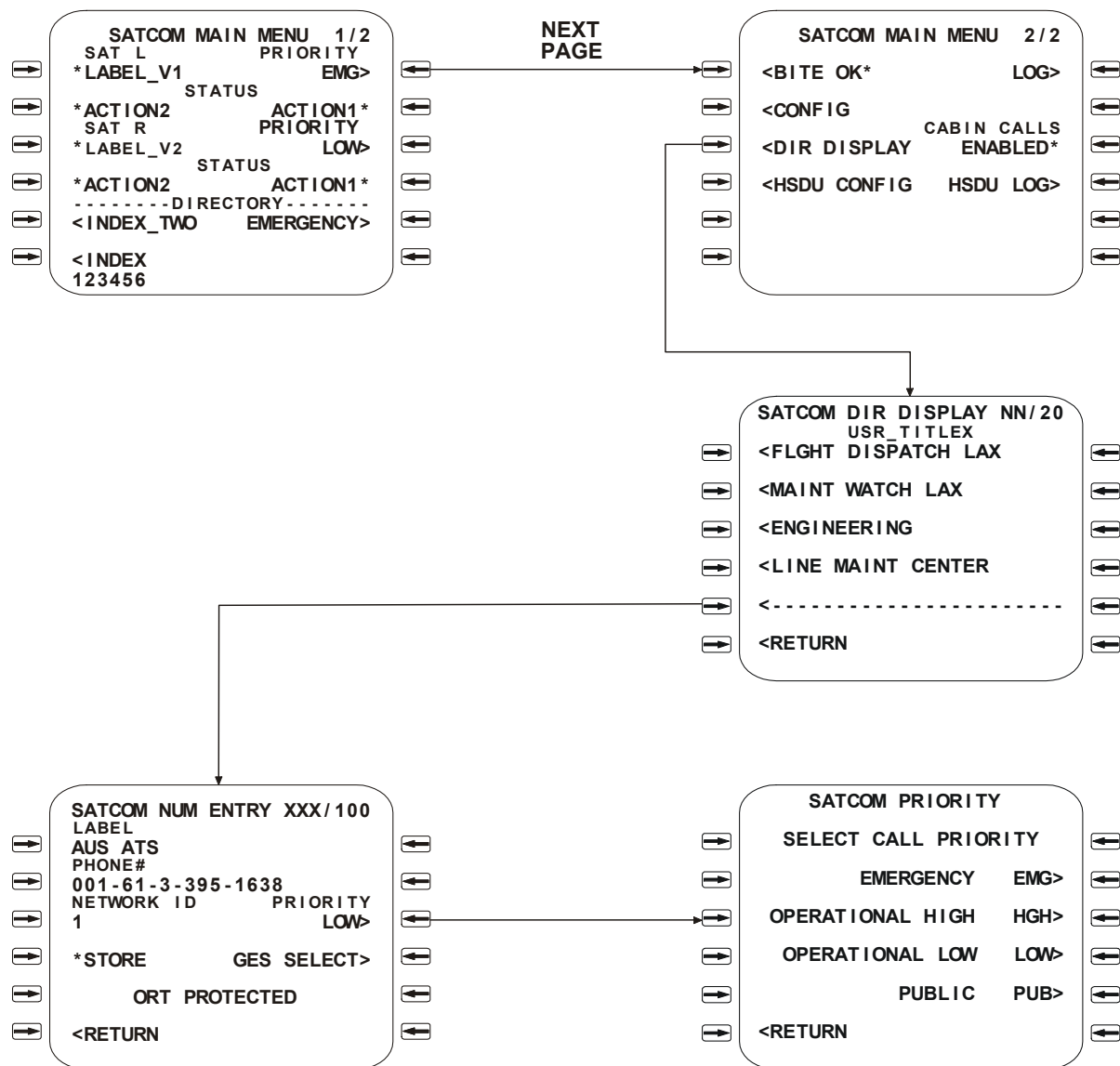
TPG9463_04

PLACING AN AIR-TO-GROUND CALL (USING ACP)
FIGURE E-3

Adding A Phone Number To The Directory (Using ACP)

1. Select SATCOM menu from MCDU.
2. Select <DIR DISPLAY from SATCOM MAIN MENU 2/2.
3. Select an uninitialized number (dashes displayed) from a DIRECTORY page within the desired index group.
4. Enter the phone number label or callee name into the scratchpad.
5. Select 1L to place the label or name into the label field.
6. Enter the phone number associated with the callee into the scratchpad. The number entered into the scratchpad will contain (in this order): the international prefix (00), country code, city or area code, and the number of the callee. Characters such as dashes and spaces may be used to separate the fields in the number.
7. Select 2L to place the phone number, for the callee, into the phone number field.
8. Enter the network ID for the callee in the scratchpad and place the network ID into the associated field by selecting 3L. Use a network ID of 1 for calls using the Public Telephone Network.
9. Selecting 3R will display the SATCOM PRIORITY page. Select the priority from the list of priorities. OPERATIONAL LOW (LOW>) is the default priority.
10. If there is a preferred GES for call placement, select 4R to display the SATCOM GES SELECT page. The preferred GES in each satellite region can be selected from the SATCOM GES SELECT page. If no GES is preferred, the display will indicate dashes and the call will be placed over the log-on GES.
11. Select 4L when * STORE is displayed to store the phone number and callee information into the DIRECTORY table.

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TPG9463_05

ADDING A PHONE NUMBER TO THE DIRECTORY (USING ACP)
FIGURE E-4

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Check BITE Status

Check BITE if:

- SAT INOP advisory is displayed (SATCOM MAIN MENU).
- BITE FAIL is displayed on SATCOM MAIN MENU.

To check BITE:

1. Select SATCOM menu from MCDU.
2. Observe field adjacent to 5L. If BITE OK is displayed, all SATCOM LRUs pass BITE, all installed channel modules are functional, and SATCOM LRUs are active on system buses.

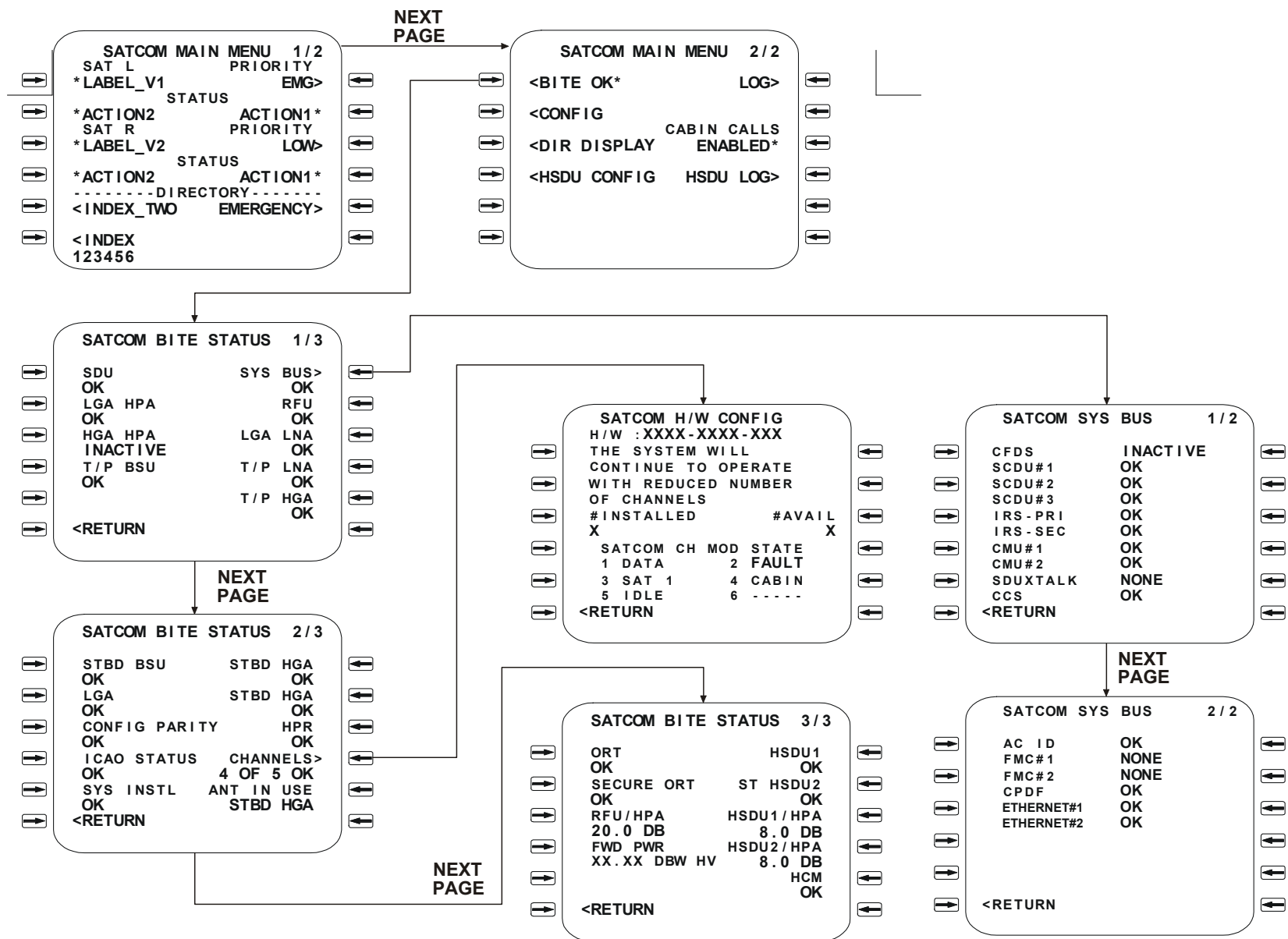
If BITE OK* is displayed, all SATCOM LRUs pass BITE and are active on system buses but not all channel modules are functional. Select 5L, NEXT PAGE, then select 4R to observe SATCOM H/W CONFIG page for channel module faults.

If BITE FAIL is displayed, one or more of the SATCOM LRUs report a failure of the LRU or inactivity on a system bus. Select 5L to observe the status of the SATCOM LRUs.

3. Look through the BITE STATUS pages and the SYS BUS pages to determine the faulted system. In most cases, the LRU status is shown as OK, INACTIVE, FAULT, or NONE. For each of these statuses there are some possible actions that the crew may take. Refer to the following list:

FAULT	The LRU should be replaced.
INACTIVE	The interwiring or power to external systems should be checked.
NONE	This indicates the rear strapping identifies the LRU is not installed.
NO DATA	This indication applies only to the IRS bus. The SDU may be receiving only partial data from the IRS. The IRS may need to be initialized.
TEST	This indication applies only to the BSUs. This status will be shown while the BSU is performing self-test. This status is not considered a fault unless the BSU does not end its self-test within two minutes of powerup.

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TPG2778_05

CHECK BITE STATUS (SAT-906B)
FIGURE E-5



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How To Log-On

The user will log-on if at power-up the owner preference table indicates log-on is USER COMMANDED, if a user commanded log-on has failed for any reason, if the AES receives a log-on reject due to permanent unavailability, or if the user has selected LOG OFF* or ABORT*. The active advisory LOG-ON> indicates the log-on search process is awaiting operator command to log-on.

NOTE

The automatic log-on is the most common setting and requires no crew action.

1. Select SATCOM from MCDU menu.
2. Select 5R from SATCOM MAIN MENU.

NOTE

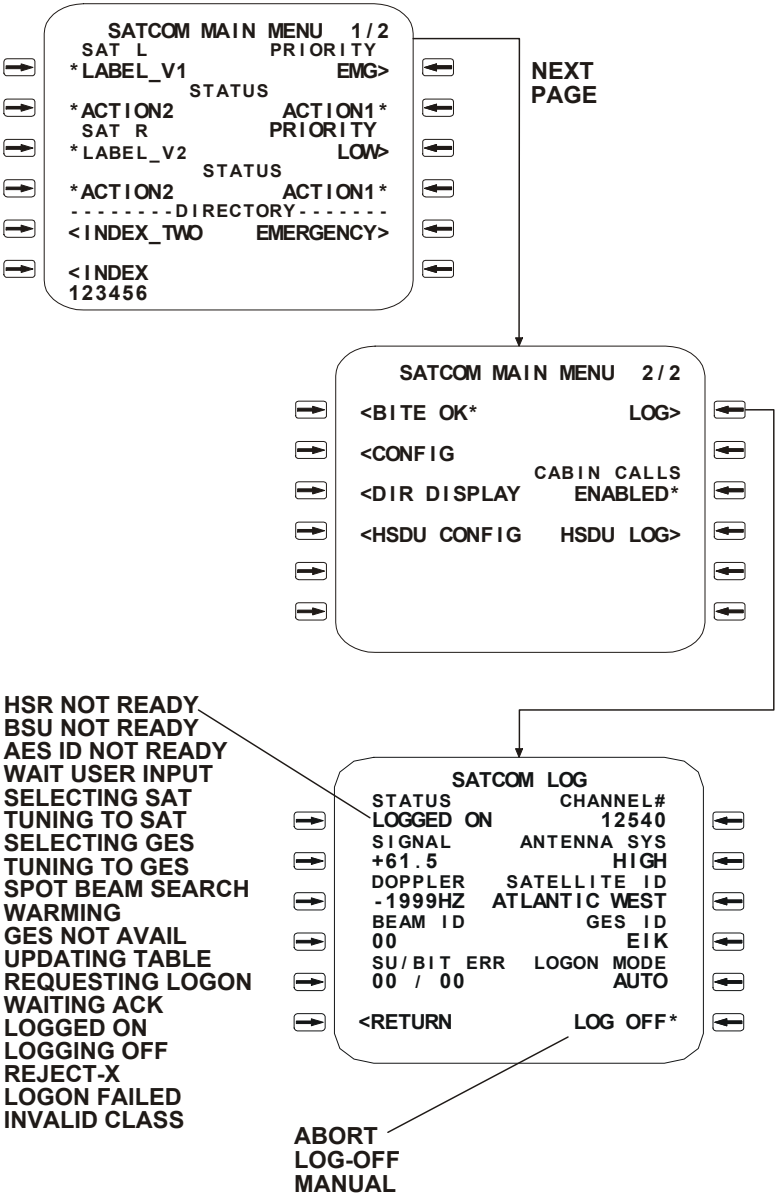
The SATCOM LOG menu can be entered from the SATCOM MAIN MENU or from any other page when the active advisory LOG-ON> is displayed. Select 6R when the active advisory is displayed on any page.

3. The log-on status is displayed as WAITING USER INPUT.
4. For SAT-906, the user may select AUTO LOG* (6R) which causes the AES to select a GES according to preferences entered in the GES preference table.

For SAT-906B systems, the user may select AUTO LOG* (6R) which causes the AES to select the most preferred satellite per the Service Selection Priorities (from the Owner's Requirements Table), and then the preferred Satellite/GES per the GES preference table. If the user desires to manually select a satellite/GES for log-on, the user enters new satellite ID and GES ID into the scratchpad. For SAT-906B systems, as the user selects the satellite ID (3R), the services associated with that satellite are displayed adjacent to 4L. Selecting 3L after entering a SATID/GESID will initiate a manual log-on to the specified GES. Attempts to enter a SATID/GESID that is not stored in the owner's preference table will result in a scratchpad message ENTRY NOT IN TABLE.

Satellite ID (SATID) is selected from the range 00 - 76.

GESID is selected from the range 000 - 376. The GESID is displayed as dashes while the AES is in the tuning-to-SAT portion of the log-on process.



TPG2778_06

LOG-ON SEQUENCE
FIGURE E-6

Notes

If you have problems or questions with operation of the Rockwell Collins SAT-906/906B Satellite Communications System, use the space below to make notes about the details. At your next stop, contact your Rockwell Collins Regional Office to get the answers. If your question is about a problem with the SAT-906/906B Satellite Communications System, some of the details helpful in understanding the problem are: the nature of the problem, where it occurred (takeoff, en route, approach, etc.), the selected operating mode, the associated equipment, and other flight conditions.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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