

HSD Phase 4 CA User Manual

EMS Technologies Canada, Ltd.

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1 Introduction

1.1 Scope

This guide provides a basic overview of how to install and operate the HSD Phase 4 CA SATCOM System.

This document is intended as a guide and does not supersede Federal Aviation Administration (FAA), or airline-approved procedures. It is written for system familiarization only.

1.2 Organization

This manual contains the following sections:

- Section 1 - Introduction
- Section 2 – Equipment Overview
- Section 3 – Installation
- Section 4 – System Operation

Only qualified avionics personnel who are knowledgeable in the technical and safety issues related to the installation of aircraft communications equipment should perform the installation procedures provided in this manual.

This manual includes general installation guidelines only; it is not intended to provide specific procedures for every type of installation.

If necessary, the information in this manual will be revised. Before attempting the installation procedures presented in this manual, verify that you have a complete and up-to-date release of this document.

Refer to the appropriate Aircraft Maintenance and Operations Manual for required details on any of the above three areas not covered in this document or the SDIM document (MN-1252-38019, HD-710 High-Speed Data Terminal, System Description, Installation and Maintenance Manual).

NOTE: Depending on your HD-710 terminal's software version and configuration, the actual (live) system messages you see, such as dialog boxes and screen displays, may differ slightly from the examples in this manual.

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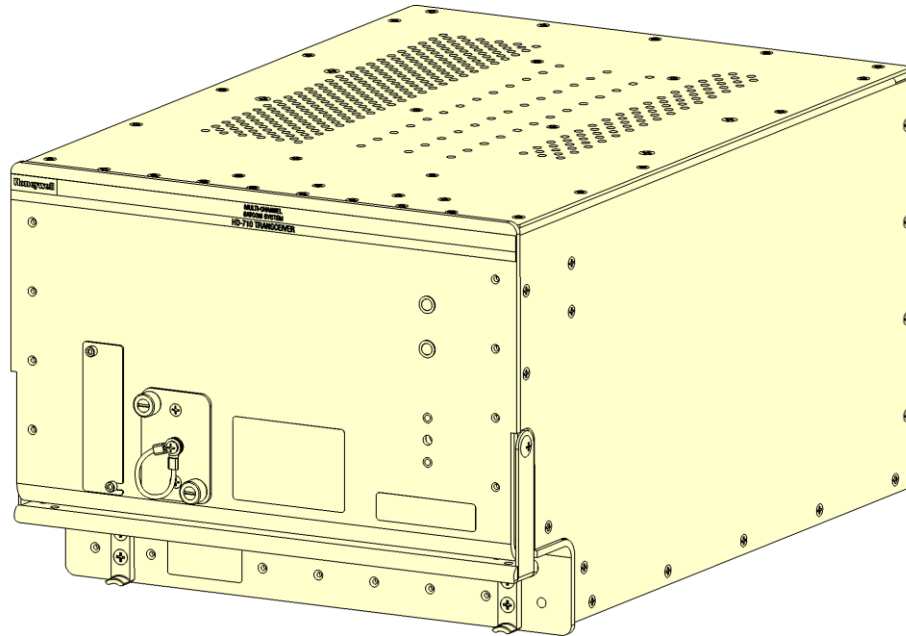
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1.3 Illustration of Equipment



ICN-38473-0000738158-001-01

Figure 1. HD-710 Terminal

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1.5 Safety Advisories

Warnings, cautions, and notes in this manual provide the reader with the following information:

- A WARNING describes an operation, procedure, or condition that, if not obeyed, could cause injury or death.
- A CAUTION describes an operation, procedure, or condition that, if not obeyed, could cause damage to the equipment.
- A NOTE provides supplementary information or explanatory text that makes it easier to understand and perform procedures.

All personnel who install, operate, and maintain the HD-710 terminal and associated test equipment must know and obey the safety precautions listed below. The procedures provided in

this manual assume that the person performing installation or maintenance tasks is familiar with and obeys standard aviation shop and safety practices.

The general safety advisories include the following:

WARNING: TO AVOID RISK OF INJURY FROM ELECTRIC SHOCK, DISCONNECT THE POWER FROM THE TERMINAL DURING INSTALLATION AND REMOVAL.

WARNING: SERVICE PERSONNEL MUST OBEY STANDARD SAFETY PRECAUTIONS, SUCH AS WEARING SAFETY GLASSES, TO PREVENT PERSONAL INJURY WHILE INSTALLING OR PERFORMING SERVICE ON THIS TERMINAL.

WARNING: ASSOCIATED SATELLITE COMMUNICATIONS EQUIPMENT RADIATES HIGH FREQUENCY RADIATION AND POSES A RADIATION HAZARD OF 1.6 GHZ. SERVICE PERSONNEL MUST EXERCISE CARE TO KEEP CLEAR OF THE ANTENNA'S BEAM WHILE PERFORMING OPERATIONAL TESTS OR INSTALLATION VERIFICATION PROCEDURES.

DO NOT APPROACH WITHIN 8 FEET (2.5 METRES) OF THE ANTENNA DURING ANTENNA OPERATION (TRANSMISSION).

DURING ANTENNA OPERATION (TRANSMISSION), MAKE SURE THAT PERSONNEL ARE EXPOSED TO A MINIMUM OF ANY REFLECTED, SCATTERED, OR DIRECT BEAMS.

CAUTION: TURN OFF POWER BEFORE DISCONNECTING ANY TERMINAL FROM WIRING. DISCONNECTING THE TERMINAL WITHOUT TURNING POWER OFF MAY CAUSE VOLTAGE TRANSIENTS THAT CAN DAMAGE THE TERMINAL.

CAUTION: THIS EQUIPMENT INCLUDES ITEMS THAT ARE ELECTROSTATIC DISCHARGE SENSITIVE (ESDS) DEVICES. ESDS DEVICES ARE SUBJECT TO DAMAGE BY EXCESSIVE LEVELS OF VOLTAGE AND/OR CURRENT. THE LOW-ENERGY SOURCE THAT MOST COMMONLY DESTROYS ESDS DEVICES IS THE HUMAN BODY, WHICH, IN CONJUNCTION WITH NONCONDUCTIVE GARMENTS AND FLOOR COVERINGS, GENERATES AND RETAINS STATIC ELECTRICITY. TO ADEQUATELY PROTECT ESDS DEVICES, THE DEVICE AND EVERYTHING THAT CONTACTS IT MUST BE BROUGHT TO GROUND POTENTIAL BY PROVIDING A CONDUCTIVE SURFACE AND DISCHARGE PATHS. USE STANDARD INDUSTRY PRECAUTIONS TO KEEP RISK OF DAMAGE TO A MINIMUM WHEN TOUCHING, REMOVING, OR SERVICING THE EQUIPMENT.

2 Equipment Overview

HD-710 terminals are scalable, high-speed data, satellite communications terminals that provide world-wide voice and data services to aircraft through high-speed communication links with the Inmarsat Satellite Network. HD-710 terminals interface with ARINC 741/781-compatible antenna subsystems to communicate with the space segment of the Inmarsat Satellite Network via L-band RF signals.

HD-710 terminals communicate with various avionics equipment, such as the aircraft's IRS and CMU, to coordinate and access a wide range of services. The HD-710 terminals also communicate with cabin and cockpit voice and data equipment to provide phone, fax, Internet connection, and other services on board the aircraft.

HD-710 terminals contain the following:

- One channel card for SBB services
- One channel card for Classic Aero and SBB services
- Data input/output (I/O) card
- High stability reference oscillator
- Control processor card
- High Power Amplifier (HPA)
- SDU Configuration Module (SCM)
- Universal (115 V AC 400 Hz / 28 VDC) power supply

The following interfaces are provided for the above defined services:

- POTS (x2): 2 wire voice interface to provide "Plain Old Telephone Service" (POTS).
- Wire Port (x2): 4 wire voice communication system to be used for AERO voice service from the cockpit.
- ISDN BRI Port (x1): used for circuit switched voice or data service.
- Ethernet Port (x2): used for packet data services access.
- CEPT-E1 Interface (x1): used to provide Aero H/H+ Voice services to external PBXs
- ARINC 429: used for packet data service access to the Aero H/H+ PRT via the Communication Management Unit

3 Installation

This section provides procedures to install HD-710 terminals on an aircraft, including the following sections:

1. Advisories
2. Pre-Installation Inspection
3. Mechanical Installation
4. Electrical Installation

3.1 Advisories

Read the safety advisories in the Introduction section in INTRODUCTION of this manual before you begin installing the terminal.

3.2 Pre-Installation Inspection

Inspect all parts before you install any HD-710 terminal, to make sure that no damage occurred during shipping.

3.2.1 Unpacking and Inspecting Equipment

- Unpack the HD-710 terminals from the shipping containers.
- Verify that the part number displayed on the shipping box and equipment component matches the model and part number ordered. If components are missing from the shipment, contact the supplier or Honeywell Product Support immediately and report the problem.
- Visually inspect the terminal for any shipping damage. If any shipping damage has occurred, contact the shipping carrier immediately and report the problem.
- Check the HD-710 terminal connectors for corrosion and damage. If damage is noted, do not apply power to the terminal. Contact the supplier or Honeywell Product Support immediately to report the problem.

3.2.2 Cabling Notes

Before proceeding with the installation of the HD-710 terminal, read all cabling notes provided on the HD-710 terminal Interconnection and Contact Assignment drawings at the end of this section.

3.2.2.1 Cabling

When installing the HD-710 terminal, follow the cabling requirements listed below:

- Maximum recommended length for Ethernet cables is 100 meters.
- LAN cables must meet flammability, TIA/EIA568-A CAT 5, requirements and conform to ARINC 628 specifications.
- Wire size recommendations:
 - For +28 V DC HOT (BP2), +28 V DC RTN GND (BP3), 11 5 V ac COLD (BP7), and Chassis GND (BP8), use 12 AWG

- For 11 5 V ac HOT (BP1), use 20 AWG
- Unless otherwise specified, for signaling, use 22 AWG

3.3 Mechanical Installation

This section contains the information required to plan the physical placement of HD-710 terminals. In typical aircraft installations, the HD-710 terminal assembly fits into standard ARINC, 8-MCU mounting trays.

3.3.1 Physical Placement

When selecting a location for the HD-710 terminal, allow for adequate spacing for the installation while providing reasonable access for servicing. Leave a minimum gap of 0.5 inches between LRUs.

3.3.2 Environmental Requirements

The environmental requirements that must be considered during the physical placement of the HD-710 terminals are based on the RTCA/DO-160G Environmental Specifications.

The mounting trays offer a number of fan configuration options depending on the physical placement of the LRU in the aircraft.

3.3.2.1 Heating and Cooling

When selecting an installation location for the HD-710 terminal, consider the heating and cooling requirements listed below:

- Power Dissipation (AC/DC models): 275 Watts nominal, 400 Watts maximum
- Cooling Air: per ARINC 600
- Recommended Flow rate: 88 kg/hr (185 lbs/hr)
- Pressure drop: 5 ± 3 mm (0.07 ± 0.025 in.) H₂O

3.3.2.2 Fan Tray Requirements

WARNING: FAILURE TO INSTALL AND CONFIGURE THE FAN TRAY ASSEMBLY AS INSTRUCTED MAY SERIOUSLY COMPROMISE THE HD-710 TERMINAL'S EXTREME TEMPERATURE OPERATION.

For adequate airflow to the HD-710 terminal subassemblies, install plugs in the fan/tray configuration as illustrated in Figure 2. Fan tray assemblies may be shipped with or without plugs. If required, order additional plugs from your fan tray manufacturer.

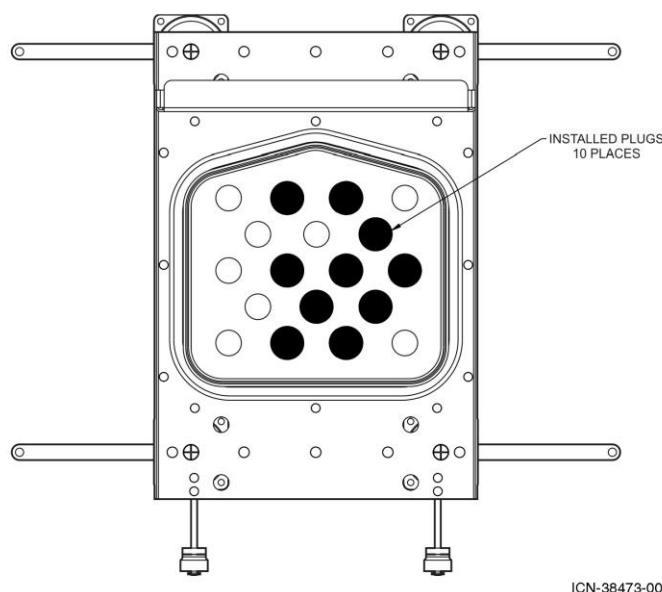


Figure 2. Fan Tray Plug Configuration (black = installed, white = removed)

3.3.3 Chassis Grounding

The HD-710 terminal tray-mounted assemblies must be electrically bonded to the airframe. Make sure that the mating surfaces are free from contaminants such as paints or other non-conductive elements. Where surface preparations are insufficient to ensure a proper bond, Honeywell recommends using a short, tin-coated, copper bonding strap of at least 6.35 mm (0.25 in.) in width.

The LRU and tray assemblies should provide a low impedance path of <0.2 ohms.

3.4 Electrical Installation

This section provides electrical installation details for HD-710 terminals.

3.4.1 Cabling and Connector Requirements

This section provides general electrical installation information on power, ground, shielding requirements, and cabling.

3.4.1.1 Power Requirements

The HD-710 terminal can operate from the aircraft's + 28 V DC or 115 V AC, 400 Hz (nominal) power supply. If both power sources are connected, the terminal will use the 115 V AC supply.

3.4.1.2 Ground Requirements

Improper grounding can lead to ground loops and induced Electromagnetic Interference (EMI) or Radio Frequency Interference (RFI). When installing an HD-710 terminal, follow standard grounding practices for both chassis and cabling shields. Refer to "Chassis Grounding" in INSTALLATION for chassis and tray grounding instructions.

3.4.1.3 Cable Shielding and Termination

The preferred method of cable shield termination is in accordance with NEMA WC 27500:2000 and ARINC 741. ARINC Report 413A—Guidance for Aircraft Electrical Power Utilization and Transient Protection provides more detailed information in Attachment 3-2, Wire Shielding and Grounding Requirements and in Appendix 7.

Unless otherwise stated, all cable shields must be connected to the closest aircraft ground at both ends of the cable and on both sides of any production break in the cable. Where applicable, terminate shields with connectors via the backshell or via a pigtail with a suitable termination to the closest aircraft ground.

General aviation cable-routing guidelines apply. See Table 1 for detailed information.

NOTE: Typically, Ethernet and ISDN cables have multiple shields; terminate each shield separately.

Table 1. Cable Shielding and Termination Specifications

Cable Function	Conductor Type (Typical)	Single Point	Multiple Point	Minimum Conductor Coverage By Shield
Power Lines	Single conductor, stranded	N/A	N/A	N/A
Digital Control	Twisted pair, stranded		Yes	85%
Serial Data	Twisted pair, stranded		Yes	85%
Ethernet Data	Twisted pair, stranded		Yes	85%
ISDN Data	Twisted pair, stranded		Yes	85%
Discrete Lines	Single conductor, stranded	N/A	N/A	N/A
RF TX and RX	Coaxial		Yes	95%
Single Point: Cable shield terminated at one end only via a connector or suitable crimp terminal. Multiple Point: Cable shield terminated at both ends via a connector or suitable crimp terminal, usually at both ends of the cable and at both sides of any production break. N/A: Not applicable.				

To minimize Passive Intermodulation (PIM), the coaxial cable between the DLNA and the antenna must be double-shielded (braid and foil wrap) with gold-plated and soldered (not crimped) connector contacts. Do not use nickel, nickel plating, or stainless steel.

4 System Operation

This section provides basic information on registering and operating HD-710 terminals, including the following sections:

1. Registering and Activating Terminals
2. Configuring Terminals
3. Using Terminals

4.1 Registering and Activating Terminals

Registering and activating HD-710 terminals has the following steps:

1. Obtaining ICAO Addresses
2. Choosing Service Providers
3. Registering Terminals

4.1.1 Obtaining ICAO Addresses

Obtain your ICAO address from your local aeronautical authority. Your service provider will require this address when you register.

4.1.2 Choosing Service Providers

Contact Inmarsat for an up-to-date list of Inmarsat Service Providers using the following contact information:

Inmarsat

99 City Road, London EC1Y 1AX

Tel: +44 20 7728 1000

Fax: +44 20 728 1044

Customer Care

Tel: +44 20 7728 1777

Fax: +44 20 7728 1142

Email: customer_care@inmarsat.com Web address: www.inmarsat.com

4.1.3 Registering Terminals

Contact your Inmarsat service provider and ask for a registration for service activation of Aircraft Earth Station form. With this form, you can register for SBB, and Aero H+ services. The services available depend on your service provider.

To complete the registration form you need the following information:

- Customer information (address and contact information)
- Service provider details (obtained from your ISP)
- System and terminal information (terminal type, manufacturer, model number, serial number of terminal)

- ICAO 24 bit technical address for Aero H+ services
- IMEI and IMSI (printed on the SCM label) for SBB services
- Aircraft information (tail number, fuselage/airframe number, manufacturer and model, and country of registration)
- List of services required (for example, , Aero H+ data-2, SBB PS and SBB CS services)

NOTE: When requesting a logon class, you must request Class 3, even if your installation does not support data services. The channel card software does not support Class 2.

4.2 Configuring Terminals

This section provides basic information on how to configure HD-710 terminals for operation with user devices.

4.2.1 Setting up Airborne Networks

For information about setting up airborne networks that use SBB services, refer to the HSD Terminal Developer's Guide, MN-1252-13005.

4.2.2 Mapping User Devices for ISDN Services

HD-710 terminals support connection to a multitude of user devices, allowing the user to customize their system. The HSD Terminal Developer's Guide, MN-1252-13005, provides more information about ISDN devices and services.

4.2.3 IMNs

IMNs are unique routing numbers that act similarly to telephone numbers. IMNs are assigned by Inmarsat to each service type (64 kbps Speech, 3.1 kHz Audio, 56 kbps data, and 64 kbps data).

When registering your system, request IMNs for each service-type device attached to the HD-710 terminal on the Service Activation form. Although the service provider may support an unlimited number of IMNs assigned to a particular system, the number of physical connections available on a system defines the number of IMNs supported.

NOTE: To get assigned extra or multiple IMNs per service type, you must request them from your service provider when filling out your service registration and application form.

The HSD Terminal Developer's Guide, MN-1252-13005, provides more information about IMNs.

4.2.4 MSNs

MSNs act as identification and routing codes for user devices attached to the HD-710 terminal ISDN bus. MSNs identify the device on the system so that incoming calls route to the appropriate device. Each device must be assigned an appropriate MSN to identify to the Inmarsat system what type of service that device needs on outgoing calls. The MSNs also provide routing information for incoming calls.

The HSD Terminal Developer's Guide, MN-1252-13005, provides more information about MSNs.

4.2.5 Configuring User ORT Parameters with the Maintenance Port Utility (MPU)

You can use the MPU to configure user-level parameters in the ORT. This feature will be available in a future release.

4.2.6 Configuring Secure ORT Parameters with the Maintenance Port Utility (MPU)

You can use the MPU to configure secure-level parameters in the ORT.

4.2.7 Creating ORTs with the Maintenance Port Utility (MPU)

Can use the MPU to configure the ORT. Refer to "Configuring the Owners Requirements Table (ORT)" for instructions.

4.2.8 Understanding CMU Messages

The CMU communicates with the HD-710 terminal using two types of ARINC 429 messages: Broadcast messages and Bit Oriented Protocol (BOP) messages. Both types of communication are supported at the same time.

4.2.9 Understanding CMC Messages

The CMC communicates with HD-710 terminals using ARINC 429 messages.

4.2.10 Activating Configurations

After you configure the HD-710 terminal parameters, you must reset the HD-710 terminal using one of the following methods:

- In Menu 2, press z
- Cycle the power to the HD-710 terminal

When the reset or restart is completed, the configuration values and parameters are activated.

4.2.11 Verifying Configurations

This section describes how to view the HD-710 terminal configuration parameters. To view the HD-710 terminal ORT system configuration:

1. In Menu 3, press o. The List ORT appears.
2. To scroll through the listing until you see a table of ORT ORs, press o. The LES Access Codes are listed in this table.

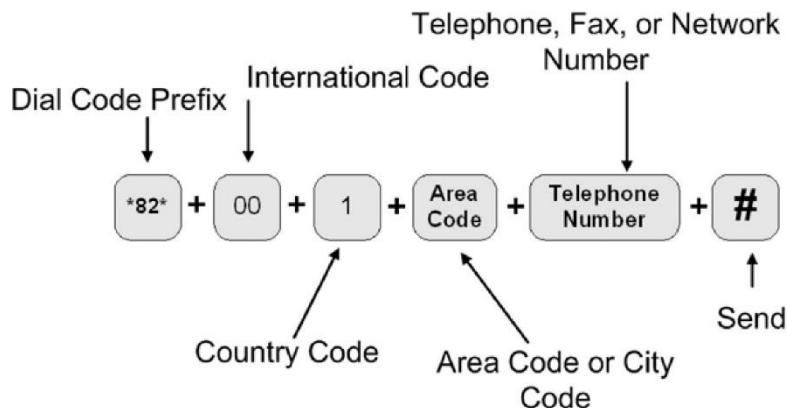
4.3 Using Terminals

This section describes how to perform the following tasks:

- Placing SwiftBroadband, and Fax Calls
- Placing Calls with the CEPT-E1 Interface
- Using Data Connections
- Operating the MCDU
- Performing Cockpit Communications with the MCDU
- Performing Cockpit Communications with the WSC

4.3.1 Placing SwiftBroadband, and Fax Calls

Placing voice and fax calls using the HD-710 terminal is similar to placing an international telephone call or entering a telephone number for dial-up networking data calls. Like international telephone numbers, the HD-710 terminal dialing-number-sequence includes different routing components or codes. Figure 3 illustrates the required order of the dialing components.



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Figure 3. Dialing-Sequence Components

Each dialing sequence component serves a different routing function:

- Dial Code Prefix:

Use service-specific dial code prefixes when sending a fax or using analog modems, or for overriding system defaults to force the system to request a specific service type. Figure 3 uses the dial code prefix for 3.1 KHz audio service type (*82*). See Table 2 for other dial code prefixes.

- International Access Code:

The international access code for all airborne equipment is 00.

- Country Code:

Use the Public Switch Telephone Network (PSTN) number assigned to the country of your call destination.

- Area Code (and City Code, if applicable):

Use the PSTN routing number assigned to the area (and if applicable, city) of your call destination.

- POUND SIGN (#):

To signal the system to send the call, at the end of the telephone dial string, press or enter POUND SIGN (#). Certain devices using the HD-710 terminal may not have the function to insert the POUND SIGN (#) at the end of the dialing sequence. For those devices, additional dial code prefixes are required to override the send command requirement. Refer to Table 3 for more information.

4.3.1.1 Dial Code Prefixes

Although the system automatically selects the appropriate service types on outgoing calls for ISDN devices, a dial code prefix is required to send a fax, identify an analogue modem, or force the system to override the system defaults to select a specific service type (see Table 2).

Table 2. Dial Code Prefixes for Forcing Service Type Selection

Service Type	Service Description	Dial Code Prefix (Forces service selection)
SBB Prefixes		
Speech 64 kbps		N/A
3.1 kHz audio	Fax, analogue modem, STU-III, STE	*82* or none ¹
56 kbps data	High-speed data	*85*
64 kbps data	High-speed data	*84*
Speech (AMBE+2)		*80* or none ¹

There is a default service type (no dial code prefix) for each POTS interface. The default service for the POTS1 interface is AMBE+2 speech and the default service for the POTS2 interface is 3.1 kHz audio. No dial code prefix is required if you are using the default service on the POTS interface.

The system requires the dial code prefix *82* for sending faxes or when using analogue modems. It forces the system to request the required 3.1 kHz audio service from the Inmarsat Satellite Communications Network. If required, use the dial code prefixes to override the system defaults for selecting specific service types. Dial code prefixes for all service types require an asterisk (*) before and after the code number.

Other dial code prefixes provide system overrides required if you are using devices that cannot add a POUND SIGN (#) to the dialing string or devices that are slow dialing. Table 2-2 provides a description of the additional dial code prefixes used for system overrides. Table 2-1 provides a list of the LESs and their associated codes.

Table 3. Dial Code Prefixes for System Overrides

Reason for Override	Dial Code Prefix	Example Dialing Sequence
Use this dial code prefix to override the default LES/GES configured in the system. This dial code prefix signals the system to override the default LES/GES and use the selected LES/GES instead.	901 + LES/GES CODE	901 + LES/GES CODE + International Code + Country Code + Area Code + Telephone Number + POUND KEY 901 + 002 + 00 + 1+ 613 +5551212 + POUND KEY
Use with fast (e.g. automated) dialing devices that cannot produce or add a POUND SIGN to end the dialing sequence. This dial code prefix signals the system to send the call after a specified delay in user input when the POUND SIGN cannot be entered (about 4 seconds).	902	902 + International Code + Country Code + Area Code + Telephone Number 902 + 00 + 1+ 613 + 5551212

Use with slow (e.g. manual) dialing devices that cannot produce or add a POUND SIGN to end the dialing sequence. This dial code prefix signals the system to send the call after a specified delay in user input (about 20 seconds).	903	903 + International Code + Country Code + Area Code + Telephone Number 903 + 00 + 1+ 613 + 5551212
---	-----	---

4.3.1.2 Mobile-to-Mobile Communication

The HD-710 terminal provides a two-way link for aircraft-to-aircraft communication. Calling aircraft-to-aircraft requires additional information. You need to know the IMN of the device or service on the aircraft you are calling.

Figure 4 illustrates the Mobile-to-Mobile dialing sequence.

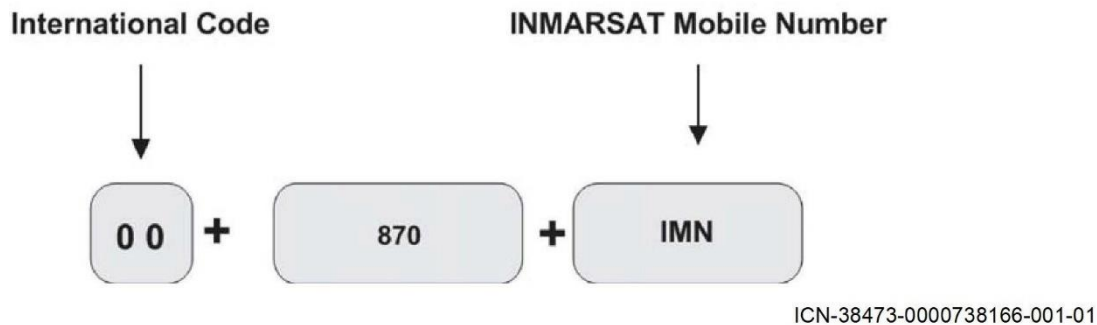


Figure 4. Mobile-to-Mobile Dialing Sequence

4.3.2 Placing Calls with the CEPT-E1 Interface

The HD-710 terminal CEPT-E1 interface provides Cabin Telecommunication Unit (CTU) access to two Aero-H+ 4800 bps AMBE voice calls simultaneously. Since the CEPT-E1 interface shares the Aero H+ voice channels with the cockpit, CTU calls maybe preempted from either the air or ground by higher priority calls.

Air-to-ground and ground-to-air calls over the CEPT-E1 interface are priority 4 (public) calls.

For information on how to place a call over the CEPT-E1 interface, see the CTU documentation.

4.3.3 Using Data Connections

For information about data connections, optimizing your airborne network and selecting the service that best meets your needs, refer to the HSD High-speed Data Terminal Developer's Guide, MN-1252-13005.

4.3.4 Operating the MCDU

This section provides information about the MCDU and its interfaces—output and input ports, the screen, and the keyboard.

4.3.4.1 Output Ports

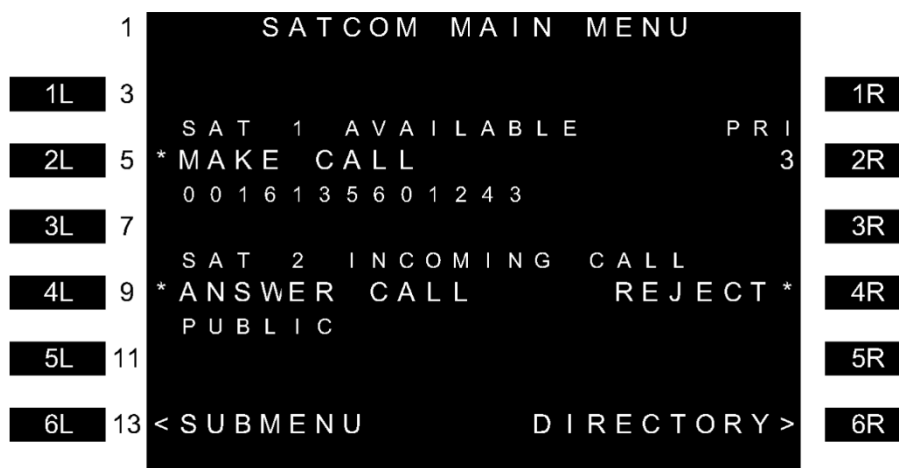
The MCDU transfers its identification and commands to the HD-710 terminal using 32 bit words and a 12-14.5 kbps output port, as defined in ARINC Specification 429, Digital Information Transfer System (DITS).

4.3.4.2 Input Ports

The MCDU receives identification information and displays data from individual subsystems using seven input ports, as defined by ARINC Specification 429. Ports 1 and 2 are reserved for FMSs, and they operate at 100 kbps. Ports 3 to 7 are available for the MCDU to communicate with the HD-710 terminal, and they operate at 12-14.5 kbps.

4.3.4.3 Screen

The MCDU displays all data on the screen, as shown in Figure 5.



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Figure 5. MCDU Screen

The top of the screen displays the title of the menu on the screen. The bottom of the screen (Line 14) is the scratchpad that displays information that you enter on the keyboard.

The MCDU has six buttons on each side of the screen that activate MCDU functions. Figure 5 displays these buttons on the left and right sides of the screen. When the functions corresponding to a button are available, the function's name appears beside the button—for example, in Figure 5, ANSWER CALL and REJECT (a call) are available functions for the incoming call on SAT 2.

Other lines on the MCDU screen display information relevant to the function or status of the HD-710. In Figure 5, line 6 displays the phone number the HD-710 terminal will dial when the user presses the MAKE CALL button, and the number 3 under PRI in row 5 indicates that the priority of the outgoing call is 3.

4.3.4.4 Keyboard

The MCDU's keyboard includes a set of numeric keys and a set of alphabetic keys, both of which you can use to enter data into the MCDU.

The keyboard may include preset keys, such as the following:

- The **IDX** or **MAIN MENU** key: this key returns you to the MCDU's main menu.
- The **CLR** key: this key clears any text you type into the scratchpad.
- The **NEXT PAGE** key: this key brings up the next page of a menu if one is available.

4.3.4.5 Special Symbols

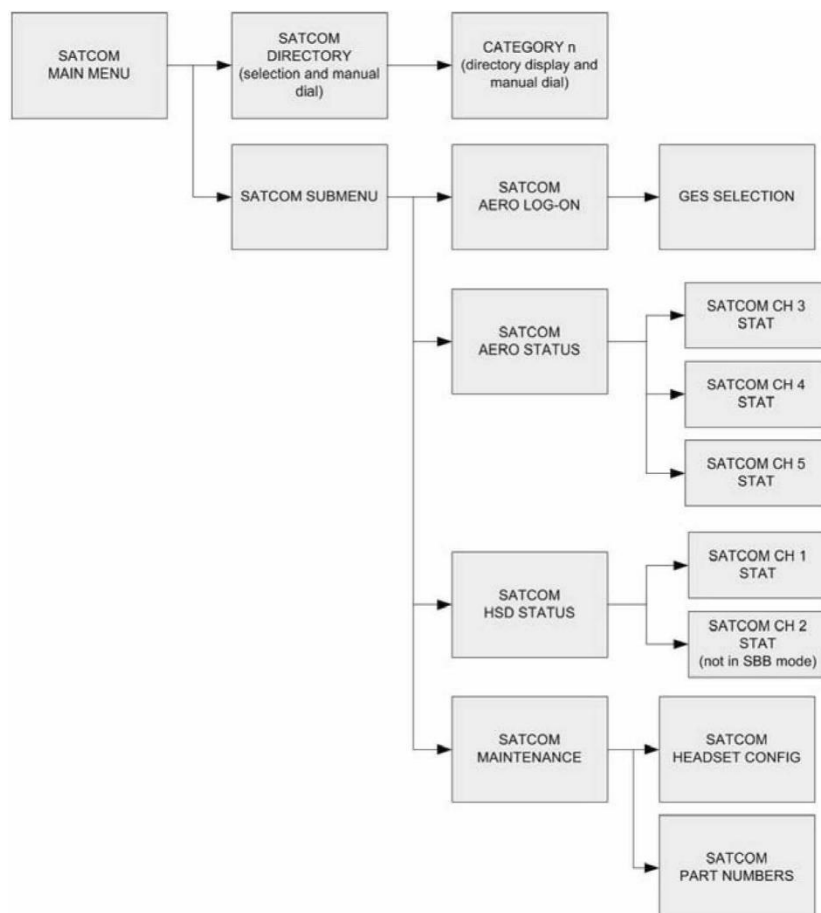
Because of space constraints on the screen, the MCDU uses a number of special symbols to indicate actions:

- < and > appear at the far left or right to indicate that another menu page is available in that direction.
- appears at the far left or right to indicate that pressing that key results in an action.
- **NUMBER/NUMBER** appears to tell you which page out of how many pages you are viewing. For example, 1/3 would appear when you are in SYSTEM DESCRIPTION pages in total.
- [and] appear around empty data fields where you can enter data. However, entering data is not mandatory in these fields.

4.3.4.6 Navigating the MCDU

The MCDU includes a number of menus, as shown in Figure 6. There are four category pages in the address book and up to 25 pages (100 phone numbers) for each category.

NOTE: The SATCOM CH 2 STAT menu is not present when the HD-710 terminal is operating in SBB mode.



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Figure 6. MCDU Menus

4.3.4.7 Viewing Flight Information

You can view the flight identification from the MCDU. To view flight information:

- On the first page of the MCDU's main menu, press the key next to **SUBMENU**. The SATCOM SUBMENU page appears.

```
      SATCOM SUBMENU
LOG - ON STATE
LOGGED - OFF

< LOG - ON

      AERO CHANNEL
      STATUS >
      HSD CHANNEL
      STATUS >

FLT ID
1 2 3 4 5

      MAINTENANCE >
      RETURN >
```

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You can view the following information from this screen:

- Flight identification on the line below **FLT ID**

4.3.4.8 Logging On and Off

You can use the MCDU to initiate a manual or automatic logon from the HD-710 terminal to the satellite network.

The HD-710 terminal boot-up logon mode is specified in the Logon/Handover Policy in the ORT. You can set this parameter to automatic or manual. After the HD-710 terminal has finished the boot-up process, you can use the MCDU to log off (from an automatic logon) or to initiate a manual (constrained) logon.

During an automatic logon, the system selects the most appropriate GES depending on HD-710 terminal location and the GES priority specified in the ORT.

During a manual logon, you must select the GES. Even if the ORT parameter is configured for automatic logon, you can still constrain the terminal to logon using a particular GES.

4.3.4.8.1 Viewing the Log Status

The log status defines whether the HD-710 terminal is currently logged on or logged off. The logon status can be:

- Logged-Off—The HD-710 terminal is logged off.
- Logged-Off Inop—The HD-710 terminal is configured to log on manually but the terminal is in an inoperable state. Clear all problems for the logon to continue.

- **Logged-Off Rejected**—The HD-710 terminal is logged on and a second logon attempt is made. The second attempt fails and the status is Logged-Off Rejected.
- **Logging-On Inop**—The HD-710 terminal is configured to log on automatically but the terminal is in an inoperable state. Clear all problems for the logon to continue.
- **Logged-On Constrained**—The HD-710 terminal is logged on manually.
- **Logged-On Auto**—The HD-710 terminal is logged on automatically.
- **Logging-off**—The HD-710 terminal is in the process of logging off.
- **Logging-on**—The HD-710 terminal is in the process of logging on.

To view the log status:

1. On the main page of the MCDU, press the key next to **SUBMENU**. The SATCOM SUBMENU page appears.

The logon state appears on the line below LOG-ON STATE.

You can view additional details about the logon, including the GES and satellite name. To view additional logon details:

1. On the main page of the MCDU, press the key next to **SUBMENU**. The SATCOM SUBMENU page appears.
2. On the **SUBMENU** page, press the key next to **LOG-ON**.

The SATCOM AERO LOG-ON screen appears. The logon state appears on the line below LOG-ON STATE. You can also view the GES name, satellite name, signal level, antenna type, azimuth and elevation, and 8-digit ICAO ID.

NOTE: If the HD-710 terminal is logged off, the LOG-OFF option is not available. If the HD-710 terminal is logged on, the AUTO LOG-ON option is not available.

```
SATCOM AERO LOG-ON
LOG-ON STATE
LOGGED-ON CONSTRAINED
( VOICE / DATA SERVICES )
* AUTO LOG-ON      LOG-OFF *
GES                ANTENNA
E I K              HGA
SATELLITE          AZIM / ELEV
AORE               + 109 ° / + 18 °
SIG LEVEL          ICAO
141                12345678
<GES SEL          RETURN>
```

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4.3.4.8.2 Initiating an Automatic Logon

When the HD-710 terminal logs on automatically, it selects an appropriate GES and satellite based on its position and the GES priority specified in the ORT.

To log on automatically:

1. On the main page of the MCDU, press the key next to **SUBMENU**. The SATCOM SUBMENU page appears.
2. On the **SUBMENU** page, press the key next to **LOG-ON**. The SATCOM AERO LOG-ON page appears.
3. On the **SATCOM AERO LOG-ON** page, press the key next to **AUTO LOG-ON**.
The HD-710 terminal logs on and the logon state is LOGGED-ON AUTO.

NOTE: The AUTO LOG-ON key is not available if the HD-710 terminal is already logged on.

4.3.4.8.3 Selecting a GES (Initiating a Constrained Logon)

You can constrain the HD-710 terminal to logon using a particular GES.

If the HD-710 terminal is logged off, selecting a GES initiates a constrained log on (logon state is LOGGED-ON CONSTRAINED).

If the HD-710 terminal is already logged on and you select a new GES, the MCDU displays the SATCOM AERO LOG-ON page and automatically logs off the old GES and logs on to the new GES. This also results in a constrained logon.

To select a GES:

1. On the main page of the MCDU, press the key next to **SUBMENU**.
The SATCOM SUBMENU page appears.
2. On the **SUBMENU** page, press the key next to **LOG-ON**.
The SATCOM AERO LOG-ON page appears.
3. On the SATCOM AERO LOG-ON page, press the key next to GES SEL.
The GES SELECTION page appears.

```

      GES  SELECTION    1 / 3
A O R W
* A U S S A G U E L    / 0 0 5
A O R W
* E I K                / 0 0 2
A O R E
* A U S S A G U E L    / 1 0 3
A O R E
* E I K                / 1 0 4
P O R
* P E R T H            / 2 0 5

                        R E T U R N >

```

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4. To select a GES, press the button next to the GES name. To access pages with more GES options, press the NEXT button on the MCDU.
A logon confirmation (LOG-ON) appears at the bottom of the screen.
5. To log on to the new GES, press the key next to LOG-ON.

4.3.4.8.4 Logging Off

You can use the MCDU to initiate the HD-710 terminal logoff sequence. To log off:

1. On the main page of the MCDU, press the key next to **SUBMENU**. The SATCOM SUBMENU page appears.
2. Press the key next to LOG-OFF. The HD-710 terminal logs off.

4.3.4.9 Viewing Channel Information

There are three Aero channels and one SwiftBroadband channel, available with the HD-710 terminal. You can use the MCDU to view the following information about each of the channels:

- Logon status (Aero channels only)—Logon status may be Valid or Invalid.
- Attach status (SwiftBroadband channels only)—Attach status may be Valid or Invalid.
- Call Termination Code (CALL TERM)
- Transmitter Effect Isotropic Radiated Power (TX EIRP)
- Receiver carrier-to-noise ratio (RX C/NO)
- Service type—Possible service types are:
 - AERO P/R/T
 - AERO VOICE
 - SBB (SwiftBroadband)
- Number of bits transmitted per second (TX KBPS)—for SBB background services, the number of bits being transmitted per second is expressed in kilobits per second (kbps). Otherwise, the number of bits transmitted is zero.
- Number of bits received per second (RX KBPS)—for SBB background services, the number of bits being received per second is expressed in kilobits per second (kbps). Otherwise, the number of bits received is zero.
- Service information (CONNECTED)—For Aero service, service information includes the GES name and number. For SBB service, no information is provided.
- Satellite ID (SAT)—Satellite ID includes the index number of each satellite, a mnemonic and abbreviated alphanumeric description, and the spot beam that the HD-710 terminal is currently using.

4.3.4.9.1 To view information about an Aero channel:

On the main page of the MCDU, press the key next to SUBMENU. The SATCOM SUBMENU page appears.

1. On the main page of the MCDU, press the key next to SUBMENU.
The SATCOM SUBMENU page appears.
2. On the SUBMENU page, press the key next to AERO CHANNEL STATUS.
The SATCOM AERO STATUS page appears.

```

      SATCOM AERO STATUS
<CHAN 3 - ACARS DATA
<CHAN 4 - AERO VOICE
<CHAN 5 - AERO VOICE

      RETURN>

```

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- On the **SATCOM AERO STATUS** page, press the key next to a channel.

The SATCOM CH STAT page appears. (MCDU pages for Channel 3 and Channel 4 are shown in DESCRIPTION AND OPERATION.)

```

      SATCOM CH 3 STAT
LOGON
WAIT FOR P CHAN SYNC
CALL TERM          TX KBPS
                   0.00
TX EIRP            RX KBPS
13.5               0.00
RX C/N0            CONNECTED
50.0               EIK
SERV TYPE          SAT
AERO P/R/T         AORE B5

      RETURN>

```

```

      SATCOM CH 4 STAT
LOGON
VALID
CALL TERM          TX KBPS
                   0.00
TX EIRP            RX KBPS
0.0               0.00
RX C/N0            CONNECTED
0.0               EIK
SERV TYPE          SAT
AERO VOICE         AORE B5

      RETURN>

```

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4.3.4.9.2 To view information about a SBB channel:

1. On the main page of the MCDU, press the key next to **SUBMENU**.
The SATCOM SUBMENU page appears.
2. On the **SATCOM SUBMENU** page, press the key next to **HSD CHANNEL STATUS**.
The SATCOM HSD STATUS page appears.

```

      SATCOM HSD STATUS
<CHAN 1 - SBB

                                     RETURN>
  
```

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3. On the SATCOM HSD STATUS page, press the key next to the SBB channel.
The SATCOM CH STAT page appears.

```

      SATCOM CH 1 STAT
ATTACH
YES
CALL TERM          TX KBPS
                   0.00
TX EIRP            RX KBPS
20.0               0.00
RX C/N0            CONNECTED
72.2
SERV TYPE          SAT
BGAN               AORE B5

                                     RETURN>
  
```

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4.3.4.10 Viewing Maintenance Information

The maintenance page provides information about:

- Terminal status
- Terminal part numbers

4.3.4.10.1 Viewing Terminal Status

To view the terminal status:

1. On the main page of the MCDU, press the key next to **SUBMENU**. The SATCOM SUBMENU page appears.
2. On the **SATCOM SUBMENU** page, press the key next to **MAINTENANCE**.

The SATCOM MAINTENANCE page appears.

```
SATCOM MAINTENANCE

      STATUS
TERMINAL      TRANSMIT
OK            NORMAL

<HEADSET CONFIG
<PART NUMBERS

RESET SATCOM SYSTEM
NOT AVAIL - IN AIR
                        RETURN >
```

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The maintenance menu displays the following information:

- Terminal status on the line below TERMINAL—Terminal status may be OK or FAULT.
- Transmit status on the line below TRANSMIT—Transmit status may be NORMAL or INHIBITED.
- Air/Ground status on the line below RESET SATCOM SYSTEM—When set to ON GROUND, the system is on the ground and can be reset. When set to NOT AVAIL – IN AIR, the system is in the air and cannot be reset.

4.3.4.11 Viewing Terminal Part Numbers

To view terminal part numbers:

1. On the main page of the MCDU, press the key next to **SUBMENU**.
The SATCOM SUBMENU page appears.
2. On the **SATCOM SUBMENU** page, press the key next to **MAINTENANCE**.
The SATCOM MAINTENANCE page appears.
3. On the **SATCOM MAINTENANCE** page, press the key next to **PART NUMBERS**.
The SATCOM PART NUMBERS page appears.

```

  SATCOM PART NUMBERS
HARDWARE
1252 - A - 3800 - 01 A00
SOFTWARE
LI - 1252 - 38015 A00
ICAO ID                      S / N
12345678                    369
FWD ID 1                     FWD ID 2
A1B2C3                       A1B2C3
IMSI #
112233445566778

RETURN >
```

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The part numbers menu displays the following information:

- HD-710 terminal part number and version
- HD-710 terminal software load and version
- 8-digit (octal) ICAO ID
- 3-digit HD-710 terminal serial number
- 15-digit IMSI number

4.3.4.12 Configuring Headsets

To configure the headset(s):

1. On the main page of the MCDU, press the key next to **SUBMENU**. The SATCOM SUBMENU appears.
2. On the **SATCOM SUBMENU** page, press the key next to **MAINTENANCE**. The SATCOM MAINTENANCE page appears.
3. Press the key next to HEADSET CONFIG.

The SATCOM HEADSET CONFIG page appears.

NOTE: Toggle between the two 4-wire headsets by pressing the key next to SAT. When you toggle between headsets, the speaker, microphone, sidetone, and noise values are displayed for that headset.

```

SATCOM HEADSET CONFIG
* DEFAULT SAT
          SPEAKER 1
* DWN      50      UP *
          MICROPHONE
* DWN      70      UP *
          SIDETONE
* DWN      50      UP *
          NOISE
* DWN      - 50     UP *

          RETURN >

```

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4. To increase or decrease the speaker, microphone, sidetone, and noise insertion levels, press the keys next to **DWN** and **UP**. When you change either of the levels, a SAVE label appears at the bottom of the screen.

NOTE: The speaker, microphone, and sidetone values move up and down by 5, and the noise value moves up and down through values -60, -50, -40, and OFF.

NOTE: To reset all the settings to the default values, press the key next to **DEFAULT**. Default values are speaker (50), microphone (70), sidetone (50), and noise (-50).

NOTE: The noise parameter adjusts the level of comfort-noise. In some versions of software the comfort noise degrades the quality of the received speech. To improve the quality of received speech, set the Noise parameter OFF.

5. To save the new levels, press the key next to **SAVE**.

4.3.5 Operating the WSC

The WSC performs the same functions as the MCDU. For more information on operating the WSC, see the WSC manufacturer's documentation and ARINC 741 Part 2 Attachment 2F-42.1.

4.3.6 Performing Cockpit Communications with the MCDU

This section provides instructions for making calls with the MCDU and 4-wire voice services available in the aircraft's cockpit. The cockpit communications system operates with one or two headsets in the aircraft's cockpit, depending on the operational mode.

4.3.6.1 Modes of Operation

The cockpit communication services are configured in one of two modes of operation before installation: Latched mode and Push-to-Talk (PTT) mode. These configurations are strapped at the terminal and cannot be changed without removing and rewiring the terminal.

In PTT mode, a telephone number can be dialed only using the MCDU keys, not with the switches on the cockpit communication console. In Latched mode, a call to a telephone number loaded into the MCDU can be initiated using the switches on the Audio Control Panel (ACP), and calls can be answered and ended with the switches or the MCDU buttons.

4.3.6.2 Accepting and Making Calls

You can accept and make voice calls using

- the HD-710 terminal, the MCDU, the ACP, and one or two 4-wire cockpit headsets or
- the HD-710 terminal, the WSC, the ACP, and one or two 4-wire cockpit headsets.

4.3.6.2.1 Automatic Call Handling Priority and Preemption

The HD-710 terminal automatically disconnects (preempts) a call if it receives a higher priority call when both classic Aero channels are in use. When two calls are in progress, the HD-710 terminal preempts the lower priority call. If both calls are the same priority, the HD-710 terminal preempts the last call received.

When the HD-710 terminal preempts the lower priority call, the 4-wire interface is placed on-hook, and the preempting call is announced just like any other incoming call.

4.3.6.2.2 Accepting and Making Calls

You can use the MCDU and ACP to accept calls, make air-to-ground calls, and make air-to-air calls. You can manually dial calls or dial previously saved telephone numbers from the MCDU's telephone directory.

The way in which you can accept or make calls depends on the mode in which your 4-wire cockpit headset is strapped (PTT mode or Latched mode) and the Cockpit Outgoing Call Pre-Select ORT parameter. Refer to "Configuring Outgoing Call Pre-Selection" in Configuring the Owners Requirements Table (ORT).

The combination of lights and chimes that alert you to an incoming call depends on the way in which the HD-710 terminal Cockpit Call Signalling Mode ORT parameter is set. Refer to C. "Configuring Cockpit Communication Parameters" in Configuring the Owners Requirements Table (ORT). If you use the alternate output discretes, the call discrete outputs are driven as per Table 2-4 instead of using lights and chimes.

Table 4. Call Discrete Outputs in HD-710 Terminals

Channel State	Audio Discrete		Alternate Call Discrete	
	Digital Audio System Light	Digital Audio System Chime	Discrete 1	Discrete 2
On hook	Open	Open	Open	Open
Call initiated/connected	1 Hz Open-Gnd	Open	Gnd	Open
Call answered	GND or 3 Hz Open-Gnd	Open	Open	Gnd
Incoming call	1 Hz Open-Gnd	Single-stroke Open-GND- Open	Gnd	Gnd

To accept the call:

- On the first page of the MCDU's main menu, press the key next to **ANSWER CALL**. or
- Assert the **Place/End** switch. or
- In Latched mode, on the ACP, assert the **SAT 1** or **SAT 2** switch. or
- In PTT mode, on the ACP, assert the **SAT 1** or **SAT 2** switch and press the PTT switch.

4.3.6.2.3 Manual Dialing Calls

Making calls using the HD-710 terminal is similar to placing an international telephone call. Air-to-ground telephone numbers include an international access code, country code, and area code.

To manually dial a call:

1. On the main page of the MCDU, press the key next to **DIRECTORY**.

The SATCOM DIRECTORY page appears.

```
SATCOM DIRECTORY
< CATEGORY 01    CATEGORY 03 >
< CATEGORY 02    CATEGORY 04 >

                                S A T
                                2
[ M A N U A L   D I A L ]      P R I
                                3

                                R E T U R N >
```

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2. To select a channel, on the **SATCOM DIRECTORY** page, press the key next to SAT (the channel number).
3. To set the priority for your call using Table 2-5, type the priority number on the MCDU scratchpad and press the key next to **PRI** (the priority value).

Table 5. Priority Codes

Call priority	Description
1	Emergency—used for distress or urgent calls
2	Operational-High—used for Flight Safety communications
3	Operational-Lo—used for Regularity of Flight, Meteorological or Administrative communications
4	Non-Operational—used for Non Safety of Flight or public phone call (cabin) communications

4. To dial the call, type the phone number into the scratchpad and press the key next to **MANUAL DIAL**.

NOTE: Do not type any dots, dashes, or spaces in the phone number.

With Pre-Select Mode disabled, the MCDU Main Menu page appears and the HD-710 terminal initiates the call. With Pre-Select Mode enabled, the MCDU Main Menu page appears.

- To start the call with Pre-Select mode enabled, in either Latched or PTT mode, press the key next to **MAKE CALL**.
- To start the call in PTT mode with Pre-Select mode enabled, on the ACP, assert the **PLACE/END CALL 1** or **PLACE/END CALL 2** switch.

Or

assert the **SAT 1** or **SAT 2** switch and then press the **PTT** switch.

- To start the call In Latched mode with Pre-Select mode enabled, on the ACP, assert the **SAT 1** or **SAT 2** switch.

4.3.6.2.4 Making Calls from the Telephone Directory

You can make voice calls from the numbers you have saved in the MCDU's telephone directory.

The HD-710 terminal MCDU enables you to keep four separate telephone books for different uses. By default, these books are called Category 01, Category 02, Category 03, and Category 04. You can customize the directory names in the HD-710 terminal ORT.

To make a call from the telephone directory:

1. On the main page of the MCDU, press the key next to **DIRECTORY**.

The SATCOM DIRECTORY page appears.

```
SATCOM DIRECTORY
< CATEGORY 01    CATEGORY 03 >
< CATEGORY 02    CATEGORY 04 >

                                S A T
                                2
[ M A N U A L   D I A L ]      P R I
                                3

                                RETURN >
```

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2. To access the phone numbers in a directory, press the key next to the directory name.

The selected directory appears.

```

CATEGORY 1                                1 / 1
MAKE CALL :                               SAT
                                           1
0 1 1 6 1 3 5 5 5 1 1 1 1                PRI
* 0 1 - LABEL 1                           3
0 1 1 6 1 3 5 5 5 2 2 2 2
* 0 2 - LABEL 2                           1
[                                           ]
[                                           ]
[ ]

* SORT                                RETURN >

```

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3. To dial or load a telephone number, press the key next to the number.

With Pre-Select mode disabled, the MCDU main menu page appears and the HD-710 terminal starts the call.

With Pre-Select mode enabled, the MCDU main menu page appears.

```

SATCOM MAIN MENU

SAT 1 AVAILABLE                            PRI
* MAKE CALL                               3
0 0 1 6 1 3 5 5 5 1 1 1 1

SAT 2 INCOMING CALL
* ANSWER CALL                            REJECT *
PUBLIC

< SUBMENU                                DIRECTORY >

```

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4. To dial the telephone number with Pre-Select mode enabled:
 - In PTT or Latched mode, on the MCDU, press the key next to MAKE CALL.
 - Or
 - In PTT mode, on the ACP, assert the PLACE/END CALL 1 or PLACE/END CALL 2 switch or close the SAT 1 or SAT 2 switch, and then press the PTT switch.
 - Or
 - In Latched mode, on the ACP, close the SAT 1 or SAT 2 switch.

4.3.6.2.5 Ending Calls

To end the call:

- In PTT or Latched mode, on the MCDU main menu, press the key next to **END CALL**.
Or
- In PTT or Latched mode, assert the **PLACE/END CALL 1** or **PLACE/END CALL 2** switch.
Or
- In Latched mode, on the ACP, open the **SAT 1** or **SAT 2** switch for the active call.

4.3.6.2.6 Saving Telephone Numbers in the Telephone Directory

You can save telephone numbers to the MCDU's telephone directory to use later, and you can dial telephone numbers from the telephone directory.

To save telephone numbers to the telephone directory:

1. On the main page of the MCDU, press the key next to **DIRECTORY**.
The SATCOM DIRECTORY page appears.
2. To view telephone numbers stored in a directory, press the key next to the directory name.
The directory listing appears.
3. Navigate to the page with the last entry in the directory, type the phone number into the scratchpad, and then press the key next to the empty brackets on the MCDU screen.
The telephone number appears in the brackets.
NOTE: Do not type any dots, dashes, or spaces in the phone number.
4. Type the name associated with the telephone number and then press the key next to the empty brackets on the MCDU screen.
5. Type the priority associated with the telephone number and then press the key next to the empty brackets on the MCDU screen.
6. To save the number, press the key next to **SAVE**. To cancel the new entry, press the key next to **CANCEL**.

NOTE: Press the key next to SORT to alphabetically sort the entries in the directory. Entries remain sorted even after the HD-710 terminal is rebooted.

4.3.7 Performing Cockpit Communications with the WSC

In HD-710 terminals, you can use the WSC to make outgoing calls instead of the MCDU. For additional details on making calls with the WSC, see the WSC manufacturer's documentation and ARINC 741 Part 2 Attachment 2F-42.1.