Multiband Plus-SW56
User Documentation

ASCEND COMMUNICATIONS, INC.

D **Declarations**

Line Connection and Signaling - Part 68 Requirements

Use of Ascend Communications Multiband Plus SW56 (4-wire) models MB-4SW56-4W and MB-7SW56-4W must comply with Part 68 of FCC Rules. Please note the following:

a   The Facility Interface Code (FIC) number for Multiband Plus SW56 is 04DU5-56 (56000 bps sub-rate digital). The service code for this equipment is 6.0N. The wall jack universal service order code (USOC) is RJ48S.

b   Multiband Plus SW56 may not be connected to a party line or telephone coin line.

c   Standardized jacks must be used for the connection

d   The manufacturer must make any necessary repairs to the unit in order to maintain valid FCC registration.

Part 15 Warning

WARNING: This equipment has been tested and found to comply with the limits for a class a digital device, pursuant of Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The authority to operate this equipment is conditioned by the requirement that no modifications will be made to the equipment unless the changes or modifications are expressly approved by Ascend.

International Safety Compliance

International Multiband Plus models, MB+ET-3BRI and MB+ET-8BRI, MB+ET-1E1, and MB+ET-2E1, comply with the following safety standards:

•   European Safety Standards EN41003 and EN60950

•   BZT VDE and European CISPR22 high frequency requirements

Data Ports European Standard

All Multiband Plus models are equipped with either two or four SELV ports as defined in European Standard EN41003. The text of this document refers to the SELV ports as Multiband Plus host ports or the DTE interface ports.

The SELV ports on the Multiband Plus must only be connected with SELF ports on other equipment.

United Kingdom Safety Warnings

WARNING: Only trained engineers authorized by Ascend are to install and maintain this equipment.

WARNING: The ports marked as "CONTROL", "PALMTOP", HOST 1", "HOST 2", "ALARM", and if fitted "HOST 3", and "HOST 4" are SELV ports and as such can only be connected to SELV ports on other equipment.

WARNING: The BNC connectors labelled TX and RX on the Multiband Plus DPNSS and PRI versions and the RJ45 connectors labelled 1 - 8 on the ISDN2 version are TNV circuits and as such may only be connected to the appropriate telecommunications network as detailed earlier.

Canadian Notice

NOTICE: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situation.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The *Load Number (LN)* assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The ter-

mination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100.

This equipment does not support line loopbacks.

WARNING: To users of digital apparatus in Canada:

THE DIGITAL APPARATUS DOES NOT EXCEED THE CLASS A LIMITS FOR RADIO NOISE EMISSIONS FROM DIGITAL APPARATUS SET OUT IN THE RADIO INTERFER- ENCE REGULATIONS OF THE CANADIAN DEPARTMENT OF COMMUNICATIONS.

LE PRESENT APPAREIL NUMERIQUE N'EMET PAS DE BRUITS RADIOELECTRIQUES DEPASSANT LES LIMITES APPLICABLES AUX APPAREILS NUMERIQUES DE LA CLASSE A PRESCRITES DANS LE REGLEMENT SUR LE BROUILLAGE RADIOELEC- TRIQUE EDICTE PAR LE MINISTERE DES COMMUNICATIONS DU CANADA.

C **Customer Service / Warranty**

Customer Service

If you have questions about Ascend's Multiband Plus or desire assistance, contact Ascend Communications in one of the following ways:

- In the U.S., you can reach Ascend customer service by telephone by dialing (800) ASCEND-4, that is (800) 272-3634. For the Ascend main office, dial (510) 769-6001.

- Outside the U.S., you can reach Ascend customer service by telephone by dialing (510) 769-8027. For the Ascend main office, dial (510) 769-6001.

- You can send a facsimile transmission (FAX) to Ascend at (510) 814-2300.

- You can send electronic mail to Ascend at the Internet address:
  `support@Ascend.com.`

- You can send written communications through U.S. Mail to Ascend at this address:

  Ascend Communications, Inc.
  1275 Harbor Bay Parkway
  Alameda, CA 94501

The product warranty appears on the following page.

Product Warranty

1   Ascend warrants that the Multiband Plus will be free from defects in material and workmanship for a period of twelve (12) months from date of shipment.

2   Ascend shall incur no liability under this warranty if

   a)   the allegedly defective goods are not returned prepaid to Ascend within thirty (30) days of the discovery of the alleged defect and in accordance with Ascend's repair procedures; or

   b)   Ascend's tests disclose that the alleged defect is not due to defects in material or workmanship.

3   Ascend's liability shall be limited to either repair or replacement of the defective goods, at Ascend's option.

4   Ascend MAKES NO EXPRESS OR IMPLIED WARRANTIES REGARDING THE QUALITY, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE BEYOND THOSE THAT APPEAR IN THE APPLICABLE Ascend USER'S DOCUMENTATION. Ascend SHALL NOT BE RESPONSIBLE FOR CONSEQUENTIAL, INCIDENTAL, OR PUNITIVE DAMAGE, INCLUDING, BUT NOT LIMITED TO, LOSS OR PROFITS OR DAMAGES TO BUSINESS OR BUSINESS RELATIONS. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES.

Warranty Repair

1   During the first three (3) months of ownership, Ascend will repair or replace a defective product covered under warranty within twenty-four (24) hours of receipt of the product. During the fourth (4th) through twelfth (12th) months of ownership, Ascend will repair or replace a defective product covered under warranty within ten (10) days of receipt of the product. The warranty period for the replaced product shall be ninety (90) days or the remainder of the warranty period of the original unit, whichever is greater. Ascend will ship surface freight. Expedited freight is at customer's expense.

2   The customer must return the defective product to Ascend within fourteen (14) days after the request for replacement. If the defective product is not returned within this time period, Ascend will bill the customer for the product at list price.

Out-of Warranty Repair

Ascend will either repair or, at its option, replace a defective product not covered under warranty within ten (10) working days of its receipt. Repair charges are available from the Repair Facility upon request. The warranty on a serviced product is thirty (30) days measured from date of service. Out-of-warranty repair charges are based upon the prices in effect at the time of return.

R **Road Map**

Starting from the top, the normal process for configuring and operating your Multiband Plus-SW56 follows:

1 Preview *Multiband Plus-SW56 Quick Start Guide*.

2 Do I have enough information?

What do I ask/tell my WAN provider? → See Chapter 4, section 4.4.3.

How do I wire my interface? → See Chapter 4.

I need an introduction to Multiband Plus and its terminology. → See Chapters 1 and 2 and Appendices C and F.

3 Complete *Multiband Plus-SW56 Quick Start Guide*, and in particular section 1 "Absolutely Important Information."

4 Where can I find an overview to Multiband Plus's menus and editor? → See the menu tree in Chapter 5. See also Appendix A and section 3.3 of Chapter 3.

5 Where can I find detailed information on Multiband Plus's parameters? → Profiles and their parameters are listed alphabetically in Chapter 6. For the names of each profile and its parameters, see the tables in Chapter 5.

6 Configure Multiband Plus for my application.

Configure Multiband Plus's operator security levels. → See Chapter 3, section 3.4.

Configure Multiband Plus's incoming/outgoing call routing. → See Chapter 3, section 3.7 and the "Call Routing" appendix.

Configure Multiband Plus's remote management interfaces. → See Chapter 3, section 3.15 (CDR) and Appendix B (MIF).

Configure Multiband Plus's inverse multiplexing features. → See Chapter 3, sections 3.16, 3.17 (Backup-and-overflow of nailed-up circuits), 3.18 (DBA), and the "Inverse-Multiplexing" appendix.

Configure the X.21, RS-366, or V.25 bis parameters. → See Chapter 3, sections 3.10 through 3.12 and the "RS-366, V.25 bis, X.21, Lead Dialing" appendix.

Configure Multiband Plus's miscellaneous features. → See Chapter 3, sections 3.9 (dual-port calls), 3.14 (calling limits).

7 Operating Pipeline can include the follow-
ing tasks.

Operating management overview. → See Chapter 4, section 4.5.

Dialing, clearing, or answering
calls features. → See Chapter 3, section 3.19 and **DO Answer**, **DO Dial**, and
DO Hang Up in Chapter 6.

Managing inverse-multiplexed
calls bandwidth. → See **DO Extend BW** and **DO Contract BW** in Chapter 6.

Troubleshooting and diagnosing
status. → See Chapters 7 and 8. See **DO Beg/End Rem Mgm**, **DO Beg/End BERT**, **DO Resynchronize**, and **DO Beg/End Rem LB** in Chapter 6. See **System Reset** in Chapter 6. See also Appendix D (error counting).

Backing up and Restoring Multi-
band Plus's configuration profiles. → See Chapter 3, sections 3.5 and 3.6.

Managing Multiband Plus. → See section 4.5 in Chapter 4 and **DO Password**, **Use MIF**, and **DO Beg/End Rem Mgm** in Chapter 6. Also see Appendix B on MIF.

T **Table of Contents**

Controlling Dynamic Bandwidth   H

Call Routing   I

Multiband Plus-SW56
Step-by-Step Quick Start

1 **Introduction**

This document contains information about Multiband Plus-SW56 models; that is, Multiband Plus models with a SW56 interface to the wide area network (WAN). For the purpose of this document "Multiband Plus" means Multiband Plus-SW56.

Multiband Plus combines the functionality of a WAN access device and a bandwidth manager. It manages two types of communications interfaces and performs the following functions.

Ports

- WAN Ports — To connect to telecommunication circuits, Multiband Plus's SW56 WAN ports can be provisioned with common carrier or private network lines, switched, and/or nailed-up circuits.

- Synchronous Serial Ports — To connect to synchronous serial hosts, Multiband Plus provides multiple V.35/RS-449/X.21 ports.

Functions

- WAN access — for building connections across the WAN

- WAN bandwidth management — for assigning WAN circuits to devices connecting directly to its synchronous serial ports

The following illustration shows the synchronous serial and SW56 WAN interfaces (I/F) provided by Multiband Plus:
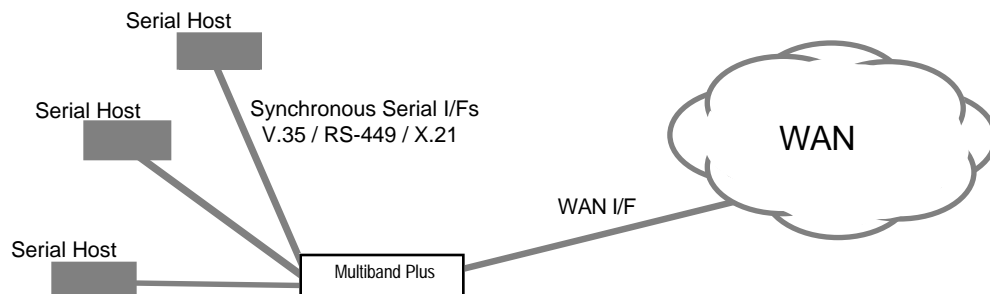
Other Multiband Plus products provide other types of WAN access. Chapter 2, *Concepts and Terminology*, describes interoperability between the various types of WAN access.

1.1 Software Revision Level

This manual documents Multiband Plus-SW56 running at software revision 3.4P. Any changes subsequent to the publication of this volume are described in the *Release Notes*.

Pipeline, MAX, and Multiband Plus are a product family with many common features and functions. To reflect the commonality of these features, these three products and future products in this family are identified by "sparse" software revision numbers.

In the "sparse" numbering scheme, when the shared features function identically, the software revision numbers are the same

Note that software revision numbers can increment unevenly (as 3.4 to 3.5 to 3.19 to 4.1). The numbers represent common functionality and not what is next in the sequence.

1.2 How to Find the Information You Need

The best overview of Multiband Plus-SW56 information is provided by the 2-page Road Map section preceding the Table of Contents.

- To understand terms and their use, see Chapter 2 or the index.

- To reference specifications, compatibility lists, or other information relevant to planning an installation, see Chapter 3, "Planning and Specifications."

- To get "how to" help, see the list of procedures in Chapter 3. The *Multiband Plus-SW56 Quick Start Guide*, a separate volume, explains how to install Multiband Plus.

- To learn about the functionality of each Multiband Plus parameter and command, see Chapters 5 through 7.

- Specialized topics are found in the appendices.

2 Concepts and Terminology

This chapter is a discussion of the key terms, concepts, and features used throughout the Multiband Plus-SW56 User Documentation. It describes Multiband Plus-SW56's functionality and its interfaces to wide area networks (WANs) and local area networks (LANs).

2.1 Network Terminology

This section defines key network terminology as it relates to Multiband Plus-SW56's user interface. Commonly accepted terms and their definitions are used wherever possible:

- A *network* is a set of computers and other equipment connected together to enable information to be transferred and resources to be shared.

- A network that connects computers and other types of digital data equipment to each other over extended geographic distances is called a wide area network (*WAN*).
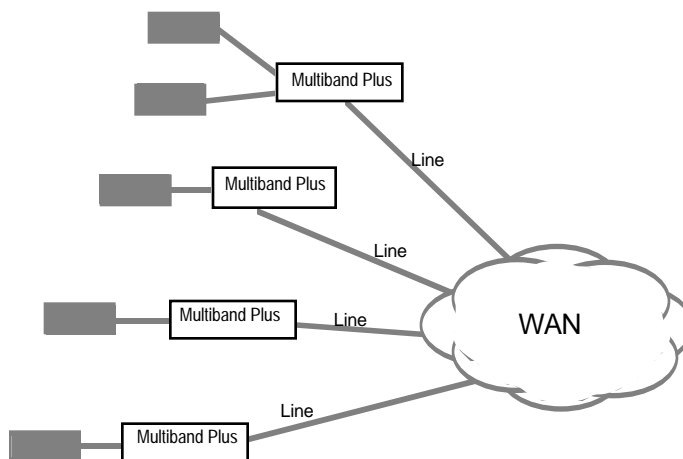
Multiple Devices Connected to the WAN

- A network that connects computers and other digital data equipment within a confined geographical area is called a local area network (*LAN*), for example, Ethernet.

The equipment at the endpoints of a network are known as *hosts*. Hosts are the ultimate source and/or destination of information carried by the network. This document distinguishes between two types of hosts:

- A *station* is a device connected to the LAN that has a LAN address and communicates with other stations by the transmission and reception of data packets. Each data packet typically has the address of its destination and its source.

- A *serial host* is a device connected to a synchronous serial port that communicates over a point-to-point link. To a serial host, Multiband Plus-SW56 appears to be a simple cable or data communications equipment (DCE). That is, two hosts are tied together over a virtual point-to-point circuit.

The term *serial host port*, as used throughout this document, means the V.35, RS-449, or X.21 port on the Multiband Plus-SW56 to serial host equipment.

Multiband Plus-SW56 uses *WAN* in the limited and specific sense, meaning that segment of a network consisting of lines and services provided by telephone companies and other telecommunication providers.

- A *call* is a single session during which a calling device and a called device are connected over the WAN. All calls mentioned in this document deliver data just as if there was a cable between the endpoints of the connection and nothing else. A call is made up of one or more circuits as defined below.

- A *nailed-up* circuit is a permanent connection between endpoints over which data is transmitted. Nailed-up circuits are also called private or leased circuits.

- A *switched* circuit is a temporary connection between end points that is established for the duration of the call, used to transmit data, and is then disconnected. The point at which switched circuits at your premises are connected to a WAN switch is called the point of presence (*POP*).

- A *line* is the physical interface to the WAN. Section 2.2   describes four types of lines. Multiband Plus-SW56 connects to *SW56* lines, a media that provides 56 kbit/s per line.

- A *channel* is an increment of bandwidth provided by the WAN. A line contains a fixed number of channels. Lines can have all switched, all nailed-up, or a mixture of switched and nailed-up channels.

    - A *DS0* is a term for a 64 kbit/s channel. In the U.S., some access lines require that 8 kbit/s of each DS0 channel be set aside for WAN synchronization and signaling, leaving the remainder, 56 kbit/s, for the transmission of user data.

    - A *B channel* is an ISDN term for a 64 kbit/s channel that carries user data. B channel is used interchangeably with DS0.

    - A *D channel* is an ISDN term for a channel that carries signaling information.

2.2 WAN Access Lines and Circuits

WAN access lines are distinguished from each other by their physical and electrical characteristics.

The following list describes the wide variety of WAN access lines. Although Multiband Plus-SW56 has ports for SW56 lines only, it can make calls to or receive calls from devices with any other WAN interface provided that the WAN can adapt from one line type to another — which generally is true:

- A *T1* line has 24 DS0s. Depending upon the provisioning by the carrier, both nailed-up and switched channels are offered:

  - *Dedicated T1 lines* provide only nailed-up channels, that is, permanent circuits.

  - *T1 access lines* use inband signaling to set up calls using switched-56 kbit/s channels. Providing switched channels does not preclude nailed-up channels on the same line.

- A *PRI access line* (ISDN Primary Rate Interface) is electrically and physically a T1 line that typically has one D channel (a DS0 used for out-of-band signaling) and 23 B channels (DS0s available for switched service). This type of PRI, based on T1, is a standard in the U.S. and other T1 countries. Providing switched channels does not preclude nailed-up channels on the same line.

- *E1 PRI access lines* have 30 B channels, 1 D-channel, and one framing channel. E1 lines, which have 32 DS0s, are a standard in Europe and Asia called G.703.

- A *switched-56 access line* has a single DS0 over either a *four-wire* or *two-wire* physical interface. The abbreviation *SW56* for switched 56 access lines is used through this document. Both nailed-up and switched lines are available.

- An ISDN Basic Rate Interface (*BRI access line*) has two B channels and one D-channel. Both, one, or none of the B channels can be nailed-up.

The following illustration shows SW56 and the other digital WAN interfaces:

WAN Access Methods
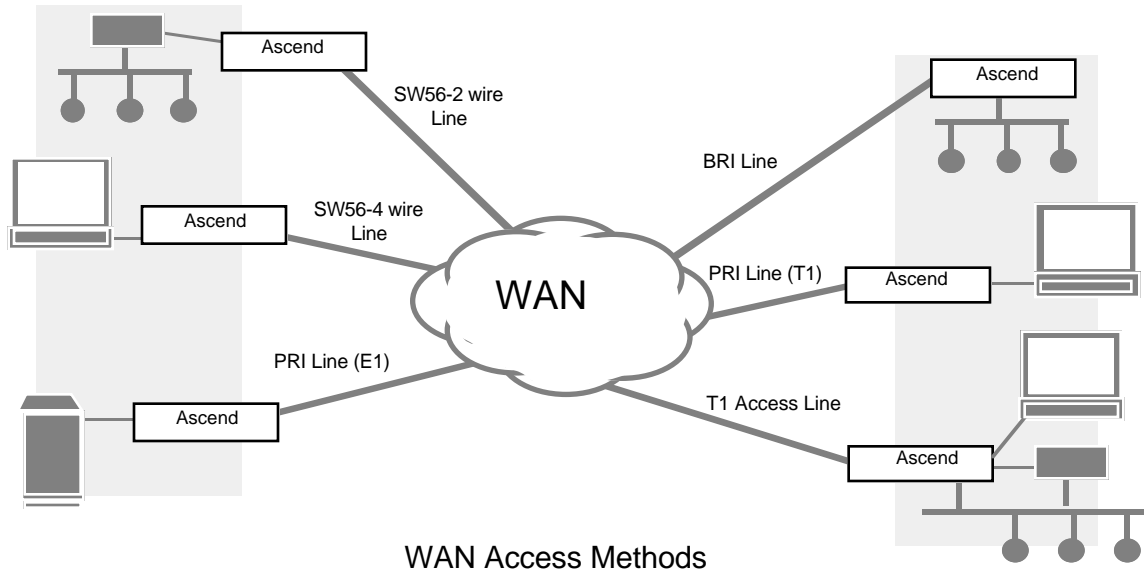
2.2.1 **WAN Switched Services (Switched Circuits)**

In this document, we talk about the following types of *switched services*, each character-ized by the unit measure of its bandwidth. A switched service by definition exists only over a switched circuit, that is, a circuit that exists only for the duration of the call:

- *Switched-56 kbit/s* service is provided over every type of access lines and consists of a single 56 kbit/s channel.

- *Switched-64 kbit/s* service is provided over ISDN BRI and PRI access line, and con-sists of a single 64 kbit/s channel.

- *Switched 384* or *H0* service is provided over PRI (T1 only) access lines from AT&T, and consists of a single 384 kbit/s circuit. The H0 channel consists of six B channels.

- *Switched 1536* or *H11* service is provided over PRI (T1 only) access lines from AT&T, and consists of a single 1536 kbit/s circuit. The H11 channel consists of 24 B channels.

- *MultiRate* is provided over PRI (T1 only) access lines, and consists of a single circuit whose bandwidth is some multiple of 64 kbit/s. For example, when MultiRate 512 kbit/s services are requested, 8 B channels are accessed to supply the requested bandwidth.

- *GloBanD* is provided over ISDN PRI access lines, and consists of a single circuit whose bandwidth is some multiple of 64 kbit/s. GloBanD services follow the CCITT Q.931W recommendations.

2.2.2 **WAN Nailed-up Circuits**

Most providers of WAN digital communication circuits offer these circuits nailed-up. Full T1 and E1 lines are offered nailed up, or a selected number of channels are offered nailed-up. Fractional-T1 refers to a T1 line in which some, but not all of the channels are nailed-up. BRI and PRI lines can be provisioned by the WAN provider to include some nailed-up channels and some switched.

2.3 **Multiband Plus-SW56 Product Definition**

Multiband Plus-SW56 is a device that provides WAN bandwidth to a variety of applications. It provides the following features:

- **Terminal Adapter (TA) /Terminal Equipment (TE) /Inverse Multiplexer Functionality** includes dialing and answering calls to and from multiple synchronous serial host devices

Each of these functions is explained in more detail in the following sections. For information on base system and optional configurations see the "Planning and Specifications" chapter.

2.3.1 **Terminal Adapter (TA) /Terminal Equipment (TE) /Inverse Multiplexer Functionality**

In addition to dialing through Multiband Plus-SW56's user interface, three dialing protocols: RS-366, V.25 bis, and X.21 are available for dialing from the serial host device. The next three sections describe these protocols. The last section describes inverse multiplexing, which is available to all serial host devices connected to Multiband Plus-SW56.

RS-366 Dialing Functionality
The *RS-366 dialing interface* on Multiband Plus meets the EIA RS-366 specification for dialing individual calls from a serial host. Additional dialing features are included in Multiband Plus's superset of RS-366.

V.25 bis Dialing Interface Functionality
Multiband Plus's *V.25 bis dialing interface* meets the V.25 bis CCITT recommendation for the addressed call mode of dialing and answering individual calls. This interface enables direct dialing and answering from serial host ports using the V.25 bis dialing protocol. Multiband Plus's implementation of V.25 bis protocol conforms to the extension of this standard published by Cisco Systems and Ascend Communications Inc.

X.21 Dialing Interface Functionality
The *X.21 dialing interface* on Multiband Plus is compatible with the CCITT X.21 recommendation for dialing and answering individual calls. It is often used for direct dialing and answering from attached codecs, routers, or other serial host.

AIM Functionality and BONDING functionality

AIM (Ascend Inverse Multiplexing) is Ascend's proprietary mechanism for combining multiple 56 or 64 kbit/s switched channels into a single logical high-speed channel. *BONDING* is an alternative standard by which channels are aggregated. Multiband Plus-SW56 can use either AIM and BONDING to aggregate bandwidth for calls between serial host devices.

Both AIM and BONDING are *inverse multiplexing* protocols by which Multiband Plus-SW56 can combine individual 56 kbit/s switched and nailed-up channels to create virtual high-speed data calls at rates that are multiples of 56 kbit/s.

At the transmitting end, Multiband Plus-SW56 distributes a high-speed serial stream over multiple channels across the WAN, and at the receiving end it reassembles the data into a single high-speed stream.
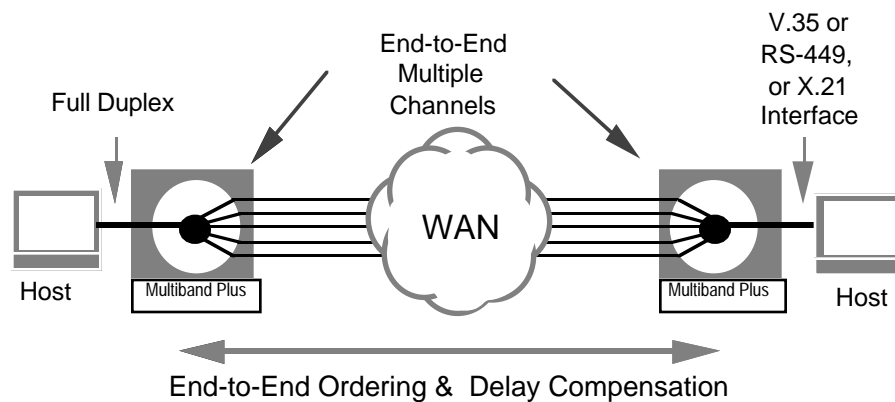
NOTE: Multiband Plus-SW56 supports *dual-port* calls for backward compatibility with existing videoconferencing applications. Dual-port means a call that achieves twice the bandwidth of a single channel by inverse multiplexing in the serial host device and not in Multiband Plus-SW56. The videoconferencing codec provides two data ports, one for each channel. Multiband Plus-SW56 can place or answer dual-port calls at 112 or 128 kbit/s with existing equipment such as switching DSU/CSUs at the other end of the call.

The two serial host ports on Multiband Plus-SW56 that connect a dual-port call to the serial host are called the *primary port* and the *secondary port*. Because Multiband Plus-SW56 places the two calls in tandem and clears the calls in tandem, they are considered a single call even though Multiband Plus-SW56 does not perform inverse multiplexing on the channels.

Automatic Dynamic Bandwidth Allocation (DBA) Functionality

This feature applies to inverse-multiplexed calls between serial host ports and extends AIM functionality so that Multiband Plus-SW56 can monitor the data stream and, in times of increased or decreased bandwidth demands, vary the data rate to match actual usage requirements. All remaining references to automatic Dynamic Bandwidth Allocation functionality in this document are given as *DBA*.

2.4 **User Interface Terminology**

This section defines the most frequently used terms referring to Multiband Plus-SW56 control interface. Additional information on the user interface is found in the "Keyboard Reference" appendix. A map of the user interface menus appears in the "Parameter Summary" chapter.

- *Parameter* — an element of Multiband Plus-SW56's configuration that appears in the user interface

  Example: The **Term Rate** parameter sets the bits per second at Multiband Plus-SW56's console port. The user can set this parameter to several values, such as *9600* bits/sec.

  Parameters appear in **bold** typeface, their values in *italics*.

- *Edit Menus* — the branch of Multiband Plus-SW56's menu tree that contains parameters that can be edited and menu-driven commands

  Example: The **Term Rate** parameter appears in the Edit Menus. The command `Save Cfg` also appears in the Edit Menus. Selecting `Save Cfg` starts the process that saves Multiband Plus-SW56's configuration.

  A map of the user interface menus appears in the "Parameter Summary" chapter. Menu commands appear in `bold courier` typeface.

- *Status Menus* — the branch of Multiband Plus-SW56's menu tree that contains read-only parameters and other types of status information

  Example: The status menu `Message Log` lists the most recent 32 system-wide events

- *Profile* — a group of parameters in one of the edit menus that represent the attributes and services of a Multiband Plus-SW56 function or object

  Example: The Security Profile contains parameters that control access to Multiband Plus-SW56's operation and configuration. The Line Profile contains parameters that define the attributes of the SW56 interface.

  For a map of the menu location of Multiband Plus-SW56's profiles, see the "Parameter Summary" chapter. Definitions of each profile appear in the "Reference to Edit Menus" chapter.

- *DO Menu* — the list of commands in Multiband Plus-SW56's user interface that appear in a pop-up window when the operator presses the `DO` key or `Ctrl-D` key combination

- *Simplified Menus* — an alternate user interface that contains a subset of the features and functionality of the full user interface

See "Simplified Menus" appendix for details about this user interface.

- *Control Interface* — Multiband Plus-SW56 is equipped with asynchronous serial ports for a VT-100 terminal or terminal-emulator and for the *Palmtop*, a hand-held terminal supplied by Ascend. When equipped with four-host ports, an additional two hand-held terminal ports are supplied.

3   Configuring and Operating

This chapter provides procedures for and information related to operating and configuring Multiband Plus-SW56.

These procedures are not meant as a stand-alone reference. For detailed information about the profiles and parameters referred to in this chapter, see Chapters 5 and 6. Chapter 6, "Reference to Edit Menus" contains descriptions of each parameter, listed in alphabetical order, and all parameter values. Chapter 5, "Parameter Summary" lists the parameters belonging to each profile and menu, and details the menu structure.

3.1   Overview of Procedures

Section 3.2 through 3.6 include installation, maintenance, and other tasks not associated with any particular configuration or application. (Maintenance information is also found in the "Troubleshooting and LEDs" chapter.)

The remaining sections consist of profiles for specific applications.

Section 3.19 describes operations that you perform after you have configured Multiband Plus-SW56's profiles. The "Simplified Menus" appendix also contains information on dialing, answering, and clearing calls.

Some operations are performed by simple commands from the user interface. These commands are described in the "Reference to Edit Menus" chapter. In particular for information on saving the layout of the display screen, see **DO Menu Save**. For information on using operator security and passwords see **DO Password**. For information on changing a call's bandwidth, see **DO Extend BW** and **DO Contract BW**. For information on operating remote management, see **DO Beg/End Rem Mgm**.

3.2   Installation and User Interface Connection Guidelines

For detailed information about planning for your installation, refer to Chapter 4, "Planning and Specifications," and for an introduction to installation procedures read the *Multiband Plus-SW56 Quick Start Guide*. Read these guidelines and reminders in conjunction with that information.

- If you have completed the installation and turned on power, but do not see the expected display, type Control-L on the VT-100 to refresh the screen, or if you are using the Palmtop Controller, remove the jack from the end of the Palmtop, wait 5 seconds, and then reinsert the jack to refresh the display. If the VT-100 still does not display properly, your terminal might have the wrong bit rate.

- To install a VT-100 monitor on a Palmtop port, use the optional HHT-VT-100 cable. The Palmtop port has a fixed 9600 bit rate, no parity, on stop bit.

3.3 Editing Parameters

Most keystrokes used by Multiband Plus-SW56 follow normal conventions for editing parameter values. For a reference to these keystrokes, see the "Keyboard Reference" appendix, which describes how to move from menu to menu, select parameters, and operate all command keys.

With the exception of parameters designated *N/A* (not applicable), you can edit all parameters in any ***profile*** (a group of parameters listed under a particular menu entry, such as System Profile parameters listed under the Sys Config menu). *N/A* means a parameter does not apply within the context of how some other parameter(s) or profile has been set.

See the "Parameter Summary" chapter for an illustration of where Multiband Plus-SW56's profiles are located within the general menu structure. This appendix also explains the structure of menu numbers. Multiband Plus-SW56's 5-digit menu numbers, such as 20-100, appear in the upper left hand corner of each menu window.

The following sections step through the input and editing processes.

3.3.1 Editing an Enumerated Parameter

An enumerated parameter is one for which there is a set of predefined values. It is modified by simply placing the cursor beside the parameter and typing the **Enter**, **Return**, or the **Right-Arrow** key until the desired value appears.

3.3.2 Opening a String Parameter for Editing

Some parameters are defined by typed-in strings. The string can be text or a numeric value.

To enter a string value or to modify an existing value from the Control Monitor, you must first move the cursor to the parameter to be modified and open it by pressing the **Right-Arrow**, **^Z**, **Return**, or **Enter** key. In the following illustration, the cursor has been positioned to select the **Name** parameter in the Sys (System) Config menu.

```
┌──── East Coast MB Edit ════╗          ┌─────────────────────┐  ┌─────────────────────┐
║00-100 Sys Config           ║          │ 10-100 1234         │  │ 00-200 11:23:55     │
║>Name=Mark                  ║          │  Link  XXXX         │  │ M31 Line    Ch      │
║ Location=                  ║          │  Call  **..         │  │ Assigned to port    │
║ Contact=                   ║          └─────────────────────┘  └─────────────────────┘
║ Date=00/00/00              ║
║ Time=12:30:44              ║          ┌─────────────────────┐  ┌─────────────────────┐
║ Term Rate=2400             ║          │ 21-100           O  │  │ 21-200           O  │
║(remaining lines not shown) ║          │  ONLINE             │  │ Qual Good 01:23:44  │
║                            ║          │  56K    1 channels  │  │ Max Rel Delay       │
║                            ║          └─────────────────────┘  │ CLU 100%  ALU 100%  │
║                            ║                                    └─────────────────────┘
║                            ║          ┌─────────────────────┐  ┌─────────────────────┐
║                            ║          │ 22-100           O  │  │ 22-200           O  │
║                            ║          │  ONLINE             │  │ Qual Good 01:23:44  │
║                            ║          │  56K    1 channels  │  │ Max Rel Delay       │
║                            ║          └─────────────────────┘  │ CLU 100%  ALU 100%  │
║                            ║                                    └─────────────────────┘
║                            ║          ┌─────────────────────┐  ┌─────────────────────┐
║                            ║          │ 00-100 Sys Option   │  │ Main Status Menu    │
║                            ║          │>Security Prof:1     │  │>00-000 System       │
║                            ║          │ Software +2.0       │  │ 10-000 Net/S56-..   │
╚════════════════════════════╝        s │ S/N:42901           │  │ 20-000 Host/..      │
                                         └─────────────────────┘  └─────────────────────┘
```

```
Right Arrow/^Z = Select      Left Arrow/^X = Exit       Up Arrow/^U = Up
Down Arrow/^N = Down         PF1/^D = DO!               Tab = Window
```

As soon as you begin to edit, a pop-up window appears showing the current parameter value within brackets. The following illustration shows **Name** being edited and its current value is *Mark*.

```
┌══East Coast MB Edit ════╗             ┌─────────────────────┐  ┌─────────────────────┐
║00-100 Sys Config        ║             │ 10-100 1234         │  │ 00-200 11:23:55     │
║Name:                    ║             │  Link  XXXX         │  │ M31 Line    Ch      │
║  [Mark]                 ║             │  Call  **..         │  │ Assigned to port    │
║                         ║             └─────────────────────┘  └─────────────────────┘
║ Date=00/00/00           ║
║ Time=12:30:44           ║             ┌─────────────────────┐  ┌─────────────────────┐
║ Term Rate=2400          ║             │ 21-100           O  │  │ 21-200           O  │
║(remaining lines not shown)║           │  ONLINE             │  │ Qual Good 01:23:44  │
║                         ║             │  56K    1 channels  │  │ Max Rel Delay       │
║                         ║             └─────────────────────┘  │ CLU 100%  ALU 100%  │
║                         ║                                       └─────────────────────┘
║                         ║             ┌─────────────────────┐  ┌─────────────────────┐
║                         ║             │ 22-100           O  │  │ 22-200           O  │
║                         ║             │  ONLINE             │  │ Qual Good 01:23:44  │
║                         ║             │  56K    1 channels  │  │ Max Rel Delay       │
║                         ║             └─────────────────────┘  │ CLU 100%  ALU 100%  │
║                         ║                                       └─────────────────────┘
║                         ║             ┌─────────────────────┐  ┌─────────────────────┐
║                         ║             │ 00-100 Sys Option   │  │ Main Status Menu    │
║                         ║             │>Security Prof:1     │  │>00-000 System       │
║                         ║             │ Software +2.0       │  │ 10-000 Net/S56-..   │
╚═════════════════════════╝           s │ S/N:42901           │  │ 20-000 Host/..      │
                                         └─────────────────────┘  └─────────────────────┘
```

```
Right Arrow/^Z = Select      Left Arrow/^X = Exit       Up Arrow/^U = Up
Down Arrow/^N = Down         PF1/^D = DO!               Tab = Window
```

NOTE: In this manual, most illustrations show only the portion of the screen of interest:

```
00-000 Sys Config
>Name=Mark
 Location=
 Contact=
```

The process of editing from the optional Palmtop Controller is nearly identical, except the **Right-Arrow** key replaces the functions of the **Enter/Return** key. That is, after you have positioned the cursor (>) in front of the desired parameter, press the **Right-Arrow** key to begin to edit it. The following display shows the cursor in front of the **Name** parameter:

```
21-101 Albuquerqu+ O
>Name=Mark
 Dial #=555-1212
 Call Type=AIM     v
```

As soon as you open a parameter that takes string values, the current parameter value within appears within brackets as shown in the following illustration:

```
21-101 Albuquerqu+ O
Name:
  [Mark]
```

3.3.3 Modifying an Existing Parameter String

To modify an input parameter (that is, one defined by a typed-in string), you have three options:

• You can clear the current input and type in a new value.

   To clear the field when the cursor is on the opening bracket, type any character other than an arrow key. The character you type becomes the first character of the new input string. As you type in the entry, if it is too long to fit onto one line, the entry wraps onto the next line.

• You can remove incorrect characters with the **Delete** (**BK Space**) key. From the Palmtop Controller, you can remove incorrect characters by typing the key combinations **SHFT->** (delete) or **SHFT-<** (rubout).

• You can use the arrow keys to move through the string and then modify the value by deleting unwanted characters or overwriting a new value onto the old value.

3.3.4 Closing or Aborting an Edited Parameter String

When you finished editing a parameter's string value, press **Enter**, **Return**, or use the **Right-Arrow** key to move past the right, or closing, bracket. This action accepts the new parameter value, closes the selection, and returns you to the originating profile menu. The new input appears as the parameter value in the edit menu as soon as you exit.

You can also exit the edit session by simply typing the **Esc** or **Left-Arrow** key. Whenever you exit an input menu this way, Multiband Plus-SW56 queries you to ensure that you really want to keep the string value as edited. The query message looks like the following illustration:

```
EXIT?
>0=ESC (Don't exit)
 1=Exit and discard
 2=Exit and accept
```

If you want your edits to be ignored and parameters to return their original values, type 1 or move the cursor to *1=Exit* and press **Enter**. If you want to keep your edits, choose 2. If you want to continue editing, choose 0 or type **ESC**.

3.3.5 Modifying and Saving Profiles

Since each profile simply is a list of parameters and their assigned values, when you modify any of a profile's parameters, you have modified the profile. Multiband Plus-SW56 has two explicit methods of saving profiles:

*   **DO Save** command

*   **Esc** or **Left Arrow** — When you exit a modified profile menu with the **Esc** or **Left-Arrow** key, Multiband Plus-SW56 prompts you to decide whether you wish to save the changes you made. You can save the profile values by choosing the `Exit and Save` option presented in the exit query pop-up menu.

```
EXIT
>0=ESC (Don't exit)
 1=Exit and discard
 2=Exit and save
```

Note, that sometimes your current Security Profiles, might block you from editing parameters or from saving all or some of your modifications. The following message

appears when you attempt to save an edited profile without first establishing proper security. Security Profiles are described in the "Reference to Edit Menus" chapter.

```
Message #120
Security violation
    Invalid security
            level
```

3.3.6 Call Profiles (Directory Menu)

Call Profiles contain the parameters of a call or nailed-up circuit between serial host ports. The *current Call Profile* is the profile that currently applies to a specific serial host port, while the stored Call Profiles can be used for future calls.

You can modify a Call Profile at any time, even during a call, however editing a Call Profile while the call is online is not recommended.

3.3.7 Initial Call Profile Definition

Multiband Plus-SW56 comes equipped with a factory-defined Call Profile that can be edited. This profile, called **Factory**, is the current Call Profile when you use Multi-band Plus-SW56 for the first time. The following example shows the Directory menu containing the **Factory** Call Profile:

```
21-100 Directory
>21-1** Factory
 21-101
 21-102
 Note: remaining lines not shown
```

3.3.8 Opening a Call Profile

To open a profile for editing, you select it from the Directory menu by pressing the **Right-Arrow** or **Enter** key. You can only open one Call Profile at a time.

Opening a Call Profile causes the list of parameters to appear. This menu bears the name of the profile and shows the profile's current parameter values. The following example shows the top of the parameter menu for the **Factory** Call Profile:

```
21-1** Factory
>Name=Factory
 Dial #=
 Call Type=AIM      v
  Note: remaining lines not shown
```

The first line of the Call Profile parameter menu shows the current name of the profile and its Directory menu number. The remaining lines contain the individual parameter names and their values. There are more than 20 Call Profile parameters. Use the **Up-Arrow** and **Down-Arrow** keys to locate the parameter you wish to modify and press the **Right-Arrow** key to select it.

3.3.9 Slave Call Profiles

The current Call Profile of a secondary port of a dual-port pair has the name *Slave*. All Call Profile parameter values for the secondary serial host port of a dual-port pair are automatically determined by the values you entered for the current primary host port and cannot be edited.

3.3.10 Modifying the Current Call Profile

As an example of modifying the current Call Profile, suppose you have changed the value of the **Dial #** parameter and saved the modified current Call Profile. Parentheses appear around the profile name indicating that you modified the current profile, but not its name:

```
21-100 Directory
>21-1** (Memphis)
 21-101 Tucson
 21-102 Memphis      v
```

NOTE: To change the profile's name, modify its **Name** parameter.

In this example, the Call Profile **21-102 Memphis** was not modified, only the current Call Profile **21-1** **Memphis** changed. To store the changes into profile 21-102, see section 3.3.12.

3.3.11 Changing an Active Current Call Profile

Modifying the currently active call can be confusing, and therefore it is recommended that only inactive Call Profiles be edited.

When you change the current Call Profile while the call is active, the new values of the Call Profile overwrite the values of the call in progress. Thus, you should be certain that the new profile parameters are compatible with those of the profile it replaces, or you might cause the call to fail or experience other difficulties.

- You cannot change the **Call Mgm** Call Profile parameter during an active call, except when the parameter **Call Type** has the value *Manual* or *Dynamic*. You can change a *Manual* call to *Dynamic* or *Static*. Similarly you can change *Dynamic* to *Manual* or *Static*. You cannot change a *Static* or *Delta* call to anything else, nor can any call be changed into a *Delta* call.

• You cannot change the **Call Type** parameter during a call.

Any change to a Call Profile can cause a small momentary burst of data errors while Multiband Plus-SW56 resets the Call Profile.

NOTE: If you are editing the current Call Profile of a port that has answered a call, the values for **Call Type**, **Call Mgm**, and **Data Svc** show the current call values and would normally be restored to their pre-call values when the call is cleared. However, if you make any change to the current Call Profile, the pre-call values are not restored.

3.3.12 **Saving Call Profiles**

In order to preserve your parameter inputs and edits for later dialing sessions, you must place the modified Call Profile in the list of saved Call Profiles.

The **DO Dial** command applied to a modified call profile saves the call profile as well as loading it into the current call profile.

If there are detectable errors or inconsistencies within the modified profile, an error message is displayed and control returns to an appropriate location to correct the error. If the profile is well-defined, you are then presented with the following pop-up menu where the storage menu numbers of all Call Profiles appear:

```
21-1** Factory
Save in profile...?
 0=ESC
>101
 102
```

To save the profile, simply scroll to the numbered location you desire and press the **Right-Arrow** or **Enter** key. The following status message indicates the saving process is complete:

```
Msg #117
 Profile stored
```

NOTE: If the current Call Profile is protected by password security, you might be able to save changes to its **Dial #** and **Base Ch Count** parameters but no other modified

parameters. In such cases, the following message is displayed. (See **Security Profiles** in the "Reference to Edit Menus" chapter.)

```
Status Msg #136
Only Base Ch Count
and Dial #
stored
```

3.3.13 Changing an Active Current Line Profile

Line Profiles contain the parameters that configure the SW56 interface. The *current Line Profile* applies to the current SW56 interface, while the stored Line Profiles are kept for future use. A current Line Profile is said to be *active* when it carries a call.

When you change the current Line Profile while the call is active, the new values of the Line Profile overwrite the values of the call in progress. Thus, you should be certain that the new profile parameters are compatible with those of the profile it replaces, or you might cause the call to fail or experience other difficulties.

3.3.14 Security Profiles (Security Menu)

A Security Profile is a list of parameters that either allow or disallow a variety of user interface operations. A Security Profile becomes activated by the user entering the pro-file's assigned password.

Multiband Plus-SW56 allows you to define nine Security Profiles. Selecting the Secu-rity option takes you to a list of nine Security Profiles:

```
00-300 Security
>00-301 Default
 00-302 Installer
 00-303 Callers     v
```

Initially all security restrictions are turned off, none of the profiles have names except 00-301 Default, and there are no passwords. As you configure Security Profiles, choose names for each profile that reflect the user groups they cover.

All security parameters can be modified, with the exception of the **Name** and **Passwd** security parameters of the `Default` Security Profile. The `Default` Security Profile is the first profile listed in the Security menu. Its name is always `Default` and it never has a password. Since the `Default` Security Profile has no password protection, it should disable all operations you do not want generally accessible.

NOTE: If editing Security Profiles is disabled under the system's current security, any changes you make to a Security Profile cannot be saved.

3.4 Configuring Security Profiles

A Security Profile is any one of the nine profiles listed in the **Security Menu**. Each Security Profile contains a password and a list of parameters that either enable or disable particular operations. Therefore, those operations allowed to a user depend on which password he enters. See Chapter 5, under **Security** for a list of the Security Profile parameters. See Chapter 6, "Reference to Edit Menus" for a detailed description of each parameter.

The *Default Security Profile* is the first profile (00-301) listed in the Security Menu. It has no password.

WARNING: Do not change the **Default Security Profile** before you have created the system administrator's Security Profile. The system administrator's profile *must* include editing Security Profiles. See the **Edit Security** parameter.

3.5 Backing Up Multiband Plus-SW56's Configuration

This procedure backs up all Multiband Plus-SW56 profiles, except Security Profiles, to a storage device, such as a hard disk. You can use this procedure with your local Multiband Plus-SW56 or most Ascend products you might be controlling through Ascend's remote management. The **Save Cfg** command enables back up.

The `Save Cfg` command is the second option listed in the Sys Diag menu, and its menu number is 00-202:

```
00-200 Sys Diag
>00-201 Restore Cfg ^
 00-202 Save Cfg
 00-203 Use MIF     v
```

3.5.1 Before You Start

You must have the **Download** Security Profile parameter (Security menu) enabled to save a configuration. See **DO Password** and **Security Profiles** in the "Reference to Edit Menus" chapter.

You cannot perform the restore or save operation through the hand-held Palmtop Controller device.

WARNING: No passwords are saved; namely, **Send PW** and **Recv PW** in the Connection Profiles, **Passwd** in Security Profiles, and **Passwd** in the System Profile. Record these parameters off-line, if you wish to restore them.

Verify that your terminal emulation program has a disk capture feature and an autotype (or ASCII file upload) feature. Disk capture allows your emulator to capture to disk the ASCII characters it receives at its serial port. Autotype allows your emulator to transmit over its serial port the contents of a file that it has built through disk capture.

3.5.2 **Procedure**

1   Connect the backup device to Multiband Plus-SW56's **Control** port.

    NOTE: See the "Planning and Specifications" chapter for the pin-outs of Multiband Plus-SW56's **Control** port, that is, the Control Monitor port.

2   Set the data rate of your terminal emulation program to 9600 baud or lower. To match, set the **Term Rate** System Profile (Sys Config menu) parameter also to *9600*. Higher speeds might cause capture errors.

3   Select `Save Cfg` from the Sys Diag menu. The following message appears:
    `Ready to download-type any key to start...`

4   Turn on the disk capture function of your emulator program and start saving by typing any key on your emulator.

5   Verify that the configuration data is being echoed to the screen of your terminal emulator and that the captured data has been written to a file on your disk.

6   You can abort saving at any time by typing **Ctrl-C**.

7   Save is complete when the following completion message appears on your emulator's display:
    `Download complete-type any key to return to menu...`

8   Turn off autotype capture.

3.6 Restoring Multiband Plus-SW56's Configuration from Backup

This procedure restores those profiles that had been backed up by **Save Cfg** or transfers these profiles to another Multiband Plus-SW56. You can use this procedure with your local Multiband Plus-SW56 or other Ascend products you might be controlling through Ascend's remote management. The **Restore Cfg** command begins the process.

The `Restore Cfg` command is the first option listed in the Sys Diag menu, and its menu number is 00-201:

```
00-200 Sys Diag
>00-201 Restore Cfg
 00-202 Save Cfg
 00-203 Use MIF
```

3.6.1 **Before You Start**

You cannot perform the restore or save operation through the handheld Palmtop Controller device.

You must have the **Upload** Security Profile (Security menu) parameter enabled.

Verify that your terminal emulation program has a disk capture feature and an autotype feature. Disk capture allows your emulator to capture to disk the ASCII characters it receives at its serial port. Autotype allows your emulator to transmit over its serial port the contents of a file that it has built through disk capture.

3.6.2 **Procedure**

1   Connect the backup device to Multiband Plus-SW56's **Control** port.

 NOTE: **Restore Cfg**: See the "Planning and Specifications" chapter for the pinouts of Multiband Plus-SW56's **Control** port, that is, the Control Monitor port.

2   Set the data rate of your terminal emulation program to 9600 baud or lower. To match, set the **Term Rate** System Profile parameter (Sys Config menu) also to *9600*. Higher speeds might cause data errors.

3   Make sure you have **Edit Security** privilege. Enter a Security Profile. If the **Passwd** parameter appears as *SECURE*, you do not have **Edit Security** privilege.

WARNING: No passwords are restored. If you restore without having **Edit Security** privilege, you can be locked out from all or some operations.

---

4   Select **Restore Cfg** from the Sys Diag menu.

5   When the following prompt appears, turn on the autotype function of your emulator program and supply the file name of the saved Multiband Plus-SW56 data:
 Waiting for upload data...

6   Verify that the configuration data is being sent to the screen of your terminal emulator and that the captured data has been restored to the target Multiband Plus-SW56.

7   You can abort restoring at any time by typing **Ctrl-C**.

8   Restore is complete when the completion message appears on your emulator's display:
 Upload complete-type any key to return to menu...

3.7   Setting Up Incoming Call Routing

The following parameters assign incoming calls to serial host ports,:

⇒⇒   **Port/Grp** Line Profile (Line Config menu) parameters

⇒⇒   **Dual Ports** Host-Interface Profile (Host Config menu) parameter

NOTE: The Line Profile parameters listed in this procedure also determine which channels and lines are used first by outgoing calls from a given serial host port.

For detailed information, see the "Call Routing" appendix.

3.8   Configuring Single-Channel Calls between Serial Hosts

To make a single-channel call that does not require support of inverse-multiplexing technology, set the **Call Type** Call Profile parameter to *1 Chnl* (Directory menu). You must choose this type of call whenever you are calling a TA or switching CSU/DSU or other type of equipment that does not support inverse multiplexing.

See also section 3.9 for dual-port calls, which are two single-channel calls placed in tandem from two serial host ports.

3.9   Configuring Dual-Port Calls between Serial Host Ports

This procedure assumes you have already configured the SW56 interface and the parameters that control incoming call routing. (See *Multiband Plus-SW56 Quick Start Guide* and section 3.7 for information on these procedures.)

Multiband Plus-SW56 can support tandem DS0-channel videoconferencing calls. Choose this type of call whenever you are connecting dual-port codecs. A dual-port call, like the single-channel calls, does not require support of inverse-multiplexing technology. The device at the far end does not need to be a Multiband Plus-SW56 or an inverse multiplexer. It can be two TAs or switching CSU/DSUs or switched-56 units, as long as the selected data service is available end-to-end data.

Depending on whether you have 56 or 64 kbit/s switched services end-to-end, the total bandwidth will be either 112 or 128 kbit/s respectively.

The two host ports of your Multiband Plus-SW56 that are connected in a dual-port call are called the *primary port* and the *secondary port.*

3.9.1   Required Dual-Port Call Parameter Values

Dual-port calls provide dual-port videoconferencing codecs with two independent calls of equal bandwidth through two independent host ports. The following steps apply to setting parameters for both the dialing and answering units:

1   Set the **Dual Ports** Host-Interface Profile (Mod Config menu) parameter to select the primary and secondary ports.

2   Set **Call Type**=*2 Chnl* in the Call Profile (Directory menu) of the primary host port.

3   Specify both phone numbers you are calling, separated by an exclamation point (!), in the **Dial #** parameter of the Call Profile of the primary port. Each phone number specified in this manner can be up to 18 digits long. However, if both connections in the call have the same phone number, you can enter only one number for this parameter's value.

4   If required, specify **Ans #** Port Profile parameter for the primary host port and not for the secondary host port. If required, specify **Ch *n* Slot** and **Ch *n* Prt/Grp** Line Profile parameters for the primary host ports. For information on routing dual-port calls, see the "Call Routing" appendix.

5   To originate a dual-port call, dial from the primary or secondary host port.

3.9.2 BONDING Mode 0 Calls

You can also make calls between dual-port videoconferencing codecs using BONDING Mode 0 (**Call Type**=*BONDING*, **Call Mgm**=*Mode 0*). The device at the far end must support BONDING Mode 0 calls. You must configure the following parameters before placing such a call:

1   Set the **Dual Ports** Host-Interface Profile (Mod Config menu) parameter to select the primary and secondary ports.

2   Set the **Call Type** Call Profile (Directory menu) parameter of the primary port to the value *BONDING*.

3   Set the **Call Mgm** Call Profile parameter of the primary port to the value *Mode 0*.

4   Specify the phone numbers of the primary port you are calling in the **Dial #** parameter of the Call Profile. The phone number can be up to 37 digits long.

3.10   Setting Serial Host Ports for V.25 bis Dialing and Answering

Setting up for V.25 bis dialing and answering involves installing the proper cables between the serial host and Multiband Plus-SW56, configuring the serial host for V.25 bis, and configuring the following Multiband Plus-SW56 Port Profile (Port Config menu) parameters:

⇒⇒ **Dial** = *V.25bis*

⇒⇒ **Answer** = *V.25bis* (or other value, depending on your serial host)

⇒⇒ **Clear** = *DTR Inactive* (or other value, depending on your serial host)

For further information on V.25 bis cabling see the "Planning and Specifications" chapter. For a description of this implementation of V.25 bis, see the "RS-366, V.25 bis, X.21, Lead Dialing" appendix.

3.11   Setting Serial Host Ports for RS-366 Dialing

Setting up for RS-366 dialing involves installing the proper cables between the serial host and Multiband Plus-SW56, configuring the following Multiband Plus-SW56 Port Profile (Port Config menu) parameters, and in some cases configuring the serial host for RS-366:

⇒⇒ **Dial** = *RS-366 ext1* or *RS-366 ext2*

⇒⇒ **RS-366 Esc** (depends on your serial host and not applicable to *RS-366 ext1*)

⇒⇒ **Answer** = *Auto* (or other value, depending on your serial host)

⇒⇒ **Clear** = *DTR Inactive* (or other value, depending on your serial host)

For further information on RS-366 cabling, see the "Planning and Specifications" chapter. For a description of this implementation of RS-366 and how to enter these RS-366 commands, see the "RS-366, V.25 bis, X.21, Lead Dialing" appendix.

3.12   Setting Serial Host Ports for X.21 Dialing and Answering

Setting up for X.21 dialing and answering involves installing the proper cables between the serial host and Multiband Plus-SW56, configuring the following Multiband Plus-SW56 Port Profile parameters, and in some cases configuring the serial host for X.21:

⇒⇒ **Dial** = *X.21 ext1*, *X.21 ext1-P,* or *X.21 ext2* (If connected to a PictureTel X.21 interface use *X.21 ext1-P*, otherwise use *X.21 ext1* or *X.21 ext2*.)

⇒⇒ **RS-366 Esc** (depends on your serial host and not applicable to *X.21 ext1*)

⇒⇒ **Answer** = *X.21* (or other value, depending on your serial host)

⇒⇒ **Clear** = *DTR Inactive* (or other value, depending on your serial host)

For further information on X.21 cabling, see the "Planning and Specifications" chapter. For a description of this implementation of X.21 and how to enter these X.21 commands, see the "RS-366, V.25 bis, X.21, Lead Dialing" appendix.

3.13   **Troubleshooting Calls between Serial Hosts**

See the "Troubleshooting and LEDs" chapter for a list of symptoms and possible causes as well as the meaning of each front-panel LED.

The following **DO** commands can help in troubleshooting calls between serial hosts. You must be in a edit or status menu specific to a serial host port with a call online to use the following commands:

- For a local loopback toward an application at its serial host interface, use the **Port Diag** (port diagnostics) menu. The port cannot have an active call. See also **Port Leads** status menu.

- For a loopback toward an application at its far-end serial host interface, see **DO Beg/End Rem LB**.

- For a channel-by-channel error measurement choose either **Auto-BERT** or **DO Beg/End BERT**. Both perform the same test, but **Auto-BERT** operates only during call setup or when adding channels to a call.

- To resynchronize a multichannel call use the **DO Resynchronize** command.

3.14   **Setting the Billing Cap (Calling Limits)**

The following parameters set up the maximum calling minutes/bandwidth usage over the SW56 lines.

⇒⇒   **DS0 Min Rst** Port Profile parameter (Port Config menu)

⇒⇒   **Max DS0 Mins** Port Profile parameter

⇒⇒   **Max Call Mins** Port Profile parameter

⇒⇒   **Max DS0 Mins** System Profile parameter (Sys Config menu)

⇒⇒   **DS0 Min Rst** System Profile parameter

3.15   **Setting Up Call Detail Reporting**

The 00-400 CDR (call detail reporting) status display provides detailed billing information. Like a message log, CDR records call events in the order in which they occur. However, unlike a log, you cannot reexamine an event that has passed. For this reason, and because the information from many screens is intended to be used to compute billing data, CDR is primarily a computer-to-computer tool.

Asynchronous traps programmed in MIF capture CDR data. The following string sets an MIF trap which captures any CDR status changes and reports these changes every 20 seconds:

```
SET 000.STAT.0.CDR=20
```

See also **CDR** in the "Reference to Status Menus" chapter and the "MIF" appendix for further information.

3.16   Configuring an Inverse Multiplexed Call with AIM

This procedure assumes you have already configured the SW56 interface and the parameters that control incoming call routing. (See Multiband Plus-SW56 Quick Start Guide and section 3.7 for information on these procedures.)

In this type of call, the Ascend Inverse Multiplexing Protocol (AIM) synchronizes multiple channels and delivers the aggregate bandwidth to your serial host. The following Call Profile parameters (Directory menu) control the inverse multiplexing functionality of the call:

⇒⇒   **Call Type** = *AIM*, *FT1-AIM*, *FT1-B&O*

⇒⇒   **Call Mgm**

⇒⇒   **Base Ch Count**

⇒⇒   **Inc Ch Count**

⇒⇒   **Dec Ch Count**

⇒⇒   **Data Svc** — sets the per channel bandwidth

⇒⇒   **Auto-BERT**

⇒⇒   **Fail Action**

⇒⇒   If **Call Type**=*FT1-AIM* or *FT1-B&O* selected, see 3.17 for additional parameters. If **Call Mgm**=*Dynamic*, see 3.18 for additional parameters.

Inverse multiplexed calls require knowledge of all phone numbers available to build multiple circuits between the ends of the call. The following parameter in the Line Profile, gives this information:

⇒⇒   The **Phone Num** parameters provide the calling Multiband Plus-SW56 with the phone numbers of those channels available to the inverse multiplexed call. You should leave these parameters blank if all available channels are reached by dialing the same number used to begin the call.

3.17   Serial-Host Calls with Some / All Nailed-Up Channels

This procedure assumes you have already configured the SW56 interface and the parameters that control where this call is routed. routing. (See Multiband Plus-SW56 Quick Start Guide and section 3.7 for information on these procedures.)

This section describes the key steps in preparing Multiband Plus-SW56 for applications involving serial hosts using nailed-up channels, namely when **Call Type** in the Call Profile is set to *FT1*, *FT1-AIM*, and *FT1-B&O*.

FT1 calls contain nailed-up channels only, while FT1-AIM and FT1-B&O calls can combine switched channels with nailed-up channels. Certain restrictions to the line, port, and Call Profiles apply to each of these call types:

1   First, you must specify which channels are nailed up and which are switched, etc. Set the Line Profile **Ch Usage** parameters as required.

Nailed-up channels must be specified on both network ends. For example, if there are *4* nailed-up channels at the local end, there must be *4* nailed-up channels at the far end, although the channel assignments at the local can be different than the channel assignments at the far end.

2   Second, set the **Port/Grp** Line Profile parameters of each nailed-up channel to a letter from A to Z. There should be a letter for each serial host port that gets a group of nailed-up channels, and optionally a letter for unused nailed-up channels.

3   For every serial host port that gets a group of nailed-up channels, set its current Call Profile parameter **Group** to the same letters you entered in step 2. Also specify a secondary port (**Dual Ports** Host-Interface Profile parameter) if you want to make an *FT1-B&O* call on a model with four host ports, although this is not re-quired on two host port models.

4   If you set the Call Profile parameter **Call Type** to *FT1*, choose a value for **Data Svc**, and skip the remaining steps; otherwise, set the Call Profile parameters **Call Type** to *FT1-AIM* or *FT1-B&O* and **Call Mgm** to *Manual*, *Dynamic*, or *Delta*.

NOTE: You can set up FT1-AIM or FT1-B&O calls only if both ends of the call are AIM compatible.

5   For those Call Profiles whose **Call Type** parameter is *FT1-AIM* or *FT1-B&O*, you must decide which end initiates the call. Set **FT1 Caller** Call Profile parameter to *Yes* if the far-end **FT1 Caller** is set to *No*; however, if the far-end is set to *Yes*, set the local **FT1 Caller** to *No*. The end with **FT1 Caller** set to *Yes* initiates any switched calls. You must also specify **B&O Restore** for *FT1-B&O* calls.

6   For those calls whose current Call Profile parameter **Call Type** is *FT1-AIM* or *FT1-B&O*, choose one of the following alternatives for both the local and far-end **Idle** and **Dial** Port Profile parameters:

Choose **Idle** = *Call* and **Dial** = *Terminal* if you wish the switched channels to be connected up power-up.

Choose **Idle** = *None* and **Dial** = *DTR* if you wish the switched channels to be connected when the host equipment at both ends sets DTR active. If you choose these values, the hosts at both ends of the connection must establish DTR active to make Multiband Plus-SW56 connect the switched channels.

7   Next, enter the Call Profile parameter **Dial #** (the complete number to dial) of the first switched channel at the far end of the call. The nailed-up channels have no phone number since they are always connected.

8   For FT1-B&O calls, set **Call Mgm** = *Dynamic* at the end of the call where **FT1 Caller**=*Yes*. The other end is optional.

3.18 Configuring a DBA Call between Serial Hosts

This procedure assumes you have already configured the SW56 interface and the parameters that control incoming call routing. (See Multiband Plus-SW56 Quick Start Guide and section 3.7 for information on these procedures.)

The "Controlling Dynamic Bandwidth" appendix gives a complete explanation of how DBA calls operate. In addition to setting **Call Type** Call Profile parameter to *AIM* and **Call Mgm** to *Dynamic*, the following Call Profile parameters configure DBA bandwidth control calls:

⇒⇒ **Base Ch Count, Max Ch Count, Min Ch Count, Dyn Alg**, **Sec History**, **Add Pers**, **Sub Pers**, **Activ**, **Beg Time**, **Flag Idle**, and **Target Util** parameters apply only to DBA calls. Since both ends can be configured to use DBA, there can be two sets of these parameters, each applied at the serial host port connected to the device on traffic flowing toward the WAN. Since data traffic might not be symmetric, the call's bandwidth is not reduced below the minimum requirements of either side.

NOTE: On a four-port Multiband Plus-SW56, you cannot use either serial host port **Host 3** or **Host 4** for DBA calls.

3.19 Dialing / Answering / Clearing Calls

3.19.1 Dialing

The **Dial** Port Profile parameter governs how a serial host port dials calls. You can dial a call automatically or manually. If your Multiband Plus-SW56 supports RS-366, V.25 bis, or X.21 dialing, you can dial calls directly from your serial host. You can also dial automatically using port leads.

The **DO Dial** command dials a call manually.

Before using **DO Dial**, you must have configured the SW56 interface, and selected a Call Profile by positioning the cursor in front of that profile. Equivalently, typing the character **D** while pointing to a callable profile dials that profile. If you attempt to dial from a Call Profile that does not include a phone number, the following error message appears:

```
Error Msg #115
 No phone number in
 .... profile
Unable to place call.
```

Dialing a call between serial hosts causes the selected Call Profile to overwrite the current Call Profile including any editing Call Profile parameters. However, all edited parameters are not overwritten if the current Call Profile is protected by Security Profiles. The **Base Ch Cnt** and **Dial #** Call Profile parameters are overwritten regardless of security.

NOTE: Positioning the cursor in front of any serial host port menu and then entering **DO Dial**, selects the current Call Profile for dialing.

As soon as a call to a serial host is dialed, the letter C appears in the upper right-hand corner of the current display. The C call status letter announces the attempt to place an outgoing call. If you are operating the Control Monitor, and you wish to view the Call Status menu as the call is being dialed, you should bring up that display before dialing. The Palmtop Controller automatically switches over to the Call Status menu as the call is being dialed.

3.19.2 **Hanging Up**

The **Clear** Port Profile parameter governs how the host port clears calls. You can clear a call using RS-366, V.25 bis, X.21, or the port's control leads, or you can clear a call manually from Multiband Plus's user interface.

The **DO Hang Up** command clears a call manually.

3.19.3 **Answering**

The **Answer** Port Profile parameter governs how the serial host port answers calls. You can answer a call automatically or manually. If your Multiband Plus-SW56 supports V.25 bis dialing, you can answer calls directly from your serial host. You can also answer automatically using serial host port leads.

The **DO Answer** command answers a call manually.

4   **Planning and Specifications**

This chapter provides system and interface descriptions, site requirements, specifications, and other preparatory information. Use the information in this chapter to plan the installation of Multiband Plus-SW56.

4.1   Physical Description

The back of a Multiband Plus-SW56 models looks roughly like the following illustration:
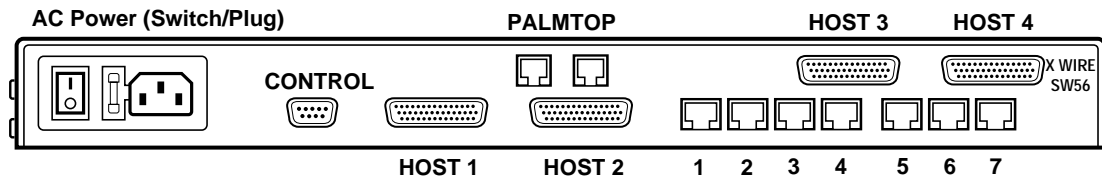
As depicted, Multiband Plus-SW56 has the following physical interfaces:

Multiband Plus-SW56 Ports, Connectors, Switches	Function or Operation
On/Off rocker switch	Power On / Power Off
Power connector	AC power
Control port	For the VT-100 terminal, modem, or MIF interface. 2400 bit/s, 8 bits per character, no parity bits, no flow control, and 1 stop bit. See section 4.5.1.
Palmtop port(s)	Secondary control terminal port for the VT-100 or Palmtop terminal. See section 4.5.2.
Two to seven 2-wire or 4-wire switched-56 WAN ports, labeled **1**, **2**, etc.	For access to WAN. RJ-48C connector. See section 4.4 on page 3.
Host 1 and **Host 2** serial host (DTE) ports optional: **Host 3** and **Host 4**	Serial host interface: V.35 / RS-449 / X.21. See section 4.6.2. Host ports #3 and #4, if installed, do not have AIM functionality.

4.1.1 Battery

Multiband Plus-SW56 contains an internal 3V lithium battery. The normal operating life of these batteries exceeds five years.

Only trained engineers authorized by Ascend should open the Multiband Plus-SW56 case for testing, maintenance, installation, or any other purpose. Furthermore, only trained engineers should replace Multiband Plus-SW56 components.

DANGER: The battery can explode if incorrectly replaced. Replace the battery only with the same recommended or equivalent type. Dispose of used batteries according to the manufacturer's instructions.

4.2 Software Options

For a list of the software options with which your Multiband Plus-SW56 has been equipped see the **Sys Options** status menu in the "Reference to Status Menus" chapter.

4.3 Specification of Site Requirements

This section provides Multiband Plus-SW56 power and environmental requirements:

4.3.1 Power Requirements

Multiband Plus-SW56 source power requirements are as follows:

Voltage	90-240 VAC
Phase	Single
Frequency	47-63 Hz
Power	40W (nominal)-60W (max)

Multiband Plus-SW56 configuration profiles are stored by the system in battery-protected memory. Even if Multiband Plus-SW56 has been turned off, the profiles are not lost.

NOTE: Use a protected power source or add surge protection between the power source and Multiband Plus-SW56.

4.3.2 Environmental Requirements

For best results, you should house Multiband Plus-SW56 in a room with constant temperature and humidity. In general, cooler environments are better, and an operating temperature of 32° to 104° Fahrenheit (0° to 40° Celsius) is recommended. Storage temperatures of -40° to 176° Fahrenheit (-71.4° to 80° Celsius) are acceptable.

Humidity should be high enough to prevent accumulation of static electricity but low enough to prevent condensation. An operating relative humidity of up to 90% is acceptable.

Multiband Plus-SW56 can be operated at altitudes of 0 to 14800 ft. (0-4500 m).

Multiband Plus-SW56 weighs 10 pounds (4.5 kg) and has these dimensions: 1.75" x 17" x 12" (4.45 cm x 43.2 cm x 30.5 cm).

4.4 Planning the SW56 WAN Interface

This section contains the specifications of Multiband Plus's WAN interface, prerequisites to its connection, cabling the WAN interface, and WAN data services.

4.4.1 2-Wire Switched-56 Cabling Requirements

Signaling between Multiband Plus-SW56 and the switch is *message based*.

You can connect Multiband Plus-SW56 directly to the WAN interface of a 2-wire switched-56 local loop.

Use only cable specifically constructed for transmission of 2-wire switched-56 signals. It should meet standard attenuation and transmission requirements. The following specifications are recommended:

135 Ω
one twisted pair
26 AWG (or greater diameter) stranded
13100 ft (4.0 km or less)

4.4.2 4-Wire Switched-56 Cabling Requirements

Multiband Plus-SW56 uses *pulsed* signaling only. Do <u>not</u> configure the switch for DTMF (*Dual-Tone Multifrequency*) signaling.

You can connect Multiband Plus-SW56 directly to the WAN interface of a 4-wire switched-56 local loop.

Use only cable specifically constructed for transmission of 4-wire switched-56 signals. It should meet standard attenuation and transmission requirements. The following specifications are recommended:

135 Ω
two twisted pairs
26 AWG (or greater diameter) stranded
13100 ft (4.0 km or less)

4.4.3 Information Required from the Switched-56 Provider

Request the following information from your WAN provider. The information you receive characterizes your switched-56 interface and is required when programming Multiband Plus.

- The phone numbers assigned to your SW56 interface, line-by-line

- Nailed-up lines (also called private WAN), if any

4.4.4 WAN Switched Services Accessible by Multiband Plus-SW56

- Multiband Plus-SW56 can access only switched-56 kbit/s services from a switched-56 line interface.

- In addition to switched circuits, Multiband Plus-SW56 can connect to nailed-up circuits and optionally aggregate nailed-up and switched circuits.

4.4.5 WAN Connectors

The modular SW56 ports on Multiband Plus-SW56 models follow RJ48C specifications.

8 Position Modular
Plug

8 Position Modular Jack
on Ascend back panel
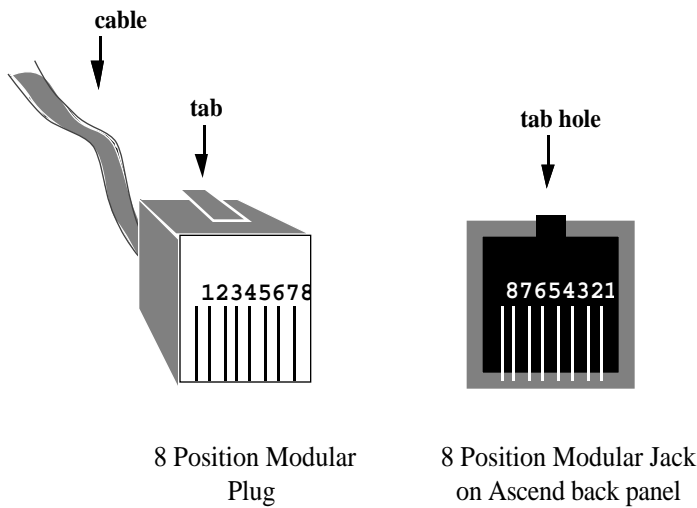
The following tables list pins on the WAN port used for the Transmit and Receive. The remaining pins are not connected:

Switched-56 4-Wire Logical Interface:	RJ48C DTE (Data Terminal Equipment)
Multiband Plus-SW56 Transmit (output) pair:	Tip (T), Position 2
	Ring (R), Position 1
Multiband Plus-SW56 Receive (input) pair:	Tip (T1), Position 8
	Ring (R1), Position 7

Switched-56 2-Wire Logical Interface:	RJ48C DTE (Data Terminal Equipment
Multiband Plus-SW56 Transmit (half-duplex) pair:	Tip (T), Position 5
	Ring (R), Position 4

4.5 Specification of Multiband Plus-SW56's Control Interface

Through Multiband Plus-SW56 control interface, users can configure and manage the system; place and answer calls; set up and store call information; backup and restore configurations on external media; load software revisions; allocate and control bandwidth; monitor the call, serial host port, and line status; and perform link verification tests. The following interfaces are supplied:

- The *Control Monitor* is a menu-based user interface for controlling, configuring, and monitoring Multiband Plus-SW56. It is presented on a 24x80 character screen. Nine not-overlapping windows are arranged on the screen, a single edit window and 8 status windows. The Control Monitor interface automatically appears in the following:

  - Whenever a VT-100 terminal (or VT-100 terminal emulator) plugs into the RS-232 serial port labeled **Control** on the back panel

  - Whenever a VT-100 terminal (or VT-100 terminal emulator) plugs into the RJ12 RS-232 serial port on the front panel or one of the optional back panel RJ12 ports labeled **Palmtop**

  NOTE: All management and control operations are available through each of the preceding ports, with the exception of the **Palmtop** ports which do not provide backup, restore, and software load functionality.

- The *Palmtop Controller* is a menu-based user interface for controlling, configuring, and monitoring Multiband Plus-SW56. It is presented on a 4x20 character screen of a hand-held terminal. It displays the same menus as the Control Monitor, but allows only a single window. The Palmtop Controller interface appears when the hand-held terminal is plugged into Multiband Plus-SW56's front-panel RJ12 control port or optional back panel control ports labeled **Palmtop**.

- The *MIF* (machine interface format) is a command-line based machine interface for controlling, configuring, and monitoring Multiband Plus-SW56. It is available through Multiband Plus-SW56's back panel **Control** port automatically if Multiband Plus-SW56 has configured that port for MIF or it can be evoked by an command entered at that port. MIF can also be evoked from a VT-100 terminal connected to a Palmtop port. MIF allows control and maintenance of Multiband Plus-SW56 programmatically. The maximum recommended data rate for MIF is 4800 bit/s.

Special Purpose Interfaces
Dialing/Answering/Clearing operations can be controlled by equipment connected to serial host ports through *V.25 bis*, *X.21*, or *RS-366* protocols, or through manipulation of the port's *control leads*.

4.5.1 Control Port, Cabling for Control Monitor and MIF

The **Control** port uses a standard DE-9 female connector that conforms to the EIA RS-232 standard for serial interfaces. The following RS-232 pinouts are used with all Multiband Plus models:

DE-9 Pin Number	RS-232 Signal Name	Function	I/O
1	DCD	Data Carrier Detect	O
2	RD	Serial Receive Data	O
3	SD	Serial Transmit Data	I
4	DTR	Data Terminal Ready	I
5	GND	Signal Ground	
6	DSR	Data Set Ready	O
7	RTS	Request to Send	I
8	CTS	Clear to Send	O
9	RI	Ring Indicator	O

4.5.2 Palmtop Port, Cabling for Palmtop Controller

The following table gives pins and corresponding functions of the Palmtop Controller jacks:

Multiband Plus-SW56 RJ12 Pin	Function	I/O
1	Power to Palmtop, +5V	O
2	Control Out	O
3	Control In	I
4	Serial Transmit Data	O
5	Serial Receive Data	I
6	Ground	
Note: **O** is Out (from Multiband Plus-SW56 toward Palmtop).		

4.5.3 Palmtop Port, Cabling for Control Monitor and MIF

To adapt the Palmtop port for use as a Control Monitor or MIF interface through a VT-100 terminal, use the HHT-VT-100 cable (PN 2510-0088-001), which has the following pinouts:

Multiband Plus-SW56 RJ12 Pin Number	VT-100 Female DE-9 Pin Number
1	not connected
2	1
3	4
4	2
5	3
6	5

4.6   Specification of the Serial Host Interface

This section describes the cabling requirements, timing requirements, and interface types for the serial host ports on the Multiband Plus-SW56.

4.6.1 Types of Serial Host Interfaces Supported

Multiband Plus-SW56's serial host ports are compatible with the following three electrical standards:

* RS-449/422

* V.35

* X.21

Multiband Plus-SW56 also supports the following dialing/answering protocols at any of its serial host ports. See the "RS-366, V.25 bis, X.21, Lead Dialing" appendix for further information:

* V.25 bis

* RS-366

* X.21

4.6.2 **Multiband Plus-SW56 Serial Host Interface Cabling**

Selection of the proper cable between a serial host port and the serial device is important to ensure the proper mapping of pinouts from Multiband Plus-SW56 to the application equipment as well as the proper voltage levels.

In the cable wiring tables that follow, Multiband Plus-SW56 is the DCE (data communications equipment) device while the host equipment is the DTE (data terminal equipment) device. The signal names and pinouts are given from that perspective. The serial host interface cabling tables that follow use these abbreviations:

FGND	Chassis Ground
SGND	Receive Common Ground
SD+	Send Data +
SD-	Send Data -
RD+	Receive Data +
RD-	Receive Data -
ST+	Send Timing +
ST-	Send Timing -
RT+	Receive Timing +
RT-	Receive Timing -
TT+	Terminal Timing +
TT-	Terminal Timing -
DSR	Data Set Ready
DCD (CD)	Data Carrier Detect
RTS	Request to Send
RI	Ring Indicate
DTR	Data Terminal Ready
DPR	RS-366 Call Digit or Tone
ACR	Abandon Call/Retry
CRQ	Call Request
PND	Present Next Digit
DLO	Data Line Occupied
NB1	RS-366 Call Digit or Tone
NB2	RS-366 Call Digit or Tone
NB4	RS-366 Call Digit or Tone
NB8	RS-366 Call Digit or Tone
RX/SEL	Select Interface Jumper (not a signal to or from host)

4.6.3 **V.25 bis Cabling**

Ascend supplies a single cable specifically intended for V.25 bis/router installations. Note that this cable supplies the DCD hardware handshake signal and does not supply DSR.

- V.35/V.25 bis Cable to Cisco (section 4.6.7).

The following cables are used with non-router V.25 bis applications. Note that these cables supply the DSR hardware handshake signal and do not supply DCD.

- V.35 Cable to Generic Serial Host (section 4.6.8)

- RS-449 Cable to Generic Serial Host (section 4.6.14)

For further information, see your V.25 bis equipment vendor.

4.6.4 RS-366 Cabling

Ascend supplies a variety of RS-366 cables:

- V.35 and RS-366 Cable to Generic Serial Host (section 4.6.9)

- V.35 / RS-366 Cable to CLI (section 4.6.10)

- V.35 / RS-366 Cable to PT (section 4.6.11)

- RS-449 / RS-366 / DB-37 Cable to VTC (section 4.6.12)

- RS-449 / RS-366 Cable to Generic Serial Host (section 4.6.13)

4.6.5 X.21 Cabling

Ascend supplies a single X.21 cable, X.21 Cable to Generic Serial Host (section 4.6.6).

4.6.6 X.21 Cable to Generic Serial Host

If your host is equipped with an X.21 interface, the host cable (model number MBHD-X21, part number 2510-0098-001) has the following pinouts:

Pair #	X.21 Signal Name	Equivalent V.35/RS-449 Signal Name	Multiband Plus Male DB-44	Host Female DA-15
1	G*	SGND*	25*	8
2	T(A) T(B)	SD+ SD-	29 30	2 9
3	R(A) R(B)	RD+ RD-	40 39	4 11
4	S(A) S(B)	ST+ ST-	42 41	6 13
5	C(A) I(A)	DTR DCD	8 36	3 5
6	RX/SEL I(B)*	RX/SEL SGND*	20, 28** 25***	 12***
7	B(A) B(B)	BT+ BT-	18 19	7 14
8	C(B)			8, 10****

* Note 1: Both I(B) and G connect to SGND, pin 25 on DB-44.

** Note 2: Pins 20 and 28 on the DB-44 interface jumpered together.

***Note 3: Connect pin 25 (DB-44) to pin 12 (DA-15) through a 200 Ohm resistor.

****Note 4: Connect pin 8 (DA-15) to pin 10 (DA-15) through a 200 Ohm resistor.

4.6.7 V.35/V.25 bis Cable to Cisco

This cable (model number MBHD-V.35-CISCO, part number 2510-0099-001) is used to connect to the V.35 port of Cisco routers that use V.25 bis dialing. It has the following pinouts:

Pair #	Signal	Multiband Plus Male DB-44	Host Female V.35
1	FGND	1	A
2	SD+	26	P
	SD-	27	S
3	RD+	2	R
	RD-	3	T
4	ST+	4	Y
	ST-	5	AA
5	RT+	14	V
	RT-	15	X
6	DSR	6	E, F*
	DCD	36	D
7	RTS	7	C
	RI	43	J
8	DTR	8	H
	SGND	25	B
9	TT+	16	U
	TT-	17	W
10	RX/SEL	28, 44*	

* Pin positions separated by commas are jumped to each other.

4.6.8 V.35 Cable to Generic Serial Host

This cable (model number MBHD-V35, part number 2510-0079-001) is used to connect to V.35 ports of a wide variety of equipment. A female to male V.35 gender changer (part number 2510-0058-00) is included when you order the cable. It has the following pinouts:

Pair #	Signal	Multiband Plus Male DB-44	Host Female V.35
1	FGND	1	A
2	SD+	26	P
	SD-	27	S
3	RD+	2	R
	RD-	3	T
4	ST+	4	Y
	ST-	5	AA
5	RT+	14	V
	RT-	15	X
6	DSR	6	E
	DCD	36	D, F*
7	RTS	7	C
	RI	43	J
8	DTR	8	H
	SGND	25	B
9	TT+	16	U
	TT-	17	W
10	RX/SEL	28, 44*	

* Pin positions separated by commas are jumped to each other.

4.6.9 V.35 and RS-366 Cable to Generic Serial Host

This cable (model number MBHD-V35-366, part number 2510-0077-001) is used to connect to V.35 ports of a wide variety of equipment that use RS-366 dialing. A female to male V.35 gender changer (part number 2510-0058-00) is included when you order the cable. It has the following pinouts:

Pair #	Signal	Multiband Plus Male DB-44	Host Female V.35	RS-366 Female DB-25
1	FGND	1	A	
2	SD+	26	P	
	SD-	27	S	
3	RD+	2	R	
	RD-	3	T	
4	ST+	4	Y	
	ST-	5	AA	
5	RT+	14	V	
	RT-	15	X	
6	DSR	6	E	
	DCD/CTS	36	D, F*	
7	RTS	7	C	
	RI	43	J	
8	DTR	8	H	
	SGND	25	B	
9	TT+	16	U	
	TT-	17	W	
10	DPR	9		2
	ACR	10		3
11	CRQ	11		4
	PND	12		5
12	DLO	13		22
	SGND	25		7, 18,19*
13	NB1	21		14
	NB2	22		15
14	NB4	23		16
	NB8	24		17
15	DSC	36		13
16	RX/SEL	28, 44*		

* Pin positions separated by commas are jumped to each other.

4.6.10 V.35 / RS-366 Cable to CLI

This cable (model number MBHD-V35CLI, part number 2510-0094-001) is used to connect to V.35 ports of the Compression Labs Rembrandt II codec with support for RS-366 dialing. It has the following pinouts:

Pair #	Signal	Multiband Plus Male DB-44	Host V.35/RS-366 Male DB-25
1	V.35 FGND	1	1
	V.35 DTR	8	8
2	V.35 SD+	26	2
	V.35 SD-	27	14
3	V.35 RD+	2	3
	V.35 RD-	3	15
4	V.35 ST+	4	4
	V.35 ST-	5	16
5	V.35 RT+	14	5
	V.35 RT-	15	17
6	V.35 DSR	6	6
	V.35 DCD/CTS	36	19
7	V.35 RTS	7	7
	V.35 RI	43	18
8	V.35 TT+	16	4
	V.35 TT-	17	16
9	RS-366 DPR	9	9
	RS-366 ACR	10	10
10	RS-366 CRQ	11	11
	RS-366 PND	12	12
11	RS-366 DLO	13	13
	SGND	25	25
12	RS-366 NB1	21	21
	RS-366 NB2	22	22
13	RS-366 NB4	23	23
	RS-366 NB8	24	24
14	RX/SEL	28, 44*	

* Pin positions separated by commas are jumped to each other.

4.6.11 **V.35 / RS-366 Cable to PT**

This cable (model number MBHD-449PT, part number 2510-0093-001) is used to con-
nect to V.35 ports of the PictureTel codec with support for RS-366 dialing. It has the fol-
lowing pinouts:

Pair #	Signal	Multiband Plus Male DB-44	Host Female DB-37	RS-366 Female DB-25
1	FGND	1	1	
2	SD+	26	4	
	SD-	27	22	
3	RD+	2	6	
	RD-	3	24	
4	ST+	4	5	
	ST-	5	23	
5	RT+	14	8	
	RT-	15	26	
6	DSR	6	11	
	DCD/CTS	36	9, 13*	
7	RTS	7	7	
	RI	43	15	
8	DTR	8	12	
	SGND	25	19, 20, 37*	
9	TT+	16	17	
	TT-	17	35	
10	DPR	9		2
	ACR	10		3
11	CRQ	11		4
	PND	12		5
12	DLO	13		22
	SGND	25		7
13	NB1	21		14
	NB2	22		15
14	NB4	23		16
	NB8	24		17
15	DSC	36		13
16	RX/SEL	28, 44*		

*   Pin positions separated by commas are jumped to each other.

4.6.12 **RS-449 / RS-366 / DB-37 Cable to VTC**

This cable (model number MBHD-449VTC, part number 2510-0081-001) is used to connect to RS-449 ports of the VTel codec with support for RS-366 dialing. It has the following pinouts:

Pair #	Signal	Multiband Plus Male DB-44	Host RS-449/RS-366 Male DB-37
1	FGND	1	1
	FGND	1	19
2	SD+	29	4
	SD-	30	22
3	RD+	40	6
	RD-	39	24
4	ST+	42	5
	ST-	41	23
5	RT+	37	8
	RT-	38	26
6	DSR	6	2
	DCD/CTS	36	9, 11, 18*
7	RTS	7	7
	RI	43	15
8	DTR	8	12
	SGND	25	37
9	RS-366 DPR	9	14
	RS-366 ACR	10	3
10	RS-366 CRQ	11	10
	RS-366 PND	12	33
11	RS-366 DLO	13	21
12	RS-366 NB1	21	16
	RS-366 NB2	22	28
13	RS-366 NB4	23	32
	RS-366 NB8	24	34
14	RX/SEL	20, 28*	

* Pin positions separated by commas are jumped to each other.
** This cable does not support terminal timing.

4.6.13 RS-449 / RS-366 Cable to Generic Serial Host

This cable (model number MBHD-449-366, part number 2510-0078-001) is used to connect to RS-449 ports of a wide variety of equipment that use RS-366 dialing. A female to male DB-37 gender changer (part number 2510-0053-00) is included when you order the cable. It has the following pinouts:

Pair #	Signal	Multiband Plus Male DB-44	Host Female DB-37	RS-366 Female DB-25
1	FGND	1	1	
2	SD+	29	4	
	SD-	30	22	
3	RD+	40	6	
	RD-	39	24	
4	ST+	42	5	
	ST-	41	23	
5	RT+	37	8	
	RT-	38	26	
6	DSR	6	11	
	DCD/CTS	36	9, 13*	
7	RTS	7	7	
	RI	43	15	
8	DTR	8	12	
	SGND	25	19, 20, 37*	
9	TT+	31	17	
	TT-	32	35	
10	DPR	9		2
	ACR	10		3
11	CRQ	11		4
	PND	12		5
12	DLO	13		22
	SGND	25		7
13	NB1	21		14
	NB2	22		15
14	NB4	23		16
	NB8	24		17
15	DSC	36		13
16	RX/SEL	20, 28*		

*   Pin positions separated by commas are jumped to each other.

4.6.14 RS-449 Cable to Generic Serial Host

This cable (model number MBHD-449, part number 2510-0080-001) is used to connect to RS-449 ports of a wide variety of equipment. A female to male DB-37 gender changer (part number 2510-0053-00) is included when you order the cable. It has the following pinouts:

Pair #	Signal	Multiband Plus Male DB-44	Host Female DB-37
1	FGND	1	1
2	SD+	29	4
	SD-	30	22
3	RD+	40	6
	RD-	39	24
4	ST+	42	5
	ST-	41	23
5	RT+	37	8
	RT-	38	26
6	DSR	6	11
	DCD/CTS	36	9, 13*
7	RTS	7	7
	RI	43	15
8	DTR	8	12
	SGND	25	19, 20, 37*
9	TT+	31	17
	TT-	32	35
10	RX/SEL	20, 28*	

* Pin positions separated by commas are jumped to each other.

NOTE: To manufacture a RS-449 cable for Cisco routers, use the above wiring list and connect the following DB-37 pins to SGND: DSR- (pin 29), CD- (pin 31), and CTS- (pin 27).

4.6.15 Cable Length Requirements

The following table specifies the recommended maximum length of the cable between Multiband Plus-SW56 and serial host data equipment. Longer distances at the specified data rates are possible when terminal timing is used, and still longer distances are supported by the installation of the Ascend RPM, a hardware device that provides an

extended distance high-speed link between Multiband Plus-SW56 and serial-host equipment.

Max Cable Length	Serial Data Rate
25 feet	3 Mbit/s
75 feet	2 Mbit/s
150 feet	512 kbit/s

4.6.16 Timing Signals

In all applications, the serial host uses timing provided by Multiband Plus-SW56. That is, Multiband Plus-SW56 supplies the send and receive clocks. Multiband Plus-SW56 is DCE and the serial host is DTE.

Terminal Timing
Terminal Timing is a clock signal specified in V.35, X.21, and RS-449 serial interfaces that compensates for the phase difference between Send Data and Send Timing. Multiband Plus-SW56 provides the Terminal Timing signal. Your serial host must use Terminal Timing whenever the distance between it and Multiband Plus-SW56 is greater than recommended in section 4.6.15.

4.7   Interoperability Specifications

Inverse Multiplexing Interoperability
When connecting devices through its V.35, RS-422, or X.21 serial host ports, Multiband Plus-SW56 can make and receive calls with equipment that aggregates channels through inverse multiplexing, using either of the following:

- AIM (Ascend Inverse Multiplexing protocol) — Inverse-multiplexed calls using the AIM protocol require AIM compatible equipment at both the calling and answering end. The AIM protocol can aggregate switched and nailed-up (leased) channels.

- BONDING — Inverse-multiplexed calls using the BONDING (mode 1) protocol require BONDING (mode 1) compatible equipment at both the calling and answering end.

Interoperability Specifications

Multiband Plus-SW56 Parameters

Main Edit Menu

- **System**
  - Sys Config (System Profile)
  - Sys Diag (Commands)
    - Restore Cfg
    - Save Cfg
    - Use MIF
    - System Reset
  - Security (Profiles)
  - Destinations (Profiles)

- **Net/..**
  - (Net/E1)
  - (Net/T1)
  - (Net/BRI)
  - (Net/SW56)
    - Line Config (Line Profiles)
    - Line Diag (Commands)
      - Line LB1, LB2
      - Switch D Chan
      - Clr Err1, Err2
      - Clr Perf1, Perf2

- **Host/..**
  - (Host/Dual)
  - (Host/Quad)
  - (Host/6)
    - Mod Config or Host Config (Host-Interface Profile)
    - Port1 Menu
    - Port2 Menu
    - PortN Menu....
      - Directory (Call Profiles)
      - Port Diag (Local LB Command)
      - Port Config (Profile)

- **Ethernet**
  - Connections (Profiles)
  - Bridge Adrs (Bridging Profiles)
  - Static Rtes (Route Profiles)
  - Filters (Profiles)
  - Answer (Profile)
  - SNMP Traps (Profiles)
  - Mod Config (Ethernet Profile)

- **Lan Modem**
  - Mod Config (LAN Mode Profile)

Main Status Menu

- **System**
  - Sys Options
  - Message Log (System)
  - Port Info
  - CDR

- **Net/..**
  - (Net/E1)
  - (Net/T1)
  - (Net/BRI)
  - (Net/SW56)
    - Line Status or Line 1 Stat and Line 2 Stat (Line Status)
    - Line Errors
    - FDL1 Stats and FDL2 Stats (FDL Stats)
    - Net Options

- **Host/..**
  - (Host/Dual)
  - (Host/Quad)
  - (Host/6)
    - Port1 Stat
    - Port 2 Stat
    - PortN Stat...
      - Call Status
      - Message Log (Host/.)
      - Statistics
      - Port Opts
      - Session Err
      - Port Leads

- **Ethernet**
  - Sessions
  - Routes
  - WAN Stat
  - Ether Stat
  - Ether Opt

- DO Commands
- Ctrl-Commands

Note: Some menus in this chart are not available to all models.
Pipeline 100/400 does not have *Host/...* menu branches.
Multiband Plus BRI and SW56 have no *Ethernet* menus.
Multiband Plus E1 and T1 have at most only some branches of *Ethernet*.
BRI, SW56, and E1/PRI models do not have *Line Diag* or *FDL Stats*.
Only MAX and Pipeline 100/400-BRI,-T1,-E1 can have *Lan Modem*.

The preceding illustration shows the names and relative locations of Multiband Plus-SW56 menus, commands, and profiles.

Edit menus (menus that contain configurable parameters) appear in the following pages. Each edit menu is given a table in which its parameters, parameter values, and defaults. Empty brackets [] indicate there is no default. Each parameter is listed in the order it appears in its menu.

Status menus are listed together under "Status Menus." Status menus are read-only menus you use to monitor the status of calls, WAN lines, and the serial host interface.

For detailed descriptions of the Edit menus, profiles, and parameters, see the "Reference to Edit Menus" chapter. For detailed descriptions of the Status menus and parameters, see the "Reference to Status Menus" chapter.

Note that each table begins with the menu name. For example, `10-100 Net/S56-2/4 (Line Profile)`, refers to the Net/S56-2/4 menu, whose menu number is 10-100, and whose profiles are grouped under the name, Line Profile. See the "Keyboard Reference' appendix for further information on the menu numbering scheme.

2*N*-100 Directory (Call Profile)		
Parameter Name	**Values**	**Default Value**
Name	user-defined text string	*[]*
Dial #	user-defined text string	*[]*
Call Type	*AIM* *FT1-AIM* *FT1-B&O* *FT1* *1 Chnl* *2 Chnl* *BONDING*	*AIM* (for units with the AIM option) *1 Chnl* otherwise
Call Mgm	*Manual* *Dynamic* *Delta* *Static* *Mode 0* *Mode 1*	*Manual*
Data Svc	*56KR*	*56K*
Force 56	*Yes* *No*	*No*
Base Ch Count	user-defined numeric string	*1*
Inc Ch Count	user-defined numeric string	*1*
Dec Ch Count	user-defined numeric string	*1*

2N-100 Directory (Call Profile)		
Parameter Name	**Values**	**Default Value**
Auto-BERT	*Off* *15 sec* *30 sec* *60 sec* *90 sec* *120 sec*	*Off*
Bit Inversion	*Yes* *No*	*No*
Fail Action	*Disc* *Reduce* *Retry*	*Reduce*
Group	user-defined alphabetic character *A to Z* (varies)	*A*
FT1 Caller	*Yes* *No*	*Yes*
B&O Restore	user-defined numeric string (*30* to *30000* seconds)	*300*
Flag Idle	*Yes* *No*	*Yes*
Dyn Alg	*Constant* *Linear* *Quadratic*	*Linear*
Sec History	user-defined numeric string	*300*
Add Pers	user-defined numeric string	*20*
Sub Pers	user-defined numeric string	*20*
Time Period 1...	submenu (shown below)	
Time Period 2...	submenu (shown below)	
Time Period 3...	submenu (shown below)	
Time Period 4...	submenu (shown below)	
The **Time Period** submenus contain these parameters		
Activ	*Enabled* *Disabled* *Shutdown*	*Disabled*
Beg Time	user-defined text string	*00:00:00*
Min Ch Cnt	numeric text string	*1*
Max Ch Cnt	numeric text string	*1*
Target Util	user-defined numeric string	*70*

10-100 Line Config (Switched-56 Line Profile)		
Parameter Name	**Values**	**Default Value**
Name	user-defined alphanumeric string up to 16 characters	*[]*
Line *n*...	submenu (shown below), where *n* is switched-56 line number.	
Line-Specific Parameters (Line 1..., etc.)		
Enabled	*Yes* *No*	*Yes*
Ch Usage	*Switched* *Nailed* *Unused*	*Switched*
Phone Num	user-defined numeric string up to 16 characters	*[]*
Port/Grp	If **Ch Usage**=*Switched*, user-defined number from *0* to the highest serial port. If **Ch Usage**=*Nailed*, user-defined alphabetic character from *A* to *Z* (varies)	*0*

20-100 Host Config (Host-Interface Profile)		
Parameter Name	**Values**	**Default Value**
Dual Port	*No Dual* *1&2 Dual* *3&4 Dual* *1&3 Dual* *2&4 Dual* *All Dual*	*No Dual*
F Palmtop, **L Palmtop**, and **R Palmtop**	*Full* *Restrict*	*Full*
F Port #, **L Port #**, or **R Port #**	user-defined numeric string from *0* to max host-port	*0*
F Menus, **L Menus**, and **R Menus**	*Standard* *Limited* *MIF*	*Standard*
Palmtop (base system or Host/Dual module)	*Full* *Restrict*	*Full*
Palmtop Port (base system or Host/Dual module)	user-defined numeric string from *0* to max host-port	*0*
Palmtop Menus (base system or Host/Dual module)	*Standard* *Limited* *MIF*	*Standard*

:

2*N*-300 Port Config (Port Profile)		
Parameter Name	**Values**	**Default Value**
Port Name	user-defined text string up to 16 char	*[]*
Ans 1#	user-defined numeric string up to 16 characters	*[]*
Ans 2#	user-defined numeric string up to 16 characters	*[]*
Ans 3#	user-defined numeric string up to 16 characters	*[]*
Ans 4#	user-defined numeric string up to 16 characters	*[]*
Idle	*None* *Call*	*None*
Dial	*Terminal* *DTR Active* *RS-366 ext1* *RS-366 ext2* *V.25bis* *V.25bis-C* *X.21 ext1* *X.21 ext1-P* *X.21 ext2*	*Terminal*
Answer	*Auto* *DTR Active* *DTR+Ring* *V.25bis* *V.25bis-C* *X.21* *Terminal* *P-Tel Man* *None*	*Auto*
Clear	*DTR Inactive* *DTR Active* *RTS Inactive* *RTS Active* *Terminal*	*Terminal*
Term Timing	*Yes* *No*	*No*
RS-366 Esc	*** *#* *5* *6* *7* *9* *0* *00*	*#*

2*N*-300 Port Config (Port Profile)		
Parameter Name	**Values**	**Default Value**
Early CD	*Answer* *Originate* *Both* *None*	*No*
DS0 Min Rst	*Off* *Daily* *Monthly*	*Off*
Max DS0 Mins	user-defined number from *1* to *214272* (minutes)	*1*
Max Call Mins	user-defined number from *0* to *2142720* (minutes)	*0*

00-300 Security (Security Profile)		
Parameter Name	**Values**	**Default Value**
Name	user-defined text string up to 16 characters	*[]*, except for the first profile, which is *Default*
Passwd	user-defined text string up to 20 characters	*[]*, except for the first profile which has no password
Operations	*Yes* *No*	*Yes*
Edit Security	*Yes* *No*	*Yes*
Edit System	*Yes* *No*	*Yes*
Edit Line	*Yes* *No*	*Yes*
Edit All Ports	*Yes* *No*	*Yes*
Edit Own Port	*Yes* *No*	*Yes*
Edit All Calls	*Yes* *No*	*Yes*
Edit Com Call	*Yes* *No*	*Yes*
Edit Own Call	*Yes* *No*	*Yes*
Edit Cur Call	*Yes* *No*	*Yes*

00-300 Security (Security Profile)		
Parameter Name	**Values**	**Default Value**
Sys Diag	*Yes* *No*	*Yes*
All Port Diag	*Yes* *No*	*Yes*
Own Port Diag	*Yes* *No*	*Yes*
Download	*Yes* *No*	*Yes*
Upload	*Yes* *No*	*Yes*
Field Service	*Yes* *No*	*Yes*

Status Menus
00-000 System
00-100 Sys Options
00-200 Message Log (System)
00-300 Port Info
00-400 CDR
10-000 Net/S56-2/4
10-100 Line Status
10-200 Line Errors
10-300 Net Options
2*N*-000 Host/Dual or **Host/Quad**
2*N*-100 Call Status
2*N*-200 Message Log (Host/..)
2*N*-300 Statistics
2*N*-400 Port Opts
2*N*-500 Session Err
2*N*-600 Port Leads

00-100 Sys Config (System Profile)		
Parameter Name	**Values**	**Default Value**
Name	user-defined text string up to 16 characters	*[]*
Date	user-defined text string	*00/00/00*
Time	user-defined text string	*00:00:00*
Term Rate	*1200* *2400* *4800* *9600* *19200* *38400* *57600*	*2400*
Console	*Standard* *Limited* *MIF*	*Standard*
Remote Mgmt	*Yes* *No*	*Yes*
Parallel Dial	user-defined numeric string from *1* to *12*	*5*
Excl Routing	*Yes* *No*	*No*
Auto Logout	*Yes* *No*	*No*
Idle Logout	user-defined text string specifying *0* to *60* minutes	*0*
DS0 Min Rst	*Off* *Daily* *Monthly*	*Off*
Max DS0 Mins	user-defined number from *1* to *357120* minutes	*1*
Delay Dual	*Yes* *No*	*No*
Edit	user-defined text string specifying an edit menu number	*00-000*
Status 1...Status 8	user-defined text string specifying a status menu number	*10-100, 00-200, 21-100, 21-200, 22-100, 22-200 00-100, 00-000*

6 Reference to Edit Menus

Use this chapter to look up menus and their profiles and parameters. Unless otherwise noted Multiband Plus means Multiband Plus-SW56. Also see the "Reference to Status Menus" Chapter.

Activ

⇒⇒ **Activ** [a Call Profile/2*N*-100 Directory Menu parameter] specifies whether a particular time period is enabled for a dynamic call (See *Dynamic* **Call Mgm** and see **Dyn Alg**). The starting time of a time period (**Time Period x...**) is specified by the **Beg Time** parameter. The ending time is specified by the **Beg Time** parameter of the next time period that is not disabled.

- *Disabled* means the time period is ignored. This is the default for time periods 2, 3, and 4.

- *Shutdown* means the DBA call is cleared during the time period and redialed at the end of the time period.

- *Enabled* activates the time period. This is the default for time period 1.

Activ: A shutdown port can be used for answering and dialing calls, but these calls are cleared when the shutdown period ends.

Add Pers

⇒⇒ **Add Pers** [a Call Profile/2*N*-100 Directory Menu parameter] specifies the number of seconds that the criterion to add bandwidth must be in place (persist) before the action is carried out. In other words, this parameter determines how rapidly channels are added. The valid values are between *1* and *300* seconds (5 minutes). The default value is *20*.

Add Pers and **Sub Pers** apply only to AIM   managed calls, otherwise they are *N/A*.

Add Pers and **Sub Pers**: The persistence values prevent the system from continually adding and then removing bandwidth. Their values should be based on the frequency that calls should be set up or torn down.

Add Pers and **Sub Pers**: The persistence values have little or no effect on a system that has a high value for **Sec History**. If **Sec History** is low, however, these parameters provide an alternative way to ensure that spikes must persist for a certain period of time before the system actually responds.

All Port Diag

⇒⇒   **All Port Diag** [a Security Profile/00-300 Security Menu parameter] allows all serial host port diagnostics to be performed. When this parameter is *Yes*, any of the options listed in the Port Diagnostics menu can be performed, either by a local operator or during remote management. See also **Own Port Diag**. The factory default for this parameter is *Yes*.

Ans 1#, Ans 2#, Ans 3#, Ans 4#

⇒⇒   **Ans *n*#** [Port Profile/2*N*-300 Port Config Menu parameters] do not apply to Multiband Plus-SW56.

You can enter up to 18 numeric characters, including hyphens and parentheses. You do not need to enter complete phone numbers. If the right-most (least significant) digits of the dialed number match **Ans *n*#**, the full phone number is assumed to match.

Ans *n*#: See the "Call Routing" appendix for further information.

Answer

⇒⇒   **Answer** [a Port Profile/2*N*-300 Port Config Menu parameter] specifies how Multiband Plus answers a call at this port:

Answer: Choosing any of these options does not prevent you from answering manually using the Palmtop Controller or Control Monitor.

- *Auto* means that Multiband Plus attempts to answer every call automatically, regardless of the control line state. This value is the default.

- *DTR Active* means that Multiband Plus answers calls only if DTR is asserted at this port.

- *DTR+Ring* means that Multiband Plus answers calls after one ring if DTR is asserted at this port.

DTR+Ring: This mode operates with most codecs configured to answer manually. See also *P-Tel Man*.

- *Terminal* means that calls are answered only at the user's request through the **DO 3** or **Control-D 3** (Do Answer) command.

- *V.25bis* means that V.25 bis hardware hand-shakes and command messages from your host equipment can control answering. If you are editing the profile of port #3 or #4, you should not select the value *V.25bis*. While ports #1 and #2 support V.25 bis, neither port #3 nor port #4 does.

- *V.25bis-C* means that the CTS (Clear-To-Send) lead does not change state during a call; otherwise, it is the same as the *V.25 bis* option.

- *X.21* means that Multiband Plus answers calls under the control of the host equipment as described in CCITT Blue Book Rec. X.21.

- *None* means that this port is used for outgoing calls only. In this case, the port cannot answer any calls.

- *P-Tel Man* Use this value rather than *DTR+Ring*, if you have a Picture Tel codec that has been configured to answer manually.

Auto-BERT

⇒⇒ **Auto-BERT** [a Call Profile/2*N*-100 Directory Menu parameter] specifies that an automatic byte-error test begins as soon as a call is connected and runs for the period of time you select. At the end of this period, if any channels have failed, Multiband Plus clears only the bad channels, redials, and repeats the test. The possible values for this parameter are *15, 30, 60, 90, 120* (seconds), and *Off*. The default value is *Off,* which disables the Auto-BERT test.

Auto-BERT: When you use the Auto-BERT feature, you increase the call setup time by at least the amount of time specified. You can abort this test at any time by selecting the command **DO Beg/End BERT**.

During this test, the **Call Status** menu displays *BERT MAST* at the dialing end of the call and *BERT MAST* at the answering end. For further information, see the "Error Counting in WAN Connections" appendix and **Line Errors**, **Session Err**, **Port Info**, **Call Status**, and **Statistics** in the "Reference to Status Menus" chapter.

Auto Logout

⇒⇒ **Auto Logout** [a System Profile/00-100 Sys Config Menu parameter] when set to *Yes*, forces a logout whenever a device (VT-100 terminal, terminal emulator, or properly configured modem) is disconnected from Multiband Plus's **Control** port or when Multiband Plus loses power. When set to *No* (the factory setting), disconnecting a device has no effect.

NOTE: Auto logout physically occurs after loss of DTR.

Logout sets the control interface back to the Security Profile named *Default*.

Auto Logout always occurs when a handheld terminal or other type of terminal type is disconnected from a **Palmtop** port on the Multiband Plus, regardless of the value of the **Auto Logout** parameter.

B&O Restore

⇒⇒ **B&O Restore** [a Call Profile/2*N*-100 Directory Menu parameter] establishes how long Multiband Plus waits before restoring a nailed-up channel to an FT1-B&O call. Its value is an integer from 30 to 30000, specifying the number of seconds to wait.

Base Ch Count

⇒⇒ **Base Ch Count** [a Call Profile/2*N*-100 Directory Menu parameter] is the initial number of channels aggregated for a multichannel call. Its value is an integer, and the default value is *1*.

This parameter does not apply when the link is connectionless (nailed-up only).

Base Ch Count [Call Profile]: For a detailed description of exactly how this parameter relates to the bandwidth delivered to your serial host and how much network bandwidth is allocated, see **Call Mgm**.

Base Ch Count [Call Profile]: BONDING Mode 1 calls cannot exceed 12 channels.

Beg Time

⇒⇒ **Beg Time** [a Call Profile/2*N*-100 Directory Menu parameter] specifies the time of day that a dynamic call's time period (**Time Period x...**) starts. Its format is *hh:mm:ss* (hours, minutes, seconds).

Beg Time: No ending time is specified; the starting time of the next period is the implicit ending time.

Bit Inversion

⇒⇒   **Bit Inversion** [Call Profile/2*N*-100 Direc-
tory Menu] specifies whether data bits
should be inverted on the data stream when
sent or received over the WAN. It has a Yes/
No value, and the default value is *No*.

Bit Inversion: If you are not certain about the require-
ment for bit inversion, check with your carrier contact
or system manager. It is important that you set **Bit In-
version** in the destination Multiband Plus to the same
value as the calling Multiband Plus.

Call Mgm

Call management of *AIM*, *FT1-B&0*, and
FT1-AIM calls between serial hosts includes
features such as remote management, online
error monitoring, remote loopbacks, and
control of an online call's bandwidth. Call
management of BONDING calls includes
only remote loopback and online bandwidth
control. *1 Chnl* and *2 Chnl* **Call Types** do
not have these call management features.

Call Mgm: When you choose *Manual* or *Dynamic*,
your serial host gets 99.8% of the bandwidth allocated
from the SW56 lines. For example, in a *Manual* call
between serial hosts with the **Base Ch Count** at 5 and
the SW56 interface providing 56 kbit/s switched ser-
vice, your host device gets approximately 279 kbit/s,
or 99.8% of 5x56=280 kbit/s. The 0.2% balance of the
bandwidth is used for Ascend's management subchan-
nel. When the parameter **Call Mgm** is *Mode 2*, your
serial host gets 98.4% of the bandwidth allocated from
the SW56 lines and a clock that is 98.4% of a multiple
of 56 or 64 kbit/s. The 1.6% balance of the bandwidth
is used for BONDING's management subchannel.

⇒⇒   **Call Mgm** [a Call Profile/2*N*-100 Directory
Menu parameter] specifies the type of the
call management applied to calls when
AIM, *FT1-AIM*, *FT1-B&O*, or *BONDING* is
the value for **Call Type**. This parameter is
not applicable to *1 Chnl* or *2 Chnl* call
types. **Call Mgm** can have the following
values:

Call Mgm: For the call management features avail-
able by command see **DO Beg/End Rem LB**, **DO
Beg/End Rem Mgm**, **DO Contract BW**, and **DO Ex-
tend BW**.

- *Manual* allows you to add or remove band-
width manually during an *AIM*, *FT1-B&O*,
or *FT1-AIM* call. This is the default.

Manual: If you have an FT1-B&O call online with
Call Mgm=*Manual*, and Multiband Plus has replaced
the nailed-up channels with switched channels, these
switched channels are not automatically dropped when
Multiband Plus restores the nailed-up channels. Only
if **Call Mgm**=*Dynamic* at one or both ends of the call,
does Multiband Plus automatically manage band-
width.

- *Delta* call management differs from *Manual* in that you cannot add or subtract bandwidth while the call is online. *Delta* also differs in the clock provided to the host, as explained in the adjacent table.

Delta: If you choose *Delta* or *Mode 3*, you get a clock that is an exact multiple of 64 kbit/s. The following table lists the host bandwidths available and the corresponding bandwidth provided by the network. The host always get a multiple of 64 kbit/s, whether the network service is 56 or 64 kbit/s:

Host BW. kbit/s	Base Ch Count	Network BW* (kbit/s)	
		56 kbit/s Service	64 kbit/s Service
1536	24	1568	1600
1344	21	1400	1408
1024	16	1064	1088
768	12	784	832
512	8	560	576
384	6	392	448
256	4	280	320

* The values listed do not include the D channel when network access is ISDN.

- *Dynamic* automatically adds or removes bandwidth during an AIM, FT1-B&O, or FT1-AIM call. In these calls, Multiband Plus monitors HDLC-encoded traffic in the connection and automatically adds or removes channels to achieve the bandwidth required. Multiband Plus must be equipped with DBA before you can choose this feature.

Dynamic: If you choose *Dynamic*, you must also specify the **Dyn Alg**, **Sec History**, **Add/Sub Pers**, and the **Time Period** Call Profile parameters.

Dynamic: If you choose *Dynamic* and Multiband Plus gets an incoming call that is *Manual*, the resulting connection is *Dynamic* in one direction and *Manual* in the other. In all other cases, the incoming call determines call management in both directions.

- *Static* provides no management facility to change bandwidth or resynchronize channels during an AIM, FT1-B&0, and FT1-AIM call. Once the call is established, no channels can be added or removed. This value is not available for calls aggregating nailed-up channels.

Static: When you choose *Static* or *Mode 1*, your host device gets a clock that is an exact multiple of 56 or 64 and 100% of the bandwidth allocated from the network. For example, in a *Static* call with the **Base Ch Count** at 5 and the network interface providing 56 kbit/s switched service, your host device gets 5x56=280 kbit/s.

- *Mode 0* is similar to *2 Chnl*. It must be used when the far-end device uses the BONDING inverse-multiplexing protocol and is connected in dual-port mode to a video codec. In this type of call, the user enters only the phone number of the primary host port associated with the far-end codec. The far-end BONDING device must have the secondary host port's phone number entered. There is no management subchannel, and inverse multiplexing is not performed by Multiband Plus, but rather by the codecs.

- *Mode 1* is used with the BONDING inverse-multiplexing protocol when the host device requires a clock that is an exact multiple of 56 or 64 kbit/s, but no management subchannel is required. It provides a subset of the *Static* features.

- *Mode 2 is* used with the BONDING inverse-multiplexing protocol when the host does not require exact clocking. Multiband Plus constructs the management subchannel by using 1.6% of the bandwidth specified for the call. It provides a subset of the *Manual* features.

- *Mode 3* is used with the BONDING inverse-multiplexing protocol when the host device requires a clock that is an exact multiple of 56 or 64 kbit/s, and a management subchannel is desired. It provides a subset of the *Delta* features.

Modes 0, *1*, *2*, and *3*: As of 1/1/94, the BONDING Interoperability Test Group has authorized all vendors to claim only Mode 1 certification. Ascend will release modes 2, 3 and 0 BONDING software when vendor interoperability testing schedules are announced, scheduled and completed

To establish a BONDING call, you must set the **Call Type** parameter to *BONDING* in the current Call Profiles of both the dialing and answering devices.

Call Profile

A **Call Profile** consists of a set of stored parameters that describe a data communications call between serial hosts so that the call can be established by simply loading the information into the system. The Call Profile functions as a file that contains information about a data call so that you can reestablish a similar call at another time.

Call Profiles are listed in the **Directory Menu**, which stores up to 32 Call Profiles in addition to a current Call Profile. The first 16 profiles (101-116) and the current Call Profile (1**) are associated with a particular serial host port, and the last 16 are common to all host ports (117-132).

Call Profile: The Time Period Call Profile parameters have no meaning for Multiband Plus models not equipped with DBA functionality.

Call Profile: Some parameter values appear only if Multiband Plus has a particular optional feature. For further information on which options are installed in your Multiband Plus, see **Sys Options** status menu.

Selecting the **Directory Menu** option from the Port*N* Menu brings up the Directory menu of its host port #1, which looks like this:

```
21-100 Directory
 21-1** Memphis
>21-101 Albuquerque
 21-102 DC
Note: remaining lines not shown
```

The following menu illustrates the first few parameters listed in the "DC" Call Profile:

```
20-102 DC
 Name=DC
 Call Type=AIM
 Call Mgm=Manual
 Data Svc=56KR
Note: remaining lines not shown
```

Call Status Characters

Whenever Multiband Plus is up and running, any port-specific menus show the state of their associated serial host port by a single letter located in the last column of the first line (upper-right-hand corner) of the display. The call status character describes the current call state of the port.

Call Status Characters: Dual-port calls are seen as two independent incoming calls and their call status letters are displayed separately, each in the status menu of its respective host port.

The following table defines the state that each status character represents:

Blank	Idle (no calls exist and no other calling operations being performed)
R	Ringing (an incoming call is on the line, ready to be answered)
A	Answering incoming call
C	Calling (dialing an outgoing call)

O	Online (a call is up on the line)
H	Hanging up (clearing) the call
D	Diagnostics (local loopback) in progress
!	Handshaking
L	Remote loopback in progress (master or slave)
S	Setting up handshake, add, remove
T	BERT test in progress (master or slave)
??	Network (SW56) alarm

Call Type

⇒⇒ **Call Type** [a Call Profile/2*N*-100 Directory Menu parameter] specifies the architectures of the end-to-end connection between serial hosts:

- *AIM* is a call type in which 56 or 64 channels are aggregated to achieve the bandwidth required. The AIM (Ascend Inverse-Multiplexing) protocol is used. This is the default for units with the *AIM* option.

- *1 Chnl* specifies a call in which a single channel is set up to achieve the bandwidth required. The single channel can be 56 or 64 kbit/s. This is the default except for units with the *AIM* option.

- *2 Chnl* specifies a dual-port call.

- *FT1-AIM* is a call type in which 56 or 64 channels are aggregated together with nailed-up channels to achieve the bandwidth required. The AIM protocol is used.

- *FT1-B&O* provides automatic backup and overflow protection of leased circuits. This value does not appear in the menu of four-host-port models if the current host port is not the primary port of a dual-port pair (**Dual Ports** parameter). The AIM protocol is used.

When **Call Type** is *1 Chnl, 2 Chnl*, *FT1*, or *Static*, your host device gets 100% of the bandwidth allocated from the network. For other call types, the bandwidth delivered to your host is somewhat less. See **Call Mgm** for further information.

Call Types *AIM*, *FT1-AIM*, *FT1-B&O*, and *BONDING* are not allowed on host ports not equipped with inverse-mux. functionality. *AIM*, *FT1-AIM*, and *FT1-B&O* require AIM-compatible equipment at both ends of the call, while *BONDING* requires BONDING compatability at both ends. .

1 Chnl: This call type is used to set up calls to TAs or CSU/DSUs without inverse multiplexing capability.

2 Chnl: This call type is used to set up calls to codecs that have dual-port interfaces. Each of the two host ports establishes a single-channel call. The far end can be equipped with TAs or DSUs without inverse-multiplexing capability.

FT1-B&O: FT1-B&O and FT1-AIM calls share functionality, except for handling failed nailed-up channels. In an FT1-AIM call, when the quality of a nailed-up channel falls to *Marginal* or *Poor*, Multiband Plus drops just that channel; whereas in FT1-B&O, all the nailed-up channels in the call are dropped. Only if **Call Mgm** = *FT1-B&O*, does Multiband Plus attempt to replace dropped nailed-up channels with switched channels. Another difference is that nailed-up channels dropped from an FT1-B&O call are monitored, and when the quality of all dropped channels returns to *Fair* or *Good*, they again become part of the call. Nailed-up channels dropped from an FT1-AIM call are not monitored and cannot be restored to an online cal

You must specify **Call Mgm**=*Dynamic* on FT1-B&O calls, otherwise switched channels are not automatically dropped after the nailed-up channels have been restored.

- *FT1* is a call type that consists entirely of nailed-up channels. This call type is used to connect to TAs or CSU/DSUs over fractional T1 or other leased circuits. Contact your SW56 lines provider if you plan to use this call type. Proper phase relationship between channels is not generally available.

- *BONDING* is a call type in which 56 or 64 kbit/s channels up to a maximum of 12 channels are aggregated to achieve the bandwidth required. The Bandwidth ON Demand Interoperability Group (BONDING) September 1992 1.0 specification is used. Calls using BONDING require BONDING-compatible equipment at both ends of the call.

Call Type: Neither *FT1*, *FT1-AIM*, nor *FT1-B&O* necessarily implies fractional T1 lines, although each uses nailed-up channels.

Call Type: If your unit has four serial ports, any call to or from port #3 or #4 is restricted to call types *1 Chnl*, *2 Chnl*, or *FT1*.

Ch Usage

⇒⇒ **Ch Usage** [Line Profile/10-100 Line Config Menu parameter] specifies how the single channel of a switched-56 line is used. This parameter can be assigned one of the following values:

- *Switched* means that the channel is used for switched connectivity. If you specify the value *Switched*, the channel must also have a phone number. This is the default value.

- *Nailed* means that the channel is used only in a nailed-up (permanently connected) manner.

- *Unused* is specified if you do not want the channel to be part of any data call.

You must specify the channel usage for each line.

Clear

⇒⇒ **Clear** [a Port Profile/2*N*-300 Port Config Menu parameter] specifies how Multiband Plus clears a call at this port:

Clear: If you have selected X.21, V.25bis, or RS-366 for either the **Dial** or **Answer** parameters, you should select *DTR Inactive* for **Clear**, unless otherwise required by your application. *DTR Inactive* is compatible with the CCITT recommendation for the V.25 bis and X.21 protocols and with most implementations of RS-366 dialing. DTR and RTS are names of hardwired handshake leads implemented in X.21, V.35, and RS-449 serial host port interfaces.

- *DTR Inactive* means that Multiband Plus clears the call when DTR goes inactive.

- *DTR Active* means that Multiband Plus clears the call when DTR is asserted.

- *RTS Inactive* means that Multiband Plus clears the call when RTS goes inactive.

- *RTS Active* means that Multiband Plus clears the call when RTS is asserted.

- *Terminal* means that calls are cleared only at the user's request through the **DO 2** or **Control-D 2** (Hang Up) command. This value is the default.

Console

⇒⇒   **Console** [a System Profile/00-100 Sys Config Menu parameter] determines what type of control interface is established at the VT-100 port labeled **Control** on Multiband Plus's back panel. It can have one of following values:

- *Standard* establishes the set of menus described in this guide, but not including the Simplified Menus. This value is the default.

  MIF: You cannot operate MIF through a handheld terminal. Only a VT-100 terminal or emulator can operate MIF, whether it is connected to the **Control** port or to a palmtop port.

- *MIF* establishes, upon power-up or system reset, the machine-to-machine interface format (MIF). To restore the menu-driven interface from within MIF, type **Ctrl-C** from the Control Monitor connected to the **Control** port. However, typing **Ctrl-C** does not return to MIF.

  MIF: To start the machine-to-machine interface at any time independently of this parameter, see **Use MIF Command**.

- *Limited* establishes the set of menus described in the "Simplified Menus" appendix.

  Limited: To go to or exit from the Simplified Menus, type **Ctrl-T** from the Control Monitor which is connected to the **Control** port.

Control-D Commands

See **DO / Control-D Commands**

Control Key Commands

The following Control Key (**Ctrl-**) com-
mands are available from the Control Mon-
itor, but not from a Palmtop Controller.

Ctrl-C	Return to normal interface from MIF, Terminate editing a profile Terminate saving or restoring process
Ctrl-T	Return from or go to Simplified Menus
Ctrl-L	Refresh the VT-100 screen
Ctrl-D	Display the current DO menu

Current Call Profile

The *current Call Profile* of a port contains
the parameters of a call currently online at
that port, or of the call most recently made
from the port if no call is up.

Current Call Profile: Every host port has one and
only one current Call Profile.

The current Call Profile appears at the top
of the Directory menu and has the root
number *1***. The other entries in the Direc-
tory menu represent stored Call Profiles.
Each of the stored profiles has a number,
which the system uses to identify the profile.

Data Svc

⇒⇒ **Data Svc** [Call Profile/2*N*-100 Directory-
Menu parameter] is the type of carrier ser-
vice to be requested for the call:

Data Svc: Which values are valid depend on your
WAN interface and the assignment of values set in the
Line Profile parameters. Check with your system man-
ager or carrier contact if you are uncertain about the
types of services available.

• *56KR* means the call contains restricted
data, which guarantees ones density for net-
work synchronization, and connects to 56
kbit/s switched data services. This is the de-
fault and only value.

Date

⇒⇒ **Date** [a System Profile/00-100 Sys Config
Menu parameter] specifies the month, day,
and year in the format *mm/dd/yy*. This pa-
rameter should be set when installing Multi-
band Plus-SW56.

Dec Ch Count

⇒⇒ **Dec Ch Count** [a Call Profile/2*N*-100 Directory Menu parameter] sets the number of channels subtracted when bandwidth is modified manually or automatically. This parameter does not apply to the following call types: *1 Chnl*, *2 Chnl*, *FT1*, nor to these call management types: *Delta, Static, BONDING Modes 0*, *1*, or *3*. Its value can be any intger from *1*, the default, to *32*.

You cannot clear a call by decrementing channels.

Delay Dual

⇒⇒ **Delay Dual** [a System Profile/00-100 Sys Config Menu parameter] determines whether there is a delay between dialing the first and second calls of a dual-port call. If **Delay Dual**=*Yes*, there is a 10 second delay between dialing the first and second calls. If **Delay Dual**=*No*, the default, both calls are placed at the same time.

Dial

⇒⇒ **Dial** [a Port Profile/2*N*-300 Port Config Menu parameter] specifies how a call originates at this port:

Dial: Choosing any of these options does not prevent you from dialing manually using the Palmtop Controller or Control Monitor.

- *Terminal* means that the calls are dialed only at the user's request with the **DO 1** or **Control-D 1** (Do Dial) command. This is the default.

- *DTR Active* means that the current Call Profile is dialed when the DTR signal is asserted at this port.

- *RS-366 ext1* means that Multiband Plus calls are dialed through an RS-366 dialing device.

- *RS-366 ext2* also supports RS-366 dialing. This extension of RS-366 has different message protocols from *RS-366 ext1*. You must also configure the Port Profile parameter **RS-366 Esc** if you select this value.

- *V.25bis* means that V.25 bis hardware handshakes and command messages from your host equipment can control dialing. If you are editing the profile of port #3 or #4, you should not select the value *V.25bis*. While ports #1 and #2 support V.25 bis, neither port #3 nor port #4 does.

- *V.25bis-C* means that the CTS (Clear-To-Send) lead does not change state during a call; otherwise, it is the same as the *V.25 bis* option.

- *X.21 ext1* means that Multiband Plus dials calls under the control of the host equipment as described in CCITT Blue Book Rec. X.21.

- *X.21 ext1-P* is required when interfacing to a PictureTel X.21 dialer. It uses the same protocol as *X.21 ext1*.

- *X.21 ext2* also supports X.21 dialing. This extension of X.21 has different message protocols from *X.21 ext2*.

V.25bis: The Ascend/Cisco extension of the V.25 bis protocol is described in the "RS-366, V.25 bis, X.21, Lead Dialing" appendix. *V.25bis* does not appear when this port is paired with another in the Host-Interface Profile.

Dial

⇒⇒ **Dial #** [a Call Profile/2*N*-100 Directory Menu parameter] specifies the phone number to be dialed for the call,

- The phone number can contain up to 37 numeric characters, including -, (), #, !, and *. Only the numerical characters in this parameter are sent to the switch to place a call.

- For **Dial # [Call Profile]** when the **Call Type** is *2 Chnl* — this parameter accepts either a single phone number up to 37 characters or two phone numbers up to 18 characters, separated by an exclamation point (!).

Dial # [Call Profile]: A dual-port example for this parameter follows: *5551212!5551234*.

2*N*-100 Directory Menu

The Directory menu lists 32 Call Profiles. There is a Directory menu for each serial host port. The following illustration shows that the Directory menu is the first submenu listed under Port*N* Menu. In this example the first port is shown:

2N-100 Directory Menu: *N* gives the serial port and *X* gives the slot(s) of the Host/.. module(s) if installed. There is a Directory menu for each serial port. See also **Call Profiles**.

```
21-000 Port1 Menu
>21-100 Directory
 21-200 Port Diag
 21-300 Port Config
```

Through this menu, the parameters of each Call Profile can be edit and stored.

DO/Ctrl-D Commands

The DO command menu is a context sensitive list of commands that appears when the DO/Ctrl-D keys are pressed. Only those DO commands which apply to the current display and situation, appear. For instance, **DO S=Save** does not appear in any status windows, and **DO 5=Decrease bandwidth** only appears from displays specific to a multichannel call that is currently online.

DO / Control-D Commands: In addition to being context sensitive, a **DO** command might not appear if the user has logged in with operational privileges. See **Operations** for further information.

The following DO commands are defined:

DO 0   Abort exit DO menu (escape)
DO 1   Dial selected or current profile
DO 2   Hang up from call in progress
DO 3   Answer incoming call
DO 4   Increase bandwidth
DO 5   Decrease bandwidth
DO 6   Begin/End remote loopback
DO 7   Begin/End BERT
DO 8   Begin/End remote management
DO 9   Not used
DO P   Password login / logout
DO R   Resynchronize call in progress
DO S   Save parameter values into specified profile
DO L   Load parameter values into current profile
DO M   Save Control Monitor menu layout

DO / Control-D Commands: To type a DO command, press and release the Palmtop's **DO** key or the Control Monitor's **Control-D** combination, and then press and release the next key in the sequence. The **PF1** function key on VT-100 monitors is equivalent to **DO**.

DO Answer (DO 3)

The **DO 3** or **Ctrl-D 3** (DO Answer) command answers an incoming call. You can apply this command only from a menu specific to a serial host port. You cannot answer an incoming call if there is a call currently in progress.

DO Answer: This command applies when set for manual answer (**Answer**=*Terminal*) at the serial host port and an incoming call is ringing at that port. It is not available from the secondary serial host port of a dual-port pair.

DO Beg/End BERT (DO 7)

The **DO 7** or **Ctrl-D 7** command starts and stops a channel-by-channel byte error test (BERT). This test runs over the current called circuits from end-to-end and reports not only total byte errors found, but also breaks the errors down to each DS0 channel. The results are displayed in the **Session Err** menu.

When you select **DO 7** or **Ctrl-D 7**, the responding end (the one that did not request the BERT test) goes into a DS0-by-DS0 loopback mode of operation. As in the remote loopback test, the signal at the remote end of the test is looped back at the application-Multiband Plus interface, rather than at the network-Multiband Plus inter-

DO Beg/End BERT: Wait at least 20 seconds between toggling remote BERT test on or off to allow Multiband Plus time to complete handshaking.

See also **Auto-BERT**. For further information, see the "Error Counting in WAN Connections" appendix and **Line Errors**, **Session Err**, **Port Info**, **Call Status**, and **Statistics** in the "Reference to Status Menus" chapter.

This command does not appear if not logged in with operational privileges. See **Operations**.

face. You must be in a port-specific edit or
status menu to use this command.

The call status letter *T*, for test, appears in
the upper right-hand corner of the display of
both the near-end and far-end Multiband
Plus to indicate a BERT is in progress. To
resume normal operation, simply end the
BERT test by selecting **DO 7** or **Ctrl-D 7**
again.

> **DO Beg/End BERT**: No user data transfer takes place
> in either direction during a BERT test, and all com-
> mands that affect the call are disabled, except the com-
> mand that ends the BERT test.

You can run the BERT test only one direc-
tion at a time (only one side can be the
requestor).

The diagram below shows the data paths in
operation during the BERT test. The far end
is looped back on all DS0s, and the near
end sends a known data pattern over the net-
work. By monitoring the data being
received against the transmitted pattern, the
near end counts the errors it receives by
individual DS0 channels. Errors are counted
on a byte basis. If a single byte has two or
more errors, it is still recorded as a single
error. Further information on error counting

is found in the "Error Counting in WAN Connections" appendix.

1. Pattern is transmitted from near end Multiband Plus.
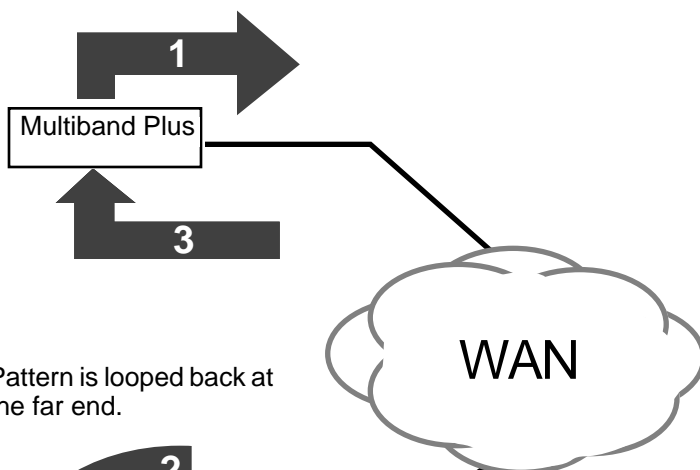
2. Pattern is looped back at the far end.
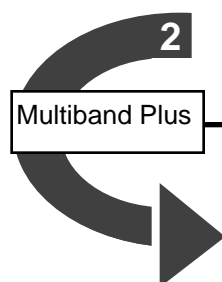
3. Pattern is received by near end Multiband Plus and analyzed for possible byte errors.
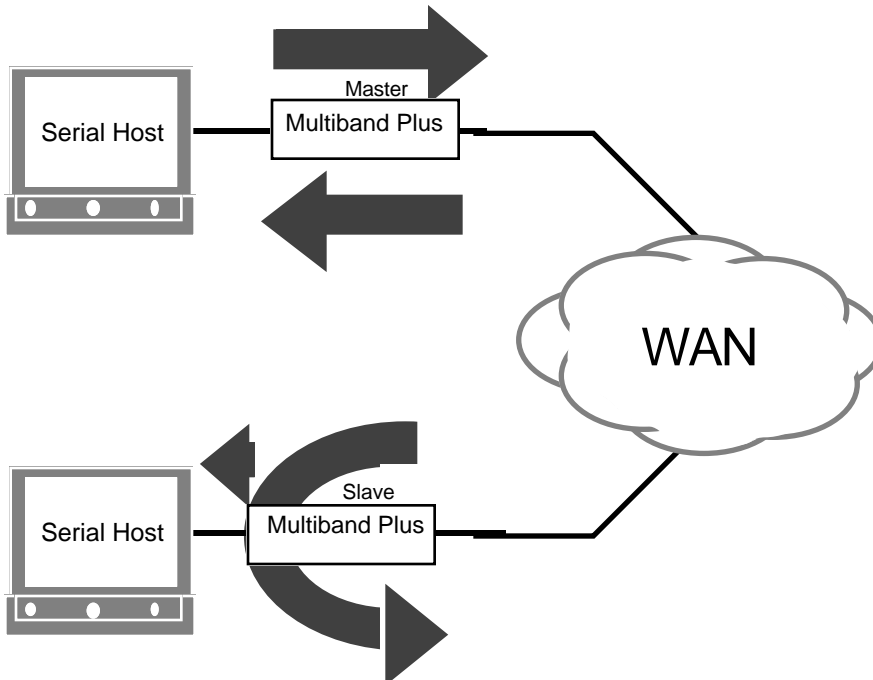
DO Beg/End Rem LB(DO 6)

The **DO 6** or **Ctrl-D 6** (Begin/End remote loopback) begins and ends a loopback at the

DO Rem LB: Remote loopback tests the entire connection from host interface to host interface. This loopback is also known as a remote data loopback because the loopback occurs at the DTE/DCE interface.

serial host port at the far-end of this call as shown in the following diagram:

1. Remote loopback is initiated at a serial host interface of the master

2. ...and data loops at the slave serial host interface toward master Multiband Plus.
    Note that data also passes through to the slave serial host port.

To begin a remote loopback, select **DO Beg/End Rem LB**. The call status character L appears in the upper right-hand corner of the screen for both the loopback master and the loopback slave. To end a remote loopback, select this option a second time. Unplugging the Palmtop Controller also terminates remote loopback.

Remote loopback disables data flow from the far end host equipment. Data flow from the far-end host is disabled, but the call remains online. DBA is also disabled.

Only switched and nailed-up channels that are active during the current call are looped back.

DO Rem LB: Wait at least 20 seconds between toggling remote loopback on or off to allow Multiband Plus time to complete handshaking. You must be in a port-specific edit or status menu with a call online to use this command.

This command does not appear if logged in without operational privileges. See **Operations**.

Remote Loopback Limitations

There are no remote loopback limitations when the far end of the call is connected by a Multiband Plus, a Multiband Plus, LSU, VSU or MAX, but some limitations exist when the far end of the call is connected by other equipment. (See below.)

If Multiband Plus fails to set up a remote loopback, instead it establishes a loopback at the local host interface calling for the loopback. This is shown below:

1. Remote loopback is initiated at a serial host interface the master Multiband Plus. ...and data loops at the master toward the slave.

Note that data also passes through to the master serial host port.
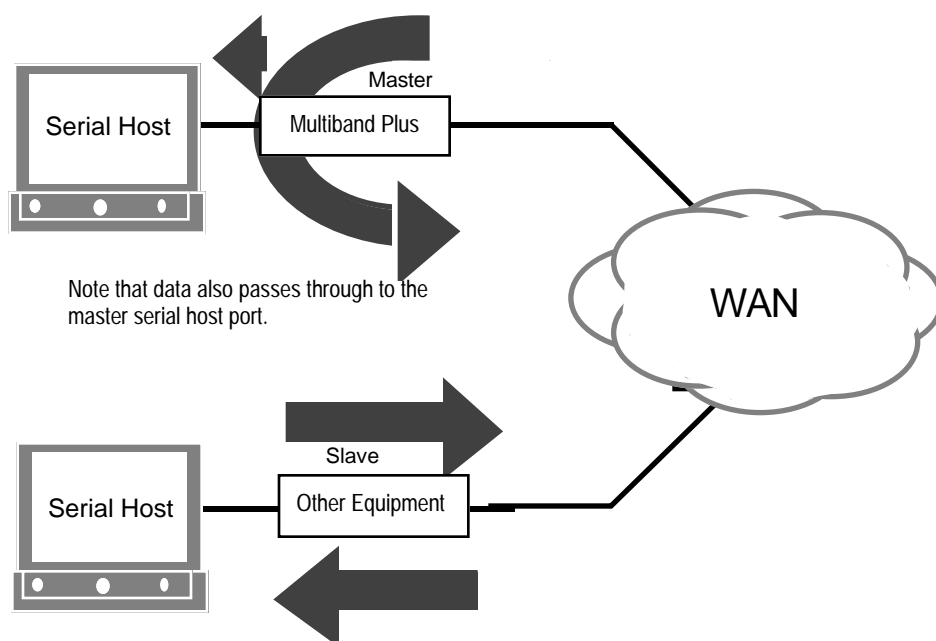
2. Slave transmits data toward the master Multiband Plus which loops it back toward the slave.

If the far-end device is an ISDN TA, remote loopbacks usually cannot be performed because most do not recognize the loopback signal.

On the other hand, most switching CSU/DSUs recognize the remote loopback command/signal sent by Multiband Plus, and remote loopbacks are usually possible.

When the far-end device is a Multiband Classic (not a MAX, Plus, VSU, or LSU),

DO Beg/End Rem LB: A proprietary loopback message is used when the AIM management subchannel is present (**Call Mgm**=*Manual*, *Dynamic*, or *Delta*). The CCITT V.54 loopback pattern is used when no management subchannel is present(*1 Chnl*, *2 Chnl*, *Static*).

remote loopbacks cannot be set up if the network connection is made over ISDN lines and **Call Type** = *1 Chnl* or *2 Chnl,* or the connection is ISDN and **Call Type**/**Call Mgm**=*AIM/Static* or *BONDING/Mode 1.*

DO Beg/End Rem Mgm (DO 8)

The **DO 8** or **Ctrl-D 8** (DO Beg/End Rem Mgm) command begins and ends remote management of the device at the far end of an AIM call. When you enter the **DO 8** command, the Control Monitor displays the following message at the top of its screen:

REMOTE MANAGEMENT VIA xxxx

In this message xxxx shows the serial host port (AIM calls) , through whose online connection you are conducting remote management.

To end a remote management session, type **DO 8** or **Ctrl-D 8** again. You cannot exit remote management from a port other than the port from which you began remote management. When the message at the top of the Control Monitor screen disappears, you are viewing the screens associated with the local Multiband Plus.

You cannot begin remote management if you do not have an online call to the remote device. Furthermore, you must select this command from a menu specific to that call.

Remote management is denied if the far end of the connection has the value *No* for its **Remote Mgmt** System Profile parameter.

DO Beg/End Rem Mgm: It is strongly recommended that you perform remote management using only the Control Monitor. Using the Palmtop Controller, there is no indication whether you are in remote management or local management.

This command does not appear if logged in without operational privileges. See **Operations**.

DO Beg/End Rem Mgm: During an AIM call, remote management adds 20 kbit/s to the 0.2% overhead and to that small extent reduces the bandwidth provided to serial hosts devices using the connection.

DO Beg/End Rem Mgm is available for connections with **Call Type**=*FT1-AIM, FT1-B&O, or AIM* (but not when **Call Mgm**=*Static*).

DO Contract BW (DO 5)

The **DO 5** or **Ctrl-D 5** (Decrease bandwidth) command decreases the bandwidth by the amount specified in the **Dec Ch Count** parameter of an online call. If the specified amount is not available, the maximum number of channels possible is removed without clearing the call.

This command is available only from a menu specific to an online call with at least two channels.

DO Contract BW is available for inverse-multiplexed calls using switched circuits.

See the "Inverse-Multiplexing" appendix for information about how the system handles requests for less bandwidth.

This command does not appear if logged in without operational privileges. See **Operations**.

DO Dial (DO 1) Command

The **DO 1** or **Ctrl-D 1** (DO Dial) command dials a selected Call.

DO Dial is not available when the call is busy. Nor can a call be placed from the secondary port of a dual-port pair. See also section 3.19 in this guide.

This command does not appear if logged in without operational privileges. See **Operations**.

Dialing a Call Profile

Before dialing a Call Profile, the selector (>) must be in one of the following positions:

- In front of a Call Profile in the Directory menu to dial the selected profile

- At any parameter within a Call Profile to dial the profile being edited

- In front of or within any port-specific menu, but not at any specific Call Profile to dial the current Call Profile

Since the current Call Profile contains the parameters of the last call made from a port, the last option redials the last call made from that port.

DO 1 automatically performs a **DO Load** of the selected profile which overwrites the current Call Profile, including any Call Profile parameters you might have edited.

DO Dial: All edited parameters are not overwritten if the current Call Profile is protected by Security Profiles.

DO ESC (DO 0) Command

The **DO 0** or **Ctrl-D 0** command (**ESC**) simply exits the DO menu without taking any other action. The remaining DO commands are described by category of operation in the sections that follow.

DO Extend BW (DO 4)

The **DO 4** or **Ctrl-D 4** (Extend bandwidth) command increases the bandwidth by the amount specified in the **Inc Ch Count** parameter of the current Call Profile. If the specified amount is not available, the maximum number of channels available is added to the call.

You must apply this command from a menu specific to an online serial host port. This command is available only from connections whose bandwidth can be incremented.

DO Extend BW is available for inverse-multiplexed calls using switched circuits. See "Inverse-Multiplexing" appendix for information about how the system handles requests for more bandwidth.

This command does not appear if not logged in with operational privileges. See **Operations**.

DO Hang Up (DO 2)

The **DO 2** or **Ctrl-D 2** (DO Hang up) command ends an online call. Either the caller or the receiver can terminate at any time. You must be in a menu specific to an online serial host port menu to use this command.

DO Hang Up: See also section 3.19 in this guide.

This command does not appear if logged in without operational privileges. See **Operations**.

DO Load (DO L)

The **DO L** or **Ctrl-D L** (DO Load) command loads a saved or edited profile onto the current profile. Loading a selected profile overwrites the values of the current profile with those from the selected profile.

DO Load: See also section 3.6 in this guide.

This command does not appear if logged in without operational privileges. See **Operations**.

For example, assume you have saved a pro-
file named `Memphis` in the Directory loca-
tion 21-102:

```
21-100 Directory
>21-1** Factory
 21-101 Tucson
 21-102 Memphis
Note: remaining lines not shown
```

When you execute **DO L** or **Ctrl-D L** (Do
Load), the following pop-up menu appears:

```
Load profile...?
 0=ESC (Don't load)
 1=Load profile 102
```

If you choose the first option by entering `0`,
the load operation will be aborted. If you
choose the second option by entering `1`, the
following status menu appears:

```
Status #116
 Profile loaded
 as current profile.
```

The Directory menu also shows the results
of the load operation:

```
01-100 Directory
 21-1** Memphis
 21-101 Tucson
>21-102 Memphis
Note: remaining lines not shown
```

DO Menu Save (DO M)

Ctrl-D M (DO Menu Save) saves the entire
current Control Monitor layout. When you
enter **Ctrl-D M**, the current layout replaces
the default layout. The **Status 1...** through
Status 8... and **Edit** System Profile parame-
ters are replaced by the current layout.

DO Menu Save: This command appears only if the
cursor is in front of the 00-100 Sys Config menu. Fur-
thermore, **Ctrl-D M** always places 00-100 Sys Config
in the default edit display. To change the default edit
display to something else, you must configure the **Edit**
System Profile parameter after **Ctrl-D M**.

This command does not apply to Palmtop Controllers, nor does it apply when your VT-100 is plugged into an RPM or Palmtop port.

DO Resynchronize (DO R)

The **DO R** or **Ctrl-D R** (Resynchronize call in progress between serial hosts) command forces Multiband Plus to perform another *handshake* with the far end. A handshake is an exchange of data over the management subchannel that verifies that transmission is reliable on both ends of the call.

You must be in a serial host port-specific edit or status menu to use this command.

DO Resynchronize is not available for all call management types (see **Call Mgm**). Nor is this command available when the host port is idle (no active call) or when the host port is the secondary port of a dual-port pair.

This command does not appear if logged in without operational privileges. See **Operations**.

DO Save (DO S)

The **DO S** or **Ctrl-D S** (DO Save) command saves the current parameter values into a specified profile.

DO Save: If profiles are protected by Security Profiles, you might not be able to overwrite them. Also see **Security Profiles** and section 3.5 in this guide

This command does not appear if logged in without operational privileges. See **Operations**.

DO Password (DO P)

The purpose of password security is to prevent certain operations from being performed by those who lack the authority to do so.

During log in, you set Multiband Plus's security by selecting and activating a Security Profile. That Security Profile remains active until you log out or replace it by activating a different Security Profile or until Multiband Plus automatically logs you out. Multiband Plus can have several simultaneous user sessions and therefore several simultaneous Security Profiles. The following sections explain the login and logout procedures.

DO Password: For example, if you log in using the password in a Security Profile named "Admin," the operations you can perform are controlled by how "Admin" is configured. Other users can be simultaneously operating under the same or different passwords.

Login Procedure

To log onto Multiband Plus, use the command **DO P**. You can log in or log out from any menu. Whenever you select the **DO P**

Login Procedure: If you begin a remote management session, you are automatically logged in at the first Security Profile, "00-301 Default." To change to another profile after starting a remote session, use the command **DO P** and enter a password.

When you power-on or reset Multiband Plus, security at all control ports initially is set to "00-301 Default."

command, a list of Security Profiles
appears. Select the desired profile with the
Right-Arrow or **Enter** key and enter its
corresponding password when prompted. If
you enter the correct password for that pro-
file, the security of Multiband Plus is reset
to the Security Profile you have selected.

If you select the first Security Profile, `00-301 Default`, during login, simply
press **Enter/Return** when prompted for a
password. The password for this profile is
always null and its name is always Default.

Logout Procedure

If you are operating Multiband Plus locally
and you want to secure Multiband Plus for
the next user, use the **DO P** or **Ctrl-D P**
command and select the first profile, `00-301 Default`. Typically, the default
Security Profile has been edited to disable
all operations you wish to secure.

If you end a remote management session or
exceed the time set by the **Idle Logout**
System Profile parameter, you are automati-
cally logged out to the first Security Profile,
`00-301 Default`. Automatic log out
to the default Security Profile also occurs
when you disconnect your terminal if you
have been connected to a **Palmtop** control
port — or the **Auto Logout** System Profile
parameter is set to *Yes* and you have been
connected to the **VT-100** control port.

Simultaneous Security Profiles

A single security profile can be used simul-
taneously by any number of users. Suppose,
for example, you log in using the Control
Monitor. Another user logs in. If both you
and the other user enter the same password,
you both get the same Security Profile and
can perform the same operations. If you log
in using different passwords, each of you
gets a separate Security Profile with sepa-
rate lists of privileges.

If you edit a Security Profile, the changes do not affect anyone logged in using that profile. However, if that person stops using the edited Security Profile, the next time he or she logs in, the new version of the profile is brought up.

DO Toggle (DO T)

This command applies only to the Palmtop Controller. It is equivalent to pressing the **Toggle Stat** key.

Download

⇒⇒ **Download** [a Security Profile/00-300 Security menu parameter] controls whether the configuration of Multiband Plus can be downloaded. When this parameter is *Yes*, profiles and other configuration parameters can be transferred from Multiband Plus to another device, generally a PC. Download enables you to back up the configuration of Multiband Plus. The factory default for this parameter is *Yes*.

Download: Security Profile passwords cannot be downloaded.

DS0 Min Rst

⇒⇒ **DS0 Min Rst** [System Profile/00-100 Sys Config Menu and Port Profile/2*N*-300 Port Config Menu parameters] enables or disables the timer that resets the accumulated DS0 minutes. It can be assigned any one of the following values:

DS0 Min Rst: The **Max Call Mins** and **Max DS0 Mins** Port Profile parameters and the **Max DS0 Mins** System Profile parameter also limit network use.

• *Daily* — Multiband Plus resets the accumulated DS0 minutes at this port to zero every day at 12:00 AM midnight.

• *Monthly* — Multiband Plus resets its accumulated DS0 minutes at this port to zero on the first day of every month at 12:00 AM midnight.

- *Off* — Multiband Plus-SW56 disables the corresponding **Max DS0 Mins** System Profile or Port Profile parameter. This is the default.

Dual Ports

⇒⇒ **Dual Ports** [a Host-Interface Profile/20-100 Host Config Menu parameter] determines which ports are paired. If this is a Host/Dual interface, this parameter can have one of the following two values:

- *No Dual* means that no host ports are paired for dialing or receiving dual-port calls. This value is the default.

- *1&2 Dual* means that host ports #1 and #2 are paired for dialing and receiving dual-port calls. This option does not appear on Multiband Plus models with four host ports. Port #2 is the *slave port*.

⇒⇒ If this is a Host/Quad interface, **Dual Ports** can have one of the values in the following list:

- *All Dual* means that all the host ports are paired for dialing and receiving dual-port calls. It is applicable only to Multiband Plus models with four host ports. Port #1 is paired with port #3, and port #2 is paired with port #4. Ports #3 and #4 are the secondary or *slave ports*. This option does not appear on Multiband Plus with only two host ports.

- *No Dual* means that no host ports are paired for dialing or receiving dual-port dual-port calls. This value is the default.

- *3&4 Dual* means that host ports #3 and #4 are paired for dialing and receiving dual-port calls. This option does not appear on Multiband Plus models with only two host ports.

Dual Port: If either of the ports in a pair is not available, you cannot dial a dual-port call from the pair, and Multiband Plus might answer an incoming dual-port call on a single port only. (There is no way of distinguishing an incoming dual-port call from two incoming single-port calls.)

Dual Port: Pairing ports does not restrict you from dialing any other type of call from the primary host port of the pair, nor does pairing ports restrict you from using host ports, paired or not, for receiving any call type. Pairing ports does not cause RS-366 dialing to be disabled at the secondary ports. RS-366 dialing is enabled or disabled independently.

Dual Ports: Port-pairing is also required on FT1-B&O calls equipped with 4 host ports. *All Dual*, *1&3 Dual*, or *2&4 Dual* must be selected.

- *1&3 Dual* means host ports #1 and #3 are paired for receiving and dialing dual-port calls. This option does not appear on Multi-band Plus models with only two host ports.

- *2&4 Dual* means host ports #2 and #4 are paired for receiving and dialing dual-port calls. This option does not appear on Multi-band Plus models with only two host ports.

Dyn Alg

⇒⇒ **Dyn Alg** [a Call Profile/2*N*-100Directory Menu parameter] specifies the bandwidth weighting algorithm that tracks bandwidth usage during a call between serial host ports.

The bandwidth usage calculation starts by integrating the recent history of data traffic flowing over a sliding window. Multiband Plus then applies one of the following algo-rithms to determine whether bandwidth should be added or removed:

- *Constant* means each of the samples taken for the duration of time specified by the **Sec History** parameter has equal weight when the algorithm is applied. Older history has equal impact on the decision when using this algorithm.

- *Linear* means the most recent samples have a greater weight on the algorithm than the older ones. Samples are weighted inversely proportional to their age. This value is the default.

- *Quadratic*, like *Linear*, means the most re-cent samples are more heavily weighted than older samples, and the weighting di-minishes with their age at a quadratic rate.

Dyn Alg [Call Profile]: The idle state of a dynamic AIM connection is indicated either by the HDLC flag or mark. The **Flag Idle** parameter indicates which to use.

Dyn Alg: To use Multiband Plus to allocate bandwidth by automatically tracking line usage, you must specify the **Dyn Alg**, **Sec History**, **Add Pers**, **Sub Pers**, and **Time Period..**.

Dyn Alg: Bandwidth is added when the average usage percentage is greater than the target utilization for the period of time specified by **Add Pers**. Bandwidth is re-moved when the calculated usage percentage has been less than the target utilization for the time given in **Sub Pers**. See "Controlling Dynamic Bandwidth" appen-dix for the equations generating each of these algo-rithms.

Early CD

⇒⇒ **Early CD** [a Port Profile/2*N*-300 Port Config Menu parameter] specifies when Multiband Plus raises CD, that is, the DCD lead (Data Carrier Detect).

- *Answer* means that as soon as soon as Multiband Plus answers a call, it raises CD rather than wait for completion of handshaking. Use this setting if your serial host has been timing out waiting for CD.

- *Originate* means that as soon as the far end answers a call, Multiband Plus raises CD rather than wait for completion of handshaking.

- *Both* raises CD before waiting for completion of handshaking, whether Multiband Plus is answering or originating.

- *None*, the default, is the normal setting. Multiband Plus raises CD after completing its handshaking plus a short delay.

Early CD applies both to answering calls and dialing calls.

Edit / Status 1 - Status 8

⇒⇒ **Edit** and **Status 1** through **Status 8** [System Profile/00-100 Sys Config Menu parameters] allow you to customize your Control Monitor display so that at power-up the desired screens are displayed. The **Edit** parameter controls the Edit display, while the **Status 1** through **Status 8** parameters control the status displays. Their values can be any menu or submenu number in the format *XN-n00.* The "Keyboard Reference" chapter has a description of menu numbers.

Edit: When running the Simplified Menus from the **Control** port, **Edit** determines which serial host port is displayed. If null, host port #1 is displayed.

Use the **Ctrl-D M** command to automatically configure **Status 1** through **Status 8**. See **DO Menu Save** for further information.

Edit All Calls

⇒⇒ **Edit All Calls** [a Security Profile/00-300
Security menu parameter] allows all Call
Profiles to be edited. When this parameter
is *Yes*, these profiles can be edited, either by
a local operator or by remote management.
When the active Security Profile has this pa-
rameter set to *No*, the **Dial #** and the **Base
Ch Cnt** parameters of the current Call Pro-
files can still be edited. See also **Edit Own
Call** and **Edit Com Call**. . The factory de-
fault for this parameter is *Yes*.

Edit All Calls: To disable editing of the **Dial #** and
Base Ch Cnt parameters, you must set this parameter
and **Edit Cur Call** to *No*.

Edit All Ports

⇒⇒ **Edit All Ports** [a Security Profile/00-300
Security menu parameter] allows all Port
Profiles to be edited. When this parameter
is *Yes*, all the Port Profiles can be edited, ei-
ther by a local operator or by remote man-
agement. See also **Edit Own Port**. The
factory default for this parameter is *Yes*.

Edit Com Call

⇒⇒ **Edit Com Call** [a Security Profile/00-300
Security menu parameter] controls whether
the Call Profiles that are not specific to any
serial host port can be edited. When this pa-
rameter is *Yes*, the common Call Profiles
can be edited, either by a local operator or
by remote management. Common Call Pro-
files are those that are not assigned to any
serial host port. This privilege is disabled
only when this parameter is *No* and **Edit
All Calls** is *No*. The factory default for this
parameter is *Yes*.

Edit Com Call: The port-specific Call Profiles are
numbered from 201 to 216. Call Profiles from 217 to
232 are common to all serial host ports.

Edit Cur Call

⇒⇒ **Edit Cur Call** [a Security Profile/00-300
Security Menu parameter] controls whether
all the parameters of the current Call Profile
can be edited. When this parameter is *Yes*,
all the parameters of the current Call Pro-
files can be edited, either by a local operator
or by remote management. When this pa-
rameter is *No*, the **Dial #** and the **Base Ch
Cnt** parameters can still be edited. This priv-
ilege is disabled only when this parameter is
No and **Edit All Calls** is *No*. The factory de-
fault for this parameter is *Yes*.

Edit Line

⇒⇒ **Edit Line** [a Security Profile/00-300 Secu-
rity Menu parameter] controls editing of the
Line Profile. When this parameter is *Yes*,
the Line Profile can be edited. The factory
default for this parameter is *Yes*.

Edit Own Call

⇒⇒ **Edit Own Call** [a Security Profile/00-300
Security Menu parameter] controls whether
the operator's own Call Profiles can be ed-
ited. When this parameter is *Yes*, the oper-
ator during remote management can edit the
port-specific Call Profiles of the port that
has been called. This privilege is disabled
only when this parameter is *No* and **Edit
All Calls** is *No*. The factory default for this
parameter is *Yes*.

Edit Own Port

⇒⇒ **Edit Own Port** [a Security Profile/00-300
Security Menu parameter] controls whether
the operator's own Port Profile can be ed-
ited. When this parameter is *Yes*, the oper-
ator during remote management can edit the
profile of the port that has been called. This
privilege is disabled only when this param-
eter is *No* and **Edit All Ports** is *No*. The fac-
tory default for this parameter is *Yes*.

Edit Security

⇒⇒ **Edit Security** [a Security Profile/00-300 Se-
curity Menu parameter] controls editing Se-
curity Profiles. When this parameter is *Yes*,
any Security Profile can be edited. This is
the most powerful security privilege, since a
user can access all other operations simply
by enabling the desired operations in his or
her active Security Profile. The factory de-
fault for this parameter is *Yes*.

Edit Security: Do not set this parameter to *No* on all nine Security Profiles, or you will be completely locked out from editing any Security Profiles.

Edit System

⇒⇒ **Edit System** [a Security Profile/00-300 Se-
curity Menu parameter] controls editing of
the System Profile. When in a Security state
that has this parameter set to *Yes*, the
System Profile can be edited. The factory
default for this parameter is *Yes*.

Enabled

⇒⇒   **Enabled** [a Line Profile/10-100 Line
Config Menu parameter] enables or disables
a line. It has the default value is *Yes*. If you
specify the value *No*, the line cannot be
used.

Excl Routing

⇒⇒   **Excl Routing** [a System Profile/00-100 Sys
Config Menu parameter] can have either a
Yes/No value.

Excl Routing (exclusive routing) does not affect in-
coming calls that reach a busy interface, which are al-
ways cleared.

• *No*. An incoming call is routed to the first
available serial host port when no port has
been designated by **Port/Grp** (Line Pro-
file). This is the default.

• *Yes*. The call is dropped if no serial host
port has been designated.

"No serial port designated" means the channel on
which it arrives has **Port/Grp** set to 0.

F Menus, L Menus, or R Menus

⇒⇒   **F Menus**, **L Menus**, or **R Menus** [Host-In-
terface Profile/20-100 Host Config Menu
parameters] determines whether the front,
left, or right Palmtop port has access to the
standard set of menus (*Standard*) or the sim-
plified menus (*Limited*), or the command
line interface (*MIF*). *Standard* is the de-
fault.

F Menus, L Menus, or R Menus: The simplified
menus are described in the "Simplified Menus" ap-
pendix. **F**, **L**, and **R** stand for front, left, and right.

F Palmtop (L, R Palmtop)

⇒⇒   **F Palmtop**, **L Palmtop**, and **R Palmtop**
[Host-Interface Profile/20-100 Host Config
Menu parameters] apply to the front panel
Palmtop port, and the optional left and right
back panel Palmtop ports, respectively.

F Palmtop, L Palmtop, and R Palmtop: If operating
Multiband Plus on a Control Monitor connected
through a Palmtop port, you can change your access
from Full to Restrict, but you cannot change your ac-
cess from Restrict to Full. Only a terminal connected
to the Control port (the back panel DE-9 connector)
can provide full access.

• When set to *Restrict*, operators connected to
that Palmtop port can make commands or
edit parameters specific to serial host ports
only if enabled by **F Port #**, **L Port #**, or **R
Port #** host-interface parameters. Further-
more, *Restrict* blocks access to the System

menus (00-100 Sys Config, etc.), Network
menus (10-100 Line Config, etc.), and the
Host Config (Host Interface Profile) menu.

- When set to *Full*, the default, that Palmtop
  port is unrestricted.

F Port #, L Port #, or R Port

⇒⇒   **F Port #**, **L Port #**, or **R Port #** [Host-Inter-
face Profile/20-100 Host Config Menu pa-
rameters] apply only if the corresponding **F
Palmtop**, **L Palmtop**, or **R Palmtop** Host-
Interface profile parameter has been set to
Restrict. In such a case you can enter the
number of any serial host port. (If you enter
0, you allow this Palmtop port access to any
host port.) When restricted to a single serial
host port, any user of this Palmtop port
cannot dial from, answer at, or edit any
other host port.

Fail Action

⇒⇒   **Fail Action** [a Call Profile/2*N*-100 Direc-
tory Menu parameter] specifies what action
is taken when the call cannot be established
with the full number of channels in the base
channel count (**Base Ch Count**):

- *Disc* means that the whole call is canceled.

- *Reduce* means that the bandwidth allocated
  for the call is lowered; then Multiband Plus
  tries to establish the call at a reduced
  number of channels. *Reduce* is the default.

- *Retry* means the call remains online at a par-
  tial bandwidth while Multiband Plus tries to
  set up the call at the full number of base
  channels. Retry attempts continue for ap-
  proximately 30 seconds or until full band-
  width is achieved or **Base Ch Count** is
  manually reduced. If the base channel count
  is not achieved within 30 seconds, the call
  remains online.

Field Service

⇒⇒   **Field Service** [a Security Profile/00-300 Security Menu parameter] controls whether the field service operations can be performed. Setting this parameter to *No* does not disable any operations described in this manual. Field service operations are special diagnostic routines not available through Multiband Plus menus. When this parameter is *Yes*, all the field service operations can be performed. The factory default for this parameter is *Yes*.

Flag Idle

⇒⇒   **Flag Idle** [a Call Profile/2*N*-100 Directory Menu parameter] determines whether a dynamic call to a serial host port looks for a flag pattern (01111110) or a mark pattern (11111111) as the idle indication. Select *Yes* to choose the flag pattern or *No* to choose the mark pattern. The default value is *Yes*.

Flag Idle: Multiband Plus does not control whether a mark or flag is used. The serial host device controls which indicates idle.

Force 56

⇒⇒   **Force 56** [Call Profile/2*N*-100 Directory-Menu parameters] when set to *Yes* in the current call profile of a serial port, forces Multiband Plus to receives incoming calls to that port at 56 kbit/s. This parameter does not apply to the Multiband Plus-SW56 since all calls are sent and received at 56 kbit/s.

Force 56 is not used with *AIM* call types which determine data rate through handshaking between the caller and answerer.

FT1 Caller

⇒⇒   **FT1 Caller** [a Call Profile/2*N*-100 Directory Menu parameter] specifies whether Multiband Plus initiates an FT1-AIM or FT1-B&O call or waits for the far end to initiate this type of call. You should set this parameter to *Yes* if the far end is set to *No*; however, if the far-end **FT1 Caller** is set to *Yes*, you should set the local **FT1 Caller** to *No*. The default value is *No*.

FT1 Caller is applicable only when the **Call Type** parameter is *FT1-AIM* or *FT1-B&O*. Whichever unit has **FT1 Caller** set to *Yes*, dials to bring online any switched circuits part of the call.

Group

⇒⇒   **Group** [a Call Profile/2*N*-100Directory
         Menu parameter] is used to route nailed-up
         channels to serial host ports. When a line
         profile has **Port/Grp** for a channel
         matching **Group** of a current Call Profile,
         the channel is routed to the serial host port
         of that current Call Profile. Enter any alpha-
         betic character from *A* to the maximum al-
         lowed by your Multiband Plus model. The
         default value is *A*.

Group is not applicable if the call is made entirely of switched channels. Also see **Call Type** Call Profile parameter.

20-100 Host Config Menu

The Host Config menu enables you to con-
figure Multiband Plus's **Host-Interface
Profile**.

20-000 Host/Dual, Host/Quad Menus

This branch of the Main Edit Menu is asso-
ciated with Multiband Plus's two-port or
four-port serial host interface. Host/Dual
menu is shown in the following illustration
of the Main Edit Menu:

```
Main Edit Menu
  00-000 System
  10-000 Net/S56-2/4
>20-000 Host/Dual
```

Host-Interface Profile

This profile treats the serial host interface as
a whole, while the Port Profiles and Call
Profiles pertain to only one host port at a
time.

The following **Host Config** menu illustrates the first few parameters in this profile:

```
20-100 Host Config v
 Dual Ports=All Dual
 F Palmtop=Full
 F Port#=N/A
```
Note: remaining lines not shown

Idle

⇒⇒   **Idle** [a Port Profile/2*N*-300 Port Config Menu parameter] specifies what action the serial host port takes when the power is first turned on or when no call is active:

- *None* means that the port waits for the user to establish a call. This value is the default.

- *Call* means that the port attempts to establish an outbound call based on the current call, port, and Line Profiles whenever the power is turned on or when no call is active, that is, when the call status is idle.

Idle Logout

⇒⇒   **Idle Logout** [a System Profile/00-100 Sys Config Menu parameter] specifies the number of minutes a Palmtop Controller or Control Monitor or TELNET session can remain inactive before Multiband Plus logs out. After logout, the terminal returns to the default Security Profile.

If you set **Idle Logout** to the value *0*, logout does not occur no matter how long the terminal remains idle. You can enter any value from 0 to 60 minutes for this parameter. The default value is *0*.

Idle [Port Profile]: Whenever a port is used for FT1-AIM or FT1-B&O calls, choose one of the following alternatives for the **Idle** and **Dial** Port Profile parameter values:

- **Idle** = *Call* and **Dial** = *Terminal*
- **Idle** = *None* and **Dial** = *DTR*

Both the local and far-end must use the same combination of these parameters. You must not set one end of the FT1-AIM or FT1-B&O connection to **Idle** = *Call* and the other end to **Idle** = *None*. Furthermore, if you choose **Idle** = *None* and **Dial** = *DTR*, the hosts at both ends of the connection must establish DTR active to make Multiband Plus connect the switched channels.

Idle [Port Profile] does not apply when this port's current Call Profile has **Call Type**=*FT1*.

If **Idle**=*Call* causes a second port to call automatically, this port is part of a dual-port pair (that is, paired by the **Dual Ports** parameter). Remove port pairing except when the **Call Type**=*2 Chnl*.

Inc Ch Count

⇒⇒ **Inc Ch Count** [a Call Profile/2*N*-100 Directory Menu parameter] is the number of 56 kbit/s channels added when bandwidth is modified manually or automatically during a call. This parameter does not apply to the following call types: *1 Chnl*, *2 Chnl*, *FT1*, nor to these call management types: *Static*, *Delta*, *BONDING Mode 0*, *Mode 1*, or *Mode 3*. Its value can be any integer from *1*, the default, to *32*.

Inc Ch Count: An error is signaled if the sum of **Base Ch Count** and **Inc Channel Count** exceeds the maximum number of channels that are available.

Inc Ch Count: Also see **Dec Ch Count**.

10-100 Line Config Menu

See **Line Profiles**.

Line Profiles

A *Line Profile* is a set of stored parameters that define Multiband Plus's SW56 interface, including the physical line that connects Multiband Plus to the wide area network.

Multiband Plus allows you to define and store up to three Line Profiles in addition to the current Line Profile.

When you select the **10-100 Line Config Menu**, the current Line Profile appears at the top of a list identified by two asterisk characters (*) in its menu number. Inactive stored Line Profiles follow:

```
10-100 Line Config
>10-1** Factory
 10-101 Main Conf Rm
 10-102
```
Note: remaining line not shown

Local LB Command

The Local LB (loopback) command [an option of the 2*N*-100 Port Diag menu] loops back the serial host port toward the serial

Local LB: The associated Multiband Plus host port must be idle; that is, it can have no calls online.

Local LB: If port diagnostics are protected by password security, you might not be able to perform them. See **Security Profiles**.

host when you press the **Right-Arrow** or
Enter key in the following menu appears:

```
21-200 Port Diag    O
>21-201 Local LB
```

Local loopback returns the signal from the
application before it reaches the network
interface or is split into channels. Therefore,
when the loopback screen shows 56K or
64K channels looped back, they should be
thought of as simulated channels, only a
convenient way to keep track of the data
rate of the test.

The following picture shows how data
flows during local loopback:

Data Flow during Local Loopback

Signal to Multiband product looped back at
Application-Multiband product interface
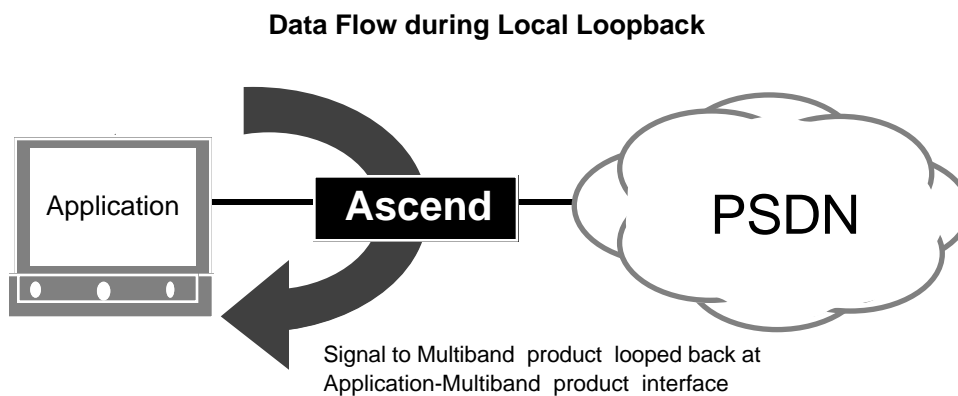
You can terminate the loopback test at any
time by exiting the Local Loop submenu
with the **Left-Arrow** key. When you end a
local loopback test, all of the control leads
revert to the state they were in before the
test was begun.

Once the local loopback is in progress, control moves to a submenu that presents a set of modifiable parameters:

```
21-201 Local LB
 DSR=Active
>RI=Active
 CD=Active
Note: remaining lines not shown
```

The following local loopback parameters are defined:

⇒⇒   **DSR** toggles the Data Set Ready output signal at the host port from active to inactive, and vice versa.

⇒⇒   **RI** toggles the Ring Indicate output signal at the host port from active to inactive, and vice versa.

⇒⇒   **CD** toggles the Carrier Detect output signal at the host port from active to inactive, and vice versa.

⇒⇒   **DLO** toggles the Data Line Occupied RS-366 output signal at the host port from active to inactive, and vice versa.

⇒⇒   **PND** toggles the Present Next Digit RS-366 output signal at the host port from active to inactive, and vice versa.

⇒⇒   **ACR** toggles the Abandon Call and Retry RS-366 output signal at the host port from active to inactive, and vice versa.

⇒⇒   **Inc Ch Count** simulates an increase in the number of channels in a call by increasing the clock rate to the host.

⇒⇒   **Dec Ch Count** simulates a decrease in the number of channels in a call by decreasing the clock rate to the host.

Local LB: All local LB parameters use the **Right-Arrow** or selector (>) key to toggle their values. Changes take effect immediately and remain in effect until the loopback is deactivated.

DSR: This signal is also used in V.25 bis dialing and answering.

RI: This signal is also used in V.25 bis dialing and answering.

Inc Ch Count, **Dec Ch Count**, **Rate**: The Call Status menu of this port displays the loopback serial data speed. It can be calculated by multiplying the number of channels simulated in the test multiplied by the data rate of the channels.

Inc Ch Count, **Dec Ch Count**, **Rate**: At ports #3 and #4, the clock rate is restricted to 1, 2, 3, 4, 6, 8, 12, or 24 times the bandwidth of a single channel.

⇒⇒ **Rate** toggles the data rate of the simulated channels from 56 to 64 kbit/s, and vice versa.

Max Call Mins

⇒⇒ **Max Call Mins** [a Port Profile/2*N*-300 Port Config Menu parameter] establishes the maximum number of minutes allowed on calls made from this port, regardless of bandwidth. When usage meets or exceeds the specified maximum, no more calls can be placed from this port, and any calls in process that were made from this port are torn down. Any value from *0* to *2142720* can be entered. The default value of *0* disables this function.

Max Call Mins: The **Max DS0 Mins** and **Max Call Mins** Port Profile parameters limit usage of switched channels of calls even if aggregated with nailed-up channels. Although Multiband Plus disconnects the switched channels when either maximum is exceeded, any nailed-up channels remain connected.

The **Max DS0 Mins** System Profile parameter also limits use of your SW56 lines.

Max Ch Count

⇒⇒ **Max Ch Count** [a Time Period.../Call Profile/2*N*-100 Directory Menu parameter] specifies the maximum number of channels allowed a dynamic AIM call during a time period (**Time Period x...**). It can have any integer value from *1*, the default, to the maximum number of channels supported by the system. The default value is *1*.

Max Ch Cnt [Call Profile] applies only to dynamic AIM calls (**Call Mgm**=*Dynamic*) otherwise it is *N/A.*.

Max DS0 Mins

⇒⇒ **Max DS0 Mins** [a System Profile/00-100 Sys Config Menu parameter] establishes the maximum number of DS0 minutes allowed on all calls made from this Multiband Plus during a day or month. A DS0 minute is the online usage of a single 56 or 64 kbit/s switched channel for one minute. When usage meets or exceeds the specified maximum, no more calls can be placed, and any calls in place from this Multiband Plus are torn down. Any value from *1* to *357120* can be entered. The default is *1*.

Max DS0 Mins: This parameter limits usage of switched channels even if aggregated with nailed-up channels. Although Multiband Plus disconnects the switched channels when either maximum is exceeded, any nailed-up channels remain connected. For example, a 5-minute, 6-channel call equals 30 DS0 minutes.

Max DS0 Mins: See also the System Profile **DS0 Min Rst**, which sets the time period. **DS0 Min Rst**=*Off* disables this function.

⇒⇒ **Max DS0 Mins** [a Port Profile/2*N*-300 Port Config Menu parameter] establishes the

Max DS0 Mins: In the case of **Max DS0 Mins [Port Profile]**, the accumulated DS0 minutes apply only to the associated serial host port. In the case of **Max DS0 Mins [System Profile]**, the accumulated DS0 minutes apply to all ports.

maximum number of DS0 minutes allowed on all calls made from this serial host port within a specified time period. When usage meets or exceeds the specified maximum, no more calls can be placed, and any calls in process place from this port are torn down. Any value from *1* to *2142720* can be entered. Setting **DS0 Min Rst**=*Off* disables this function.

Min Ch Cnt

⇒⇒   **Min Ch Cnt** [a Time Period.../Call Profile/ 2*N*-100 Directory Menu parameter] specifies the minimum number of channels a dynamic AIM call maintains during a time period (**Time Period x...**). It can have any integer value from *1*, the default, to 32. The default value is *1*.

Min Ch Cnt [Call Profile] applies only to dynamic AIM calls (**Call Mgm**=*Dynamic*) otherwise it is *N/A.*.

Name

⇒⇒   **Name** [Security Profile/00-300 Security Menu, Call Profile/2*N*-100 Directory Menu, Line/10-100 Line Config, or System Profile/ 00-100 Sys Config Menu parameters] are strings that name profiles. Each can contain up to 16 alphanumeric characters.

Name: You do not have to supply profile names.

The System Profile **Name** is sent to the far-end device whenever a call is established. After you enter a system name, it appears in the top line of the Edit display of the Control Monitor.

10-000 Net/S56-.. Menu

This branch of the Main Edit Menu, associated with Multiband Plus's switched-56 interface, includes configuration of the Line

Profiles. The Net/SW56 menu is the second menu listed under the Main Edit menu.

```
Main Edit Menu
  00-000 System
 >10-000 Net/S56-
  20-000 Host/..
```

The Net/S56-2/4 menu has one submenu, the **Line Config Menu**.

Operations

⇒⇒ **Operations** [a Security Profile/00-300 Security menu parameter] provides peruse-only security. If set to *No*, users can view Multiband Plus's profiles but cannot change the value of any parameter. If set to *No*, users cannot access most **DO** commands — only **DO Esc** and **DO Password** are available. The default value is *Yes*.

Own Port Diag

⇒⇒ **Own Port Diag** [a Security Profile/00-300 Security menu parameter] allows port diagnostics to be performed on the operator's own serial host port. When this parameter is *Yes*, the operator during remote management can perform any of the options listed in the port diagnostics menu of the port that has been called. This privilege is disabled only when this parameter is *No* and **All Port Diag** is *No*. The factory default for this parameter is *Yes*.

Parallel Dial

⇒⇒ **Parallel Dial** [a System Profile/00-100 Sys Config Menu parameter] specifies the number of channels that can be dialed simultaneously over the SW56 lines connection or can be disconnected simultaneously. **Parallel Dial** determines how many channels Multiband Plus dials simultaneously, up to the call's base bandwidth requirement. Its

Parallel Dial: If calls from the U.S. to another country have trouble establishing an initial connection at the full bandwidth, reduce the **Parallel Dial** parameter to the value *2* or *1*.

value is an integer from 1 to 12, and the default value is *5*.

Passwd

⇒⇒ **Passwd** [a Security Profile/00-300 Security Menu parameter] specifies the password that activates a Security Profile. The first Security Profile, *Default*, has no password. See **DO Password** and **Security Profiles** for password operation.

Passwd: If the value for the **Passwd** parameter shows **SECURE** instead of the actual value of the field, you are not allowed to edit Security Profiles. Any changes you make cannot be saved. If you wish to edit Security Profiles, you must log in to a Security Profile whose **Edit Security** parameter has the value *Yes*.

Phone Num

⇒⇒ **Phone Num** [a Line Profile/10-100 Line Config Menu parameter] specifies the phone number for the switched-56 line. Its value is a numeric string of up to 16 characters, including parentheses and hyphens.

Phone Num: When Multiband Plus receives an inverse-multiplexing call, it reports **Phone Num** to the calling party so more channels can be added. If you do not enter a phone number, the calling Multiband Plus redials the phone number used to make the first connection when adding more channels to an AIM call.

When you specify phone numbers you only need to include unique characters identifying the number. For example, if the first line has the number 777-3330 and the remaining lines have the numbers 777-3331, 777-3332, and so forth, you can specify those phone numbers simply as 31, 32, and so forth.

The phone numbers that you specify are the numbers used to call this unit. Do not enter phone numbers of the Multiband Plus you are calling in the Line Profile. The numbers you are calling belong in the Call Profiles.

2*N*-300 Port Config Menu

The Port Config menu lists the Port Profile parameters associated with a serial host port. Through the Port Config menus, the Port Profiles are edited and stored. Port Config is the third menu listed under Port*N*

2*N*-300 Port Config Menu: *N* gives the serial port number

Menu. Port Config for the first port is
shown in the following:

```
21-000 Port1 Menu
 21-100 Directory
 21-200 Port Diag
>21-300 Port Config
```

2*N*-300 Port Diag Menu

There is one port diagnostics menu for each
serial host port. It allows you to perform a
local loopback at that port.

Port Diag menu is the second menu listed
under Port*N* Menu. Port Diag for the first
port is shown in the following:

Port Diag: See **Local LB Command**.

```
21-000 Port1 Menu
 21-100 Directory   ^
>21-200 Port Diag
 21-300 Port Config
```

Port Profiles

Port Profiles define the mechanisms by
which serial hosts dial, answer, and clear
calls. Port Profiles also specify the phone
number, if any, associated with each port,
which can be used for routing purposes.

When you select the **Port Config Menu** by
pressing the **Right-Arrow** or **Enter** key,
the following menu appears:

```
21-300 Factory      O
 Port Name=Factory
 Ans 1#=555-1212
 Ans 2#=555-1212
Note: remaining lines not shown
```

The first line of the profile menu shows the
current name of the Port Profile. The
remaining lines contain the individual
parameter names and their values.

Port Name

⇒⇒   **Port Name** [a Port Profile/2*N*-300 Port Config Menu parameter] is a string that names the profile. It can contain up to 16 alphanumeric characters.

Port Name: If you enter a port name, that name replaces "Port*N* Menu" as a menu title. For example if **Port Name**=*Jimmy* for serial host port #1, then "21-000 Port1 Menu" becomes "21-000 Jimmy."

20-000 Port*N* Menu (Port1, Port2...)

The Port*N* Menu lists the submenus associated with each host port. These submenus enable you to suitably configure the port to the device connected to it and the task at hand. The following example shows the submenus listed under the Port*N* Menu for port #1:

Port*N* Menu: See also **Port Name**.

```
21-000 Port1 Menu
>21-100 Directory
 21-200 Port Diag
 21-300 Port Config
```

Port/Grp

⇒⇒   **Port/Grp** [a Line Profile/10-100 Line Config Menu parameter] associates a channel with a serial host port or with a nailed-up group.

- If this channel is switched, you can assign it to a serial host port for incoming and outgoing calls by entering the host port # (an integer). However, you can alternatively enter *0*, making this channel available on a first-come first-serve basis.

- If the channel is nailed-up, this parameter can be any alphabetic character from *A* to the maximum allowed by your model. Each of these letters represents a nailed-up group. Choose the **Call Profile** with which the channel belongs and then configure its **Group** parameter with the same value as **Port/Grp**.

Remote Mgmt

⇒⇒ **Remote Mgmt** [a System Profile/00-100 Sys Config Menu parameter] controls whether this Multiband Plus can be operated remotely by the device at the far end of this call. It has a Yes/No value, and the default value is *Yes*. If you specify the value *No*, remote management of your unit is not possible. Remote management is not possible if the far-end device is not running an AIM call.

Remote Mgmt: The error message *Remote Mgmt Denied* indicates you have tried to control a Multiband Plus that is configured not to allow remote management. AIM calls include the **Call Type** Call Profile parameter value *AIM*, *FT1-B&O*, and *FT1-AIM*, but when the **Call Mgm** Call Profile parameter is *Static*, remote management is not possible.

Restore Cfg Command

The **Restore Cfg** command [00-200 Sys Diag menu] restores those profiles that had been saved by **Save Cfg** or transfers these profiles to another Multiband Plus.

You cannot perform the restore or save operation through the handheld Palmtop Controller device.

Restore Cfg; The procedure for using this command is found in the *Tasks* section. Security Profile passwords are not saved.

RS-366 Esc

⇒⇒ **RS-366 Esc** [a Port Profile/2*N*-300 Port Config Menu parameter] is the escape character used during RS-366 ext2 and X.21 ext2 dialing. The default escape character is #. For further information see the "RS-366, V.25 bis, X.21, Lead Dialing" appendix. If you chose RS-366 ext2 or X.21 ext2 for **Dial**, select one of the following escape characters:

, #, 5, 6, 7, 9, 0, or *00*

Save Cfg Command

The **Save Cfg** command [00-200 Sys Diag menu] enables you to back up all Multiband Plus profiles, except Security Profiles, to a storage device, such as a hard disk.

Save Cfg: Security Profile passwords are not saved. See the *Tasks* section for instructions on using this command.

Sec History

⇒⇒ **Sec History** [a Call Profile/2*N*-100 Direc-
tory Menu parameter] specifies the length
of time, in seconds, over which the utiliza-
tion is averaged by the dynamic algorithm
(**Dyn Alg**). Valid values are between *1* and
300 seconds (5 minutes). The default value
is *300*.

Sec History determines how sensitive a
DBA-AIM call is to bursts of traffic, or
spikes. If you want the system to average
spikes with normal traffic flow, you should
specify a high value for this parameter to
allow a large amount of history to be cov-
ered by the algorithm.

Sec History: If you specify a small value for the **Sec History** and increase the values of the **Add** / **Sub Pers** parameters relative to the value of the **Sec History**, the system becomes less responsive to quick spikes.

The easiest metric for determining the value of **Sec History**, **Add**, and **Sub Pers** is by use: if the system is not responsive enough, the **Sec History** is probably too large.

Sec History [Call Profile] applies only to dynamic AIM calls (**Call Mgm**=*Dynamic*) otherwise it is *N/A*..

00-300 Security Menu

The Security menu is used to configure and
record Multiband Plus's Security Profiles.
The following example shows the Security
as the third menu listed under the System
branch of the Main Edit Menu:

Security Menu: See also **Security Profiles**.

```
00-000 System
 00-100 Sys Config
 00-200 Sys Diag
>00-300 Security
```

The Security menu lists nine Security Pro-
files. The following example shows three
Security Profiles. The first profile in this list
is always named *Default*:

```
00-300 Security
>00-301 Default
 00-302 Installer
 00-303 Callers
Note: remaining lines not shown
```

Security Profiles

A *Security Profile* is any one of the nine
profiles listed in the **Security Menu**. Each

Security Profiles: A typical operation that you might wish to protect is Multiband Plus's system diagnostics, including system reset. Security Profiles can be con-
figured to protect these operations from all users ex-
cept those with the appropriate password.

Security Profile contains a list of operations that are either enabled or disabled when a user enters the particular password associated with the profile.

Security Profiles are the means by which you can limit access to crucial Multiband Plus operations, while leaving other less critical operations more broadly available.

The *Default Security Profile* is that profile defining the operations available without a password. It is the first profile listed in the **Security Menu**.

WARNING: Do not change the **Default Security Profile** before you have created the system administrator's Security Profile. The system administrator's profile *must* include editing Security Profiles. See the **Edit Security** parameter.

Status 1 - Status 8 (see **Edit**)

Sub Pers

⇒⇒   **Sub Pers** [a Call Profile/2*N*-100 Directory Menu parameter] specifies the number of seconds the utilization of the DBA AIM call must remain below the threshold before channels are removed. The valid values are between *1* and *300* seconds (5 minutes). The default value is *20*.

Sub Pers: Also see **Add Pers**.

00-100 Sys Config Menu

The Sys Config menu is used to establish Multiband Plus's System Profile. Selecting Sys Config menu displays the System Profile parameters and their values as shown in the following example:

```
00-100 Sys Config
>Name=[ ]
 Location=
 Contact=
 Date=07/08/91
 Time=01:43:57
```
Note: remaining lines not shown

Sys Diag

⇒⇒   **Sys Diag** [a Security Profile/00-300 Secu-
rity menu parameter] allows all system diag-
nostics to be performed. When this
parameter is *Yes*, any of the options listed in
the Sys Diag menu can be performed, either
by a local operator or by remote manage-
ment. The factory default for this parameter
is *Yes*.

00-200 Sys Diag Menu

The Sys Diag menu contains options for
saving and restoring the configuration pro-
files of Multiband Plus, and for resetting the
system. It also contains the option *Use MIF*
that replaces the normal user interface with
the MIF (machine interface format) inter-
face:

```
00-200 Sys Diag
>00-201 Restore Cfg ^
 00-202 Save Cfg
 00-203 Use MIF
 00-204 System Reset
```

00-000 System Menu

The System menu contains a list of menus
that apply to Multiband Plus as a whole, or
to functions or features that apply to the
interaction of one interface type with
another (SW56 or serial host).

The System menu contains the following
submenus:

```
00-000 System
 00-100 Sys Config
>00-200 Sys Diag
 00-300 Security
```

System Profile

General information about the Multiband Plus system is contained in the *System Profile*. The System Profile contains such parameters as the system date and time, and control interface characteristics.

To make changes to the System Profile, you must edit the System Profile through the **00-100 Sys Config Menu**.

System Reset Command

System Reset is an option in the 00-200 Sys Diag menu. It restarts Multiband Plus and clears all calls in the process. During system reset, *power-on self tests* (POST) are run.

```
00-200 Sys Diag
 00-202 Save Cfg    ^
 00-203 Use MIF
>00-204 System Reset
```

CAUTION: If you perform a system reset, all current calls terminate. All users are logged off and user security is returned to the default.

To reset Multiband Plus, move the selector to **00-204 System Reset** and press the **Right-Arrow** or **Enter** key. Multiband Plus prompts to determine if you wish to perform the reset, which clears all active calls.

After you have confirmed the reset, the following message is displayed indicating Multiband Plus is being reset:

```
Status Msg #134
 System reset
 in progress
```

In addition to clearing calls on system reset, Multiband Plus performs the same self test as is done when power is cycled. The POST display should appear. If you do not see the POST display, press **Ctrl-L**. If you are using the Palmtop Controller, unplug it, wait 5 seconds, and plug it back in to refresh the screen.

```
    Power-On Self Test
          Running
```

While the orange **ER** LED on the front panel remains solidly lit, the system checks the memory, the configuration, and the SW56 connections. If Multiband Plus fails any of these tests, the **ER** LED remains lit or blinks.

When the tests have successfully completed, the following message appears. You then press any key to bring up the Main Edit Menu.

```
    Power-On Self Test
          PASSED
     Press any key...
```

Target Util

⇒⇒ **Target Util** [a Call Profile/2*N*-100 Directory Menu parameter] is an integer that specifies the target percentage of usage for a dynamic time period (**Time Period x...**). It can be any percentage from *1* to *100*. The default value is *70*.

Target Util [Call Profile] applies only to dynamic AIM calls (**Call Mgm**=*Dynamic*) otherwise it is *N/A*..

Target Util: Selecting a target utilization generally requires understanding how the application behaves under different bandwidths. For example, am application might be able to use a full 88% of a 64 kbit/s call/link, but only 70% of 256 kbit/s. Furthermore, utilization might also depend on how the application is configured or the load/traffic it is running.

Target Util: To choose the best target utilization, monitor the application at the different loads and bandwidths that would actually run.

Term Rate

⇒⇒   **Term Rate** [a System Profile/00-100 Sys Config Menu parameter] specifies the data rate for the Control port in bits per second. It can have one of the following values: *57600, 38400, 19200, 9600, 4800, 2400,* or *1200.* The default value is *2400.*

Term Rate: The most commonly used data rates at the Control Monitor port are 9600 bit/s when operating Multiband Plus from a local terminal and 2400 bit/s when operating Multiband Plus remotely by modem hookup.

Term Rate: Whenever you modify the data rate, you must also set the data rate of your terminal to match the new rate.

Term Timing

⇒⇒   **Term Timing** [a Port Profile/2*N*-300 Port Config Menu parameter] specifies whether or not the Terminal Timing signal is used. Terminal timing is described in the "Planning and Specifications" chapter.

•   *Yes* means that Multiband Plus uses the Terminal Timing signal from the serial host to clock data received from the serial host. Your serial host equipment must support terminal timing if you choose this option.

•   *No* means that Multiband Plus uses its Send Timing signal to clock data received from the host. This value is the default.

Time

⇒⇒   **Time** [a System Profile/00-100 Sys Config Menu parameter] specifies the time of day in the format *hh:mm:ss* (hours, minutes, seconds). This parameter should be set when first installing Multiband Plus-SW56.

Time Period 1.. (2.., 3.., 4..)

⇒⇒   **Time Period...** [Call Profile/2*N*-100 Directory Menu submenus] lists a group of parameters associated with a dynamic bandwidth call during a particular time period. The call can be divided up into as many as 4 time periods, each characterized by separate **Activ**, **Max Ch Cnt**, **Min Ch Cnt**, and **Target Util**.

Upload

⇒⇒   **Upload** [a Security Profile/00-300 Security
     Menu parameter] controls whether the con-
     figuration of Multiband Plus can be up-
     loaded. When this parameter is *Yes*, profiles
     and other configuration parameters can be
     transferred from another device, typically a
     PC, to Multiband Plus. The factory default
     for this parameter is *Yes*.

Use MIF Command

The Multiband machine-to-machine control
and monitoring interface format (MIF) pre-
sents all Multiband Plus commands and dis-
plays in a machine-compatible protocol.
Using this interface, you can write pro-
grams that interface to your network control
and maintenance center to Multiband Plus.

To run MIF instead of the standard inter-
face, select the `00-203 Use MIF` option
in the Sys Diag system menu and press the
Right-Arrow or **Enter** key.

Use MIF: An alternative method of getting MIF is to
set the **Console** System Profile parameter to *MIF*.

```
 00-200 Sys Diag
  00-201 Restore Cfg
  00-202 Save Cfg
 >00-203 Use MIF
  00-204 System Reset
```

The Control Monitor can operate MIF,
whether connected to the **Control** port or to
a palmtop port. However, if you attempt to
run MIF from the Palmtop Controller, an
error message is displayed. MIF can also be
accessed during a TELNET session.

To return to the standard Control Monitor
interface, press **Ctrl-C**.

The **Use MIF** command runs MIF only at
the control port that makes the request. Sim-
ilarly, the **Ctrl-C** commands restores the

Use MIF: For more information, see the "MIF" appen-
dix.

Control Monitor interface only at the control port making the request.

7 Reference to Status Menus

Use this chapter to look up status menus and their parameters. See also the "Parameter Summary" and "Reference to Edit Menus" chapters.

2*N*-100 Call Status

The Call Status menu is a read-only menu that indicates whether a call is active at a specific serial host port. If there is an active call, the Call Status menu displays its current state.

There is a Call Status menu for each serial host port. It is the first option listed in the Port*N* Stat menu, and its menu number is 2*N*-100, where *N* is the port number.

```
 21-000 Port1 Stat
>21-100 Call Status
 21-200 Message Log
 21-300 Statistics
 21-400 Port Opts
 21-500 Session Err
 21-600 Port Leads
```

The example below shows the four-line Call Status display for the first serial host port:

```
21-100 Albuquerqu+ C
CALLING/ONLINE
336K      6 channels
 Albq. NM
```

Call Status displays the following information about the call in progress:

2N-100 Call Status

⇒⇒ <u>First Line</u>: The first line of the Call Status menu contains the status menu number, the name of the current Call Profile, along with the call status character. In this example, the call status character is C, indicating that an outgoing call is being dialed.

⇒⇒ <u>Second Line</u>: The second line shows the call status message, an expanded form of the call status character, corresponding to the current state. It can change dynamically as you dial, modify, or receive calls.

These status messages have the following meanings:

- *IDLE* means that no calls exist and that no other Multiband Plus operations are being performed. The corresponding call status letter is blank.

- *RINGING* means that an incoming call is on the line(s), ready to be answered. The corresponding **call status character** is *R*.

- *ANSWERING* means that an incoming call is being answered. The corresponding call status character is *A*.

- *CALLING* means that an outgoing call is being dialed. The corresponding call status character is *C*.

- *ONLINE* means that a call is up on the line(s). The corresponding call status character is *O*.

- *CLEARING* means that the current call is being cleared, that is, hanging up. The corresponding call status character is *H*.

- *LOCAL LOOP* means that local loopback diagnostic tests are in progress. The corresponding call status character is *D*.

- *HANDSHAK* means that Multiband Plus is exchanging information with the inverse multiplexer at the far end and verifying that the call is transmitting reliably. The corresponding call status character is *!*.

- *LOOP MAST* means that you have selected **DO 6** or **Control-D 6** to begin a remote loopback test. While the loopback test is in progress, the far end displays the status message *LOOP SLAV*. The corresponding call status character is *L*.

- *BERT MAST* means that Multiband Plus has connected with the far-end AIM-compatible product and is performing an auto-BERT test. It might also mean that you are performing a manual BERT test from the local Multiband Plus. The call status character for BERT master and slave is *T*.

- *BERT SLAVE* means that your Multiband Plus has received a call and the calling AIM-compatible product is performing an auto-BERT test. It might also mean a manual BERT test is being performed by someone using the remote Multiband Plus. The call status character for BERT master and slave is *T*.

- *SETUP ADD* and *SETUP REM* means Multiband Plus is preparing to add or remove channels. The call status character during this process is *!*.

- *SETUP HND* means Multiband Plus is preparing to handshake. The call status character during this process is *!*

When Multiband Plus is adding or removing channels, it appends */ONLINE* behind another status word. For example, if you issue a **DO 4** or **Control-D 4** command to increase the bandwidth of an active call,

the status changes to *CALLING/ONLINE*. When the far end responds, the status *ANSWERING/ONLINE* appears on the remote Multiband Plus unit.

⇒⇒   Third Line: The third line of the Call Status menu shows the current data rate, in kbit/s, and how many channels this data rate represents.

Third Line: In some types of calls, you might notice that the data rate provided to your host is actually somewhat less than reported on line 3. Line 3 shows the bandwidth provided by the SW56 interface, but does not show how much of this bandwidth has been consumed by an AIM or BONDING management subchannel. See the Call Profile parameters **Call Type** and **Call Mgm** for further information.

If the current call is *FT1-B&O*, the third line of the Call Status menu shows how many channels the online data represents, followed by the number of nailed-up channels that have been placed offline because they were bad.

Third Line: See *FT1-B&O* under the **Call Type** parameter for information on how FT1-B&O calls handle band channels. The **Statistics** menu and the "Error Counting in WAN Connections" describe call quality.

The following example shows the call status of an FT1-B&O call with six channels online and two channels offline:

```
21-100 Albuquerqu+ C
CALLING
336K  6/2  channels
 Albq. NM
```

⇒⇒   Fourth Line: The last line of the Call Status menu contains the name of the serial host port of the far-end AIM-compatible product that has been connected. If the far-end Port Profile is not named, the far-end system name is used instead.

Call Status Characters

Whenever Multiband Plus is up and running, any port-specific menus show the state of their associated serial host port by a single letter located in the last column of the first line (upper-right-hand corner) of the display. The call status character describes the current call state of the port.

Call Status Characters: These status letters are described under **Call Status** in this chapter.

00-400 CDR

The CDR (call detail reporting) display provides detailed billing information. Like the Multiband Plus message logs, CDR shows the most recent calling/session event and new CDRs are generated as events occur. However, unlike a log, Multiband Plus's user interface does not store events that have passed. CDR is primarily a source of data that is captured by external devices.

CDR: See the MIF appendix on asynchronous traps, which are used to capture CDR data. Syslog also captures CDR data.

The four-line CDR display is shown in the following example:

CDR: CDR status displays can be viewed in real time through the Control Monitor or Palmtop Controller.

```
00-400 CDR
  93:05:28:10:33:52
  OR 025 384KR 02-01
  15105551212
```

CDR consists of the following of fields:

- The first line displays 00-400 CDR, the status screen menu number and title.

- The second line gives the time the event occurred (**timestamp**), in the following format:
  yy:mm:dd:hh:mm:ss.

- The third line has four fields: **XX YYY ZZZZZ 02-PP**.

  - The first field, XX, gives the **event description**. The types of events recorded are shown in the following list:

    event description: All events except *OF* are associated with calls. *OF* indicates the CDR buffer overflowed because events occurred faster than could be reported.

    OR for Originated

    AN for Answered

    AP for Assigned to Port or module

    CL for Cleared

    OF for Overflowed

    event ID: Multiband Plus creates a new **event ID** for every DS0 channel originating a connection. **Event ID** ranges from *0* to *255*, where the event after *255* starts the count again at *0*.

- The second field, YYY, gives the **event ID**.

- The third field, ZZZZZ, gives the **data service**. Its values are nearly identical to the **Data Svc** Call Profile parameter: *Voice*, *56K*, *56KR*, etc. The only difference is in the **Data Svc** values *384K/H0* and *1536K*, which correspond to the CDR **data service** values *384K* and *1536KR*, respectively.

- 02 is a constant with no significance to Multiband Plus, while PP indicates the serial host **port**.

⇒⇒ The fourth line displays either the dialed or incoming **phone number**. If **event description** on line 3 is *OR*, then the dialed number appears. If **event description** on line 3 is *AN*, then the incoming number appears.

20-000 Host/.. Status Menus

The Host/.. status menu is a branch of the Main Status menu that holds a list of sub-menus that give the status of Multiband Plus-SW56's serial host interface and calls to and from the serial host ports of that interface.

Your Multiband Plus-SW56 has either the *Host/Dual* or *Host/Quad* status menu depending on whether it is equipped with two or four serial host ports. The following illustration shows the Host/Dual status menu:

```
20-000 Host/Dual
 20-100 Mod Config
 20-200 Port1 Menu
 20-300 Port2 Menu
```

10-300 Line Errors

The Line Errors status menu displays the errors recorded on all current channels in a channel-by-channel, line-by-line list. The Line Errors menu displays the status of lines even if the interface is disabled in the Line Profile.

Line Errors is the second option listed in the Net/SW56 status menu:

```
10-000 Net/SW56
  10-100 Line Status
  10-200 Line Errors
```

The Line Errors menu displays the channel-by-channel errors accumulated during all current calls. There are two columns in the display.

```
10-200   Errors     O
   1:      33
   3:       0
   4:       0
Note: remaining lines not shown
```

⇒⇒ In the <u>first column</u> are the line numbers, each followed by a colon (:).

⇒⇒ The <u>second column</u> gives the byte errors that have been detected on that line during the current call.

Line Errors: If a channel is not associated with any current call, it does not appear. In the preceding display notice that line #2 is not listed.

For the meaning of the errors listed in these displays, see the "Error Counting in WAN Connections" appendix.

For further information on call quality, see **Session Err**, **Port Info**, **Statistics**, and **Call Status** in this chapter and **Auto-Bert** in the "Reference to Edit Menus" chapter.

10-100 Line Status

The Line Status menu displays the dynamic status of each SW56 line, the condition of its electrical link to the carrier, and the status of each line's individual channels.

Line Status: The line status is also reflected in the front-panel LEDs of Multiband Plus. See the "Troubleshooting and LEDs" chapter for more information.

For Multiband Plus two-wire and four-wire SW56 models, the Line Status (10-100) menu looks like the following:

```
10-100 1234567      O
Link   AAA----
Call   ***.....
```

⇒⇒   The <u>first line</u> of the SW56 Line Status menu contains the menu number (10-100), and the column headers for all the possible lines connected to the unit.

⇒⇒   The <u>second line</u> of the SW56 Line Status menu uses one-character abbreviations to characterize the overall state of the line:

A   Line in active state and physically connected (link active / in service)

.   Line not active at this time but physically connected (no link / out of service)

X   Line not physically connected and cannot pass data

-   Line disabled

⇒⇒   The <u>third line</u> describes the call state of the switched-56 channels. The state is represented by a single character as follows:

.   Channel not available, either because the line is disabled, has no physical link or is marked as *Unused* in the Line Profile

*   Channel connected in a current call

-   Channel currently idle

d   Dialing from this channel for an outgoing call

r   Ringing channel for incoming call

n   Channel marked as *Nailed* in the Line Profile

2*N*-200 Message Log (Host/..) 00-200 Message Log (System)

The Message Log (Host/..) menu provides a log for events that occurred at each serial host port during call dialing and transmission. There is a Message Log (Host/..) for

Message Log: The system message log and the port-specific (Host/..) message log do not overlap. That is, an event that is logged in the system message log is not also logged in the message log specific to a serial host port.

each serial host port, and it is listed in the Port*N* Stat menu.

The Message Log (System) menu provides a log for system events. Message Log (System) is an option listed in the System status menu.

Each message log displays up to 32 of the most recent system events recorded by Multiband Plus. When you select the Message Log option, the most recent message appears.

Message logs update dynamically. Pressing the **up-arrow** or **down-arrow** key completely refreshes the display with the previous or following entry.

The following example shows a Message Log (Host/..) record generated by an incoming call on the first serial host port:

```
21-200 12:23:47     O
>M31 Line 1 Ch 13
 Assigned to port
 MBID 022
```

The following example shows a Message Log (System) record generated by an incoming call not yet assigned to a serial host port:

```
00-200 11:23:55
>M31 Line 1 Ch 07
 Incoming Call
 MBID 022
```

The Message Log displays the following information:

⇒⇒   The <u>first line</u> of the menu shows the status menu number and the time the event occurred.

⇒⇒   The <u>second line</u> identifies the log entry
number (M00-M31) and, if applicable, the
line and channel on which the event oc-
curred.

Message Log: To clear all messages from the Message
Log while using the Palmtop Controller, enter the
SHFT-> command (delete). When you are using the
Control Monitor, the **Delete** key clears all the messag-
es in the log.

⇒⇒   The <u>third line</u> contains the text of the mes-
sage. These messages are listed later in this
section.

⇒⇒   The <u>fourth line</u>, as shown in the example
above, contains a message parameter or the
line is blank. The following types of mes-
sage parameters can appear:

   •   The **MBID** parameter appears with either
       the **Incoming Call** or **Assigned
       to Port** (line 3) messages. The first
       message means an incoming call has been
       received and the second message means it
       has been routed to a Multiband Plus re-
       source (port). If you cannot match the
       MBID value of an incoming call log to
       the **MBID** value in an assigned-to-port
       log, the call disconnected, often because
       the intended port was busy.

       MBID Assigned to Port appears in the logs specific to
       a serial host port **Message Log [Host/..]**, while **MBI**
       Incoming Call appears in system logs **Message Log
       [System]**,

   •   **Channels =** gives the number of chan-
       nels added to or removed from a call. It
       appears with the **Added Bandwidth**,
       Removed Bandwidth, **Moved to
       Primary**, and **Moved to Secondary**
       messages.

   •   Line 4 displays the **Phone Number** in the
       log of an outgoing call event. Namely,
       when line 3 is **Outgoing Call**. This is
       the phone number that was dialed for the
       first connection. Although the phone
       number appears, the parameter name
       Phone Number does not.

⇒⇒   The fourth line of the log differs when an
online FT1-B&O call restores or removes
nailed-up channels. An example showing
one channel restored to an FT1-B&O call
follows:

```
00-200 12:23:47    O
>M31 Line 1 Ch 13
 Moved to primary
 1 secondary chans
```

⇒⇒   The <u>third line</u> of the message log reports the
following event types:

Events Logged (Warnings)
Busy — The phone number was busy when the call was dialed.
No Connection — The far end did not answer when the call was dialed.
No Channel Avail — No channel was available to dial the initial call.
Not Enough Chans — A request to dial multiple channels or to increase bandwidth could not be completed because there were not enough channels available at that time.
No Chan Other End — No channel was available on the far end to establish the call.
Network Problem — The call setup was faulty because of problems within the WAN network or in the Line Profile configuration.
Call Disconnected — The call has ended unexpectedly.
Far End Hung Up —The far end terminated the call normally.
Internal Error — Call setup failed because of a lack of system resources, such as insufficient memory. If this type of error occurs, notify Ascend customer support.
Incoming Glare — Multiband Plus could not place a call because it saw an incoming "glare" signal from the switch. If you receive this error message, you probably have selected incorrect Line Profile parameters. Glare occurs when an incoming call was placed simultaneously with an outgoing one.
Wrong Sys Version — The far-end product version was incompatible with the near-end Multiband Plus. The software version appears on the Sys Options status menu.
Request Ignored — The request to manually change bandwidth during a call was denied because the **Call Mgm** Call Profile parameter had the value *Dynamic*. With this value, Multiband Plus only allows automatic bandwidth changes.
Remote Mgmt Denied — A request to run the far-end Multiband Plus by remote management was rejected because the **Remote Mgmt** System Profile parameter at the far end had the value *No*.
Call Refused — An incoming call could not be connected to the specified serial host port because the resource was busy or otherwise unavailable.
No Phone Number —— No phone number exists in the Call Profile being dialed.

Events Logged (Warnings)
Not FT1-B&O —The local Multiband Plus attempted to connect an FT1-B&O call to the far-end, but the call failed because the call type at the far end was not FT1-B&O.
No system DS0 Mins— No maximum has been specified for the **Max DS0 Mins** System Profile parameter.
No port DS0 Mins — No maximum has been specified for the **Max DS0 Mins** or **Max Call Mins** Port Profile parameter.
Dual Port req'd — The call could not be placed because both ports of the dual-port pair were not available.

⇒⇒ The <u>third line</u> of the message log reports the following event types:

Events Logged (Information)
Incoming Call — An incoming call has been answered at the SW56 network interface but has not yet been assigned to a serial host port .
Assigned to port — The assignment of an incoming call to a serial host port has been determined.
Outgoing Call — Multiband Plus has dialed a call.
Added Bandwidth — Bandwidth has been added to an active call.
Removed Bandwidth — Bandwidth has been subtracted from an active call.
Call Terminated — An active call was disconnected normally, although not necessarily by operator command.
Incomplete Add — An attempt to add channels to an inverse-multiplexing call failed; some channels were added, but less than the number requested. This can also occur when placing a call and the first channel connects, but the requested base channel count fails.
Moved to secondary — Some poor-quality nailed-up channels in an FT1-B&O call have been have been detected and the call backed up on switched channels. The fourth line of the message log menu gives the number of channels removed.
Moved to primary — Some nailed-up channels, which had been removed from an FT1-B&O call, have been restored to the call because their quality was no longer poor. The <u>fourth line</u> of the message log menu gives the number of channels restored.
Sys use exceeded — Call usage for the entire system has exceeded the maximum specified by **Max DS0 Mins** System Profile parameter.
Port use exceeded — Call usage for a serial host port has exceeded the maximum specified by either the **Max DS0 Mins** or **Max Call Mins** Port Profile parameter.
Handshake Complete — The handshake completed, but no channels were added, such as when commanding **DO R** (**^D R**) to resynchronize. If an attempt to add channels to an inverse-multiplexing call failed, and no channels were added, this message appears.

10-000 Net/S56-2/4

The Net/S56-2/4 status menu is a branch of the Main Status Menu that lists submenus that give the status of the SW56 interface.

The following illustration shows the switched-56 two-wire Net/S-2 status menu. The four-wire menu's heading is Net/S-4:

```
10-000 Net/S-2
>10-100 Line Status
 10-200 Line Errors
```

10-300 Net Options

Net Options, found in the Net/S56-2/4 status menu, gives a read-only list that lists the SW56 interface features with which your Multiband Plus-SW56 has been equipped:

```
10-300 Net Options
>SW56 Network I/F
 2 Network I/F(s)
```

The following items are listed:

⇒⇒   The first line defines the physical interface to the WAN: *2SW56 Network I/F* or *4SW56 Network I/F*

⇒⇒   The second line shows the number *N* of SW56 ports: *N Network I/F(s)*

00-300 Port Info

The Port Info menu gives the status of active calls. It also gives the remaining available bandwidth that is not utilized by the current calls.

00-300 Port Info

The following illustration is an example of
a Port Info menu:

```
00-300 Port Info
 Avail BW= 128K
 DS0 Mins=12
>21 O G  384K      v
```

The Port Info screen displays the following
information:

⇒⇒ The <u>first line</u> gives the menu number and
name.

⇒⇒ The <u>second line</u> shows the available band-
width, which in this example is 128 kbit/s.

⇒⇒ The <u>third line</u> gives the current accumulated
DS0 minutes for all calls placed from this
Multiband Plus.

Third Line: See **DS0 Min Rst** for when the DS0 min-
utes are reset.

⇒⇒ The <u>fourth line and all further lines</u> give the
serial host-interface status in the format
XN Y Z R. The following bullets describe
each of these parameters:

Fourth Line, etc.: The fourth of line of the preceding
example shows that serial host port #1 is active. Its call
status is **O**, which indicates online. The quality of call
is **G**, which indicates good. The bandwidth used by the
port is 384 kbit/s. Press the **down-arrow** key to view
the information after the fourth line.

• XN follows the same format as the first two
digits in the menu number. X is always 2 in-
dicating serial host port functionality, and N
indicates the serial host port number.

• Y is the call status character. The call status
character is described under **Call Status
Characters** in this chapter. The call status
character can have the following values:

Blank	No calls exist and no other Multiband Plus oper-ations are being performed
R	Ringing (an incoming call is on the line, ready to be answered)
A	Answering incoming call
C	Calling (dialing an outgoing call)
O	Online (a call is up on the line)
H	Hanging up (clearing) the call

D	Diagnostics (local loopback) in progress
!	Handshaking
L	Remote loopback in progress (master or slave)
S	Setting up handshake, add, remove
T	BERT test in progress (master or slave)
??	WAN network alarm

• Z is the quality of the call, if any call is active at the serial port. It can be **G** (good), **F** (fair), **M** (marginal), **N** (not applicable), or **P** (poor). Not applicable (**N**) appears during calling before the call is connected end-to-end and other times when call quality is not relevant.

For further information on call quality, see **Line Errors**, **Session Err**, **Statistics**, and **Call Status** in this chapter, **Auto-Bert** in the "Reference to Edit Menus" chapter, and the "Error Counting in WAN Connections" appendix.

• R is the approximate bandwidth given to the serial host. However, if this is an FT1-B&O call, the offline bandwidth as well as the online bandwidth appears here, as shown in the following bullet:

• R/R applies only to FT1-B&O calls. This gives the online and offline bandwidths, as is illustrated below for the base system's serial host port #2:

```
00-300 Port Info
 Avail BW= 128K
 21 O G 384K
>22 O G 128K/  64K
```
Note: remaining lines not shown

R/R: In the example to the left, the fourth line shows serial host port #2 has an FT1-B&O call online. The call status letter O indicates online, and G indicates call quality is good. Next, the online / offline bandwidths, 128K / 64K, appear. This means that the call is running at 128 kbit/s, and an additional 64 kbit/s is available but has been removed from the call. Whenever nailed-up channels in an FT1-B&O call are bad, Multiband Plus removes them from the call and monitors them for possible restoration. In this example, one 64K channel has been removed and is being monitored.

2N-600 Port Leads

Multiband Plus provides a Port Leads status menu for checking the state of the input and output control leads of the associated serial host port. There is a Port Leads status menu for each serial host port.

Port Leads: By checking the status of the serial host port's control leads using this menu, you can monitor an automatic dialing or answering process, such as X.21, V.25 bis, RS-366, or control-lead dialing. The pinouts for these leads are shown in the "Planning and Specifications" chapter.

The example below shows the Port Leads menu for the first serial port :

```
21-600 Port Leads  O
 DSR+ DTR+ RTS+ CD+
 RI-  acr- pnd+ dp-
 crq- dlo+ digit 7
```

The Port Leads status menu has the following format:

⇒⇒   The <u>first line</u> contains the status menu number which identifies the serial port being monitored, namely port #1 in this example.

⇒⇒   The <u>remaining lines</u> show the state of the control leads going into and out of the serial port. The plus symbol (+) indicates an active control lead, while the minus symbol (-) indicates that the lead is inactive.

The digit field in the lower right-hand corner of the menu displays the last digit dialed through the RS-366 dialing interface.

Port Leads: The following abbreviations are used for dialing output and input signals at the host port. The Clear to Send (CTS) output signal is not monitored in this menu. The standard cables supplied with Multi-band Plus tie CD and CTS together:

Output	Input
DSR (Data Set Ready)	DTR (Data Term. Ready)
CD (Carrier Detect)	RTS (Request to Send)
RI (Ring Indicate)	

Port Leads: The following abbreviations are used for RS-366 dialing output and input signals:

Output	Input
acr (Abandon Call and Retry)	dp (Digit Present)
pnd (Present Next Digit)	crq (Call Request)
dlo (Data Line Occupied)	

2*N*-400 Port Opts

Multiband Plus provides a read-only menu that displays information about the configuration options of its serial host ports. There is a Port Options status menu for each serial host port.

The example below shows the Port Option menu for the first serial port:

```
21-400 Port Opts
>V.35 Host I/F
```

⇒⇒   The <u>first line</u> gives the menu name, Port Opts.

⇒⇒ The <u>second line</u> can have one of the following values, indicating the electrical interface of the port:

- *V.35 Host I/F* is displayed if the port is configured to be electrically compatible with CCITT V.35.

- *RS-449 Host I/F* is displayed if the port is electrically compatible with RS-449/422. This option is compatible with X.21.

- *Universal Host I/F* is displayed if no cable is installed at the port.

Port Opts: Multiband Plus senses the type of cable you plugged into the serial host port and changes its electrical characteristics accordingly.

2*N*-000 Port*N* Stat

The Port*N* Stat (Port1 Stat, Port2 Stat, etc.) consists of a list of submenus that give the status of a serial host port. It appears in the Host/.. branch of the Main Edit Menu. The following illustration shows the Port1 Stat menu of the #1 serial host port .

```
21-000 Port1 Stat
  21-100 Call Status
  21-200 Message Log
  21-300 Statistics
 >21-400 Port Opts
  21-500 Session Err
  21-600 Port Leads
```

2*N*-500 Session Err

The Session Errors status menu displays the errors encountered during the current call channel-by-channel, line-by-line. There is a Session Errors menu for each host port.

For switched-56 models, the Session Errors menu displays the channel-by-channel errors accumulated during the current calls. There are two columns in the display. In the first column are the line numbers, each followed by a colon (:). Following the line number and colon, the next column gives

Session Err: The "Error Counting in WAN Connections" appendix describes the meaning of the errors listed in these displays. See also **Line Errors**.

Session Errors Status menu: If a channel is not associated with the current call from the selected serial host port, it is not listed.

the byte errors that have been detected on
that line during the current call.

```
21-500   Errors      O
   1:      33
   3:       0
   4:       0
Note: remaining lines not shown
```

2*N*-300 Statistics

The Statistics menu is a serial host port-specific menu that provides information about
line utilization and synchronization delay
while a call is up. There is a Statistics menu
for each serial host port.

The example below shows the four-line Statistics display for the first port:

```
21-300 Albuquerqu+ O
  Qual Good 01:23:44
  Max Rel Delay 10
  CLU  80%  ALU  77%
```

The Statistics menu contains the following
information:

⇒⇒ First Line: The first line of the Statistics
menu shows the status menu number, which
includes the host port's number, the name
of the current Call Profile, and the call
status character.

⇒⇒ Second Line: The second line lists quality
of the call and the call duration, which is a
running account of the amount of time spent
in the call. When a call lasts more than 96
hours, the parameter is reported in number
of days. The call quality, or **Qual**, can be
Good, *Marg* (Marginal), or *Poor*.

   •   *Good* means that no errors have been detected during the transmission of the call.

For further information on call quality, see **Line Errors**, **Port Info**, and **Call Status** in this chapter, **AutoBert** in the "Reference to Edit Menus" chapter, and the
"Error Counting in WAN Connections" appendix.

- *Fair* means that some errors have been detected in transmission.

- *Marg* means that a significant number of errors have been detected. In this case, reliable transmission is not guaranteed and resynchronization is recommended.

- *Poor* means that individual channels might be dropped from the call or the call might be automatically cleared by Multiband Plus.

For FT1-B&O calls, the second line of the Statistics menu might not show the call duration as it does for other types of calls. When an FT1-B&O call has no bad channels, the call duration appears as usual. Otherwise the number of offline nailed-up channels appears after the call quality. The following example shows the Statistics menu of an FT1-B&O call with two channels offline:

For further information on call quality, see **Session Err**, **Port Info**, **Line Errors**, and **Call Status** in this chapter and **Auto-Bert** in the "Reference to Edit Menus" chapter.

```
21-300 Albuquerqu+ O
  Qual Good 2=Poor
  Max Rel Delay 10
  CLU  80%  ALU  77%
```

⇒⇒ Third Line: The third line displays the **Max Rel Delay** parameter. During a Multiband Plus call, different channels can take different paths through the WAN and can arrive at the destination at different times. This difference is known as a *relative delay*. The **Max Rel Delay** is the largest amount of delay between any two channels in the call. The delay is calculated and reported in multiples of 125 microseconds. This parameter cannot exceed "3000" (that is, 375 msec.).

Third Line: In the example to the left, the maximum relative delay is *10*, which translates to 10*125 or 1250 microseconds.

⇒⇒ Fourth Line: The last line of the Statistics menu displays two different values:

- **CLU** specifies the current line utilization, which is the percentage of bandwidth currently being used by the call divided by the total amount of bandwidth that is available.

- **ALU** specifies the averaged line utilization and is the average amount of available bandwidth used by the call during the current history period as specified by **Sec History** and **Dyn Alg**.

Fourth Line: **CLU** and **ALU** only applies to calls whose **Call Mgm** Call Profile parameter has the values *Dynamic* as well as to **Call Type** *FT1-AIM* and *FT1-B&O*.

00-100 Sys Options

The Sys Options menu gives a read-only list that identifies your Multiband Plus-SW56 and names each of the features with which it has been equipped:

Sys Options: The serial number of your Multiband Plus can also be found on the model number/serial number label on Multiband Plus's bottom panel. See also **Net Options**.

```
00-100 Sys Options
>Security Prof:1    ^
 Software +1.0+
 S/N:42901
```
Note: remaining lines not shown

The following items are listed:

Sys Options
Security Prof: 1 or *Security: Prof: 2* or... — shows which of the nine Security Profiles is controlling the user interface
Software... — defines the version and revision of the system ROM code
S/N:... — shows the serial number of this Multiband Plus
Switched Installed or *Switched Not Inst* — shows whether or not Multiband Plus can dial, that is, place calls over switched circuits
RS-366 Installed or *RS-366 Not Inst* — shows whether or not the EIA RS-366 dialing protocol has been installed
Dyn Bnd Installed or *Dyn Bnd Not Inst* — stands for Dynamic Bandwidth Allocation (DBA)
Nx56/64 Installed or *Nx56/64 Not Inst* — stands for Ascend Inverse Multiplexing functionality and includes remote management capability, and BONDING; a prerequisite for *Dyn Bnd*
X.21 Installed or *X.21 Not Inst* — shows whether the X.21 dialing and answering protocol has been installed
V.25bis Installed or *V.25bis Not Inst* — shows whether or not the CCITT V.25 bis dialing and answering protocol has been installed

00-000 System Status Menu

The System status menu is a branch of the
Main Status Menu that includes the menus
that give the status of the Multiband Plus-
SW56 system as a whole. It contains the fol-
lowing submenus:

```
00-000 System
 00-100 Sys Options
>00-200 Message Log
 00-300 Port Info
 00-400 CDR
```

Submenus listed under the System status
menu provide information about Multiband
Plus that pertain to the system as a whole;
that would not fall under the classification
of its SW56 WAN interface, or its serial
host interface.

00-000 System Status Menu

8 Troubleshooting and LEDs

This chapter explores the types of problems that might interrupt or prevent call transmission and provides some suggested procedures for addressing those problems.

This chapter assumes that you are familiar with the software and hardware options supported by your Multiband Plus. The Sys Options menu displays the factory-installed options.

In some cases, the descriptions that follow suggest that you contact Ascend Customer Support. You can reach Ascend customer support by telephone, facsimile transmission (FAX), electronic mail, or U.S. Mail. See the customer service section in the front of this guide for more information.

8.1 LEDs

The front panel of Multiband Plus-SW56 model includes a set of LED displays as shown in the following illustration:

SYS		HOST				LINES					
PW	ER	1	2	3	4	1	2	3	4	5	6
○	○	○	○	○	○	○	○	○	○	○	○
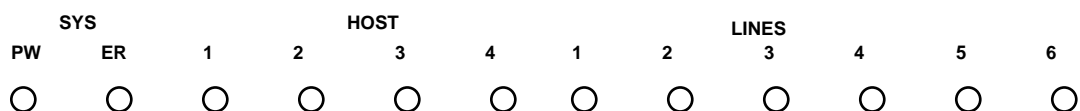
The first two front-panel LEDs indicate the general status of the system:

PW (Power)

This green LED is lit when Multiband Plus is switched on.

ER (Fault/Error)

The red **ER** LED lights to indicate a self-test of the hardware; if this LED remains fully lit or blinks, it means that the unit is not functional and that service is required.

The middle front-panel LEDS, grouped under **HOST**, give the status of the serial host ports like a modem front panel:

1 (Host Port 1)

This green LED is lit whenever a channel is active end-to-end in a call to or from serial host port 1; it is analogous to the modem signal Carrier Detect. Whenever the channel is inactive, the light goes off.

A blinking **1** LED should be interpreted as an indication that Multiband Plus is in a diagnostic mode and that data cannot be exchanged between hosts at either end of the session. Specifically, a blinking **1** LED indicates either BERT, Auto-BERT, re-

mote loopback, or local loopback. Except for local loopback, these LEDs blink on both the near-end and far-end Multiband Plus.

The Call Status menu provides messages describing the diagnostic test status; see also the **Call Status** menus.

2 (Host Port 2) — **4** (Host Port 4)
These green LEDs have the same functionality as **1** (Host Port 1), except they reflects the state of serial host ports 2-4. Ports 2 through 4 are a factory installed option.

The last 1 to 4 (optionally, 1 to 7) front-panel LEDs, grouped under **LINES**, give the status of each switched-56 line.

1 (Line 1)
The LED for each connected switched-56 line should be on and steady at all times. Off indicates the corresponding line is either not connected to the central office switch or the disabled in Multiband Plus's Line Profile. Blinking indicates connected and enabled in the Line Profile, but a line that cannot make or receive calls.

2 (Line 2) through **7** (Line 7)
These LEDs have the same functionality as line #1 except they reflect the states of lines 2, 3, etc.

8.2   List of Symptoms

The following table lists the most common problems and their causes:

Problem	Page
Check Me First	
I have not been able to get my new installation operational.	page 4
User Interface Problems	
When the list of DO commands appears, most operations do not appear.	page 4
Call Profile Checklist	
The SW56 line is in service, but no calls can be made.	page 4
The data appears to be corrupted on 1 Chnl or 2 Chnl call types dialed in the U.S. to another country.	page 5
Line Profile Checklist	
The first channel of an inverse multiplexing call connects, and then the call clears or does not connect on the remaining channels.	page 5
The error message No Channel Avail appears in the Message Log display immediately upon trying to place a call.	page 5

Problem	Page
Hardware Configuration Problems	
Nothing is displayed on the VT-100 or the Palmtop.	page 6
The ER LED turned off, but nothing is displayed on the Control Monitor's VT-100 terminal.	page 6
Random characters appear on the Control Monitor screen.	page 6
Random characters appear on the Palmtop screen.	page 7
The start-up display indicates a power-on self test failure.	page 7
Serial Host Interface Cabling Problems	
Excessive data errors reported on all calls.	page 7
Calls cannot be made, answered, or cleared using control leads.	page 7
Serial Host Interface Loopback Testing	
In local loopback, your application indicates there is no connection.	page 8
In local loopback, no data is received by your application.	page 8
The Port Profile is set to establish calls when DTR is active, but a call cannot be established from your application.	page 9
A call initiated by control-lead toggling is cleared before it can be established completely.	page 9
A serial host-initiated call cannot be cleared from your application equipment.	page 10
SW56 Interface Problems	
A LINES LED is off.	page 10
A LINES LED does not stay on continuously.	page 10
SW56 Circuit Quality Problems	
Excessive handshaking on calls to serial host ports	page 11
Excessive data errors reported on some calls to serial host ports but not on every call.	page 11
AIM Static Call Problems	
The data received by your equipment becomes scrambled during an AIM Static call.	page 11
Incoming Call Routing Problems	
After the Call Status menu reports ANSWERING and HANDSHAKING, it drops back to IDLE.	page 12
Cannot make a call to a particular serial host port.	page 12

Problem	Page
When trying to make a dual-port call, the Call Status menu reports ANSWERING and HANDSHAKING, and then drops back to IDLE.	page 12
When trying to make an AIM, BONDING, or AIM/DBA call, the Call Status menu reports ANSWERING and HANDSHAKING, and then drops back to IDLE.	page 12

8.3 Check Me First

Problem: I have not been able to get my new installation operational.
Use the *Multiband Plus-SW56 Quick Start Guide.* If you need to return some parameters to their default values, see the "Parameter Summary" chapter.

8.4 User Interface Problems

When you are not familiar with the Palmtop Controller or Control Monitor of Multiband Plus, you might bring up a DO menu that does not allow you to perform a certain operation.

Problem: When the list of DO commands appears, most operations do not appear.
Since Multiband Plus-SW56 can manage a number of calls simultaneously, you might need to select a specific serial host port, or Call Profile before the DO command appears. Multiband Plus only lists those DO commands that are currently available. For example, to dial (**Ctrl-D 1**) a Call Profile, move to the Call Profile in the Directory Menu, and then type **Ctrl-D 1**. Note, you cannot dial if the control port's current level of security has **Operations**=*No*, or if a call is active already, **DO 2 (Hang Up)** appears instead of **DO 1 (Dial)**.

8.5 Profile Configuration Problems

As described in the "Reference to Edit Menus" chapter, Call Profiles contain the configuration of a call. In a similar manner, a *Line Profile* contains the configuration of the SW56 interface. The most common problems are also the easiest to solve and result from improperly configured call or Line Profiles. Profiles are always the first place to check for possible problems.

8.5.1 Call Profile Checklist

The following is a typical problem that might occur after a Call Profile configuration error.

Problem: The SW56 line is in service, but no calls can be made.
There are other possible causes for this trouble indication, but you should always verify the Call Profile using the following checklist:

- Make certain that you have entered the correct phone number to dial.

- Refer to the **"**Reference to Edit Menus" chapter for the definition of each parameter listed in the Call Profile.

- Refer to the "Controlling Dynamic Bandwidth" appendix for further information on Call Profile parameters used in routing calls and controlling DBA.

Problem: The Line Status menu shows multiple channels being called simultaneously, but only some of the channels connect. An International Multiband Plus placed the call or the call was from the U.S. to another country.
In some countries, setting the **Parallel Dial** System Profile parameter above 1 or 2 violates certain dialing rules, and only some of the channels can connect during call setup. Try reducing the **Parallel Dial** parameter to the value *2*. If the problem persists, try reducing it to *1*.

Problem: The data appears to be corrupted on 1 Chnl or 2 Chnl call types dialed in the U.S. to another country.
On some international calls, the data service per channel is not conveyed by the WAN to the Multiband Plus answering the call, and you must set the **Force 56** Call Profile parameter to *Yes* to correctly receive these calls; otherwise Multiband Plus incorrectly thinks the call uses 64 kbit/s channels.

8.5.2 Line Profile Checklist

Multiband Plus requires you to configure the SW56 interface before you use any dialing features. You configure the SW56 interface through the Line Profile. Refer to the "Reference to Edit Menus" chapter for the definition of each parameter listed in the Line Profile.

Problem: The first channel of an inverse multiplexing   call connects, and then the call clears or does not connect on the remaining channels.
The most common error in defining Line Profiles is having incorrect phone numbers. Multiband Plus cannot successfully build inverse inverse multiplexing   calls if the phone numbers in the Line Profile of the called unit are incorrect. Incorrect phone numbers in the Line Profile do not affect outgoing calls.

The phone numbers that you specify in the Line Profile are the numbers local to your unit. Do not enter phone numbers of the Multiband Plus you are calling in the Line Profile. See the Line Profile parameter **Phone Num** in the "Reference to Edit Menus" chapter. The numbers you are calling belong in the Call Profiles or Destination Profiles.

Problem: The error message No Channel Avail appears in the Message Log display immediately upon trying to place a call.
Check the Line Profile configuration to determine that it has been configured correctly.

This message can also indicate the SW56 cables have been disconnected or were installed incorrectly. Section 8.8   describes SW56 cabling problems.

8.6 **Hardware Configuration Problems**

If you cannot communicate with Multiband Plus through the Palmtop or the VT-100 control terminal, you might have a terminal configuration, control port cable, or Multiband Plus hardware problem.

Problem: Nothing is displayed on the VT-100 or the Palmtop.
If Multiband Plus is in this state, verify that the unit completes all of the power-on self tests successfully by looking at the LEDs on the front panel. Follow these steps:

*   Verify that Multiband Plus and your terminal are set at the same speed.

*   Locate the LED labeled **ER** in the row of lights.

*   Turn Multiband Plus power on. The **ER** LED should remain off except during the power-on self tests. If you are using the Control Monitor, type **Ctrl-L** to refresh the screen. If you are using the Palmtop Controller, unplug it, wait 5 seconds, and plug it back in to refresh the screen.

*   If the **ER** LED remains on longer than a minute, there is a Multiband Plus hardware failure. A blinking **ER** LED also indicates a hardware failure. Should these situations arise, contact Ascend Customer Support.

Problem: The ER LED turned off, but nothing is displayed on the Control Monitor's VT-100 terminal.
If the unit passed its power-on tests as described above and you still cannot communicate with the Control Monitor, type **^L** to refresh the screen. If nothing appears, check the cabling between Multiband Plus and your terminal.

The control terminal plugs into the HHT-VT-100 cable or 9-pin connector labeled **Control** on the back of Multiband Plus. Check the pinout carefully on the 9-pin cable. If you are connecting to an IBM PC-like 9-pin serial connector, a straight-through cable is appropriate. Otherwise, you might need a 9-to-25 pin conversion cable.

Next, check the flow control settings on your VT-100 terminal. If you are not communicating at all with Multiband Plus, see if you can establish communications after you have turned off all transmit and receive flow control at your terminal or terminal emulator.

Finally, you might need a null-modem cable converter. In general, these are not required for communications to Multiband Plus. However, so many different cable and terminal configurations are available that occasionally a null-modem cable converter might be required. Check with your system manager for more information.

Problem: Random characters appear on the Control Monitor screen.
If random or illegible characters appear on your display, there is probably a communications settings problem. Multiband Plus is shipped with the following communications characteristics:

*   2400 bits per second data rate

- 8 data bits

- 1 stop bit

- No flow control

- No parity

If you are using the Control Monitor, verify that your terminal is also configured with these characteristics. If you have changed the data rate through the Port Profile, make certain that your VT-100 terminal matches that rate.

Problem: Random characters appear on the Palmtop screen.
If the Palmtop screen presents scrambled information, unplug the Palmtop from its coiled cable, wait 5 seconds, and plug it back in to refresh the screen.

Problem: The start-up display indicates a power-on self test failure.
If the start-up display indicates a failure in any of its tests, an internal hardware failure has occurred with the unit. In this case, contact Ascend Customer Support.

8.7 Serial Host Interface Problems

Local loopback testing is the best aid when troubleshooting the serial host interface, that is, the interface between your application equipment and Multiband Plus. All of the symptoms and operations described in this section assume you are working from the local loopback diagnostics menu. Unless otherwise specified, the host interfaces in this section could optionally include the Ascend Remote Port Modules (RPMs).

8.7.1 Serial Host Interface Cabling Problems

The first and most critical aspect of the synchronous serial host interface is the cable or cables connecting your application to Multiband Plus. If you are unsure about the cabling required for your application, contact Ascend Customer Support, who can provide you with application-specific cable information for many different applications.

Problem: Excessive data errors reported on all calls.
This problem can indicate that you have installed faulty host interface cables or cables not suited to the application. Information on host interface cabling requirements is found in the "Planning and Specifications" chapter.

Problem: Calls cannot be made, answered, or cleared using control leads.
If you have purchased or built your own cables, verify the pin-out against the Multiband Plus pin-out for compatibility. The "Planning and Specifications" chapter lists the host interface pin-out.

Frequently a DB-25 breakout box is useful for monitoring control leads and to help make quick changes to the cabling. However, because the host interface is running V.35 or RS-

422 signal levels, you must verify that the breakout box is passive, that is, not regenerating RS-232 level signals.

You can find the pin-out of the host interface cables in the "Planning and Specifications" chapter.

8.7.2 **Serial Host Interface Loopback Testing**

There are two ways to test the synchronous serial host interface: either through a mechanism by which your equipment can recognize its own data looped back to itself (that is, through local loopback), or through true end-to-end communications.

Most kinds of applications support some knowledge of loopback. For example, when Multiband Plus is in loopback mode and is connected to a video codec, users see their own image through the codec. Likewise, most bridge/router devices recognize and report a diagnostic message when a packet is sent out and received back to itself. More often than not, the application equipment must be configured explicitly to accept the loopback from the communications device.

The following problems describe typical behaviors that might arise during local loopback tests of the host interface.

Problem: In local loopback, your application indicates there is no connection.
Your application expects one or more of its control lines to be active. If no lines are active, toggle the various outputs available on the local loopback diagnostics menu. If there is still no connection, verify that you have installed the host cables correctly as described in the "Planning and Specifications" chapter. If the serial host cabling was installed correctly, examine the host interface cable pin-outs, also described in the "Planning and Specifications" chapter.

Problem: In local loopback, no data is received by your application.
In this case, you should first verify that your application is configured to accept a loopback at the communications device.

Frequently, the application equipment requires certain control lines to be active during data transfer. Therefore, you might want to toggle the various host interface output lines, especially DSR and CD, to ensure they are active.

With the control lines active, if there is still no data transfer, one or more control lines required by the host probably are not provided in your cable. Refer to the documentation of your equipment for a description of what pins it requires to be active. The following control lines generally have an impact:

• Carrier Detect (CD) and/or Clear To Send (CTS)

• Data Set Ready (DSR)

If you are convinced that the control lines are in their correct states but there is still no data transfer, you might have a clocking problem. Multiband Plus provides both the

transmit data clocks and the receive data clocks to your equipment through the host interface. Your equipment must be configured to accept (or slave) the clocks from Multiband Plus.

If the cable length exceeds the recommended distances, you should be using terminal timing. Alternately, you might need to install Multiband RPMs.

The final variable is the data rate. You can adjust the data rate from the local loopback diagnostics menu by choosing the number of channels. Some applications cannot work below or above a certain data rate range; for example, some high performance codecs cannot operate at data rates less than 384 kbit/s. In such cases, adjust the number of channels of data being looped back.

Problem: The Port Profile is set to establish calls when DTR is active, but a call cannot be established from your application.
If your application is going to originate the calls directly by using control-lead dialing, the call origination and clearing mechanisms must be configured compatibly between Multiband Plus and your application equipment.

To verify a compatible configuration from the local loopback diagnostics menu, disable each of the Multiband Plus output control lines except DSR. To disable an output control line, toggle it to be *Inactive* (-). At this time, your equipment should indicate that there is no connection.

Next, request an outgoing call from your equipment and monitor the Port Leads status menu of the ports active in the call. One or more of the control line inputs should go active and remain active for a period of time.

If the DTR input is not one of the leads that changes state, your cable is not properly configured. In this case, you must change the cable to route the appropriate host output signal to the DTR input of Multiband Plus. The DTR lead must be used to establish outbound calls.

Once you have made any changes that are required to verify that the DTR lead becomes active when the call is requested, configure the Port Profile to expect the DTR input. In the Port Profile, set the value for the **Dial Call** parameter to the value *DTR Active*.

Problem: A call initiated by control-lead toggling is cleared before it can be established completely.
If the call is cleared almost immediately, the Port Profile most likely has a configuration error. To verify this problem, place an outgoing call from your equipment while monitoring the Port Leads status menu of the serial host ports used in the call.

Watch the DTR input carefully while the call is being established. If the DTR input indicates *Active* (+) and then shortly thereafter returns to *Inactive* (-), DTR is being used as a pulse to place the call. Make sure that the **Clear** parameter in the Port Profile does not have the value *DTR Inactive*. (*DTR Inactive* should be selected for **Clear** only when the application maintains DTR positive during the call.)

While your equipment is still dialing the call, toggle the value of the CD output to indicate to your equipment that the call completed. At this time, watch the control leads very carefully. Make certain that any control leads that toggle while the call is being established are not used in the **Clear** port parameter to clear the call. This type of configuration error is the most likely cause of a call being cleared almost immediately.

Problem: A serial host-initiated call cannot be cleared from your application equipment.
If the call cannot be cleared from your application equipment, the serial host Port Profile is probably not configured correctly. To verify this problem, place an outgoing call from the your equipment while monitoring the Port Leads status menu of the ports used in the call.

Toggle the CD output to *Active* (+) once the host has requested the outbound call. The host should recognize that the call is online.

At this time, make a request to clear the call from your equipment. Watch the control leads very carefully as one or more of the input control lines toggle. Generally either DTR or RTS is the line that toggles. Record whether the control lead input goes to *Active* (+) or *Inactive* (-) when the call is cleared; then check that the value of the **Clear** Port Profile parameter matches the action that the host takes when the call is cleared.

8.8 SW56 Interface Problems

The first and most critical aspect of the SW56 interface is the cable or cables connecting Multiband Plus to the WAN interface or WAN terminating equipment. Typically, SW56 interface cabling problems appear immediately after installation.

If you are unsure about the cabling required for your application, contact Ascend Customer Support. The "Planning and Specifications" chapter describes the general SW56 interface requirements, and lists SW56 cabling pin-outs.

Although the largest set of problems surrounding SW56 interfaces involves improper cabling, as a secondary problem, the line is sometimes configured incorrectly with respect to the signaling characteristics. If the cabling is not the problem, check the Line Profile.

Problem: A LINES LED is off.
Verify that the **Enabled** Line Profile parameter is *Yes*. If the line is enabled, verify the line is physically connected and intact. Finally, verify that the line is connected to an enabled SW56 interface provided by your carrier.

Problem: A LINES LED does not stay on continuously.
Blinking indicates connected and enabled, but the line cannot make or receive calls. A poor quality cable might cause this symptom. Contact your carrier to determine if this line is in service.

8.8.1 SW56 Circuit Quality Problems

Problem: Excessive data errors reported on some calls to serial host ports but not on every call.
Multiband Plus provides a BERT (byte error test) that counts data errors that occur on each channel during a call to a serial host port. The BERT test checks the data integrity from the Multiband Plus at one end of the call to the Multiband Plus at the other end.

If you have verified Multiband Plus is correctly installed and configured, and you have previously placed calls without excessive errors, run the BERT test (**DO Beg/End BERT**). Do not clear the call before running the BERT test. The BERT test can only be run while a call is active and only if the **Call Type** parameter is *AIM*, *FT1-B&O*, or *FT1-AIM* and the **Call Mgm** parameter is *Manual*, *Dynamic*, or *Delta*. Alternatively, you can configure the Call Profile to run the auto-BERT (**Auto-BERT**).

If the BERT test indicates very high errors on some of the channels, clear the call and redial. When redialed, the call might take a different path, which might correct the excessive error problem.

Problem: Excessive handshaking on calls to serial host ports
If there is trouble in the circuits that carry the call, frequent handshaking can occur during the call. If the trouble is serious enough to degrade the quality of the call, Multiband Plus disconnects. Handshaking is a normal and momentary occurrence during call setup and when Multiband Plus increases or decreases bandwidth. If handshaking is continuous for over a minute, the problem is probably not due to the quality of the line, and you should call Ascend Customer Support.

8.9 AIM Static Call Problems

Problem: The data received by your equipment becomes scrambled during an AIM Static call.
Since an AIM Static call does not have a management channel, it is possible for data scrambling to occur due to WAN slips, a type of timing error. Slips are a very infrequent occurrence. If you encounter such problems, clear the call and redial.

All other call types can avoid this problem. Investigate if you can set up your host equipment so that both the near end and far end of the call can use another call type, such as AIM Manual or AIM Delta.

8.10 Incoming Call Routing Problems

Routing problems occur when a call is connected to the answering Multiband Plus but cannot be routed to one of its host ports.

Problem: After the Call Status menu reports ANSWERING and HANDSHAKING, it drops back to IDLE.
This might not indicate a problem. It can indicate the call was initially answered and when its routing was checked, the target serial host port was busy or disabled.

Problem: Cannot make a call to a particular serial host port.
Check the Call Status menu of the serial host port and determine that the port is not busy. You should see that the port state is IDLE. Refer to the "Call Routing" appendix for information on how the routing parameters should be configured.

Problem: When trying to make a dual-port call, the Call Status menu reports ANSWERING and HANDSHAKING, and then drops back to IDLE.
Check the status of both ports specified in **Dual Ports** Host-Interface Profile parameter of the answering Multiband Plus. If either port in the pair is busy, the call cannot be routed to that pair.

Problem: When trying to make an AIM, BONDING, or AIM/DBA call, the Call Status menu reports ANSWERING and HANDSHAKING, and then drops back to IDLE.
If the routing parameters are configured incorrectly, an AIM, BONDING, or AIM/DBA call might be routed to ports that cannot support these types of calls.

A Keyboard Reference

This chapter describes the display format, keypad, and keyboard commands of the following interfaces.

- The ***Control Monitor*** interface runs on a VT-100 terminal or a PC with a VT-100 terminal emulator.

- The ***Palmtop Controller*** works on a Palmtop hand-held terminal.

A.1 Displays

When a user interface screen is divided into multiple areas that display separate activities, these areas are referred to as ***windows***. Throughout this document, the term ***display*** refers both to the Palmtop Controller's single window and the Control Monitor's multiple windows. There is no significant difference between the displays on these, other than the fact that the edit display on the Control Monitor has more room for parameters and lists than the Palmtop Controller.

A.1.1 **Control Monitor Full Menus**

The Control Monitor Full Menus consists of eight status displays and a single edit display. The screen is divided into two parts. The part on the left is used by the edit display, which is reserved for options through which you can configure Multiband Plus and command Multiband Plus's diagnostic options. The part on the right shows the eight status displays, through which you can observe Multiband Plus's status but cannot manage its configuration..

```
┌─────── East Coast MB Edit ───────┐   ┌────────────────────┐   ┌────────────────────┐
│ Main Edit Menu                   │   │ 10-100 1234        │   │ 00-200 11:23:55    │
│  00-000 System                   │   │  Link   AAAA       │   │  M31 Line    Ch    │
│ >10-000 Net/S56-...              │   │  Call   **..       │   │  Assigned to port  │
│  20-000 Host/...                 │   └────────────────────┘   └────────────────────┘
│                                  │
│                                  │   ┌────────────────────┐   ┌────────────────────┐
│                                  │   │ 21-100           O │   │ 21-200           O │
│                                  │   │  ONLINE            │   │  Qual Good 01:23:44│
│                                  │   │  56K    1 channels │   │  Max Rel Delay     │
│                                  │   │                    │   │  CLU 100%  ALU 100%│
│                                  │   └────────────────────┘   └────────────────────┘
│                                  │
│                                  │   ┌────────────────────┐   ┌────────────────────┐
│                                  │   │ 22-100           O │   │ 22-200           O │
│                                  │   │  ONLINE            │   │  Qual Good 01:23:44│
│                                  │   │  56K    1 channels │   │  Max Rel Delay     │
│                                  │   │                    │   │  CLU 100%  ALU 100%│
│                                  │   └────────────────────┘   └────────────────────┘
│                                  │
│                                  │   ┌────────────────────┐   ┌────────────────────┐
│                                  │   │ 00-100 Sys Option  │   │ Main Status Menu   │
│                                  │   │ >Security Prof:1   │   │ >00-000 System     │
│                                  │   │  Software +2.0     │   │  10-000 Net/S56-.. │
│                                  │  s│  S/N:42901         │   │  20-000 Host/..    │
└──────────────────────────────────┘   └────────────────────┘   └────────────────────┘


Right Arrow/^Z = Select    Left Arrow/^X = Exit       Up Arrow/^U = Up
Down Arrow/^N = Down        PF1/^D = DO!               Tab = Window
```

The bottom two lines of the Control Monitor display are saved for command key information, which describes the key sequences required to execute pertinent commands:

You can interact with only one display at a time. The display you are currently interacting with has thick double line borders on its left, right, and top sides. This display is called the *current window*.

In the example above, you are interacting with the 10-100 status display near the top-middle of the screen. If you press the **Tab** key once, the thick double lines move to 00-200, the next screen to the right. If you continue pressing **Tab**, your selection moves from left to right and down, until it reaches the last display in the lower righthand corner, at which point it wraps up to the edit display. **Back-Tab** or the **Ctrl-O** key combination moves in the opposite direction.

All displays are continuously updated by Multiband Plus.

Control Monitor Input Pop-Up Windows
Control Monitor input pop-up windows appear whenever you open an editable parameter in a Control Monitor menu. These windows overwrite the surrounding text during the

input procedure. A pop-up input window appears on lines 3-5 of the first column in the following example:

```
                       ══ East Coast MB Edit ══
                     ┃ 00-302 Installer        O ┃  ┃ 10-100        ┃  ┃ 00-200        ┃
                     ┃  Name=Installer           ┃  ┃ ...etc.       ┃  ┃ ...etc.       ┃
                     ┃  Passwd:                  ┃  ┃ ...etc.       ┃  ┃ ...etc.       ┃
Security pop-up window ┃  [opanszme]             ┃  ┃ ...etc.       ┃  ┃ ...etc.       ┃
                     ┃                           ┃
                     ┃  Edit System=Yes          ┃  ┃ 21-100        ┃  ┃ 21-200        ┃
                     ┃  Edit Line=Yes            ┃  ┃ ...etc.       ┃  ┃ ...etc.       ┃
                     ┃ (remaining lines not shown)┃  ┃ ...etc.       ┃  ┃ ...etc.       ┃
                     ┃                           ┃  ┃ ...etc.       ┃  ┃ ...etc.       ┃
                     ┃                           ┃
                     ┃                           ┃  ┃ 22-100        ┃  ┃ 22-200        ┃
                     ┃                           ┃  ┃ ...etc.       ┃  ┃ ...etc.       ┃
                     ┃                           ┃  ┃ ...etc.       ┃  ┃ ...etc.       ┃
                     ┃                           ┃  ┃ ...etc.       ┃  ┃ ...etc.       ┃
                     ┃                           ┃
                     ┃                           ┃  ┃ 00-100        ┃  ┃ Main Status Menu ┃
                     ┃                           ┃  ┃ ...etc.       ┃  ┃ ...etc.       ┃
                     ┃                           ┃  ┃ ...etc.       ┃  ┃ ...etc.       ┃
                     ┃                           ┃  ┃ ...etc.       ┃  ┃ ...etc.       ┃

                       Right Arrow/^Z = Select    Left Arrow/^X = Exit      Up Arrow/^U = Up
                       Down Arrow/^N = Down        PF1/^D = DO!             Tab = Window
```

The pop-up menu shows the name of the editable parameter on its first line, followed by the current parameter value, surrounded by brackets, on the next line. The rest of the pop-up menu is blank. As shown in this example, part of the underlying menu is occluded by the pop-up window. In this example, the editable parameter is **Dial #** and its value is **[555-1212]**. On input windows, brackets always enclose the value to be edited. Empty brackets indicate a null value. Whenever you enter an input window, the cursor appears over the left, or opening, bracket.

Default and Custom Control Monitor Layout

When you start up Multiband Plus for the first time, certain screens appear on the Control Monitor display by default. This arrangement is called the *factory default layout*. The factory default layout is shown in section A.1.1.

You can customize the Control Monitor layout of status displays by executing the **Ctrl-D M** (**DO M**) command. When you enter **Ctrl-D M**, the current layout is saved and replaces the previous layout.

Furthermore, when you enter **Ctrl-D M**, you also update the **Status 1** through **Status 8**, and **Edit** system profile parameters.

A.1.2 **Control Monitor's Simplified Menus**

The Simplified Menus are a slightly restructured subset of the full set of Control Monitor menus. See the "Simplified Menus" appendix for information on the Control Monitor's Simplified Menus.

A.1.3 **Palmtop Controller**

The Palmtop Controller display is the same size as a status display on the Control Monitor. It can contain up to 4 lines of ASCII text, each line a maximum of 20 characters long. The Palmtop Controller screen contains a single display.

```
Main Edit Menu
>00-000 System
 10-000 Net/...
 20-000 Host/...    v
```

Palmtop Controller Input Displays
Palmtop Controller input displays appear whenever you open an editable parameter in a Palmtop Controller menu. These displays look like this:

```
21-101 Albuquerqu+ O
Name:
  [Albuquerque]
```

As with menus, the top line is reserved for the menu number, name, and status character. The next line contains the name of the editable parameter. The last two lines of the display show the current parameter value, surrounded by brackets. On input displays, brackets always enclose the value to be edited. Empty brackets indicate a null value. Whenever you enter an input display, the cursor appears over the left, or opening, bracket.

A.2 **Special Display Characters**

The following characters have special meaning within the displays:

+ The plus character indicates that an input entry is too long to fit onto one line and is thus truncated on the menu display.

... An ellipses means that details of a menu option are given on a submenu. The submenu is displayed when you select the menu option.

A.3 Special Keys

The following table lists the special purpose keys and key combinations used by the Control Monitor and Palmtop Controller. The equivalent Control Monitor and Palmtop Controller are listed:

Palmtop Controller.	Control Monitor		Operation
>	**Right-Arrow or Return/Enter**	**Ctrl-Z or Ctrl-F**	Enumerated parameter: Select next value. String value: Move one character to the right or enter the current input. Menu: Open the current selection.
<	**Left-Arrow**	**Ctrl-X or Ctrl-B**	Enumerated parameter: Select previous value. String value: Move left one character or exit the current input. Menu: Close the current selection.
v	**Down-Arrow**	**Ctrl-N**	Move down to next selection.
^	**Up-Arrow**	**Ctrl-U or Ctrl-P**	Move up to previous selection.
N/A	**N/A**	**Ctrl-V**	Move to next page of list.
N/A	**Tab**	**Ctrl-I**	Move to next display (window).
	Back-Tab	**Ctrl-O**	Move to previous display (window).
TOGGLE STAT	**N/A**	**N/A**	Toggle to status menu from edit menu and vice versa.
Shift->	**Delete**	**none**	Delete character under cursor.
Shift-<	**Backspace**	**none**	Delete character to left of cursor (rubout).
Shift-^	**none**	**none**	Overwrite character under cursor with a space.
DO	**none**	**Ctrl-D**	Open DO menu.
N/A	**none**	**Ctrl-T**	Return from or go to Simplified Menus.
N/A	**none**	**Ctrl-L**	Refresh the VT-100 screen.
N/A	**none**	**Ctrl-C**	Return from MIF to normal menus.
D	**D**	**none**	Typing the character D while pointing to a callable profile dials that profile.

NOTE: The **Control** and **Shift** keys are always used in combination with other keys. This document represents key combinations as two characters separated by a hyphen,

such as **Shift-t**, which types capital letter T. On the Palmtop Controller, the main character associated with the key is large and white, and the **Shift-** character associated with the key is small and yellow.

A.4 **Menu Numbers**

Every Multiband Plus menu is identified by a five-digit menu number **XN-nnn**:

- **X** The first digit indicates the menu type: system, SW56 line, or serial host:

  - Menus beginning with the digit **0** contain information about the Multiband Plus system as a whole.

  - Menus beginning with the digit **1** contain information about Multiband Plus's SW56 interface.

  - Menus beginning with the digit **2** contain information specific to Multiband Plus serial host ports.

- **N** The second digit is called the *port number*. If this number is not 0, it specifies to which serial host port the menu applies. For serial host-port menus, the digit **0** indicates information pertinent to any portion. For system and SW56-network menus, the second digit is always **0**.

- **-nnn** The three digits after the dash (-) are called the *root number*. Any 000 root number identifies an upper level branch of the menu tree. If the first digit of the root number is not 0, it identifies a sub-menu type. The second and third digits identify items in the submenu. For example, the upper level menu 10-000 Net/.. has several submenus including 10-100 Line Config. When you select the 10-100 Line Config, control moves to a list of line profiles, numbered from 10-101 to 10-101.

B MIF

This appendix specifies the Multiband Machine Interface (MIF) for the following products:

  • Multiband Plus, software release **3.4P**

  • Multiband MAX, software release **2.2P**

MIF has been designed to allow users or VARs to write programs to control these products. The primary features of MIF follow:

  • Command line driven

  • Does not require the controlling computer to process asynchronous events

  • Allows the controlling computer to enable asynchronous event reporting

The controlling computer can start MIF by sending the following four characters:

        <ESC>[<ESC>!

A user can also manually enter MIF from a terminal interface by choosing the *Use MIF* command in the Sys Diag menu.

This appendix gives the syntax used by MIF. For the meaning of MIF parameters, see the "Reference to Edit Menus" and "Reference to Status Menus" chapters.

B.1   MIF Addresses

Entity is the name given to an addressable item. Profiles, profile fields (also called **attributes**), DO menu items, and status screens of the standard user interface are all entities, and therefore all have an <address>. The format of an address is:

        <slot><port>.<type>.<entry>.<name>

<slot>   The one-digit slot number of the addressed entity.
              For most addresses, the slot number of the addressed entity is iden-
              tical to the first digit of the menu number of the standard user
              interface.

<port>   The two-digit port number of the addressed entity.
              For most addresses, the port number of the addressed entity is iden-
              tical to the 2nd and 3rd digits of the menu number of the standard
              user interface.

<type>   The type of the addressed entity.
              The defined types are:

     ALARM   Line alarm indications

     CONN   Answer and Connection Profiles (MAX and Pipeline 100/400 only)

```
        DEST         Destination Profiles (T1/PRI models only)

        DIAG         System Diagnostics

        DIAGN        Line Diagnostics (T1/PRI models only)

        DIAL         Call Profiles (MAX and Multiband Plus only)

        DO           DO Command Menu

        ETHERNET     Ethernet Profile (requires Ethernet interface)

        FILT         Filter Profiles (MAX and Pipeline 100/400 only)

        HOST2        Host-Interface Profile for Host/Dual modules

        HOST4        Host-Interface Profile for Host/Quad modules

        HOST6        Host-Interface Profile for Host/6 modules

        LINE         Line Profiles

        LOOP         Port Diagnostics (loopback) (MAX and Multiband Plus only)

        PORT         Port Profile (MAX and Multiband Plus only)

        ROUTE        Route Profiles (MAX and Pipeline 100/400 only)

        SEC          Security Profiles

        STAT         Status Menu

        SYS          System Profile

        TRAP         SNMP Traps Profiles (requires Ethernet interface)
```

```
<entry>    Where multiple versions of the <type> exist, such as Line Profiles,
           0 is the current (default) entry, 1 is the first entry saved after
           the current entry, etc. For items that do not support multiple
           entries, such as the Port profile or the DO Menu, <entry> is coded
           as zero. Addresses without an <entry> signify the factory version of
           the <type> profile.

<name>     The name of an addressed entity.
           The <name> component of an address is derived from, but not identi-
           cal to the parameter names as used in the standard user interface.
           Every attribute has a <name> and a value.
```

A **full address** specifies a specific attribute and consists of the full form
defined above. A **partial address** does not include the attribute <name>.

B.2 MIF Commands

There are six MIF commands. The attribute <value> is established by the SET command and returned by the GET and NEXT commands. The commands are:

> **#** <this entire line is a comment>
>
> **LOAD** <partial address>
>
> **SAVE** <partial address>
>
> **GET** <full or edit address>
>
> **NEXT** <address>
>
> **SET** <full or edit address>=<value>

LOAD

> The commands **LOAD** and **GET**, load a profile into the *edit area*. Only profiles that have been copied to the edit area may be modified. Since there is only one edit area and since the edit area can have only one profile loaded into it at a time, commands that operate on a entities in the edit area can use another version of <address> called the <*edit address*>. The <edit address> consists of only the <name>.

SAVE

> **SAVE** copies the profile in the edit area to the address specified.

GET

> See **LOAD**. This command, **GET**, returns the <value> of the addressed attribute. When the addressed attribute is a parameter in the standard user interface, the <value> returned by **GET** is a *parameter value*. When the addressed attribute is a *Status Screen* in the standard user interface, all lines the Status Screen are returned.

NEXT

> **NEXT** returns the <address> and <value> of the attribute with the next <address>. Addresses, though composed of both textual and numeric components, are ordered as if each component was a digit of a decimal number. The sequence is:
>
>> <name> within <entry>
>> <entry> within <type>
>> <type> within <port>
>> <port> within <slot>

SET

> **SET** replaces the current value of the addressed attribute with the <value> given in the command; such as changing the value of a parameter. (You can also apply **SET** to STAT and ALARM addresses, as described in section B.3.) Note that **SET** does not change the value of the addressed attribute until you use the **SAVE** command; that is, only **SET** followed by **SAVE** actually changes a profile. Applying **SET** to an enumerated parameter, the <value> must be identical to (except for case) the enumerated value in the standard user interface. See the user documentation for enumerated values. When setting the value of a profile parameter, **SET** accepts only an edit address; therefore a preceding **LOAD** command must have placed the profile in the edit area. See example on page B-24.

B.3   MIF Traps and Asynchronous Reports

The **SET** command applied to a STAT <address> (that is, a status screen) or an ALARM <address> enables asynchronous reports (***traps***) of the requested status screen or alarms. The <value> established in the **SET** command sets the time period in seconds between status checks. Reports are generated only whenever a change is detected in the requested status screen components or whenever an alarm occurs. If the <value> in the **SET** command is 0, asynchronous reports are not generated.

B.4   MIF Responses

GET and **NEXT** return the following when valid:

> + <address>=<value>

SET (except when applied to a status or alarm entity), **LOAD**, and **SAVE** respond with a prompt (:) if valid:

> :

SET (when applied to a status or alarm entity) creates a trap which is reported in the same format as responses to the **GET** command, except the + character is replaced by the - character:

> - <address>=<value>

SET, **LOAD**, **SAVE**, **GET** and **NEXT** return the following when invalid:

> + ERROR

B.5   The Information in This Document Might Change

Ascend Corporation reserves the right to change MIF at any time without notice. Release Notes are available for each major release of software. These Releases Notes will provide information on significant changes made to the Ascend MIF as appropriate.

B.6   Lexical Sequence of MIF Variables

This section lists each MIF variable with its allowed values. Variables are

grouped together under <type> (see B.1, "MIF Addresses") and listed in the order they would appear using the **NEXT** command. The following format is used:

        <address>=<value>

For example, the variable "Remote Mgmt" can be either "Yes" or "No." It appears in the system profile (SYS) at the MIF address "000.SYS.0.Remote Mgmt" and in this section it is listed as the following:

        000.SYS.0.Remote Mgmt=Yes/No

Comments are set off by parentheses() as in the following example that illustrates a variable, "Clr Err1" that can be **SET** but cannot be read:

        100.DIAGN.0.Clr Err1=Yes (write only)

If the variable does not have enumerated values, the type of values it can take are given in *italics* as in the following two examples:

        000.SYS.0.Name=*text*

        000.SYS.0.Status 1=*XN-n00* (menu number for a status screen)

The slot and port of most addresses are given explicitly; however, in some cases they are represented by *spp*, where "*s*" is the slot number and "*pp*" is the port number.

ALARM = <type>

For T1/PRI and E1/PRI models:

```
s00.ALARM.n.alarm= (write)
                   DS/RA/YA/1S/DF/LA (read)
```

For BRI models:

```
100.ALARM.n.alarm= (write)
                   -/X/./P/M/D (read)
```

For Switched-56 models:

```
100.ALARM.n.alarm= (write)
                   -/X/./A (read)
```

Notes:
- Do not exceed 32,000 seconds when using **SET** to write to these addresses

- ***s00*.ALARM.*n*...**
    - *s* = 1 (Multiband Plus and Pipeline 100/400)
    - *s* = 1 or slot number of a T1/PRI or E1/PRI module (MAX)
    - *n* = the line number minus 1. Namely, *n*=0 is line #1, *n*=1 is line #=2, etc.

T1/PRI lines	
<name>	**Definition**
DS	Line disabled
RA	Red Alarm, loss of sync
YA	Yellow Alarm
1S	AIS, Blue alarm
DF	No D-channel
LA	Link Active
BRI/Switched-56 lines	
-	Line disabled
X	No physical link
P	Link active, BRI point-to-point
M	Link active, BRI multipoint 1
D	Line active, BRI multipoint 2
A	Line active, switched-56

ALARM = <type>

Example (Report status of the "100.ALARM.0.alarm" entity every 20 seconds if change occurs):

```
: SET 100.ALARM.0.alarm=20
- 100.ALARM.0.alarm=LA
:
```

BRIDGE=<type>

```
s00.BRIDGE.n.Enet Adrs=12-digit hexadecimal string
             .Net Adrs=text in dotted decimal format
             .Connection #=2-digit decimal string
```

Notes:
- applies to MAX equipped with the Ethernet module and Pipeline 100/400 only

- does not apply to Multiband Plus

- **s00.BRIDGE.n...**
    - **s** = slot into which the Ethernet card is installed (MAX)
    - **s** = 2 (Pipeline 100/400)
    - **n** = 0 to 98

CONN = <type>

```
s00.CONN.n.Force 56=Yes/No (n=0)
          .Profile Reqd=Yes/No (n=0)
          .Assign Adrs=Yes/No (n=0)
          .Station=text  (n=1 to 31)
          .Active=Yes/No  (n=1 to 31)
          .Encaps...MPP  (n=0)
          .Encaps...PPP  (n=0)
          .Encaps...X25  (n=0)
          .Encaps...COMB  (n=0)
          .Encaps=MPP/PPP/X25/COMB  (n=1 to 31)
          .LAN Adrs=text in dotted decimal format  (n=1 to 31)
          .Netmask=text in dotted decimal format  (n=1 to 31)
          .WAN Alias=text in dotted decimal format  (n=1 to 31)
          .Metric=number  (n=1 to 31)
          .Private=Yes/No  (n=1 to 31)
          .PRI # Type=Unknown/Intl/National/Local/Abbrev (n=1 to 31)
          .Dial #=phone number (n=1 to 31)
          .MPP/PPP options...PPP Auth=PAP/CHAP/None (n=0 to 31)
          .MPP/PPP options...Send PW=text (n=1 to 31)
          .MPP/PPP options...Recv PW=text (n=1 to 31)
          .MPP/PPP options...Base Ch Count=number (n=1 to 31)
          .MPP/PPP options...MRU=number (n=0 to 31)
          .MPP/PPP options...LQM=Yes/No (n=0 to 31)
          .MPP/PPP options...LQM Min=number (n=0 to 31)
          .MPP/PPP options...LQM Max=number (n=0 to 31)
          .MPP/PPP options...VJ Comp=Yes/No (n=0 to 31)
          .X25 options...Base Ch Count=number (n=1 to 31)
          .COMB options...Password Reqd=Yes/No (n=0 to 31)
          .COMB options...Send PW=text (n=1 to 31)
          .COMB options...Recv PW=text (n=1 to 31)
          .COMB options...Interval=number (n=0 to 31)
          .COMB options...Dial Brdcast=Yes/No (n=1 to 31)
          .COMB options...Base Ch Count=number (n=1 to 31)
          .Session options...RIP=Off/Send/Recv/Both (n=0 to 31)
          .Session options...Data Filter=number (n=0 to 31)
          .Session options...Call Filter=number (n=0 to 31)
          .Session options...Idle=number (n=0 to 31)
          .Session options...Preempt=number (n=0 to 31)
          .Telco options...AnsOrig=Both/Ans Only/Call Only (n=1 to 31)
          .Telco options...Callback=Yes/No (n=1 to 31)
          .Telco options...Call Type=Switched/Nailed (n=1 to 31)
          .Telco options...Group=letter (n=1 to 31)
          .Telco options...Data Svc=Voice/56KR/56K/64K/384KR/
                  384K/1536K/1536KR/128K/192K/256K/320K/448K/
                  512K/576K/640K/704K/768K/832K/896K/960K/1024K/
                  1088K/1152K/1216K/1280K/1344K/1408K/1472K
                   (n=1 to 31)
          .Telco options...Force 56=Yes/No (n=1 to 31)
          .Telco options...Bill #=number (n=1 to 31)
          .Telco options...Call-by-Call=number (n=1 to 31)
          .Telco options...Transit #=number (n=1 to 31)
```

Notes:
- applies to MAX equipped with the Ethernet module and Pipeline 100/400 only

- does not apply to Multiband Plus

- **s00.CONN.n.PRI # Type** is a T1/PRI parameter only

- **s00.CONN.n.Telco Options...Bill #** is a T1/PRI parameter only

- **s00.CONN.n.Telco Options...Call-by-Call** is a T1/PRI parameter only

- **s00.CONN.n.Telco Options...Transit #** is a T1/PRI or E1/PRI parameter

- **s00.CONN.n...**
  - **s** = slot into which the Ethernet card is installed (MAX)
  - **s** = 2 (Pipeline 100/400)
  - **n** = 1 to 31

- **s00.CONN.n.Data Svc** for -SW56 models must = 56K
        .Data Svc for -BRI models can be Voice/56KR/56K/64K only

DEST = <type>

(For T1/PRI models only)

```
000.DEST.n.Name=text
          .Option=1st Avail/1st Active/Any
          .Dial 1#=phone number
          .Call-by-Call 1=number
          .Dial 2#=phone number
          .Call-by-Call 2=number
          .Dial 3#=phone number
          .Call-by-Call 3=number
          .Dial 4#=phone number
          .Call-by-Call 4=number
          .Dial 5#=phone number
          .Call-by-Call 5=number
          .Dial 6#=phone number
          .Call-by-Call 6=number
```

Notes:
- does not apply to Pipeline 100/400

- **000.DEST.n...**
  n = 1 to 31

- **000.DEST.n.Call-by-Call** are PRI parameters only

DIAG = <type>

```
000.DIAG.0.Sys Reset=Yes (write only)
```

Notes:

Example:

```
: SET 000.DIAG.0.Sys Reset=No
+ ERROR
: SET 000.DIAG.0.Sys Reset=Yes
(unit resets!)
```

DIAGN = <type>

```
s00.DIAGN.0.Line LB1=Yes/No
             .Line LB2=Yes/No
             .Clr Err1=Yes (write only)
             .Clr Perf1=Yes (write only)
             .Clr Err2=Yes (write only)
             .Clr Perf2=Yes (write only)
```

Notes:
- applies to MAX-T1/PRI and Multiband Plus-T1/PRI only

- does not apply to E1/PRI, BRI, or SW56 models or to Pipeline 100/400

- **s00.DIAGN.n...**
  s = 1 (Multiband Plus)
  s = 1 or slot number of a T1/PRI or E1/PRI module (MAX)

Example:
```
: SET 100.DIAGN.0.LB1=No
:
```

DIAL = <type>

```
spp.DIAL.n.Name=text
             .Dial #=phone number
             .Call Type=AIM/BONDING/1 Chnl/2 Chnl/FT1/Ft1-AIM/FT1-B&O
             .Call Mgm=Manual/Static/Dynamic/Delta/Mode 1/Mode 2
             .Data Svc=Voice/56KR/56K/64K/384KR/384K/1536K/1536KR/
                       128K/192K/256K/320K/448K/512K/576K/640K/704K/
                       768K/832K/896K/960K/1024K/1088K/1152K/1216K/
                       1280K/1344K/1408K/1472K
             .Force 56K=Yes/No
             .Base Ch Count=number
             .Inc Ch Count=number
             .Dec Ch Count=number
             .Call-by-Call=number (PRI only)
             .Bill #=number    (T1/PRI only)
             .Auto-BERT=Off/15 sec/30 sec/60 sec/90 sec/120 sec
             .Bit Inversion=Yes/No
             .Fail Action=Disc/Reduce/Retry
             .PRI # Type=Unknown/Intl/National/Local/Abbrev (PRI only)
             .Transit #=number (PRI only)
             .Group=letter
             .FT1 Caller=Yes/No
             .B&O Restore=number (between 30 and 30000)
             .Flag Idle=Yes/No
             .Dyn Alg=Constant/Linear/Quadratic
             .Sec History=number
             .Add Pers=number
             .Sub Pers=number
             .Time Period 1...Activ=Disabled/Enabled/Shutdown
             .Time Period 1...Beg Time=hh:mm:ss
             .Time Period 1...Min Ch Cnt=number
             .Time Period 1...Max Ch Cnt=number
             .Time Period 1...Target Util=number
        (.Time Period 2... thru .Time Period 4... same as Time Period 1.)
```

Notes:
- applies to MAX and Multiband Plus only

- does not apply to Pipeline 100/400

- **spp.DIAL.n...**(Multiband Plus)
  s = 0 or 2
  when *s*=0, **pp** = 00
  when *spp*=000, **n** = 0 through 15 (These are shared Call Profiles 17 to 32)
  when s=2, **pp** = 01 through last serial host port
  when *spp* is not 000, **n** = 0 through 16 (If *n*=0, this is the current
      Call Profile of serial host port *pp*. If n is not 0, these are
      stored Call Profiles 1 to 31.)

DIAL = <type>

- *spp*.**DIAL.***n*...(MAX)
    s = 0 or 2 or slot number of a Host/Dual or Host/6 module
        when s=0*,* *pp* = 00
        when *spp*=000*,* *n* = 0 through 15 (These shared Call Profiles 17 to 32)
        when s=2 or slot number*,* *pp* = 01 through last serial host port
        when *spp* is not 000*,* *n* = 0 through 16 (If *n*=0, this is the current
            Call Profile of serial host port *pp*. If n is not 0, these are
            stored Call Profiles 1 to 31.)

- *spp*.**DIAL.***n***.Data Svc** for -SW56 models must = 56K
    spp.**DIAL.***n***.Data Svc** for -BRI models can be Voice/56KR/56K/64K only

Example:
```
            : NEXT 000.DIAL.1.Data Svc
            + 000.DIAL.1.Base Ch Count=5551212
            : GET 201.DIAL.16.Call Type
            + 201.DIAL.16.Call Type=AIM
            :
```

DO = <type>

```
spp.DO.0.Dial=Yes/No (read) Yes (write)
        .Hang Up=Yes/No (read) Yes (write)
        .Answer=Yes/No (read) Yes (write)
        .Extend BW=Yes/No (read) Yes (write)
        .Contract BW=Yes/No (read) Yes (write)
        .Beg/End Rem LB=Yes/No (read) Toggle (write)
        .Beg/End BERT=Yes/No (read) Toggle (write)
        .Resynchronize=Yes/No (read) Yes (write)
```

Notes:
- **spp.DO...**(Multiband Plus)
    s = 2
    pp = 01 through last serial host port

- **spp.DO...**(Pipelin 100/400)
    spp = 200

- **spp.DO...**(MAX)
    s = 2 or the slot number of a serial host or Ethernet module
      when s=2 or the slot number of a serial host module, **pp** = 01 through
        last serial host port
      when s= the slot number of the Ethernet module, **pp** = 00

- The <value> Toggle in a **SET** (write) command changes the state of the
  addressed entity from it current state to another state, i.e., from Yes to
  No or from No to Yes. The **SET** command applied to a **DO** <address> causes the
  DO action to be invoked if active.

- The **GET** (read) command returns the <value> YES or NO when applied to a DO
  <address>. YES is returned if the item can be invoked at the time of the
  request (is active) and NO is returned otherwise.

- **DO** P (password), **DO** S (save), and **DO** L (load) are not available.

Example:
```
: NEXT 201.D0.0.Extend
+ 201.D0.0.Contract=Yes
:
```

ETHERNET = <type>

(Note: The following applies to MAX equipped with Ethernet module and Pipeline
100/400)

```
        s00.ETHERNET.0.Module Name=text  (MAX only)
                      .Ether options...Ethernet IF=AUI/COAX/UTP
                      .Ether options...IP Adrs=dotted decimal format
                      .Ether options...Netmask=dotted decimal format
                      .Ether options...RIP=Off/Send/Recv/Both
                      .Ether options...Proxy Mode=Off/Inactive/Active/Always
                      .Ether options...Filter=number
                      .WAN options...X25 WAN Adr=dotted decimal format
                      .WAN options...Ans 1#=Phone number  (MAX only)
                      .WAN options...Ans 2#=Phone number  (MAX only)
                      .WAN options...Ans 3#=Phone number  (MAX only)
                      .WAN options...Ans 4#=Phone number  (MAX only)
                      .WAN options...Pool Start=dotted decimal format
                      .WAN options...Pool Count=number
                      .SNMP options...Read Comm=text
                      .SNMP options...R/W Comm=text
                      .TServe options...TS Enabled=Yes/No
                      .TServe options...Prompt=text
                      .TServe options...Term Type=text
                      .TServe options...Telnet=Yes/No
                      .TServe options...Clear Call=Yes/No
                      .TServe options...SLIP=Yes/No
                      .Bridging=Yes/No
                      .Domain Name=text
                      .Pri DNS=dotted decimal format
                      .Sec DNS=dotted decimal format
                      .Auth=Yes/No
                      .Auth Host=dotted decimal format
                      .Syslog=Yes/No
                      .Log Host=dotted decimal format
                      .Log Facility=Local0/Local1/Local2/Local3/Local4/Local5/
                                Local6/Local 7
```

(Note: The following applies to Multiband Plus-T1/PRI or -E1/PRI only if
equipped with Ethernet module)

```
        300.ETHERNET.0.Ether options...Ethernet IF=COAX/UTP
                      .Ether options...IP Adrs=dotted decimal format
                      .Ether options...Netmask=text in dotted decimal format
                      .Ether options...RIP=Off/Recv
                      .SNMP options...Read Comm=text
                      .SNMP options...R/W Comm=text
                      .Syslog=Yes/No
                      .Log Host=dotted decimal format
                      .Log Facility=Local0/Local1/Local2/Local3/Local4/Local5/
                                Local6/Local 7
```

ETHERNET = \<type\>

```
Notes:
```
- ***s*00.ETHERNET...** (MAX models)

    s = any slot into which the Ethernet expansion module is installed.

- ***s*00.ETHERNET...** (Pipeline 100/400 models)

    s = 2

- ***s*00.ETHERNET...** (Multiband Plus-T1/PRI or -E1/PRI models)

    s = 3

FILT=\<type>

```
s00.FILT.n.Name=text
          .In Filter 01...Valid=Yes/No
          .In Filter 01...Type=Generic/Ip
          .In Filter 01...Generic...Forward=Yes/No
          .In Filter 01...Generic...Offset=number
          .In Filter 01...Generic...Length=number
          .In Filter 01...Generic...Mask= hexadecimal string
          .In Filter 01...Generic...Value= hexadecimal string
          .In Filter 01...Generic...More=Yes/No
          .In Filter 01...Ip...Forward=Yes/No
          .In Filter 01...Ip...Src Mask=dotted decimal format
          .In Filter 01...Ip...Src Adrs=dotted decimal format
          .In Filter 01...Ip...Dst Mask=dotted decimal format
          .In Filter 01...Ip...Dst Adrs=dotted decimal format
          .In Filter 01...Ip...Protocol=number
          .In Filter 01...Ip...Src Port Cmp=None/Less/Eql/Gtr/Neq
          .In Filter 01...Ip...Src Port #=number
          .In Filter 01...Ip...Dst Port Cmp=None/Less/Eql/Gtr/Neq
          .In Filter 01...Ip...Dst Port #=number
          .Out Filter 01...Valid=Yes/No
          .Out Filter 01...Valid=Yes/No
          .Out Filter 01...Type=Generic/Ip
          .Out Filter 01...Generic...Forward=Yes/No
          .Out Filter 01...Generic...Offset=number
          .Out Filter 01...Generic...Length=number
          .Out Filter 01...Generic...Mask= hexadecimal string
          .Out Filter 01...Generic...Value= hexadecimal string
          .Out Filter 01...Generic...More=Yes/No
          .Out Filter 01...Ip...Forward=Yes/No
          .Out Filter 01...Ip...Src Mask=dotted decimal format
          .Out Filter 01...Ip...Src Adrs=dotted decimal format
          .Out Filter 01...Ip...Dst Mask=dotted decimal format
          .Out Filter 01...Ip...Dst Adrs=dotted decimal format
          .Out Filter 01...Ip...Protocol=number
          .Out Filter 01...Ip...Src Port Cmp=None/Less/Eql/Gtr/Neq
          .Out Filter 01...Ip...Src Port #=number
          .Out Filter 01...Ip...Dst Port Cmp=None/Less/Eql/Gtr/Neq
          .Out Filter 01...Ip...Dst Port #=number
       (.In/Out Filter 02... thru 12... same as .In/Out Filter 01...)
```

Notes:

- applies to MAX equipped with the Ethernet module and Pipeline 100/400 only

- does not apply to Multiband Plus

- **s00.FILT.n...**
  - **s** = slot into which the Ethernet card is installed (MAX)
  - **s** = 0 (Pipeline 100/400)
  - **n** = 0 to 15

HOST2 = <type> (also HOST4, HOST6)

```
(HOST2 applies to Multiband Plus and MAX only)
        s00.HOST2.0.Module Name=text (MAX only)
                   .Dual Port=No Dual/1&2 Dual
                   .Palmtop=Full/Restrict
                   .Palmtop Port #=number
                   .Palmtop Menus=Standard/Limited

(HOST4 applies to Multiband Plus only)
        200.HOST4.0.Dual Port=No Dual/1&3 Dual/2&4 Dual/All Dual
                   .F Palmtop=Full/Restrict
                   .F Palmtop Port #=number
                   .F Palmtop Menus=Standard/Limited
                   .L Palmtop=Full/Restrict
                   .L Palmtop Port #=number
                   .L Palmtop Menus=Standard/Limited
                   .R Palmtop=Full/Restrict
                   .R Palmtop Port #=number
                   .R Palmtop Menus=Standard/Limited

(HOST6 applies to MAX only)
        s00.HOST6.0.Module Name=text
                   .Port 1/2 Dual=Yes/No
                   .Port 3/4 Dual=Yes/No
                   .Port 5/6 Dual=Yes/No
```

```
Notes:
    • applies to MAX and Multiband Plus only

    • does not apply to Pipeline 100/400

    • s00.HOST2... (MAX)
      s = 2 or any slot in which a Host/Dual serial host expansion module is
      installed.

    • s00.HOST2... (Multiband Plus)
      s = 2

    • s00.HOST4... (Multiband Plus)
      s = 2

    • s00.HOST6... (MAX)
      s = any slot in which a Host/6 serial host expansion module is installed.
```

LINE = <type>

For T1/PRI models:

```
        s00.LINE.n.Name=text
                .2nd Line=Disabled/D&I/Trunk
                .Line 1...Sig Mode=Inband/ISDN/PBX T1/ISDN_NFAS
                .Line 1...NFAS_ID num=number
                .Line 1...Rob Ctl=Wink-Start/Idle-Start/Inc-W-200/Inc-W-400
                .Line 1...Switch Type=AT&T/NTI/GloBanD/Japan
                .Line 1...Framing Mode=D4/ESF
                .Line 1...Encoding=AMI/B8ZS/None
                .Line 1...FDL=None/AT&T/ANSI/Sprint
                .Line 1...Length=1-133/134-266/267-399/400-533/534-655
                .Line 1...Buildout=0 db/7.5 db/15 db/22.5 db
                .Line 1...Clock Source=Yes/No
                .Line 1...PBX Type=Voice/Data/Leased 1:1
                .Line 1...Delete Digits=number
                .Line 1...Add Number=
                .Line 1...Call-by-Call=number
                .Line 1...Ans #=phone number
                .Line 1...Ans Service=Voice/56KR/56K/64K/384KR/384K/
                        1536K/1536KR/128K/192K/256K/320K/448K/512K/576K/
                        640K/704K/768K/832K/896K/960K/1024K/1088K/1152K/
                        1216K/1280K/1344K/1408K/1472K
                .Line 1...Ch 1=Unused/Switched/D&I/Nailed/D-channel
                .Line 1...Ch 1 #=number
                .Line 1...Ch 1 Slot=number (MAX only)
                .Line 1...Ch 1 Prt/Grp=number or letter
                .Line 1...Ch 1 TrnkGrp=number
               (.Line 1...Ch 2 thru Ch 23 same as Ch 1)
                .Line 1...Ch 24=Unused/Switched/D&I/Nailed/D-channel/
                                NFAS-Prime/NFAS-Second
                .Line 1...Ch 24 #=number
                .Line 1...Ch 24 Slot=number (MAX only)
                .Line 1...Ch 24 Prt/Grp=number or letter
                .Line 1...Ch 24 TrnkGrp=number
               (.Line 2... same as Line 1...)
```

For BRI models:

```
        100.LINE.n.Name=text
                .Switch Type=AT&T/NTI/NI1/FRANC/U.K./JAPAN/BELGI/AUSTR/SWISS
                .Line 1...Enabled=Yes/No
                .Line 1...LinkType=P_T_P/Multi_P
                .Line 1...B1 Usage=Unused/Switched/Nailed
                .Line 1...B1 Prt/Grp=number or letter
                .Line 1...B2 Usage=Unused/Switched/Nailed
                .Line 1...B2 Prt/Grp=number or letter
                .Line 1...Pri Num=phone number
                .Line 1...Pri SPID=number
                .Line 1...Sec Num=phone number
                .Line 1...Sec SPID=number
               (.Line 2... thru .Line 8... same as Line 1...)
```

LINE = <type>

```
Only for Switched-56 models:

        100.LINE.n.Name=text
                 .Line 1...Enabled=Yes/No
                 .Line 1...Ch Usage=Unused/Switched/Nailed
                 .Line 1...Phone Num=phone number
                 .Line 1...Port/Grp=number or letter
               (.Line 2... thru .Line 7... same as Line 1...)


For E1/PRI models:

        s00.LINE.n.Name=text
                 .Line 1...Sig Mode=ISDN/None
                 .Line 1...Switch Type=ETSI/Australia/NTI/French/German/
                         GloBanD/Net 5
                 .Line 1...Clock Source=Yes/No
                 .Line 1...Ch 1=Unused/Switched/Nailed
                 .Line 1...Ch 1 #=number
                 .Line 1...Ch 1 Slot=number (MAX only)
                 .Line 1...Ch 1 Prt/Grp=number or letter
                 .Line 1...Ch 1 TrnkGrp=number
               (.Line 1...Ch 2 to Ch 15 and Ch 17 to Ch 31 same as Ch 1)
                 .Line 1...Ch 16=D-channel
                 .Line 1...Ch 16 #=N/A
                 .Line 1...Ch 16 Slot=N/A
                 .Line 1...Ch 16 Prt/Grp=N/A
                 .Line 1...Ch 16 TrnkGrp=N/A
               (.Line 2... same as Line 1...)
```

```
Notes:
   • s00.LINE.n... (MAX)
      s = 1 or any slot in which a BRI module is installed.
      n = 0 through 3, where 0 is the current Line Profile.

   • s00.LINE.n... (Multiband Plus and Pipeline 100/400)
      s = 1
      n = 0 through 3, where 0 is the current Line Profile.

Example:
            : LOAD 100.LINE.1
            :
```

LOOP = <type>

```
spp.LOOP.0.Local LB=Yes/No
             .DSR=Active/Inactive (read) Toggle (write)
             .RI=Active/Inactive (read) Toggle (write)
             .CD=Active/Inactive (read) Toggle (write)
             .DLO=Active/Inactive (read) Toggle (write)
             .PND=Active/Inactive (read) Toggle (write)
             .ACR=Active/Inactive (read) Toggle (write)
             .Inc Ch Count=Yes (write only)
             .Dec Ch Count=Yes (write only)
             .Rate=64K/56K (read) Toggle (write)
```

Notes:

- applies to MAX and Multiband Plus only

- does not apply to Pipeline 100/400

- **spp.LOOP...** (MAX)
  s = 1 or any slot in which a serial host expansion module is installed.
  pp = 01 through last serial host port.

- **spp.LOOP...** (Multiband Plus)
  s = 1
  pp = 01 through last serial host port.

- Active/Inactive and 64K/56K are <value>s only for read commands such as **GET**.

- Toggle is a <value> only for write commands such as **SET**.

- "SET spp.LOOP.0.Local LB=Yes" must be commanded before any other LOOP commands, such as RI, CD, etc.

- The <value> Toggle in a **SET** command changes the state of the addressed entity from it current state to another state, i.e., from Active to Inactive or from Inactive to Active.

Example:

```
: SET 202.LOOP.0.DSR=Toggle
+ ERROR
: SET 202.LOOP.0.Local LB=Yes
: SET 202.LOOP.0.DSR=Toggle
:
```

PORT = <type>

```
spp.PORT.0.Port Name=text
          .Ans 1#=phone number
          .Ans 2#=phone number
          .Ans 3#=phone number
          .Ans 4#=phone number
          .Idle=None/Call
          .Dial=Terminal/DTR Active/RS-366 Ext1/RS-366 Ext2/V.25bis/
                V.25bis-C/X.21 Ext1/X.21 Ext2/X.21 Ext1-P
          .Answer=Auto/DTR Active/DTR+Ring/V.25bis/V.25bis-C/Terminal/
                X.21/P-Tel Man/None
          .Clear=DTR Inactive/DTR Active/RTS Inactive/RTS Active/
                 Terminal
          .Term Timing=Yes/No
          .RS-366 Esc=*/#/5/6/7/9/0/00
          .Early CD=Answer/Originate/Both/No
          .DS0 Min Rst=Monthly/Daily/Off
          .Max DS0 Mins=number
          .Max Call Mins=number
```

Notes:
   • applies to MAX and Multiband Plus only

   • does not apply to Pipeline 100/400

   • **spp.PORT...** (MAX)
     s = 1 or any slot in which a serial host expansion module is installed.
     pp = 01 through last serial host port.

   • **spp.PORT...** (Multiband Plus)
     s = 1
     pp = 01 through last serial host port.

Examples:
```
          : LOAD 201.PORT.0
          : SET 201.PORT.0.Port Name=Chicago #1
          + ERROR
          : SET Port Name=Chicago #1
          : SAVE 200.PORT.0
          + ERROR
          : SAVE 201.PORT.0
          :
```

ROUTE = <type>

```
s00.ROUTE.n.Name=text
            .Active=Yes/No
            .Dest=text in dotted decimal format
            .Gateway=text in dotted decimal format
            .Metric=number
            .Private=Yes/No
```

Notes:
- applies to MAX equipped with the Ethernet module and Pipeline 100/400 only

- does not apply to Multiband Plus

- **s00.ROUTE.n...**
  s = slot into which the Ethernet card is installed (MAX)
  s = 2 (Pipeline 100/400)
  n = 0 to 63

- If **n** = 0, **Name**=Default and **Dest**=0.0.0.0

- MAX Models must have the Ethernet expansion module option

SEC = <type>

```
000.SEC.n.Name=text
            .Passwd=*SECURE*
            .Operations=Yes/No
            .Edit Security=Yes/No
            .Edit System=Yes/No
            .Edit Line=Yes/No
            .Edit All Port=Yes/No   (Multiband Plus and MAX only)
            .Edit Own Port=Yes/No   (Multiband Plus and MAX only)
            .Edit All Calls=Yes/No  (Multiband Plus and MAX only)
            .Edit Com Call=Yes/No   (Multiband Plus and MAX only)
            .Edit Own Call=Yes/No   (Multiband Plus and MAX only)
            .Edit Cur Call=Yes/No   (Multiband Plus and MAX only)
            .Sys Diag=Yes/No
            .All Port Diag=Yes/No   (Multiband Plus and MAX only)
            .Own Port Diag=Yes/No   (Multiband Plus and MAX only)
            .Download=Yes/No
            .Upload=Yes/No
            .Field Service=Yes/No
```

```
Notes:
   • 000.SEC.n...
      n = 0 thru 8 (The default security profile is 0.)

   • The command SAVE cannot be applied to a security profile address.


Example:
            : SAVE 000.SEC.8
            :
```

STAT = <type>

For all models:

```
      000.STAT.0.Sys Options=
              n.Message Log=          (n = 0 thru 31)
              0.Port Info=
              0.CDR=
```

For T1/PRI models only:

```
      s00.STAT.0.Line 1 Stat=
              0.Line 2 Stat=
              0.Line Error=
              n.FDL1=         (n = 0 thru 96)
              n.FDL2=         (n = 0 thru 96)
              0.Net Options=
```

   (*s*=1 for Pipeline 100/400 and Multiband Plus. *s*=1 or any other slot in
   which a T1/PRI module is installed in a MAX.)

For BRI and Switched-56 models only:

```
      100.STAT.0.Line Stat=
```

For MAX and Multiband Plus models only:

```
      spp.STAT.0.Call Status=
              n.Message Log=          (n = 0 thru 31)
              0.Statistics=
              0.Port Opts=
              0.Session Err=
              0.Port Leads=
```

   (*s*=2 for Multiband Plus. *s*=2 or any other slot in which a serial host mod-
   ule is installed. *pp*=01 through last serial host port)

For models with Ethernet interface:

```
      s00.STAT.0.Sessions =      (does not apply to Multiband Plus)
              0.WAN Stat=        (does not apply to Multiband Plus)
              0.Ether Stat=
              0.Ether Opt=
```

   (*s*=2 for Pipeline 100/400.*s*=3 for Multiband Plus. *s*=slot in which the
   Ethernet module is installed.)

STAT = <type>

Notes:

- *n* can range from 0 through 96 for the FDL Status Screens. If *n* is 0, the last 24 hours are reported. 1 through 96 refer to the 15 minute time intervals occurring during the last 24 hours, with 1 being the most recent interval.

- Do not exceed 32,000 seconds when using **SET** to write to these addresses

- The **GET** command returns a multiple-line <value> when applied to a Status Screen <address>. Output from a status request is almost identical to the status display using the native mode user interface. The difference is that displays that would scroll (000.STAT.0.Sys Option, 100.STAT.0.Line Error, etc.) have all lines listed. Each line of the multi-line response is separated by a <CR><LF> pair. Multi-line output is indicated by starting the value field of the response with a <CR><LF> pair.

- When you apply SET to CDR, all events that occurred during the time period are displayed. This is unlike other traps generated by SET. For example, SET 201.STAT.0.Port Leads=20 compares the Port Info screen at the beginning to the end of the 20 sec. time period; and if there is a difference, only the current Port Leads is displayed.

Example:

```
        : GET 100.STAT.0.Line Error
        + 100.STAT.0.Line Error=
        + 01-005 Ln1    Ln2
        + 1       0      -
        + 2      10      -
        :
        : SET 000.STAT.0.CDR=1
        :
```

Example:

```
        : GET 600.STAT.0.Line 2 Stat
(Get status of line #2 in the module in slot 6.)
```

Example:

```
        : GET 202.STAT.0.Call Status
(Get call status of serial host port #2.)
```

SYS = <type>

```
000.SYS.0.Name=text
        .Location=text (Ethernet interface required)
        .Contact=text (Ethernet interface required)
        .Date=mm/dd/yy
        .Time=hh:mm:sec
        .Term Rate=300/1200/2400/4800/9600/19200/38400/57600
        .Console=Standard/Limited/MIF
        .Passwd=text (Ethernet interface required)
        .Banner=text (Ethernet interface required)
        .Remote Mgmt=Yes/No (MAX and Multiband Plus only)
        .Parallel Dial=number
        .Use Trunk Grps=Yes/No (T1/PRI only)
        .Excl Routing=Yes/No (MAX and Multiband Plus only)
        .Auto Logout=Yes/No
        .Idle Logout=number
        .DS0 Min Rst=Monthly/Daily/Off
        .Max DS0 Mins=number
        .Dual Delay=Yes/No (MAX and Multiband Plus only)
        .High BER=10 ** -3/10 ** -4/10 ** -5 (T1/PRI or E1/PRI only)
        .High BER Alarm=Yes/No (T1/PRI or E1/PRI only)
        .No Trunk Alarm=Yes/No (T1/PRI or E1/PRI only)
        .Edit=XN-n00 (menu number for an edit screen)
        .Status 1=XN-n00 (menu number for a status screen)
        .Status 2=XN-n00    "                               "
        .Status 3=XN-n00    "                               "
        .Status 4=XN-n00    "                               "
        .Status 5=XN-n00    "                               "
        .Status 6=XN-n00    "                               "
        .Status 7=XN-n00    "                               "
        .Status 8=XN-n00    "                               "
```

Notes:

Example:
```
        : GET 000.SYS.0.Name
        + =kansas BRI
        :
```

TRAP = <type>

```
s00.TRAP.n.Name=text
         n.Comm=dotted decimal format
         n.Dest=dotted decimal format
```

Notes:
- applies to MAX equipped with the Ethernet module and Pipeline 100/400 only

- applies to Multiband Plus if equipped with Ethernet interface

- **s00.TRAP.n...**
  s = slot into which the Ethernet card is installed (MAX)
  s = 2 (Pipeline 100/400)
  s = 3 (Multiband Plus)
  n = 0 to 7

B.7   Command Line Basics

Command Line Length
>   The maximum command line is limited to 76 characters. Data entered after
>   the 76th character is ignored and not echoed to the screen. The line is
>   not terminated until a Line Termination is entered.

Command Echo
>   All data entered by the user except the line termination character will be
>   echoed back to the user, character by character.

Line Terminations
>   Lines are terminated by either a Return (ASCII <CR>), or a Line Feed
>   (ASCII <LF>), or both. When either is first received, the sequence <CR>-
>   <LF> is echoed. A <LF> following a <CR> does not result in an additional
>   <CR>-<LF> being echoed. The Line Termination character may be entered at
>   any point on the line; the entire line is accepted.

Prompt
>   The display of a prompt is an explicit acknowledgment that the previous
>   entry has been processed and that the system is now ready to process the
>   next request. The default prompt is a colon (:).

Output Indicators
>   To make it easier for a computer program to parse, all output lines are
>   prefixed with either an output indicator, namely plus (+) or minus (-).
>   There are two indicators used.

>   +   The plus indicator is used when the output is a response to a previ-
>   ous command. Multi-line responses start each line with the output
>   indicator.

>   -   This indicator is used when the output is the result of an asynchro-
>   nous event.

B.8   Editor

Line History
>   The last 10 lines entered are kept. Whenever a line is entered the oldest
>   kept line is thrown away. The stack is initialized empty at power up. Pre-
>   vious lines can be selected using the line selection characters. When a
>   previous line is selected, the newly edited line replaces the selected
>   line. That line becomes the newest line.

Line Selection Characters.
>   There are two line selection characters, one to walk backwards through the
>   Line History and another to walk forward through the Line History. When
>   the oldest entry is selected while walking backwards through the line his-
>   tory, the next backward selection selects the newest line entered. When
>   the newest entry is selected while walking forward through the line his-
>   tory, the next forward selection selects the oldest line.

The backward line selection character is either a VT100 up arrow (the Escape sequence ESC-[-A) or the control character ^P. The P is mnemonic for Previous.

The forward line selection character is either a VT100 down arrow (the escape sequence ESC-[-B) of the control character ^N. The N is mnemonic for Next.

If you enter a Line selection character while editing a line, the current line is replaced by the current line -- any edits in progress are lost.

The cursor is positioned at the end of the selected line.

Cursor movement

The cursor can be moved within a line by entering the Cursor Left character or the Cursor Right character. The Cursor Left character is ignored when the cursor is at the first character of a line. The Cursor Right character is ignored when the cursor is one position to the right of the last character of the line.

The Cursor Left character is either a VT100 left arrow (the escape sequence ESC-[-D) or the control character ^B. The B is mnemonic for Backward.

The Cursor Right character is either a VT100 right arrow (the escape sequence ESC-[-C) or the control character ^F. The F is mnemonic for Forward.

Line Editing

The current line can be edited until the Line Termination character is entered. Line editing is always in "insert" mode; the character typed will be entered before the cursor and any characters starting from the cursor to the end of the line will be shifted right one position. If the insertion causes the line to exceed the maximum line length the last (right-most) character is dropped. Cursor movement and line selection commands are processed as described above. The backspace character deletes the character behind the cursor. When a backspace is received at the beginning of a line it is ignored.

C Public Networks and WANs

Public networks, also known as *carriers*, provide most leased lines and switched services used to build WANs, or more generally used to build telecommunication circuits between distant devices. To understand how Multiband Plus-SW56 operates and what functionality it provides, you should be familiar with the characteristics of public networks.

C.1 International Public Networks

International public switched digital services traditionally have been provided by government-run monopolies known as Post Telegraph and Telephone (PTT) companies. Many countries have deregulated and privatized telecos, but the implementation and characteristics of public switched digital services within a country's PTT are uniform, even though they differ from country to country.

The predominant switched digital service available in Europe and countries outside North America is ISDN BRI. Not as widely available is E1 based ISDN PRI. In some countries, notably the U.S. and Japan, ISDN PRI is T1 based. The international standard for ISDN signaling is CCITT Q.931.

The following table shows names for BRI and PRI in various countries:

Country	BRI	PRI
United States	names vary per carrier offering service	
United Kingdom	ISDN2	ISDN30*
Switzerland	Swiss Net 1 & 2	—
Singapore	BRI	PRI
Japan	INS-64	INS-1500
Italy	BRI	PRI
Hong Kong	Dataline BRI	Dataline PRI
Germany and Netherlands	1TR6*	1TR6*
France	Numéris S0	Numéris S2
Belgium	Aline	Aline
Australia	Microlink	Macrolink
* not CCITT compliant		

C.2 **U.S. Public Networks**

The public network in the U.S. consists of the interexchange carriers (IECs) and the local exchange carriers (LECs).

The IECs are companies like AT&T, MCI, and Sprint that offer long-distance voice and data services. Included in IEC offerings are high-speed digital data services between the calling party's network access point and the network access point at the receiving end; the network access point is known as the *point-of-presence*, or POP.

To use any of the switched or nailed-up services offered by the IECs, you must have lines that access the POP. These access lines can be provided by the IEC, or they can be provided by an LEC if the LEC-IEC interface handles digital data.

When the access line is provided by an LEC, it mainly is via ISDN BRI lines and SW56 access lines. Fractional T1, T1 access, and ISDN PRI lines often are available. Note that LECs offer carrier services without an LEC-IEC interface for end-to-end connections within their calling area.

If you access an IEC network directly, you can only communicate with others who also access that network directly or who access it through a LEC. For example, if you are connected directly to the AT&T network, you might not be able to access a user connected directly to the MCI network. In contrast, with LEC access, you can connect to services offered by any of the carriers on a call-by-call basis. Thus, LEC access often provides a greater degree of interconnectivity. On the other hand, tariffs tend to be lower for users who have direct access to carrier services than for those who access these services through the LECs.

Multiband Plus-SW56 can connect to SW56 lines provided by any common carrier, LEC or IEC, in the U.S. The following diagram illustrates the long distance services offered by IEC and the more local services offered by LECs:
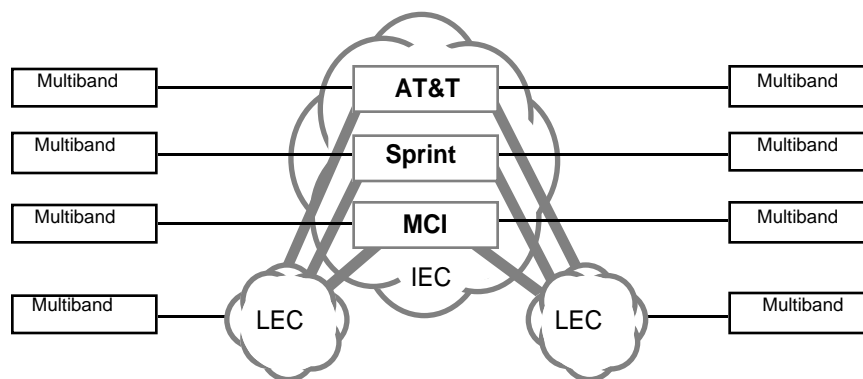
The following table shows what switched services are currently available using the different access lines:

Access	Switched Services
BRI access line from LEC	56, 64 kbit/s
PRI (T1) access line from IEC	56, 64, 384/H0, 1536/H11 kbit/s, GloBanD
PRI (T1) access line from LEC	56, 64 kbit/s, MultiRate
T1 access line from IEC	56 kbit/s
T1 access line from LEC	56 kbit/s
Switched-56 (SW56) access line (2-wire or 4-wire) from LEC	56 kbit/s
Switched-56 (SW56) access line (2-wire or 4-wire) from IEC	56 kbit/s

As this table demonstrates, all of the access mechanisms interoperate at 56 kbit/s. In other words, you can get 56 kbit/s services over T1 access lines, switched-56, BRI, or PRI access lines. Notice that switched services at data rates higher than 64 kbit/s are only available through ISDN PRI. Multiband Plus-SW56 connects only to switched-56 access lines.

D

Error Counting in WAN Connections

Multiband Plus counts errors in WAN connections between devices linked through Multiband Plus's serial host ports.

In connections between serial hosts, Multiband Plus continuously monitors the management subchannel, but not the host data, for byte errors in the background of the following:

- **Call Type** [**Call Profile parameter**] = *AIM*, *FT1-B&O*, or *FT1-AIM* if and only if **Call Mgm** = *Manual, Delta,* or *Dynamic*.

Multiband Plus also counts errors on a connection between serial hosts when running its BERT (Byte Error Test). Multiband Plus BERT monitors the entire serial data stream. It precedes calls when the **Auto-BERT** Call Profile parameter is enabled, or it interrupts calls and runs whenever an operator commands **DO Beg/End BERT (DO 7)**.

The cumulative error count for all channels is presented in the **Line Errors** menu. In addition the cumulative error for all channels connected to a given serial host port presented in the **Session Errors** menu for that port. Errors during the current call are reset to zero when the call is disconnected. Errors are also reset to zero if a channel is disconnected during Auto-BERT or during the call itself. The maximum number of errors that can be accumulated per channel is approximately 65,000. It is important to note that the total number of accumulated errors for each channel during the current call is reported, not the error rate.

NOTE: The **Statistics** menu **Qual** parameter can be *Good, Fair, Marg,* or *Poor.* This parameter's value is derived from the error data accumulated in the background of a call and corresponds to an error rate, *Good* indicates the lowest error rate, and *Poor* indicates the highest.

D.1 For Further Information

For how Multiband Plus displays per channel errors, see **Line Errors** in the "Reference to Status Menus" chapter.

For further information on call quality, see **Session Err**, **Port Info**, **Statistics**, and **Call Status** in the "Reference to Status Menus" chapter and **Auto-Bert** AND **DO Beg/End BERT** in the "Reference to Edit Menus" chapter.

For Further Information

E **Simplified Menus**

This appendix assumes that the system installer has configured Multiband Plus and you are using Multiband Plus's set of Simplified Menus to dial or answer calls, or to make small changes to the Call Profile before dialing. The Simplified Menus present a subset of the features and functionality of the standard menus and are sufficient for dialing and answering calls to devices connected to Multiband Plus-SW56's serial host ports, for configuring phone numbers in Call Profiles, changing a call's bandwidth, and other similar operations. For information on setting up or installing Multiband Plus-SW56, or for entering or leaving the Simplified Menus, see the main chapters of this guide.

Simplified Menus are available only from a VT-100 terminal or PC with VT-100 emulation. When such a terminals controls Multiband Plus, this document refers to it as a *Control Monitor*.

The top level menu that appears before you have made a call has three options, as shown in the following menu. The greater-than symbol (>) is used as a cursor. In the following illustration, the cursor appears in front of the *R = Re-Dial* option:

```
        Position '>' with Up and Down arrows          Last three messages

            21-000 Menu                                21-200 16:43:59
             21-100 Directory                          >M31  Line    Ch
             21-200 D=Dial                               Call Terminated
            >21-300 R=Re-Dial

                                                       21-200 16:43:41
                                                       >M30  Line    Ch
                                                         Outgoing Call
                                                         897

                                                       21-200 16:43:36
                                                       >M29  Line    Ch
                                                         Call Terminated


        Right arrow/Return to Select entry
        Left arrow/ESC for previous menu

   21-100 Interlock        23-100 [slave]          10-100 1234567
    IDLE                    IDLE                    Link    AAA-----
    OK      0 channels      OK      0 channels      Call    ---.....
```

Use the **Down-Arrow** or **Up-Arrow** keys to position the cursor in front of the option you want. Then, to select the option press the **Right-Arrow** or **Return** key.

⇒⇒ If you simply wish to dial the current Call Profile, select *R=Re-Dial* (page 1) and the following menu appears:

```
┌─────────────────────────────────────────┐ ┌──────────────────────┐
│     Position '>' with Up and Down arrows │ │ Last three messages  │
│                                          │ │                      │
│          21-000 Menu                     │ │  21-200 16:51:39     │
│          DO...                           │ │ >M31 Line    Ch      │
│         >2=Hang Up                       │ │  Added Bandwidth     │
│          4=Extend BW                     │ │  05 Channels         │
│          5=Contract BW                   │ │                      │
│          6=Beg/End Rem LB                │ │  21-200 16:51:25     │
│          7=Beg/End BERT                  │ │ >M30  Line    Ch     │
│          R=Resynchronize                 │ │  Outgoing Call       │
│                                          │ │  897                 │
│                                          │ │                      │
│                                          │ │  21-200 16:43:59     │
│                                          │ │ >M29  Line    Ch     │
│                                          │ │  Call Terminated     │
│                                          │ │                      │
│    Right arrow/Return to Select entry    │ │                      │
│    Left arrow/ESC for previous menu      │ │                      │
└─────────────────────────────────────────┘ │                      │
┌──────────────────┐ ┌──────────────────┐   │                      │
│ 21-100 Interlock │ │ 23-100 [slave]   │   │ 10-100 1234567       │
│  ONLINE          │ │   IDLE           │   │  Link  PPPPPP-       │
│  336K   6 channels│ │  0K    0 channels│   │  Call  ******-       │
└──────────────────┘ └──────────────────┘   └──────────────────────┘
```

Selections and options appear only within the large square window. The windows on the right and bottom display status information.

Notice that the call status menus at the bottom of the screen describe whether the call is connected or not. *IDLE* means the call is not connected, while *ONLINE* means the call is connected. Other call status states are described in section E.5 of this appendix.

DO menus command Multiband Plus actions, such as dialing. The actual **DO** menu items that are displayed change depending upon the type of call and Multiband Plus's current state.

⇒⇒ If you wish to edit the current Call Profile before dialing, select *D=Dial* (page 1) and the following menu appears. Section, E.2 describes how to edit and dial the current Call Profile:

```
┌──────────────────────────────────────────────┐  ┌─────────────────────┐
│    Position '>' with Up and Down arrows       │  │ Last three messages │
│                                               │  │                     │
│         21-200 D=Dial                         │  │ 21-200 16:43:59     │
│        >Dial #=897                            │  │ >M31  Line    Ch    │
│         Call Type=1 Chnl                      │  │  Call Terminated    │
│         Call Mgm=N/A                          │  │                     │
│         Data Svc=56KR                         │  │                     │
│         Base Ch Count=N/A                     │  │ 21-200 16:43:41     │
│         Cal+-by-Call=N/A                      │  │ >M30  Line    Ch    │
│                                               │  │  Outgoing Call      │
│                                               │  │  897                │
│                                               │  │                     │
│                                               │  │ 21-200 16:43:36     │
│                                               │  │ >M29  Line    Ch    │
│                                               │  │  Call Terminated    │
│                                               │  │                     │
│      Right arrow/Return to Select entry       │  │                     │
│      Left arrow/ESC for previous menu         │  │                     │
└──────────────────────────────────────────────┘  └─────────────────────┘
┌─────────────────────┐  ┌─────────────────────┐  ┌─────────────────────┐
│ 21-100 Interlock    │  │ 23-100 [slave]      │  │ 10-100 1234567      │
│  IDLE               │  │  IDLE               │  │  Link  -------      │
│  OK     0 channels  │  │  OK     0 channels  │  │  Call  -------      │
└─────────────────────┘  └─────────────────────┘  └─────────────────────┘
```

⇒⇒ If you select *21-100 Directory* (page 1), a list of **Call Profiles** appears as shown in the following illustration. From this menu you can make a call using any of the listed Call Profiles, or you can edit any of the listed Call Profile parameters. From the menu you can make a call using any of the listed Call Profiles, or you can edit any of the listed Call Profile parameters:

```
┌──────────────────────────────────────────────┐  ┌─────────────────────┐
│    Position '>' with Up and Down arrows       │  │ Last three messages │
│                                               │  │                     │
│         21-100 Directory                      │  │ 21-200 16:43:59     │
│        >21-1** 1 channel  ^                   │  │ >M31  Line    Ch    │
│         21-101 1 channel                      │  │  Call Terminated    │
│         21-102                                │  │                     │
│         21-103                                │  │                     │
│         21-104                                │  │ 21-200 16:43:41     │
│         21-105                                │  │ >M30  Line    Ch    │
│         21-106                                │  │  Outgoing Call      │
│         21-107                                │  │  897                │
│         21-108                                │  │                     │
│         21-109                                │  │ 21-200 16:43:36     │
│         21-110          v                     │  │ >M29  Line    Ch    │
│                                               │  │  Call Terminated    │
│                                               │  │                     │
│      Right arrow/Return to Select entry       │  │                     │
│      Left arrow/ESC for previous menu         │  │                     │
└──────────────────────────────────────────────┘  └─────────────────────┘
┌─────────────────────┐  ┌─────────────────────┐  ┌─────────────────────┐
│ 21-100 Interlock    │  │ 23-100 [slave]      │  │ 10-100 1234567      │
│  IDLE               │  │  IDLE               │  │  Link  --------     │
│  OK     0 channels  │  │  OK     0 channels  │  │  Call  --------     │
└─────────────────────┘  └─────────────────────┘  └─────────────────────┘
```

The *current Call Profile* is listed first. It is always numbered *1***. Each Call Profile contains the information necessary to make a call that connects the equipment at your site to the equipment at another site.

Section, E.3 describes how to edit or dial any of the Call Profiles listed in the Directory.

E.1 **Notes**

Sometimes the screen needs to be refreshed by typing **^L** (Control-L).

Although Multiband Plus can support multiple devices, called *serial hosts*, connected to its synchronous serial host ports, the Simplified Menus restrict configuration and operation to a single device and the serial host port(s) to which it is connected. The menu number, for example *21-100* shown in the example above, might be different from the menu number in your displays. This is because the example above illustrates the status for host port #1, while your installation might use a different port(s).

E.2 **Using *D=Dial* Command**

The *D=Dial* menu allows you to edit the **Dial #**, **Call Type**, **Call Mgm**, **Data Svc**, **Base Ch Count** parameters of the current Call Profile.

• If you change your mind and do not wish to dial the current Call Profile, type **ESC**.

• To change parameters, see section E.6 of this appendix.

• To redial without changing any parameters, type D.

• Section E.5 describes the status screens. Also see section E.4 in this appendix, which explains the **DO** commands that appear when the call goes ONLINE.

• To hang up the call, select *2=Hang Up* from the **DO** menu and type the **Right-Arrow** or **Enter** key.

E.3 **Using the Directory**

1   To dial a call, use the **Up-Arrow** and **Down-Arrow** keys to select the Call Profile you want and then type the letter D. The Call Profile you selected replaces the current Call Profile and its phone number is dialed.

2   To edit a Call Profile, use the **Up-Arrow** and **Down-Arrow** keys to select the Call Profile you want and then press **Right-Arrow** or **Enter** key. A complete list of Call Profile parameters appears. Section E.6 describes how to edit these parameters and save the changes you made. This section also describes some of the parameters listed.

3   If you dial the call during or after editing (see step 2), the Call Profile replaces the current Call Profile, including all changes you have made up to issuing the dial command.

4   If you have dialed a call, see section E.5   describes the status screens. Also see section E.4 , which explains the **DO** commands that appear when the call goes *ONLINE*.

E.4 **DO Commands**

DO commands allow you to perform call-related operations, such as dialing, answering, and clearing calls, modifying calls in progress, and saving or loading profile information.

DO is a sequential operator. That is, to perform a DO operation on the Control Monitor, you type either **Ctrl-D** or **PF1** first, followed by another key representing an operation. This document represents key sequences as two characters separated by a space, for example **DO 1**, and equivalently **Ctrl-D 1**. The following DO operations are defined:

Command	Operation
DO 0	Abort current command and exit DO menu (escape)
DO 1	Dial selected or current Call Profile
DO 2	Hang up from call in progress
DO 3	Answer incoming call
DO 4	Increase bandwidth
DO 5	Decrease bandwidth
DO 6	Begin/End remote loopback
DO 7	Begin/End BERT
DO 8	Begin/End remote management
DO 9	Not used
DO L	Load parameter values into current profile
DO P	Password Login/Logout
DO R	Resynchronize call in progress
DO S	Save parameter values into specified profile
DO M	Save current status screen layout

Use the **Down-Arrow** and **Up-Arrow** keys to scroll through the DO commands. If a DO command does not apply in the current situation, the command does not appear. For instance, you cannot dial a call from a port that is currently online.

E.5 **Status Screens**

The status screens appear in the windows below and on the right side of the big configuration window. The big window is the one with the inverse video border. See Chapter 7 for desriptions of the following menus:

- **Call Status**

- **Statistics**

- **Message Log**

- **Line Status**

E.6 **Editing Call Profile Parameters**

The Simplified Menus allow you to make changes to Call Profile parameters.

Some parameters need to be typed in and others need to be selected.

1   In either case, to change a parameter, select that parameter by placing the > symbol beside it, and then type the **Right-Arrow** or **Enter** key.

2   If the [..] (square brackets) appear, type in the characters you wish to enter. The **Backspace** key rubs out the last character you typed. When you are done, press the **Right-Arrow** or **Enter** key. To go to the next parameter, press the **Down-Arrow** key.

3   If the [..] do not appear, press the **Right-Arrow** or **Enter** key until the selection you want appears. To go to the next parameter, press the **Down-Arrow** key.

4   When you have all the parameters just the way you want them, press the **Left-Arrow** key, and Multiband Plus prompts you whether or not you wish to save the changes you have made. if you wish to save the changes, choose *2=Exit and Accept.* If you wish to continue to make changes, choose *0=Esc (Don't Exit).* If you wish to restore the parameters to their values before you made any changes, choose *1=Exit and Restore*.

5   You can edit the following parameters. See Chapter 6 for a detailed description of each:

⇒⇒   **Dial #**

⇒⇒   **Call Type**

⇒⇒   **Call Mgm**

⇒⇒   **Data Svc**

⇒⇒ **Base Ch Count**

Editing Call Profile Parameters

Inverse-Multiplexing

Whenever you make a Multiband Plus data call between serial hosts, you begin with a call profile that describes certain parameters for your call, such as the type of the call, the number of channels (total bandwidth) required for the call, and the type of switched access used in the call. You initiate the call by dialing the destination phone number, either directly or programmatically.

For call types that do not involve inverse multiplexing, Multiband Plus simply connects to the far end over the channel or channels whose phone number is dialed, without synchronizing the channels. If the **Call Type** call profile parameter has the value *1 Chnl*, a single channel is connected, whereas for *2 Chnl*, two channels are connected in tandem without synchronization.

For call types involving inverse multiplexing, Multiband Plus connects to the far end over a single channel and then uses information stored in the far-end inverse multiplexer to dial multiple channels to the same destination based on the total amount of bandwidth requested. Multiband Plus synchronizes and aligns the channels during the **handshake** phase of call setup. Handshaking typically takes 10 seconds to establish the alignment and synchronization of the call. If a channel fails during call setup, the system attempts to provide replacement bandwidth and resynchronizes in real time. The dialing process of inverse-multiplexing calls is described in detail in section F.1 of this volume. Sections F.2 and F.3 describe the process of adding and removing bandwidth.

For inverse-multiplexing calls under DBA management, Multiband Plus automatically varies the transmission rate after call setup. Addition or subtraction of channels involves handshaking during the call. For more information on DBA functionality, which is only available during an AIM, FT1-B&O, or FT1-AIM call, see the *Controlling Dynamic Bandwidth* Appendix.

F.1   Inverse-Multiplexing Dialing Process

The AIM and BONDING call types use inverse-multiplexing functionality, which aggregates channels to get the specified bandwidth. To dial an AIM call, both ends of the WAN interface must have AIM functionality. Similarly, to dial a BONDING call, both ends of the WAN interface must have BONDING functionality. If an AIM call is dialed and Multiband Plus is also equipped with the **Dyn Bnd** (DBA) option, Multiband Plus can vary the bandwidth automatically to meet usage requirements, while BONDING calls do not have the ability to do so.

To understand AIM's dialing system, consider the following example. The BONDING protocol follows the same steps.

Assume that there are two locations, Location A and Location B. Each is equipped with a Multiband Plus. Both locations have 10 available 56 kbit/s channels, each of which has assigned a unique dial number. In this example, each location's channels are provided by a SW56 line; however, the inverse-multiplexing dialing system is the same regardless of the type of line and access method.

NOTE: This example shows how 10 channels aggregate using inverse multiplexing. Although your Multiband Plus might not have as much bandwidth, the principles apply regardless of how many channels are aggregated.

Each Multiband Plus keeps a list of its own local phone numbers in its line profile. As shown in the following table, Location A is in the 415 area code. It stores its own 10 telephone numbers in its line profile. Likewise, Location B, which is in the 212 area code, stores its ten telephone numbers in its line profile.

Telephone numbers of each channel at Location A	Telephone number differences stored in Location A line profile	Telephone numbers of each channel at Location B	Telephone number differences stored in Location B line profile
415-282-48*90*	90	212-321-87*60*	60
415-282-48*91*	91	212-321-87*61*	61
415-282-48*92*	92	212-321-87*62*	62
415-282-48*93*	93	212-321-87*80*	80
415-282-48*94*	94	212-321-87*81*	81
415-282-48*10*	10	212-321-87*82*	82
415-282-48*11*	11	212-321-87*83*	83
415-282-48*12*	12	212-321-87*84*	84
415-282-48*13*	13	212-321-87*85*	85
415-282-48*14*	14	212-321-87*86*	86

Suppose Location A wants to place a six-channel call (336 kbit/s) to Location B. The user at Location A only has to dial one number, 212-321-8760, to place a six-channel call to Location B. As soon as that first channel from Location A to Location B is connected, the Multiband Plus at Location B automatically sends a list of the differences of Location B's telephone numbers back to the Multiband Plus at Location A. Now, using the original user-supplied number initially dialed and the differences of the rest of the numbers at Location B, the Multiband Plus at Location A knows all of the Location B numbers and can proceed to automatically dial the remaining five channels to complete the six-channel call.

Note that if each location's telephone numbers have some digits in common, only the telephone number differences have to be stored in the line profile of the local Multiband

Plus. Because the calling location dials one complete telephone number to start, it can easily reconstruct the remaining numbers if the receiving end sends back the differences to the calling location when the first channel is connected. If the numbers were in different dialing plans, such as

*   415-282-4890

*   415-365-4891

*   415-366-4892

the differences will be seven digits, not two:

*   282-4890

*   365-4891

*   366-4892

Thus, the key points to understand about AIM and BONDING call types that use inverse-multiplexing technology are as follows:

*   Each location keeps a list of the differences of its own local telephone numbers.

*   To call another location, a user only has to dial one number. Using the process described above, the Multiband Plus automatically obtains the rest of the destination's numbers and automatically dials the remaining channels to complete the call.

The following picture illustrates what happens when an AIM or BONDING call is dialed:
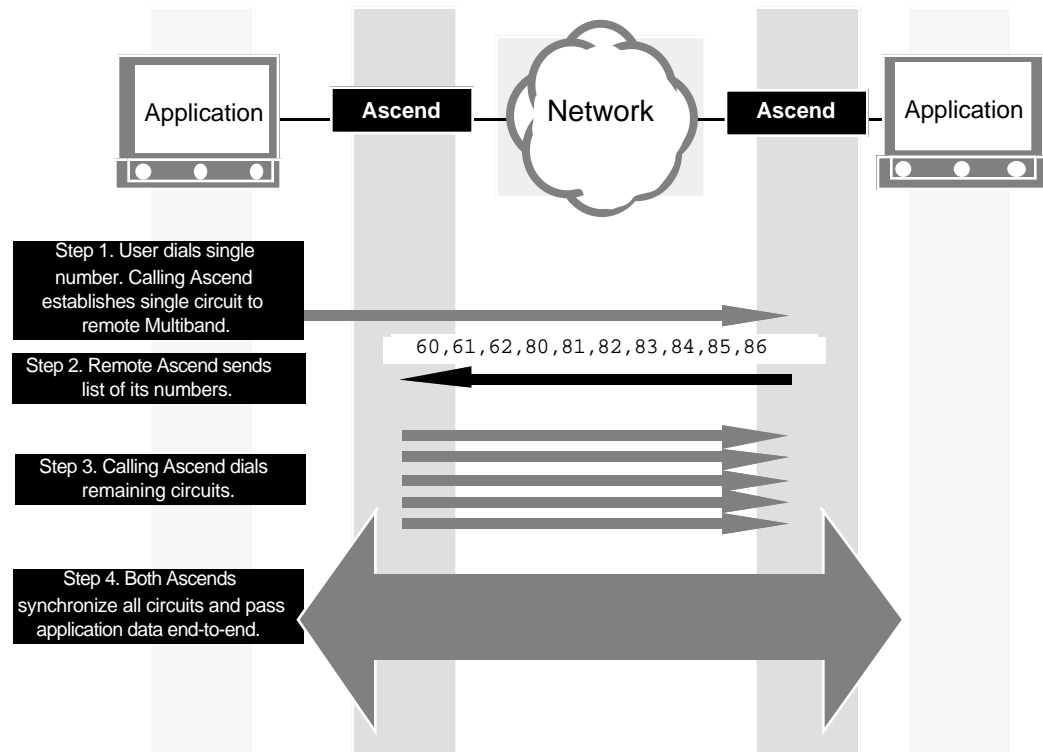
AIM and BONDING calls are established using the following steps:

1   The user at Location A dials 212-321-8760. A single 56 kbit/s call is completed.

2   The Multiband Plus at Location B sends back its list of telephone number differences to Location A. That is, location B sends to Location A the following numbers: 60, 61, 62, 80, 81, 82, 83, 84, 85, 86.

3   Location A now can reconstruct Location B's actual telephone numbers, since it knows the user-supplied first number it originally dialed (212-321-8760) and the differences from that number of all the remaining numbers. So Location A now dials the remaining five channels (212-321-8761, etc.) necessary to complete the six-channel call.

    NOTE: When you specify six channels for an inverse-multiplexing call, you pay the cost of six calls, even though you only dialed one explicitly. Whenever you add bandwidth, you also increase the cost of a call.

These steps apply to all AIM calls whether the **Call Mgm** call profile parameter is *Static, Dynamic*, *Manual,* or *Delta*. These steps also apply to all BONDING calls, except when **Call Mgm** is *Mode 0*.

Call Setup with Nailed-up Channels

If an FT1-AIM or FT1-B&O call initially consists only of nailed-up channels, there is no signaling between Multiband Plus and the network to set up the call. Multiband Plus simply handshakes to establish the management subchannel when the call is initiated. Switched channels can be added later.

If an FT1-AIM or FT1-B&O call consists of both nailed-up channels and switched channels, Multiband Plus first handshakes over the nailed-up channels when the call is initiated. Immediately thereafter, the calling Multiband Plus signals the network to connect the switched channels and handshakes again with the receiving Multiband Plus to synchronize the channels. At this point, the process is the same as described for AIM calls.

NOTE: There is no call setup for an FT1 call, unlike FT1-AIM or FT1-B&O calls. An FT1 call has no switched channels, nor does it have a management subchannel.

F.2 Adding Bandwidth

Using inverse multiplexing enables either the transmitting end or the receiving end of the current call to add bandwidth. The addition of bandwidth can be requested through time-of-day parameters, the line usage parameters, or by direct user or programmatic intervention. The **Call Mgm** call profile parameter governs whether manual or dynamic bandwidth modification is used, and the **Inc Ch Count** parameter determines how many channels are added with any single request.

During an AIM, FT1-B&O, or FT1-AIM call, if the online call uses dynamic bandwidth control, any attempt you make to manually add or subtract channels is rejected or overridden. To take manual control of the bandwidth of an online DBA call, change your current call profile **Call Mgm** parameter to *Manual* or *Delta*. To restore automatic tracking, set the value of the **Call Mgm** parameter to *Dynamic*.

Multiband Plus can reject the request to add bandwidth if any of the following conditions holds:

* There are no more channels available at one or both ends.

* The network is congested.

If the addition fails for any of these reasons, the two ends enter ***bandwidth addition lockout mode***. In this mode, neither side can request additional bandwidth. This restriction prevents both ends from continually trying to add new channels unsuccessfully.

The lockout restriction is automatically removed when any of the conditions that caused the lockout changes. Changes typically result from plugging in a new switched service line, from reconfiguration of the line profile, or from a switched service congestion timeout. Once the lockout is removed, either end is free to add bandwidth.

F.3 **Removing Bandwidth**

Bandwidth cannot be removed unless the inverse multiplexers at both ends of the call agree to the removal. Either the transmitting or the receiving end can request or reject the removal of bandwidth at any time. If one end rejects a removal request, further removal requests are ignored until the end that rejected the original request also agrees that bandwidth can be removed.

During an AIM, FT1-B&O, FT1-AIM, or BONDING call, the **Dec Ch Count** parameter determines how many channels are removed with any single request. If the system is set for DBA and you want to switch to manual bandwidth allocation, you must explicitly change the value of the **Call Mgm** parameter to *Manual* or *Delta*. To restore DBA, set the value of the **Call Mgm** parameter to *Dynamic*. You can modify these values without disrupting the call in progress.

Except when using time-of-day control on a DBA call, you cannot remove the last channel in the system; a single channel is always left up.

When channels are removed, those with the greatest number of errors are removed first.

G RS-366, V.25 bis, X.21, Lead Dialing

Multiband Plus offers several different dialing and answering options. These options are distinguished by the call setup procedure, and in some cases by the way the call is answered and cleared. This appendix discusses the following options:

- RS-366 dialing

- X.21 dialing and answering

- V.25 bis dialing and answering

- Control-lead dialing and answering

In addition Multiband Plus offers the following dialing options, which are discussed elsewhere:

- Manual dialing through the user interface of Multiband Plus, see **DO DIAL**

- Automatic dialing using the DBA functionality of Multiband Plus, see the value *Shutdown* listed under the **Activ** parameter in the "Reference to Edit Menus" chapter.

G.1 RS-366 and X.21

The following sections describe the command lines used by both the *RS-366 Ext1*, *RS-366 Ext2*, *X.21 Ext1*, and *X.21 Ext2* protocols. These protocols enable serial host equipment, such as a video codec, to control Multiband Plus dialing using a combination of hardware handshakes and command lines messages. In addition, X.21 enables host equipment to control Multiband Plus answering using its hardware handshakes.

Multiband Plus-SW56 allows you to enable X.21 and RS-366 separately for each specific serial host port. (See the **Dial** and **Answer** Port Profile parameters.) Multiband Plus-SW56's serial host ports are compatible with both V.35 or RS-449 electrical interfaces. Enabling X.21 or RS-366 does not prevent you from dialing, answering, or clearing manually using the Palmtop Controller or the Control Monitor.

NOTE: The message syntax and fields for X.21 and RS-366 are identical. However, the electrical signals and hardware handshake processes for X.21 and RS-366 are different.

G.1.1 Restrictions on X.21 Operation

The X.21 interface does not provide DCE provided information or call progress signals during the calling phase.

The Multiband Plus X.21 interface complies with the X.21 specification for called states (incoming call) of the call control phase. It does not provide call information (sub addressing) or DCE provided information signals during this phase.

The CCITT X.21 is specified to operate at up to 64 kbit/s. The Multiband Plus X.21 interface will provide inband signaling at this speed or lower. During the data transfer phase, the Multiband Plus X.21 interface might provide clock and data at the various speeds determined by its operational mode. This might preclude interoperability with some X.21 DTEs at speeds above 64 kbit/s.

G.1.2 **RS-366 Ext1 and X.21 Ext1**

Four commands are described:

• Loading and dialing a Call Profile

• Dial the current Call Profile

• Direct dialing when the start of the phone number is the character #

• Direct Dialing when the start of the phone number is different from the character #

Here is the format for of loading and dialing a Call Profile and some examples. For a detailed description of the fields used in this command see section G.1.3:

Load and Dial a Call Profile: '#' Call_Profile [Phone_Number | '*']	
Command_Line	**Action**
# 006 5551212	Load Call Profile #6, change the phone number (**Dial #** parameter of the current Call Profile) to 5551212 and dial.
# 006 *	Load Call Profile #6 and dial.
# 000 *	Dial the current Call Profile.
# 006	Load Call Profile #6.
Fields	
Call_Profile=	Must be 3 digits '000' to '999'
Phone_Number=	Use any characters in the RS-366 set

Here is the format for the Dial the Current Call Profile command and how it appears:

Dial the Current Call Profile: '#' '*'	
Command_Line	**Action**
# *	Dial the current Call Profile.
5551212	Change the phone number (**Dial #** parameter of the current Call Profile) to 5551212 and dial.

Here is the format of direct dialing when the start of the phone number is the character # and an example. For a detailed description of the phone number field used in this command see section G.1.3:

Dial a Phone Number That Starts with # '#' #_Phone_Number	
Command_Line	**Action**
# #551212	Change the phone number (**Dial #** parameter of the current Call Profile) to #5551212 and dial.
Fields	
#_Phone_Number=	'#' Phone_Characters (The first character of the phone number is #.)

Here is the format of direct dialing when the start of the phone number is different from the character #. For a detailed description of the phone number field used in this command see section G.1.3:

Dial a Phone Number That Does Not Start with #: Phone_Number_Not_#	
Command_Line	**Action**
5551212	Change the phone number (**Dial #** parameter of the current Call Profile) to 5551212 and dial.
Fields	
Phone_Number_Not_#=	The phone number can use any characters in the RS-366 set, but this format does not apply if the first character of the phone number is #; then, you must use one of the other commands.

G.1.3 **Ext1 Command Fields**

Some RS-366 Ext1 and X.21 Ext1 commands distinguish between phone numbers that start with "#" and phone numbers that start with any other character. With other RS-366 Ext1 and X.21 Ext1 commands it does not matter what character starts the phone number. The phone number fields used in RS-366 Ext1 and X.21 Ext1 commands follow:

- Phone_Number (phone numbers that start arbitrarily)

- #_Phone_Number (phone numbers that start with #)

- Phone_Number_Not_# (phone numbers that do not start with #)

Phone number characters can be any RS-366 dialing characters. However, Multiband Plus disregards any phone numbers with more than 37 characters.

The Call Profile field used in the RS-366 Ext1 and X.21 Ext1 commands follows:

- Call_Profile

Multiband Plus stores up to 32 Call Profiles, as well as the current Call Profile, at each serial port. The current Call Profile is 000. The first stored Call Profile after the current Call Profile is 001.

The Call_Profile field must have three digits. Because Multiband Plus stores only 32 Call Profiles for any port, the first digit of the Call Profile is always 0. The last two digits of the Call_Profile field are taken from the last two digits of the Multiband Plus menu number. For example, the saved Call Profile at the menu number entry 22-113 becomes 013 in the Call_Profile field, and the Call Profile at 21-109 becomes 009.

G.1.4 **Ext1 Command Line Syntax**

The following table lists the RS-366 Ext1 and X.21 Ext1 command line syntax. The fields in brackets, such as [Phone_Number], are optional and can be omitted. The characters in single parentheses, such as '#', are literal.

Command Description	
Command_Line =	Load_Dial or Direct_Dial
Load_Dial=	'#' #_Phone_Number or '#' Call_Profile [Phone_Number | '*'] or '#' '*'
Direct_Dial=	Phone_Number_Not_#
Phone_Number_Not_#=	Not_# Phone_Characters
#_Phone_Number=	'#' Phone_Characters

Command Description	
Phone_Number=	Phone_Characters
Call_Profile=	Digit Digit Digit ('000' to '999' must be 3 digits)
Digit=	'0', '1', '2', '3', '4', '5', '6', '7', '8', or '9'
Phone_Characters=	Phone_Characters Phone_Character (any number of Phone_Character)
Phone_Character=	'0', '1', '2', '3', '4', '5', '6', '7', '8', '9', '*', '#', EON, or SEP (As specified in RS-366)
Not_#=	'0', '1', '2', '3', '4', '5', '6', '7', '8', '9', '*', EON, or SEP (As specified in RS-366, but without #)

G.1.5 RS-366 Ext2 and X.21 Ext2

Four commands are described:

- Direct dialing when start of phone number is different from escape character(s)

- Direct dialing when start of phone number is the same as escape character(s)

- Modifying and dialing the current Call Profile

- Loading and dialing a Call Profile

Here is the format for the Loading and Dialing command and some examples. For a detailed description of the fields used in this command see section G.1.6:

Load and Dial a Call Profile Esc '8' Call_Profile [Phone_Number]	
Command_Line	**Action**
Esc 8 06 5551212	Load Call Profile #6, change the phone number (**Dial #** parameter of the current Call Profile) to 5551212 and dial.
Esc 8 06	Load Call Profile #6 and dial.
Fields	
Phone_Number=	Phone_Characters
Call_Profile=	Must be 2 digits '00' to '99'

Here is a format and an example of direct dialing when the start of the phone number is the same as the escape character(s). This format can be used even if the phone number starts with a character(s) different from the escape character(s):

Dial a Phone Number that Starts with Escape Char: Esc '9' Phone_Number	
Command_Line	**Action**
Esc 9 5551212	Change the phone number (**Dial #** parameter of the current Call Profile) to 5551212 and dial.
Fields:	
Phone_Number=	Phone_Characters

Here is the format for the Modifying and Dialing command and some examples. For a detailed description of the fields used in this command see section G.1.6:

Modify the Current Call Profile and Dial: Esc Channelizn [Service_Type [Phone_Number]]	
Command_Line	**Action**
Esc 06 6 5551212	Change the current Call Profile's channelization (**Base Ch Count** parameter), service type (**Data Svc** parameter), phone number (**Dial #** parameter) to 6, 64 kbit/s, and 5551212, respectively, and dial.
Esc 06 6	Change the current Call Profile's channelization (**Base Ch Count** parameter) and service type (**Data Svc** parameter) to 6 and 64 kbit/s, respectively, and dial.
Esc 06	Change the current Call Profile's channelization (**Base Ch Count** parameter) to 6 and dial.
Fields	
Channelizn	Must be 2 digits '01' to '49'
Service_Type=	'0', '1', '3', '5', '6', or '7'
Phone_Number=	Phone_Characters

Here is the format for direct dialing when the start of the phone number is different from the escape character(s) and an example of its use:

Dial a Phone Number that Does Not Start with Esc Char: Phone_Number	
Command_Line	**Action**
5551212	Change the phone number (**Dial #** parameter of the current Call Profile) to 5551212 and dial.
Fields:	
Phone_Number=	Phone_Characters (The phone number can use any characters in the RS-366 set, but this format does not apply if the first character(s) of the phone number is the same as Esc, the escape character(s); then, you must use one of the other commands.)

G.1.6 Ext2 Command Fields

RS-366 Ext2 and X.21 Ext2 commands use the following fields:

- Phone_Number

- Call_Profile

- Esc

- Channelizn

- Service_Type

Phone_Number
The Phone_Number field can be any RS-366 dialing characters. However, Multiband Plus disregards any phone numbers with more than 37 characters.

Call_Profile
Multiband Plus stores up to 32 Call Profiles, as well as the current Call Profile, at each port. The current Call Profile is 00. The first stored Call Profile after the current Call Profile is 01.

The Call_Profile field must have two digits. The two digits of the Call_Profile field are taken from the last two digits of the Multiband Plus menu number. For example, the saved Call Profile at the menu number entry 22-113 becomes 13 in the Call_Profile field, and the Call Profile at 21-109 becomes 09.

Esc (Escape Character)

Before you can use Ext2 dialing, choose which character, or characters, you wish to be the RS-366 or X.21 Ext2 escape character, **Esc**. The choice must be compatible with your host equipment, which actually does the dialing. **Esc** can be any character or characters in the following list:

    *
    #
    5
    6
    7
    9
    0
    00

Esc indicates that the character immediately following it is not part of a phone number.

You set up **Esc** in the Port Profile **RS-366 Esc** parameter.

Channelizn (Channelization)

The number of channels with which the call is set up is given by the two-digit *channelization field* (Channelizn). It can have the value from 01 to 49. If the number of channels is less than 10, this field starts with the digit 0. The bandwidth of an individual channel is determined by the **Service_Type** field which is described next.

NOTE: 00 indicates Multiband Plus place a single-port call. That is, the **Call Type** Call Profile parameter is set to *1 Chnl* and a single channel is connected without any inband per-call management.

Service_Type

The type of switched service that is requested from the network is indicated by a single digit. This single-digit field is called the *RS-366 service type* (Service_Type) and can have the values 0, 1, 3, 5, 6, or 7. The following table shows the correspondence between these values and the network service and Call Profile parameter **Data Svc.** The value specified is loaded and stored in the current Call Profile:

RS-366 Service Type	Network Service	Data Svc Parameter
5	56 kbit/s	56K

G.1.7 **Ext2 Command Line Syntax**

The following table lists the RS-366 Ext2 and X.21 Ext2 command line syntax. The fields in brackets, such as [Phone_Number], are optional and can be omitted. The characters in single parentheses, such as '#', are literal.

Command Description	
Command_Line =	Load_Dial or Phone_Number
Load_Dial=	Esc Direct_Dial_Same or Esc Load_Dial_Profile or Esc Mod_Dial_Profile
Direct_Dial_Same=	'9' Phone_Number
Load_Dial_Profile	'8' Call_Profile [Phone_Number]
Mod_Dial_Profile	Channelizn [Service_Type [Phone_Number]]
Phone_Number=	Phone_Characters
Call_Profile=	Digit Digit (Must be 2 digits '00' to '99')
Digit=	'0', '1', '2', '3', '4', '5', '6', '7', '8', or '9'
Channelizn	'01', '02', '03',... '49' (Must be 2 digits '01' to '49')
Service_Type=	'0', '1', '3', '5', '6', or '7'
Phone_Characters=	Phone_Characters Phone_Character
Phone_Character=	'0', '1', '2', '3', '4', '5', '6', '7', '8', '9', '*', '#', EON, or SEP (As specified in RS-366)

G.2 **V.25 bis Dialing and Answering**

When a Multiband Plus equipped with the V.25 bis dialing option is used in conjunction with host equipment that has V.25 bis dialing capability, such as a router, the router can request Multiband Plus to perform various dialing operations. Answering incoming calls is also controlled by the host using V.25 bis.

Multiband Plus is compatible with both the V.25 bis as described in the CCITT Blue Book recommendations, and the V.25 bis extension, revision 1.04, developed by Cisco Systems and Ascend.

Multiband Plus-SW56 allows you to enable V.25 bis separately for each specific serial host port. (See the **Dial** and **Answer** Port Profile parameters.) Multiband Plus-SW56's serial host ports are compatible with both V.35 or RS-449 electrical interfaces. Enabling

V.25 bis does not prevent you from dialing, answering, or clearing manually using the Palmtop Controller or the Control Monitor.

V.25 bis, as implemented by Multiband Plus, is a superset of the CCITT V.25 bis recommendation. It includes hardware handshakes and command messages between Multiband Plus and the serial host. Using this extension of V.25 bis, serial host equipment can command Multiband Plus to place a call using a stored Call Profile or the current Call Profile. In addition, if your host equipment uses V.25 bis with the current Call Profile, it can also load in new values for some Call Profile parameters. Once you load new values, they remain in the current Call Profile.

From the perspective of serial host equipment, you can use V.25 bis to dial either a number stored in Multiband Plus, or you can dial a number that you entered at your host equipment. The latter case is called a *Call Request with Number*.

G.2.1 Call Request with Number

In this type of call, Multiband Plus places the call using the current Call Profile with the V.25 bis phone number and other V.25 bis parameters you entered at your serial host equipment. Optionally, you can leave the V.25 bis phone number blank, and Multiband Plus dials the number stored in its current Call Profile.

V.25 bis Phone Number
The V.25 bis phone number you specify is loaded and saved as part of the current Call Profile, namely as the value of the **Dial #** parameter.

V.25 bis Switched Call Service
Additional Call Profile parameters can be set by your V.25 bis host. To choose an AIM call type, you must first indicate from your host equipment that the V.25 bis switched call service is an AIM call type. You specify AIM call types to Multiband Plus by sending the letter N from the host. The default call type is *1 Chnl*.

Part of the V.25 bis switched call service is the switched service type. From the host equipment, you can specify 56, 56R, 64, 384, 384R, 1536, or 1536R. These values correspond directly to the Call Profile parameter **Data Svc** values: *56K, 56KR, 64K, 384K/H0, 384KR, 1536K,* and *1536KR*. Some of these values might not be available, depending on how Multiband Plus is configured.

V.25 bis Bandwidth Range and Management Channel Type
Finally, V.25 bis can specify the bandwidth range and management channel type. These V.25 bis parameters apply only if you selected an AIM call type, as previously described. These parameters determine the call management features of the call, and its bandwidth range.

The V.25 bis bandwidth range specifies the number of base channels, or optionally the minimum to maximum number of channels. Enter only the number of base channels to specify the **Base Ch Count** Call Profile parameter value. Enter both the minimum and

maximum number of channels to specify the **Base Ch Count**, **Min Ch Cnt**, and **Max Ch Cnt** Call Profile parameter values.

The V.25 bis management channel type specifies what type of management facility your AIM call will have. Enter `NMC` (no management channel) to specify *Static* for the **Call Mgm** Call Profile parameter. `DMC` (delta management channel) specifies *Delta.* `MMC` (minimal management channel) specifies either *Manual* or *Dynamic,* depending on what you entered for the V.25 bis bandwidth range. Namely, if you entered both the minimum and maximum number of channels, you implied *Dynamic*.

Example
In this example you intend to dial a call with the following Call Profile parameter values:

> **Dial #** (the number you are calling) = *555-1212*
> **Base Ch Count** (the initial number of channels) = *7*
> **Data Svc** (the data service of each channel) = *56KR*
> **Call Type** (see "Reference to Edit Menus" chapter) = *AIM*
> **Call Mgm** (see "Reference to Edit Menus" chapter)= *Dynamic*
> **Min Ch Cnt** (see "Reference to Edit Menus" chapter)= *5*
> **Max Ch Cnt** (see "Reference to Edit Menus" chapter) = *10*

NOTE: The **Base Ch Count** Call Profile parameter value is derived as the arithmetic mean of the minimum and maximum channel count.

The complete call request with number (`CRN`) command string sent to Multiband Plus includes semicolons (`;`) as command separators between the command parameters switched call service (`SCT`), bandwidth request (`BWR`), and management channel type. The management channel type `MMC` together with the bandwidth range `BWR5-10` requests that an AIM/Dynamic call be set up:

> CRN5551212;SCTN56R;BWR5-10;MMC

Default
If you do not specify any of the V.25 bis parameters except the phone number, Multiband Plus uses the values that are in its current Call Profile. For example, if you enter only `CRN555-1212` and no other parameters, Multiband Plus dials 555-1212 using the current Call Profile to specify the remaining parameter values.

G.2.2 **Call Request from a Stored Call Profile**

When a phone number is dialed using a stored Call Profile, Multiband Plus places the call using the Call Profile values in the indicated stored current Call Profile. This type of V.25 bis dialing is also called a ***Call Request from a Storage Address***.

The V.25 bis Call Profile address is indicated by a three-digit string. The first stored profile is `001`. Multiband Plus stores up to 32 Call Profiles, in addition to the current Call Profile, at each serial port. You can also dial the current Call Profile by selecting the `000` Call Profile. If no address is indicated, Multiband Plus dials using the current Call Profile.

NOTE: The number designating a saved Call Profile number must have three digits exclusive of the menu number, and the leading digit is always 0. For example, the saved Call Profile at the directory entry 213 is actually 013, and the Call Profile at 209 actually is 009. The complete call request from stored Call Profile (CRS) command string sent to Multiband Plus in the latter case is as follows:

CRS009

G.2.3 **V.25 bis Extension Specification**

Copies of the V.25 bis extension specification may be obtained from Ascend.

G.3 **Control-Lead Dialing and Answering**

Multiband Plus can be configured to dial, answer, and clear calls when certain control leads are toggled by the serial host equipment:

- To enable control-lead dialing, you must set the **Dial** Port Profile parameter to the value *DTR Active*. Enabling control-lead dialing does not prevent you from dialing manually using the Palmtop Controller or Control Monitor.

- To enable control-lead answering, you must set the **Answer** Port Profile parameter to the either the value *DTR* or *DTR+Ring*.

- To clear calls in response to control leads, select the value *DTR Inactive*, *DTR Active*, *RTS Inactive*, or *RTS Active* for the **Clear** Port Profile parameter.

During control-lead dialing, the current Call Profile is dialed when the host sets DTR active. An incoming call is answered whenever the host has set DTR active, or when the host sets DTR active in response to Multiband Plus setting RI active. RI is the ring indication control lead. Even if DTR were not active, an incoming call can be answered from the Control Monitor or Palmtop Controller. The host does not have to toggle DTR active before you can dial the current Call Profile from your Control Monitor or Palmtop Controller.

Depending on which control-lead option you choose for clearing a call, the current call is cleared whenever the host toggles DTR inactive, DTR active, RTS inactive, RTS active, or whenever you clear the call by command through the Palmtop Controller or Control Monitor.

It should be noted that control-lead dialing, answering, and clearing are serial port-specific and that any action you take at one serial host port does not affect any others.

H Controlling Dynamic Bandwidth

Dynamic control of a call's bandwidth means that Multiband Plus continuously monitors the data traffic it is sending over the call's circuits and calculates the percentage utilization of that call's bandwidth. Based on one of three selectable dynamic algorithms and other user-defined parameters, Multiband Plus then decides whether or not to add or subtract bandwidth. This appendix describes the function of these parameters.

H.1 DBA

Dynamic control of the bandwidth of a call between serial hosts is a configuration option of your Multiband Plus. If present, you can choose to apply it to AIM, FT1-B&O, and FT1-AIM calls by setting the **Call Mgm** Call Profile parameter to *Dynamic*. Dynamic control of calls between serial hosts is also referred to as *DBA* (Dynamic Bandwidth Allocation).

Dynamic control of the bandwidth of a bridge/router call is a feature of all MPP calls. To apply MPP and dynamic bandwidth control to a link/connection, set the **Encaps** Connection Profile parameter to *MPP*.

H.2 Parameters

The following parameters control the bandwidth of DBA calls. See Chapter 6 for a description of each.

⇒⇒ **Base Ch Count**

⇒⇒ **Max Ch Count**

⇒⇒ **Min Ch Count**)

⇒⇒ **Sec History**

⇒⇒ **Dyn Alg**

⇒⇒ **Add Pers**

⇒⇒ **Sub Pers**

⇒⇒ **Target Util**

⇒⇒ **Flag Idle**

⇒⇒ **Time Period 1...** to **Time Period 4...**

NOTE: You can reconfigure these parameters at any time, even while a session is in progress.

NOTE: You do not need to have both ends of a DBA call dynamic; that is, you do not need to set **Call Mgm** Call Profile parameter to *Dynamic* at both ends. If you only set one end to *Dynamic* and the other end to *Manual*, only the *Dynamic* end controls adding or subtracting bandwidth under DBA control, regardless of which end placed the call.

H.3 DBA Requirements

To implement DBA on calls between serial host devices, the bit stream between the devices must use HDLC encoding, or an HDLC derivative scheme (like SDLC) at the frame layer. Most synchronous communications devices use HDLC-derived encoding, including bridges, routers, SNA networks, X.25 networks, and frame relay links.

Every second, Multiband Plus samples the transmit bit stream to determine what percentage of the time it is idle and what percentage of the time it is utilized. Multiband Plus can identify an idle bit stream by detecting either the flag pattern or mark pattern. Neither of these patterns occurs within a frame. When the serial host, also called the data terminal equipment (DTE), has no data to send, it transmits one of these two patterns.

NOTE: If the data stream does not use HDLC-derived encoding, the bandwidth appears to Multiband Plus to be 100% utilized. Multiband Plus cannot adjust the bandwidth allocated to the call based on traffic in this case.

H.4 Dynamic Algorithms

This section describes the algorithms used in calculating percentage utilization of bandwidth.

Algorithms
The **Dyn Alg** parameter specifies the history algorithm. Three different algorithms are available:

Constant Weighting
Dyn Alg=*Constant* treats all the samples within the time window specified by the **Sec History** parameter as equally weighted. The weighted percentage (*Pw*) is calculated as the mean (average) of all the samples.

Older history has the greatest impact on the decision when using this algorithm.

Linear Weighting
Dyn Alg=*Linear* weights the samples within the time window specified by the **Sec History** parameter in linear proportion to the start of the window.

The most recent samples have more influence on *Pw* than the earlier samples.Linear weighting is the most popular form of weighting.

Quadratic Weighting
Dyn Alg=*Quadratic* weights the samples within the time window specified by the **Sec History** parameter in quadratic proportion to the start of the window.

Quadratic weighting, even more than linear, favors most recent samples over older ones.

Graph of Weighting Algorithms
The following graphs compares the three types of weighting algorithms, assuming each uses the same **Sec History** value (in this example 1800 seconds). :

H.4.1 **Formulas**

The bandwidth history algorithms use the following general values:

Pt   Percentage utilization at time *t*

Tn   Time now (always 0)

Tt   Time at sample *t*. *Tt* is measured as number of seconds before *Tn*

N   Number of DSO or B channels currently in use

I   Incremental number of channels specified by user

S   Number of seconds of history

Pw   The calculated weighted percentage

Constant Weighting
With this algorithm, the calculated weighted percentage is defined as

$$Pw = \frac{\left(\displaystyle\sum_{t=1}^{S} Pt \right)}{S}$$

Linear Weighting

With this algorithm, the calculated weighted percentage is defined as:

$$Pw = \frac{\left(\displaystyle\sum_{t=1}^{S} (Pt)(S - Tt) \right)}{\left(\displaystyle\sum_{t=1}^{S} (S - Tt) \right)}$$

Quadratic Weighting

The formula for calculating the quadratic weighting is

$$Pw = \frac{\left(\displaystyle\sum_{t=1}^{S} (Pt)(S - Tt)^2 \right)}{\left(\displaystyle\sum_{t=1}^{S} (S - Tt)^2 \right)}$$

H.5 Bandwidth Allocation Decision Process

The **Target Util** parameter sets a threshold that is compared to the weighted percentage (*Pw*) of the current line utilization recorded over the seconds of history. The result of the comparison determines whether bandwidth is added or removed.

H.5.1 Adding Bandwidth

If the weighted percentage exceeds the defined utilization threshold for a period of time greater than the value specified by the **Add Pers** parameter, Multiband Plus attempts to add the number of channels specified by the **Inc Ch Count** parameter. Addition of bandwidth is subject to following constraints:

- Channels must be available.

- Adding bandwidth cannot cause the value specified by the **Max Ch Count** time-period parameter to be exceeded.

H.5.2 **Removing Bandwidth**

If the weighted percentage falls below the defined utilization threshold for a period of time greater than the value specified by the **Sub Pers** parameter, the number of channels specified by the **Dec Ch Count** parameter are removed. Removal of bandwidth is subject to following constraints:

- One channel must be kept up at all times.

- Removing bandwidth cannot cause the weighted percentage to exceed the defined utilization threshold.

- Removing bandwidth from DBA calls cannot cause the value specified by the **Min Ch Count** time-period parameter to be violated. (Calls between serial hosts only.)

H.6 **Considerations**

The values for the **Sec History** and **Add/Sub Pers** parameters should be chosen to smooth out spikes in bandwidth utilization that last for a shorter time than it takes to add capacity. Over T1 access, bandwidth can be added in less than ten seconds; ISDN is slightly faster at about five seconds.

Once bandwidth is added, there is typically a minimum usage charge; thereafter billing is time sensitive. The **Sub Pers** value should be at least equal to the minimum duration charge plus one or two billing time increments. Typically billing is done to the next multiple of six seconds, with a minimum charge for the first thirty seconds. Your carrier representative can help you understand the billing structure of their switched tariffs.

Channels can be added either one at a time or in multiples determined by the **Parallel Dial** parameter.

Avoid adding or subtracting channels too quickly (less than 10-20 seconds), since this will lead to many short duration calls, each of which will incur the carrier's minimum charge. Also, adding or subtracting channels too quickly can affect the link efficiency, since the DTEs have to retransmit data when the link speed changes.

Considerations

I

Call Routing

Multiband Plus-SW56 allows you to specify the end point of calls placed across the WAN. This appendix details routing criteria so that Multiband Plus can support multiple virtual circuits concurrently. The following sections describe inbound and outbound call routing in detail.

• *Inbound call routing* specifies the Multiband Plus-SW56 interface which receives an incoming call. Specifically, incoming calls can be answered by devices connected to Multiband Plus's serial host ports.

• *Outbound call routing* specifies which SW56 channels uses first in dialing an outgoing call.

I.1   Inbound Call Routing

Whenever possible, an inbound call should reach the desired Multiband Plus interface simply by virtue of the number dialed.

The following section describes called-party number and line-and-channel routing in detail, as well as other routing criteria. For information on how connections consisting of some or all nailed-up channels, see section I.2.

• When a call is received over ISDN access lines, Multiband Plus often can get this phone number (*called-party number*) and use it to direct the call to the associated interface.

• When a call is received over inband signaling T1 or switched-56 lines, each channel or group of channels can be uniquely associated with a dialed number. In this case, Multiband Plus can use the line and channel on which the call initially connects for directing the call to an associated interface. Routing by this criterion is called *line-and-channel routing*.

Incoming call routing can be determined by a number of criteria which are derived from the incoming call itself. The criteria are listed in the order in which they are checked. When incoming call routing is determined, criteria lower in the list are not checked (with the possible exception of dual-port calls).

Port/Grp in the Line Profile
Port/Grp Line Profile parameters specify line-by-line the interfaces that receive incoming calls. Incoming calls that first connect to the switched-56 channel of line #1 are received by the serial host port specified by Port/Grp of line #1. Calls coming in on the line #2 look to Port/Grp of line #2, and so on.

First Available

When none of the preceding criteria can determine where to route an incoming call, incoming calls are routed to the first available serial host port, but only if **Excl Routing**=*No*. If **Excl Routing** (System Profile parameter) = Yes, Multiband Plus requires specific routing. That is, it clears any calls whose routing cannot be determined by the preceding criteria.

Dual Ports in the Host-Interface Profile

Dual Ports is a Host-Interface Profile parameter that specifies which serial host ports are paired for dual-port calls. If an incoming call (not AIM or BONDING) has been answered by the primary serial host port, the next incoming call (not AIM or BONDING) is sent to the secondary serial host port specified by this parameter. The first channel of such calls are routed by the preceding criteria.

The following gives the conditions under which Multiband Plus cannot determine the routing of an incoming call based on a **Port/Grp** parameter.

- If the call arrives on a channel with **Port/Grp** set to *0.*

NOTE: Multiband Plus routes the first channel of an inverse multiplexed call (AIM or BONDING) as described above. Subsequent channels of the call are aggregated to this connection until reaching the requested number of channels.

---

i.1.1 **Dual-Port Calls**

The essential nature of dual-port calls is their compatibility with TAs and switching CSU/DSUs, that is, with devices that have no destination-port capability and connect a call to their serial host port immediately upon answering.

As has been described above, Multiband Plus uses the phone number dialed or channel reached to route an incoming call to a serial host port. But these routing methods might not be sufficient for dual-port calls, which are viewed internally by Multiband Plus as two unrelated calls that do not require inverse multiplexing.

Phone-number and port-number routing criteria apply only to the first call of a dual-port call when the incoming **Dial #** is the same for both calls. Thus, a third criterion is some-times required to route the second call of the dual-port pair. In this case, the routing of the second call is determined by **Dual Ports** Host-Interface Profile parameter, which has one of the following values:

- *No Dual* means that no serial host ports are paired for dialing or receiving dual-port or FT1-B&O calls. This value is the default.

- *1&2 Dual* means that serial host ports #1 and #2 are paired for dialing and receiving dual-port calls or FT1-B&O calls. When a non-AIM non-BONDING call (**Call Type**=*1 Chnl* or *2 Chnl*) arrives, it is routed to port #1 if both ports #1 and #2 are

available. The second non-AIM non-BONDING call is routed to port #2, the secondary or *slave port*. If this pair is not available, Multiband Plus routes the call to whatever ports are available.

The following options do not appear on Multiband Plus models with only two host ports.

* *3&4 Dual*: see *1&2 Dual*.

* *1&3 Dual*: see *1&2 Dual*.

* *2&4 Dual*: see *1&2 Dual*.

* *All Dual* means port #1 is paired with port #3, and port #2 is paired with port #4. Ports #3 and #4 are the secondary or slave ports. When a non-AIM non-BONDING call arrives, it is routed to port #1 if both ports #1 and #3 are available. If this pair is not available, it is routed to port #2 if both ports #2 and #4 are available. The second non-AIM or BONDING call is paired with the first. If neither pair is available, Multiband Plus routes to the first available port.

If either of the ports in a **Dual Ports** pair is not available, you cannot dial a dual-port call from the pair. You can always dial any other type of call from the primary host port of the pair. On the other hand, if one port of a **Dual Ports** pair is not available and no other **Dual Ports** pairs are available, Multiband Plus might answer the call on a single port only. There is no way of distinguishing an incoming dual-port call from two incoming single-port calls.

Enabling dual-port calling does not restrict you from using host ports, paired or not, for receiving any call type.

i.1.2 Busy Principles

Sometimes Multiband Plus tries to route a call to a serial host port that is unavailable. A serial host port is unavailable under any of the following circumstances:

* The port is busy.

* The port is set up to be used only for outgoing calls; that is, **Answer** = *None*.

* The incoming call requests services not available at the port. For example, the incoming call is a AIM call and it requests a destination port that does not support AIM functionality. In this circumstance, Multiband Plus rejects the call or refuses to answer it.

* The port is the secondary port for FT1-B&O calls.

Calls routed to busy serial host ports are handled differently depending on the call type:

* *AIM, BONDING* calls — When routing directs an AIM or BONDING call to a busy port, the call is rejected.

- 1 Chnl, 2 Chnl calls — When routing directs a *1 Chnl* or *2 Chnl* call to a busy port, the call is rejected, except when the busy port is a primary port as of a dual-port pair as defined in the Host-Interface Profile parameter, and the secondary port is not busy. In this case, the call is redirected to the secondary port. (If Multiband Plus tries to route a dual-port call to a primary or secondary host port that is busy with a *1 Chnl* call, it will connect at most on a single channel and might fail to connect at all.)

I.2   Calls with Nailed-up Channels

Nailed-up channels are permanently connected and therefore incoming call routing does not apply. See the **Group** parameter for further information on the where these callsare connected.

I.3   Outbound Call Routing

Outbound call routing determines the channels over which a port dials outbound calls. Outbound calls are routed using the following criteria:

- **Port/Grp** Line Profile parameters specify serial host ports that use these channels before any others for outbound dialing.

  Channels whose **Port/Grp** parameters have the value *0* are considered unassigned and are available as outbound dialing resources to any call.

- Dual-port calls are placed from two ports, called the primary and secondary host ports, as defined in the Host-Interface Profile. Dual-port calls can be dialed over any channels assigned to either the primary or the secondary port.

  When ports are paired for dual-port operation, any type of call can be configured and placed from the primary port, while only dual-port (*2-Chnl*) calls can be placed and cleared from the secondary port.

- If a specified channel is busy or there are not enough channels available to complete an outbound call, Multiband Plus uses channels that are not assigned to any port to place the call.

I.4   Routing Restrictions

AIM, FT1-AIM, FT1-B&O, and BONDING calls can only be dialed and received on host ports #1 or #2. You can have up to two AIM, FT1-AIM, FT1-B&O, or BONDING calls connected to Multiband Plus simultaneously. If you have four host ports in your unit, the remaining ports can be connected to calls that do not provide inverse multiplexing, such as two *1 Chnl* calls or a dual-port call. (See also **Call Type**=*FT1-B&O* in the "Reference to Edit Menus" chapter for restrictions on this call type in four-port units.)

I.5   Inbound Routing Examples

The following sections describe the inbound routing behavior of Multiband Plus as it applies in specific cases:

i.5.1 Routing by the Called-Party Phone Numbers

Routing by the called-party number means the called-party number matches **Ans** *n#* in a Port Profile parameter, and the call is routed to the device or interface corresponding the parameter.

Multiband Plus-SW56 cannot route by **Ans** *n#* because the called number cannot be determined at a SW56 (switched-56) interface.

i.5.2   Routing by Line and Channel

Routing by line and channel means that Multiband Plus routes a call first connecting on channel *n* to the port and/or module denoted by the **Port/Grp** parameters.

Example: Inverse Multiplexed Call Received at a WAN Interface with No Hunt Groups

The carrier has provisioned the SW56 interface with one phone number per channel: *555-1212*, *555-1213*, *555-1214*, *555-1215*, and so forth sequentially. (Each line has only one channel.) Since each of these phone numbers is associated with a single channel, none of the numbers belongs to a hunt group. The phone number *555-1212* connects to line #1, and the other phone numbers connect to the remaining lines in sequential order.

To route an incoming call to channel to port #1 follow these steps:

1   Configure **Phone Num** Line Profile parameter for each phone number associated with each channel.

2   Assign line #1 to port #1 by setting the **Line 1...Port/Grp** Line Profile parameter to *1*. Do not assign any other channels to this port. Assign the remaining lines to other host ports or leave them unassigned by accepting the default **Port/Grp** values of *0*.

    NOTE: Whatever channels you leave unassigned become resources shared by all ports. To reserve channels for a port, you must explicitly assign them to the port.

When an incoming inverse multiplexed call is dialed using the phone number *555-1212*, the call is routed as follows:

1   The switch makes the first connection over line #1, since it is provisioned for *555-1212*.

2   Since the call arrives on line #1, it is routed to port #1.

3 Additional channels in the inverse multiplexed Mode 1 call arrive (during hand-shaking) on channels that are unassigned to any port, and are also connected by Multiband Plus to port #1.

Index

Multiband Plus-SW56
Quick Start Guide

ASCEND COMMUNICATIONS, INC.

R **Road Map**

Starting from the top, the normal process for configuring and operating your Multiband Plus-SW56 follows:

1 Preview *Multiband Plus-SW56 Quick Start Guide*.

2 Do I have enough information?

What do I ask/tell my WAN provider? → See Chapter 4, section 4.4.3.

How do I wire my interface? → See Chapter 4.

I need an introduction to Multiband Plus and its terminology. → See Chapters 1 and 2 and Appendices C and F.

3 Complete *Multiband Plus-SW56 Quick Start Guide*, and in particular section 1 "Absolutely Important Information."

4 Where can I find an overview to Multiband Plus's menus and editor? → See the menu tree in Chapter 5. See also Appendix A and section 3.3 of Chapter 3.

5 Where can I find detailed information on Multiband Plus's parameters? → Profiles and their parameters are listed alphabetically in Chapter 6. For the names of each profile and its parameters, see the tables in Chapter 5.

6 Configure Multiband Plus for my application.

Configure Multiband Plus's operator security levels. → See Chapter 3, section 3.4.

Configure Multiband Plus's incoming/outgoing call routing. → See Chapter 3, section 3.7 and the "Call Routing" appendix.

Configure Multiband Plus's remote management interfaces. → See Chapter 3, section 3.15 (CDR) and Appendix B (MIF).

Configure Multiband Plus's inverse multiplexing features. → See Chapter 3, sections 3.16, 3.17 (Backup-and-overflow of nailed-up circuits), 3.18 (DBA), and the "Inverse-Multiplexing" appendix.

Configure the X.21, RS-366, or V.25 bis parameters. → See Chapter 3, sections 3.10 through 3.12 and the "RS-366, V.25 bis, X.21, Lead Dialing" appendix.

Configure Multiband Plus's miscellaneous features. → See Chapter 3, sections 3.9 (dual-port calls), 3.14 (calling limits).

7 Operating Pipeline can include the follow-
  ing tasks.

Operating management overview. ➤ | See Chapter 4, section 4.5. |

Dialing, clearing, or answering calls features. ➤ | See Chapter 3, section 3.19 and **DO Answer**, **DO Dial**, and **DO Hang Up** in Chapter 6. |

Managing inverse-multiplexed calls bandwidth. ➤ | See **DO Extend BW** and **DO Contract BW** in Chapter 6. |

Troubleshooting and diagnosing status. ➤ | See Chapters 7 and 8. See **DO Beg/End Rem Mgm**, **DO Beg/End BERT**, **DO Resynchronize**, and **DO Beg/End Rem LB** in Chapter 6. See **System Reset** in Chapter 6. See also Appendix D (error counting). |

Backing up and Restoring Multi-band Plus's configuration profiles. ➤ | See Chapter 3, sections 3.5 and 3.6. |

Managing Multiband Plus. ➤ | See section 4.5 in Chapter 4 and **DO Password**, **Use MIF**, and **DO Beg/End Rem Mgm** in Chapter 6. Also see Appendix B on MIF. |

Multiband Plus-SW56
Step-by-Step Quick Start

Begin here to learn the basics of Multiband Plus-SW56.

- ## Absolutely Important Information
  Answering the questions on page 2 through page 3 supplies the core data required by any installation.

- ## Powering On, Connecting Up, and Getting Around
  This section contains unpacking, inspecting, connecting a terminal, and connecting lines and cables. It also introduces Multiband Plus's screens and menus.

- ## Configuring the Multiband Plus-SW56
  You perform a simplified configuration of the unit — enough to ensure that the Multiband Plus-SW56 is fully functional and that the S56-2/4 (switched-56 2-wire or 4-wire) interfaces are active and connected.

- ## Testing the Connections
  This section takes you through simple tests of the connections the S56-2/4 lines.

Section 1. Absolutely Important Information

Before you begin, check to make sure you know where to go to get the critical information required by Quick Start.

- installation plan

  The checklist in this section should be a subset of your installation plan.

- your LAN and WAN (SW56) managers

- the WAN (SW56) provider, typically a telephone company

- The *Multiband Plus-SW56 User Documentation Guide*

  Chapter 5 "Parameter Summary"shows the menu structure and parameter defaults. Chapter 6 "Reference to Edit Menus"details each parameter. Chapter 4 "Planning and Specifications" describes how to connect Multiband Plus to SW56 lines.

Setup requirements

A suitable place to install Multiband Plus where it can connect to the WAN and LAN

Circle one:
Yes / No

At least two active and installed switched-56 lines (2-wire or 4-wire) accessible from the unit that provide switched data service

Circle one:
Yes / No

NOTE: Quick Start requires two lines for Multiband Plus to place a call to itself as in the following illustration.

WAN

WAN I/F

Multiband Plus
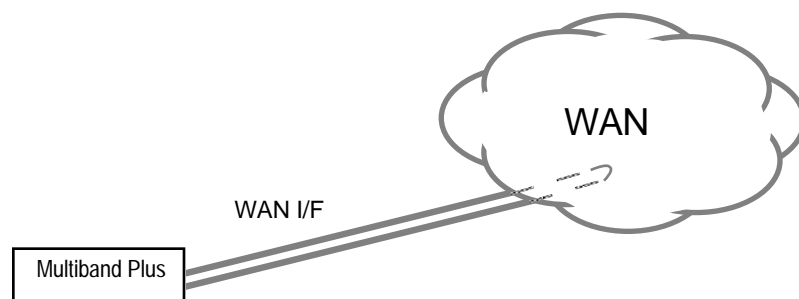
Figure 1: Testing the WAN Interface by
Placing a Call to Yourself

Configuration data

Provide the following information in the spaces provided. **Do not skip any steps**. Notice that each step gives **parameter** names in bold, which correspond to a parameters listed in the "Reference to Edit Menus" chapter of the *Multiband Plus-SW56 User Documentation Guide*.

Line Profile Parameters (Line Config Menu)

Enter for each installed switched-56 line, whether the is *Switched*, *Nailed*, or *Unused* (**Ch Usage** parameter) and the Phone Number(s) (**Phone Num** parameter) dialed to reach your Multiband Plus through that line. Note that the phone numbers entered are the ones used to call this Multiband Plus, not those used to dial out.

A list of all lines is not essential for Quick Start, but might be needed by some applications. The self-call test in these procedures requires two switched lines.

Line	Ch Usage	Phone Num

Phone Num. Enter the phone number of each line.

Ch Usage. Enter: *Switched, Nailed, or Unused* for each line.

Call Profile Parameters (Directory Menu)

For the test in which Multiband Plus calls itself, enter the phone number to be dialed (`Dial #` found in the `Directory` menu). See the preceding table and use the phone number of the second switched channel.

Enter **Dial**# used to call Multiband Plus's second switched channel
_____

NOTE: Although Quick Start covers the core parameters, some parameters appropriate to it might later be reconfigured to meet the special needs of your application. For complete information, see "How to Find the Information You Need" in Chapter 1 in the Multiband Plus-SW56 User Documentation Guide.

NOTE: Quick Start documents Multiband Plus-SW56 running at software revision 3.4P. Any changes subsequent to the publication of this volume are described in the Release Notes.

Section 2. Powering On, Connecting Up, and Getting Around

This section includes connecting your Multiband Plus to a terminal and powering it up. You'll also learn how to get around the menus and edit the Multiband Plus configuration.

Starting Up

1 Unpack the equipment.

2 √ **Check**: Do the contents match your sales order?
If YES: Continue with the next step.
If NO: Call the person with whom you placed the order.

3 Physically install Multiband Plus. If rack-mounted, retain a one-unit (approximately 1 inch) air gap for cooling between Multiband Plus and any other devices mounted above.

4 Plug in the Palmtop and/or VT-100 terminal (or PC with terminal emulator) into the **Palmtop** and **Control** ports, respectively, as shown in the following figure. The Control port is a serial port and it can be connected directly to a PC serial port using the null-modem cable supplied by Ascend. Many PC communications programs can be used to emulate a VT-100 terminal and establish the connection. If using a VT-100 or emulator, set it up to operate at 2400 bits/s, 8 data bits, no parity, 1 stop bit.

Multiband Plus optionally is equipped with the Palmtop, a hand-held terminal. Do not exceed 10 feet (3 m) cable length between the Palmtop port on Multiband Plus and the Palmtop.

PALMTOP

Front Panel
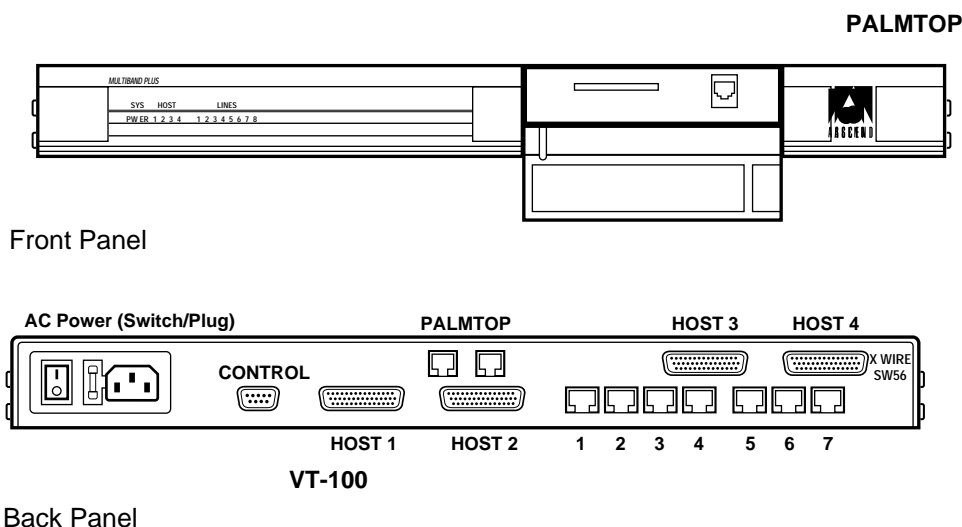
Back Panel

Figure 2: Front and Back Panels of Multiband Plus-SW56

5   Plug in AC Power and then press AC Power switch to ON
     position. The *power on self test* (POST) should begin immedi-
     ately and conclude within 1 minute. While POST is running
     observe the LEDs.

6   Observe front panel PW (power) and ER (fault) LEDs.
     √ **Check**: Is the green PW LED on and the red ER LED off?
     If YES: Continue with the next step.
     If NO: Report failure to vendor**.**

7   Observe the Palmtop or VT-100 display during POST. Note
     that thick double lines border the relevant area of the VT-
     100. To move to a different segment of the screen, press **Tab**
     as many times as required.
     √ **Check**: Does POST successfully complete as shown below?
     If YES: Congratulations, Multiband Plus is in place and run-
     ning. Continue with the next step.
     If NO: Report failure to vendor**.**
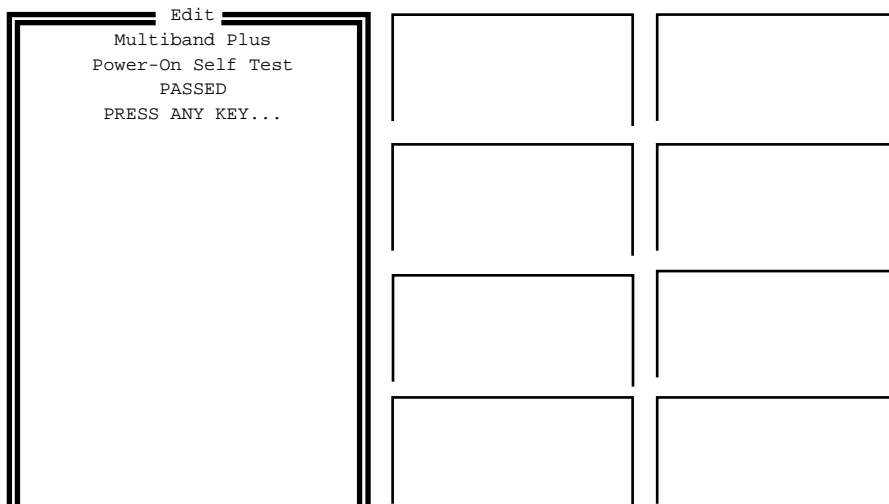
```
        ═══ Edit ═══
       Multiband Plus
     Power-On Self Test
          PASSED
      PRESS ANY KEY...
```

```
Right Arrow/^Z = Select    Left Arrow/^X = Exit      Up Arrow/^U = Up
Down Arrow/^N = Down        PF1/^D = DO!              Tab = Window
```

To simplify this guide, only the portion of the user-interface screen that pertains to the text will be shown. For example, the following illustration shows the portion of the VT-100 display that appears after a successful POST:

```
     Multiband Plus
  Power-On Self Test
         PASSED
   Press any key...
```

The Palmtop consists of a single undivided display, while the VT-100 has nine segments. The Palmtop display has the same number of lines and characters as one of the smaller VT-100 segments. Note that the user-interface illustrations in this guide sometimes show more than the four lines available in the Palmtop.

Before you can place an actual call, you must first edit the line configuration.

8   Press any key. The following screen appears to remind you of what needs to be done next.

```
  Edit Line Config
  before dialing
   Press any key...
```

9   Press any key. You are in the **Main Edit Menu**. The specific content of line 4 of this menu varies:

```
  Main Edit Menu
  >00-000 System
   10-000 Net/S56-2/4
   20-000 Host/...
```

Making the Physical Connections

Once the Multiband Plus-SW56 is powered up, it's ready to be connected to its lines.

Connecting to the SW56 Line

1   Connect the Multiband Plus to the switched-56 lines, using the WAN ports in the back of the unit. Connect line #1 (the left-most connector) first.

Throughout this procedure, examples show four lines. In practice, your system could have a different number of SW56 ports or lines installed.

Multiband Plus-SW56   Demarcation Point

Look for the RJ-48 WAN ports (SW56) on the back panel.
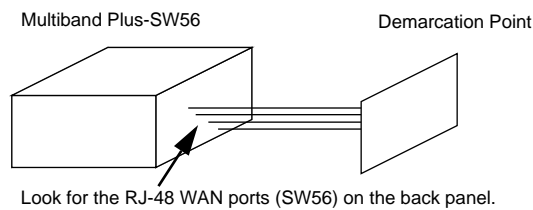
Figure 3: SW56 network (WAN) Interface Wiring

Quick Start does not install any security features. To protect from unauthorized users, turn off power after you have completed Quick Start, or if you interrupt these procedures. For a description of security, see the *Multiband Plus-SW56 User Documentation Guide.*

Getting Around the Menus

If you are already familiar with getting around the Multi-band Plus menus, you can skip this section. If you're not familiar, this section contains essential information on navigating the menus, editing fields, and understanding the menus and displays — the control interface.

NOTE: Your screen might appear somewhat different from the "generic" menus illustrated.

1   The **Up-** and **Down-Arrow** keys move up and down within a menu or submenu.

At the ***Main Edit Menu***, use the **Up-** and **Down-Arrows** to highlight different selections with the angle-bracket (>) cursor.

```
Main Edit Menu
 00-000 System
>10-000 Net/S56-2/4
 20-000 Host/..
```

2   The **Right-Arrow** makes selections; that is, it selects either a menu/submenu or an editable parameter. Selecting a menu displays its contents, while selecting an editable parameter either opens it for editing or toggles its value.

From the ***Main Edit Menu***, select the ***Net/S56-2/4*** menu:

```
10-000 Net/S56-2/4
>10-100 Line Config
```

Select the ***10-100 Line Config*** menu:

```
10-100 Line Config
>10-1** Factory
 10-101
 10-102
 10-103
```

This menu also illustrates another feature; that is, some menus are simply numbered lists of profiles.

A thorough discussion of using the Control Interface is found in the Multiband Plus-SW56 User Documentation Guide.

Alternatively you can use Control key combinations: **Up**=**Ctrl-U**, **Down**=**Ctrl-N**, **Left**=**Ctrl-X**, **Right**=**Ctrl-Z**.

*When Quick Start says **select**, an item, it means "Move the cursor to the item with the Up- or Down-Arrow key, then press the Right-Arrow key to open the menu or edit the parameter." This is true whether the item is another menu or a parameter.*

A *profile* is simply the set of parameters that configure how an object functions. For example, a *Line Profile* is composed of parameters that prescribe Multiband Plus's interface to SW56 lines. Since more than one such line can interface to Multiband Plus, it includes parameters such as a *Enabled,* that specify whether any particular line is used. The menu above lists four different Line Profiles.

The first profile in this and some other cases, is the *active* profile. The asterisks (**) in the menu number *10-1*** indicate *the currently active profile*. Note that the currently active Line Profile has a default name—in this case, "Factory"—that you can change if you like. The three remaining profiles are kept in storage and can replace the current profile.

3   Continuing the exercise, select the **Factory** profile.

```
10-1** Factory
>Name=Factory
 Line 1...
 Line 2...
```

Now, select the **Name** parameter. When the following appears, you can edit the *Name* parameter:

```
10-1** Factory
 Name=
 [Factory]
 Line 1...
 Line 2...
```

Change "Factory" to some other name—for example, "SW56 Profile." You can use the **Backspace** key or **Delete** keys to delete characters. When you're done editing, press the **Enter** key to return to the other parameters.

```
10-1** Factory
 Name=SW56 Profile
 Line 1...
 Note: remaining lines not shown
```

The menu title still says, "Factory," even though you changed the name. This is because the change isn't permanent yet.

NOTE: When you see three periods, or dots (**...**), after an item in a menu, it means there is a further submenu, a further list of parameters. Selecting **Line 1...** The following **Line 1...** submenu appears. Do not change any parameters.

```
Line 1...
>Enabled=Yes
 Ch Usage=Switched
 Phone Num=
Note: remaining lines not shown
```

4   Press the **Left-Arrow** key to back out of *Line 1.* While the **Right-Arrow** takes you further down the menu structure, the **Left-Arrow** takes you back up toward the main menu.

Press the **Left-Arrow** again to back out of *10-1** Factory* and you'll see the following confirmation menu:

```
EXIT?
>0=ESC (Don't exit)
 1=Exit and discard
 2=Exit and accept
```

Previously, you changed the name of the "Factory" Line Profile to "SW56 Profile" or some other name, and now the Control Interface wants to know if you want to save your changes. You must confirm all changes you make to the Multiband Plus configuration. The confirmation is not requested for each item or each set of parameter options, but is required when you exit a menu or profile. You can choose to accept the changes and exit to the next higher menu, to discard and exit to the next higher menu, or to return to the menu you just left.

In our exercise, press **1** to exit and discard the name change. Press **Left-Arrow** until you return to the **Main Edit Menu**.

To summarize some of the lessons in the exercise:

•   **Up-** and **Down-Arrow** keys select items on a menu.

•   **Right-Arrow** opens the selected menu or edits the selected object.

•   When the manual asks you to *select* an item or parameter, the meaning is, "Move the cursor to the item with the **Up** or **Down-Arrow** key and press the **Right-Arrow** key to open the menu or edit the item."

•   **Left-Arrow** backs out toward the main menu.

- When you edit a field, you can use the **Backspace** or **Delete** keys to delete characters. The **Enter** key accepts the changes and returns you to the menu. (You can also use the **Right-Arrow** key to accept changes at the end of the field.)

- When you see a list of editable parameters it is a *profile*. When several objects of the same type need to be configured by profiles, a numbered list of profiles of that type appears in a menu.

- When you see three dots (*...*) after a menu item, it means there are additional options on a submenu.

- When you see an asterisk or two (**) beside an object, it means the object is active, for example, the active line profile.

- When you make changes to the configuration, you need to confirm the changes. The confirmation menu allows you to save the changes, discard the changes, or return to continue editing the menu or profile.

You are now ready to perform the Quick Start configuration on your Multiband Plus-SW56!

Section 3. Configuring the Multiband Plus-SW56

The following configuration establishes enough function- ality to verify that Multiband Plus is up and running, con- nected and can perform basic functions.

Quick Start configuration involves modifying the following:

- Line Profile

  Parameters that apply to the SW56 lines

- Call Profile

  Parameters that apply to the establishment of a WAN link that provides a point-to-point circuit between syn- chronous serial devices

This procedure assumes you have not yet configured Multi- band Plus; therefore, all parameters initially are at their fac- tory default settings. Do not turn the Multiband Plus off during this procedure.

Configuring the Lines

The flowchart on the following page presents a picture of the steps to this procedure.

1   From the ***Main Edit Menu***, select ***10-000 Net/S56-4 or S56-2***, depending on whether you have 4-wire or 2- wire lines.

```
Main Edit Menu
 00-000 System
>10-000 Net/S56-2/4
```

2   The following menu appears:

```
10-000 Net/SW-4
>10-100 Line Config
```

Refer to page 3 for the value of the Line Profile parameters.

Main Edit Menu	Net/SW-.. menu	Line Config menu	10-1** Line Profile	Line 1.. etc.
00-000 System	10-100 Line Config	10-1** Factory	Name=...	Enabled= Yes
			Line 1...	Ch Usage=...
start → 10-000 Net/S56-..			Line 2...	Phone Num=...
			Line 3...	Port/Grp=..
20-000			etc.	

Configure Line 3... if
two switched channels
are not available on
Lines 1 and 2.

exit and save
current Line Profile
←
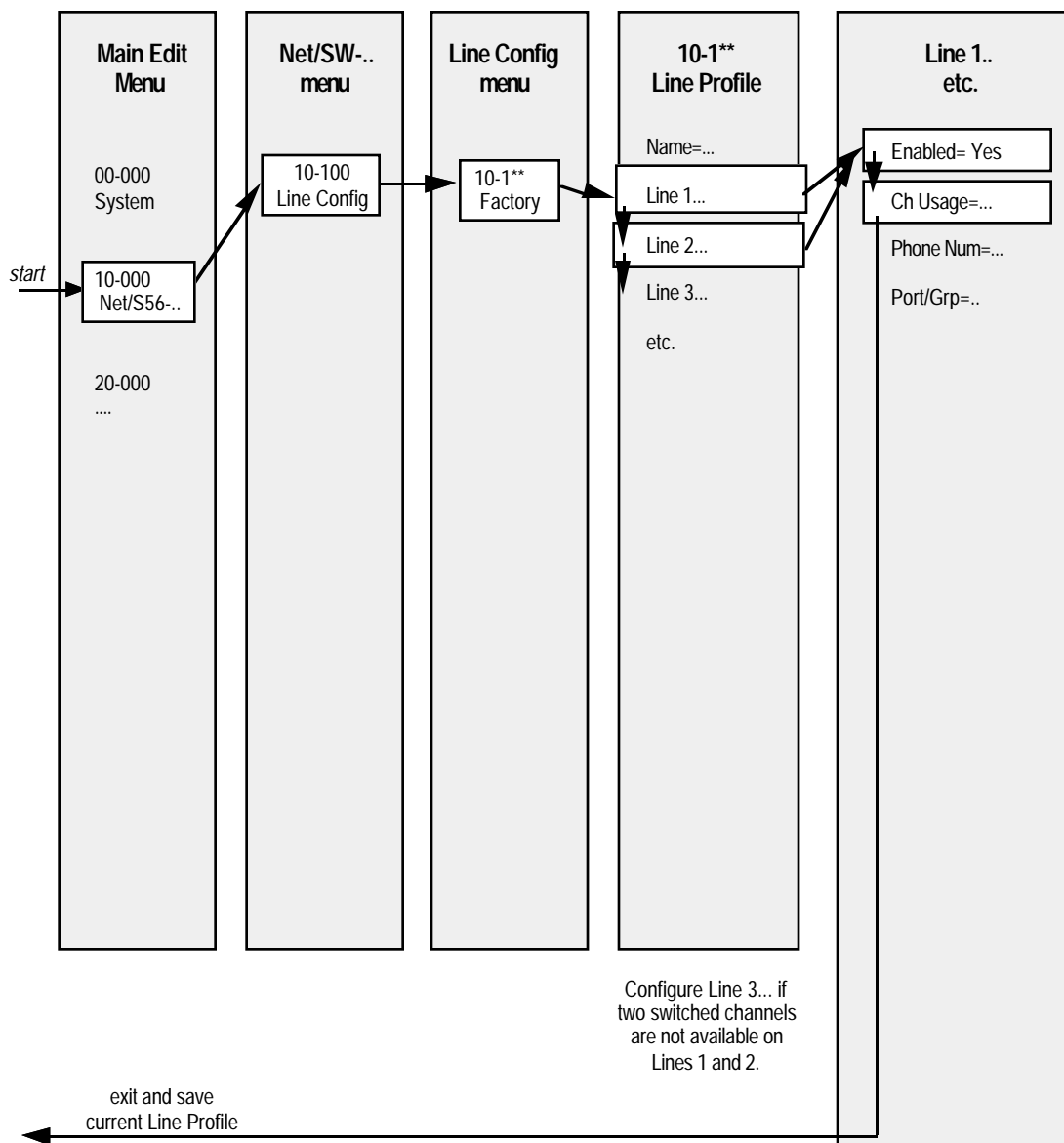
Figure 4: The parameters involved in configuring your switched-56 interface

Configuring the Lines   *Comments*

---

3 Select the `10-100 Line Config` menu. The following
menu appears:

```
10-100 Line Config
>10-1** Factory
 10-101
 10-102
 10-103
```

4 Select the currently active Line Profile, `10-1** Factory`.
The following menu appears:

```
10-1** Factory
>Name=Factory
 Line 1...
 Line 2...
 Line 3...
 Line 4...
```

*The Factory Line Profile is the factory-installed profile which appears on all newly installed units. You can edit the parameter values of Factory, or, if you wish, you can change the name Factory to some other name. The unedited Factory parameter values are the **default** parameter values.*

5 Select `Line 1...` The following list of parameters appears:

```
10-1** Factory
>Line 1...
 Enabled=Yes
 Ch Usage=Switched
 Phone Num=
 Port/Grp=
```

6 Select and, if necessary, modify the following Line #1 parameters:

• `Enabled`: Select "Yes."

• `Ch Usage`
Select the channel usage for the line by pressing Right-Arrow to cycle through the possible values.
If Switched: Switched is the factory default.
If Nailed: Press Right-Arrow to select Nailed.
If Unused: Press Right-Arrow twice to select Unused.
Repeat this step (6) **until you have configured all lines**.

*For the purpose of the self-call test later in Quick Start, you need to have **two switched channels**.*

You do not need to enter phone numbers (`Phone Num`) to enable SW56 lines or for any Quick Start call.

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7 Press Left-Arrow twice to exit the current Line Profile. In the Confirmation menu, Press 2 to save your configuration and exit to the Line Config menu as seen in step 4.

```
EXIT?
>0=ESC (Don't exit)
 1=Exit and discard
 2=Exit and accept
```

8 √ **Check**: After the switched-56 lines provider has established service, observe Multiband Plus's front panel LEDs to make sure your setup is functioning properly. Is PW (power) on, ER (error/fault) off, and LINES-1 and LINES-2 (asuuming you connected lines #1 and #2) on and steady? Also check the LEDs of other lines provided by the network that you have connected.
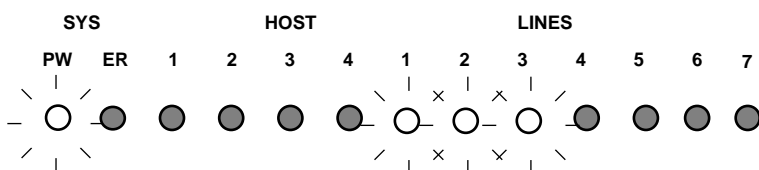
Figure 5: Front Panel LEDs, Lines 1, 2, & 3 Active

- **If LEDs indicate normal operation:** Continue with the next section.

- **If LEDs indicate a problem:** This usually indicates a cabling problem, although in some cases it may be a problem in the lines. To check the cabling, refer to the "Planning and Specifications" chapter in the *Multiband Plus-SW56 User Documentation Guide.* To check the lines, contact your switched-56 line provider. If your switched-56 provider and ask if the lines are in service and if they can be checked. Repeat this procedure after corrective actions have been made; otherwise proceed to the next step.

9 Press Left-Arrow until you return to the **Main Edit Menu**. Proceed to the next set of steps.

Configuring the Connections

In this section, you configure Multiband Plus for a test in which it calls itself across the WAN.

Configuring a Test Call Profile

Call Profiles give the parameters associated with a link that transports unpacketized serial data. The Call Profile in this procedure has Multiband Plus call itself and thereby test the S56-2/4 line.

The flowchart on the following page presents a picture of this set of steps.

1   From the **Main Edit Menu**, select the **20-000 Host/Dual or Host/Quad** menu. The Host/Dual menu is shown in the following example:

```
Main Edit Menu
  00-000 System
  10-000 Net/S56-2/4
 >20-000 Host/Dual
```

A **Host/..** submenu similar to the following appears:

```
20-000 Host/Dual
>21-000 Port1 Menu
 22-000 Port2 Menu
 20-100 Host Config
```

2   Select the **21-000 Port1** menu. The following menu appears:

```
21-000 Port1
>21-100 Directory
 21-200 Port Diag
 21-300 Port Config
```

3   Select **21-100 Directory**. A list of Call Profiles appears. The following shows only the first four lines of the menu, which contains Call Profiles from 1** to 132:

```
21-100 Directory
>21-1** Factory
 21-101
 21-102
Note: remaining lines not shown
```

Main Edit Menu	**Host/.. menu**	**Port1 Menu**	**Directory menu**	**21-1** call profile**
00-000 System	21-000 Port1 Menu	21-100 Directory	21-1** Factory	Name=...
				Dial #=...
				Call Type=1 Chnl
10-000 Net/..	22-000 Port2 Menu	21-200 Port Diag	21-101	Call Mgm=..
				Data Svc=...
				Base Ch Count=...
start → 20-000 Host/...	23-000 Port3 Menu	21-300 Port Config	21-102	Inc Ch Count=...
				Dec Ch Count=...
	24-000 Port4 Menu		21-103	Auto-BERT=...
				Bit Inversion=...
				Fail Action=...
	20-100 Host Config		21-104	Group=...
				FT1 Caller=...
				etc.
			21-105	
			etc.	

exit and save current call profile ←

Figure 6: Configuration of Current Call Profile of Host Port #1 for Test Call

4   Select **21-1** Factory**, the current Call Profile. A list of
parameters appears. The following shows only the first four
lines of this Call Profile:

```
21-1**=Factory
>Name=Factory
 Dial #=
 Call Type=AIM
Note: remaining lines not shown
```

*Refer to page 3 for the value of the
Call Profile parameters.*

5   Select and modify the following **Factory** parameters:

*In this procedure, Multiband Plus places
a call on the first switched channel and
answers on the second. Therefore, this
step enters the phone number of the
second switched channel. (Note, in some
cases several channels can share the same
phone number which is called a hunt
group.)*

•   **Dial #**
Type the phone number for the second switched
channel as the number to be dialed, then press Enter.

```
21-1**
 Dial #:
   [555-1515]

Note: remaining lines not shown
```

•   **Call Type**
Press Right-Arrow until you select **Call Type=1 Chnl.**

*Selecting Call Type=1 Chnl
means that the call will be placed
using only a single channel, without
inverse multiplexing.*

```
21-1**=Factory
 Name=Factory
 Dial #=
>Call Type=1 Chnl
Note: remaining lines not shown
```

6   Press Left-Arrow *twice* to exit the current Call Profile.

7   At the confirmation menu, press 2 to keep the changes you
have entered in the Call Profile.

```
EXIT?
>0=ESC (Don't exit)
 1=Exit and discard
 2=Exit and accept
```

8   Press Left-Arrow until you return to the **Main Edit Menu**.

Section 4. Testing the Connections

Testing the connections assumes you have successfully configured the Multiband Plus-SW56 in the previous section. The following tests are involved:

- Testing the SW56 Line

  Placing and answering a test call to from Multiband Plus-SW56 to itself over the SW56 interface. This tests the S56-2/4 lines to make certain they are active and the phone numbers are correct.

- Connecting to Serial Host and Loopback

  This is a specialized test primarily of value if the unit is connected to a videoconferencing coder/decoder (codec). Otherwise, this test can be skipped.

Testing the SW56 Line

In this procedure, Multiband Plus places a test call to itself.

1 From the **Main Edit Menu**, return to the Directory entry you previously configured for a call to yourself ("Config-uring a Test Call Profile" on page 17). You do this by first selecting **Host/Dual** or **Host/Quad** from the **Main Edit Menu**. Then select **Port1 Menu** and from the **Port1 Menu** and move the cursor to the current call profile.

2 √ **Check**: What type of terminal are you using to operate Multiband Plus?
If Palmtop Controller: Continue with step 7.
If VT-100 (or emulator): Continue with the next step.

3 (Steps 3-6 are for VT-100 users.) Press Ctrl-D and then press 1 (Dial) to place the test call.

4 Observe the Call Status displays. The Call Status display for host port #1 (numbered 21-100) appears in the middle column, second from the top of the following illustration.

Also observe the 10-100 (Line Status) display. It should show first one asterisk (*) and then a second asterisk (*), indi-cating two channels online, that is, Multiband Plus places a call to itself, dialing on one channel and receiving on the other.

The 00-200 (Message Log) should record "Outgoing Call" and "Incoming Call" and then show that a port is assigned to the call. Also observe the Call Status display for host port #2 (numbered 22-100) which receives the call:

```
 ┌────── East Coast MB Edit ──────┐   ┌──────────────────┐   ┌──────────────────┐
 Main Edit Menu                       10-100 1234            00-200 11:23:55
 >00-000 System                        Link  AAAA            M31 Line   Ch
  10-000 Net/S56-..                    Call  **..            Assigned to port
  20-000 Host/..                   └──────────────────┘   └──────────────────┘

                                   ┌──────────────────┐   ┌──────────────────┐
                                   21-100            O     21-200            O
                                    ONLINE                 Qual Good 01:23:44
                                    56K     1 channels     Max Rel Delay
                                                           CLU 100%  ALU 100%
                                   └──────────────────┘   └──────────────────┘

                                   ┌──────────────────┐   ┌──────────────────┐
                                   22-100            O     22-200            O
                                    ONLINE                 Qual Good 01:23:44
                                    56K     1 channels     Max Rel Delay
                                                           CLU 100%  ALU 100%
                                   └──────────────────┘   └──────────────────┘

                                   ┌──────────────────┐   ┌──────────────────┐
                                   00-100 Sys Option      Main Status Menu
                                   >Security Prof:1        >00-000 System
                                    Software +2.0           10-000 Net/S56-..
                                  s  S/N:42901              20-000 Host/..
 └────────────────────────────┘   └──────────────────┘   └──────────────────┘


   Right Arrow/^Z = Select    Left Arrow/^X = Exit      Up Arrow/^U = Up
   Down Arrow/^N = Down        PF1/^D = DO!              Tab = Window
```

5 √ **Check**: Wait 5 to 30 seconds for Multiband Plus to dial and answer. Do two channels in the 10-100 (Line Status) display go online as indicated by two asterisks (*) as in the illustration above?
Does **ONLINE** appear in the second line of the 21-100 (Call Status) display of host port #1?
If YES. Continue with the next step.
If NO: This procedure has failed. To repeat, first return all parameters that you changed to their default values.

See the "Reference to Status Menus" chapter of the Multiband Plus-SW56 User Documentation Guide for further information on the status screens.

The 22-100 Call Status display for host port #2 should also show **ONLINE***. This test places a call from host port #1 to host port #2.*

6 Congratulations. You have successfully completed a test call through the WAN to yourself. Press Ctrl-D and then 2 to hang up. Press Left-Arrow twice to return to the Main Edit Menu. Continue with the next procedure.

7 (Steps 7-10 are for Palmtop Controller users) Press DO and then press 1 to place the test call.

8 Observe the Call Status display for host port #1, which automatically appears. When the call has been dialed and

answered, **ONLINE** should appear in the second line as shown in the following illustration:

```
┌─────────────────────────────┐
│ 21-100                    O  │
│   ONLINE                    │
│   56K    1 channel          │
│                             │
└─────────────────────────────┘
```

9   √ **Check**: Wait 10 to 30 seconds for Multiband Plus to dial and answer. Does **ONLINE** appear in the second line of the Call Status display?
If YES. Continue with the next step.
If NO: This procedure has failed. To repeat, first return all parameters that you changed to their default values.

The most frequent cause for failing to connect is incorrect phone numbers.

See the "Reference to Status Menus" chapter of the Multiband Plus-SW56 User Documentation Guide for information on Call Status.

10   Congratulations. You have successfully completed a test call through the WAN to yourself. Press DO and then 2 to hang up. Press Left-Arrow twice to return to the Main Edit Menu. Then press Up-Arrow as required to return to the first item in the Main Edit Menu.

*The Call Status display for host port #2 (menu number 22-100) should also show **ONLINE**. This test places a call from host port #1 to host port #2.*

Connecting to the Host and Loopback

This procedure connects your host equipment to Multiband Plus and establishes a local loopback over that connection. If your host equipment is a videoconferencing coder/decoder (codec), such a loopback can test the connection, but for other host equipment such as routers, the local loopback steps have no value and should be omitted.

The flowchart on the following page presents a picture of this set of steps, beginning with step 5.

In local loopback, data sent from the host is received by the host after passing through Multiband Plus's host interface. Multiband Plus supplies the clock for the data interface.

1   Locate the host ports on the back panel of Multiband Plus.
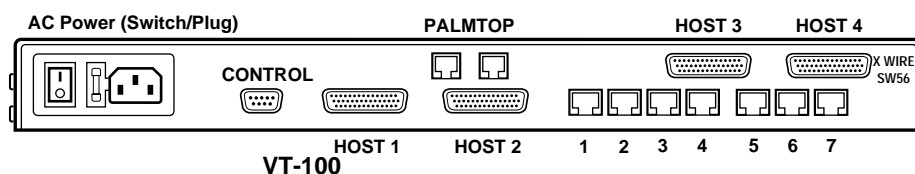
Figure 8: Back Panel of Multiband Plus

2   Locate the serial data ports on your host equipment.

Multiband Plus supports V.35, RS-449/422, and X.21 data ports.

3   Using the host cables specified in your installation plan, connect Multiband Plus to your host equipment as shown in the following figure:

In this test, locate host equipment and Multiband Plus in the same room. I

Figure 9: Connect to Host

Look for "HOST 1"on back panel.

Depending on the type of host equipment, you might need to connect both HOST 1 and HOST 2, in which case, two host cables are needed.
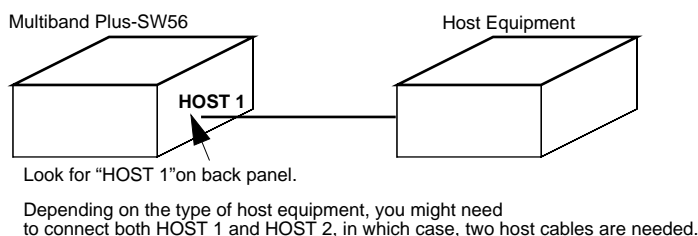
4   √ **Check**: Is your host equipment a videoconferencing codec or other device for which a local loopback would provide a valid test?
If YES: Continue with the next step.
If NO: This step concludes this procedure.

If local loopback is not a valid test, as an alternative test you might wish to connect a second host to HOST 2 on Multiband Plus and establish a call between HOST 1 and HOST 2 as in the next procedure, "Testing the SW56 Line."
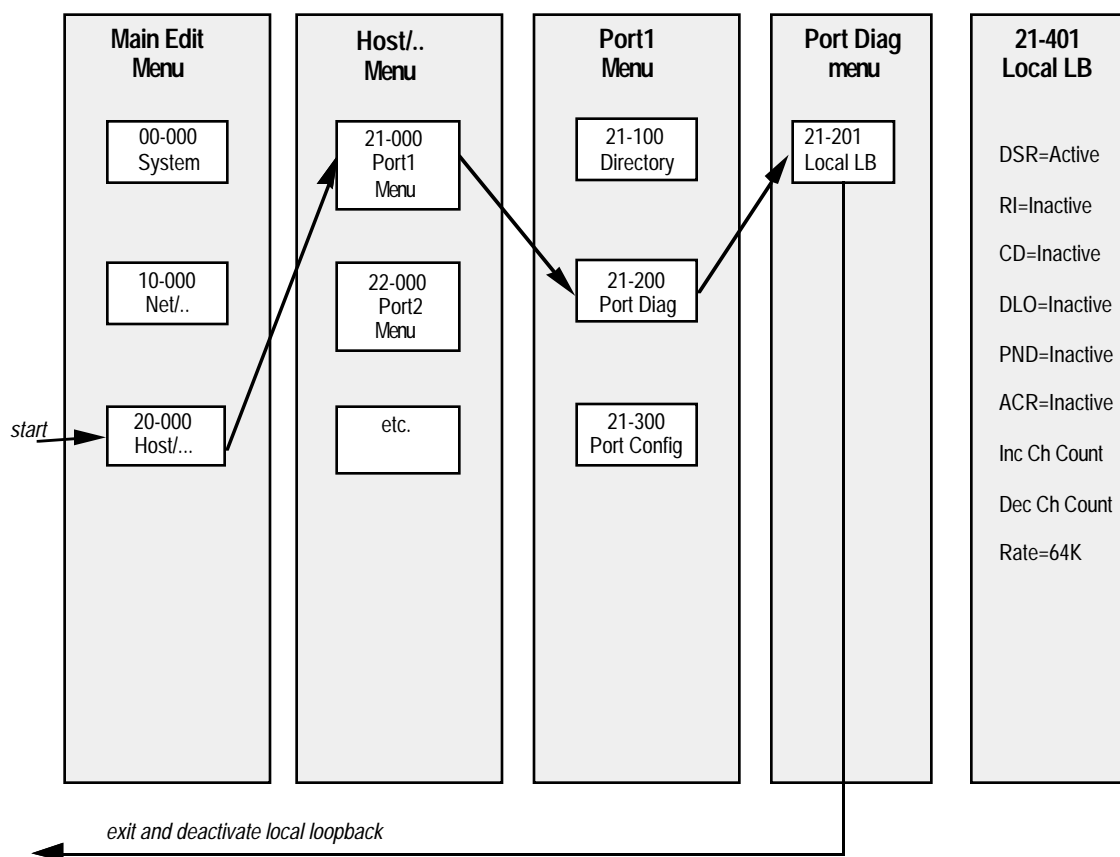
Main Edit Menu	Host/.. Menu	Port1 Menu	Port Diag menu	21-401 Local LB
00-000 System	21-000 Port1 Menu	21-100 Directory	21-201 Local LB	DSR=Active
				RI=Inactive
				CD=Inactive
10-000 Net/..	22-000 Port2 Menu	21-200 Port Diag		DLO=Inactive
				PND=Inactive
				ACR=Inactive
20-000 Host/...	etc.	21-300 Port Config		Inc Ch Count
				Dec Ch Count
				Rate=64K

start →

exit and deactivate local loopback

Figure 7: Sequence of steps to activate local loopback

5   From the **`Main Edit Menu`***,* select **`20-000 Host/Dual`**
`or Host/Quad` menu. The **`Host/Dual`** menu is shown in
the following example:

```
Main Edit Menu
  00-000 System
  10-000 Net/S56-2/4
 >20-000 Host/Dual
```

A **`Host/`** submenu similar to the following appears:

```
20-000 Host/Dual
>21-000 Port1 Menu
 22-000 Port2 Menu
 20-100 Host Config
```

6   Select **`21-000 Port1`**. The following menu appears:

```
21-000 Port1
>21-100 Directory
 21-200 Port Diag
 21-300 Port Config
```

7   Select **`21-200 Port Diag`**:

```
21-000 Port1 Menu
 21-100 Directory
>21-200 Port Diag
 21-300 Port Config
```

8   Select **`Local LB`** to activate the local loopback:

```
21-200 Port Diag
>21-201 Local LB
```

The following options appear:

```
21-201 Local LB
 DSR=Active
 RI=Inactive
 CD=Inactive
 Note: remaining lines not shown
```

9   √ **Check**: Is your host equipment verifying the loopback?
If YES: Continue with the next step.
If NO: This test has failed. Check the host cabling. Call your
equipment vendor for further help.

10   Press Left-Arrow to deactivate local loopback.

11   Press Left-Arrow *three times* to return to the Main Edit Menu.

Congratulations. You have successfully completed the quick
start configuration for your Multiband Plus-SW56.

Multiband Plus-SW56 Release Notes

These release notes describe changes to the *Multiband Plus-SW56 Quick Start Guide* (part number 7820-0056-001) and the *Multiband Plus-SW56 User Documentation Guide* (part number 7820-0055-001).

1   Software Version

These Release Notes cover changes to Multiband Plus-SW56 from software revision 3.4K through 3.4R.

2   New or Changed Features

2.0.1 "Single Answer" New Parameter for Dual-Port Calls

✓   The following information applies to software 3.4R and should be added to Chapter 6.

⇒⇒   **Single Answer** [a System Profile/00-100 Sys Config Menu parameter] has application to dual-port calls.

- If Multiband Plus is not configured for answering dual-port calls or the incoming call is explicitly routed by **Port/Grp**, set **Single Answer**=*No*. In this mode, incoming calls are answered immediately and their routing assigned.

- If Multiband Plus has ports paired for answering dual-port calls and the incoming call is not explicitly routed, set **Single Answer**=*Yes* (the default). In this mode, incoming calls are answered singly; that is, the answering and routing of each incoming call is completed before the next incoming call is answered and routed.

2.0.2 **Software for Very Low Jitter Serial Host Ports**

✓ Software revision 3.4R supports modifications to the synchronous serial host ports of Multiband Plus models. These modifications provides very low jitter to all serial host pots. Prior to these changes, very low jitter clocking was only available in 4-port (Host/Quad) units and only at bandwidth of 1, 2, 3, 4, 6, 8, 12, or 24 DS0 channels. Very low jitter is now available at any number of channels, whether or not the unit has a Host/Quad interface. Furthermore, the restriction that serial host ports 3 and 4 only operated at 1, 2, 3, 4, 6, 8, 12, or 24 DS0 channels has been removed.

2.0.3 **New Value for Dial Parameter when Interfacing to X.21 with PictureTel Codecs**

✓ Software revision 3.4P introduces a new value for the **Dial**. The following bullet should be added under **Dial** in Chapter 6 and to the list of values for Dial in the MIF appendix.

- *X.21 ext1-P* is required when interfacing to a PictureTel X.21 dialer. It uses the same protocol as *X.21 ext1*.

3 Hardware Changes

✓ The X.21 Cable to Generic Serial Host cable described in Chapter 4 has been changed as follows:

If your host is equipped with an X.21 interface, the host cable (model number MBHD-X21, part number 2510-0098-001) has the following pinouts:

Pair #	X.21 Signal Name	Equivalent V.35/RS-449 Signal Name	Multiband Plus Male DB-44	Host Female DA-15
1	G*	SGND*	25*	8
2	T(A)	SD+	29	2
	T(B)	SD-	30	9
3	R(A)	RD+	40	4
	R(B)	RD-	39	11
4	S(A)	ST+	42	6
	S(B)	ST-	41	13
5	C(A)	DTR	8	3
	I(A)	DCD	36	5
6	RX/SEL	RX/SEL	20, 28**	
	I(B)*	SGND*	25***	12***
7	B(A)	BT+	18	7
	B(B)	BT-	19	14
8	C(B)			8, 10****

* Note 1: Both I(B) and G connect to SGND, pin 25 on DB-44.
** Note 2: Pins 20 and 28 on the DB-44 interface jumpered together.
***Note 3: Connect pin 25 (DB-44) to pin 12 (DA-15) through a 200 Ohm resistor.
****Note 4: Connect pin 8 (DA-15) to pin 10 (DA-15) through a 200 Ohm resistor.

4 Operational Problems Corrected

Software revisions 3.4R corrects the following operational problems:

- If Multiband Plus BRI was connected to BRI lines from an NTI switch, and it was attempting to place or answer on multiple channels simultaneously (typically 6 or more), it would fail to place or answer the calls on some of these channels.

Software revision 3.4P corrected the following operational problems:

- The type of serial host port was not identified on port #4 of Multiband Plus units.

- Multiband Plus units running X.21 at a serial host port had problems with the timing of the CD assertion when connected to certain video codecs.

- Operator could not reliably command Multiband Plus to dial through the PictureTel X.21 interface. If call was placed, it was cleared immediately after handshaking.

- If **Force 56** parameter was set to *Yes*, it incorrectly affected AIM calls on MAXs and Multiband Pluses. Since AIM calls convey data service information during handshake, **Force 56** should not apply.

5   Addenda and Errata

5.0.1 Routing Criteria

✓   The "Routing Criteria" section of the Call Routing appendix should be changed as follows:

Incoming call routing can be determined by a number of criteria which are derived from the incoming call itself. The criteria are listed in the order in which they are checked. When incoming call routing is determined, criteria lower in the list are not checked (with the possible exception of dual-port calls).

Port/Grp in the Line Profile
Port/Grp Line Profile parameters specify line-by-line the interfaces that receive incoming calls. Incoming calls that first connect to the switched-56 channel of line #1 are received by the serial host port specified by **Port/Grp** of line #1. Calls coming in on the line #2 look to **Port/Grp** of line #2, and so on.

First Available
When none of the preceding criteria can determine where to route an incoming call, incoming calls are routed to the first available serial host port, but only if **Excl Routing**=*No*. If **Excl Routing** (System Profile parameter) = Yes, Multiband Plus requires specific routing. That is, it clears any calls whose routing cannot be determined by the preceding criteria.

Dual Ports in the Host-Interface Profile
Dual Ports is a Host-Interface Profile parameter that specifies which serial host ports are paired for dual-port calls. If an incoming call (not AIM or BONDING) has been answered by the primary serial host port, the next incoming call (not AIM or BONDING) is sent to the secondary serial host port specified by this parameter. The first channel of such calls are routed by the preceding criteria.

The following gives the conditions under which Multiband Plus cannot determine the routing of an incoming call based on a **Port/Grp** parameter.

- If the call arrives on a channel with **Port/Grp** set to *0*.

NOTE: Multiband Plus routes the first channel of an inverse multiplexed call (AIM or BONDING) as described above. Subsequent channels of the call are aggregated to this connection until reaching the requested number of channels.

5.0.2 **BONDING Calls Cannot Exceed 12 Channels**

✓ In Chapter 6, under **Call Type**, the following note should be added adjacent to the paragraph describing *BONDING*:

> **BONDING** calls cannot exceed 12 channels.

5.0.3 **Force 56 Parameter Clarification**

✓ In Chapter 6, under **Force 56**, the following note clarifies when this parameter is not used.

> **Force 56** is not used with *AIM* call types which determine data rate through handshaking between the caller and answerer.

5.0.4 **Delay Dual Parameter Was Incorrectly Called Dual Delay**

✓ Chapter 5, 6, and Appendix B incorrectly referred to the **Dual Delay** parameter, which actually is **Delay Dual**.

Appendix X
Controlling Dynamic Bandwidth

✓ The following replaces the "Controlling Dynamic Bandwidth" appendix (X).

Dynamic control of a call's bandwidth means that Multiband Plus continuously monitors the data traffic it is sending over the call's circuits and calculates the percentage utilization of that call's bandwidth. Based on one of three selectable dynamic algorithms and other user-defined parameters, Multiband Plus then decides whether or not to add or subtract bandwidth. This appendix describes the function of these parameters.

X.1 DBA

Dynamic control of the bandwidth of a call between serial hosts is a configuration option of your Multiband Plus. If present, you can choose to apply it to AIM, FT1-B&O, and FT1-AIM calls by setting the **Call Mgm** Call Profile parameter to *Dynamic*. Dynamic control of bandwidth between serial hosts is also referred to as *DBA* (Dynamic Bandwidth Allocation).

X.2 Parameters

The following parameters control the bandwidth of DBA calls. See Chapter 6 for a description of each.

⇒⇒ **Base Ch Count**

⇒⇒ **Max Ch Count**

⇒⇒ **Min Ch Count**)

⇒⇒ **Sec History**

⇒⇒ **Dyn Alg**

⇒⇒ **Add Pers**

⇒⇒ **Sub Pers**

⇒⇒ **Target Util**

⇒⇒ **Flag Idle**

⇒⇒ **Time Period 1...** to **Time Period 4...**

NOTE: You can reconfigure these parameters at any time, even while a session is in progress.

NOTE: You do not need to have both ends of a DBA call dynamic; that is, you do not need to set **Call Mgm** Call Profile parameter to *Dynamic* at both ends. If you only set one end to *Dynamic* and the other end to *Manual*, only the *Dynamic* end controls adding or subtracting bandwidth under DBA control, regardless of which end placed the call.

X.3 DBA Requirements

To implement DBA on calls between serial host devices, the bit stream between the devices must use HDLC encoding, or an HDLC derivative scheme (like SDLC) at the frame layer. Most synchronous communications devices use HDLC-derived encoding, including bridges, routers, SNA networks, X.25 networks, and frame relay links.

Every second, Multiband Plus samples the transmit bit stream to determine what percentage of the time it is idle and what percentage of the time it is utilized. Multiband Plus can identify an idle bit stream by detecting either the flag pattern or mark pattern. Neither of these patterns occurs within a frame. When the serial host, also called the data terminal equipment (DTE), has no data to send, it transmits one of these two patterns.

NOTE: If the data stream does not use HDLC-derived encoding, the bandwidth appears to Multiband Plus to be 100% utilized. Multiband Plus cannot adjust the bandwidth allocated to the call based on traffic in this case.

X.4 Dynamic Algorithms

This section describes the algorithms used in calculating percentage utilization of bandwidth.

Algorithms
The **Dyn Alg** parameter specifies the history algorithm. Three different algorithms are available:

Constant Weighting
Dyn Alg=*Constant* treats all the samples within the time window specified by the **Sec History** parameter as equally weighted. The weighted percentage (*Pw)* is calculated as the mean (average) of all the samples.

Older history has the greatest impact on the decision when using this algorithm.

Linear Weighting
Dyn Alg=*Linear* weights the samples within the time window specified by the **Sec History** parameter in linear proportion to the start of the window.

The most recent samples have more influence on *Pw* than the earlier samples.Linear weighting is the most popular form of weighting.
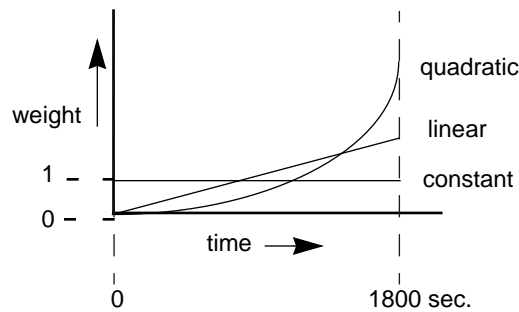
Quadratic Weighting
Dyn Alg=*Quadratic* weights the samples within the time window specified by the **Sec History** parameter in quadratic proportion to the start of the window.

Quadratic weighting, even more than linear, favors most recent samples over older ones.

Graph of Weighting Algorithms
The following graphs compares the three types of weighting algorithms, assuming each uses the same **Sec History** value (in this example 1800 seconds).:

X.4.1 **Formulas**

The bandwidth history algorithms use the following general values:

Pt	Percentage utilization at time *t*
Tn	Time now (always 0)
Tt	Time at sample *t*. *Tt* is measured as number of seconds before *Tn*
N	Number of DSO or B channels currently in use
I	Incremental number of channels specified by user
S	Number of seconds of history
Pw	The calculated weighted percentage

Constant Weighting
With this algorithm, the calculated weighted percentage is defined as

$$Pw = \frac{\left(\sum_{t=1}^{S} Pt\right)}{S}$$

Linear Weighting

With this algorithm, the calculated weighted percentage is defined as:

$$Pw = \frac{\left(\sum_{t=1}^{S} (Pt)(S - Tt)\right)}{\left(\sum_{t=1}^{S} (S - Tt)\right)}$$

Quadratic Weighting

The formula for calculating the quadratic weighting is

$$Pw = \frac{\left(\sum_{t=1}^{S} (Pt)(S - Tt)^2\right)}{\left(\sum_{t=1}^{S} (S - Tt)^2\right)}$$

X.5 Bandwidth Allocation Decision Process

The **Target Util** parameter sets a threshold that is compared to the weighted percentage (*Pw*) of the current line utilization recorded over the seconds of history. The result of the comparison determines whether bandwidth is added or removed.

X.5.1 Adding Bandwidth

If the weighted percentage exceeds the defined utilization threshold for a period of time greater than the value specified by the **Add Pers** parameter, Multiband Plus attempts to add the number of channels specified by the **Inc Ch Count** parameter. Addition of bandwidth is subject to following constraints:

- Channels must be available.

- Adding bandwidth cannot cause the value specified by the **Max Ch Count** time-period parameter to be exceeded.

X.5.2 **Removing Bandwidth**

If the weighted percentage falls below the defined utilization threshold for a period of time greater than the value specified by the **Sub Pers** parameter, the number of channels specified by the **Dec Ch Count** parameter are removed. Removal of bandwidth is subject to following constraints:

- One channel must be kept up at all times.

- Removing bandwidth cannot cause the weighted percentage to exceed the defined utilization threshold.

- Removing bandwidth from DBA calls cannot cause the value specified by the **Min Ch Count** time-period parameter to be violated. (Calls between serial hosts only.)

X.6 **Considerations**

The values for the **Sec History** and **Add/Sub Pers** parameters should be chosen to smooth out spikes in bandwidth utilization that last for a shorter time than it takes to add capacity. Over T1 access, bandwidth can be added in less than ten seconds; ISDN is slightly faster at about five seconds.

Once bandwidth is added, there is typically a minimum usage charge; thereafter billing is time sensitive. The **Sub Pers** value should be at least equal to the minimum duration charge plus one or two billing time increments. Typically billing is done to the next multiple of six seconds, with a minimum charge for the first thirty seconds. Your carrier representative can help you understand the billing structure of their switched tariffs.

Channels can be added either one at a time or in multiples determined by the **Parallel Dial** parameter.

Avoid adding or subtracting channels too quickly (less than 10-20 seconds), since this will lead to many short duration calls, each of which will incur the carrier's minimum charge. Also, adding or subtracting channels too quickly can affect the link efficiency, since the DTEs have to retransmit data when the link speed changes.