Multiband Plus T1/PRI
User Documentation

ASCEND COMMUNICATIONS, INC.

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Trademarks:

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FCC Registration numbers: See label on unit
Ringer Equivalence number (REN): 0.0A
Canadian Certificate number: See label on unit

Approvals:

UL listed to UL 1950
CSA - C22.2 NO. 950-M89

D Declarations

Line Connection and Signaling - Part 68 Requirements

Ascend Communications Multiband Plus models MB+1DSX, MB+2DSX, MB+1CSU, MB+2CSU, and MB+1CSU-1DSX, have been tested to comply with Part 68 of FCC Rules. Please note the following:

a Upon request of the telephone company, you should provide the FCC registration number of the equipment that is connected to your line. Multiband Plus's registration number for the CSU interface(s) of MB+1DSX, MB+1CSU, MB+2CSU, and MB+1CSU-1DSX models is 2CZUSA-73892-DE-N. Multiband Plus's registration number for the DSX interface(s) of MB+1DSX, MB+2DSX, MB+1CSU, and MB+1CSU-1DSX models is 2CZUSA-73893-XD-N.

b Multiband Plus operates with a 1.544Mbit/s digital channel using RJ48 USOC jacks. The service code is 6.0N. The Facility Interface Code is 04DU9-BN for lines using Superframe Format (SF), 04DU9-DN for lines using SF with B8ZS, 04DU9-1SN for lines using Extended Superframe Format (ESF) with B8ZS, and 04DU9-1KN for lines using ESF format with AMI. The Multiband Plus connects to the network using eight pin modular plugs, wired per FCC Part 68, USOC RJ48C.

c The telephone company must be notified before removal of a Multiband Plus connected to 1.544 Mbit/s digital service. If the telephone company notes a problem, they may temporarily discontinue service and will notify you of this disconnection. (If advance notice is not feasible, you will be notified as soon as possible.) When you are notified, you will be given the opportunity to correct the problem and informed of your right to file a complaint with the FCC.

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 SELV ports on other equipment.

International Approvals

Multiband Plus models have been approved for use in many countries. Contact the Ascend international homologation department for the current list of approvals.

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 equip-

ment 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 termination 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 INTERFERENCE 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 RADIOELECTRIQUE 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 94502

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.

C Contents Road Map

Starting from the top, the normal process for configuring and operating your Multiband Plus-T1/PRI follows:

1 Get acquainted.

→ Preview *Multiband Plus T1/PRI Quick Start Guide*.

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

2 Do I have enough information?

What do I ask/tell my WAN provider? → See Chapter 4, sections 4.4.1, 4.4.4, 4.4.5, 4.4.6.

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

3 Complete *Multiband Plus T1/PRI 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.

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 and defaults, see the tables in Chapter 5.

6 Configure Multiband Plus for serial data applications, including videoconferencing.

Single Channel and Dual Channel Call. → See Chapter 3, sections 3.7 and 3.8.

X.21, RS-366, or V.25 bis. → See Chapter 3, sections 3.9 through 3.11 and the "RS-366, V.25 bis, X.21, Lead Dialing" appendix.

Multichannel / Inverse Multiplexing. → See Chapter 3, sections 3.12, 3.13 (Backup-and-overflow of nailed-up circuits), 3.14 (DBA), 3.21 (GloBanD), and the "Inverse-Multiplexing" and "Controlling Dynamic Bandwidth" appendicies.

7 Configure Multiband Plus's system features.

Incoming/Outgoing Call Routing. → See Chapter 3, section 3.6 and the "Call Routing" appendix. See also 3.17 and 3.18 (multiple carriers).

Ethernet Interface, if installed. → See Chapter 3, sections 3.2 and 3.3 (routing TELNET and SNMP packets),

Local and Remote Management (SNMP , Syslog require Ethernet). → See Chapter 4, section 4.1 Chapter 3, sections 3.4 (Syslog), 3.5 (SNMP), 3.22 (CDR), and Appendix B (MIF).

Miscellaneous Features. → See Chapter 3, sections 3.15 (drop-and-insert), 3.16 (T1-PBX support), 3.19 (NFAS), 3.20 (calling limits).

Operator Security. → See Chapter 3, section 3.24.

8 Operating Multiband Plus can include the following tasks.

Operating management overview.	See Chapter 4, section 4.5.
Dialing, clearing, or answering calls features.	See Chapter 3, section 3.23 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 **Term Serv**, **System Reset**, **Line LB**, and **Switch D Chan** commands in Chapter 6. See also Appendix D (error counting).
Backing up and Restoring Multiband Plus's parameters.	See Chapter 3, sections 3.25 and 3.26.
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.

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Multiband Plus T1/PRI Release Notes

1 Introduction

This document contains information about Multiband Plus T1/PRI models; that is, Multiband Plus models with a T1/PRI interface to the wide area network (WAN). For the purpose of this document “Multiband Plus” means Multiband Plus T1/PRI.

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

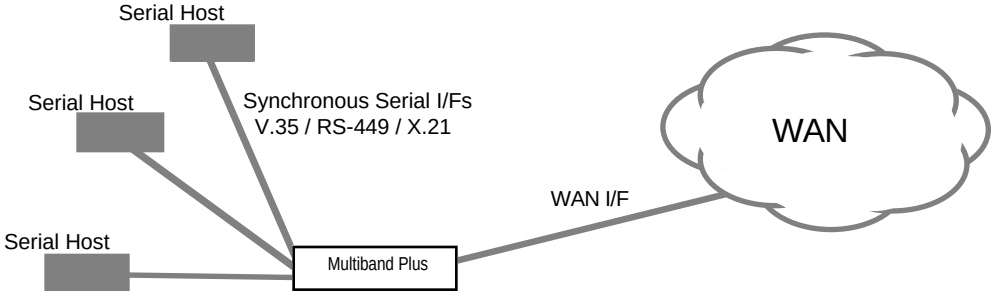
Ports

- WAN Ports — To connect to telecommunication circuits, Multiband Plus’s T1/PRI WAN ports can be provisioned with common carrier or private network lines, switched, and/or nailed-up circuits.
- Ethernet Interface (optional) — To connect to LANs for management via TELNET or SNMP management protocols, Multiband Plus provides a single Ethernet interface.
- 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 T1/PRI WAN interfaces (I/F) provided by Multiband Plus. The Ethernet interface, used for Multiband Plus management but not as a user data port, is not shown:



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 T1/PRI running at software revision 4.4. 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 T1/PRI 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 4, “Planning and Specifications.”
- To get “how to” help, see the list of procedures in Chapter 3. The *Multiband Plus T1/PRI 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.

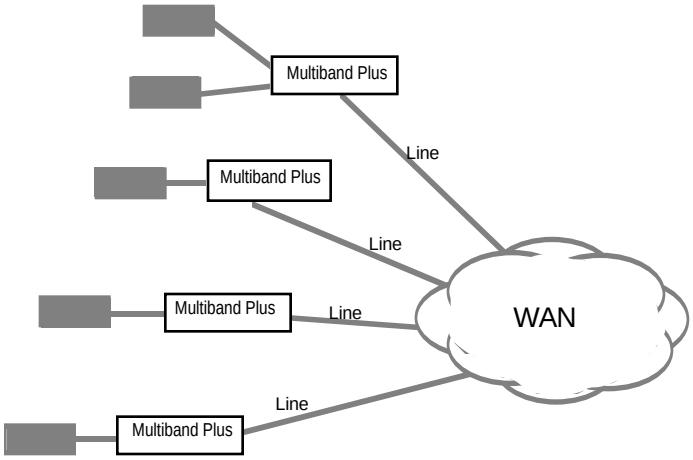
2 Concepts and Terminology

This chapter discusses of the key terms, concepts, and features used throughout the Multiband Plus T1/PRI User Documentation. It describes Multiband Plus T1/PRI'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 T1/PRI's user interface. Commonly accepted terms and their definitions are used wherever possible:

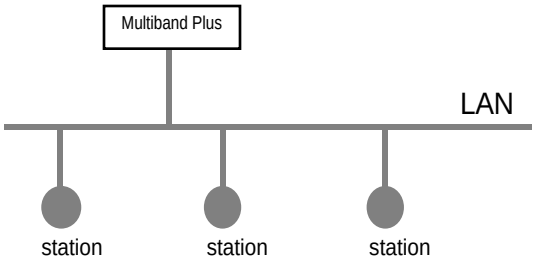
- A ***network*** is a set of computers and other equipment connected together to enable information to be transferred and resources to be shared.
- A network that connects computers and other types of digital data equipment to each other over extended geographic distances is called a wide area network (***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.

Multiband Plus T1/PRI has both WAN and (optional) LAN interfaces. The following illustrates Multiband Plus T1/PRI's Ethernet interface:



Multiple Devices Connected to an Ethernet LAN

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 T1/PRI 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 T1/PRI to serial host equipment.

Multiband Plus T1/PRI 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 T1/PRI connects to ***T1/PRI*** lines, a media that provides 1536 kbit/s per line.
- A ***channel*** is an increment of bandwidth provided by the WAN.
  - 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.

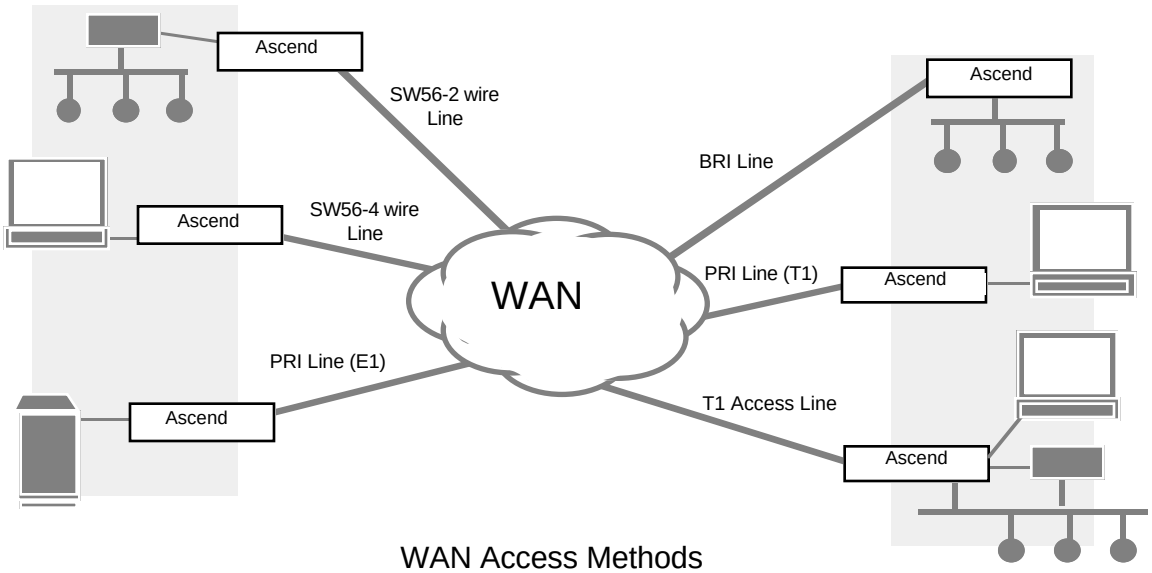
2.2 WAN Access Lines and Circuits

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 T1/PRI has ports for T1/PRI 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 ***T1 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 T1/PRI 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 characterized 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 consists 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 T1/PRI Product Definition

Multiband Plus T1/PRI 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
- **Drop-and-Insert Functionality** when connected to T1 access lines
- **Support of T1 PBXs** when connected to a PRI access line

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 T1/PRI’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 T1/PRI.

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

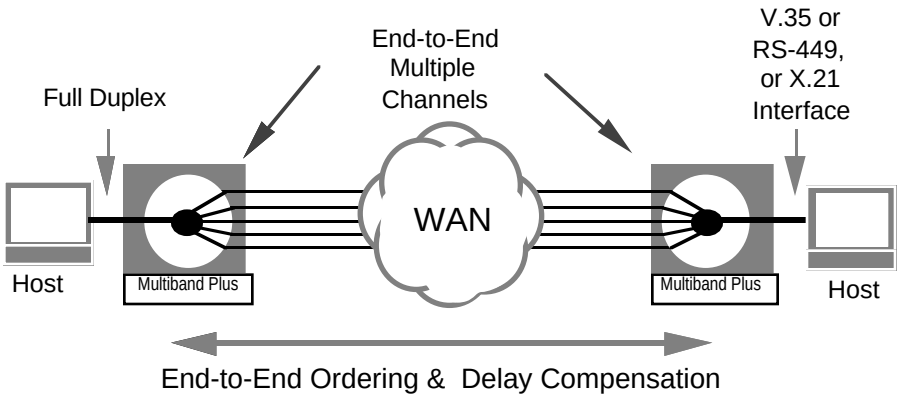
The ***X.21 dialing interface*** on Multiband Plus is compatible with the CCITT X.21 recommendation for dialing and answering individual calls. It is often used for direct dialing and answering from attached codecs, routers, or other serial host.

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 T1/PRI 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 T1/PRI can combine individual 56 or 64 kbit/s switched and nailed-up channels to create virtual high-speed data calls at rates that are multiples of 56 or 64 kbit/s. ***Nx56/64*** stands for an inverse multiplexed call that aggregates 56 or 64 kbit/s channels. In addition, AIM can aggregate H0 (***Nx384***), MultiRate, or GloBanD channels to produce multiples of data services higher than 64 kbit/s such as multiples of 256 kbit/s.

At the transmitting end, Multiband Plus T1/PRI 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 T1/PRI 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, such as a codec, and not in Multiband Plus. The videoconferencing codec provides two data ports, one for each channel. Multiband Plus T1/PRI 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.

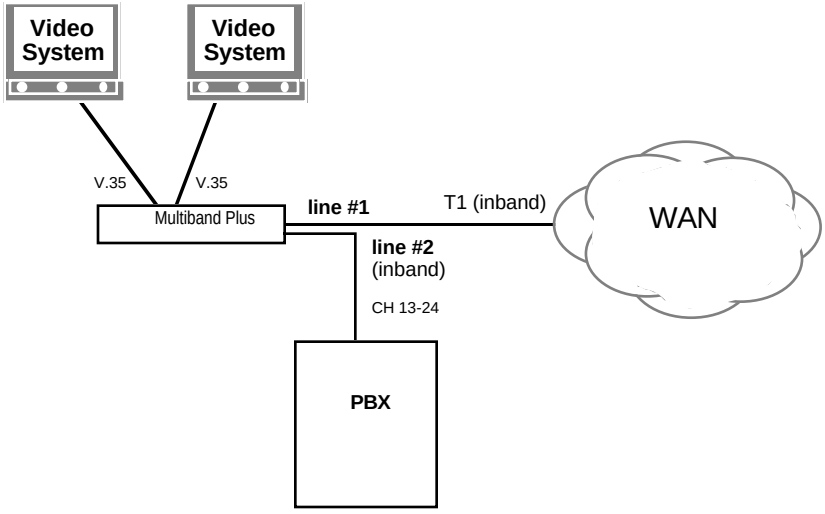
The two serial host ports on Multiband Plus T1/PRI that connect a dual-port call to the serial host are called the ***primary port*** and the ***secondary port***. Because Multiband Plus T1/PRI places the two calls in tandem and clears the calls in tandem, they are considered a single call even though Multiband Plus T1/PRI 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 T1/PRI 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***.

2.3.2 Drop-and-Insert on T1 Access Lines

Drop-and-insert refers to applications that pass some channels through Multiband Plus T1/PRI transparently, while the remaining channels terminate at Multiband Plus's interface to its serial host ports. The channels tagged drop-and-insert pass through Multiband Plus T1/PRI from its T1/PRI #1 port to its T1/PRI #2 port where a local T1-access device is connected. The channels not tagged drop-and-insert support calls to or from Multiband Plus T1/PRI's serial host ports. Both the local device and the WAN use inband signaling.

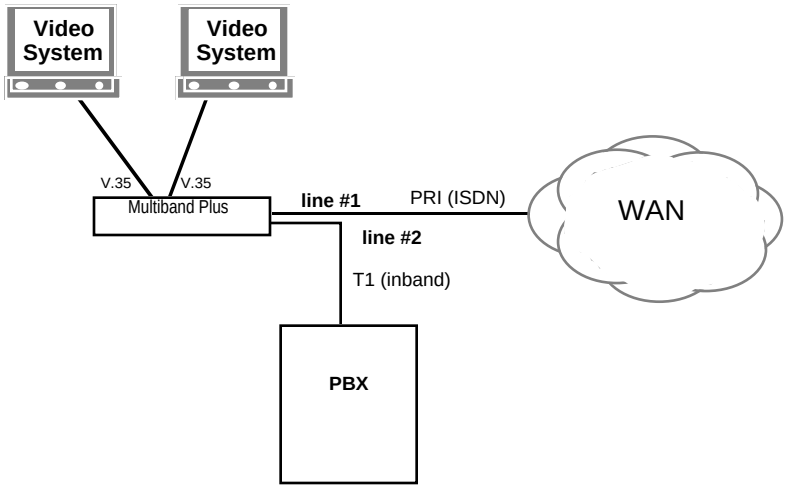
The following diagram shows Multiband Plus T1/PRI in a drop-and-insert configuration passing channels 13-24 to a PBX, leaving channels 1-12 for WAN connections to videoconferencing systems.



2.3.3 T1-PBX Support

PRI-to-T1 conversion refers to applications that require conversion of PRI signaling to inband signaling. In PRI-to-T1 conversion, Multiband Plus's T1/PRI port #1 connects to the WAN and its T1/PRI port #2 connects to a local device. The WAN uses ISDN D Channel signaling while the local device, typically a PBX, uses inband signaling. Calls to the local PBX are identified by their service or number dialed. Channels not used by the local PBX are available for calls to or from Multiband Plus's serial host ports.

In the following example, the PBX and video codecs share the pool of channels on the PRI line.



2.4 User Interface Terminology

This section defines the most frequently used terms referring to Multiband Plus T1/PRI control interface. Additional information on the user interface is found in the "User Interface Overview" appendix. A map of the user interface menus appears in the "Multiband Plus T1/PRI Parameters" chapter.

- ***Parameter*** — an element of Multiband Plus T1/PRI's configuration that appears in the user interface

  Example: The **Term Rate** parameter sets the bits per second at Multiband Plus T1/PRI'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 T1/PRI'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 T1/PRI's configuration.

A map of the user interface menus appears in the "Multiband Plus T1/PRI Parameters" chapter. Menu commands appear in **`bold courier`** typeface.

- ***Status Menus*** — the branch of Multiband Plus T1/PRI'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 T1/PRI function or object

  Example: The Security Profile contains parameters that control access to Multiband Plus T1/PRI's operation and configuration. The Line Profile contains parameters that define the attributes of the T1/PRI interface.

  For a map of the menu location of Multiband Plus T1/PRI's profiles, see the "Multiband Plus T1/PRI Parameters" chapter. Definitions of each profile appear in the "Reference to Edit Menus" chapter.

- ***DO Menu*** — the list of commands in Multiband Plus T1/PRI'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 T1/PRI 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 T1/PRI. To quickly find the section you need, see the Contents Road Map and Table of Contents at the front of this guide.

For More Information than is in this Chapter
Always begin with the *Multiband Plus T1/PRI Quick Start Guide.* It contains procedures you complete before beginning your installation.

For planning your installation, refer to the specifications and detailed descriptions in Chapter 4.

For detailed descriptions of parameters, see Chapter 6, which lists all parameters of all profiles in alphabetical order. Chapter 5 details the menu structure.

3.1 Installation and User Interface Connection Guidelines

- 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.
- After installation has been completed and verified, connect (if required) your office alarm relay leads to the screw-down terminal block connector on the back panel of Multiband Plus T1/PRI.
- Do not turn off power to a Multiband Plus T1/PRI model equipped with internal CSUs, unless absolutely necessary. If you do turn power off, you are required to contact your T1/PRI provider in advance. If you turn the power off, you can lose your link to the WAN, and you might have to contact your carrier to restore your T1/PRI interface.

3.2 Ethernet Interface Configuration

The following Ethernet Profile parameters must be configured to make the Ethernet interface operational before running SNMP, PING, or TELNET:

⇒⇒ **IP Adrs** is required to identify Multiband Plus's IP address and its subnet. It is entered in the dotted decimal format. The default value, *0.0.0.0/0*- must be changed to a valid IP address and subnet.

⇒⇒ **Ethernet IF** must be entered to identify the type of Ethernet interface.

The remaining parameters in the Ethernet Profile are described in other sections of this chapter under the names of the applications where they are used.

3.3 Configuring Multiband Plus's Routing for SNMP Traps, Syslog, and Telnet

Read this section for guidelines in configuring the parameters that enable Multiband Plus to determine destinations for SNMP trap reports, Syslogs, and Telnet responses.

The destination of SNMP trap reports or the SNMP manager might not be on the local LAN. Similarly, the TELNET client or Syslog server might not be on the same LAN. Multiband Plus cannot reach stations off the local LAN without knowing what gateway to use. If the SNMP manager is not on the local LAN, traps should be sent to a gateway that can reach that manager. Two options exist by which Multiband Plus can learn of gateways on its LAN:

⇒⇒ **RIP** — (in the **Ether Options..** submenu of the Ethernet Profile) enables or disables receiving RIP updates across the Ethernet interface. Set to *Recv* to receive updates on gateways that can reach stations not on the same LAN.

⇒⇒ **Def Rte** — (in the **Ether Options..** submenu of the Ethernet Profile) gives Multiband Plus the IP address of the gateway to use whenever the destination station is off the LAN and the destination station is not one included in the RIP updates, or RIP is off.

NOTES: RIP (receive only) is the only dynamic routing protocol currently implemented for Multiband Plus.

3.4 Configuring for Syslog Host Operation

Read this section when configuring Multiband Plus to report events to a syslog host. The following Ethernet Profile (Ethernet menu) parameters establish syslog operation:

⇒⇒ **Syslog**=*Yes* (See **Syslog** in Chapter 6 and Chapter 7.)

⇒⇒ **Log Host** — Ethernet Profile parameter that defines the IP address of the syslog host that receives System Message Logs

⇒⇒ **Log Facility** — Ethernet Profile parameter that identifies the source of syslog messages from this Multiband Plus T1/PRI

The syslog daemon is usually configured by changing the control file **`/etc/syslog.conf`**. This file specifies the action to perform when a message from a facility.level is received. The syslog daemon must reread syslog.conf after it has been changed. For example, if the Multiband Plus **Log Facility**=*Local5*, to log all info messages from the Multiband Plus to a local file xxx.info, add the following line and then have the syslog daemon reread syslog.conf:

```
local5.info        /var/log/xxxx.info
```

See **Syslog** in Chapter 7 of this manual for information on info, warning, and notice logs.

NOTE: Do not use an off-net log host that can only be reached by dial-up connection. If you do, every logged action, including hanging, up causes a redial to the log host.

NOTE: You might have to define a default router to reach the syslog host. Section 3.3 describes options available.

NOTE: This feature is available only on the Multiband Plus models with the Ethernet option.

3.5 Configuring for SNMP Operation

This section provides an overview of SNMP on the Multiband Plus and guidelines on configuring the parameters that enable SNMP traps.

SNMP

If Multiband Plus T1/PRI has the optional Ethernet interface, it can be managed by an SNMP manager. SNMP (Simple Network Management Protocol) can control operations, such as dial and hang up, and monitor Multiband Plus T1/PRI's operational status. For detailed information, see the following which are available from Ascend Customer Service:

- *Ascend Implementation for SNMP*
- *Ascend Enterprise MIB and Ascend Enterprise Traps* — You must compile (MIB-to-schema) the Ascend Enterprise MIB into a format acceptable to your SNMP manager's program. Remember to turn on the traps options during the compile, if you intend to use the Ascend Enterprise Traps.
- MIB-2 (RFC 1213)
- RS-232 MIB (RFC 1317)

- DS1/E1 MIB (RFC 1406)

Traps

A ***trap*** is a mechanism in SNMP for reporting system change in real time. An incoming call to a serial host port is such a system change. To report system change, a traps-PDU (protocol data unit) is sent across the Ethernet interface to the SNMP manager. A brief summary of the system changes which cause a traps-PDU follows. (A complete list specifying these events is available in the Ascend Enterprise Traps MIB.)

- change of state of a serial host port including changes resulting from a call state change
- cold start (see RFC 1215)
- warm start (see RFC 1215)
- link up (at the WAN or LAN interface, see RFC 1215)
- link down (at the WAN or LAN interface, see RFC 1215)
- authentication error (see RFC 1215)
- TELNET login attempts exceeded

SNMP Related Parameters

Before running SNMP, you must have completed the following:

- "Ethernet Interface Configuration", section 3.2
- If the SNMP manager is on a different LAN, see section 3.3, "Configuring Multiband Plus's Routing for SNMP Traps, Syslog, and Telnet" (Note: You must similarly configure the SNMP manager to reach ABC/MAX.)

The following parameters in the SNMP Options.. branch of the Ethernet Profile (Mod Config menu) edit the keywords that determine whether the SNMP user may access only "get" commands or both "get" and "set" commands:

⇒⇒ **Read Comm**

⇒⇒ **R/W Comm**

The following parameters in the System Profile (Sys Config menu) edit the text that describe Multiband Plus T1/PRI's location and contact to the SNMP manager:

⇒⇒ **Location**

⇒⇒ **Contact**

The following parameters in the SNMP Traps menu configure up to 8 destinations of the traps-PDUs sent by Multiband Plus to the SNMP manager:

⇒⇒ **Name** identifies the SNMP Traps Profile and usually is set to the destination of the trap PDUs. Up to 31 characters can be entered.

⇒⇒ **Alarm** enables the trapping of events that are classified as alarms when set to *Yes*. The default is *No*.

⇒⇒ **Port** enables the trapping of serial host port state changes when set to *Yes*. The default is *No*.

⇒⇒ **Security** enables the trapping of the following events when set to *Yes*. The default is *No*.

- authenticationFailure — See RFC-1215 for a definition of this event.
- consoleStateChange — When a console port (VT100, Palmtop, or TELNET session) has changed its state. Consoles are defined in the Ascend MIB's console group.
- portUseExceeded — When the maximum DS0 minutes (set by **Max DS0 Mins** Port Profile parameter) permitted a serial host port has been exceeded.
- systemUseExceeded — When the maximum DS0 minutes (set by **Max DS0 Mins** System Profile parameter) permitted ABC/MAX has been exceeded.
- maxTelnetAttempts — The number of consecutive failed TELNET logins has exceeded the maximum allowed by ABC/MAX.

For a detailed description of the events reported when **Alarm**=*Yes*, **Port**=*Yes*, or **Security**=*Yes*, see the addendum "Ascend Implementation for SNMP."

⇒⇒ **Comm** is equivalent to the SNMP "community name." Enter an alphanumeric string up to 31 characters that becomes a password sent to the SNMP management station when an SNMP trap event occurs. It authenticates the sender who is identified by the source IP address. To turn off SNMP traps, delete the value for this parameter and set **Dest** [SNMP Traps Profile]=*0.0.0.0*.

⇒⇒ **Dest** establishes the destination address of the trap-status report. Use IP dotted decimal format. Its default value is *0.0.0.0*. To turn off SNMP traps, set **Dest**=*0.0.0.0* and delete the value for **Comm**.

NOTE: See Chapter 6 for detailed information on any of the preceding parameters.

NOTE: This feature is available only on Multiband Plus models with the Ethernet interface option.

3.6 Setting Up Incoming Call Routing

This section lists the parameters that assign incoming calls to serial host ports,. Before configuring these parameters, you must read the "Call Routing" appendix. You can also find further information on each parameter in Chapter 6.

⇒⇒ **Ans 1#**, **Ans 2#**, **Ans 3#**, and **Ans 4#** Port Profile (Port Config menu) parameters

⇒⇒ **Ch *n* Prt/Grp** Line Profile (Line Config menu) parameters

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

3.7 Configuring Single-Channel Calls between Serial Hosts

This section describes when to configure Multiband Plus T1/PRI for single-channel non-inverse multiplexed calls. See also section 3.8 for dual-port calls, which two single-channel calls are placed in tandem from paired serial host ports.

If you are calling a TA or switching CSU/DSU or other type of equipment that does not support inverse multiplexing, nor does the device support dual-port calls, set the following parameter as shown:

⇒⇒ **Call Type** [Call Profile parameter] = *1 Chnl*

3.8 Configuring Dual-Port Calls between Serial Host Ports

This section describes when to configure Multiband Plus T1/PRI for dual-port calls, a type of call in which are two single-channel calls placed in tandem from paired serial host ports

Configure for dual-port calls when the serial device at the far end requires two serial ports and that serial device (usually a codec) performs the inverse multiplexing of the two channels to which it is connected. The equipment providing the two ports to the far end device does not need to be a Multiband Plus T1/PRI 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. However, if you have H0-channel, or MultiRate or GloBanD end-to-end, the total bandwidth can be higher.

The two host ports of your Multiband Plus T1/PRI that are connected in a dual-port call are called the ***primary port*** and the ***secondary port.***

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.

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.

This procedure assumes you have already configured the T1/PRI interface and the parameters that control incoming call routing. (See *Multiband Plus T1/PRI Quick Start Guide* and section 3.6 for information on these procedures.)

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

This section provides guidelines in configuring Multiband Plus for V.25 bis dialing and answering. The following parameters appear in the Port Profile (Port Config menu):

⇒⇒ **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 information on V.25 bis cabling, see Chapter 4. For the syntax and usage of V.25 bis commands, see the "RS-366, V.25 bis, X.21, Lead Dialing" appendix.

3.10 Setting Serial Host Ports for RS-366 Dialing

This section provides guidelines in configuring Multiband Plus for RS-366 dialing. The following parameters appear in the Port Profile (Port Config menu):

⇒⇒ **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 Chapter 4. For the syntax and usage of RS-366 commands, see the "RS-366, V.25 bis, X.21, Lead Dialing" appendix.

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

This section provides guidelines in configuring Multiband Plus for X.21 dialing and answering. The following parameters appear in the Port Profile (Port Config menu):

⇒⇒ **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 Chapter 4. For the syntax and usage of X.21 commands, see the "RS-366, V.25 bis, X.21, Lead Dialing" appendix.

3.12 Configuring an Inverse Multiplexed Call with AIM

Use this section to set up the parameters that control AIM type inverse multiplexed calls between serial host ports. Refer to the alphabetical listing of parameters in Chapter 6 to determine what parameter values meet the needs of your application. For an overview of inverse multiplexing, see the "Inverse-Multiplexing" appendix and for an overview of dynamic control of bandwidth during an AIM call, see the "Controlling Dynamic Bandwidth" appendix.

This procedure assumes you have already configured the WAN Line Profiles and incoming call routing. (See *Multiband Plus T1/PRI Quick Start Guide* and section 3.6 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* (most videoconferencing applications use *AIM*, while most bridge/router backup use applications either *FT1-AIM* or *FT1-B&O*.)

⇒⇒ **Call Mgm** (most videoconferencing applications use *Manual* or *Static*, while *DBA* is used mostly with data transfer applications and bridge/router backup.)

⇒⇒ **Base Ch Count** (See Chapter 6 for information on this parameter.)

⇒⇒ **Inc Ch Count** (See Chapter 6 for information on this parameter.)

⇒⇒ **Dec Ch Count** (See Chapter 6 for information on this parameter.)

⇒⇒ **Data Svc** (See Chapter 6 for information on this parameter.)

⇒⇒ **Auto-BERT** (See Chapter 6 for information on this parameter.)

⇒⇒ **Fail Action** (See Chapter 6 for information on this parameter.)

⇒⇒ If **Call Type**=*FT1-AIM* or *FT1-B&O* selected, see 3.13 for additional parameters. If **Call Mgm**=*Dynamic*, see 3.14 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: (See also **Use Trunk Grps** if you have multiple dial-plans.)

⇒⇒ The **Ch *n* #** parameters provide the calling Multiband Plus T1/PRI 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. See Chapter 6 for more information on this parameter.

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

Use this section in conjunction with section 3.12 to set up the parameters that control AIM type inverse multiplexed calls between serial host ports that have nailed-up channels.

⇒⇒ In AIM calls with nailed up channels, **Call Type** {Call Profile} is set to *FT1*, *FT1-AIM*, or *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 channel usage (**Ch *n***) 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 **Ch *n* Prt/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 required 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 T1/PRI 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.

3.14 Configuring a DBA Call between Serial Hosts

Use this section in conjunction with section 3.12 to set up the parameters that control AIM type inverse multiplexed calls between serial host ports that have automatic bandwidth control.

⇒⇒ **Call Type** [Call Profile] = *AIM*, *FT1-AIM*, or *FT1-B&O*

⇒⇒ **Call Mgm** [Call Profile] = *Dynamic*

Also set the following Call Profile parameters to configure DBA:

⇒⇒ **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 T1/PRI, you cannot use either serial host port **Host 3** or **Host 4** for DBA calls.

3.15 Configuring a Drop-and-Insert T1/PRI Interface

Use this section when configuring the Line Profile parameters that set up drop and insert.

⇒⇒ **2nd line** (Line Profile) = *D&I.*

If a parameter does not appear in the following list, drop-and-insert operation does not determine its setting or it is automatically *N/A*. (Some of the parameters of line #2 are automatically *N/A* when you set **2nd Line**=*D&I*.) See Chapter 6 for how to set parameters not listed.

⇒⇒ **Sig Mode** = *Inband* for line #1, *N/A* for line #2.

⇒⇒ **Clock Source** = *Yes* for line #1, *No* for line #2.

⇒⇒ **Ch *n*** =*D&I* for those channels of line #1 which pass through from line #1 to line #2.

⇒⇒ **Ch *n*** =*Switched*, *Nailed*, or *Unused* for those channels of line #1 which do not pass from line #1 to line #2 but are used by applications connected to Multiband Plus.

3.16 PRI-T1 Conversion/T1 PBX Support

Use this section if you have PRI lines from the WAN and need to convert to T1 signaling for support of T1 PBXs.

The T1 PBX must conform to the following requirements:

- The T1 PBX must use 2-state inband (robbed-bit) with DTMF signaling.
- The PBX must support Senderized (En-Block) digit transmission. This requirement is derived from the fact that Multiband Plus has preset time limits on received dialing digits.

The T1 PBX can use DNIS digits to route incoming calls to the end stations when the called-party number is available from the switch. (Multiband Plus forwards the dialed number on incoming calls.)

This feature allows Multiband Plus T1/PRI to emulate a T1 switch to the PBX and pass the phone number dialed onto a PRI line.

In this configuration, the physical port for line #1 connects to an ISDN PRI line going to the WAN, while the physical port for line #2 connects to a T1 access (inband signaling) line going to a PBX or similar device.

NOTE: PRI-T1 conversion is available only on the Multiband Plus motherboard which is identified by its front panel bantam jacks.

The following parameters in the Line Profile (Line Config menu) control this application:

⇒⇒ Set **2nd Line** = *Trunk.*

⇒⇒ Set **Sig Mode** Line Profile parameter (line #1 only) = *ISDN*.

⇒⇒ Set **Sig Mode** Line Profile parameter (line #2 only) = *PBX T1*.

⇒⇒ Set **Rob Ctl** Line Profile parameter (line #2 only) as required by the PBX. See Chapter 6 for information on setting this parameter.

The following Line Profile parameters (line #2 only) tell Multiband Plus T1/PRI whether or not to convert a call incoming on line #1 from PRI to T1 signaling on line #2 or to answer the call and route the data to a serial host port:

⇒⇒ **PBX Type** = *Voice* or *Data* (Most installations select *Voice*. The value *Data* does not supply call progress tones or information messages to the user.)

⇒⇒ **Ans Service** (Most installations select *Voice*.)

NOTE: If you select *Voice*, incoming voice service calls are converted to T1 signaling on line #2 outgoing to the PBX. Data service calls do not go to the PBX and are not converted.

⇒⇒ **Ans #** (Most installations leave this parameter blank.)

The following two Line Profile parameters (line #2 only) convert the phone number dialed at the PBX to an ISDN PRI format:

⇒⇒ **Delete Digit**

⇒⇒ **Add Number**

The last Line Profile parameter (line #2 only) adds the appropriate ISDN PRI call-by-call request to calls dialed at the PBX:

⇒⇒ **Call-by-Call** Line Profile parameter (line #2 only)

3.17 Setting Up Trunk Groups and Multiple Dial-Plans

This section gives guidelines in configuring Multiband Plus to operate with trunk groups and multiple dial-plans. For how multiple dial-plans affect outgoing calls, see the "Call Routing" appendix. For how trunk groups and multiple dial plans affect incoming multichannel calls, see ***Use Trunk Grps*** *in Chapter 6. See also section 3.18.*

When you configure trunk groups in Multiband Plus T1/PRI, you are constructing boundaries between sets of channels. These boundaries might come from a number of requirements including any of the following:

- to separate multiple dial plans; that is, when the phone number to reach a destination depends on which line you use, the dial plans must be separated into trunk groups. (Multiband Plus cannot build multichannel calls across different dial plans.) Multiple dial-plans generally occur when Multiband Plus T1/PRI is connected to circuits supplied by more than one carrier.
- to limit the number of channels available to multichannel calls (cannot exceed the number of channels in the trunk group where the call was placed or answered).
- to partition a GloBanD line.
- to set up alternative outbound routing; that is, the dialing prefix to the phone number either selects a trunk group for the outgoing call or the trunk group is automatically selected as described in section 3.18 (Destination Profiles).

The following parameters set up trunk groups:

⇒⇒ Set the System Profile parameter **Use Trunk Grps** = *Yes*.

⇒⇒ Configure the Line Profile parameters **Ch *n* Trnk Grp** of each channel of your T1/PRI lines, setting each to the trunk group to which it belongs. The default value is *9*.

When you dial, the number dialed (**Dial #**) must begin with a dialing prefix selecting a trunk group or *3* for Destination Profile.

3.18 Setting Up Alternative Outbound Routes and Destination Profiles

Read this section to set up Multiband Plus to automatically select between several dial-plans in placing outbound calls. See also section 3.17.

Destination Profiles (Destinations menu) give Multiband Plus T1/PRI the ability to choose between several different trunk groups when placing outbound calls. The following parameters set up trunk groups:

1 This procedure assumes you have already configured the Line Profiles and the outgoing call routing as described in the “Call Routing” appendix.

2 Set **Use Trunk Grps** = *Yes*. (System Profile parameter / Sys Config menu)

3 Configure each channel, setting each **Ch *n* Trnk Grp** (Line Profile parameter / Line Config menu) to the trunk group (dialing plan) to which it belongs. Up to 6 trunk groups can be identified by this parameter which accepts a single digit from *4* to *9*.

4 Configure a Destination Profile for each outgoing call for which you need alternate outbound call routing. In particular, the nth outbound route in a Destination Profile has a **Dial *n*#** which must start with a dialing prefix equal to a trunk group number set up in step 2. That is, you can have as many alternative outbound routes as you have trunk groups. You must also set up **Call-by-Call *n*** for each outbound PRI route, and **Option** to determine which routes can be used.

5 To match a Destination Profile to an outgoing call, the **Dial #** Call Profile parameter (Directory menu) must start with the dialing prefix *3*. The next two digits specify the Destination Profile. For example, to dial using the 12th Destination Profile, **Dial #** = *312*. Multiband Plus T1/PRI then selects one of the six outbound routes listed in the 12th Destination Profile and dials.

3.19 Configuring and Operating T1/PRI Lines that Use NFAS

Use this section to configure Multiband Plus T1/PRI for non-facility associated signaling (NFAS). NFAS is a special case of ISDN signaling in which one D channel is shared between two or more T1/PRI lines and a backup D channel can be configured.

NFAS is required for H11 (1536 kbit/s) data service because all 24 channels of one PRI line are used to carry user data, and the D channel must be on another line.

For other applications, the reliability of a single D channel might be unacceptable. NFAS can establish a backup, or standby, D channel. Only one D channel is active at any time. The backup becomes active when the primary D channel trunk goes down, or when the user chooses to switch active channels with a **`new Switch D Chan`** action in the Line Diagnostics menu.

The following Line Profile parameters (Line Config menu) configure NFAS:

⇒⇒ **Switch Type** = *AT&T* or *NTI*

⇒⇒ **Sig Mode** = *ISDN_NFAS*

⇒⇒ **NFAS ID num** (assigned by T1/PRI provider)

⇒⇒ **Ch 24** = *NFAS-Prime* or *NFAS-Second* or *Switched* or *Unused* or *Nailed*

- must have one and only one primary line (**Ch 24** = *NFAS-Prime*)
- optionally one secondary line (**Ch 24** = *NFAS-Second*)
- remaining lines using NFAS **Ch 24** =*Switched* or *Unused* or *Nailed*)

Example of NFAS Configuration
Both PRI lines have been provisioned by the network provider to operate in the NFAS mode. You set **Sig Mode**=*ISDN_NFAS* for these two lines. The PRI provider has established *0* as the ID of the line with the primary D Channel, *1* for the line with the secondary D Channel. NFAS lines without D channels are allowed IDs from 2 to 31. For the primary line, you configure **Ch 24**=*NFAS-Prime* and **NFAS ID num**=*0*, and for the secondary line, you set **Ch 24**=*NFAS-Second* and **NFAS ID num**=*1*. The IDs used by different PRI service providers might vary.

NFAS Operation
Three actions can cause switch-over from the primary D Channel to the secondary one or vice versa:

- loss of the NFAS line with the active D Channel
- signal from the switch commanding a change to the other D Channel
- selection of the **`Switch D Chan`** option in the Line Diag menu.

3.20 Setting the Billing Cap (Calling Limits)

Use this section to configure the parameters to set up the maximum calling minutes/ bandwidth usage over the WAN 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

3.21 Configuring for GloBanD Calls

This section lists the parameters and gives guides in configuring for GloBanD, a network service that provides channel bandwidths greater than 64 kbit/s.

Before you can access GloBanD Q.931W network services, first verify that your PRI offers GloBanD services. Also determine the end-to-end path; that is, whether the complete path from calling unit to called (including the switches in-between) offer GloBanD. Next, you must set the following parameters on the calling unit:

⇒⇒ **Switch Type** [**Line Profile**] — Set to *GloBanD*.

⇒⇒ **Data Svc** [**Line Profile**] — Set to a bandwidth available with your GloBanD access. Bandwidth higher than 64 kbit/s require end-to-end GloBanD service. When calling non-GloBanD units, use 56 or 64 kbit/s.

⇒⇒ **Ch 1 #**, **Ch 2 #**, etc. [**Line Profile**] —Leave this parameter blank. Most GloBanD installations have a single phone number assigned to all channels of the PRI line. Although you can have GloBanD lines with multiple phone numbers, you must set **Use Trunk Grps**=*Yes* and create a separate trunk group for each phone number. See the rules in section 3.17. Multiple phone numbers partition the GloBanD line. You cannot combine channels (AIM or BONDING) across these trunk group boundaries.

You must also set the following parameters on the called unit:

⇒⇒ **Ans 1#**, **Ans 2#**, **Ans 3#**, **Ans 4#** [**Port Profile**] —To route incoming GloBanD calls to a serial host port, assign an **Ans *n#*** to the GloBanD phone number (see **Ch 1 #**, etc. above) of the calling unit. For non-GloBanD calls, the **Ans *n#*** parameter is set to the called party number, but for GloBanD calls it is set to the calling party number. Incoming call routing is also described in the "Call Routing" appendix.

3.22 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
```

To send CDR to a Syslog host, you must configure **Log Host** as described in section 3.4. Furthermore, you might need to add a route to that log host, if one already does not exist. See section 3.3 for further information.

See also **CDR** and **Syslog** in Chapter 7 and the "MIF" appendix for further information.

3.23 Dialing / Answering / Clearing Calls

This section gives background information on how Multiband Plus dials, answers, and clears calls, and shows how DO commands can perform these operations.

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 T1/PRI 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 Line Profiles for the WAN 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.

If trunk groups are enabled (**Use Trunk Grps**=*Yes*), the first digit of the number dialed is a dialing prefix. See the **Dial #** parameter for this dialing prefix. Note that when trunk groups are enabled, the dialing prefix applies to numbers dialed through RS-366, V.25bis, and X.21, as well as to **Dial #**.

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.

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 T1/PRI 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.

3.24 Security Profiles, Configuring

Follow the instructions in this section to set up password protection at the Multiband Plus T1/PRI menu level.

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.

1 Set each Security Profile parameter as required by your installation. The **Security** section in Chapter 5 lists all the Security Profile parameters. See Chapter 6 for a detailed description of each parameter.

2 Set the password of each Security Profile. However, the ***Default Security Profile*** has no password. It is the first profile (00-301) 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.

3.25 Backing Up Multiband Plus T1/PRI's Configuration

This procedure backs up all Multiband Plus T1/PRI profiles, except Security Profiles, to a storage device, such as a hard disk.

You can use this procedure with your local Multiband Plus T1/PRI or most Ascend products you might be controlling through 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
```

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 Chapter 6.

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

WARNING: No passwords are saved; namely, **Passwd** in Security Profiles. 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.

Procedure

1 Connect the backup device to Multiband Plus T1/PRI's **Control** port.

NOTE: See Chapter 4 for the pin-outs of Multiband Plus T1/PRI'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.

NOTE: Backup files are in printable ASCII.

3.26 Restoring Multiband Plus T1/PRI'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 T1/PRI.*

You can use this procedure with your local Multiband Plus T1/PRI or other Ascend products you might be controlling through 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
```

Before You Start
You cannot perform the restore or save operation through the hand-held 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.

Procedure
1 Connect the backup device to Multiband Plus T1/PRI's **Control** port.

NOTE: **Restore Cfg**: See Chapter 4 for the pin-outs of Multiband Plus T1/PRI'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 **Passwd** parameters appear 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 T1/PRI 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 T1/PRI.

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

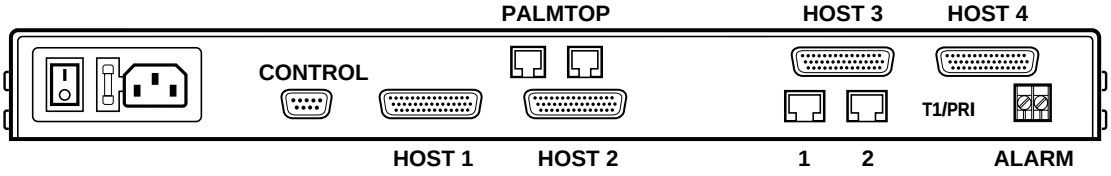
8 Restore is complete when the completion message appears on your emulator's display:
`Upload complete-type any key to return to menu...`

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 T1/PRI.

4.1 Physical Description

The following illustration shows the back of a Multiband Plus-T1/PRI. The optional Ethernet interface is not shown:



As depicted, Multiband Plus T1/PRI has the following physical interfaces:

Multiband Plus T1/PRI 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 (default), 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.
COAX, **10 BaseT**	A single Ethernet interface (selectable)
One or two T1/PRI WAN ports, labeled **1** and **2**	For access to WAN. RJ-48C connector. CSU optional per T1/PRI port. See section 4.4 on page 3.
Host 1 and **Host 2** serial host (DTE) ports optional: **Host 3** and **Host 4**	Serial host data interfaces: V.35 / RS-449 / X.21. See section 4.7.2. Host ports #3 and #4, if installed, do not have AIM functionality.
Alarm relay screw-down terminal block connector labeled **Alarm**	Power failure, unit restart/reset indicator. See section 4.3.3.

4.1.1 Battery

Multiband Plus T1/PRI contains an internal 3V lithium battery. The normal operating life of this battery exceeds five years.

Only trained engineers authorized by Ascend should open the Multiband Plus T1/PRI case for testing, maintenance, installation, or any other purpose. Furthermore, only trained engineers should replace Multiband Plus T1/PRI 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 T1/PRI 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 T1/PRI power and environmental requirements:

4.3.1 Power Requirements

Multiband Plus T1/PRI source power requirements are as follows:

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

Multiband Plus T1/PRI configuration profiles are stored by the system in battery-protected memory. Even if Multiband Plus T1/PRI 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 T1/PRI.

4.3.2 Environmental Requirements

For best results, you should house Multiband Plus T1/PRI in a room with constant temperature and humidity. In general, cooler environments are better, and an operating tem-

perature 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 T1/PRI can be operated at altitudes of 0 to 14800 ft. (0-4500 m).

Multiband Plus T1/PRI 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).

4.3.3 Alarm Relay Operating Specifications

Multiband Plus T1/PRI models are equipped with an alarm relay whose contacts are brought out on the back panel's alarm relay terminal block. The alarm relay contacts, if enabled, close during loss of power, during hardware failure, or whenever Multiband Plus T1/PRI is being reset, such as during its power-on self test. During normal operation, the alarm relay contacts open and remain open.

The alarm relay has the following characteristics:

Normally Open
1 Amp at 30 Vdc
0.3 Amp at 110 Vdc
0.3 Amp at 125 VAC

4.4 Planning the T1/PRI WAN Interface

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

4.4.1 CSU Requirements and Specifications

If a T1/PRI port of Multiband Plus T1/PRI is equipped with an internal Channel Service Unit (CSU) it can connect directly to the metallic interface to the WAN. T1/PRI ports of Multiband Plus T1/PRI which are not equipped with internal CSUs cannot connect directly to the WAN.

Carrier Approval
If the T1/PRI port has an internal CSU, it can connect directly to T1/PRI lines; however, to avoid harming the WAN, you must first contact your carrier for approval before actual installation. Once installed, you are required to notify the carrier prior to disconnecting Multiband Plus T1/PRI from the WAN. If you disconnect or turn off Multiband Plus T1/PRI without prior notification, the carrier might temporarily discontinue your T1/PRI service.

Buildout
Your carrier also determines the correct setting for the line buildout setting of the CSU. This buildout value is configured during installation. See the *Multiband Plus T1/PRI Quick Start Guide* and the **Buildout** parameter in the "Reference to Edit Menus" chapter.

Span Power
If your Multiband Plus T1/PRI does not have front-panel bantam jacks, its CSU ports are compatible only with dry loop spans and are incompatible with span-powered or wet-loop powered spans. For these CSUs, your carrier must provide unpowered dry loop T1 lines. If your Multiband Plus T1/PRI has front-panel bantam jacks, its CSU ports are compatible with both dry loop and wet loop spans.

CSU Specifications

CSU Registration	2CZUSA-73892-DE-N
Critical Circuitry Power Source	Dry Loop from local AC power source
Line Capture Frequency	1.544 Mb/s +/- 200 b/s
Line Code	AMI or B8ZS
Line Framing	D4 or ESF
Line Input/Output Impedance	100 Ohms +/- 5%
Received Signal Level Range	DSX-1 level to -27.5 db
Transmitted Signal Level	DSX-1 level into 100 Ohms
Line Buildout	0.0, 7.5, 15.0, or 22.5 db
Pulse Density and Consecutive Zeros Enforcement	In accordance with requirements of AT&T Pub 62411
Line Loopback (LLB) Set Inband Code	(10000) repeating binary pattern
Line Loopback (LLB) Reset Inband Code	(100) repeating binary pattern

4.4.2 T1/PRI Cable Maximum Length

The maximum cable distance between the T1/PRI WAN interface equipment and Multiband Plus T1/PRI should not exceed 655 feet (200 m) if you have a Multiband Plus T1/PRI without CSUs. Measure this line length and record it when you install Multiband Plus T1/PRI. You must specify this length when you configure the Line Profile parameters.

4.4.3 T1/PRI Cable Specifications

Use only cables specifically constructed for transmission of T1/PRI signals. It should meet standard T1 attenuation and transmission requirements. The following specifications are recommended:

100 Ω
Two twisted pairs, individual shielding around each pair
24 AWG stranded

4.4.4 Provisioning of the Switch for T1 Access

If robbed-bit signaling is used, the T1 circuit at the point of presence (POP) must support the following translations for compatibility with Multiband Plus T1/PRI:

- Outgoing wink start
- Immediate answer or incoming wink start
- Answer supervision
- Two-state DTMF (Dual-Tone Multifrequency) dialing
- Switched data (no voice/digital loss plan — however, the drop-and-insert channels to a PBX can be voice.))

Neither four-state A and B bit signaling nor pulse dialing are supported; however, these are passed these through transparently when Multiband Plus T1/PRI performs drop-and-insert between lines #1 and #2 only if the inband signaling and framing on both lines is the same.

For further information on wink-start and robbed-bit signaling, see the **Rob Ctl** parameter in the “Reference to Edit Menus” chapter.

4.4.5 Provisioning of the Switch for PRI (ISDN) Access

In general, for PRI-based applications, the circuit must comply with these requirements:

- D channel on channel 24
- ESF framing
- B8ZS line encoding
- For applications that require non-facility associated signaling (NFAS), you must be connected to an AT&T or Northern Telecom switch provisioned with NFAS. The service provider will supply guidelines for NFAS ID assignments.

  Note that Multiband Plus T1/PRI must have D-channel signaling functionality and at least two WAN ports to utilize NFAS.

4.4.6 Information Required from the T1/PRI Provider

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

- Inband (robbed-bit) or ISDN signaling
- B8ZS or AMI line encoding

- ESF or D4 framing
- The phone numbers assigned to your T1/PRI interface, channel-by-channel or service-by-service
- Nailed-up channels (also called private WAN), if any

  NOTE: Multiband Plus T1/PRI can connect to fractional T1 services.
- Unused channels, if any
- Call-by-call services (also called NSF identifier) on the switched channels
- B channel, H0 channel, or H11 channel provisioning

4.4.7 Loss of Power / Warm Boot Action

During loss of power or whenever Multiband Plus T1/PRI restarts, a relay closure returns the T1/PRI signal to the WAN; that is the T1/PRI line is looped back. However, if Multiband Plus T1/PRI is configured for framing-compatible drop-and-insert, all channels of line #1 are cut-through to line #2.

4.4.8 WAN Switched Services Accessible by Multiband Plus T1/PRI

- Multiband Plus T1/PRI is compatible with both AT&T and Northern Telecom central office switches. Multiband Plus T1/PRI can access the following ISDN services. For a listing of the compatible switch types, see the **Switch Type** parameter in the “Reference to Edit Menus” chapter:
  - All T1/PRI switched digital services offered by AT&T's ACCUNET Switched Digital Services (56, 64, 384/H0, and 1536/H11 kbit/s)
  - MCI 56 and 64 kbit/s services
  - Sprint Switched 56 and 64 kbit/s services
  - MultiRate and GloBanD (and GVPN in CCITT countries) PRI network services — multiples of 64 kbit/s
- Multiband Plus T1/PRI can access only switched-56 kbit/s services from a robbed-bit signaling interface.

NOTE: When requesting any data service, it must be available end-to-end, otherwise the data carried by the call is corrupted or the carrier rejects the call. For example, a GloBanD 512 kbit/s call made at a PRI interface is rejected when the called end is BRI, since BRI does not support GloBanD.

- Multiband Plus T1/PRI can connect to the T1/PRI services in the U.S. and in some countries in the Pacific Rim. See the parameter **Switch Type** in the “Reference to Edit Menus” chapter for a list the international options on a per country basis.

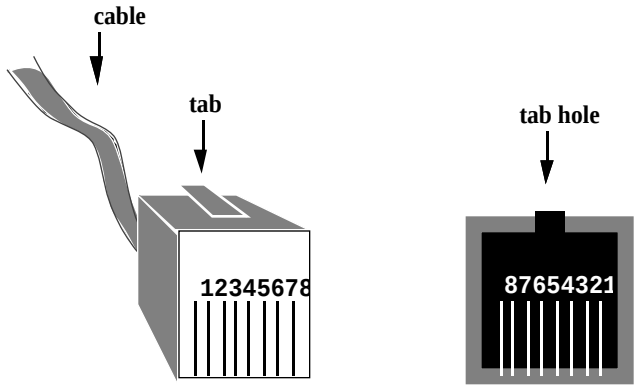
- In addition to switched circuits, Multiband Plus T1/PRI can connect to nailed-up circuits and optionally aggregate nailed-up and switched circuits.

4.4.9 T1-PBX Support with ISDN Access

Multiband Plus T1/PRI supports installations where PRI lines are provided from the WAN, but the local PBX uses inband signaling (T1 access). In such installations, Multiband Plus T1/PRI provides conversion of signaling information between the PRI line from the WAN and the inband signaling line to the PBX. See the **Sig Mode** parameter in the "Reference to Edit Menus" for more information.

4.4.10 WAN Connectors

The modular T1/PRI ports on Multiband Plus T1/PRI models follow RJ48C specifications. (T1/PRI)



8 Position Modular Plug

8 Position Modular Jack on Ascend back panel

The following table lists pins on the T1/PRI WAN port used for the Transmit and Receive. The remaining pins are not connected:

T1/PRI Logical Interface	RJ48C DTE
Multiband Plus T1/PRI Receive (input) pair, Tip (T1) Multiband Plus T1/PRI Receive (input) pair, Ring (R1)	Position 2 Position 1
Multiband Plus T1/PRI Transmit (output) pair, Tip (T) Multiband Plus T1/PRI Transmit (output) pair, Ring (R)	Position 5 Position 4

4.4.11 T1/PRI Crossover Cable: RJ48C/RJ48C

This WAN interface cable is available for Multiband Plus T1/PRI WAN interfaces. This cable is installed when the WAN transmits on pins 5 and 4 and receives on pins 2 and 1; that is, the opposite of the straight-through cable in section 4.4.12.

model number RJ48C-X, part number 2510-0059-001			
Pair #	**Signal**	**Male RJ48C**	**Male RJ48C**
1	Receive	2 1	5 4
2	Transmit	5 4	2 1

4.4.12 T1/PRI Straight Through: RJ48C/RJ48C

This WAN interface cable is available from Ascend for Multiband Plus T1/PRI WAN interfaces. Before installing this cable, verify the WAN transmits on pins 2 and 1 and receives on pins 5 and 4.

model number RJ48C-S, part number 2510-0064-001			
Pair #	**Signal**	**Male RJ48C**	**Male RJ48C**
1	Receive	1 2	1 2
2	Transmit	5 4	5 4

4.4.13 T1/PRI Crossover Cable: RJ48C/DA-15

This WAN interface cable is available from Ascend for Multiband Plus T1/PRI WAN interfaces. Before installing this cable, verify that the WAN transmits on pins 3 and 11

and receives on pins 1 and 9; that is, the opposite of the straight-through cable in section 4.4.14.

model number DB15-X, part number 2510-0082-001			
Pair #	**Signal**	**Male RJ48C**	**Male DA-15P**
1	Receive	1 2	3 11
2	Transmit	5 4	1 9

4.4.14 T1/PRI Straight Through: RJ48C/DA

This WAN interface cable is available from Ascend for Multiband Plus T1/PRI WAN interfaces. Before installing this cable, verify that the WAN transmits on pins 1 and 9 and receives on pins 3 and 11.

model number DB15-S, part number 2510-0065-001			
Pair #	**Signal**	**Male RJ48C**	**Male DA-15P**
1	Receive	1 2	1 9
2	Transmit	5 4	3 11

4.4.15 T1/PRI Straight Through: RJ48C/Bantam

This WAN interface cable is available from Ascend for Multiband Plus T1/PRI WAN interfaces. The WAN side of the cable connects to dual bantam jacks.

model number DBNT-RJ45, part number 2510-0066-001			
Pair #	**Signal**	**Male RJ48**	**Male Dual - 310P**
1	Receive	1 2	Tip 1 Ring 1
2	Transmit	5 4	Tip 2 Ring 2

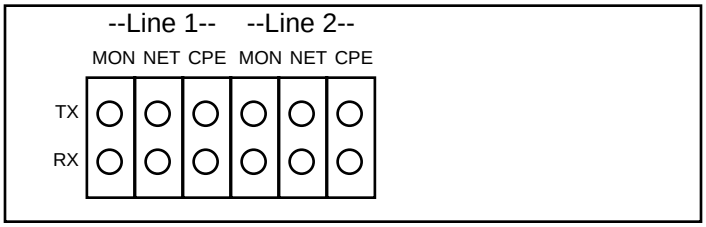
4.4.16 T1 RJ48C-Loopback Plug

This plug loops the transmit signal back to Multiband Plus T1/PRI:

Pair #	Signal	Male RJ48C
1	Receive	1 (connects to 5) 2 (connects to 4)
2	Transmit	5 (connects to 1) 4 (connects to 2)

4.4.17 T1/PRI Bantam Test Jacks

If your model is equipped with bantam jacks, these twelve front-panel bantam jacks give Multiband Plus T1/PRI the capability of monitoring and testing its T1/PRI interface. The following illustration shows two rows of bantam jacks, which appear on Multiband Plus T1/PRI's front panel beside the Palmtop port. The left-most six jacks correspond to T1 line #1's interface. If your unit is equipped with a second T1 port, the right-most six jacks correspond to T1 line #2's interface:

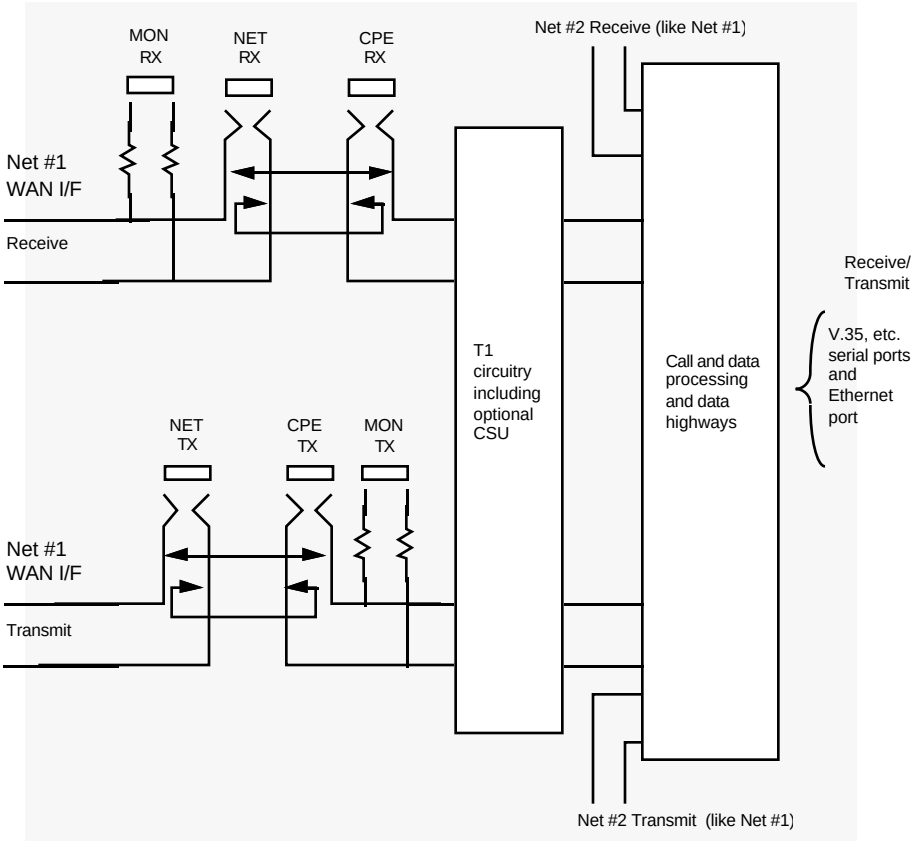


Inserting a bantam plug in the either the NET RX or CPE RX jacks, breaks the T1 signal received from the WAN. Similarly, inserting a plug in either the NET TX or CPE TX plugs, breaks the signal transmitted to the WAN:

- Each monitor jack pair (MON RX & MON TX) allows for passive monitoring of the circuit between the network (T1/PRI Line 1 or Line 2) and the internal CSU (if present) or between the network and the DSX line interface to the Multiband Plus.
- Inserting bantam plugs in a network jack pair (NET RX & NET TX) opens the connections to and from the CSU or DSX interface to the Multiband Plus, and routes the network transmit and receive interface (T1/PRI Line 1 or Line 2) to the test jacks.

  NOTE: If the unit has an internal CSU, the NET TX jack will bypass the CSU and feed directly into the line. Thus the signal on this test jack should be generated by an external CSU or test equipment that provides the proper signal level.

- Inserting bantam plugs in a CPE jack pair (CPE RX & CPE TX) opens connections to and from the network and routes the Multiband Plus's CSU or DSX transmit and receive interfaces (T1/PRI Line 1 and Line 2) to the test jacks.



NOTE: These jacks bypass Multiband Plus T1/PRI's internal CSU, and you should provide an external CSU or network-compatible test equipment when supplying a signal through the NET TX jack.

4.5 Specification of Multiband Plus T1/PRI's Control Interface

Through Multiband Plus T1/PRI 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 T1/PRI. 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. (Status information is also available through the ***show*** command during terminal server sessions.) 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 running a TELNET session to Multiband Plus T1/PRI; if the optional Ethernet interface is installed
- 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 T1/PRI. 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 T1/PRI'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 T1/PRI. It is available through Multiband Plus T1/PRI's back panel **Control** port automatically if Multiband Plus T1/PRI has configured that port for MIF or it can be evoked by a 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 T1/PRI programmatically. The maximum recommended data rate for MIF is 4800 bit/s.
- ***SNMP*** (Simple Network Management Protocol) also provides a machine-compatible control and monitoring interface based on the SNMP protocol. SNMP is available whenever Multiband Plus T1/PRI is connected to a LAN through its optional Ethernet interface.

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***.
- ***Syslog***, a TCP/IP application, provides recording of system log. The Ethernet interface is required for Syslog.

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 pin-outs 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
*Pin 9 is not active (Ring Indication signal not supplied)			

4.5.2 Palmtop Port, Cabling for Palmtop Controller

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

Multiband Plus T1/PRI 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 T1/PRI 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 following cable:

model number HHT-VT-100 part number 2510-0088-001	
Multiband Plus T1/PRI 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 Planning the Ethernet Interface

This section contains the specification of Multiband Plus's Ethernet interface, prerequisite to Ethernet connection, and Ethernet cables.

4.6.1 General Specifications of the Ethernet Interface

Multiband Plus T1/PRI (with the optional Ethernet interface) supports the physical specifications of IEEE l802.3 with Ethernet 2 (Ethernet/DIX) framing. It provides a single Ethernet interface that is user-configured to support any one of the following Ethernet types.

- Coax (Coaxial) — Thin Ethernet and IEEE 802.3 (10 Base2) with BNC connector.
- 10 BaseT (Unshielded Twisted Pair) — Twisted pair Ethernet and IEEE 802.3 (10 BaseT) with RJ-45 connector

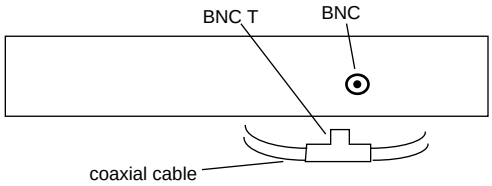
The Ethernet address for the Ethernet interface resides in the motherboard rather than in the Ethernet transceiver. Ethernet is available only on motherboards characterized by front-panel bantam jacks.

4.6.2 Required Equipment

To install the Ethernet Interface you need the following:

- For connection to Coax: a BNC T-connector and a 50 ohm terminator if your connection is at the end of a cable segment (not supplied)

To install, attach a LAN BNC T-connector to the BNC port on the back of ABC/MAX. Use standard 10 Base2 50 Ohm cable, such as RG-58 A/U and RG58 C/U.
CAUTION: Breaking the LAN's continuity by inserting a cable segment or removing either of the 50 ohm terminations disrupts and probably disables thin Ethernet



- For connection to 10 BaseT: twisted pair Ethernet cable, a dual twisted pair cable terminated with RJ-45 modular jacks

  Use EIA/TIA 568 or IEEE 802.3 10 BaseT cable. Some installations require a crossover cable; for example, when connecting directly to the Ethernet port of a PC since both Multiband Plus and the PC are nodes relative to a hub.

4.7 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 T1/PRI.

4.7.1 Types of Serial Host Interfaces Supported

Multiband Plus T1/PRI's serial host ports are compatible with the following three electrical standards:

- RS-449/422
- V.35
- X.21

Multiband Plus T1/PRI 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

4.7.2 Multiband Plus T1/PRI 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 pin-outs from Multiband Plus T1/PRI to the application equipment as well as the proper voltage levels.

In the cable wiring tables that follow, Multiband Plus T1/PRI is the DCE (data communications equipment) device while the host equipment is the DTE (data terminal equipment) device. The signal names and pin-outs 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)

4.7.3 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 4.7.7).

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 4.7.8)
- RS-449 Cable to Generic Serial Host (section 4.7.14)

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

4.7.4 RS-366 Cabling

Ascend supplies a variety of RS-366 cables:

- V.35 and RS-366 Cable to Generic Serial Host (section 4.7.9)
- V.35 / RS-366 Cable to CLI (section 4.7.10)
- V.35 / RS-366 Cable to PT (section 4.7.11)
- RS-449 / RS-366 / DB-37 Cable to VTC (section 4.7.12)
- RS-449 / RS-366 Cable to Generic Serial Host (section 4.7.13)

4.7.5 X.21 Cabling

Ascend supplies a single X.21 cable:

- X.21 Cable to Generic Serial Host (section 4.7.6)

4.7.6 X.21 Cable to Generic Serial Host

If your host is equipped with an X.21 interface, the host cable has the following pin-outs:

model number MBHD-X21, part number 2510-0098-001				
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.

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

This cable is used to connect to the V.35 port of Cisco routers that use V.25 bis dialing. It has the following pin-outs:

model number MBHD-V.35-CISCO, part number 2510-0099-001			
Pair #	**Signal**	**Multiband Plus Male DB-44**	**Host Female V.35**
1	FGND	1	A
2	SD+ SD-	26 27	P S
3	RD+ RD-	2 3	R T
4	ST+ ST-	4 5	Y AA
5	RT+ RT-	14 15	V X
6	DSR DCD	6 36	E, F* D
7	RTS RI	7 43	C J
8	DTR SGND	8 25	H B
9	TT+ TT-	16 17	U W
10	RX/SEL	28, 44*	

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

4.7.8 V.35 Cable to Generic Serial Host

This cable is used to connect to V.35 ports of a wide variety of equipment. A female to male V.35 gender changer is included when you order the cable. It has the following pin-outs:

model number MBHD-V35, part number 2510-0079-001			
Pair #	**Signal**	**Multiband Plus Male DB-44**	**Host Female V.35**
1	FGND	1	A
2	SD+ SD-	26 27	P S
3	RD+ RD-	2 3	R T
4	ST+ ST-	4 5	Y AA
5	RT+ RT-	14 15	V X
6	DSR DCD	6 36	E D, F*
7	RTS RI	7 43	C J
8	DTR SGND	8 25	H B
9	TT+ TT-	16 17	U W
10	RX/SEL	28, 44*	

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

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

This cable 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 is included when you order the cable. It has the following pin-outs:

model number MBHD-V35-366, part number 2510-0077-001				
Pair #	**Signal**	**Multiband Plus Male DB-44**	**Host Female V.35**	**RS-366 Female DB-25**
1	FGND	1	A	
2	SD+ SD-	26 27	P S	
3	RD+ RD-	2 3	R T	
4	ST+ ST-	4 5	Y AA	
5	RT+ RT-	14 15	V X	
6	DSR DCD/CTS	6 36	E D, F*	
7	RTS RI	7 43	C J	
8	DTR SGND	8 25	H B	
9	TT+ TT-	16 17	U W	
10	DPR ACR	9 10		2 3
11	CRQ PND	11 12		4 5
12	DLO SGND	13 25		22 7, 18,19*
13	NB1 NB2	21 22		14 15
14	NB4 NB8	23 24		16 17
15	DSC	36		13
16	RX/SEL	28, 44*		

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

4.7.10 V.35 / RS-366 Cable to CLI

This cable 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 pin-outs:

model number MBHD-V35CLI, part number 2510-0094-001			
Pair #	**Signal**	**Multiband Plus Male DB-44**	**Host V.35/RS-366 Male DB-25**
1	V.35 FGND V.35 DTR	1 8	1 8
2	V.35 SD+ V.35 SD-	26 27	2 14
3	V.35 RD+ V.35 RD-	2 3	3 15
4	V.35 ST+ V.35 ST-	4 5	4 16
5	V.35 RT+ V.35 RT-	14 15	5 17
6	V.35 DSR V.35 DCD/CTS	6 36	6 19
7	V.35 RTS V.35 RI	7 43	7 18
8	V.35 TT+ V.35 TT-	16 17	4 16
9	RS-366 DPR RS-366 ACR	9 10	9 10
10	RS-366 CRQ RS-366 PND	11 12	11 12
11	RS-366 DLO SGND	13 25	13 25
12	RS-366 NB1 RS-366 NB2	21 22	21 22
13	RS-366 NB4 RS-366 NB8	23 24	23 24
14	RX/SEL	28, 44*	

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

4.7.11 V.35 / RS-366 Cable to PT

This cable is used to connect to V.35 ports of the PictureTel codec with support for RS-366 dialing. It has the following pin-outs:

model number MBHD-449PT, part number 2510-0093-001				
Pair #	**Signal**	**Multiband Plus Male DB-44**	**Host Female DB-37**	**RS-366 Female DB-25**
1	FGND	1	1	
2	SD+ SD-	26 27	4 22	
3	RD+ RD-	2 3	6 24	
4	ST+ ST-	4 5	5 23	
5	RT+ RT-	14 15	8 26	
6	DSR DCD/CTS	6 36	11 9, 13*	
7	RTS RI	7 43	7 15	
8	DTR SGND	8 25	12 19, 20, 37*	
9	TT+ TT-	16 17	17 35	
10	DPR ACR	9 10		2 3
11	CRQ PND	11 12		4 5
12	DLO SGND	13 25		22 7
13	NB1 NB2	21 22		14 15
14	NB4 NB8	23 24		16 17
15	DSC	36		13
16	RX/SEL	28, 44*		

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

4.7.12 RS-449 / RS-366 / DB-37 Cable to VTC

This cable is used to connect to RS-449 ports of the VTel codec with support for RS-366 dialing. It has the following pin-outs:

model number MBHD-449VTC, part number 2510-0081-001			
Pair #	**Signal**	**Multiband Plus Male DB-44**	**Host RS-449/RS-366 Male DB-37**
1	FGND FGND	1 1	1 19
2	SD+ SD-	29 30	4 22
3	RD+ RD-	40 39	6 24
4	ST+ ST-	42 41	5 23
5	RT+ RT-	37 38	8 26
6	DSR DCD/CTS	6 36	2 9, 11, 18*
7	RTS RI	7 43	7 15
8	DTR SGND	8 25	12 37
9	RS-366 DPR RS-366 ACR	9 10	14 3
10	RS-366 CRQ RS-366 PND	11 12	10 33
11	RS-366 DLO	13	21
12	RS-366 NB1 RS-366 NB2	21 22	16 28
13	RS-366 NB4 RS-366 NB8	23 24	32 34
14	RX/SEL	20, 28*	

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

NOTE: This cable does not support terminal timing.

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

This cable 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 is included when you order the cable. It has the following pin-outs:

model number MBHD-449-366, part number 2510-0078-001				
Pair #	**Signal**	**Multiband Plus Male DB-44**	**Host Female DB-37**	**RS-366 Female DB-25**
1	FGND	1	1	
2	SD+ SD-	29 30	4 22	
3	RD+ RD-	40 39	6 24	
4	ST+ ST-	42 41	5 23	
5	RT+ RT-	37 38	8 26	
6	DSR DCD/CTS	6 36	11 9, 13*	
7	RTS RI	7 43	7 15	
8	DTR SGND	8 25	12 19, 20, 37*	
9	TT+ TT-	31 32	17 35	
10	DPR ACR	9 10		2 3
11	CRQ PND	11 12		4 5
12	DLO SGND	13 25		22 7
13	NB1 NB2	21 22		14 15
14	NB4 NB8	23 24		16 17
15	DSC	36		13
16	RX/SEL	20, 28*		

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

4.7.14 RS-449 Cable to Generic Serial Host

This cable is used to connect to RS-449 ports of a wide variety of equipment. A female to male DB-37 gender changer is included when you order the cable. It has the following pin-outs:

model number MBHD-449, part number 2510-0080-001			
Pair #	**Signal**	**Multiband Plus Male DB-44**	**Host Female DB-37**
1	FGND	1	1
2	SD+ SD-	29 30	4 22
3	RD+ RD-	40 39	6 24
4	ST+ ST-	42 41	5 23
5	RT+ RT-	37 38	8 26
6	DSR DCD/CTS	6 36	11 9, 13*
7	RTS RI	7 43	7 15
8	DTR SGND	8 25	12 19, 20, 37*
9	TT+ TT-	31 32	17 35
10	RX/SEL	20, 28*	

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

NOTE: To manufacture an 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).

4.7.15 Cable Length Requirements

The following table specifies the recommended maximum length of the cable between Multiband Plus T1/PRI 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 T1/PRI 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

4.7.16 Timing Signals

In all applications, the serial host uses timing provided by Multiband Plus T1/PRI. That is, Multiband Plus T1/PRI supplies the send and receive clocks. Multiband Plus T1/PRI 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 T1/PRI provides the Terminal Timing signal. Your serial host must use Terminal Timing whenever the distance between it and Multiband Plus T1/PRI is greater than recommended in section 4.7.15.

4.8 Interoperability Specifications

When equipped with the optional Ethernet interface module, Multiband Plus T1/PRI is compatible with the following:

- IP — You must assign an IP address to Multiband Plus T1/PRI's Ethernet interface.
- TELNET— Multiband Plus T1/PRI acts as a TELNET server. Multiband Plus T1/PRI supports a maximum of 2 TELNET sessions.
- SNMP — Multiband Plus T1/PRI supports the following MIBs:

  MIB-2 (RFC 1213)

  RS-232 MIB (RFC 1317)

  DS1/E1 MIB (RFC 1406)

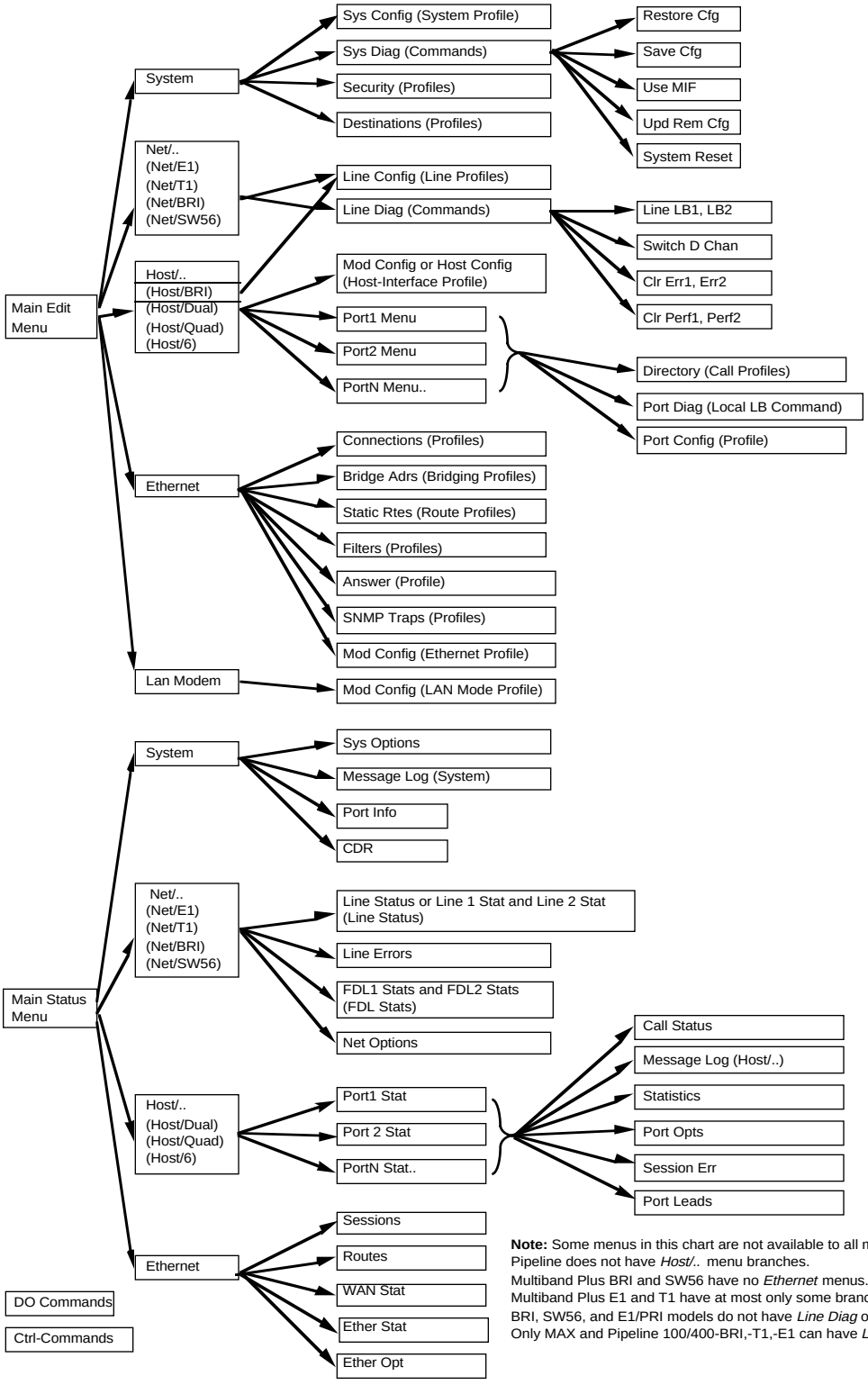
  ASCEND ENTERPRISE MIB (include ASCEND-TRAPS file)
- PING
- RIP — optional on the Ethernet interface

Inverse Multiplexing Interoperability

When connecting devices through its V.35, RS-422, or X.21 serial host ports, Multiband Plus T1/PRI 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.

5 Multiband Plus T1/PRI Parameters



Note: Some menus in this chart are not available to all models.
Pipeline 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 T1/PRI 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 are given. 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, the optional Ethernet interface, 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/T1 (Line Profile)`**, refers to the Net/T1 menu, whose menu number is 10-100, and whose profiles are grouped under the name, Line Profile. See the "User Interface Overview' appendix for further information on the menu numbering scheme.

00-400 Destinations (Destination Profile)		
Parameter Name	**Values**	**Default Value**
Name	user-typed-in text string	*[]*
Option	*1st Avail* *1st Active* *Any*	*1st Avail*
Dial *n*# (*n*=1 to 6)	user-typed-in text string	*[]*
Call-by-Call *n* (n=1 to 6)	user-typed-in numeric string from *0* to *31*	*6*

2*N*-100 Directory (Call Profile)		
Parameter Name	**Values**	**Default Value**
Name	user-typed-in text string	*[]*
Dial #	user-typed-in 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	varies per T1/PRI service: *56K* *56KR* *64K* *384K/H0* *384KR* *1536K* *1536KR* *other multiples of 64K* *Voice*	*56KR*
Force 56	*Yes* *No*	*No*
Base Ch Count	user-typed-in numeric string	*1*
Inc Ch Count	user-typed-in numeric string	*1*
Dec Ch Count	user-typed-in numeric string	*1*
Call-by-Call (PRI only)	user-typed-in numeric string: *0* to *31*	*6*
Bill #	user-typed-in string	
Auto-BERT	*Off* *15 sec* *30 sec* *60 sec* *90 sec* *120 sec*	*Off*
Bit Inversion	*Yes* *No*	*No*

2*N*-100 Directory (Call Profile)		
Parameter Name	**Values**	**Default Value**
Fail Action	*Disc* *Reduce* *Retry*	*Reduce*
PRI # Type (PRI only)	*National* *Local* *Abbrev* *Unknown* *Intl*	*National*
Transit #	user-typed-in numeric string or null	
Group	user-typed-in alphabetic character *A to Z* (varies)	*A*
FT1 Caller	*Yes* *No*	*Yes*
B&O Restore	user-typed-in numeric string (*30* to *30000* seconds)	*300*
Flag Idle	*Yes* *No*	*Yes*
Dyn Alg	*Constant* *Linear* *Quadratic*	*Linear*
Sec History	user-typed-in numeric string	*300*
Add Pers	user-typed-in numeric string	*20*
Sub Pers	user-typed-in 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-typed-in text string	*00:00:00*
Min Ch Cnt	numeric text string	*1*
Max Ch Cnt	numeric text string	*1*
Target Util	user-typed-in numeric string	*70*

10-100 Line Config (T1/PRI Line Profiles)		
Parameter Name	**Values**	**Default Value**
Name	user-defined alphanumeric string up to 16 characters	*[]*
2nd Line	*Disabled* *Trunk* *D&I*	*Disabled*
Line *n*..	submenu (shown below). *n* is the T1/PRI line #	
Line-Specific Parameters (Line 1.., etc.)		
Sig Mode	*Inband* *ISDN* *ISDN_NFAS* *PBX T1*	*Inband*
NFAS ID num	user-defined number 0 to 31	*1* (line #1) *2* (line #2)
Rob Ctl	*Wink-Start* *Idle-Start* *Inc-W-200* *Inc-W-400*	*Wink-Start*
Switch Type	*AT&T* *GloBanD* *NTI* *Japan* *NI-2*	*AT&T*
Framing Mode	*D4* *ESF*	*D4*
Encoding	*AMI* *B8ZS* *None*	*AMI*
FDL	*None* *AT&T* *ANSI* *Sprint*	*None*
Length (only present if internal CSU is not installed)	*1-133* *134-266* *267-399* *400-533* *534-655*	*1-133*
Buildout (only present if internal CSU is installed)	*0 db* *7.5 db* *15 db* *22.5 db*	*0 db*
Clock Source	*Yes* *No*	*Yes*

10-100 Line Config (T1/PRI Line Profiles)		
Parameter Name	**Values**	**Default Value**
PBX Type	*Voice* *Data* *Leased 1:1*	*Voice*
Delete Digits	user-typed-in number from *0* to *9*	
Add Number	user-typed-in number from *0* to *999*. Can be null.	
Call-by-Call	user-typed-in number from *0* to *31*	*6*
Ans #	user-typed-in text string	*[]*
Ans Service	varies per T1/PRI service: *56K* *56KR* *64K* *384K/H0* *384KR* *1536K* *1536KR* *other multiples of 64K* *Voice*	*Voice*
Ch *n*	*Unused* *Switched* *D&I* *Nailed* *NFAS-Prime* *NFAS-Second* *D-Channel*	*Switched*, except when **Sig Mode**=*ISDN*, then **Ch 24** default is *D-Channel*.
Ch *n* #	user-defined numeric string up to 16 characters	*[]*
Ch *n* Prt/Grp	If **Ch *n*** = *Switched*, user-typed-in number from *0* to the highest serial host port. If **Ch *n*** = *Nailed*, user-typed-in alphabetic character from *A* to *Z* (varies)	*0*
Ch *n* TrnkGrp	user-typed-in number from *4* to *9*	*9*

30-200 Mod Config (Ethernet Profile)		
Parameter Name	**Values**	**Default Value**
Ether Options..		
Ethernet IF	*AUI* *COAX*	*COAX*
IP Adrs	user-typed-in string in the IP decimal format/netmask n.n.n.n/m, where n is a number from 0 to 255, m is a number from 8 to 32	*0.0.0.0/0*
RIP	*Off* *Recv*	*Off*
Def Rte	user-typed-in string in the IP dotted decimal format n.n.n.n	*0.0.0.0*
SNMP options..		
Read Comm	user-typed-in text string	*public*
R/W Comm	user-typed-in text string	*write*
General Parameters at the Ethernet Profile Level		
Telnet PW	user-typed-in text string up to 20 characters	*[]*
Syslog	*Yes* *No*	*No*
Log Host	user-typed-in string in the IP dotted decimal format n.n.n.n	*0.0.0.0*
Log Facility	*Local0* *Local1* etc. *Local7*	*Local0*

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-typed-in numeric string from *0* to max host-port	*0*

20-100 Host Config (Host-Interface Profile)		
Parameter Name	**Values**	**Default Value**
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-typed-in 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 Profiles)		
Parameter Name	**Values**	**Default Value**
Port Name	user-typed-in text string up to 16 char	*[]*
Ans 1#	user-typed-in numeric string up to 16 characters	*[]*
Ans 2#	user-typed-in numeric string up to 16 characters	*[]*
Ans 3#	user-typed-in numeric string up to 16 characters	*[]*
Ans 4#	user-typed-in 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*

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

00-300 Security (Security Profile)		
Parameter Name	**Values**	**Default Value**
Name	user-typed-in text string up to 16 characters	*[]*, except for the first profile, which is *Default*

00-300 Security (Security Profile)		
Parameter Name	**Values**	**Default Value**
Passwd	user-typed-in 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*
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*

30-100 SNMP Traps (SNMP Traps Profiles)		
Parameter Name	**Values**	**Default Value**
Name	user-typed-in text string up to 31 char.	*[]*
Comm	user-typed-in text string up to 31 char.	*[]*
Dest	user-typed-in string in the IP dotted decimal format/netmask n.n.n.n, where n is a number from 0 to 255	*0.0.0.0*
Alarm	*Yes* *No*	*Yes*
Port	*Yes* *No*	*No*
Security	*Yes* *No*	*No*

Status Menus
00-000 System
00-100 Sys Options
00-200 Message Log (System)
00-300 Port Info
00-400 CDR
10-000 Net/T1
10-100 Line 1 Stat
10-200 Line 2 Stat
10-300 Line Errors
10-400 FDL1 Stats
10-500 FDL2 Stats
10-600 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

Status Menus
30-000 Ethernet
30-100 Ether Stat
30-200 Ether Opt

00-100 Sys Config (System Profile)		
Parameter Name	**Values**	**Default Value**
Name	user-typed-in text string up to 16 characters	*[]*
Location	user-typed-in text string up to 38 characters	*[]*
Contact	user-typed-in text string up to 38 characters	*[]*
Date	user-typed-in text string	*00/00/00*
Time	user-typed-in 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-typed-in numeric string from *1* to *12*	*5*
Single Answer	*Yes* *No*	*No*
Use Trunk Grps	*Yes* *No*	*No*
Excl Routing	*Yes* *No*	*No*
Auto Logout	*Yes* *No*	*No*
Idle Logout	user-typed-in text string specifying *0* to *60* minutes	*0*
DS0 Min Rst	*Off* *Daily* *Monthly*	*Off*

00-100 Sys Config (System Profile)		
Parameter Name	**Values**	**Default Value**
Max DS0 Mins	user-typed-in number from *1* to *357120* minutes	*1*
High BER	*10 ** -3* *10 ** -4* *10 ** -5*	*10 ** -3*
High BER Alarm	*Yes* *No*	*No*
No Trunk Alarm	*Yes* *No*	*No*
Delay Dual	*Yes* *No*	*No*
Edit	user-typed-in text string specifying an edit menu number	*00-000*
Status 1...Status 8	user-typed-in 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 T1/PRI. Also see Chapter 7, “Reference to Status Menus.”

2nd Line

⇒⇒ **2nd Line** [a **Line Profile** (10-100) Line Config parameter] together with **Sig Mode** specifies how the T1/PRI interface labeled **2** (line #2) is used:

- *Disabled* means that T1/PRI interface #2 (line #2) is ignored. This value is the default.
- *D&I* means that T1/PRI interface #2 (line #2) is used for drop-and-insert applications only. If you specify *D&I* for **2nd Line**, then in the Line Profile for line #1, set **Ch *n*** = *D&I* for each channel which is passed to line #2. These channels pass through Multiband Plus transparently. Signaling bits also pass through transparently. Channels not designated drop-and-insert are available for use by Multiband Plus.
- *Trunk* means that T1/PRI interface #2 (line #2) is a standard interface. *Trunk* means that line #2 exchanges signaling information over the interface. **Sig Mode** determines the type of signaling exchange. In particular, if line #2 interfaces to a telco or private switch, set line #2 **Sig Mode**=*In-band* or *ISDN*. If line #2 interfaces to WAN terminating devices (robbed-bit only) like PBXs, set line #2 **Sig Mode**=*PBX T1*.

D&I: Multiband Plus does not support *D&I* with switched ISDN PRI channels. The D channel cannot be shared.

Activ

⇒⇒ **Activ** [a **Call Profile** (2*N*-100 Directory) 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 Number

⇒⇒ **Add Number** [a **Line Profile** (10-100 Line Config) parameter] specifies a digit string that is added to the front of the phone number being dialed by the device connected to line #2 after the number of digits specified in **Delete Digit** have been removed. (Typically a PBX is connected to line #2.) This parameter applies only when **Sig Mode** = *PBX T1*.

Add Number: This parameter can specify a Multiband Plus trunk group if trunk groups have been defined in the current Line Profile. You can also use this parameter to add any digit string required by the PRI switch. Or, you can leave this parameter blank (null).

Add Pers

⇒⇒ **Add Pers** [a **Call Profile** (2*N*-100 Directory) 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 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.

Alarm

⇒⇒ **Alarm** [an **SNMP Traps Profile** (30-100 SNMP Traps) parameter] enables the trapping of alarm events when set to *Yes*, the default. Alarm events are defined in RFC 1215 and include the following:

- coldStart — When Multiband Plus T1/PRI starts from a power-off condition.
- warmStart — When Multiband Plus T1/PRI starts from a power-on condition, typically through a system reset either by command or otherwise.
- linkDown — Whenever a WAN link/connection or the Ethernet interface goes down.
- linkUp — Whenever a WAN link/connection or the Ethernet interface goes up.

All Port Diag

⇒⇒ **All Port Diag** [a **Security Profile** (00-300 Security) 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

⇒⇒ **Ans #** [a **Line Profile** (10-100 Line Config) parameter that appears only for line #1] is a number compared to the phone number called to reach this Multiband Plus. It routes an incoming call to line #2 (that is, to the PBX) if the called number matches and **Sig Mode**=*PBX T1*. If you leave **Ans Service** blank, **Ans #** determines whether incoming calls are switched to line #2. If you leave both **Ans Service** and **Ans #** blank, incoming calls are not switched to line #2. You can enter up to 18 numeric characters including hyphens and parentheses. If the right-most (least significant) digits of the phone number dialed match the entire **Ans #**, a full match is assumed.

Ans # [Line Profile]: This parameter applies only when **Sig Mode** = *PBX T1*.

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

⇒⇒ **Ans *n*#** [**Port Profile** (2*N*-300 Port Config) parameters] specify the phone numbers, if any, associated with this serial host port. If an incoming call has dialed any of these numbers, the call is routed to this port. If you leave all these parameters blank, Multiband Plus cannot use called-party number for routing an incoming call to this port. Nailed-up calls (*FT1-B&O*, *FT1-AIM*, and *FT1*) ignore this parameter.

You can enter up to 18 numeric characters, including hyphens and parentheses. You should not 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*# [Port Profile] call routing only works where the called party (dialed number) is conveyed by the network to the answerer and more than one phone number can be assigned to the WAN interface. Incoming calls on T1 access lines cannot be routed by the dialed number, whereas calls coming in on ISDN lines can. Consult your WAN service provider for further information.

Ans *n*# [Port Profile] normally means the called party number; however, if **Switch Type**=*GloBanD*, it means the calling party number. See section 3.21.

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

Ans Service

⇒⇒ **Ans Service** [a **Line Profile** (10-100 Line Config) parameter that appears only for line #1] routes an incoming call to line #2 (that is, to the PBX) if the data service of the incoming call matches. If you leave both **Ans #** and **Ans Service** blank, incoming calls are not routed to line #2.

Ans Service: This parameter applies only when **Sig Mode** = *PBX T1* and **PBX Type**=*Data*. If **PBX Type**= *Voice*, **Ans Service**=*Voice* only.

Ans Service: For most PBX applications, set this parameter to *Voice*. Other possible values for this parameter are described under the **Data Svc** parameter.

Answer

⇒⇒ **Answer** [a **Port Profile** (2*N*-300 Port Config) 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 handshakes 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.

P-Tel Man waits until all channels of the call have been synchronized before raising RI to inform the codec of the incoming call.

Auto-BERT

⇒⇒ **Auto-BERT** [a **Call Profile** (2*N*-100 Directory) 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) 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 hand-held terminal or other type of terminal 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) 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) 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) 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.

Bill

⇒⇒ **Bill #** [**Call Profile** (2*N*-100 Directory) parameter], called the billing number or billing code, is used by your carrier to segregate and sort your bill. Multiband Plus accepts up to 10 digits for **Bill #**. For example, if you have six departments, each department could have its own carrier-approved **Bill #**, and then the carrier could separate and tally each department's usage. Your carrier determines the billing codes you can enter. Leave this parameter blank if you have not arranged with your carrier for billing code support.

Bill # value for PRI networks is carried in the Calling Party information element. For T1 access networks, the **Bill #** value is appended to the end of phone number, that is, each number dialed for this call has the **Bill #** digits appended to it.

Bit Inversion

⇒⇒ **Bit Inversion** [a **Call Profile** (2*N*-100 Directory) parameter] 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 requirement for bit inversion, check with your carrier contact or system manager. It is important that you set **Bit Inversion** in the destination Multiband Plus to the same value as the calling Multiband Plus.

Buildout

⇒⇒ **Buildout** [a **Line Profile** (10-100 Line Config) parameter] specifies the amount of attenuation that Multiband Plus should apply to this line's network interface to match the cable length from Multiband Plus to the next repeater. The values for this parameter can be *0db*, *7.5db*, *15db*, or *22.5db*. The default value is *0db*.

Buildout: Check with your carrier to determine which value to use. This parameter is applicable only if Multiband Plus is equipped with an internal CSU at this line.

Call-by-Call

⇒⇒ **Call-by-Call** [a **Call Profile** (2*N*-100 Directory) parameter] specifies the ISDN PRI service used in placing a call to a serial host port.

Call-by-Call: For clarification on call-by-call service definitions, consult your carrier contact. This parameter is also known as network-specific facility (***NSF***). See also **Call-by-Call 1-6**.

⇒⇒ **Call-by-Call** [a **Line Profile** (10-100 Line Config) parameter that appears only for line #1] specifies the call-by-call value appropriate to calls made from the device connected to line #2 when **Sig Mode** = *PBX T1*.

Call-by-Call [Line Profile]: Typically a PBX is connected to line #2 and this parameter specifies voice service.

This parameter (any profile) can be configured for any value from *0* to *31*, with *6* as the default.

The following list gives the services called out by the **Call-by-Call** (any profile) parameters only if the service provider is AT&T. The most common values for Multiband Plus applications are ACCUNET (6) and

SDN (1). Other services correspond to **Call-by-Call** numerical values for other carriers:

0	Disable call-by-call
1	SDN (including GSDN)
2	Megacom 800
3	Megacom
6	ACCUNET Switched Digital Services
7	Long Distance Service (including AT&T World Connect)
8	International 800 (I800)
16	AT&T MultiQuest

The following list gives the VPN and GVPN services called out by the **Call-by-Call** (any profile) parameters only if the carrier is Sprint:

0	Reserved
1	Private
2	Inwatts
3	Outwatts
4	FX
5	Tie Trunk

The following list gives the services called out by the **Call-by-Call** (any profile) parameters only if the carrier is MCI:

1	VNET/Vision
2	800
3	PRISM1, PRISM II, WATS
4	900
5	DAL

Call-by-Call is usually not required when the POP is Sprint or MCI and should be set to *0*. Ask your carrier for specific details on your installation.

Call-by-Call *n* (*n*=1 - 6)

⇒⇒ **Call-by-Call *n*** [**Destination Profile** (00-400 Destinations) parameters] specify the ISDN PRI services associated with the **Dial *n*#** Destination Profile parameters; for example, when **Dial 5#** is dialed the **Call-by-Call 5** PRI services are used. **Call-by-Call *n*** in the Destination Profile profile overrides **Call-by-Call** in the Call Profile.

Call-by-Call *n*: Since each Destination Profile has six (***n=1..6***) **Call-by-Call** and **Dial #** parameters, up to six options can be configured for reaching the destination. The **Option** parameter helps Multiband Plus select which option to use.

See **Call-by-Call** for the values to which this parameter can be set. See also **Destination Profiles**.

Call Mgm

Call management of *AIM*, *FT1-B&O*, 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 T1/PRI lines. For example, in a *Manual* call between serial hosts with the **Base Ch Count** at 5 and the T1/PRI interface providing 56 kbit/s switched service, 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 AIM's management subchannel. When the parameter **Call Mgm** is *Mode 2*, your serial host gets 98.4% of the bandwidth allocated from the T1/PRI 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) 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 available by command see **DO Beg/End Rem LB**, **DO Beg/End Rem Mgm**, **DO Contract BW**, and **DO Extend BW**.

- *Manual* allows you to add or remove bandwidth 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 bandwidth.

- *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 gets a multiple of 64 kbit/s, whether the network service is 56 or 64 kbit/s:

		Network BW* (kbit/s)	
Host BW. kbit/s	**Base Ch Count**	**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&O, 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

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.

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.

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

Blank	Idle (no calls exist and no other calling operations 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)
??	Network (T1/PRI) alarm

Call Type

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

- *AIM* is a call type in which 56 or 64 or H0/384 kbit/s or MultiRate or GloBanD 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 or MultiRate or GloBanD multiples of 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 or H0/384 kbit/s 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 line. For other call types, the bandwidth delivered to your host is somewhat less. See **Call Mgm**.

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

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 T1/PRI lines provider if you plan to use this call type with more than one line. Proper phase relationship between individual channels in the different lines 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 *n*

⇒⇒ **Ch *1, Ch 2, etc.*** [**Line Profile** (10-100 Line Config) parameters] specify how an individual channel is used within the interface. 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.

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

- *D&I* (drop-and-insert) means the channel is passed through Multiband Plus transparently to its second network interface.

  If you have configured **2nd Line** to *D&I*, specify the **Ch *n*** parameters only for line #1. **Ch *n*** of line #2 are automatically *N/A* since line #2 does not interface to the

Switched: This value is the default, except for the D channel, namely channel 24 of a T1/PRI line #1 or channel 16 of an E1/PRI interface.

D&I: You must have already specified *D&I* for the **2nd Line** parameter before you can specify *D&I* for any channels. Multiband Plus provides full 8-bit transparency to channels whose usage is *D&I.*

network, but instead to other CPE equipment.

- *D-Channel* is automatically assigned to **Ch 24** of ISDN lines; that is, lines where **Sig Mode**=*ISDN*.

- *NFAS-Prime* means the channel is assigned as the active D channel to the set of lines using NFAS.

- *NFAS-Second* means the channel is assigned as the backup, or standby D channel. The channel is inactive unless it is activated by the user or by a failure of the primary D channel. The assignment of an *NFAS-Second* is optional.

- *NFAS-Second* does not apply to Pipeline 100/400-T1/PRI configurations and should not be chosen.

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

You must specify the **Ch *n*** (channel usage) parameter for each channel in the line.

NFAS-Prime and ***NFAS-Second***: Both theses values apply only to lines where **Sig Mode**=*ISDN_NFAS*. One and only one of these lines must have **Ch 24** configured *NFAS-Prime*. Optionally, one but no more than one *ISDN_NFAS* line can have **Ch 24** configured *NFAS-Second*. Any further *ISDN_NFAS* lines must be configured *Switched*, *Nailed*, or *Unused*. See also **NFAS ID num**.

Ch *n*

Ch 1 #, **Ch 2 #**, **etc.** [**Line Profile** (10-100 or *X*0-100 Line Config) parameters] are the phone numbers of each T1 channel. **Ch *n* #** is a string of up to 16 numeric characters, including parentheses and hyphens. **Ch *n* #** default is blank.

Typically, the phone numbers assigned to the lines share a group of leading (left-most) digits. *Enter only the right-most digits identifying each phone number, excluding the digits that are in common!* For example, suppose 777-3300 is dialed to reach channel 1 of line 1 and 777-3331, 777-3332, through 777-3348, reaches other channels and other lines. In this case, set

Ch *n* #: When Multiband Plus answers a call, **Ch *n* #** is sent to the calling Multiband Plus, which dials it when an additional channel is to be added to an inverse-multiplexed call. If this parameter is left blank, Multiband Plus assumes additional channels can be added to the call by redialing the number used to set up the call initially.

Ch *n* # applies only if the channel is switched, that is the parameter **Ch *n*** = *Switched*.

Ch 1 #=*30*, and the other channels and lines 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.

If you configure trunk groups, the common digits have meaning only to phone numbers in the same trunk group; otherwise, same rule applies: *Enter the minimum number of right-most digits that distinguish* ***Ch n*** **Ch *n* #** specifies a 1-to-1 correspondence between a phone number and a channel, except for GloBanD access. When **Switch Type**=*GloBanD*, these phone numbers are pooled and can apply to any channel of the PRI line.

Ch *n* Prt/Grp

⇒⇒ **Ch 1 Prt/Grp**, **Ch 2 Prt/Grp**, **etc.** [**Line Profile** (10-100 Line Config) parameters] associate the following:

Ch *n* Prt/Grp: For a complete discussion of call routing and the importance of various routing criteria, see the “Call Routing” appendix.

- switched channels with serial host ports
- nailed-up channels with nailed-up groups which in turn are associated with specific Call Profiles

To assign nailed-up channel *n* to a Call Profile, set **Ch *n* Prt/Grp** to the same value as **Group** in that Call Profile.

To explicitly associate a serial host port with a switched channel *n*, set **Ch *n* Prt/Grp** to the port number. Set **Ch *n* Prt/Grp**=*0* if you do not want to reserve this channel for a specific port; and it becomes part of a general pool of channels available for routing.

Ch *n* Prt/Grp: Do not route AIM, FT1-B&O, or FT1-AIM calls to serial host ports #3 or #4.

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 **Ch *n* Prt/Grp**.

Ch *n* Trnk Grp

⇒⇒ **Ch *n* Trnk Grp** [a **Line Profile** (10-100 Line Config) parameter] assigns channel *n* to a trunk group, but only applies when the System Profile parameter **Use Trunk Grps**= *Yes*. Choose a one-digit number between 4 and 9 for each trunk group. The default is *9*. Each trunk group should include only those circuits which share a common dialing plan. Do not assign trunk groups that include circuits with more than one dialing plan. To use channel *n* to place an outgoing call, the value assigned to **Ch *n* Trnk Grp** appears as a prefix to the number dialed (**Dial #** in a Call Profile) and is called the ***dialing prefix***.

Clear

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

- *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.

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.

Clock Source

⇒⇒ **Clock Source** [a **Line Profile** (10-100 Line Config) parameter] determines the source of synchronous timing for the WAN (T1) and serial host interfaces.

- *Yes* means this line provides timing as long as it is enabled and not in Red Alarm. In this configuration, Multiband Plus runs in the ***recovered loop timing mode***, that is, the signal received from the T1/PRI line provides synchronization for the WAN and serial host interfaces. This is the default.

Clock Source: Use this option for all normal operations. If Multiband Plus connects to more than one line, selecting *Yes* for all lines gives Multiband Plus the option of using any for a clock source.

- Selecting *No* forces Multiband Plus to either use the timing from another line whose **Clock Source**=*Yes*, or Multiband Plus's internal clock provides timing when all lines have **Clock Source**=*No*.

Clock Source: Use internal timing (*No*) only in back-to-back configurations, that is, when two Multiband Plus models are connected to each other by a crossover cable (perhaps with T1 repeaters) between their network ports.

Clr Err 1 and 2 Commands

Clr Perf 1 and 2 Commands

The fourth through seventh options in the 10-200 Line Diag menu allow you to reset its line #1 and line #2 user performance registers:

Clr Err, **Clr Perf**: Also see **FDL Stats Status Menus**.

```
10-200 Line Diag
>10-204 Clr Err1^
 10-205 Clr Perf1
 10-206 Clr Err2
```
Note: remaining lines not shown

To clear the user error event register of line #1, move the selector to `Clr Err1` and press the **Right-Arrow** or **Enter** key. This clears **EE** for line #1 but does not clear the performance registers for the line.

Clr Err: Error events have no meaning for D4 lines.

To clear all user performance registers of line #1, move the selector to `Clr Perf1` and press the **Right-Arrow** or **Enter** key. When you clear the performance registers,

the current time period also restarts and new performance data is accumulated. The same process is used for clearing line #2's registers.

Comm

⇒⇒ **Comm** [an **SNMP Traps Profile** (30-100 SNMP Traps) parameter] is equivalent to the SNMP "community name." Enter an alphanumeric string up to 31 characters that becomes a password sent to the SNMP management station when an SNMP trap event occurs. It authenticates the sender who is identified by the source IP address. To turn off SNMP traps, delete the value for this parameter and set **Dest** [SNMP Traps Profile]= *0.0.0.0*.

Console

⇒⇒ **Console** [a **System Profile** (00-100 Sys Config) 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* 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.

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

MIF: You cannot operate MIF through a hand-held 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: To start the machine-to-machine interface at any time independently of this parameter, see **Use MIF Command**.

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

Contact

⇒⇒ **Contact** [a **System Profile** (00-100 Sys Config) parameter] is a user-defined text string. The information in this field does not affect the operation of Multiband Plus, although it might be used by management applications. “Contact” suggests a person or agency who manages this device. Up to 38 characters can be entered.

Control-D Commands

See **DO / Control-D Commands**

Control Key Commands

The following Control Key (**Ctrl-**) commands are available from the Control Monitor, 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 Directory 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** [s **Call Profile** (2*N*-100 Directory) parameter] is the type of carrier service 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 manager or carrier contact if you are uncertain about the types of services available.

- *56K* means the call contains any type of data and connects to 56 kbit/s switched data services.

- *56KR* means the call contains restricted data, which guarantees ones density for network synchronization, and connects to 56 kbit/s switched data services. This is the default.

56KR is the only value available with robbed-bit WAN interfaces. For most ISDN (PRI) interfaces select *56K*, although some require *56KR*. Both provide 56 kbit/s data service per channel. Restricted means that data transmitted by Multiband Plus meets the one's density restrictions of AMI encoded T1 lines.

- *64K* means the call contains any type of data and connects to 64 kbit/s switched data services.

- *384K/H0* means the call contains any type of data and connects to H0 ISDN Primary Rate services at 384 kbit/s.

384K/H0 is an AT&T service that not require MultiRate or GloBanD, while ***384KR*** is a MultiRate or GloBanD service.

- *384KR* means the call contains restricted data and connects to MultiRate or GloBanD services at 384 kbit/s.

- *1536K* means the call contains any type of data and connects to H11 ISDN Primary Rate services at 1536 kbit/s.

- *1536KR* means the call contains restricted data and connects to H11 ISDN PRI services at 1536 kbit/s.

1536K and ***1536KR***: These values are only valid for Multiband Plus T1/PRI models that have the D-channel signaling option and two or more PRI lines using NFAS. See **Sig Mode**'s value *ISDN_NFAS*.

- *128K, 192K, 256K,* and other multiples of 64K are available on PRI access lines with MultiRate or GloBanD service. If your Multiband Plus has the MultiRate option, these additional data services appear.

Data Svc: Data services above 64 kbit/s are not valid if the **Call Type** = *BONDING*.

- *Voice*, which only applies to calls made using ISDN D-channel signaling (BRI or PRI), is a value that allows Multiband Plus to instruct the network to place an end-to-end digital voice call for transporting data when switched data service is not available. It works only on networks that provide digital end-to-end connectivity, with no intervening loss plans, echo cancellation, or other data modifications.

Data Svc: Because FT1 calls do not include any switched services, **Data Svc** lists only *56KR* and *64K* when the **Call Type** parameter has the value *FT1*. In this case, *56KR* and *64K* merely mean how much bandwidth is routed to the host for each channel in the connection. When the **Call Type** parameter has the value *FT1-B&O* or *FT1-AIM*, **Data Svc** refers to the switched channels.

Date

⇒⇒ **Date** [a **System Profile** (00-100 Sys Config) parameter] specifies the month, day, and year in the format *mm/dd/yy*. This parameter should be set when installing Multiband Plus T1/PRI.

Dec Ch Count

⇒⇒ **Dec Ch Count** [a **Call Profile** (2*N*-100 Directory) 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 integer from *1*, the default, to *32*.

You cannot clear a call by decrementing channels.

Inc Ch Count and **Dec Ch Count**: If you have set **Data Svc** to *384K/H0* or *384KR*, then **Dec Ch Count** should each be divisible by 6 (namely, *6*, *12*, *18*, or *24*), since 384 kbit/s is 6x64 kbit/s. Operational problems can result, if you do not specify a multiple of 6. (**Base Ch Count**, less any nailed-up channels, should also be divisible by 6.) Similarly, if you have selected a MultiRate or GloBanD data service that is a multiple of 64 kbit/s, then be sure to make **Inc Ch Count** and **Dec Ch Count** divisible by the same multiple.

Dec Ch Count does not apply when all channels of connection/link are nailed-up (leased).

Delay Dual

⇒⇒ **Delay Dual** [a **System Profile** (00-100 Sys Config) 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.

Delete Digits

⇒⇒ **Delete Digits** [a **Line Profile** (10-100 Line Config) parameter] specifies the number of digits deleted from the front of the phone number being dialed by the device connected to line #2. (Typically a PBX is connected to line #2.) This parameter applies only when **Sig Mode** = *PBX T1*.

Delete Digits: You should set this parameter equal to the number of digits received from the PBX which are specific to the T1 switch Multiband Plus is emulating.

Dest

⇒⇒ **Dest** [an **SNMP Traps Profile** (30-100 SNMP Traps) parameter] establishes the destination address of the trap-status report. Use IP dotted decimal format. Its default value is *0.0.0.0*. To turn off SNMP traps, set **Dest**=*0.0.0.0* and delete the value for **Comm**.

Dest: You must always supply a value for **Dest**, even if you have entered a name for the profile. Multiband Plus cannot determine where to route packets solely on **Name [SNMP Traps]**.

00-400 Destinations Menu

The Destinations menu provides a means of configuring up 32 Destination Profiles. The following shows the Destinations menu listed as the fourth submenu under 00-000 System:

Destinations Menu: See also **Destination Profiles**.

```
00-000 System
 00-100 Sys Config
 00-200 Sys Diag
 00-300 Security
>00-400 Destination
```

Destination Profiles

Destination Profiles define alternative outbound call routing when Multiband Plus's T1/PRI interface connects to circuits supplied by more than one carrier. Up to 32 Destination Profiles can be configured.

The following illustration shows an example of Destination Profiles listed under the **00-400 Destination Menu**:

```
00-400 Destinations
 00-409 Muskogee
 00-410 Kishnif
 00-411 Kansas City
>00-412 Chicago
 00-413 Boomsvil
```

Note: not all destinations shown

Destination Profiles: To use Destination Profiles, the **Dial #** Call Profile parameter must start with *3*, and the next two digits give the number of the Destination Profile; for example, **Dial #**=312 uses the 12th Destination Profile.

Each Destination Profile defines up to six outbound routes to reach a single destina-

tion. Each set of **Dial *n*#** and **Call-by-Call *n*** parameters in a Destination Profile (*n=1 to 6*) gives the outbound routes, and the **Option** parameter sets the criteria by which a route is chosen.

```
00-412 Chicago
 >Name=Chicago
 Option=1st Active
 Dial 1#=4-555-1212
 Call-by-Call 1=6
 Dial 2#=9-412
 Call-by-Call 2=6
```
Note: remaining lines not shown

Dial

⇒⇒ **Dial** [a **Port Profile** (2*N*-300 Port Config) 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: 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.

- *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*.

Dial

⇒⇒ **Dial #** [a **Call Profile** (2*N*-100 Directory) 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*.

- If **Use Trunk Grp**=*Yes*, **Dial #** has one of the following formats:

- If the first digit, called the dialing prefix, is between *4* to *9*, this profile places the call over the corresponding trunk group listed in the **Ch *n* Trnk Grp** Line Profile parameters. The digits following the first digit are an ordinary phone number.

- If the first digit is *3*, this profile places the call to a destination listed in the Destination Profiles. The second and third digits indicate which Destination Profile.

Dial *n*# (*n* = 1 to 6)

⇒⇒ **Dial *n*#** [**Destination Profile** (00-400 Destinations) parameters] are the phone numbers that reach the destination of this profile. The first digit **Dial *n*#** must match a trunk group that has been defined by **Ch*n* Trnk Grp** in the Line Profiles. For example, the dialing prefix of **Dial 1#***=4-555-1212* is *4*, which must match at least one value given to the **Ch*n* Trnk Grp** parameters.

Dial *n*#: See **Dial #** for the format of the phone number part of this parameter. See also **Call-by-Call *n*** [Destination Profile parameters].

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:

```
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.

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**.

DO/Ctrl-D Commands

The DO command menu is a context-sensitive list of commands that appears when the

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.

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.

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 C	Close the current TELNET session
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.

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**.

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 interface. 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.

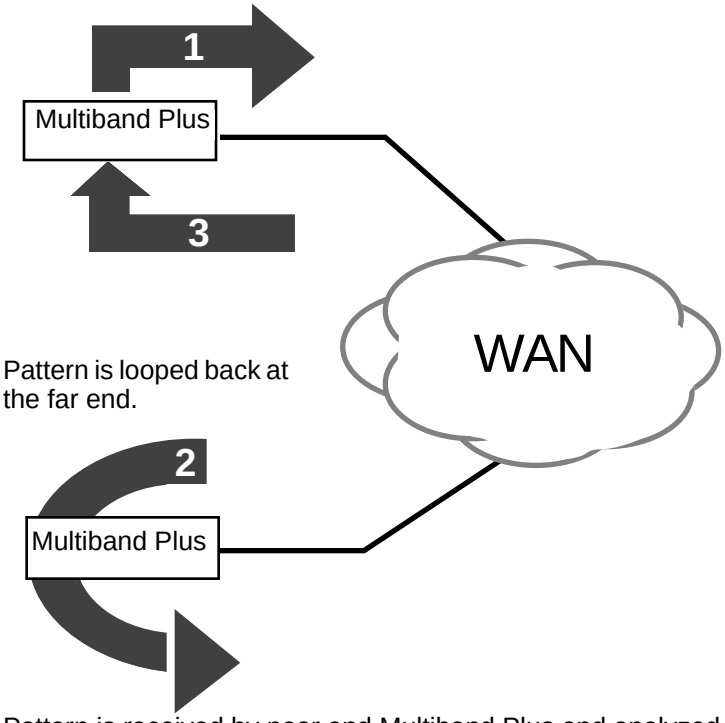
DO Beg/End BERT: No user data transfer takes place in either direction during a BERT test, and all commands that affect the call are disabled, except the command that ends the BERT test.

You can run the BERT test only one direction 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 network. 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.

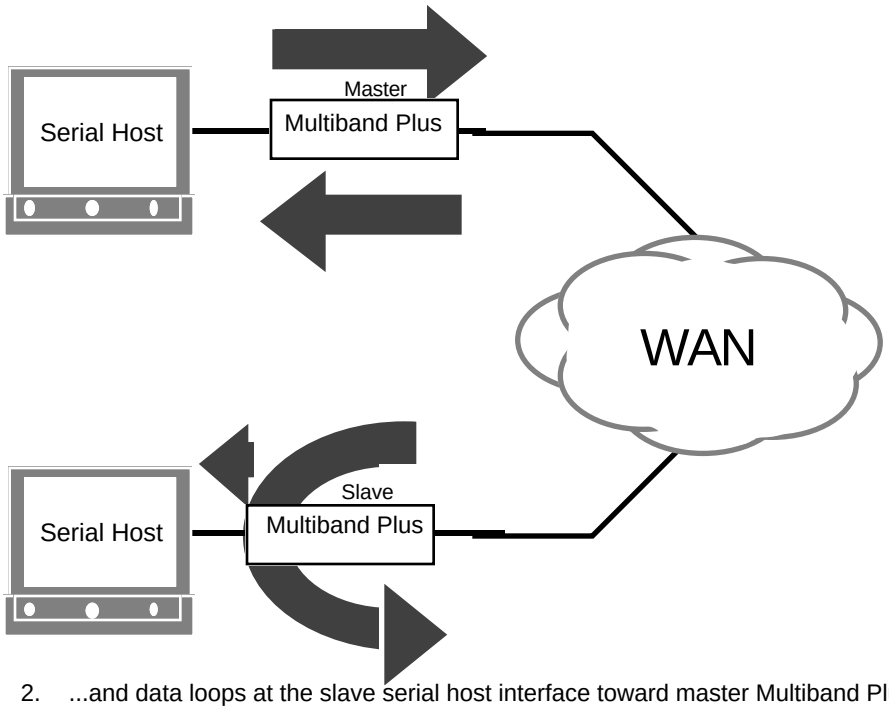
DO Beg/End Rem LB(DO 6)

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 Multiband Plus.



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. Drop-and-insert channels are not 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.

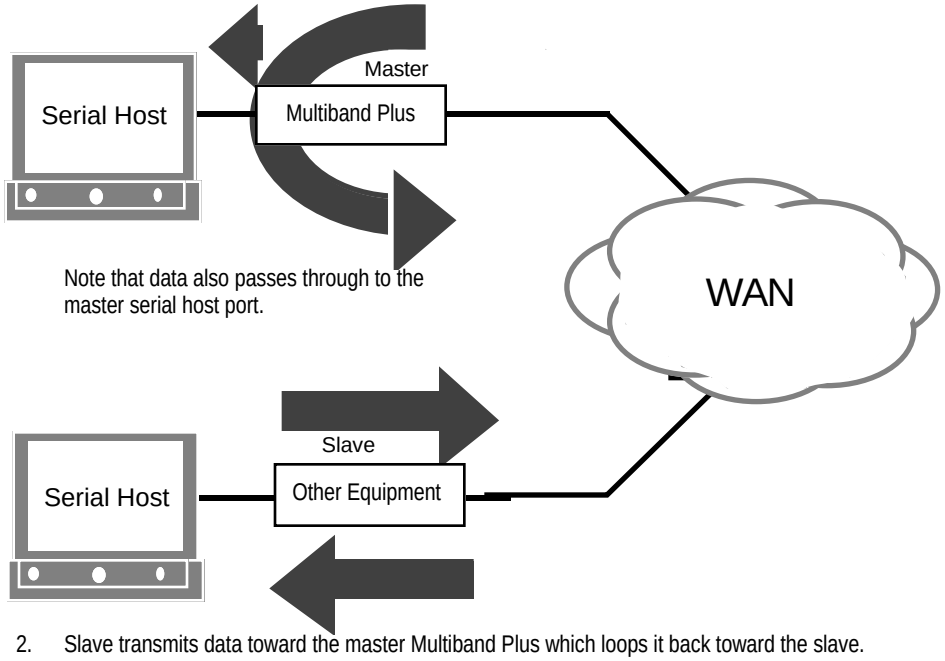
This command does not appear if logged in without operational privileges. See **Operations**.

Remote Loopback Limitations

There are no remote loopback limitations when the far end of the call is connected by current Ascend inverse multiplexers, 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, it establishes a loopback at the local host interface calling for the loopback as shown in the following illustration:

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



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 not an Ascend inverse multiplexer, remote loopbacks

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*).

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:

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**.

```
REMOTE MANAGEMENT VIA xxxx
```

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

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 host devices using the connection.

To end an AIM 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.

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*).

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

DO Close TELNET (DO C)

This command closes the current TELNET session. This command only applies when Multiband Plus is operated through a TELNET session.

DO Close TELNET applies only to units with the optional Ethernet interface.

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 3.23 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 3.23 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 3.26 in this guide.

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

For example, assume you have saved a profile named `Memphis` in the Directory location 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 parameters 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. Furthermore, **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 3.25 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 AIM remote management session, you enter at the first Security Profile, "00-301 Default." To change to another Security Profile, 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 profile, 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 console session (through the Console port or an AIM remote management session) or exceed the time set by the **Idle Logout** System Profile parameter, you are automatically 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 simultaneously 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 separate 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: Security Profile passwords cannot be downloaded.

⇒⇒ **Download** [a **Security Profile** (00-300 Security) 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*.

DS0 Min Rst

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.

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

- *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 T1/PRI 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) 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 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 Multiband 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 Multiband Plus models with only two host ports.

Dyn Alg

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

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.

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 algorithms 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 for dynamic AIM calls.

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

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 removed when the calculated usage percentage has been less than the target utilization for the time given in **Sub Pers**. See “Controlling Dynamic Bandwidth” appendix for the equations generating each of these algorithms.

Early CD

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

Early CD applies both to answering calls and dialing calls.

- *Answer* means that 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.

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 “User Interface Overview” 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) 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 AIM remote management. When the active Security Profile has this parameter set to *No*, only the **Dial #** and the **Base Ch Cnt** parameters of the current Call Profiles can still be edited. See also **Edit Own Call** and **Edit Com Call**. The factory default 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) parameter] allows all Port Profiles to be edited. When this parameter is *Yes*, all the Port Profiles can be edited, either by a local operator or by remote management. 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) parameter] controls whether the Call Profiles that are not specific to any serial host port can be edited. When this parameter is *Yes*, the common Call Profiles can be edited, either by a local operator or by remote management. Common Call Profiles 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) 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 Profiles can be edited, either by a local operator or by remote management. When this parameter is *No*, the **Dial #** and the **Base Ch Cnt** parameters can still be edited. 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 Line

⇒⇒ **Edit Line** [a **Security Profile** (00-300 Security) parameter] controls editing of Line Profiles. 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) parameter] controls whether the operator's own Call Profiles can be edited. When this parameter is *Yes*, the operator 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) parameter] controls whether the operator's own Port Profile can be edited. When this parameter is *Yes*, the operator during remote management can edit the profile of the port that has been called. This privilege is disabled only when this parameter is *No* and **Edit All Ports** is *No*. The factory default for this parameter is *Yes*.

Edit Security

⇒⇒ **Edit Security** [a **Security Profile** (00-300 Security) parameter] controls editing Security 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 default 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 Security) parameter] controls editing of the System Profile and Ethernet Profile. When in a Security state that has this parameter set to *Yes*, the System Profile and the **Read Comm** and **R/W Comm** in the Ethernet Profile can be edited. The factory default for this parameter is *Yes*.

Encoding

⇒⇒ **Encoding** [a **Line Profile** (10-100 Line Config) parameter] specifies the type of T1/PRI line encoding used:

- *AMI* means that Alternate Mark Inversion encoding is used. This value is the default.
- *B8ZS* means that the encoding is Bipolar with 8-Zero Substitution.
- *None* is identical to *AMI* without density enforcement.

Encoding: In most cases, your carrier specifies which line encoding is required with your line.

AMI: In this case, logical zeros are zero voltage, while logical ones alternate between +/- 3 volts. With this value, you get 1-in-8 ones density enforcement.

B8ZS: This encoding is often required with ISDN. B8ZS is a means of meeting ones density requirements.

Ethernet IF

⇒⇒ **Ethernet IF** [an **Ethernet Profile** (30-200 Mod Config/Ether Options..) parameter] sets up the physical connection for *COAX* (thin-net) or *UTP* (unshielded twisted-pair). The default is *COAX*.

30-000 Ethernet Menu

This menucontains the following submenus:

- SNMP Traps (SNMP Traps Profiles)
- Mod Config (Ethernet Profile)

Ethernet Menu: This menu and its submenus require installation of the optional Ethernet interface.

Ethernet Profile

The parameters in Multiband Plus's Ethernet Profile specify the IP address of its Ethernet interface, Multiband Plus's IP subnet, and other parameters pertaining to the Multiband Plus Ethernet interface as a whole. The Ethernet Profile is established through selecting **30-200 Mod Config** submenu under **Ethernet**.

Ethernet Profile: This profile and its parameters require installation of the optional Ethernet interface.

Excl Routing

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

Excl Routing (exclusive routing) does not affect incoming calls that reach a busy interface, which are always cleared.

- *No*. An incoming call is routed to the first available host port when no port has been designated by **Ans *n*#** (Port Profile) or **Ch *n* Prt/Grp** (Line Profile). This is the default.

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

"No serial port designated" means the called party number (if any) does not match does not match **Ans *n*#**, and the channel on which it arrives has **Ch *n* Port/Grp** set to 0.

F Menus, L Menus, or R Menus

⇒⇒ **F Menus**, **L Menus**, or **R Menus** [**Host-Interface Profile** (20-100 Host Config) parameters] determine whether the front, left, or right Palmtop port has access to the standard set of menus (*Standard*) or the simplified menus (*Limited*), or the command line interface (*MIF*). *Standard* is the default.

F Menus, L Menus, or R Menus: The simplified menus are described in the "Simplified Menus" appendix. **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) 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 access 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. Furthermore, *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-Interface Profile** (20-100 Host Config) parameters] 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 Directory) 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 partial bandwidth while Multiband Plus tries to set up the call at the full number of base channels. Retry attempts continue for approximately 30 seconds or until full bandwidth is achieved or **Base Ch Count** is manually reduced. If the base channel count is not achieved within 30 seconds, the call remains online.

FDL

⇒⇒ **FDL** [a **Line Profile** (10-100 Line Config) parameter] specifies the facilities data link (FDL) protocol. It can have the value *None*, *AT&T*, *ANSI*, or *Sprint*. If you select *None*, FDL signaling is disabled. The default value is *None*.

FDL: Your carrier specifies the FDL protocol. You still accumulate D4/ESF performance statistics even if you do not choose an FDL protocol. **FDL** does not apply to D4-framed T1 lines.

Field Service

⇒⇒ **Field Service** [a **Security Profile** (00-300 Security) 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) 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** [a **Call Profile** (2*N*-100 Directory parameter] when set to *Yes* in the current call profile of a serial port, forces Multiband Plus to receive incoming calls to that port at 56 kbit/s, regardless of what the telephone company indicates. The default is *No*. **Force 56** is used when you receive an international call from the U.S in which a telephone company made a 56 kbit/s to 64 kbit/s rate adaption in placing the call, but the rate adaption was not indicated in the ISDN setup message. This problem only occurs on international calls placed from the United States.

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

Framing Mode

⇒⇒ **Framing Mode** [a **Line Profile** (10-100 Line Config) parameter] specifies the framing mode used by the physical layer:

- *D4* means that the D4 or Superframe format is used. A Superframe consists of 12 consec-

Framing Mode: In most cases, your carrier specifies which framing mode is required with your line. Check with your carrier contact or system manager.

Framing Mode: Multiband Plus (only models having internal bantam test jacks) supports different framing modes on drop-and-insert applications. That is, if you have set **2nd Line** = *D&I*, and **Sig Mode**=*Inband*, then you can set **Framing Mode**=*ESF* on one line and **Framing Mode**=*D4* on the other. Multiband Plus converts the inband signaling between the two lines.

utive frames separated by framing bits. If you specify D4 with D-channel signaling, false framing and Yellow Alarm emulation can occur; thus, ESF generally is used with D-channel signaling. This value is the default.

- *ESF* means that Extended Superframe format is used. An Extended Superframe consists of 24 consecutive frames separated by framing bits. The ISDN specifications advise that ESF be used in conjunction with D-channel signaling.

FT1 Caller

⇒⇒ **FT1 Caller** [a **Call Profile** (2*N*-100 Directory) 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*-100 Directory) parameter] is used to route nailed-up channels to serial host ports. When a line profile has **Ch *n* Prt/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 alphabetic character from *A* to the maximum allowed 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.

High BER

⇒⇒ **High BER** [a **System Profile** (00-100 Sys Config) parameter] can have the values *10**-3*, *10**-4*, and *10**-5*. This sets the maximum bit error rate for any T1/PRI line. The number after ** gives the power of 10

High BER: This error rate is based on the measurement of framing bit errors for both D4 and ESF lines. When exceeded, excessive BER is reported in the Message Log (System). See also **High BER Alarm**.

for the current ratio of errored bits to total bits. The default is *10***-3*.

High BER Alarm

⇒⇒ **High BER Alarm** [a **System Profile** (00-100 Sys Config) parameter] when set to *Yes*, causes the back panel alarm relay to close when **High BER** is exceeded. When set to *No*, the event is logged, but no relay closure occurs.

20-100 Host Config Menu

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

20-000 Host/Dual, Host/Quad Menus

This branch of the Main Edit Menu is associated 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/T1
>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) 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) 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 (*N/A*) 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) parameter] is the number of 56 or 64 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** does not apply when the connection/link is nailed-up.

Also see **Dec Ch Count**.

Inc Ch Count [Call Profile]: If **Data Svc** requests 384 kbit/s H0 channels or MultiRate or GloBanD services, this parameter should equal the number of B channels in that service or a integer multiple of that service's B channels.

IP Adrs

⇒⇒ The **IP Adrs** [an **Ethernet Profile** (30-200 Mod Config/Ether Options..) parameter] is Multiband Plus's IP address and its subnet. This parameter specifies the IP address of Multiband Plus's interface to the local Ethernet LAN in dotted decimal format, n.n.n.n, where n is a number from 0 to 255, followed by a slash (/) and the number of bits in its subnet mask. The default is *0.0.0.0/0*.

Length

⇒⇒ **Length** [a **Line Profile** (10-100 Line Config) parameter] specifies the cable length of the line from the CSU or other interface unit to Multiband Plus. In general, the value that you specify should reflect the longest line length you expect to encounter in your installation. The length can be one of the following range options: *1-133 ft*, *134-266 ft*, *267-399 ft*, *400-533 ft*, *534-655 ft*. The default value is *1-133 ft*.

Length: This parameter applies only if Multiband Plus is not equipped with an internal CSU at the interface to this line.

10-100 Line Config Menu

See **Line Profiles**.

Line Diag Menu

The line diagnostics menu allows you to perform a line loopback at each T1/PRI

interface and switch D Channels between PRI lines (if NFAS is provided) and reset performance registers.

The following example shows Line Diag listed in the Net/T1 menu:

```
10-000 Net/T1
 10-100 Line Config
>10-200 Line Diag
```

The Line Diag menu is shown in the following illustration:

```
10-200 Line Diag
>10-201 Line LB1
 10-202 Line LB2
 10-203 Switch D Chan
```
Note: remaining lines not shown

Line LB1 / LB2 Commands

The Line LB1 and Line LB2 commands are the first and second options in the 10-200 Line Diag menu. These options allow you to activate line loopback (LLB) at either line #1 or line #2.

To activate LLB, move the selector to **`Line LB1`** or **`Line LB2`** and press the **Right-Arrow** or **Enter** key. Multiband Plus prompts you to confirm that you really wish to perform this operation.

When a line has LLB active, its **RL** LED is lit.

Do not activate LLB when there is a call active on the line, because it disrupts data flow between serial host equipment connected to either end of the network line.

To deactivate LLB, press the **Left-Arrow** key to exit the menu option. When you exit

Line LB: During LLB, the entire DS1 is looped back. That is, all received channels of the T1/PRI line, including framing, are looped back to the T1/PRI provider (WAN). LLB occurs at the metallic interface to the line of the local Multiband Plus. It is important to note that even channels you configured as drop-and-insert channels are looped back.

Line LB: Multiband Plus responds to both the inband LLB signal and the facility data link (FDL) LLB message. Therefore, Multiband Plus is capable of being put into LLB by a management device.

the line loopback menu options, the LLB is deactivated automatically.

Line Profiles

A ***Line Profile*** is a set of stored parameters that define Multiband Plus's T1/PRI interface, including the physical line that connects Multiband Plus to the wide area network (WAN).

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 lines 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 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

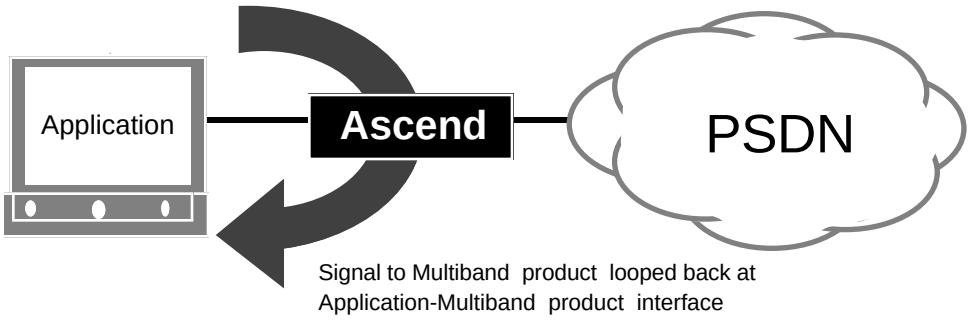
Local LB: The associated Multiband Plus host port must be idle; that is, it can have no calls online.

Local LB: If port diagnostics are protected by password security, you might not be able to perform them. See **Security Profiles**.

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



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.

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.

⇒⇒ **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.

⇒⇒ **Rate** toggles the data rate of the simulated channels from 56 to 64 kbit/s, and vice versa.

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.

Location

⇒⇒ **Location** [a **System Profile** (00-100 Sys Config) parameter] is a user-defined text string. The information in this field does not affect the operation of Multiband Plus, although it might be used by management applications. “Location” suggests this Multiband Plus’s location. Up to 38 characters can be entered.

Log Facility

⇒⇒ **Log Facility** [an **Ethernet Profile** (30-200 Mod Config) parameter] is a part of the message sent to the **Log Host** that the Log Host can use to sort syslogs; that is, all syslogs whose facility is *Local0* are grouped to-

Log Facility applies only when **Syslog**=*Yes.*

gether in the host's file system, *Local1* syslogs have their file location, and so on. **Log Facility** can have the values: *Local0* (the default), *Local1*, *Local2*, *Local4*, *Local5*, *Local6*, and *Local7*.

Log Host

⇒⇒ **Log Host** [an **Ethernet Profile** (30-200 Mod Config) parameter] controls where to send system logs, if anywhere. Use the dotted decimal format for the IP address of this the log host. Its default value, 0.0.0.0, disables sending system logs.

Log Host: See also **Syslog** in the "Reference to Status Menus" chapter. The Log Host must be running Unix. This parameter applies only when **Syslog**=*Yes*.

Max Call Mins

⇒⇒ **Max Call Mins** [a **Port Profile** (2*N*-300 Port Config) parameter] establishes the maximum number of minutes allowed on calls made from this port, regardless of bandwidth. When a call meets or exceeds the specified maximum, it is 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 T1/PRI lines.

Max Ch Count

⇒⇒ **Max Ch Count** [a **Call Profile** (2*N*-100 Directory/Time Period..) 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) 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) parameter] establishes the 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 placed from this port are torn down. Any value from *1* to *2142720* can be entered. Setting **DS0 Min Rst**=*Off* disables this function.

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.

Min Ch Cnt

⇒⇒ **Min Ch Cnt** [a **Call Profile** (2*N*-100 Directory/Time Period..) 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*.

30-200 Mod Config Menu

The Mod Config menu lists the parameters of the Ethernet Profile.

Mod Config Menu: This menu requires installation of the optional Ethernet interface.

Name

⇒⇒ **Name** [**Security Profile** (00-300 Security) , **Call Profile** (2*N*-100 Directory), **Line Profile** (10-100 Line Config), or **System Pro-**

Name: You do not have to supply profile names.

file (00-100 Sys Config) parameters] is a string that name profiles. It can contain up to 16 alphanumeric characters.

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.

⇒⇒ **Name** [an **SNMP Traps Profile** (30-100 SNMP Traps) parameter] is the name of the destination of the trap PDUs. Up to 31 characters can be entered.

10-000 Net/T1 Menu

This branch of the Main Edit Menu, associated with Multiband Plus's T1/PRI interface, includes configuration of the Line Profiles. The Net/T1 menu is the second menu listed under the Main Edit menu.

```
Main Edit Menu
 00-000 System
>10-000 Net/T1
 20-000 Host/..
 30-000 Ethernet
```

The Net/T1 menu has two branches, the **Line Config Menu** and the **Line Diag Menu**.

NFAS ID num

⇒⇒ **NFAS ID num** [a **Line Profile** (10-100 Line Config) parameter] establishes an ID for the line when NFAS is used. The value for **NFAS ID num** must be a number between 0 and 31. Its default values are 1 for line #1 and 2 for line #2. A different ID value must be assigned to each NFAS line.

NFAS ID num: This parameter only applies to lines using NFAS; that is, to lines in which **Sig Mode**=*ISDN_NFAS*. The T1/PRI provider establishes the convention by which IDs are assigned. See also **Ch *n*** for channel 24.

No Trunk Alarm

⇒⇒ **No Trunk Alarm** [a **System Profile** (00-100 Sys Config) parameter] when set to *Yes*, causes the back panel alarm relay to close when all T1/PRI lines (trunks) go out of service. When **No Trunk Alarm** = *No*, loss of all lines is recorded in the system log, but no relay closure occurs. *No* is the default.

Operations

⇒⇒ **Operations** [a **Security Profile** (00-300 Security) 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**, **DO Close TELNET**, and **DO Password** are available. The default value is *Yes*.

Option

⇒⇒ **Option** [a **Destination Profile** (00-400 Destinations) parameter] gives the criteria Multiband Plus uses to select a trunk group from those listed in this profile to place the call.

Option: Also see **Ch *n* Trnk Grp**.

- When set to *1st Avail*, Multiband Plus selects the first group that has enough available bandwidth to meet the base bandwidth requirements of the Call Profile. If no group has enough bandwidth, the call is dropped. This is the default.

- When set to *1st Active*, Multiband Plus selects the first active trunk group that has at least one available channel. If you select this option, also set the Port Profile parameter **Fail Action** = *Reduce*, so that Multiband Plus won't disconnect the call even if the full base bandwidth is not available.

- When set to *Any*, Multiband Plus uses any combination of circuits from any trunk group to make the call. However, combining channels from trunk groups of different carriers to get a base bandwidth is not allowed.

Own Port Diag

⇒⇒ **Own Port Diag** [a **Security Profile** (00-300 Security) 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) parameter] specifies the number of channels that can be dialed simultaneously over the T1/PRI 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 value is an integer from 1 to 12, and the default value is *5*.

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*.

Passwd

⇒⇒ **Passwd** [a **Security Profile** (00-300 Security) 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.

If the value for the **Passwd [Security Profile]** 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*. **Passwd** is case sensitive.

PBX Type

⇒⇒ **PBX Type** [a **Line Profile** (10-100 Line Config) parameter] specifies the signaling

PBX Type: See also **Sig Mode**, **Ans #**, and **Ans Service**.

conversion Multiband Plus provides when line #2 **Sig Mode**=*PBX T1*. The following values can be selected:

- *Leased 1:1* — Line #1 uses inband signaling. Line #2 consists of entirely of nailed-up and unused channels. Each channel of line #1 must have a unique phone number. When any channel on line #1 indicates it has an incoming call and that channel is not busy, Multiband Plus answers the call and connects it to the same channel in line #2 if that channel is nailed-up. If that channel on line #2 is unused, the call is handled in the usual manner. The call remains connected until the caller hangs up.

Leased 1:1: If this value is selected, **Ans Service**=*N/A*.

- *Voice* — Line #1 uses ISDN signaling, and line #2 uses inband signaling. The device connected to line #2 views Multiband Plus as a switch. Incoming calls on line #1 are switched to line #2 only if they are voice service calls.

Voice: If this value is selected, **Ans Service**=*Voice*.

- *Data* — Line #1 uses ISDN signaling, and line #2 uses inband signaling. The device connected to line #2 views Multiband Plus as a switch. Incoming calls on line #1 are switched to line #2 only when they match the service specified by **Ans Service** and the phone number specified by **Ans #**.

Data: If this value is selected, **Ans Service** can have any valid value, including *Voice*; however, no call progress tones are generated and no call information messages are sent.

Port

⇒⇒ **Port** [an **SNMP Traps Profile** (30-100 SNMP Traps) parameter] enables the trapping of serial host port state changes. The default is *No*, which ignores serial host port state changes. For a detailed description of the following serial host port events, see the Ascend Enterprise MIB Traps:

- portInactive
- portDualDelay
- portWaitSerial

- portHaveSerial
- portRinging
- portCollectDigits
- portWaiting
- portConnected
- portCarrier
- portLoopback
- portAcrPending
- portDteNotReady

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* Menu. Port Config for the first port is shown in the following:

2*N*-300 Port Config Menu: *N* gives the serial port number.

```
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: See **Local LB Command**.

Port Diag menu is the second menu listed under Port*N* Menu. Port Diag for the first port is shown in the following:

```
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) 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
```

PRI # Type

⇒⇒ **PRI # Type** [a **Call Profile** (2*N*-100 Directory)] allows the switch to use your **Dial #**

correctly when making PRI calls and your POP is an AT&T switch. The values for this parameter are *National, Intl, Unknown, Local,* and *Abbrev.* For calls to other phone numbers within your Centrex group choose *Local*. For calls within the US, select *National,* which is the default. For international calls, select *Intl*. Use these values unless otherwise instructed by your network provider.

R/W Comm

⇒⇒ **R/W Comm** [an **Ethernet Profile** (30-200 Mod Config/SNMP Options..) parameter] establishes the keyword (password) that accesses both "get," "get-next," and "set" SNMP agents (commands). Enter an alphanumeric string up to 16 characters that becomes a password used in authenticating the SNMP management station. The default string is *write*.

R/W Comm stands for read/write community name. Multiband Plus also supports a read-only SNMP community, whose community name is set up in the **Read Comm** parameter.

Read Comm

⇒⇒ **Read Comm** [an **Ethernet Profile** (30-200 Mod Config/SNMP Options..) parameter] establishes the keyword that accesses SNMP "get" and "get-next" commands only. Enter an alphanumeric string up to 16 characters that becomes a password used in authenticating the SNMP management station. The default string is *public*.

R/W Comm: Multiband Plus also supports a read/write SNMP community, whose community name is set up in the **R/W Comm** parameter.

Remote Mgmt

⇒⇒ **Remote Mgmt** [a **System Profile** (00-100 Sys Config) parameter] controls whether this Multiband Plus can be operated remotely by the device at the far end of an AIM call. It has a Yes/No value, and the default value is *Yes*. If you specify the value *No,* AIM remote management of your unit is not possible. See **DO Rem Mgm** for information on AIM remote management.

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 hand-held Palmtop Controller device.

Restore Cfg: The procedure for using this command is found in section 3.26. Passwords are not saved.

RIP

⇒⇒ The **RIP** [an Ether Options../Ethernet Profile/30-200 Mod Config Menu parameter] controls RIP updates across the Ethernet interface.

RIP [Ethernet Profile]: RIP currently only operates with full octet subnet masks.

RIP (Routing Information Protocol) is the only routing protocol currently supported.

- *Off* — RIP updates are not sent over the interface and any received updates are discarded.
- *Recv* — RIP updates are received by Multiband Plus over the interface, but no updates are sent.

Rob Ctl

⇒⇒ **Rob Ctl** [**Line Profile** (10-100 Line Config) parameter] specifies the call control mechanism used when the value of the **Sig Mode** parameter is *Inband* or *PBX T1*. When **Sig Mode** = *Inband*, Multiband Plus places and answers calls as described in the following paragraphs. However, when **Sig Mode** = *PBX T1*, the roles reverse and Multiband Plus emulates the WAN switch, and the PBX (or whatever device connects to the line #2 port) places and answers calls.

Rob Ctl: The mechanisms that are supported are based on the AT&T Special Access Connections specification for ACCUNET T1.5 services (AT&T TR 41458).

Rob Ctl does not apply when all channels are nailed-up, and that is the case when **Sig Mode**=*PBX T1* with **PBX Type**=*Leased 1:1*.

- *Wink-Start* means that in placing a call, Multiband Plus goes off-hook and then waits for a wink acknowledgment before dialing. In a ***wink***, the off-hook signal is trans-

Rob Ctl: When **Sig Mode**=*PBX T1* and **Rob Ctl**=*Wink-Start*, Multiband Plus issues a 200 msec wink after which the PBX can dial. For *Idle-Start*, the PBX can dial after going off-hook without waiting for a wink. *Inc-W-400* and *Inc-W-200* behave like *Wink-Start*, except Multiband Plus expects the PBX to transmit a 400 or 200 msec wink before going off-hook to answer a call.

mitted for a few hundred milliseconds. In this mode, Multiband Plus begins to send dialed digits after receiving the wink. No wink is sent when answering a call. This value is the default.

- *Idle-Start* means that no wink is issued and that off-hook dialing alone initiates the call. No wink is required when answering a call.

- *Inc-W-400* differs from *Wink-Start* because a wink is also sent when answering a call. That is, when the switch goes off-hook, Multiband Plus transmits a 400 msec wink before going off-hook itself to answer the call. Like *Wink-Start*, if Multiband Plus is going to dial, it waits for an incoming wink before dialing.

Inc-W-400: One situation in which you would choose this value is when a Multiband Plus is connected back-to-back with another Multiband Plus (i.e., T1/PRI port hard-wired to T1/PRI port) for testing purposes. It also is the usual configuration when connecting to a PBX.

- *Inc-W-200* is identical to *Inc-W-400*, except Multiband Plus sends a 200 msec wink.

Regardless of the type of robbed-bit control, the switch should not forward dialed digits to Multiband Plus, which would disrupt the handshaking process during multichannel calls.

RS-366 Esc

⇒⇒ **RS-366 Esc** [a **Port Profile** (2*N*-300 Port Config) 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: Passwords are not saved. See section 3.25 for instructions on using this command.

Sec History

⇒⇒ **Sec History** [a **Call Profile** (2*N*-100 Directory) parameter] specifies the length of time, in seconds, over which the utilization 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 covered by the algorithm.

Sec History applies only to dynamic calls (DBA AIM):

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*.

Second Line

See **2nd Line**.

⇒⇒ **Security** [an **SNMP Traps Profile** (30-100 SNMP Traps) parameter] enables the trapping of the following events when set to *Yes*. The default is *No*.

- authenticationFailure — See RFC-1215 for a definition of this event.
- consoleStateChange — When a console port (VT100, Palmtop, or TELNET session) has changed its state. Consoles are defined in the Ascend MIB's console group.
- portUseExceeded — When the maximum DS0 minutes (set by **Max DS0 Mins** Port Profile parameter) permitted a serial host port has been exceeded.
- systemUseExceeded — When the maximum DS0 minutes (set by **Max DS0 Mins** System Profile parameter) permitted Multiband Plus has been exceeded.

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:

```
00-000 System
 00-100 Sys Config
 00-200 Sys Diag
>00-300 Security
```

The Security menu lists nine Security Profiles. 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 Menu: See also **Security Profiles**.

Security Profiles

A ***Security Profile*** is any one of the nine profiles listed in the **Security Menu**. Each 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**.

Security Profiles: A typical operation that you might wish to protect is Multiband Plus's system diagnostics, including system reset. Security Profiles can be configured to protect these operations from all users except those with the appropriate 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.

Sig Mode

⇒⇒ **Sig Mode** [a **Line Profile** (10-100 Line Config) parameter] specifies whether the line uses inband or out-of-band ISDN signaling:

- *Inband* indicates T1 robbed-bit signaling is used. If you use this value, you must also specify the **Rob Ctl** parameter. This value is the default.

- *PBX T1* indicates line #2 can receive calls placed on line #1.

  - Line #2 uses inband signaling and line #1 uses D-channel signaling. In this case, **PBX Type**=*Voice* or *Data*, and calls placed by devices connected to line #2 are switched to line #1. Calls received on line #1 can be received by the device connected to line #2.

  - Line #2 consists entirely of nailed-up and unused channels and line #1 uses inband signaling. In this case, **PBX Type** = *Leased 1:1*, and calls received on line #1 are connected to the corresponding nailed-up channels of line #2 or handled in the usual manner when the corresponding channel of line #2 is unused.

    Note that *PBX T1* is supported only on models identified by the presence of front-panel bantam jacks.

- *ISDN* indicates that the interface supports ISDN Primary Rate Interface out-of-band signaling.

- *ISDN_NFAS* means that the line supports non-facility associated signaling (NFAS). This is a special case of ISDN signaling in which one D channel is shared between more than one line.

PBX T1: If **PBX Type**=*Data*, **Ans #** and **Ans Service** determine which incoming calls on the PRI line are switched to line #2. If **PBX Type**=*Voice*, only incoming voice calls are switched to line #2. Section 3.16 describes other PBX T1 parameters. Line #2 typically connects to a PBX or other type of DCE that uses inband signaling. Do not use line #2 for data calls.

ISDN: The value *ISDN* is valid only if your Multiband Plus is equipped with the D-channel signaling option; if it is not, an error message is displayed.

ISDN_NFAS: NFAS applies to models that support ISDN D-channel signaling. In addition, the PRI must connect to an AT&T or Northern Telecom switch; that is, the value of the **Switch Type** parameter must be *AT&T* or *NTI*. See also **NFAS ID num** and **Ch *n***.

Single Answer

⇒⇒ **Single Answer** [a **System Profile** (00-100 Sys Config) 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 **Ans #** or **Ch *n* Prt/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.

30-100 SNMP Traps Menu

The SNMP Traps menu establishes up to eight destinations where Multiband Plus can send SNMP trap PDUs.

This menu appears only when Multiband Plus has an Ethernet interface. The SNMP Traps menu is listed under the Ethernet menu:

The following example shows SNMP Traps menu with the first three of eight SNMP trap profiles:

```
30-100 SNMP Traps
>30-101 NY
 30-102 Chi
 30-103 KC
```

Note: remaining lines not shown

SNMP Traps: A trap PDU is a message that Multiband Plus generates when a WAN T1/PRI line or a serial host port changes status.

SNMP Traps Profiles

See **SNMP Traps Menu**.

Status 1 - Status 8 (see **Edit**)

Sub Pers

⇒⇒ **Sub Pers** [a **Call Profile** (2*N*-100 Directory) 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**.

Switch D Chan Command

The Switch D Chan command is the third option in the 10-200 Line Diag menu. This option swaps the status of the primary and secondary NFAS D Channels:

Switch D Chan: See also **Sig Mode**=*ISDN_NFAS*.

```
10-200 Line Diag
 10-201 Line LB1
 10-202 Line LB2
>10-203 Switch D Chan
 10-204 Clr Err1
```

Note: remaining lines not shown

To switch D channels, move the selector to **`Switch D Chan`** and press the **Right-Arrow** or **Enter** key.

Switch Type

⇒⇒ **Switch Type** [a **Line Profile** (10-100 Line Config) parameter] specifies the network switch that provides this T1/PRI line to Multiband Plus and connects this line to the WAN. Its value can be any one of the following:

Switch Type: This parameter does not apply to inband signaling interfaces or to interfaces consisting entirely of nailed-up channels.

- *AT&T* (the default)
- *NTI* (Northern Telecom, Inc.)
- *Japan*
- *GloBanD* (for Q.931W GloBanD services)

- *NI-2* (National ISDN-2)

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 Security) parameter] allows all system diagnostics 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 management. 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 profiles 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) interface:

```
00-200 Sys Diag
>00-201 Restore Cfg ^
 00-202 Save Cfg
 00-203 Use MIF
 00-204 System Reset
```

Syslog

⇒⇒ **Syslog** [an **Ethernet Profile** (30-200 Mod Config) parameter] when set to *Yes*, enables sending warning, notice, and CDR records to the SYSLOG host. When set to *None*, syslog host is disabled.

Syslog: See also **Syslog** status menu in Chapter 7 and **Log Host** in this chapter.

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 (T1/PRI or serial host or Ethernet).

The System menu contains the following submenus:

```
00-000 System
 00-100 Sys Config
>00-200 Sys Diag
 00-300 Security
 00-400 Destinations
```

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. In addition, a system reset of a Multiband Plus T1/PRI causes momentary loss of T1 framing and the T1 line might be shut down.

System Reset: During system reset of a Multiband Plus T1/PRI, relays at the T1/PRI interface close, which cause a line loopback, or these relays pass through the entire T1/PRI line if the system is configured for D&I in the Line Profile.

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 T1/PRI connections. If Multiband Plus fails any of these tests, the **ER** LED remains lit or blinks.

The alarm relay remains closed while the POST is running and opens when and if POST successfully completes.

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) parameter] is an integer that specifies the target percentage of *bandwidth used / call-bandwidth* 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, an 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 how 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.

Telnet PW

⇒⇒ **Telnet PW** [an **Ethernet Profile** (30-200 Mod Config/Ether Options..) parameter] sets the password that users must enter before they can access Multiband Plus's user interface through TELNET. Up to 20 alphanumeric characters can be entered. If **Telnet PW** is left blank, the TELNET client is not asked for a password. If **Telnet PW** is given a value, the TELNET client has three tries (60 seconds each) to enter the correct password.

Term Rate

⇒⇒ **Term Rate** [a **System Profile** (00-100 Sys Config) 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) 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) parameter] specifies the time of day in the format *hh:mm:ss* (hours, minutes, sec-

onds). This parameter should be set when first installing Multiband Plus T1/PRI.

Time Period 1.. (2.., 3.., 4..)

⇒⇒ **Time Period...** [**Call Profile** (2*N*-100 Directory) 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**.

Transit

⇒⇒ **Transit #** [**Call Profile** (2*N*-100 Directory] applies to PRI interfaces when you wish to choose a U.S. Interexchange Carrier (IEC) for a long distance call. Generally, you enter the same characteristic digits you would use to prefix a phone number dialed over a BRI, T1 access, or voice interface.

Transit #: For example, entering *288* selects *AT&T*, *222* selects *MCI*, and *333* selects *Sprint*. If you do not enter a value (the default for this parameter) any available IEC is used for long distance calls.

Upload

⇒⇒ **Upload** [a **Security Profile** (00-300 Security) parameter] controls whether the configuration of Multiband Plus can be uploaded. 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) presents all Multiband Plus commands and displays in a machine-compatible protocol. Using this interface, you can write programs that interface to your network control and maintenance center to Multiband Plus.

To run MIF instead of the standard interface, select the **`00-203 Use MIF`** option

Use MIF: An alternative method of getting MIF is to set the **Console** System Profile parameter to *MIF*.

in the Sys Diag system menu and press the **Right-Arrow** or **Enter** key.

```
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. Similarly, the **Ctrl-C** command restores the Control Monitor interface only at the control port making the request.

Use MIF: For more information, see the "MIF" appendix.

Use Trunk Grps

⇒⇒ **Use Trunk Grps** [a **System Profile** (00-100 Sys Config) parameter] determines whether or not Multiband Plus divides its WAN channels into trunk groups. If **Use Trunk Grps** = *Yes*, the first digit of the **Dial #** Call Profile parameter specifies the group of channels (trunk group) to which the call can be placed. Furthermore, if **Use Trunk Grps** = *Yes* on the answering side of a multichannel call, the trunk group of the first connected channel is the trunk group of all additional channels. Multichannel (AIM or BONDING) calls cannot cross trunk groups. The default is *No*.

Use Trunk Grps also enables Destination Profiles in which **Dial #** is prefixed by *3* and port-to-port calls in which **Dial #** is prefixed by *2*.

All channels with the same **Ch *n* Trnk Grp** value are in the same trunk group. These also are the single-digit ***dialing prefixes*** in the **Dial #** parameter. Trunk group configuration is required when Multiband Plus is connected to circuits supplied by more than one carrier or whenever connected to multiple dial-plans.

7 Reference to Status Menus

Use this chapter to look up status menus and their parameters. See also Chapters 5 and 6, “Multiband Plus T1/PRI Parameters” and “Reference to Edit Menus”.

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:

⇒⇒ First Line: 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.

⇒⇒ Second Line: 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.

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.

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.

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 T1/PRI 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.

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" appendix describe call quality.

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:

    OR for Originated

    AN for Answered

    AP for Assigned to Port or module

    CL for Cleared

    OF for Overflowed

event description: All events except *OF* are associated with calls. *OF* indicates the CDR buffer overflowed because events occurred faster than could be reported.

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-PP indicates slot - port. 02 is a constant indicating the serial host interface, while PP indicates the serial host **port**.

Event ID / **slot/port**: CDR creates a new **event ID** for every change in a channel's status. Because a Multiband Plus call can consist of several channels, multiple CDRs can be generated for every change in call status.

⇒⇒ 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.

30-200 Ether Opt

This status menu lists the Ethernet options, specifically, the type of Ethernet interface and its MAC address. The following illustration shows the Ether Opt display:

Ether Opt: The type of interface is selected by the **Ethernet I/F** parameter.

```
30-200 Ether Opt
>I/F: COAX
 Adrs: 00c07b322bd8
```

30-100 Ether Stat

This status menu gives the number of Ethernet frames received and transmitted and the number of collisions at the Ethernet interface. The following example shows the Ether Stat display:

Ether Stat: The counts return to zero when Multiband Plus is powered off or software reset; otherwise, they continuously increases up to the maximum allowed by the display.

Ether Stat appears only if the optional Ethernet interface has been installed.

```
30-100 Ether Stat
>Rx Pkt:      106
    Col:        0
 Tx Pkt:      118
```

⇒⇒ The first parameter, **Rx Pkt**, displays the number of Ethernet frames that have been received from the Ethernet interface.

⇒⇒ The second parameter, **Col**, displays the number of collisions that have been detected at the Ethernet interface.

⇒⇒ The third parameter, **Tx Pkt**, displays the number of Ethernet frames that have been transmitted over the Ethernet interface.

30-000 Ethernet

The Ethernet Status menu is a branch of the Main Status Menu that lists those submenus which display status of the optional Ethernet module. The following illustrations shows the Ethernet Status menu:

```
30-000 Ethernet
 30-100 Ether Stat
 30-200 Ether Opt
```

10-400, 10-500 FDL Stats

Multiband Plus T1/PRI models have two menus that list the performance registers of the T1/PRI interface. These menus, for line #1 and line #2, are FDL1 Stats and FDL2 Stats, respectively.

The FDL statistics menus are the fourth and fifth options listed in the Net/T1:

```
10-000 Net/T1
 10-300 Line Errors ^
 10-400 FDL1 Stats
>10-500 FDL2 Stats
 10-600 Net Options
```

Shown below is the FDL Stats menu for line #2. You can choose to view the accumulated error events, the statistics accumulated during the current 15-minute period,

FDL Stats: The name for this menu, FDL (facility data link), does not imply no data is accumulated if you do not have a facility data link. These registers accumulate data whether you have D4 or ESF lines, and whether you have a facility data link.

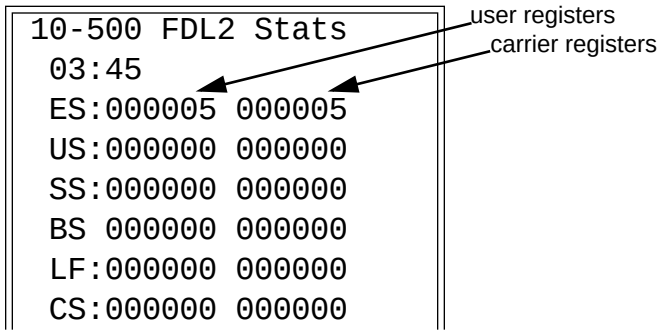
FDL Stats: See also **Clr Err** and **Clr Perf Command**s, which clear these registers.

the cumulative statistics accumulated during the past 24 hours, or any 15-minute period in the previous 24 hours:

```
10-500 FDL2 Stats
>Error Events...
 Current Period...
 Last 24 Hours...
 00:00...          v
```

You can view 97 sets of user ESF (extended superframe format) performance-registers statistics and 97 sets of carrier ESF performance-registers statistics through this menu. You can view the current 15-minute period's performance registers and 96 previous 15-minute-period performance registers for both the user and the carrier. The user performance-registers are listed in the middle column after the register names, and the carrier performance-registers are listed in the last column. You can reset the user performance-registers (see **Clr Perf 1**, etc.), but only the carrier can reset the carrier registers. All performance registers are reset upon power-up or software reset:

FDL Stats: If you have a D4 (SF) interface, no carrier performance data is recorded.



If you select **`Error Events...`**, the user and carrier error events registers are displayed.

If you select **`Current Period...`**, the performance registers for the current 15-minute period are displayed. If you select **`Last 24 Hours...`**, the summed performance data over the last 24 hours are dis-

played. To get any past period's registers, select an hour from the menu, such as **`03:00...`**, and then select any 15-minute period within that hour. You can select any hour within the last 24. Whichever period you select, the following six registers are displayed:

- **EE** stands for the number of ***error events*** accumulated since the last time this register was reset. An ESF error event is counted when the CRC-6 calculations at the data receiving end of the T1 span do not match the CRC-6 calculations at the sending end. This mismatch indicates that the frame had at least one data error.

EE: Error events have no meaning for D4 lines. Only ESF lines carry CRC-6 (Cyclic Redundancy Check-6) signature used to check the quality of the T1/PRI line as a whole.

- **ES** stands for ***errored seconds***. For ESF lines, it is the number of seconds in the 15-minute period in which there was at least one error event as described above or in which two or more framing errors were detected within a 3-millisecond interval.

ES: For D4 lines, it is the number of seconds in which one or more framing bit errors (FE) were detected, or in which a controlled slip (CS) occurred.

- **US** stands for ***unavailable seconds***, which is the number of seconds in the 15-minute period that were preceded by at least 10 consecutive severely errored seconds. (See SS in the next paragraph.)

- **SS** stands for ***severely errored seconds***, which is the number of seconds in the 15-minute period in which there were at least 320 CRC-6 errors as detected by Multiband Plus, or the T1 line was out of frame.

SS: For D4 lines, this is the number of one second intervals containing eight or more FE events or one or more SEF events.

- **BS** stands for ***bursty errored seconds***, which is the number of seconds in the 15-minute period in which there were at least 2, but not more than 319, CRC-6 errors, as detected by Multiband Plus.

- **LF** stands for ***loss of frame seconds***, which is the number of seconds in the 15-minute period in which the T1 line was out of frame.

- **CS** stands for ***controlled slip seconds***, which is the number of seconds in the 15-minute period in which a frame was either replicated or deleted.

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 T1/PRI's serial host interface and calls to and from the serial host ports of that interface.

Your Multiband Plus T1/PRI 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 (Net/T1) is the third option listed in the Net/T1 status menu:

```
10-000 Net/T1
 10-100 Line 1 Stat
 10-200 Line 2 Stat
 10-300 Line Errors
```

Note: remaining lines not shown

The T1 Line Errors menu displays the channel-by-channel errors accumulated

during all current calls. The menu is divided into three columns as in the following:

```
10-300 Ln1  Ln2
 1:      0    -
 3:     33    -
 4:      0    -
Note: remaining lines not shown
```

⇒⇒ In the first column are T1 channel numbers, each followed by a colon (:).

⇒⇒ The second column gives the number of byte errors that have been detected on that channel in line #1 during the current call.

⇒⇒ The third column gives the number of byte errors that have been detected on that channel in line #2 during the current call.

For the meaning of the errors listed in these displays, see the "Error Counting in WAN Connections" appendix.

Line Errors: If a channel is not associated with any current call, in place of errors a a dash (-) appears. See channels 1, 3, and 4 of line #2 in the preceding example. Notice that channel 2 is not listed. Any channel in the Line Errors display that would show dashes in both columns is omitted.

10-100 Line 1 and Line 2 Stat

The Line 1 Stat and Line 2 Stat (Line Status) menus show the dynamic status of each WAN line, the condition of its electrical link to the carrier, and the status of each line's individual channels.

The (T1/PRI) Line 1 Stat and Line 2 Stat menus have the same format. Line 1 Stat follows.

```
10-100  1234567890
L1/LA   ******---
    12345678901234
    --------------
```

⇒⇒ The first line begins with the menu number (10-100), followed by the column headers for channels 1 through 10. The third line has column headers for the remaining channels.

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.

Line Status is also reflected in the front-panel LEDs of Multiband Plus. See the "Troubleshooting and LEDs" chapter for more information.

10-100 Line 1 and Line 2 Stat

⇒⇒ The second line begins with the line number/link status (L1/LA). The two-character abbreviations for the link status are as follows:

LA Link active. The line is active and physically connected.

RA Red Alarm/Loss of Sync. The line is not connected, improperly configured, experiencing a very high error rate, or is not supplying adequate synchronization. When the line is in this state, either the **RA** LED alone is lit or both the **RA** and **LS** LEDs are lit.

YA Yellow Alarm. Multiband Plus is receiving a Yellow Alarm pattern. The Yellow Alarm pattern is sent to Multiband Plus to indicate that the other end of the line cannot recognize the signals Multiband Plus is transmitting. When the line is in this state, the **YA** LED is lit.

DF D-channel failure. The out-of-band signaling channel for a Primary Rate Interface is not currently communicating.

1S Keep alive (all ones). A signal is being sent from the T1/PRI network to Multiband Plus to indicate the T1/PRI line is currently inoperative. When the line is in this state, the **1S** LED is lit.

DS Disabled link. The line is physically connected but you have disabled the line in the Line Profile.

⇒⇒ Following the line number/link status, the second line continues with the states of T1/PRI channels 1 through 10. A single character represents the status of each channel in the line.

Second Line: If Multiband Plus is configured for drop and insert and a Red Alarm (**RA**) or Loss of Synch condition is detected, the failure is conveyed to the device using the drop and insert by sending an all ones (AIS) over line #2. During the time this failure is active, devices connected to line #2 cannot place calls.

⇒⇒ The fourth line shows continues where the second line left off, showing the status of the remaining channels. The following list describes the status characters used in the second and fourth lines:

.	Channel not available because the line is disabled, has no physical link, does not exist, or is marked as *Unused* in the Line Profile
*****	Channel connected in a current call
-	Channel currently idle (but in service)
b	Backup NFAS D channel (ISDN only)
c	Channel currently not available because it is in the process of clearing the most recent call or because it is in the process of sending echo cancellation tones to receive a call (Robbed-bit only)
d	Dialing from this channel for an outgoing call
r	Ringing channel for incoming call
m	Channel in maintenance/backup (ISDN only)
n	Channel marked as *Nailed* in the Line Profile
o	Channel out of service (ISDN only)
s	Active D channel (ISDN only)
x	Drop & insert channel (Robbed-bit only)

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 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 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.

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 messages in the log.

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 first line of the menu shows the status menu number and the time the event occurred.

⇒⇒ The second line identifies the log entry number (M00-M31) and, if applicable, the line and channel on which the event occurred.

⇒⇒ The third line contains the text of the message. These messages are listed later in this section.

⇒⇒ The fourth line, as shown in the example above, contains a message parameter or the line is blank. The following types of message 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 resource (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 channels 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.

- **Cause Code=** indicates a signaling error or event. This code number was sent by the ISDN network equipment and received by Multiband Plus. Except for normal call clearing (cause code=16), this parameter does not appear when you are not using ISDN access.

Cause Code: See the "Troubleshooting and LEDs" chapter for a listing of the cause codes.

⇒⇒ 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 third line 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.
Missing Wink-Start — The switch did not reply with the wink-start signal, either because the line was out of service or because the switch was busy. In either case, Multiband Plus could not even start to dial a call over that line.
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 AIM 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 or Ethernet module because the resource was busy or otherwise unavailable.
No Phone Number — No phone number exists in the Call Profile being dialed.
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 third line of the message log reports the following event types:

Events Logged (Information)
Incoming Call — An incoming call has been answered at the T1/PRI 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 fourth line 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.
High Bit Errors — One or more lines has a bit error rate greater than the value set by the **High BER** parameter.
Normal Bit Errors — One or more lines had a bit error rate greater than the value set by the **High BER** parameter, but has now returned to a lower bit error rate.
No Trunk Available — All lines are out of service.
Trunk Down — One or more lines are out of service.
Trunk Up — One or more lines were out of service, but have now returned to service.
Ethernet up — Appears after the Ethernet interface has been initialized and is running.
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/T1

Net/T1 is a branch of the Main Status Menu that lists submenus giving the status of the T1/PRI interface.

The following illustration shows the Net/T1 menu:

```
10-000 Net/T1
 10-100 Line 1 Stat
>10-200 Line 2 Stat
 10-300 Line Errors
```
Note: remaining lines not shown

10-600 Net Options

Net Options, found in the Net/T1 status menu, lists the T1/PRI interface features with which your Multiband Plus has been equipped.

```
10-600 Net Options
>T1/PRI Network I/F
 2 Network I/F(s)
 T1 Type: DSX/DSX
```

The following items are listed:

⇒⇒ The first line defines the physical interface to the WAN: *T1/PRI Network I/F*

⇒⇒ The second line shows the number *N* of ports for the T1/PRI lines: *N Network I/F(s)*

⇒⇒ The third line shows whether internal CSUs are installed for T1/PRI line #1 and #2 respectively: *T1 Type: DSX/DSX* or *T1 Type: CSU/DSX* or *T1 Type: DSX/CSU* or *T1 Type: CSU/CSU*

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.

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 first line gives the menu number and name.

⇒⇒ The second line shows the available bandwidth, which in this example is 128 kbit/s.

⇒⇒ The third line gives the current accumulated DS0 minutes for all calls placed from this Multiband Plus.

Third Line: See **DS0 Min Rst** for when the DS0 minutes are reset.

⇒⇒ The fourth line and all further lines 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 indicating 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 operations 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.

2*N*-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  0
 DSR+ DTR+ RTS+ CD+
 RI-  acr- pnd+ dp-
 crq- dlo+ digit 7
```

The Port Leads status menu has the following format:

⇒⇒ The first line contains the status menu number which identifies the serial port being monitored, namely port #1 in this example.

⇒⇒ The remaining lines 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 Multiband 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 first line gives the menu name, Port Opts.

⇒⇒ The second line 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.

The T1/PRI Session Errors menu displays the channel-by-channel errors accumulated during the current call. Each row of this menu reports the accumulated errors on one of the channels active in the call. There are

Session Err: The "Error Counting in WAN Connections" appendix describes the meaning of the errors listed in these displays. See also **Line Errors**.

four columns separated from each other by colons (:).

```
21-500 Errors      O
 0: 1: 1:     0  -
 0: 1: 3:    33  -
 0: 1: 4:     0  -
Note: remaining lines not shown
```

⇒⇒ Column 1 is always 0.

⇒⇒ Column 2 gives the line number, either 1 or 2, of the channel reported in column 3.

⇒⇒ Column 3 gives the channel number whose errors are reported in column 4.

⇒⇒ Column 4 gives the number of byte errors that have been detected on this row's channel during the current call.

In an online FT1-B&O call, any channels that have been removed appear in the Session Errors status menu with an asterisk (*) following in the error column.

Session Err: If a channel is not associated with the current call from the selected serial host port, its session errors are displayed as a dash (-). Notice in the example above that channel 2 is not listed. Any line in the Session Errors display that would show dashes in both columns is omitted.

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*.

For further information on call quality, see **Line Errors**, **Port Info**, and **Call Status** in this chapter, **Auto-Bert** in the "Reference to Edit Menus" chapter, and the "Error Counting in WAN Connections" appendix.

- *Good* means that no errors have been detected during the transmission of the call.
- *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*.

Syslog

Syslog is not a Multiband Plus status display, but an IP protocol that describes system status messages sent to a host computer, **Log Host**.

Syslog: This data is accessed only through the syslog host, an external device whose address is given by the **Log Host** parameter. See UNIX man pages on logger(1), syslog(3), syslog.conf(5), and syslogd(8) for details on the syslog daemon. The syslog function requires the UDP port 514.

The data for warning (level 4), and info (level 6) syslog messages are derived from the **Message Log** displays. Warning and info messages are presented in the following format:

ASCEND: slot *aa* port *bb*, line *cc*, channel *dd*, *text1*, *text2*

aa: the module's slot number (For example, "slot 4" in "ASCEND: slot 4 port 1, Outgoing Call")
bb: the serial port
cc: the line
dd: the channel
text 1: line 3 of the **Message Log (System)** display (For example, "Outgoing Call")
text 2: line 4 of the **Message Log (System)** display (For example, "555-1212")

NOTE: slot *aa*, port *bb*, line *cc*, and channel *dd* are suppressed when not applicable or unknown.

The data for notice (level 5) syslog messages is derived from the **CDR** display, lines 3 and 4. Notice messages are presented in the following format:

ASCEND: call *yy xx* slot *ss* port *pp zz*K *nn*

yy: the **event ID** as in the **CDR** display (For example, "call 5" in "call 5 OR 64K 5551212")
xx: the **event description** as in the **CDR** display
ss: the module's **slot** number as in the **CDR** display
pp: the serial host **port** as in the **CDR** display
*zz*K: the **data service** as in the **CDR** display
nn: the **phone number** as in the **CDR** display

NOTE: slot *ss* and port *pp* are suppressed when not applicable or unknown.

Since the syslog host adds the date, type, and name of all syslog messages from Multiband Plus (the sender), that data is not included in the above data formats. Some example syslog entries follow:

```
Oct 21 11:18:07 marcsmax ASCEND: slot 0 port 0, line 1, channel 1, \
                    No Connection
Oct 21 11:18:07 marcsmax ASCEND: slot 4 port 1, Call Terminated
Oct 21 11:19:07 marcsmax ASCEND: slot 4 port 1, Outgoing Call, 123
```

In the example above, three messages are displayed for the system "marcsmax." Notice that the back-slash (\) indicates the continuation of a log entry onto the next line is treated as a single line.

00-100 Sys Options

The Sys Options menu gives a read-only list that identifies your Multiband Plus T1/PRI and names each of the features with which it has been equipped:

```
00-100 Sys Options
>Security Prof:1   ^
 Software +1.0+
 S/N:42901
```

Note: remaining lines not shown

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**.

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
PRI<->T1 Installed or *PRI<->T1 Not Inst* — shows whether T1 to PRI conversion is installed (T1 PBX support)
MRate Installed or *MRate Not Inst* — shows whether Multiband Plus supports MultiRate services
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)
ISDN Sig Installed or *ISDN Not Inst* — stands for D-channel signaling which is prerequisite to *MRate*, GloBanD, NFAS, or any other PRI feature
Nx56/64 Installed or *Nx56/64 Not Inst* — stands for Ascend Inverse Multiplexing (AIM) functionality and includes AIM 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

NOTE: Although GloBanD (Q.931W), a software option, does not appear in this menu, but its presence can be verified by checking the **Switch Type** values.

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 T1/PRI system as a whole. It contains the following 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 T1/PRI WAN interface, or its serial host interface.

8 Troubleshooting and LEDs

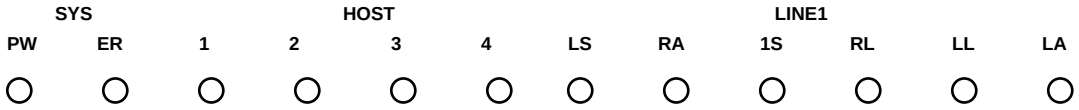
This chapter explores the types of problems that might interrupt or prevent call transmission and provides some suggested procedures for addressing those problems.

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 / Warranty" section in the front of this guide for more information.

8.1 LEDs

The front panel of Multiband Plus T1/PRI includes a set of LED displays as shown in the following illustration:



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 front-panel LEDs, grouped under **LINE1** and **LINE2**, give the status of each T1/PRI line:

LS (Loss of Sync)
When the interface loses synchronization from excess noise, too much jitter, or frame errors, this red LED is lit and a Yellow Alarm indication is transmitted toward the WAN.

RA (Red Alarm)
The Red Alarm indicates that there is an improper receive signal or no receive signal. This condition can occur as a result of a high error rate or improper line configuration. When such a condition arises, this red LED is lit and a Yellow Alarm indication is transmitted toward the WAN.

YA (Yellow Alarm)
The Yellow Alarm LED is lit when Multiband Plus is receiving a Yellow Alarm pattern. The Yellow Alarm pattern is sent to Multiband Plus to indicate that the other end of the line cannot recognize the signals Multiband Plus is transmitting.

1S (All Ones)
This error condition, known also as the Alarm Indication Signal (AIS), results when an unframed “all ones” is being received. When such a condition arises, this yellow LED is lit and a Yellow Alarm indication is transmitted toward the WAN.

AIS, also known as a Blue Alarm, can be sent from a CSU when it loses synchronization on the signal received from the WAN.

RL (Line Loopback)
When in line loopback diagnostic mode, this yellow LED is lit. The line loopback test verifies the T1/PRI or E1/PRI line. Line loopback is described in the “Reference to Edit Menus” chapter.

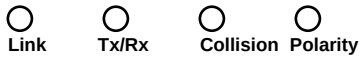
LL
This LED is unused.

LA (Link Active)
When the link is active, and there are no pending alarm or test conditions, this green LED is lit. If a Primary Rate Interface is active and using D-channel signaling, this

LED blinks when the unit is unable to establish layer 2 and layer 3 protocol communications with the central office switch, which can indicate a configuration error.

NOTE: When Multiband Plus is configured so that the second T1/PRI line is disabled, all LEDs for that line are turned off, and Multiband Plus generates an AIS toward the WAN.

The back panel of Multiband Plus with the optional Ethernet interface includes a set of LED displays as shown in the following illustration:



The following LEDs appear on the back panel of Multiband Plus models with an optional Ethernet Interface:

Link Integrity
a green LED, applies only to 10 BaseT (unshielded twisted pair) Ethernet. It is lit when the 10 BaseT Ethernet interface is functional.

TX/RX
a red LED, lights when there is traffic (activity) across the Ethernet interface.

Collision
a red LED, lights when there are collisions on this Ethernet.

Polarity
a red LED, applies only to 10 BaseT (unshielded twisted pair) Ethernet. It is lit when polarity is inverted.

8.2 List of Symptoms

If you have not yet examined the status displays, see Chapter 7 now.

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 6
Troubleshooting Calls between Serial Hosts	
What are the first level diagnostics available for calls between serial host ports?	page 6
User Interface Problems	
When the list of DO commands appears, most operations do not appear.	page 6

Problem	Page
Call Profile Checklist	
The T1/PRI line is in service, but no calls can be made.	page 7
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.	page 7
The data appears to be corrupted on 1 Chnl or 2 Chnl call types dialed in the U.S. to another country.	page 7
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 8
The error message No Channel Avail appears in the Message Log display immediately upon trying to place a call.	page 8
Hardware Configuration Problems	
Nothing is displayed on the VT-100 or the Palmtop.	page 8
The ER LED turned off, but nothing is displayed on the Control Monitor's VT-100 terminal.	page 9
Random characters appear on the Control Monitor screen.	page 9
Random characters appear on the Palmtop screen.	page 9
The start-up display indicates a power-on self test failure.	page 10
Serial Host Interface Cabling Problems	
Excessive data errors reported on all calls.	page 10
Calls cannot be made, answered, or cleared using control leads.	page 10
Serial Host Interface Loopback Testing	
In local loopback, your application indicates there is no connection.	page 11
In local loopback, no data is received by your application.	page 11
The Port Profile is set to establish calls when DTR is active, but a call cannot be established from your application.	page 12
A call initiated by control-lead toggling is cleared before it can be established completely.	page 12
A serial host-initiated call cannot be cleared from your application equipment.	page 12
ISDN Cause Codes	
A Message Log displays an ISDN cause code.	page 13

Problem	Page
T1/PRI Interface Problems	
Dialing and answering do not operate reliably after initial installation.	page 15
T1/PRI LEDs	
No LEDs on the front panel are lit for the second T1/PRI line.	page 15
The RA LED and the Line Status menu indicate that the T1/PRI line is in a Red Alarm state.	page 15
This is a PRI Line and the LA LED blinks.	page 16
When running in a T1 drop-and-insert configuration, Line #2 remains in a Red Alarm state.	page 16
T1/PRI Access Problems	
Whenever an AIM or BONDING call is made, only some of the T1/PRI channels can be dialed.	page 17
Some T1/PRI channels are never used.	page 17
An outgoing call that uses T1 access (inband signaling) fails to connect to the far end.	page 17
Incoming calls that use T1 access (inband signaling) are not being answered.	page 18
When using D4 framing, a 24-channel call using T1 access (inband signaling) cannot be established.	page 18
The WAN carrier reports loss of synchronization on the signal transmitted from Multi-band Plus.	page 19
T1/PRI Circuit Quality Problems	
Excessive handshaking on calls to serial host ports.	page 19
Excessive data errors reported on some calls to serial host ports but not on every call.	page 19
AIM Static Call Problems	
The data received by your equipment becomes scrambled during an AIM Static call.	page 20
Incoming Call Routing Problems	
After the Call Status menu reports ANSWERING and HANDSHAKING, it drops back to IDLE.	page 20
Cannot make a call to a particular serial host port.	page 20
When trying to make a dual-port call, the Call Status menu reports ANSWERING and HANDSHAKING, and then drops back to IDLE.	page 20
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 20

8.3 Check Me First

Problem: I have not been able to get my new installation operational.
Complete the *Multiband Plus T1/PRI Quick Start Guide.* If you need to return some parameters to their default values, before going to *Multiband Plus T1/PRI Quick Start Guide*, see Chapter 5.

8.4 Troubleshooting Calls between Serial Hosts

Problem: What are the first level diagnostics available for calls between serial host ports?
The following **DO** commands can help in troubleshooting calls between serial hosts. You must be in an 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** (remote loopback).
- 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.

8.5 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 T1/PRI 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)**. If the T1/PRI line is not available, *Trunk Down* appears in the message log and you cannot dial.

8.6 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 T1/PRI 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.

8.6.1 Call Profile Checklist

The following is a typical problem that might occur after a Call Profile configuration error.

Problem: The T1/PRI 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.
- If you request a WAN service that is not available on your line, the WAN rejects your request to place a call. Another possible cause is that the channels that provide this service are busy and the outgoing call is routed to channels for which you did not subscribe to this service. Check the **Data Svc**, **Call-by-Call**, and **PRI # Type** Call Profile parameter values. If you think this is the problem, ask your carrier representative to enable your line with each switched service you desire.
- 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.

8.6.2 Line Profile Checklist

Multiband Plus requires you to configure the T1/PRI interface before you use any dialing features. You configure the T1/PRI 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 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 parameters **Ch *n* #,** in the "Reference to Edit Menus" chapter. The numbers you are calling belong in the Call Profiles or Destination Profiles.

In addition, when using T1 access (inband signaling), any channels that are used must correspond to those channels within the circuit that are available for data transmission. For example, if the channels 13-24 in the circuit are allocated for your Multiband Plus application, the phone numbers must be specified for channels 13-24 in the Line Profile. Switched data channels do not have to be contiguous within the circuit.

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 T1/PRI cables have been disconnected or were installed incorrectly. Section 8.10 describes T1/PRI cabling problems.

8.7 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.

8.8 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).

8.8.1 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.

8.8.2 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 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 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.

8.9 ISDN Cause Codes

ISDN cause codes are numerical diagnostic codes sent from an ISDN switch to DTE that provide an indication of why a call failed to be established or why a call terminated. The cause codes are part of the out-of-band communications supported by the Signaling System 7 supervisorial network (WAN). When you dial a call from Multiband Plus using ISDN access, Multiband Plus reports the cause codes on the Message Log status menu. (Note: When Multiband Plus clears the call, a cause code is reported even when inband signaling is being used.)

Problem: A Message Log displays an ISDN cause code.
The following table lists the numerical cause codes and provides a description of each. (The cause codes for German 1TR6 networks (WANs) are different from this table.)

Code	Cause
1	Unallocated (unassigned) number
2	No route to specified transit network (WAN)
6	Channel unacceptable
16	Normal clearing
17	User busy
18	No user responding
21	Call rejected
22	Number changed
28	Invalid number format (Incomplete number)
29	Facility rejected
30	Response to STATUS ENQUIRY
31	Normal, unspecified
34	No circuit/channel available
38	Network (WAN) out of order
41	Temporary failure

Code	Cause
42	Switching equipment congestion
43	Access information discarded
44	Requested circuit channel not available
45	Pre-empted
50	Requested facility not subscribed
52	Outgoing calls barred
54	Incoming calls barred
58	Bearer capability not presently available
63	Service or option not available, unspecified
65	Bearer service not implemented
66	Channel type not implemented
69	Requested facility not implemented
81	Invalid call reference value
82	Identified channel does not exist
88	Incompatible destination
96	Mandatory information element is missing
97	Message type non-existent or not implemented
98	Message not compatible with call state or message type non-existent or not implemented
100	Invalid information element contents
102	Recovery on timer expiry
127	Internetworking, unspecified

8.10 T1/PRI Interface Problems

The first and most critical aspect of T1/PRI interfaces is the cable or cables connecting Multiband Plus to the WAN line or WAN terminating equipment. Typically, WAN 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 T1/PRI interface requirements, and lists cabling pin-outs.

Although the largest set of problems surrounding T1/PRI 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 and how the switch is provisioned. The recommended provisioning is given in the "Planning the T1/PRI WAN Interface" section of Chapter 4. If you can get a printout of the line translations from your carrier representative, you can troubleshoot your T1/PRI connections more easily.

Problem: Dialing and answering do not operate reliably after initial installation.
Check that the value of the T1/PRI **Length** Line Profile parameter or the **Buildout** Line Profile parameter matches the actual distance in your configuration.

Multiband Plus T1/PRI displays the **Buildout** Line Profile parameter if its interface to the T1/PRI line is equipped with an internal CSU. Its enumerated values can be *0 db, 7.5 db, 15 db,* and *22.5 db*. Contact your carrier representative to determine which value to choose. If the line interface is not equipped with an internal CSU, the **Length** Line Profile parameter is displayed. Its value can be *1-133, 134-266, 267-399, 400-533,* or *534-655* feet, which should correspond to the distance between Multiband Plus and the WAN interface equipment, typically a CSU or T1 multiplexer.

T1/PRI ports not equipped with internal CSUs require an external CSU or other equipment approved for the metallic interface between Multiband Plus and the WAN metallic facility.

Those T1/PRI ports of Multiband Plus T1/PRI models that are not equipped with internal CSUs require an external CSU or other equipment approved for the metallic interface between Multiband Plus and the WAN metallic facility.

8.10.1 T1/PRI LEDs

Multiband Plus provides two indicators for the state of a line: first, there is a set of LEDs on the front panel for each line, and second, the Line Status menus. Multiband Plus also provides six bantam jack plugs, described in the "Planning and Specifications" chapter, to diagnose and monitor T1 signals to and from the WAN.

Problem: No LEDs on the front panel are lit for the second T1/PRI line.
If none of the LEDs relating to the secondary T1/PRI line is lit, the line is disabled in the Line Profile. You can enable the secondary T1/PRI line by modifying the Line Profile for your unit.

Problem: The RA LED and the Line Status menu indicate that the T1/PRI line is in a Red Alarm state.
If the line is in a Red Alarm state, Multiband Plus cannot establish proper synchronization and frame alignment with the WAN. This behavior is normal for as long as 30 seconds when a T1/PRI line is first plugged into Multiband Plus.

If the Red Alarm condition persists for longer than 30 seconds, check the value of the **Framing Mode** Line Profile parameter. Change the value to the other available option and check to see if the Red Alarm condition goes away within 30 seconds.

If the Red Alarm state still persists, the second thing to check is the cabling. You might have a crossover cable installed where a straight through cable is required, or vice versa. If Multiband Plus is connected through bantam plugs, reverse the transmit and receive plugs. Then allow Multiband Plus to attempt to establish synchronization for an additional 30 seconds.

You can eliminate the T1/PRI cabling as a possible cause by replacing the T1/PRI connection with a loopback plug. The LS LED (loss of synchronization) should go off immediately, followed by the RA LED in about 30 seconds.

Problem: This is a PRI Line and the LA LED blinks.
A blinking **LA** LED means that the physical configuration of the PRI line is correct but the signaling channel—the D channel— is not communicating with the WAN.

Verify with your carrier representative that the D channel is channel 24, or whatever has been configured in the Line Profile.

If the channel number is correct, check the value of the **Line Encoding** Line Profile parameter. When B8ZS encoding is used, a non-inverted D channel is established. If AMI encoding is selected, an inverted D channel is established. Check the line translations provided by your carrier representative and set the line encoding to match the inversion requirements.

If neither your WAN interface nor Multiband Plus is equipped with a CSU, or if you have chosen the wrong line length or buildout Line Profile parameter values, this error condition can result.

Finally, an ISDN PRI line is very much like a T1 line in that, if no equipment has been plugged into the line for a short period of time, namely 5 to 10 minutes, the D channel is taken out of service. You might need to contact your carrier to put the D channel back into service.

Problem: When running in a T1 drop-and-insert configuration, Line #2 remains in a Red Alarm state.
Almost always, if line #1 is active and the line #2 is in a Red Alarm state, the problem can be attributed to the cabling between Multiband Plus and the downstream device, that is, the device that accepts that drop-and-insert connection. Frequently, a cross-over cable is required for the second port. If you are using bantam plugs, try reversing the transmit and receive connectors of the cable.

If your unit is not equipped with front-panel bantam jacks and the cabling has been verified, make certain that all of the devices are using the same framing mode. The lines, Multiband Plus, and the downstream device must all be configured for the same framing mode. However, if your unit has front-panel bantam jacks (section 4.4.17) the framing on line #1 and line #3 does not need to be the same. The **Framing Mode** parameter is part of the Line Profile.

8.10.2 T1/PRI Access Problems

Problem: Whenever an AIM or BONDING call is made, only some of the T1/PRI channels can be dialed.
Verify that there are enough channels enabled for switched services in the Line Profile to meet the requirements of the **Parallel Dial** parameter in the System Profile.

Most WAN providers can place a limited number of calls simultaneously from a single T1/PRI line. If more concurrent attempts are made than the WAN can support, the WAN applies a congestion tone—a fast-busy signal—to them.

If this problem occurs, try adding bandwidth once the call is up. If you can add bandwidth, the solution is to adjust the **Parallel Dial** parameter in the System Profile. A value of *5* works for almost all WAN providers, while some support substantially more. If adding bandwidth does not work, the problem is most likely within the individual channel translations. The recommended translations are given in the "Planning and Specifications" chapter. In this case, call your carrier representative.

Problem: Some T1/PRI channels are never used.
If your are making AIM or BONDING calls, verify that those channels are enabled for switched services in the Line Profile.

Check whether the T1/PRI line has been recently connected to a device that does not support the full 24 channels. If such has been the case, the switch might take the unused channels out of service. This situation can arise on either the local or the far end.

The channels that you have enabled in your Line Profile must correspond with the channels enabled in the circuit. If only some of the channels in the circuit are available for data calls, you must specifically choose those channels to enable in your Line Profile.

If you place a call and some channels are always skipped, call your carrier representative.

Problem: An outgoing call that uses T1 access (inband signaling) fails to connect to the far end.
Check the Call Profile making the call first. If that profile is configured correctly and you still cannot place a call, generally you have a signaling configuration problem or a WAN problem.

Make sure that your Line Profile is properly configured for wink-start or idle-start, based on what the WAN is providing. The **Rob Ctl** Line Profile parameter determines which of these call-control mechanisms is used. Check with your carrier representative to find out which inband signaling your T1/PRI interface supports.

If the Line Profile is configured correctly and you still cannot place an outgoing call, check the service state of the T1 line. Frequently, if a T1 line has been unplugged for an extended duration, the switched services available on the line are taken out of service. Once you install Multiband Plus, you might need to call your carrier representative to have the line reactivated. If this is the case for you, leave Multiband Plus on all the time,

even when you are not using it; otherwise, you will have to call your carrier representative to reactivate the line each time the unit is switched off and on.

Finally, ask your carrier representative whether the T1 line is configured for DTMF dialing. The line must support this type of dialing in order to recognize digits being dialed.

Problem: Incoming calls that use T1 access (inband signaling) are not being answered.
If you think calls are coming in but Multiband Plus is not answering them, you might have the wrong value for the **Rob Ctl** parameter in your Line Profile.

If you are connecting two Multiband Plus units back to back for testing purposes, the value of the **Rob Ctl** parameter on both units should be *Inc W-200*. If you are connected directly to an interexchange carrier, the value normally should be *Wink-Start*. Finally, if you are connected to a PBX, the value *Inc Wink* generally is required.

If *Inc W-200* or *Inc W-400* is required, the value *Wink-Start* or *Idle-Start* prevents the unit from answering calls correctly. See the **Rob Ctl** parameter for the types of robbed-bit mechanisms Multiband Plus supports.

Problem: When using D4 framing, a 24-channel call using T1 access (inband signaling) cannot be established.
When all 24 channels of a D4-framed T1 link are used for digital data transmission, it is possible for the data patterns to simulate a WAN alarm indications which causes the calls to be cleared on all 24 channels.

On a T1 link with D4 framing, a Yellow Alarm is generated by sending a zero in bit location 2 of each of the 24 DS0s for a persistent period. If the switch thinks your data is a Yellow Alarm, it assumes that the far end is not receiving its framing signal, so it drops all the calls on the link. This condition would never occur when the T1 link is ESF framed, but it can happen with data communications in certain instances.

To prevent such a condition, try one or more of these procedures:

- Make certain that a host is connected before a 24-channel call is placed. If there is no host connected to Multiband Plus, there is a 50% chance that all zeros will be transmitted over the link and will generate a Yellow Alarm.
- Contact your service provider and change your service from D4 to ESF if available. When the line is ESF, change the **Framing Mode** Line Profile parameter to *ESF*.
- When running HDLC-based protocols, set the **Bit Inversion** Call Profile parameter to *Yes* to guarantee a minimum number of one bits. The data inversion must be the same on both ends of the call for the data to be received properly.
- Finally, if there is no other way to guarantee ones density within the data, use only 23 of the 24 available channels to ensure that no false alarms are signaled.

Problem: The WAN carrier reports loss of synchronization on the signal transmitted from Multiband Plus.
One test of the T1/PRI interface is to turn off Multiband Plus. There are three possibilities depending on how the **2nd Line** parameter has been configured. (1) If line #2 is configured as a *Trunk* and power is turned off or lost, a relay closes and establishes a hard-wired loopback toward the WAN both for line #1 and line #2, each of which can be verified by your WAN provider. (2) If line #2 is configured as *D&I* (drop-and-insert), the relay closure provides a hard-wired connection between line #1 and line #2. (3) If line #2 is configured as *Disabled*, the relay closure establishes a hard-wired loopback only for line #1.

You can have Multiband Plus try to synchronize on its own signal by inserting a loopback plug in the port of the line interface in question. The front-panel LS LED should go off immediately followed by the **RA** LED within 30 seconds.

8.10.3 T1/PRI 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.

8.11 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.

8.12 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.

Appendix

A User Interface Overview

This chapter describes the display format, keypad, and keyboard commands of the following interfaces.

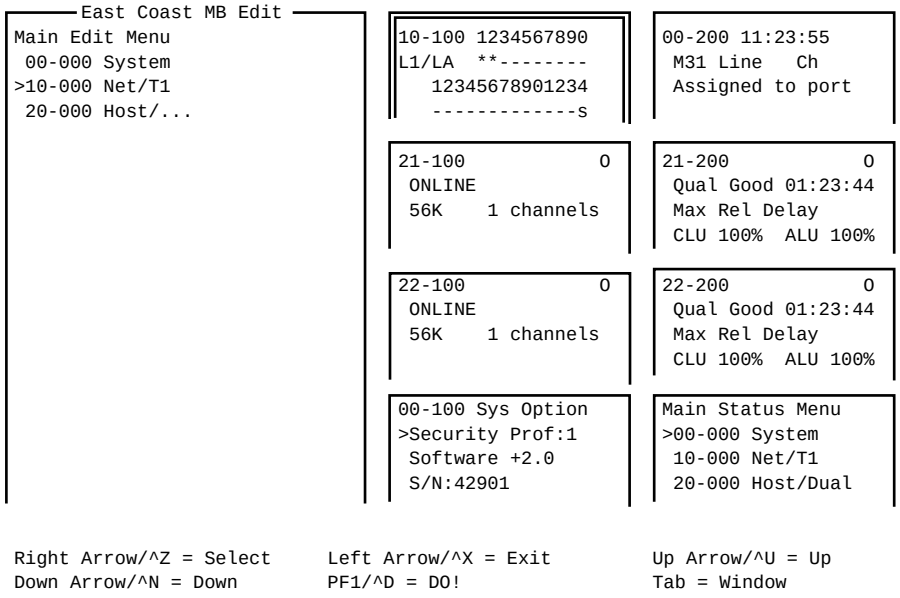
- The ***Control Monitor*** interface runs on a VT-100 terminal or a PC with a VT-100 terminal emulator.
- The ***Palmtop Controller*** works on a Palmtop hand-held terminal.

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.



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.

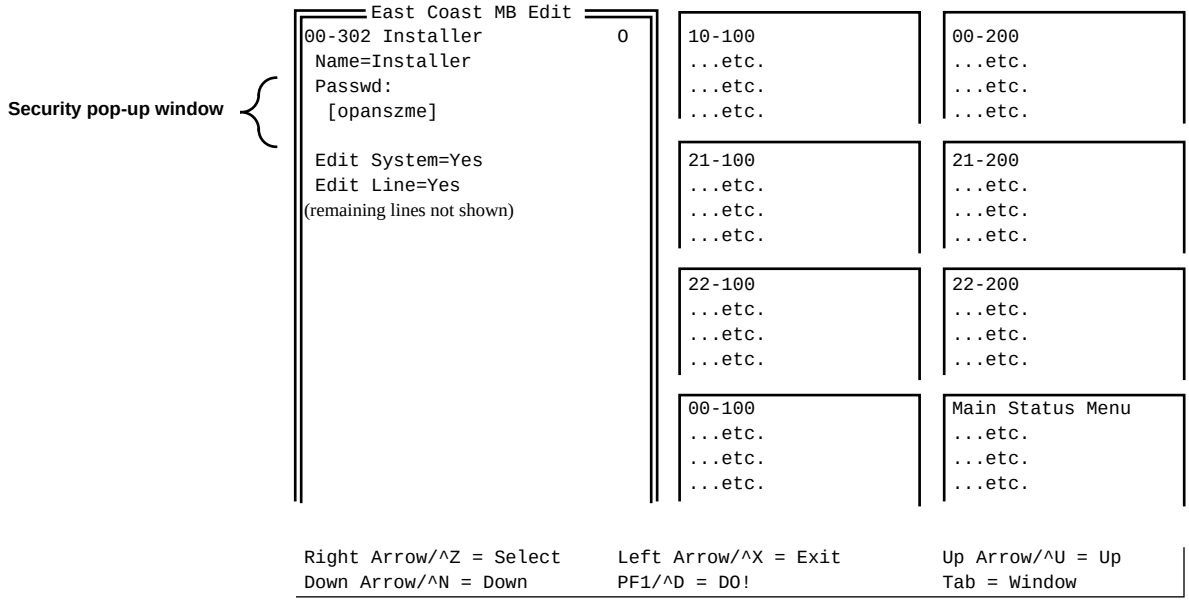
You can interact with only one display at a time. The display you are currently interacting with has thick double line borders on its left, right, and top sides. This display is called the ***current window***.

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:



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, T1/PRI line, or serial host:

  NOTE: SNMP management systems refer to the first digit X as the *SlotIndex* field.

  - 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 the Multiband Plus T1/PRI 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 T1/PRI-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 10-103.

A.5 Editing Parameters

Most keystrokes used by Multiband Plus T1/PRI follow normal conventions for editing parameter values. For a reference to these keystrokes, see the "User Interface Overview" 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 Chapter 5 for an illustration of where Multiband Plus T1/PRI's profiles are located within the general menu structure. This appendix also explains the structure of

menu numbers. Multiband Plus T1/PRI'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.

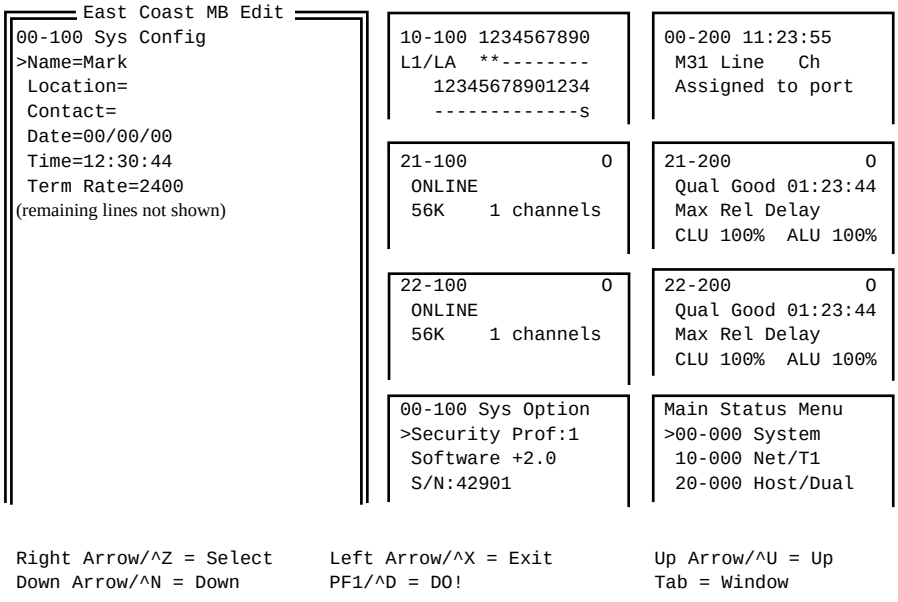
A.5.1 Editing an Enumerated Parameter

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.

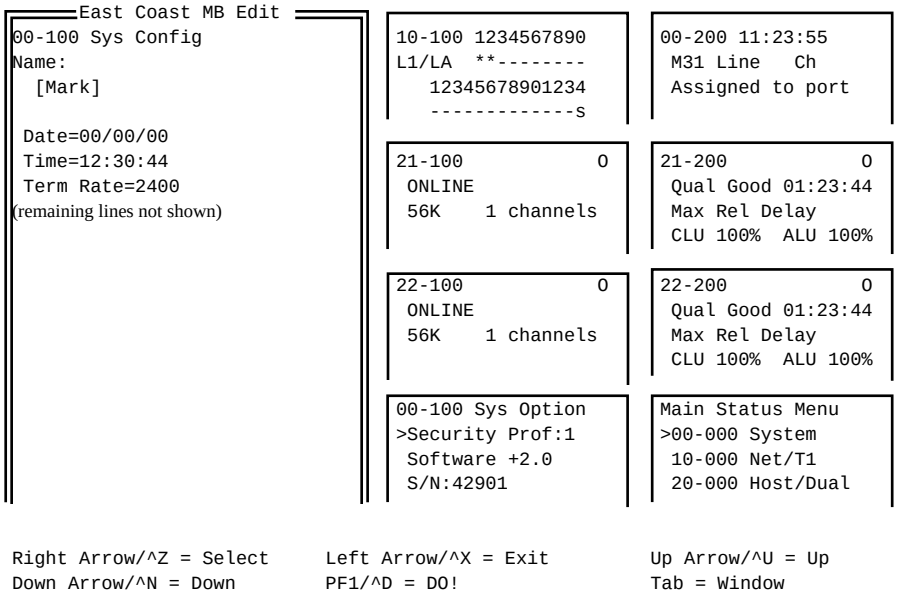
A.5.2 Opening a String Parameter for Editing

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

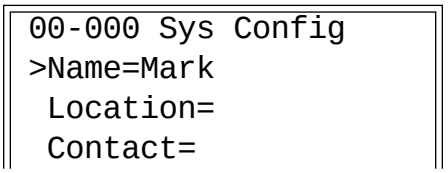
To enter a string value or to modify an existing value from the Control Monitor, you must first move the cursor to the parameter to be modified and open it by pressing the **Right-Arrow**, **^Z**, **Return**, or **Enter** key. In the following illustration, the cursor has been positioned to select the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



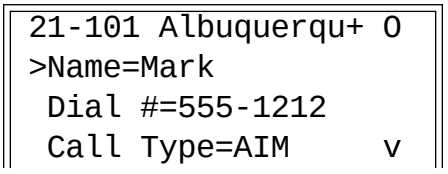
As soon as you begin to edit, a pop-up window appears showing the current parameter value within brackets. The following illustration shows **Name** being edited and its current value is *Mark.*



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



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:



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]
```

A.5.3 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.

A.5.4 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 T1/PRI 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**.

A.5.5 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 T1/PRI 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 T1/PRI 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
```

A.5.6 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.

A.5.7 Initial Call Profile Definition

Multiband Plus T1/PRI comes equipped with a factory-defined Call Profile that can be edited. This profile, called **`Factory`**, is the current Call Profile when you use Multiband

Plus T1/PRI 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

A.5.8 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.

A.5.9 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.

A.5.10 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 A.5.12.

A.5.11 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 T1/PRI 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.

A.5.12 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
```

A.5.13 Changing an Active Current Line Profile

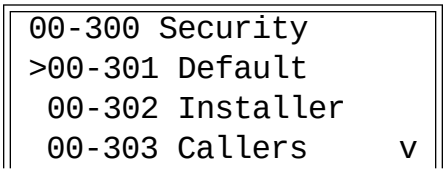
Line Profiles contain the parameters that configure the T1/PRI interface. The ***current Line Profile*** applies to the current T1/PRI interface, while the stored Line Profiles are kept for future use. A current Line Profile is said to be ***active*** when it carries a call.

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.

A.5.14 Security Profiles (Security Menu)

A Security Profile is a list of parameters that either allows or disallows a variety of user interface operations. A Security Profile becomes activated by the user entering the profile's assigned password.

Multiband Plus T1/PRI allows you to define nine Security Profiles. Selecting the Security option takes you to a list of nine Security Profiles:



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.

Appendix

B MIF

This appendix specifies the Machine Interface Format (MIF) for the following products:

- Multiband Plus, software release 4.4 (A subset of these parameters is available to software releases 3.4X.)
- MAX (Multiband MAX), software release 4.4 (A subset of these parameters is available to software releases 2.2X.)

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 identical 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 identical 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 (does not apply to Plus)
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 (does not apply to Plus)
FR	Frame Relay Profiles (does not apply to Plus)
HOST2	Host-Interface Profile for Host/Dual modules
HOST4	Host-Interface Profile for Host/Quad modules
HOST6	Host-Interface Profile for Host/6 modules
LMODEM	LAN Modem Profiles (does not apply to Plus)
LINE	Line Profiles
LOOP	Port Diagnostics (loopback) (MAX and Multiband Plus only)
PORT	Port Profile (MAX and Multiband Plus only)
ROUTE	Route Profiles (does not apply to Plus)
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 identical 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 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 in 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-25.

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 reserves the right to change MIF at any time without notice. Release Notes are available for each major release of software. Release 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)
  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> (continued)

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>

*s*00.BRIDGE.*n*.Enet Adrs=*12-digit hexadecimal string*
.Net Adrs=*dotted decimal format*
.Connection #=*2-digit decimal string*

Notes:

- does not apply to Multiband Plus

CONN = <type>

```
s00.CONN.n.Force 56=Yes/No (n=0)
          .Profile Reqd=Yes/No (n=0)
          .Assign Adrs=Yes/No (n=0)
          .Encaps...MPP=Yes/No  (n=0)
          .Encaps...PPP=Yes/No  (n=0)
          .Encaps...X25=Yes/No  (n=0)
          .Encaps...COMB=Yes/No  (n=0)
          .PPP options...Route IP=Yes/No (n=0)
          .PPP options...Bridge=Yes/No (n=0)
          .PPP options...Recv Auth=PAP/CHAP/None (n=0)
          .PPP options...MRU=number (n=0)
          .PPP options...LQM=Yes/No (n=0)
          .PPP options...LQM Min=number (n=0)
          .PPP options...LQM Max=number (n=0)
          .PPP options...Link Comp=Stac/None (n=0)
          .PPP options...VJ Comp=Yes/No (n=0)
          .PPP options...Dyn Alg=Constant/Linear/Quadratic (n=0)
          .PPP options...Sec History=number (n=0)
          .PPP options...Add Pers=number (n=0)
          .PPP options...Sub Pers=number (n=0)
          .PPP options...Max Ch Count=number (n=0)
          .PPP options...Target Util=number (n=0)
          .PPP options...Idle Pct=number (n=0)
          .COMB options...Password Reqd=Yes/No (n=0)
          .COMB options...Interval=number (n=0)
          .COMB options...Compression=Yes/No (n=0)

          .Station=text  (n=1 to 31)
          .Active=Yes/No  (n=1 to 31)
          .Encaps=MPP/PPP/X25/COMB/FR  (n=1 to 31)
          .PRI # Type=Unknown/Intl/National/Local/Abbrev (n=1 to 31)
          .Dial #=phone number (n=1 to 31)
          .Route IP=Yes/No (n=1 to 31)
          .Bridge=Yes/No (n=1 to 31)
          .Dial Brdcast=Yes/No (n=1 to 31)
          .Encaps options...Send Auth=PAP/CHAP/None (n=1 to 31)
          .Encaps options...Send PW=text (n=1 to 31)
          .Encaps options...Recv PW=text (n=1 to 31)
          .Encaps options...Base Ch Count=number (n=1 to 31)
          .Encaps options...Max Ch Count=number (n=1 to 31)
          .Encaps options...Inc Ch Count=number (n=1 to 31)
          .Encaps options...Dec Ch Count=number (n=1 to 31)
          .Encaps options...MRU=number (n=1 to 31)
          .Encaps options...LQM=Yes/No (n=1 to 31)
          .Encaps options...LQM Min=number (n=1 to 31)
          .Encaps options...LQM Max=number (n=1 to 31)
          .Encaps options...Link Comp=Stac/None (n=1 to 31)
          .Encaps options...VJ Comp=Yes/No (n=1 to 31)
         .Encaps options...Dyn Alg=Constant/Linear/Quadratic (n=1 to 31)
          .Encaps options...Sec History=number (n=1 to 31)
```

CONN = <type> (continued)

```
.Encaps options...Add Pers=number (n=1 to 31)
.Encaps options...Sub Pers=number (n=1 to 31)
.Encaps options...Target Util=number (n=1 to 31)
.Encaps options...Idle Pct=number (n=1 to 31)
.Encaps options...Password Reqd=Yes/No (n=1 to 31)
.Encaps options...Interval=number (n=1 to 31)
.Encaps options...Compression=Yes/No (n=1 to 31)
.Ip options...LAN Adrs=dotted decimal format/subnet mask
                       (n=1 to 31)
.Ip options...WAN Alias=dotted decimal format  (n=1 to 31)
.Ip options...Metric=number  (n=1 to 31)
.Ip options...Private=Yes/No  (n=1 to 31)
.Ip options...RIP=Off/Send/Recv/Both (n=1 to 31)
.Ipx options...Handle IPX=None/Client/Server (n=1 to 31)
.Ipx options...Netware t/o=number (n=1 to 31)

.Session options...RIP=Off/Send/Recv/Both (n=0)
.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)
.Session options...FR Direct=Yes/No (n=1 to 31)
.Session options...FR Prof=text (n=1 to 31)
.Session options...FR DLCI=number (n=1 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:

- does not apply to Multiband Plus

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:

- **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)
000.DIAG.0.UPD REM CFG=Yes (write only)
```

Notes:

The UPD REM CFG command does not apply to Plus.

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
- ***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* (T1/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 (T1/PRI only)
.Transit #=*number* (T1/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
- ***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> (continued)

- ***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

- **s00.DIAL.n.PRI # Type** is a T1/PRI parameter only
- **s00.DIAL.n.Bill** # is a T1/PRI parameter only
- **s00.DIAL.n.Call-by-Call** is a T1/PRI parameter only
- **s00.DIAL.n.Transit** # is a T1/PRI 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:

These commands apply only during certain conditions. For example, *spp*.DO.0.Hang Up applies only when the object specified has a call online, while *spp*.DO.0.Dial applies only to objects not having a call online. See **DO.**. in Chapter 6 for the applicability of these commands.

- ***spp*.DO...**(Multiband Plus)
  s = 2
  pp = 01 through last serial host port

- ***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 Ethernet-equipped Multiband Plus-T1/PRI and -E1/PRIs)

```
      300.ETHERNET.0.Ether options...IP Adrs=dotted decimal format/subnet mask
                    .Ether options...Def Rte=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
```

Notes:

- ***s*00.ETHERNET...** (MAX models)
  s = any slot into which the Ethernet expansion module is installed.

- ***s*00.ETHERNET...** (Multiband Plus-T1/PRI or -E1/PRI models)
  s = 3

FILT=<type>

*s*00.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*
.In Filter 01...Ip...TCP Estab=Yes/No
.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*
.Out Filter 01...Ip...TCP Estab=Yes/No
(.In/Out Filter 02... thru 12... same as .In/Out Filter 01...)

Notes:

- does not apply to Multiband Plus

FR = <type>

```
s00.FR.0.Name=text
        .Active=Yes/No
        .Active=Yes/No
        .Active=Yes/No
        .Active=Yes/No
        .Active=Yes/No
        .Active=Yes/No
        .Active=Yes/No
        .Active=Yes/No
        .Active=Yes/No
        .Active=Yes/No
        .Active=Yes/No
        .Active=Yes/No
        .Active=Yes/No
        .Active=Yes/No
        .Active=Yes/No
        .Active=Yes/No
```

Notes:

- does not apply to Multiband Plus

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/MIF

(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/MIF
                   .L Palmtop=Full/Restrict
                   .L Palmtop Port #=number
                   .L Palmtop Menus=Standard/Limited/MIF
                   .R Palmtop=Full/Restrict
                   .R Palmtop Port #=number
                   .R Palmtop Menus=Standard/Limited/MIF

(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
- ***s*00.HOST2...** (MAX)
  s = 2 or any slot in which a Host/Dual serial host expansion module is installed.
- ***s*00.HOST2...** (Multiband Plus)
  s = 2
- ***s*00.HOST4...** (Multiband Plus)
  s = 2
- ***s*00.HOST6...** (MAX)
  s = any slot in which a Host/6 serial host expansion module is installed.

LINE = <type>

```
For models that interface to T1/PRI lines:
        s00.LINE.n.Name=text
                  .2nd Line=Disabled/D&I/Trunk
                  .2nd Line=Yes/No (E1 Models only)
                  .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/NI-2
                  .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 models that interface to BRI lines:
        100.LINE.n.Name=text
                  .Switch Type=AT&T/NTI/NI1/FRANC/U.K./JAPAN/BELGI/AUSTR/SWISS/
                               GERMAN/DUTCH
                  .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 = <type> (continued)

```
For models that interface to BRI lines:
                (.Line 2... thru .Line 8... same as Line 1...)

For models that interface to Switched-56 lines:
        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 models that interface to E1/PRI lines:
        s00.LINE.n.Name=text
                 .Line 1...Sig Mode=ISDN/None/DPNSS
                 .Line 1...Switch Type=NTI/French/German/GloBanD/Net 5
                           /Australian/DASS 2/ISDX/ISLX/MERCURY
                 .Line 1...L2=A END/B END
                 .Line 1...L3=X END/Y END
                 .Line 1...NL Value=number
                 .Line 1...LoopAvoidance=number
                 .Line 1...Framing Mode=G.703/2DS
                 .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:

- ***s*00.LINE.*n*...** (MAX)
  s = 1 or any slot in which a WAN (line) module is installed.
  n = 0 through 3, where 0 is the current Line Profile.

- ***s*00.LINE.*n*...** (Multiband Plus)
  s = 1
  n = 0 through 3, where 0 is the current Line Profile.

Example:

```
            : LOAD 100.LINE.1
            :
```

LMODEM = <type>

```
(LAN does not apply to the Plus)
        s00.LMODEM.0.Module Name=text
                    .Ans 1#=phone number
                    .Ans 2#=phone number
                    .Ans 3#=phone number
                    .Ans 4#=phone number
```

Notes:

LOOP = <type>

```
s pp.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
- ***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>

```
s pp.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
- ***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>

*s*00.ROUTE.*n*.Name=*text*
.Active=Yes/No
.Dest=*text in dotted decimal format/subnet mask*
.Gateway=*text in dotted decimal format*
.Metric=*number*
.Private=Yes/No

Notes:

- does not apply to Multiband Plus

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
          .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 and E1/PRI models only:

```
        s00.STAT.0.Line 1 Stat=
                 0.Line 2 Stat=
                 0.Line Error=
                 n.FDL1=        (n = 0 thru 96) (FDL1 not apply to E1/PRI)
                 n.FDL2=        (n = 0 thru 96) (FDL2 not apply to E1/PRI)
                 0.Net Options=
```

(***s***=1 for 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=
                 0.Line Error=
                 0.Net Options=
```

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 module is installed in a MAX. ***pp***=01 through last serial host port)

For models with Ethernet interface:

```
        s00.STAT.0.Sessions=       (does not apply to Multiband Plus)
                 0.Routes=         (does not apply to Multiband Plus)
                 0.WAN Stat=       (does not apply to Multiband Plus)
                 0.Ether Stat=
                 0.Ether Opt=
                 0.Dyn Stat=
```

(***s***=3 for Multiband Plus. ***s***=slot of MAX in which the Ethernet module is installed.)

STAT = <type> (continued)

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
         .Palmtop Rate=300/1200/2400/4800/9600/19200/38400/57600
         .Console=Standard/Limited/MIF
         .Remote Mgmt=Yes/No
         .Parallel Dial=number
         .Single Answer=Yes/No (MAX and Multiband Plus only)
         .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
         .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)
         .Delay Dual=Yes/No (MAX and Multiband Plus 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:

- Remote Mgmt applies only to MAX and Multiband Plus
- Palmtop Rate applies only to MAX and Multiband Plus

Example:

```
: GET 000.SYS.0.Name
+ =kansas BRI
:
```

TRAP = <type>

*s*00.TRAP.*n*.Name=*text*
n.Alarm=Yes/No
n.Port=Yes/No
n.Security=Yes/No
n.Comm=*dotted decimal format*
n.Dest=*dotted decimal format*

Notes:

- applies to MAX equipped with the Ethernet module
- applies to Multiband Plus if equipped with Ethernet interface
- ***s*00.TRAP.*n*...**
  s = slot into which the Ethernet card is installed (MAX)
  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. An <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 previous command. Multi-line responses start each line with the output indicator.

- This indicator is used when the output is the result of an asynchronous 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. Previous 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 history, the next backward selection selects the newest line entered. When the newest entry is selected while walking forward through the line history, 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 (rightmost) 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.

Appendix

C Public Networks and WANs

Public networks, also known as ***carriers***, provide leased lines and switched services used in telecommunication circuits between distant devices. These circuits form the interconnecting data paths across WANs, teleconferencing networks, and other types of networks of digital equipment. To understand how Multiband Plus T1/PRI 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).

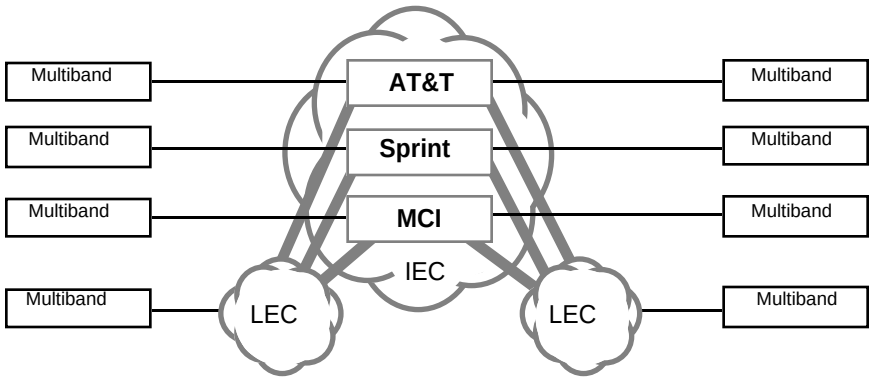
The IECs are companies like AT&T, MCI, and Sprint that offer long-distance voice and data services. Included in IEC offerings are high-speed digital data services between the calling party's network access point and the network access point at the receiving end; the network access point is known as the ***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 T1/PRI can connect to T1/PRI 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 T1/PRI connects only to T1 access lines or PRI (T1) access lines.

Appendix

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 count for all channels connected to a given serial host port is 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.

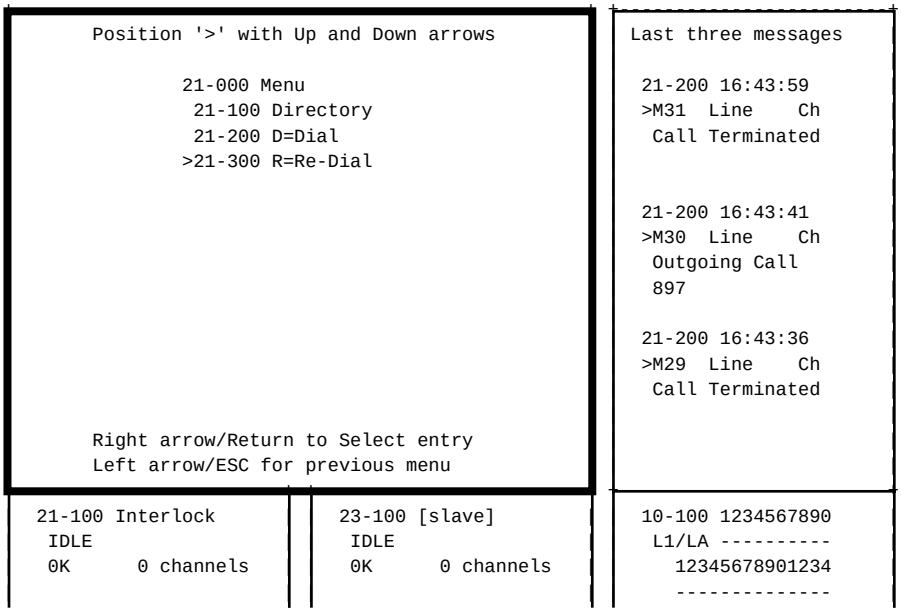
Appendix

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 T1/PRI'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 T1/PRI, or for entering or leaving the Simplified Menus, see the main chapters of this guide.

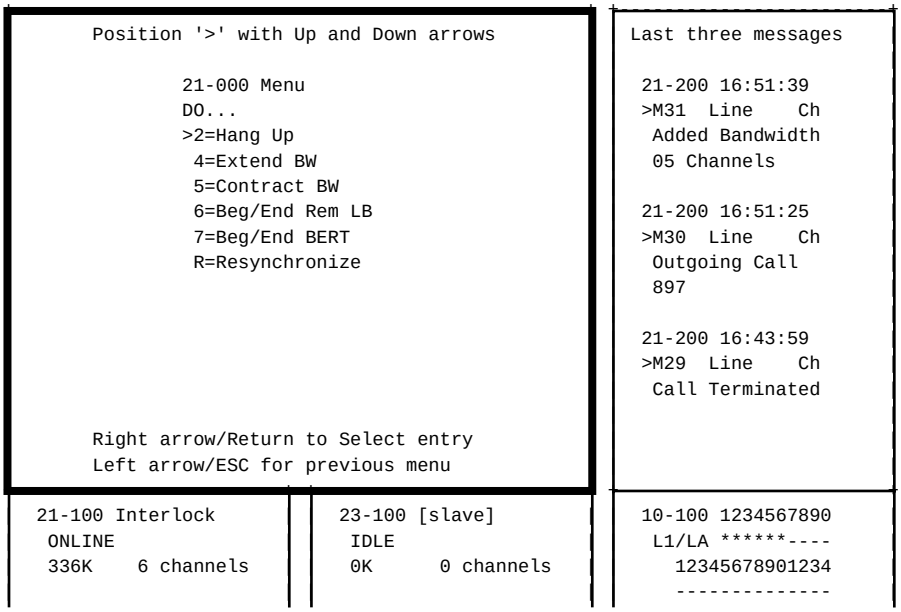
Simplified Menus are available only from a VT-100 terminal or PC with VT-100 emulation. When such a terminal controls Multiband Plus, this document refers to it as a ***Control Monitor***.

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:



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:



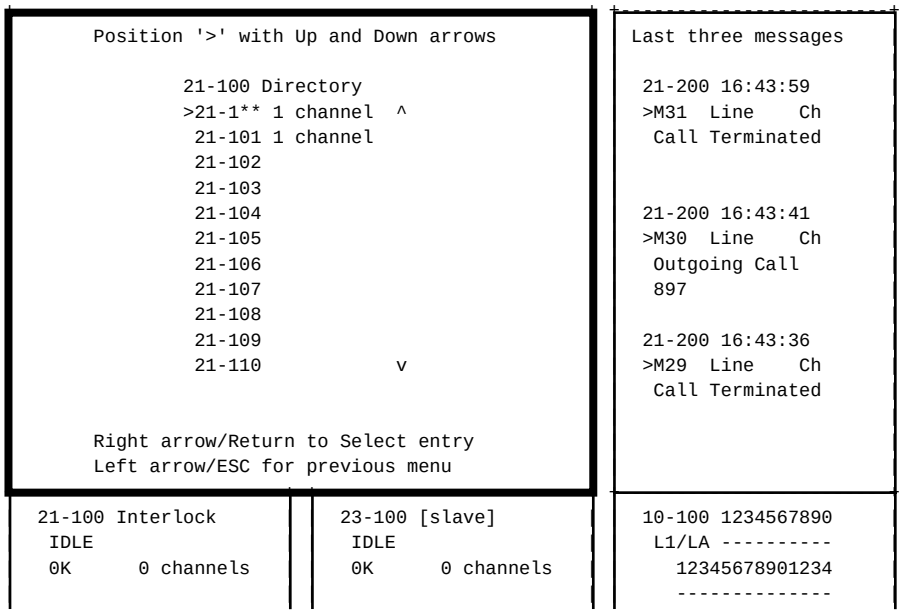
Selections and options appear only within the large square window. The windows on the right and bottom display status information.

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 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:



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**, and **Call-by-Call** 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

Command	Operation
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 disruptions 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**

⇒⇒ **Call-by-Call**

Appendix

F 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 multichannel calls 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 is assigned a unique dial number. In this example, each location's channels are provided by a T1/PRI 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

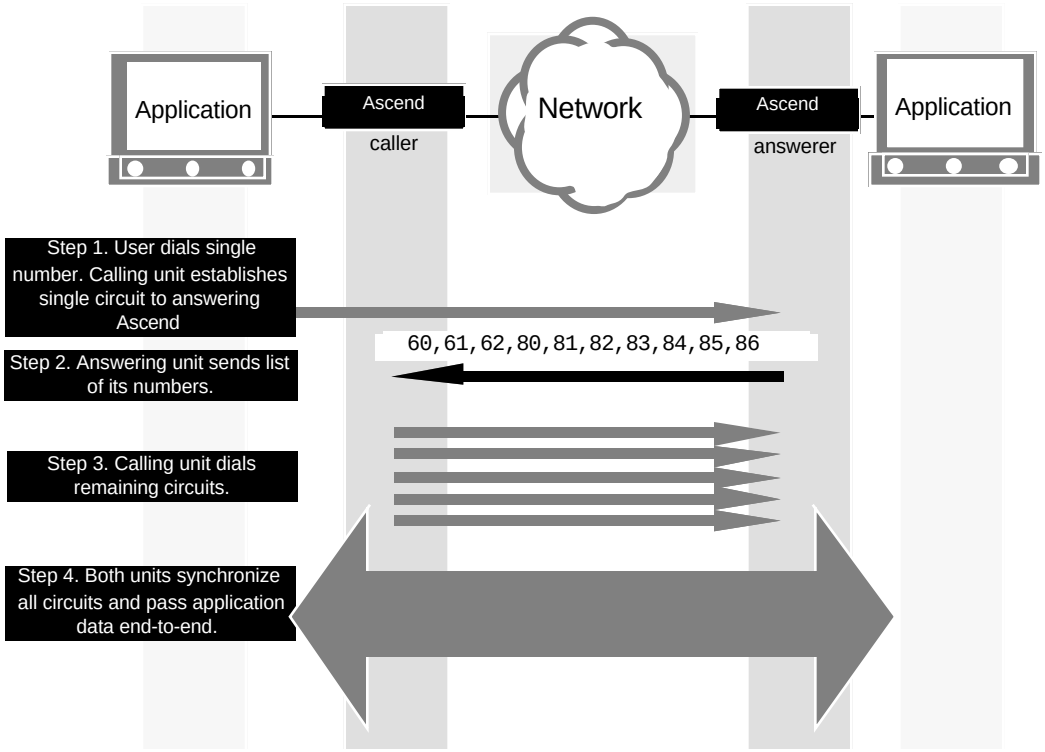
the differences will be seven digits, not two:

- 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.

Appendix

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 T1/PRI 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 T1/PRI'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
- Dialing 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 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 for 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 for 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
0	Voice	Voice
1	H11	1536K
3	H0	384K/H0
5	56 kbit/s	56K
6	64 kbit/s	64K
7	MultiRate	not currently supported by Multiband Plus

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 T1/PRI allows you to enable V.25 bis separately for each specific serial host port. (See the **Dial** and **Answer** Port Profile parameters.) Multiband Plus T1/PRI'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 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.

Appendix

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 bandwidth between serial hosts is also referred to as ***DBA*** (Dynamic Bandwidth Allocation).

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 between Serial Hosts 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.

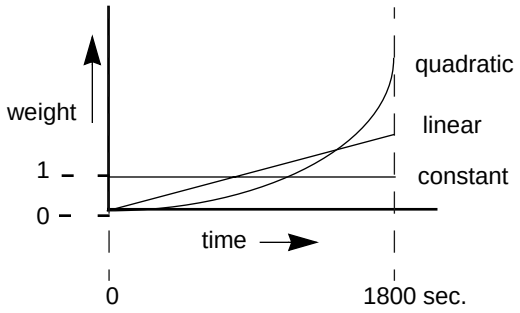
Linear Weighting
Dyn Alg=*Linear* weights the samples within the time window specified by the **Sec History** parameter in linear proportion to the start of the window.

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 graph 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::

$$Pw = \frac{\left(\sum_{t=1}^{S} Pt\right)}{S}$$

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:

$$Pw = \frac{\left(\sum_{t=1}^{S} (Pt)(S - Tt)^2\right)}{\left(\sum_{t=1}^{S} (S - Tt)^2\right)}$$

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 chan-

nels 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.

Appendix

I Call Routing

Multiband Plus T1/PRI 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 T1/PRI 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 T1/PRI channels uses first in dialing an outgoing call.

Note that drop-and-insert and PRI-to-T1 conversion bypass call routing. See the description of drop-and-insert in the "Reference to Edit Menus" chapter, under **2nd Line** when set to *D&I*. PRI-to-T1 conversion is described in the same chapter under **Sig Mode** when set to *PBX T1*.

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).

Ans Svc in the Line Profile
If the data service of the incoming call matches **Ans Svc** in the Line Profile of line #2 and line #2 has **Sig Mode** = *PBX T1*, the call is switched to line #2.

Ans # in the Line Profile
If the number dialed matches **Ans #** in the Line Profile of line #2 and line #2 has **Sig Mode** = *PBX T1*, the call is switched to line #2.

Ans # in the Port Profile
If the number dialed matches an **Ans *n*#** in a Port Profile, the incoming call is sent to that serial host port. (Note that for GloBanD calls, the number of the caller rather than the originator should match Ans #.)

> NOTE: In this appendix, the **Ans 1#**, **Ans 2#**, **Ans 3#**, and **Ans 4#** parameters in the Port Profile are referred to as **Ans *n*#** or simply as **Ans #**.

Ch *n* Prt/Grp in the Line Profile
Ch *n* Prt/Grp Line Profile parameters specify channel-by-channel and line-by-line the interfaces that receive incoming calls. Incoming calls that first connect to channel 1 of line #1 are received by the serial host port specified by **Ch 1 Prt/Grp** of line #1. Calls coming in on channel 2 of line #1 look to **Ch 2 Prt/Grp** of line #1, and so on.

First Available Serial Host Port
When none of the preceding criteria determine where to route an incoming call, the incoming call is 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, and clears any calls without specific routing.

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 is routed by the preceding criteria.

The following list gives the conditions under which Pipeline 100/400 cannot determine the routing of an incoming call based on an **Ans #** or **Ans Svc** parameter:

- **Ans #** does not match the dialed number or **Ans #** is blank.
- **Ans Svc** does not match the dialed service or **Ans Svc** is blank.
- Multiband Plus cannot determine the number dialed or service either because the WAN access type is not ISDN or the switch has not been set up to provide the called-party-number. The WAN access type at the calling end has no effect on routing.
- The call consists of some or all nailed-up channels, since no number is dialed.

The following gives the conditions under which Multiband Plus cannot determine the routing of an incoming call based on a **Ch *n* Slot** parameter.

- If the call arrives on a channel with **Ch *n* Slot** 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.

Incoming call routing has additional variations when trunk groups are enabled. See **Use Trunk Grps** in Chapter 6 and sections 3.17, and 3.18.

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 sometimes 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.

If **Use Trnk Grps** = *Yes*, both channels of the call must be in the same trunk group.

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 an 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 calls are 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:

- **Ch *n* Trnk Grp** Line Profile parameters (trunk group) specify the dialing prefix associated with each channel. Calls placed from a serial host port whose **Dial #** starts with a matching prefix use these channels only for outbound dialing. The following parameters can be used in addition to trunk groups or by themselves.

- **Ch *n* Prt/Grp** Line Profile parameters specify serial host ports that use these channels before any others for outbound dialing. (If channels assigned to this host port are unavailable, unassigned channels can be used to place the call, but channels assigned to other host ports cannot be used.)

  Channels whose **Ch *n* Prt/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.

Outgoing call routing has additional variations when trunk groups are enabled. See **Use Trunk Grps** in Chapter 6 and sections 3.17, and 3.18.

Multiband Plus uses special criteria when routing a PRI GloBanD, MultiRate, or H0 384 kbit/s call, as described in the following section.

I.3.1 Outbound PRI GloBanD, MultiRate, and H0 384 kbit/s Calls

A GloBanD, MultiRate, or H0 384 kbit/s call is treated as six calls over contiguous channels within the switched WAN. To place such a call, six consecutive channels must be available. Specifically, six consecutive channels 1-6, 7-12, or 13-18, or 19-24 (if NFAS line without a D Channel) must be available. In addition, channel 1, 7, or 13, or 19 (if

NFAS line) must be either assigned to the port making the call by **Ch *n* Prt/Grp** Line Profile parameters or unassigned to any port. If both these criteria are met, the call is placed.

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.

Example: Inverse Multiplexed Call Received at a PRI Interface with Hunt Groups
The carrier has provisioned the ISDN interface in a hunt group associated with four phone numbers: *555-1212*, *555-1213*, *555-1214*, and *555-1215*. Each of these numbers can dial any B channel on any line connected to the WAN interface.

To route an incoming call by called-party number to port #1 by called-party number, follow these steps:

1 Assign *555-1212* to **Ans 1#** of port #1. Similarly, assign *555-1213*, *555-1214*, and *555-1215* to ports #2, #3, and #4 respectively.

2 Configure the **Ch *n* #** Line Profile parameter for all channels as blank, the default value. In this way, whatever phone number was used to make the initial connection will be redialed whenever channels are added.

3 Set **Excl Routing**=*Yes*.

When an incoming call is dialed using the phone number *555-1212*, the call is routed as follows:

1 The switch makes the first connection over any one of the channels provisioned for *555-1212*. The switch also provides the called-party number to Multiband Plus, which uses it to route the incoming call.

2 The first B channel connected is routed to port #1. The line status menus show which channel makes the initial connection.

3 Additional channels are also dialed to 555-1212 and are routed to port #1.

Example: Dual-Port Call Received at a PRI Interface
You can configure Multiband Plus to route both incoming dual-port and inverse-multiplexed calls. The carrier has provisioned the WAN with the same hunt groups as in the previous example.

1 Assign *555-1212* to **Ans 1#** of port #1.

2 Configure the **Dual Ports** Host-Interface Profile parameter for *All Dual*. This pairs port #1 with #3 and #2 with #4, where #1 and #2 are primary ports and #3 and #4 are their secondary ports.

When an incoming dual-port call is dialed using the phone number *555-1212*, the call is routed as follows:

1 The switch makes the first connection over any B-Channel in the hunt group since all are provisioned for *555-1212*. The switch also provides the called-party number to Multiband Plus, which uses it to route the incoming call.

2 The first B channel connected is routed to port #1. The line status menus show which channel makes the initial connection.

3 The second B channel is routed to port #3, as configured in the Host-Interface Profile.

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 **Ch *n* Prt/Grp** parameters.

Although it is possible to use this type of routing when receiving calls over an ISDN interface, the preferred method is by called-party number, as described in section I.5.1.

Example: Inverse Multiplexed Call Received at a WAN Interface with No Hunt Groups
The carrier has provisioned the T1/PRI interface with one phone number per channel: *555-1212*, *555-1213*, *555-1214*, *555-1215*, and so forth sequentially. 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 channel 1 of line #1 and the other phone numbers connect to the remaining channels and lines in sequential order.

To route an incoming call to channel to port #1 follow these steps:

1 Configure **Ch *n* #** Line Profile parameter for each phone number associated with each channel.

2 Assign channel 1 of line #1 to port #1 by setting the **Line 1...Ch 1 Prt/Grp** Line Profile parameter to *1*. Do not assign any other channels to this port. Assign the remaining channels to other host ports or leave them unassigned by accepting the default **Ch *n* Prt/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 channel 1 of line #1, since it is provisioned for *555-1212*.

2 Since the call arrives on channel 1 of line #1 it is routed to port #1.

3 Additional channels in the inverse multiplexed Mode 1 call arrive (during handshaking) on channels that are unassigned to any port, and are also connected by Multiband Plus to port #1.

Example: Inverse Multiplexed Call Received at a T1/PRI Interface with Hunt Groups
The carrier has provisioned the T1/PRI interface with two phone numbers: *555-1212* and *555-1213*. Each of these numbers is associated with 4 channels; that is, each of these numbers is part of a hunt group. The phone number *555-1212* connects to the hunt group of channels 1-4 of line #1, and *555-121*3 is associated with channels 5-8 of line #1.

To route incoming inverse multiplexed calls dialing *555-1212* to serial host ports #1 and calls dialing *555-1212* to port #2), follow these steps:

1 Configure the Line Profile so that channels 1-4 and 5-8 are assigned channels to ports #1 and #2, respectively.

Network Interface Channels	Ch *n* #	Ch *n* Prt/ Grp
Line 1...Ch 1-4	555-1212	1
Line 1...Ch 5-8	555-1213	2

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 one of the channels provisioned for *555-1212*.

2 The first channel connected is routed to port #1. By viewing the Line Status menus, you can see which channel makes the initial connection.

3 Additional channels, selected from those channels in the Line Profile whose **Ch *n* Prt/Grp** Line Profile parameter is assigned to port #1, are routed to port #1.

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Multiband Plus T1/PRI
Quick Start Guide

ASCEND COMMUNICATIONS, INC.

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Trademarks:

Ascend is a registered trademark of Ascend Communications, Inc.
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FCC Registration numbers: See label on unit
Ringer Equivalence number (REN): 0.0A
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Approvals:

UL listed to UL 1950
CSA - C22.2 NO. 950-M89

C Contents Road Map

Starting from the top, the normal process for configuring and operating your Multiband Plus-T1/PRI follows:

1 Get acquainted.

→ Preview *Multiband Plus T1/PRI Quick Start Guide*.

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

2 Do I have enough information?

What do I ask/tell my WAN provider? → See Chapter 4, sections 4.4.1, 4.4.4, 4.4.5, 4.4.6.

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

3 Complete *Multiband Plus T1/PRI 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.

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 and defaults, see the tables in Chapter 5.

6 Configure Multiband Plus for serial data applications, including videoconferencing.

Single Channel and Dual Channel Call. → See Chapter 3, sections 3.7 and 3.8.

X.21, RS-366, or V.25 bis. → See Chapter 3, sections 3.9 through 3.11 and the "RS-366, V.25 bis, X.21, Lead Dialing" appendix.

Multichannel / Inverse Multiplexing. → See Chapter 3, sections 3.12, 3.13 (Backup-and-overflow of nailed-up circuits), 3.14 (DBA), 3.21 (GloBanD), and the "Inverse-Multiplexing" and "Controlling Dynamic Bandwidth" appendicies.

7 Configure Multiband Plus's system features.

Incoming/Outgoing Call Routing. → See Chapter 3, section 3.6 and the "Call Routing" appendix. See also 3.17 and 3.18 (multiple carriers).

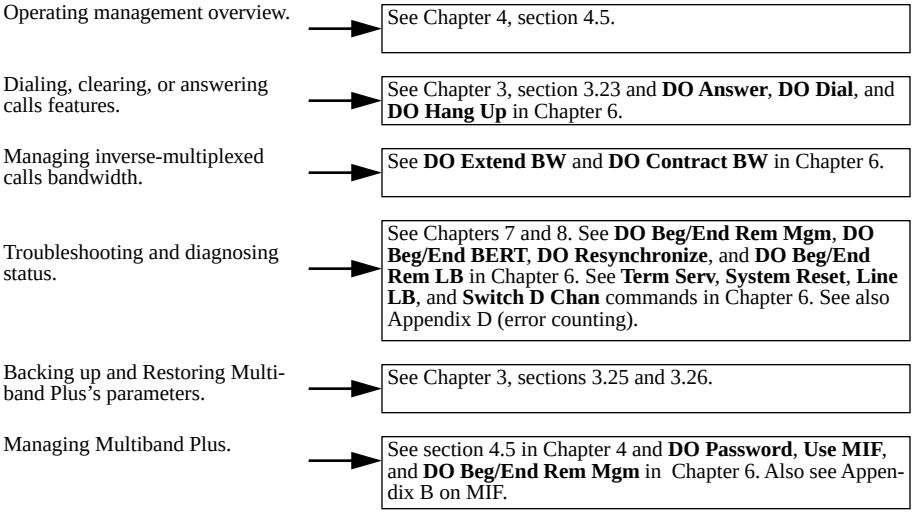
Ethernet Interface, if installed. → See Chapter 3, sections 3.2 and 3.3 (routing TELNET and SNMP packets),

Local and Remote Management (SNMP , Syslog require Ethernet). → See Chapter 4, section 4.1 Chapter 3, sections 3.4 (Syslog), 3.5 (SNMP), 3.22 (CDR), and Appendix B (MIF).

Miscellaneous Features. → See Chapter 3, sections 3.15 (drop-and-insert), 3.16 (T1-PBX support), 3.19 (NFAS), 3.20 (calling limits).

Operator Security. → See Chapter 3, section 3.24.

8 Operating Multiband Plus can include the following tasks.



Multiband Plus T1/PRI
Step-by-Step Quick Start

Begin here to learn the basics of Multiband Plus T1/PRI.

- **Absolutely Important Information**

  Answering the questions on page 2 through page 6 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 T1/PRI**

  You perform a simplified configuration of the unit — enough to ensure that the Multiband Plus T1/PRI is fully functional and that the T1 and Ethernet (if installed) interfaces are active and connected.

- **Testing the Connections**

  This section takes you through simple tests of the connections the T1 lines and the Ethernet LAN.

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 (T1/PRI) managers
- the WAN (T1/PRI) provider, typically a telephone company
- The *Multiband Plus T1/PRI User Documentation Guide*

  Chapter 5 "Multiband Plus T1/PRI Parameters"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 T1/PRI lines as well as how the WAN provider should provision them.

Setup Requirements

A suitable place to install Multiband Plus where it can connect to the WAN and LAN

Circle one:
Yes / No

One or more active and installed T1 lines accessible from the unit that provide switched data service on at least two channels

Circle one:
Yes / No

NOTE: Quick Start tests Multiband Plus by calling itself — using one channel to dial out and another channel to answer as in the following illustration. Note: This requires that the T1/PRI line is set for bidirectional calling.

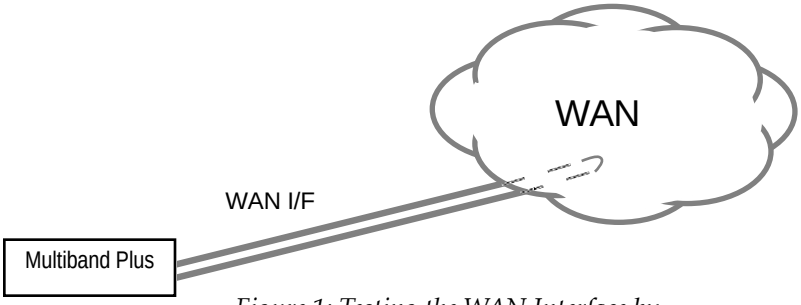


Figure 1: Testing the WAN Interface by Placing a Call to Yourself

If your unit has the optional Ethernet interface — An active Ethernet LAN with appropriate cables and connectors

Circle one:
Yes / No

A local host or workstation that can TELNET or PING Multiband Plus

Circle one:
Yes / No

NOTE: The following illustration shows how Quick Start tests the Ethernet Interface of your Multiband Plus T1/PRI by PINGing or TELNETing to your Multiband Plus T1/PRI from a station on the same LAN.

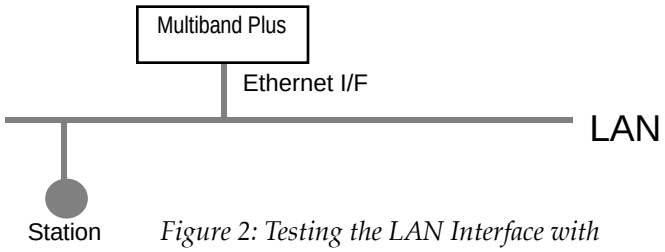


Figure 2: Testing the LAN Interface with TELNET or PING

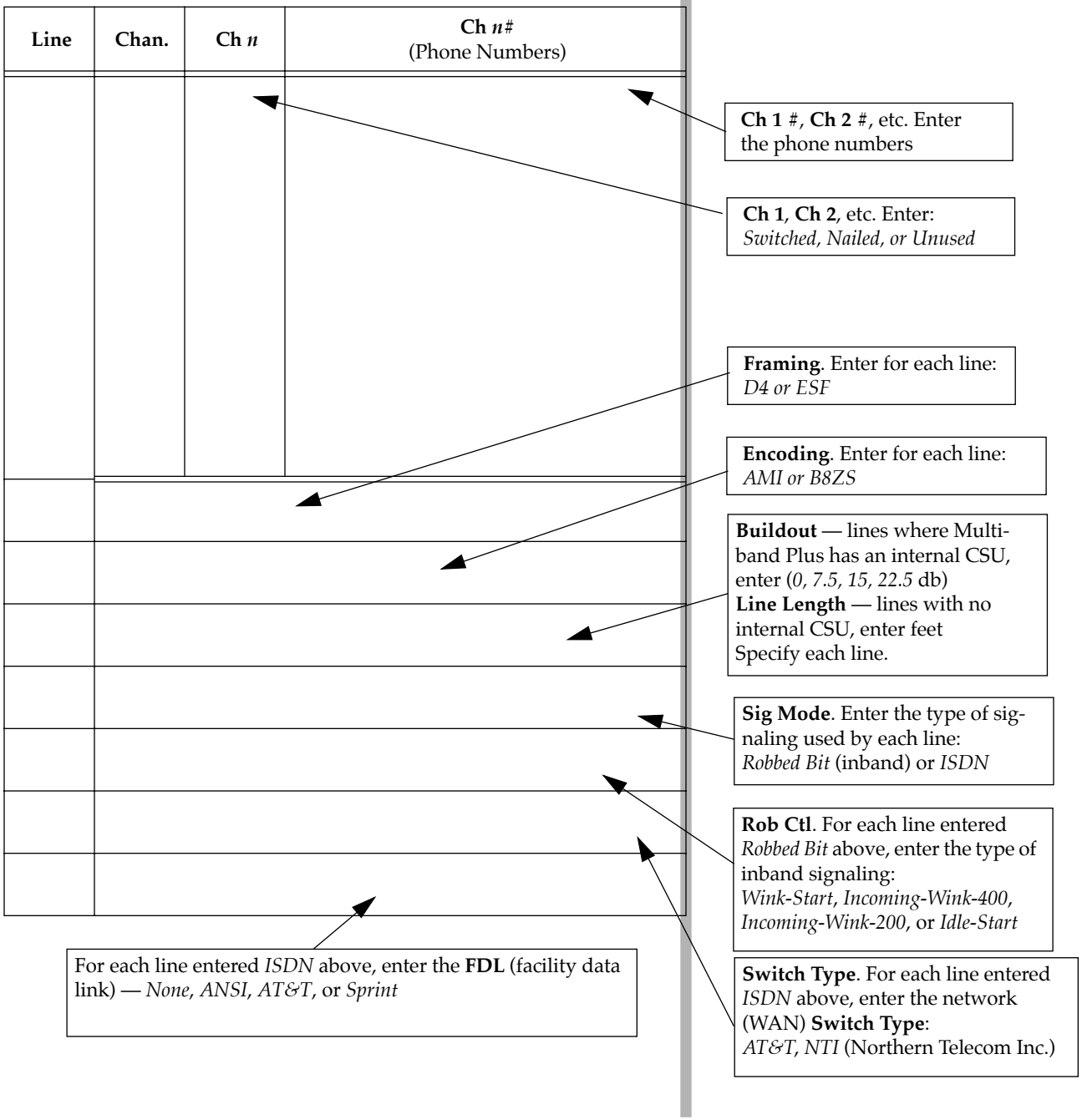
Configuration Data

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 parameter listed in the Chapter 6 of the *Multiband Plus T1/PRI User Documentation Guide*.

Line Profile Parameters (Line Config Menu)

Enter for each channel of each installed line, the phone number used to reach your Multiband Plus through that channel (**Ch *n* #** parameter) and whether that channel is switched, nailed (leased) or unused (**Ch *n*** parameter). Note that the phone numbers entered are the ones used to call this Multiband Plus, not those used to dial out. Also enter any other parameters required in the following table:

A list of all channels is not essential for Quick Start, but might be needed by some applications. The self-call test in these procedures requires two switched channels.



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. In addition, if the line is ISDN, enter the call-by-call service (***Call-by-Call***) and the type of dialing plan (***Pri # Type***) used to dial out.

Call-by-Call *requests certain WAN services from your T1/PRI provider at the time you make a call. Each service is represented by a numerical value from 0 to 31.*

Enter **Dial#** used to call Multiband Plus's second switched channel
_____

Call-by-Call, if ISDN (Note, for Sprint and MCI installations enter *0*, unless otherwise specified:
_____

PRI # Type, if ISDN, Circle One:
National, *Unknown*, *Local*, or *Abbreviated*

Skip the remaining steps if your Multiband Plus is not equipped with an Ethernet interface.

Ethernet Profile Parameters (Mod Config Menu)

Circle the type of Ethernet interface (***Ethernet IF***). *Coax* (coaxial) or *UTP* (unshielded twisted pair).

Circle one:
Coax / *UTP*

Enter the IP address (***IP Adrs***) of Multiband Plus's interface to the local LAN and the LAN's subnet mask. Use the dotted-decimal format for the IP address separated by a slash from the number of bits in the netmask.

If you simply enter an IP address, Multiband Plus enters the default netmask for your network type (A, B, or C).

Enter your IP and /netmask bits:
_____/_____

The remaining steps are not used by Quick Start, but often are required in complete installations.

Does your Multiband Plus use RIP across the Ethernet interface to receive updates to its routing table? (**RIP** in the Mod Config menu)

Circle one:
Recv / *Off*

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 T1/PRI User Documentation Guide*.

NOTE: Quick Start documents Multiband Plus T1/PRI running at software revision 4.4. 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

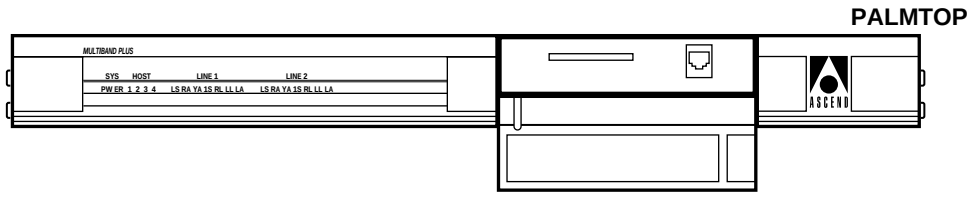
1 Unpack the equipment.

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.

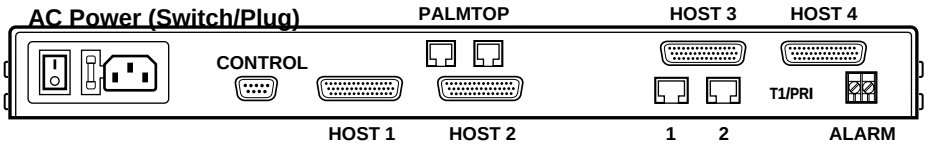
3 Physically install Multiband Plus. If rack-mounted, retain a one-unit (approximately 1 inch) air gap for cooling between Multiband Plus and any other devices mounted above.

4 Plug in the Palmtop and/or VT-100 terminal (or PC with terminal emulator) into the **Palmtop** and/or **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.



Front Panel



Back Panel

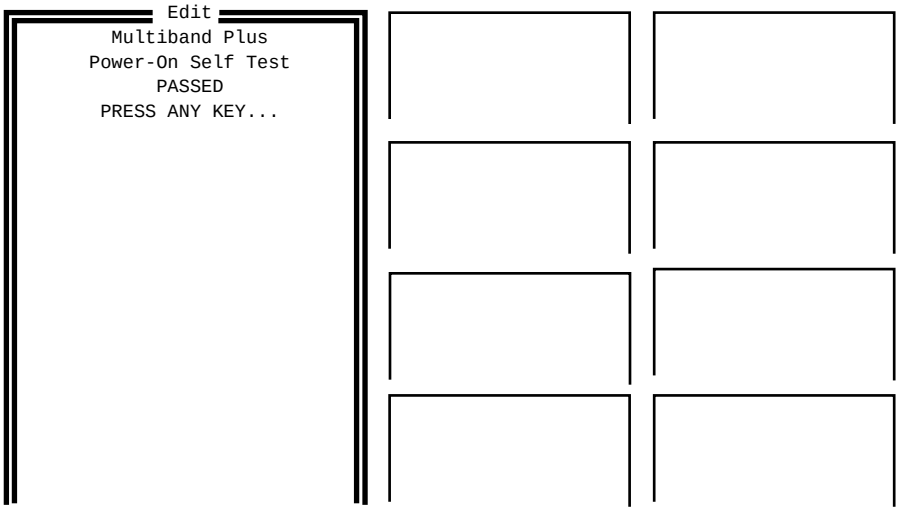
Figure 3: Front and Back Panels of Multiband Plus T1/PRI

5 Plug in AC Power and then press AC Power switch to ON position. The *power on self test* (POST) should begin immediately 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 running. Continue with the next step.
If NO: Report failure to vendor**.**

Multiband Plus generates a message log at the conclusion of POST. Among these messages "Ethernet is Up" indicates the proper connection to an Ethernet LAN, but does not check Ethernet activity. See ***Message Log*** *in the Multiband Plus T1/PRI User Documentation Guide.*



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.

To refresh the VT-100 (or VT-100 emulator) display, type Ctrl-L.

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...
```

Before you can place an actual call, you must first edit the line configuration.

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/T1
 20-000 Host/...
```

Note: 30-000 Ethernet might also be present

Making the Physical Connections

Once the Multiband Plus T1/PRI is powered up, it's ready to be connected to its lines and to the Ethernet LAN. If you don't have the Ethernet option, skip this procedure and continue with "Connecting to the T1/PRI Line" immediately below.

Ethernet connectivity is optional and might not be present.

Connecting to the Ethernet LAN

1 Connect to the local Ethernet LAN using the appropriate Ethernet connector and port in the back of the Multiband Plus T1/PRI. Later sections describe how to configure this interface to and make it operational.

Connecting to Ethernet is described in details in Chapter 4 of the Multiband Plus T1/PRI User Documentation Guide.

Connecting to the T1/PRI Line

1 If Multiband Plus replaces other equipment directly connected to the T1/PRI demarcation point, inform the T1/PRI provider that you are disconnecting your network (T1/PRI) interface equipment and you will inform them when reconnected.

The demarcation point is where the T1/PRI line's metallic interface connects to customer equipment. To connect to the demarcation point, Multiband Plus's T1/PRI port(s) must be equipped with internal CSU(s); otherwise external CSU(s) or other network (WAN) interface equipment must be installed between Multiband Plus and the demarcation point.

2 Connect Multiband Plus either directly to the T1/PRI line or through other network (T1/PRI) interface equipment as shown in the figure below. Connect line #1 first, and then line #2, if provided.

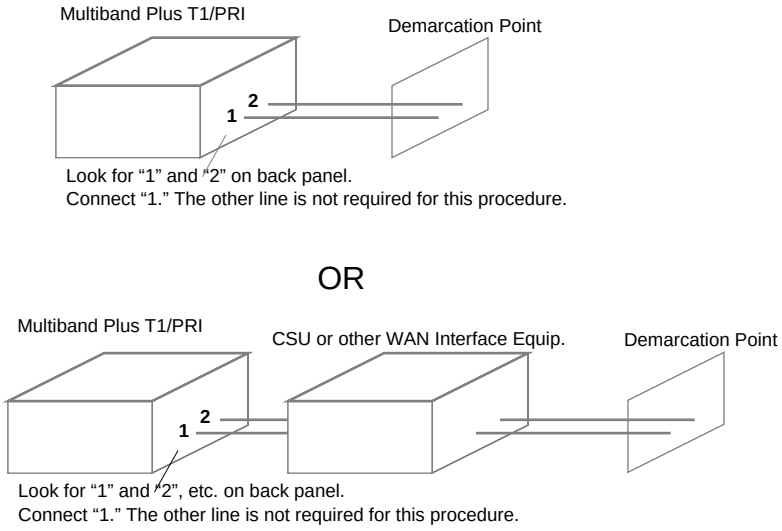


Figure 4: T1/PRI Network (WAN) Interface Wiring

3 Inform the T1/PRI line provider that your T1/PRI network interface equipment is connected and that they should bring up the line(s) (restore service).

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 T1/PRI User Documentation Guide*.

Getting Around the Menus

If you are already familiar with getting around the Multiband 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.

A thorough discussion of using the Control Interface is found in the Multiband Plus T1/PRI User Documentation Guide.

1 The Up- and Down-Arrow keys move up and down within a menu or submenu.

Alternatively you can use Control key combinations: Up=Ctrl-U, Down=Ctrl-N, Left=Ctrl-X, Right=Ctrl-Z.

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/T1
 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.

*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.*

From the ***Main Edit Menu***, select the ***Net/T1*** menu:

```
10-000 Net/T1
>10-100 Line Config
 10-200 Line Diag
```

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 ***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 T1/PRI lines. Since more than one such line can interface to Multiband Plus, it includes parameters such as *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, "T1/PRI 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=T1/PRI Profile
 2nd Line=Disabled
 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..`*** causes the following ***`Line 1...`*** submenu to appear. Do not change any parameters.

```
Line 1...
>Sig Mode=Inband
 Rob Ctl=Wink-Start
 Switch Type=N/A
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 "T1/PRI 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 T1/PRI!

Section 3. Configuring the Multiband Plus T1/PRI

The following configuration establishes enough functionality to verify that Multiband Plus is up and running, connected, and can perform basic functions.

Quick Start configuration involves modifying the following:

- Line Profile

  Parameters that apply to the T1/PRI lines

- Ethernet Profile

  Parameters that apply to this unit's Ethernet address and protocols

- Call Profile

  Parameters that apply to the establishment of a WAN link that provides a point-to-point circuit between synchronous serial devices

This procedure assumes you have not yet configured Multiband Plus; therefore, all parameters initially are at their factory 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 in this section.

1 From the Main Edit Menu, select ***10-000 Net/T1*** menu as shown below.

```
Main Edit Menu    ??
 00-000 System
>10-000 Net/T1
 20-000 Host/...
```

Note: remaining lines not shown

The flashing?? that might appear in the upper right-hand corner of the screen indicates no link to the T1/PRI line and should be disregarded at this time.

The following submenus appear:

```
10-000 Net/T1
>10-100 Line Config
 10-200 Line Diag
```

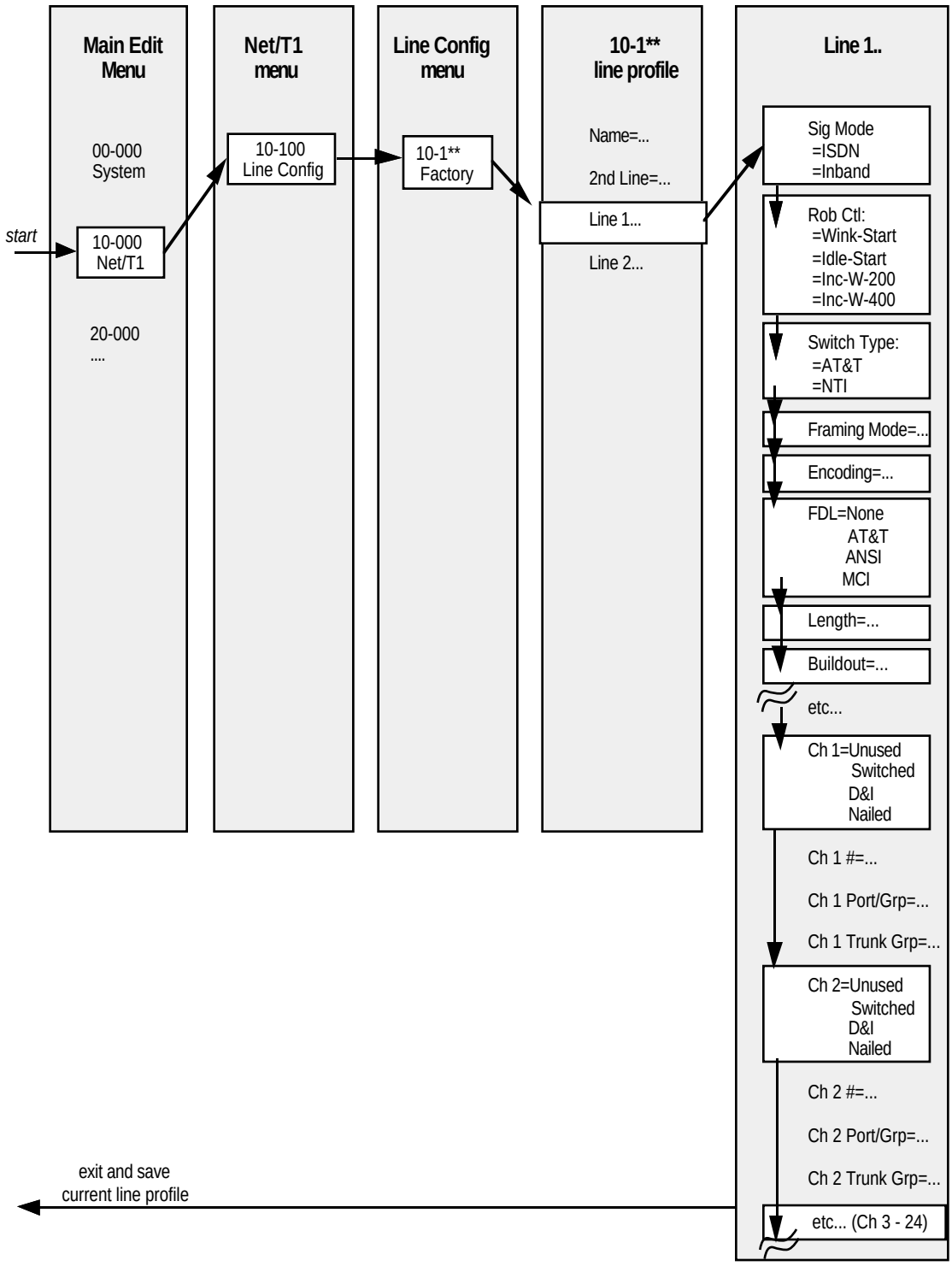


Figure 5: The Parameters Involved in the Configuration of T1/PRI Line #1 for a Test Call

2 Select ***10-100 Line Config***. The following Line Profiles appear:

```
10-100 Line Config
>10-1** Factory
 10-101
 10-102
 10-103
```

3 Select the currently active Line Profile, ***10-1** Factory***. The following parameters and submenus appear:

```
10-1** Factory
>Name=Factory
 2nd Line=Disabled
 Line 1...
 Line 2...
```

*The **Factory** Line Profile is the factory-installed default profile which appears on all newly installed units. You can edit the parameter values of **Factory**. The unedited parameter values of Factory are called the default parameter values.*

4 Select ***Line 1.*** The following list of parameters appears.

```
Line 1..
>Sig Mode=Inband
 Rob Ctl=Wink-Start
 NFAS ID num=N/A
Note: remaining lines not shown
```

5 Select and edit the following Line 1 parameters:

- ***Sig Mode***
  √ **Check:** Does the T1/PRI line(s) use ISDN or inband signaling?
  If ISDN: Press Right-Arrow to select Sig Mode=ISDN.
  If Inband: The default. Continue with the next step.
- ***Rob Ctl***
  √ **Check**: If you selected *Inband* above, select the type of robbed bit control (inband signaling).
  If N/A: This parameter is not applicable whenever the ***Sig Mode=ISDN***.
  If Wink-Start: Wink-Start is the factory default. Continue with next step.
  If Idle-Start: Press Right-Arrow to select Idle-Start.
  If Inc-W-200 msec: Press Right-Arrow twice to select Incoming-Wink (200 msec).

***Refer to page 5** for the value of the following parameters.*

Parameters can have enumerated values or string values. If the cursor (>) points to an enumerated parameter, pressing Right-Arrow toggles though the list of values for that parameter. If the cursor points to a string parameter, pressing Right-Arrow puts you in the edit mode, where you type in the characters that make up the parameter value.

If Inc-W-400 msec: Press Right-Arrow three times to select Incoming-Wink (400 msec).

```
 Name=Factory
 Sig Mode=Inband
>Rob Ctl=Wink-Start
 NFAS ID num=N/A
```
Note: remaining lines not shown

- ***Switch Type***
  √ **Check**: If you selected *ISDN* above, select the type of WAN switch at the lines' point-of-presence.
  If N/A: This parameter is not applicable whenever ***Sig Mode=Inband***.
  If AT&T: AT&T is the default. Continue with the next step.
  If NTI: Press Right-Arrow to select NTI (Northern Telecom Inc.).
  If GloBanD: Press Right-Arrow twice to select GloBanD.

```
 Name=Factory
 Sig Mode=ISDN
 Rob Ctl=N/A
 NFAS ID Num=N/A
>Switch Type=AT&T
```
Note: remaining lines not shown

- ***Framing Mode***
  √ **Check:** Is the T1/PRI line D4 or ESF framed?
  If D4: D4 is the factory default setting. Continue with the next step.
  If ESF: Press Right-Arrow to change the Framing to ESF.

```
Line 1..
>Framing Mode=D4
 Encoding=AMI
 FDL=None
```
Note: remaining lines not shown

- ***Encoding***
  √ **Check:** Is the T1/PRI line AMI or B8ZS encoded?
  If AMI: AMI is the factory default setting. Continue with the next step.

If B8ZS: Press Right-Arrow to change Encoding to B8ZS.

```
Line 1..
 Framing Mode=D4
>Encoding=AMI
 FDL=N/A
Note: remaining lines not shown
```

- ***FDL***
  √ **Check**: What type of FDL (Facility Data Link) does the line use?
  If N/A: This parameter is not applicable whenever the ***Framing Mode=D4***.
  If None: None is the default. Continue with the next step.
  If AT&T: Press Right-Arrow to select AT&T.
  If ANSI: Press Right-Arrow twice to select ANSI.
  If Sprint: Press Right-Arrow three times to select Sprint.

```
Line 1..
 Framing Mode=D4
 Encoding=AMI
>FDL=None
Note: remaining lines not shown
```

Length *refers to the cable distance between Multiband Plus and the WAN interface equipment.*

- ***Length***
  If N/A: (not applicable) Continue with the next step
  If xxx-xxx: Press Right-Arrow until you have Length set to the correct cable distance in feet between Multiband Plus and the CSU or other network (WAN) interface unit to which it is connected. The default is ***1-133***.

```
Line 1..
 FDL=N/A
>Length=1-133
 Buildout=N/A
Note: remaining lines not shown
```

- ***Buildout***
  If N/A: Continue with the next step.
  If xxx db: Press Right-Arrow until you have the

Buildout set to the proper line attenuation. The default is ***0db.***

```
Line 1..
 FDL=None
 Length=N/A
>Buildout=7.5 db
```
Note: remaining lines not shown

- ***Ch 1, Ch 2, Ch 3,...***
  √ **Check**: Is channel 1, 2, etc. switched, dedicated (nailed), or not in service (unused)?
  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 the above **until you have configured all channels**.

*For the purpose of the self-call test later in Quick Start, you need to have **two switched channels**.*

*If you plan to use a channel for drop-and-insert (**D&I**), you can enter it as **Switched** for Quick Start and then change it to D&I for the final installation.*

6 Press Left-Arrow *twice* to exit the current Line Profile.

7 In the Confirmation menu, press 2 to save and exit.

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

8 √ **Check**: For Line 1, is PW on, ER off, LS off, RA off, YA off, 1S off, RL off, LL off, LA on?

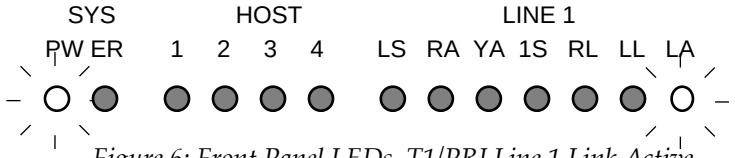


Figure 6: Front Panel LEDs, T1/PRI Line 1 Link Active

If YES: Continue with the next step.
If NO: Connection to the T1/PRI line has failed. If the LS and RA LEDs are on, check your cabling. If the LA LED is off, your T1/PRI line provider can verify whether or not you have the correct ***Framing Mode***, ***Encoding***, ***Length***, and ***Buildout*** values.

If you repeat this procedure, first return all parameter values to their defaults as listed in the "Multiband Plus T1/PRI Parameters" chapter of the Multiband Plus T1/PRI User Documentation Guide.

9 Press Left-Arrow until you return to the ***Main Edit Menu.***

Configuring the Ethernet Profile

This procedure requires the optional Ethernet interface.

The flowchart on the following page is a picture of steps involved in this procedure.

1 From the ***Main Edit Menu***, select the ***30-000 Ethernet*** menu shown below.

```
Main Edit Menu
 00-000 System
 10-000 Net/T1
 20-000 Host/..
>30-000 Ethernet
```

The following menu appears:

```
30-000 Ethernet
>30-100 SNMP Traps
 30-200 Mod Config
```

2 Select ***Mod Config.*** A list of parameters appears:

```
30-200 Mod Config
>Ether options...
 SNMP options
```

3 Select ***Ether options***. The following list of parameters appears:

```
30-200 Mod Config
Ether options...
>Ethernet IF=COAX
 IP Adrs=0.0.0.0/0
 RIP=Off
```

4 Select and, if necessary, modify the following parameters:

- ***Ethernet IF***
  √ **Check**: Press Right-Arrow to select one of the following types of Ethernet interfaces:
  If COAX: This is the default and is also called 10Base2 and thin-net.
  If UTP: This stands for unshielded twisted pair and is also called 10BaseT. .

Refer to page 6 *for the value of the Mod Config parameters.*

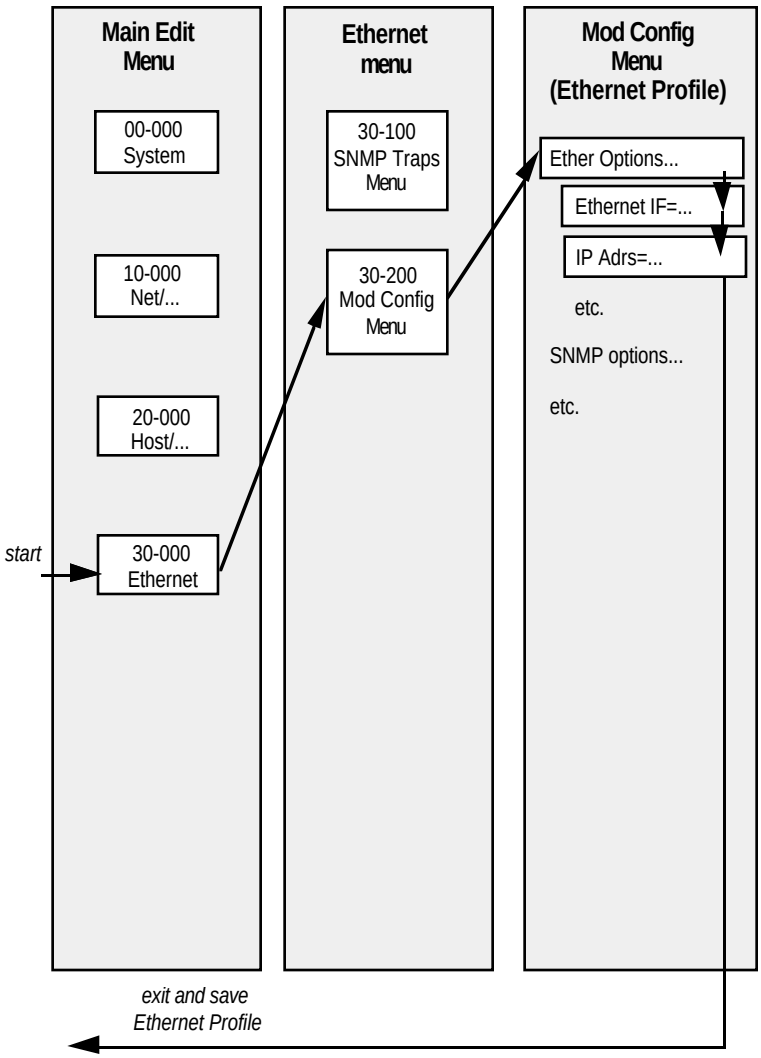


Figure 7: Configuration of Ethernet Profile (X.25 options not shown)

- ***IP Adrs***
  Type in the IP address /subnet mask of this Multiband Plus, then press Enter to return to the list of parameters. The default is ***0.0.0.0/0***.

```
Ether options...
 IP Adrs:
  [215.15.32.09/24]

Note: remaining lines not shown
```

See your network administrator for the IP address of Multiband Plus's interface to the local LAN and the LAN's subnet mask.

5 Press Left-Arrow twice to exit the Ethernet (Mod Config menu) Profile.

6 At the Confirmation menu, press 2 to save your changes.

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

7 Press Left-Arrow until you return to the ***Main Edit Menu***.

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 T1 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/T1
>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

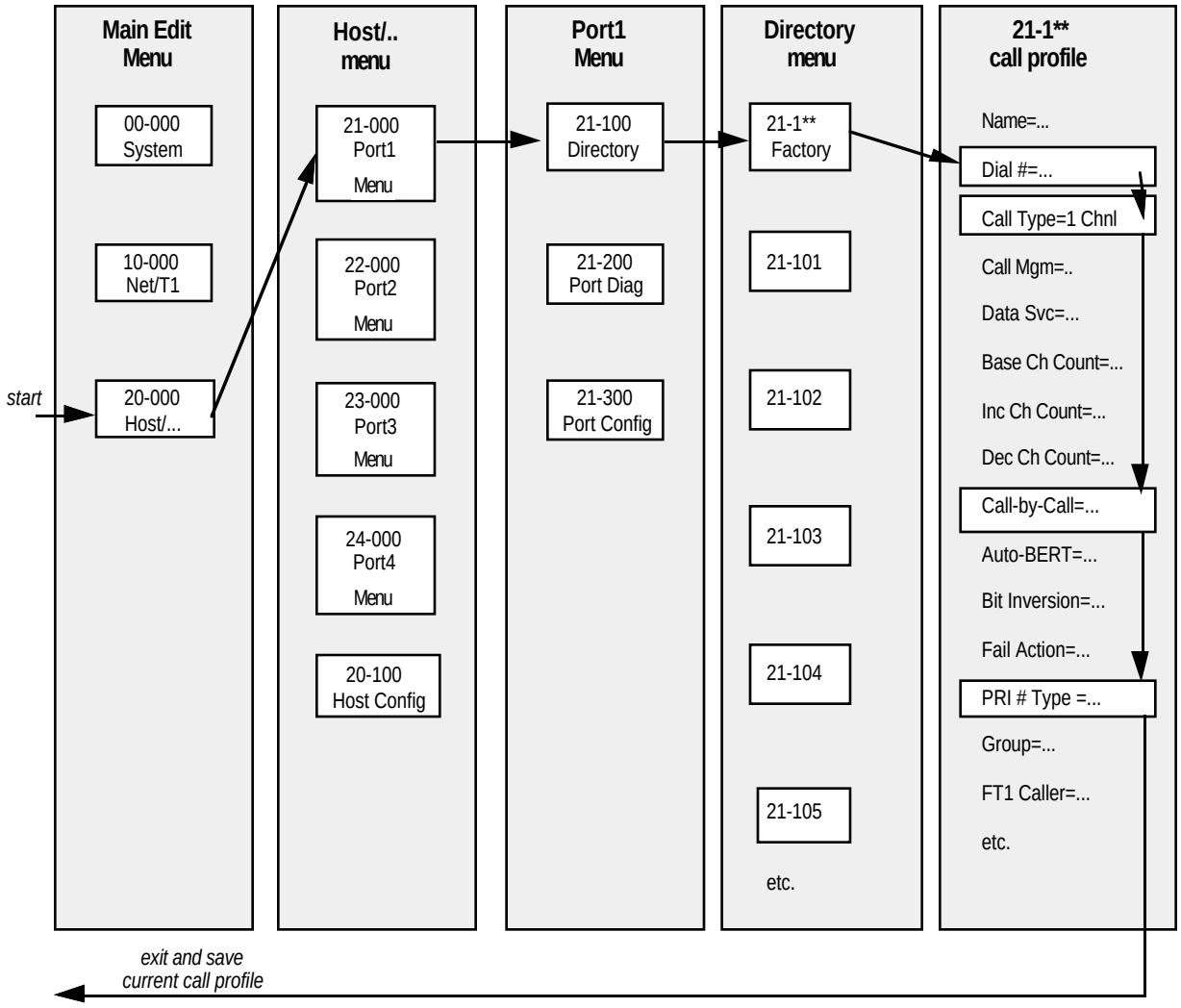


Figure 8: Configuration of Current Call Profile of Host Port #1 for Test Call

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 6 *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
```

- ***Call-by-Call***
  √ **Check**: What Call-by-Call service does the network (WAN) provide?
  If N/A: This parameter does not apply if ***Sig Mode=Inband***.
  If 0-31: Press Right-Arrow and then type in the number corresponding to the selected call-by-call service. The default value is 6. After you have typed in a value, press Right-Arrow to return to the list of parameters.

```
21-1**=Factory
 Inc Ch Count=N/A
 Dec Ch Count=N/A
>Call-by-Call=6
Note: remaining lines not shown
```

- ***PRI# Type***
  √ **Check**: What Primary Rate format (***PRI# Type***) do you use when dialing your own number?
  If N/A: This parameter does not apply if ***Sig Mode=Inband***.
  If National: ***National*** is the default. Continue with the next step.
  If Local: Press Right-Arrow to select Local.
  If Abbrev: Press Right-Arrow twice to select Abbreviated.
  If Unknown: Press Right-Arrow three times to select Unknown.
  If Intl: Press Right-Arrow four times to select International.

```
21-1**=Factory
 Bit Inversion=No
 Fail Action=N/A
>PRI# Type=National
 Note: remaining lines not shown
```

This test dials your own number. Your T1/PRI provider can tell you which formats your number fits. In most cases, use the format ***PRI# Type=National***.

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 T1/PRI in the previous section. The following tests are involved:

- Testing the LAN Connection

  PING or TELNET to your Multiband Plus T1/PRI from a workstation or host on the same LAN as the unit. This tests the LAN connection and is only relevant if your unit has the optional Ethernet card.

- Testing the T1/PRI Line

  Placing and answering a test call from Multiband Plus T1/PRI to itself over the T1/PRI interface. This tests the T1 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 LAN Connection

This test requires that you have the optional Ethernet interface and that you have the ability to run PING or TELNET from a host or workstation on the same LAN with your Multiband Plus.

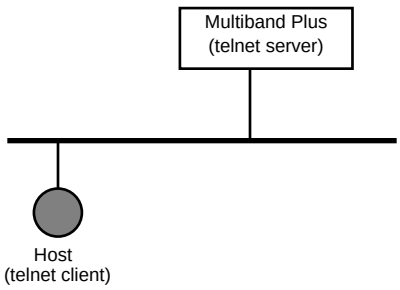


Figure 9: Multiband Plus / Local LAN Interface

1 From a host or workstation, on the same LAN as Multiband Plus, enter the TELNET or PING command for Multiband Plus. **The exact format of the command depends upon your operating system and application software**, but the

command could be as simple as entering the command followed by the Multiband Plus IP address. For example:

telnet 215.15.32.09

ping 215.15.32.09

2 √ **Check**: **If you're running TELNET**, the Multiband Plus user interface display should appear.
If you're running PING, you should get the message that you're immediately receiving a return packet for every packet you're sending to the Multiband Plus.
If you're not getting the proper response, this procedure has failed. It might be because of a problem with the LAN, because you entered the wrong IP address, or because of misconfiguration of either the ***Netmask*** or ***IP Adrs*** parameter in the Ethernet Profile. To repeat the configuration of the Ethernet Profile, first return all parameters that you changed to their default values.

3 Terminate the TELNET or PING sessions.

Testing the T1/PRI 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 ("Configuring a Test Call Profile" on page 26). 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.

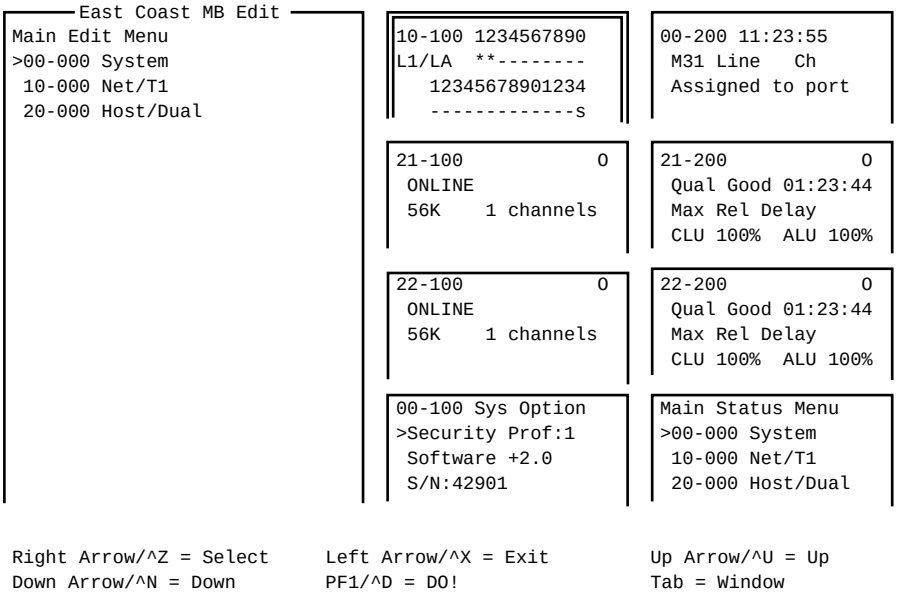
2 √ **Check**: What type of terminal are you using to operate Multiband Plus?
If Palmtop Controller: Continue with step 7.
If VT-100 (or emulator): Continue with the next step.

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 (*), indicating 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:



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 T1/PRI User Documentation Guide for further information on the status screens.

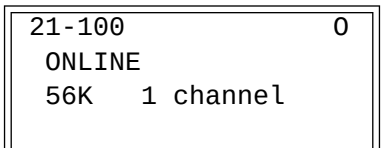
6 Congratulations. You have successfully completed a test call through the WAN to yourself. Press Ctrl-D and then 2 to hang up. Press Left-Arrow twice to return to the Main Edit Menu. Continue with the next procedure.

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

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.*

answered, ***ONLINE*** should appear in the second line as shown in the following illustration:



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 T1/PRI User Documentation Guide for information on Call Status.

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.*

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.

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.

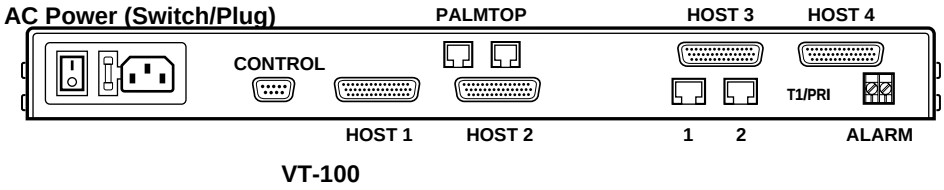


Figure 10: Back Panel of Multiband Plus

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. If Multiband Plus is equipped with internal CSU(s) and you have to disconnect it for this test, inform the T1/PRI provider first.

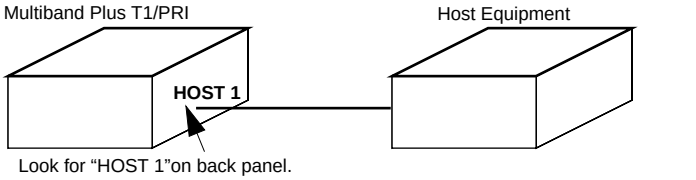


Figure 11: Connect to Host

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 T1/PRI Line."

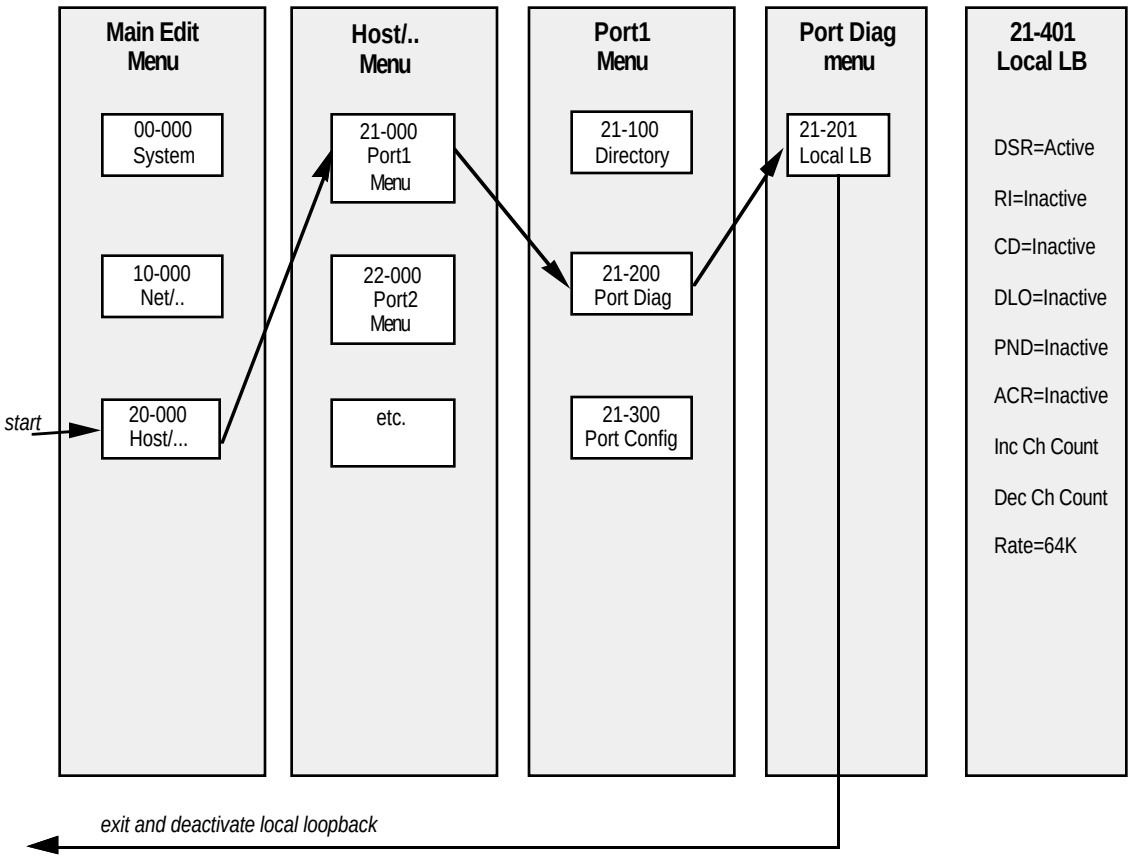


Figure 12: Sequence of Steps to Activate Local Loopback

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/T1
>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 T1/PRI.

Multiband Plus T1/PRI Release Notes

These Release Notes describe the features of the Multiband Plus T1/PRI System Software Version 4.5 and 4.4B. It is intended for Multiband Plus T1/PRI owners who have System Software 4.4 or earlier. Use these Release Notes in conjunction with your existing Multiband Plus T1/PRI documentation. Your *Multiband Plus T1/PRI Quick Start Guide* and *Multiband Plus T1/PRI User Documentation Guide* provide most of the information you need to install and configure the Multiband Plus.

NOTE: If you have a unit running software 3.4R, the *Multiband Plus T1/PRI User Documentation* still applies, but the set of features associated with SNMP and the Ethernet interface are not present.

1 How to Use This Release Note

First, read the sections "What's New In Software Version 4.5 and 4.4B?" on page 1 and "Problems Corrected in This Software" on page 19 to determine whether or not to upgrade your System Software.

If you want to upgrade, contact the Ascend Technical Assistance Center (in the US dial (800) 272-3634; outside the U.S., dial (510) 769-6001) to obtain System Software 4.5.

When you are ready to upgrade, refer to the section, "Upgrading Your System Software" page 16.

These release notes are also available electronically from the sources listed in the following table:

Source	Location
ftp server	ftp.ascend.com (Use ftp, a Unix file transfer program, and login as "anonymous")
Ascend Customer Support	(510) 814-2302 (Customer Support bulletin board available by modem)

2 What's New In Software Version 4.5 and 4.4B?

The following new features were added in Software Version 4.5:

Ethernet Profile Reorganization

The Ethernet Profile has been reorganized to place the Syslog parameters in Log, a new submenu.

Section 4.0.1, Page 4

Subaddressing Added to Units with ISDN Capability	Software revision 4.5 adds subaddressing in the dialed phone number as a means of routing calls to their destinations. The WAN carrying the phone call must be end-to-end ISDN and provisioned for subaddressing. Section 4.0.2, Page 4

The following new features were added in Software Version 4.4B:

SNMP Support for Accounting	The Ascend enterprise MIB has been revised to include read-only fields that provide a history of call events useful for accounting and billing purposes. Section 4.0.3, Page 6
Ethernet Interface Changes to the Multiband Plus T1/PRI	A new Ethernet module for the Multiband Plus T1/PRI allows selection of AUI, coax, or UTP interfaces. The earlier Ethernet module did not include an AUI option. Software revision 4.4B or later is required. Section 4.0.4, Page 6
Nailed-up Parameters Changed from Alphabetic (A, B, etc.) to Numeric	Certain Line Profile parameters associate nailed-up channels with connections to serial hosts. Software release 4.4B changes these parameters from an alphabetic range to a numeric range. Section 4.0.5, Page 7
Very Low Jitter Serial Host Ports	Software modifications to the synchronous serial host ports of Multiband Plus models. These modifications provide very low jitter clocks to some (or all) serial host ports. Section 4.0.6, Page 8

3 Errata

The following table describes documentation errata as covered by these Release Notes.

Documentation Errata	SW	Overview
Section 5.0.1, Switch Provisioning Section Revised	N/A	The section describing switch provisioning has been revised and presented in table format.
Section 5.0.3, Safety Instructions Added to Front of Manuals	N/A	Safety instructions have been added to the Declarations Section.
Section 5.0.4, Base Bandwidth Explanation	N/A	The manual did not describe the relationship between Base Ch Count and Data Svc. The following paragraph should be added to section 3.12 and to the description of the Base Ch Count parameter in Chapter 6.
Section 5.0.5, Default Route Added to Multiband Plus Units with SNMP Option	4.3C and later	The parameter which sets up the default route, Def Rte, was mistakenly omitted from the Chapter 6 of the manual and is described below. (Software revision 4.3C added the ability to configure Multiband Plus T1/PRI with a default route.) See section the existing section 3.3, Configuring Multiband Plus's Routing for SNMP Traps, Syslog, and Telnet, for information on how to set up the default route.
Section 5.0.6, AUI Ethernet Interface Note	N/A	A note should be inserted in section 4.7.2 of Chapter 4 that states an Ethernet transceiver is required when interfacing through the AUI port.
Section 5.0.7, T1 Wiring	N/A	The following description of T1 wiring replaces the description in section 4.5.3 of Chapter 4:

4 New Features

•

•

4.0.1 Ethernet Profile Reorganization

✓ The Ethernet Profile has been reorganized to place the Syslog parameters in **Log**, a new submenu.

The following table shows the new Ethernet Profile organization:

30-200 Mod Config (Ethernet Profile)		
Parameter Name	**Values**	**Default Value**
Log..		
Syslog	*Yes* *No*	*No*
Log Host	user-typed-in string in the IP dotted decimal format n.n.n.n	*0.0.0.0*
Log Facility	*Local0* *Local1* etc. *Local7*	*Local0*
more general parameters at the top level of the Ethernet Profile		

4.0.2 Subaddressing Added to Units with ISDN Capability

✓ Software revision 4.5 adds subaddressing in the dialed phone number as a means of routing calls to their destinations. The WAN carrying the phone call must be end-to-end ISDN and provisioned for subaddressing.

✓ The following note should be added to the description of **Dial #** in Chapter 6:

Multiband Plus models with interface(s) to ISDN lines use a comma (,) to separate the phone number from a subaddress. That is, numeric characters before a comma in **Dial #** comprise the phone number, while the one or two numeric characters after the comma comprise the subaddress (information element) sent to the ISDN switch. For example, 555-1212,23 dials the phone number 555-1212 and conveys the subaddress 23 to the answering party.

Dial #: Ascend units with ISDN interfaces can use the subaddress to route incoming calls if the subaddress feature is supported by the WAN end-to-end. On the calling side, the dialed number must specify an ISDN subaddress. On the answering side, the **Serial** parameters need to be set up to recognize this subaddress.

✓ The following new parameters control whether Multiband Plus uses subaddressing and should be added to section 3.6:

⇒⇒ **Sub-Adr** System Profile parameter (subaddressing can be used to route incoming calls if the connection supports the subaddress information element end-to-end.)

✓ The following should be added after section I.1.2 in the "Call Routing" appendix.

ISDN Subaddressing

If your Multiband Plus has an ISDN interface and the ISDN switch to which it connects has been provisioned for subaddressing, you can use the subaddress to route incoming calls. Subaddressing apply only when routing incoming calls by the number dialed:

- The call must support the subaddress information element end-to-end.
- On the answering side, set the **Sub-Adrs** parameter to *Req'd* or *Optional*. (See Chapter 6 for details.)
- On the answering side, set the **Ans #** parameters of the target modules to include these subaddresses.
- Caller knows what subaddress applies to the target module and includes it in the number dialed.

✓ The following parameters should be added to the Chapter 6.

⇒⇒ **Sub-Adrs** [a **System Profile** (00-100 Sys Config) parameter] determines what Multiband Plus does with incoming calls depending on whether they do/do not convey an ISDN subaddress. The default is *Ignore*.

Sub-Adrs applies only to ISDN lines.

- *Req'd* means that Multiband Plus requires subaddress information as part of the incoming call. Incoming calls without a subaddress are not answered. The subaddress of incoming calls must match a subaddress in the **Ans *n*#** [Port Profile].
- *Optional* means that Multiband Plus does not require subaddress information, but uses it when supplied to route incoming calls. The search for a match subaddress is first tried as described for *Req'd*, but if no match is found incoming calls are routed by other criteria.
- *None* means that Multiband Plus ignores subaddress information when routing incoming calls.

For More Information

4.0.3 SNMP Support for Accounting

✓ The Ascend enterprise MIB has been revised to include read-only fields that provide a history of call events useful for accounting and billing purposes.

The following groups have been added to the Ascend MIB:

systemStatusGroup

eventGroup

callStatusGroup

sessionStatusGroup

Detailed information can be obtained from the "SNMP Implementation for MAX/Pipeline/Multiband" document available from the ftp server at ftp.ascend.com.

4.0.4 Ethernet Interface Changes to the Multiband Plus T1/PRI

✓ A new Ethernet module for the Multiband Plus T1/PRI allows selection of AUI, coax, or UTP interfaces. The earlier Ethernet module did not include an AUI option. Software revision 4.4B or later is required.

✓ The following section replaces section 4.6.1 in Chapter 4. (The table listing Multiband Plus T1/PRI Ports, Connectors, and Switches in section 4.1 should include the AUI interface.)

General Specifications of the Ethernet Interface

Multiband Plus T1/PRI (with the optional Ethernet interface) supports the physical specifications of IEEE l802.3 with Ethernet 2 (Ethernet/DIX) framing. It provides a single Ethernet interface that is user-configured to support any one of the following Ethernet types.

- Coax (Coaxial) — Thin Ethernet and IEEE 802.3 (10 Base2) with BNC connector
- 10 BaseT (Unshielded Twisted Pair) — Twisted pair Ethernet and IEEE 802.3 (10 BaseT) with RJ-45 connector
- AUI (Attachment Unit Interface) — Standard Ethernet and IEEE (10 Base5) with 15-pin AUI connector

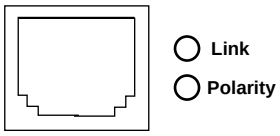
  Note: For connection to the *AUI* port: You need a transceiver and transceiver cable.

✓ The following replaces the **Ethernet IF** parameter in Chapter 6.

⇒⇒ **Ethernet IF** [an **Ethernet Profile** (30-200 Mod Config/Ether Options..) parameter] sets up the physical connection for *AUI*, *COAX* (thin-net) or *UTP* (unshielded twisted-pair). The default is *COAX*.

✓ The following should be added to section 8.1 in Chapter 8 explaining the Ethernet LEDs.

Current Ethernet Option
The back panel of Multiband Plus with the current optional Ethernet interface includes a two LEDs adjacent to the UTP connector as shown in the following illustration:



The following LEDs appear on the back panel of Multiband Plus models with an optional Ethernet Interface:

Link Integrity
a green LED, applies only to 10 BaseT (unshielded twisted pair) Ethernet. It is lit when the 10 BaseT Ethernet interface is functional.

Polarity
a yellow LED, applies only to 10 BaseT (unshielded twisted pair) Ethernet. It is lit when polarity is inverted.

4.0.5 Nailed-up Parameters Changed from Alphabetic (A, B, etc.) to Numeric

✓ Certain Line Profile parameters associate nailed-up channels with connections to serial hosts. Software release 4.4B changes these parameters from an alphabetic range to a numeric range.

⇒⇒ **Ch 1 Prt/Grp**, **Ch 2 Prt/Grp**, **etc.** [**Line Profile** (10-10-100 Line Config) parameters] associate the following:

Ch *n* Prt/Grp: For a complete discussion of call routing and the importance of various routing criteria, see the “Call Routing” appendix.

If the channel is nailed-up, this parameter can be any number from *1* to *60*. Each of these numbers 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 **Ch *n* Prt/Grp**.

⇒⇒ **Group** [a **Call Profile** (2*N*-100 Directory) parameter] is used to route nailed-up channels to serial host ports. When a line profile has **Ch *n* Prt/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 numeric character from *1*to the maximum allowed by your Multiband Plus model. The default value is *1*.

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

4.0.6 Very Low Jitter Serial Host Ports

✓ Software modifications to the synchronous serial host ports of Multiband Plus models. These modifications provide very low jitter clocks to some (or all) serial host ports.

Which serial host ports provide this very low jitter depend on the specific hardware. 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.

The following table details the hardware modifications as supported by the current software:

	Port 1	**Port 2**	**Port 3**	**Port 4**
Host/Dual, earlier version*	no VLJC	no VLJC	N/A	N/A
Host/Dual, 0048 daughter board	VLJC with AIM	no VLJC with AIM	N/A	N/A
	VLJC with DP	VLJC with DP	N/A	N/A
Host/Quad, earlier version*	no VLJC with AIM	no VLJC with AIM	no AIM	no AIM
	VLJC with Static only at 1, 2, 3, 4, 6, 8, 12, or 24 DS0 channels	VLJC with Static only at 1, 2, 3, 4, 6, 8, 12, or 24 DS0 channels	no Static	no Static
	*VLJC with DP or Single-Channel	*VLJC with DP or Single-Channel	*VLJC with DP or Single-Channel	*VLJC with DP or Single-Channel
Host/Quad, 0049 daughter board	VLJC with AIM	VLJC with AIM	no AIM	no AIM
	VLJC with Static	VLJC with Static	no Static	no Static
	VLJC with DP or Single-Channel	VLJC with DP or Single-Channel	VLJC with DP or Single-Channel	VLJC with DP or Single-Channel

NOTES: VLJC = Very Low Jitter Clock
AIM = Ascend Inverse Multiplexed call type
DP = Dual-Port (2 Chnl) call type
Static = Static call type

*If Multiband Plus is set to the Single-Channel (1 Chnl) or Dual-Port (2 Chnl) call type, VLJC is available at any port with earlier hardware versions even with higher bandwidth services (GloBanD, Multirate, H0), if and only if bandwidth is 1, 2, 3, 4, 6, 8, 12, or 24 DS0 channels.

5 Addenda and Errata

This section contains changes to the manual that add information or correct errors.

5.0.1 Switch Provisioning Section Revised

✓ The section describing switch provisioning has been revised and presented in table format.

Provisioning of the Switch for T1 Access

If robbed-bit signaling is used, the T1 circuit at the point of presence (POP) must support the following translations for compatibility with Multiband Plus T1/PRI:

Two-state DTMF (Dual-Tone Multifrequency) dialing	required
Outgoing wink start	required
Incoming Immediate seizure	optional to a switch, does not apply on T1 lines to a PBX
Incoming wink start	optional to a switch, typically required on T1 lines to a PBX
Incoming digits suppressed	required, except when PBX is connected to T1 line supplied by Multiband Plus through PRI-to-T1 conversion
Answer supervision	required
Switched data	data integrity required — However, the drop-and-insert channels to a PBX can be voice.
Neither four-state A and B bit signaling nor pulse dialing are supported; however, these are passed through transparently when Multiband Plus T1/PRI performs drop-and-insert between lines #1 and #2.	

For further information on wink-start and robbed-bit signaling, see the **Rob Ctl** parameter in the “Reference to Edit Menus” chapter.

Provisioning of the Switch for PRI (ISDN) Access

In general, for PRI-based applications, the circuit must comply with these requirements:

D channel assignment	required on channel 24, except for NFAS (see note*)
ESF framing	recommended
B8ZS line encoding	recommended
*For applications that require non-facility associated signaling (NFAS), you must be connected to an AT&T or Northern Telecom switch provisioned with NFAS. The service provider will supply guidelines for NFAS ID assignments and D-channel assignments. Note that Multiband Plus T1/PRI must have D-channel signaling functionality and at least two WAN ports to utilize NFAS.	

The following table lists ISDN services that you might use to route or identify incoming calls:

Optional ISDN Services		
Dialed Number Identification Service (DNIS)	Yes	Required when Multiband Plus routes incoming calls by examining the number dialed. For example, each serial host port supporting a video conference system can have a separate phone number. See the “Call Routing” appendix.

5.0.2 Cause codes list expanded

✓ The list of ISDN cause code in Chapter 8 has been expanded and now includes those listed in CCITT Q.931.

The following table lists the numerical cause codes and provides a description of each. (The cause codes for German 1TR6 networks (WANs) are different from this table.)

Code	Cause
0	Valid cause code not yet received
1	Unallocated (unassigned) number
2	No route to specified transit network (WAN)
3	No route to destination
4	send special information tone
5	misdialled trunk prefix
6	Channel unacceptable
7	Call awarded and being delivered in an established channel
8	Prefix 0 dialed but not allowed
9	Prefix 1 dialed but not allowed
10	Prefix 1 dialed but not required
11	More digits received than allowed, call is proceeding
16	Normal call clearing
17	User busy
18	No user responding
19	No answer from user (user alerted)
21	Call rejected
22	Number changed
23	Reverse charging rejected
24	Call suspended

Code	Cause
25	Call resumed
26	Non-selected user clearing
27	Destination out of order
28	Invalid number format (incomplete number)
29	Facility rejected
30	Response to STATUS ENQUIRY
31	Normal, unspecified
33	Circuit out of order
34	No circuit/channel available
35	Destination unattainable
37	Degraded service
38	Network (WAN) out of order
39	Transit delay range cannot be achieved
40	Throughput range cannot be achieved
41	Temporary failure
42	Switching equipment congestion
43	Access information discarded
44	Requested circuit channel not available
45	Preempted
46	Precedence call blocked
47	Resource unavailable, unspecified
49	Quality of service unavailable
50	Requested facility not subscribed
51	Reverse charging not allowed
52	Outgoing calls barred
53	Outgoing calls barred within CUG
54	Incoming calls barred
55	Incoming calls barred within CUG
56	Call waiting not subscribed
57	Bearer capability not authorized
58	Bearer capability not presently available
63	Service or option not available, unspecified
65	Bearer service not implemented

Code	Cause
66	Channel type not implemented
67	Transit network selection not implemented
68	Message not implemented
69	Requested facility not implemented
70	Only restricted digital information bearer capability is available
79	Service or option not implemented, unspecified
81	Invalid call reference value
82	Identified channel does not exist
83	A suspended call exists, but this call identity does not
84	Call identity in use
85	No call suspended
86	Call having the requested call identity has been cleared
87	Called user not member of CUG
88	Incompatible destination
89	Non-existent abbreviated address entry
90	Destination address missing, and direct call not subscribed
91	Invalid transit network selection (national use)
92	Invalid facility parameter
93	Mandatory information element is missing
95	Invalid message, unspecified
96	Mandatory information element is missing
97	Message type non-existent or not implemented
98	Message not compatible with call state or message type non-existent or not implemented
99	information element nonexistent or not implemented
100	Invalid information element contents
101	Message not compatible with call state
102	Recovery on timer expiry
103	Parameter non-existent or not implemented, passed on
111	Protocol error, unspecified
127	Internetworking, unspecified

5.0.3 Safety Instructions Added to Front of Manuals

✓ Safety instructions have been added to the Declarations Section.

IMPORTANT SAFETY INSTRUCTIONS

1 Read and follow all warning notices and instructions marked on the product or included in the manual.

2 This product is intended to be used with a three-wire grounding type plug - a plug which has a grounding pin. This is a safety feature. Equipment grounding is vital to ensure safe operation. Do not defeat the purpose of the grounding type plug by modifying the plug or using an adapter.

Prior to installation, use an outlet tester or a voltmeter to check the AC receptacle for the presence of earth ground. If the receptacle is not properly grounded, the installation must not continue until a qualified electrician has corrected the problem. Similarly, in the case of DC input power, check the DC ground (s).

If a three-wire grounding type power source is not available, consult a qualified electrician to determine another method of grounding the equipment.

3 Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, these slots and openings must not be blocked or covered.

4 Do not allow anything to rest on the power cord and do not locate the product where persons will walk on the power cord.

5 Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous high voltage points or other risks. Refer all servicing to qualified service personnel.

6 General purpose cables are provided with this product. Special cables, which may be required by the regulatory inspection authority for the installation site, are the responsibility of the customer.

7 When installed in the final configuration, the product must comply with the applicable Safety Standards and regulatory requirements of the country in which it is installed. If necessary, consult with the appropriate regulatory agencies and inspection authorities to ensure compliance.

8 A rare phenomenon can create a voltage potential between the earth grounds of two or more buildings. If products installed in separate buildings are **interconnected**, the voltage potential may cause a hazardous condition. Consult a qualified electrical consultant to determine whether or not this phenomenon exists and, if necessary, implement corrective action prior to interconnecting the products.

In addition, if the equipment is to be used with telecommunications circuits, take the following precautions:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Avoid using equipment connected to telephone lines (other than a cordless telephone) during an electrical storm.
- Do not use a telephone or other equipment connected to telephone lines to report a gas leak in the vicinity of the leak.

5.0.4 Base Bandwidth Explanation

✓ The manual did not describe the relationship between **Base Ch Count** and **Data Svc**. The following paragraph should be added to section 3.12 and to the description of the **Base Ch Count** parameter in Chapter 6.

The base bandwidth of a call is given by multiplying the parameters in a profile:
Base Ch Count * **Data Svc**=base bandwidth.

5.0.5 Default Route Added to Multiband Plus Units with SNMP Option

✓ The parameter which sets up the default route, **Def Rte**, was mistakenly omitted from the Chapter 6 of the manual and is described below. (Software revision 4.3C added the ability to configure Multiband Plus T1/PRI with a default route.) See section the existing section 3.3, *Configuring Multiband Plus's Routing for SNMP Traps, Syslog, and Telnet,* for information on how to set up the default route.

⇒⇒ **Def Rte** [an **Ethernet Profile** (30-200 Mod Config/Ether Options..) parameter] defines the IP address of Multiband Plus's default router. This router must be on the same LAN as Multiband Plus. **Def Rte** follows the dotted decimal format, n.n.n.n, where n is a number from *0* to *255*.

5.0.6 AUI Ethernet Interface Note

✓ A note should be inserted in section 4.7.2 of Chapter 4 that states an Ethernet transceiver is required when interfacing through the AUI port.

- For connection to the *AUI* Ethernet port: You need a transceiver and transceiver cable.

5.0.7 T1 Wiring

✓ The following description of T1 wiring replaces the description in section 4.5.3 of Chapter 4:

Use only cables specifically constructed for transmission of T1/PRI signals. It should meet standard T1 attenuation and transmission requirements. The following specifications are recommended:

Two twisted pairs, Category 3 or better

NOTE: Category 3 is an informal recommendations for 100 Ohm twisted-pair cables.

6 Upgrading Your System Software

✓ This procedure describes the steps to upgrading your Multiband Plus system software.

Multiband Plus software executes out of a Flash-EEPROM. Flash-EEPROMs work like standard ROMs except that they can be reprogrammed under software control.

Ascend uses the XModem file-transfer protocol to upgrade system software in the field. You can reprogram Multiband Plus's Flash-EEPROM by uploading new system software using a standard communications software package and a PC.

Before Starting

In order to upgrade your Multiband Plus, you must have the following equipment and software:

- a personal computer (PC) with a hard drive (and a high density 3 1/2" disk drive if you receive the upgrade software on a floppy disk)
- an available serial port on the PC capable of connecting to Multiband Plus's **Control** port (DE-9 connector), which is on the back of the Multiband Plus
- a data communications software package which supports XModem CRC/1K; Procomm Plus from Intuitive Communications (PC) or ZTerm from Global Village (Macintosh) have been tested. (XModem CRC/1K is sometimes referred to as XModem 1K.)

  NOTE: Do not use WINDOWS-based communication software packages. A conflict with the mouse port causes these packages to not work in this application.
- The upgrade software binary file supplied by Ascend (If this file is on a floppy, transfer it to the hard disk before starting. Upgrading from a floppy takes much longer.)

WARNING: This upgrade procedure erases all Call Profiles, Line Profiles, and the System Profile from Multiband Plus's memory. Make a backup of all profile parameters before starting the upgrade process. Follow the Backup and Restore procedures in Chapter 3 of the *Multiband Plus T1/PRI User Documentation Guide.*

WARNING: The backup and restore procedures only works when parameters have not changed their menu locations. The parameters moved in "Ethernet Profile Reorganization" on page 4 will not automatically be restored. However, You can modify a saved configuration with a text editor to create a file that can be updated. In the following example, the **Domain Name** parameter has moved to the submenu *DNS.*. and the modification is to add *DNS.*. to the front of the parameter name:

Domain Name=Ascend.COM

becomes

DNS...Domain Name=Ascend.COM

In order to upgrade your Multiband Plus, the **Field Service** parameter of the current Security Profile must be enabled.

- Use the **Sys Options** status menu to determine which Security Profile is in current use (Chapter 6).
- Go to the current Security Profile under the 00-300 Security menu and determine whether **Field Service** is set to *Yes* or *No*. (See Chapter 5 for the menu structure.)
- If **Field Service**=*No* in the current Security Profile, either use the **DO P** (password) command to go to a profile with Field service enabled or edit the current profile. (See **DO P** and **Security Profiles** Chapter 6.)

The Upgrade Process

To upload new software into your Multiband Plus, follow these steps:

1. Start up the PC communications software package. The parameters to use are no parity, 8 data bits, 1 stop bit, or N81. There is no software or hardware flow control on the **Control** port. The **Term Rate** parameter controls the speed of the **Control** port. Set the speed to 2400 bit/s.
2. Verify that you can communicate with the Multiband Plus by checking the terminal screen. Try typing **CTRL L** once or twice. The screen should refresh and you should see the Multiband Plus T1/PRI user interface.
3. Once you are communicating with the Multiband Plus, type the following four-character escape sequence. The escape sequence must be typed very, very quickly, one after the other. If you type the keystrokes too slowly, they will not be recognized by Multiband Plus and you will have to retype them:

   ESC [ESC -
   (escape, left bracket, escape, minus)
4. Now, type an uppercase **D**.

5 If you have successfully typed the escape sequence followed by D, the Multiband Plus display should prompt "XMODEM UPLOADER. TYPE ANY KEY TO CONTINUE".

6 Type a **SPACE** character at the prompt.

7 Multiband Plus then begins transmitting a series of XModem control characters, which appear on the screen as a string of **CK**s.

8 Start the upload process from your XModem communications program. When asked for a file name, enter the name of the binary file that you copied to your hard disk. Ascend binary files typically use the BIN suffix. Your file name might be different.

MB1T1.BIN

9 Your communications program should start the upload process. Don't worry if your program has to retry the first block of data transmitted or if similar types of errors occur —this is normal behavior. The upload process can take anywhere from 5 to 15 minutes. Under worst case conditions upload can take up to 45 minutes.

10 After the upload process is complete, Multiband Plus restarts and initiates its power-on self tests (POST). At this point, Multiband Plus is running with the new software.

11 If the upload fails during transfer, contact Ascend customer service.

NOTE: When you load a new software release, Multiband Plus returns to its factory default state. As a result, Multiband Plus loses any configuration information defined under the previous release. If you need to restore this configuration, use the Backup and Restore procedures in Chapter 3 of the *Multiband Plus T1/PRI User Documentation Guide*.

WARNING: No passwords are saved during backup. Record passwords off-line, if you wish to restore them.

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7 Problems Corrected in This Software

Software revision 4.5 corrects the following problems:

- When Multiband Plus answered a BONDING call where the calling unit was many switch hops away, the call would fail.
- If the user attempted to reduce the number of channels in a six-channel AIM call, the call would terminate.
- When Multiband Plus was set up for RS-366 dialing and the call attempt timed out, ACR is not should have been asserted, but it was not.

Multiband Plus T1/PRI Release Notes

1 Software Version

These Release Notes cover changes to Multiband Plus T1/PRI occurring with the release of software revision 4.4B. If there are corrections or additions to *Multiband Plus T1/PRI User Documentation* (part number 0800-0159-002) which is at software revision level 4.4, these release notes will also include them.

NOTE: If you have a unit running software 3.4R, the *Multiband Plus T1/PRI User Documentation* still applies, but the set of features associated with SNMP and the Ethernet interface are not present.

These release notes are also available electronically at the following addresses:

ftp.ascend.com (Use ftp, a Unix file transfer program. Login as “anonymous.”)
(510)814-2302 (Customer support bulletin board available by modem)

2 What's New

- SNMP Support for Accounting
- Ethernet Interface Changes to the Multiband Plus T1/PRI
- Nailed-up Parameters Changed from Alphabetic (A, B, etc.) to Numeric
- Very Low Jitter Serial Host Ports
- Instructions on upgrading your software are found on page 10.
- Problems corrected by this software revision are found on page 13.

3 New Features

The following table describes new features introduced since the publication of the current Multiband Plus T1/PRI users manual.

Feature Changes	Page	Overview
SNMP Support for Accounting, Section 5.0.1	4	The Ascend enterprise MIB has been revised to include read-only fields that provide a history of call events useful for accounting and billing purposes. Software Release 4.4B is required for operation with this revised Ascend enterprise MIB.
Ethernet Interface Changes to the Multiband Plus T1/PRI, Section 5.0.2	4	A new Ethernet module for the Multiband Plus T1/PRI allows selection of AUI, coax, or UTP interfaces. The earlier Ethernet module did not include an AUI option. Software revision 4.4B or later is required.
Nailed-up Parameters Changed from Alphabetic (A, B, etc.) to Numeric, Section 5.0.3	5	Certain Line Profile parameters associate nailed-up channels with connections to serial hosts. Software release 4.4B changes these parameters from an alphabetic range to a numeric range.
Very Low Jitter Serial Host Ports, Section 5.0.4	6	Software modifications to the synchronous serial host ports of Multiband Plus models. These modifications provide very low jitter clocks to some (or all) serial host ports. Which serial host ports provide this very low jitter depend on the specific hardware. 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.

4 Errata

The following table describes documentation errata as covered by these Release Notes.

Documentation Errata	SW	Overview
Section 6.0.1, Safety Instructions Added to Front of Manuals	N/A	Safety instructions have been added to the Declarations Section.
Section 6.0.2, Base Bandwidth Explanation	N/A	The manual did not describe the relationship between Base Ch Count and Data Svc. The following paragraph should be added to section 3.12 and to the description of the Base Ch Count parameter in Chapter 6.
Section 6.0.3, Default Route Added to Multiband Plus Units with SNMP Option	4.3C and later	The parameter which sets up the default route, Def Rte, was mistakenly omitted from the Chapter 6 of the manual and is described below. (Software revision 4.3C added the ability to configure Multiband Plus T1/PRI with a default route.) See section the existing section 3.3, Configuring Multiband Plus's Routing for SNMP Traps, Syslog, and Telnet, for information on how to set up the default route.
Section 6.0.4, AUI Ethernet Interface Note	N/A	A note should be inserted in Chapter 4 that states an Ethernet transceiver is required when interfacing through the AUI port:
Section 6.0.5, T1 Wiring	N/A	The following description of T1 wiring replaces the corresponding description in Chapter 4:

5 New Features

5.0.1 SNMP Support for Accounting

✓ The Ascend enterprise MIB has been revised to include read-only fields that provide a history of call events useful for accounting and billing purposes. Software Release 4.4B is required for operation with this revised Ascend enterprise MIB.

The following groups have been added to the Ascend MIB:

systemStatusGroup

eventGroup

callStatusGroup

sessionStatusGroup

Detailed information can be obtained from the "SNMP Implementation for MAX/Pipeline/Multiband" document available from the ftp server at ftp.ascend.com.

5.0.2 Ethernet Interface Changes to the Multiband Plus T1/PRI

✓ A new Ethernet module for the Multiband Plus T1/PRI allows selection of AUI, coax, or UTP interfaces. The earlier Ethernet module did not include an AUI option. Software revision 4.4B or later is required.

✓ The following section replaces section 4.6.1 in Chapter 4. (The table listing Multiband Plus T1/PRI Ports, Connectors, and Switches in section 4.1 should include the AUI interface.)

General Specifications of the Ethernet Interface

Multiband Plus T1/PRI (with the optional Ethernet interface) supports the physical specifications of IEEE l802.3 with Ethernet 2 (Ethernet/DIX) framing. It provides a single Ethernet interface that is user-configured to support any one of the following Ethernet types.

- Coax (Coaxial) — Thin Ethernet and IEEE 802.3 (10 Base2) with BNC connector
- 10 BaseT (Unshielded Twisted Pair) — Twisted pair Ethernet and IEEE 802.3 (10 BaseT) with RJ-45 connector
- AUI (Attachment Unit Interface) — Standard Ethernet and IEEE (10 Base5) with 15-pin AUI connector

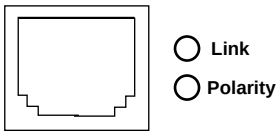
  Note: For connection to the *AUI* port: You need a transceiver and transceiver cable.

✓ The following replaces the **Ethernet IF** parameter in Chapter 6.

⇒⇒ **Ethernet IF** [an **Ethernet Profile** (30-200 Mod Config/Ether Options..) parameter] sets up the physical connection for *AUI*, *COAX* (thin-net) or *UTP* (unshielded twisted-pair). The default is *COAX*.

✓ The following should be added to section 8.1 in Chapter 8 explaining the Ethernet LEDs.

Current Ethernet Option
The back panel of Multiband Plus with the current optional Ethernet interface includes a two LEDs adjacent to the UTP connector as shown in the following illustration:



The following LEDs appear on the back panel of Multiband Plus models with an optional Ethernet Interface:

Link Integrity
a green LED, applies only to 10 BaseT (unshielded twisted pair) Ethernet. It is lit when the 10 BaseT Ethernet interface is functional.

Polarity
a yellow LED, applies only to 10 BaseT (unshielded twisted pair) Ethernet. It is lit when polarity is inverted.

5.0.3 Nailed-up Parameters Changed from Alphabetic (A, B, etc.) to Numeric

✓ Certain Line Profile parameters associate nailed-up channels with connections to serial hosts. Software release 4.4B changes these parameters from an alphabetic range to a numeric range.

⇒⇒ **Ch 1 Prt/Grp**, **Ch 2 Prt/Grp**, **etc.** [**Line Profile** (10-10-100 Line Config) parameters] associate the following:

Ch *n* Prt/Grp: For a complete discussion of call routing and the importance of various routing criteria, see the “Call Routing” appendix.

If the channel is nailed-up, this parameter can be any number from *1* to *60*. Each of these numbers 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 **Ch *n* Prt/Grp**.

⇒⇒ **Group** [a **Call Profile** (2*N*-100 Directory) parameter] is used to route nailed-up channels to serial host ports. When a line profile has **Ch *n* Prt/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 numeric character from *1*to the maximum allowed by your Multiband Plus model. The default value is *1*.

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

5.0.4 Very Low Jitter Serial Host Ports

✓ Software modifications to the synchronous serial host ports of Multiband Plus models. These modifications provide very low jitter clocks to some (or all) serial host ports. Which serial host ports provide this very low jitter depend on the specific hardware. 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.

The following table details the hardware modifications as supported by the current software:

	Port 1	**Port 2**	**Port 3**	**Port 4**
Host/Dual, earlier version*	no VLJC	no VLJC	N/A	N/A
Host/Dual, 0048 daughter board	VLJC with AIM	no VLJC with AIM	N/A	N/A
	VLJC with DP	VLJC with DP	N/A	N/A
Host/Quad, earlier version*	no VLJC with AIM	no VLJC with AIM	no AIM	no AIM
	VLJC with Static only at 1, 2, 3, 4, 6, 8, 12, or 24 DS0 channels	VLJC with Static only at 1, 2, 3, 4, 6, 8, 12, or 24 DS0 channels	no Static	no Static
	*VLJC with DP or Single-Channel	*VLJC with DP or Single-Channel	*VLJC with DP or Single-Channel	*VLJC with DP or Single-Channel
Host/Quad, 0049 daughter board	VLJC with AIM	VLJC with AIM	no AIM	no AIM
	VLJC with Static	VLJC with Static	no Static	no Static
	VLJC with DP or Single-Channel	VLJC with DP or Single-Channel	VLJC with DP or Single-Channel	VLJC with DP or Single-Channel

NOTES: VLJC = Very Low Jitter Clock
AIM = Ascend Inverse Multiplexed call type
DP = Dual-Port (2 Chnl) call type
Static = Static call type

*If Multiband Plus is set to the Single-Channel (1 Chnl) or Dual-Port (2 Chnl) call type, VLJC is available at any port with earlier hardware versions even with higher bandwidth services (GloBanD, Multirate, H0), if and only if bandwidth is 1, 2, 3, 4, 6, 8, 12, or 24 DS0 channels.

6 Addenda and Errata

This section contains changes to the manual that add information or correct errors.

6.0.1 Safety Instructions Added to Front of Manuals

✓ Safety instructions have been added to the Declarations Section.

IMPORTANT SAFETY INSTRUCTIONS

1 Read and follow all warning notices and instructions marked on the product or included in the manual.

2 This product is intended to be used with a three-wire grounding type plug - a plug which has a grounding pin. This is a safety feature. Equipment grounding is vital to ensure safe operation. Do not defeat the purpose of the grounding type plug by modifying the plug or using an adapter.

Prior to installation, use an outlet tester or a voltmeter to check the AC receptacle for the presence of earth ground. If the receptacle is not properly grounded, the installation must not continue until a qualified electrician has corrected the problem. Similarly, in the case of DC input power, check the DC ground (s).

If a three-wire grounding type power source is not available, consult a qualified electrician to determine another method of grounding the equipment.

3 Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, these slots and openings must not be blocked or covered.

4 Do not allow anything to rest on the power cord and do not locate the product where persons will walk on the power cord.

5 Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous high voltage points or other risks. Refer all servicing to qualified service personnel.

6 General purpose cables are provided with this product. Special cables, which may be required by the regulatory inspection authority for the installation site, are the responsibility of the customer.

7 When installed in the final configuration, the product must comply with the applicable Safety Standards and regulatory requirements of the country in which it is installed. If necessary, consult with the appropriate regulatory agencies and inspection authorities to ensure compliance.

8 A rare phenomenon can create a voltage potential between the earth grounds of two or more buildings. If products installed in separate buildings are **interconnected**, the voltage potential may cause a hazardous condition. Consult a qualified electrical consultant to determine whether or not this phenomenon exists and, if necessary, implement corrective action prior to interconnecting the products.

In addition, if the equipment is to be used with telecommunications circuits, take the following precautions:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Avoid using equipment connected to telephone lines (other than a cordless telephone) during an electrical storm.
- Do not use a telephone or other equipment connected to telephone lines to report a gas leak in the vicinity of the leak.

6.0.2 Base Bandwidth Explanation

✓ The manual did not describe the relationship between **Base Ch Count** and **Data Svc**. The following paragraph should be added to section 3.12 and to the description of the **Base Ch Count** parameter in Chapter 6.

The base bandwidth of a call is given by multiplying the parameters in a profile:
Base Ch Count * **Data Svc**=base bandwidth.

6.0.3 Default Route Added to Multiband Plus Units with SNMP Option

✓ The parameter which sets up the default route, **Def Rte**, was mistakenly omitted from the Chapter 6 of the manual and is described below. (Software revision 4.3C added the ability to configure Multiband Plus T1/PRI with a default route.) See section the existing section 3.3, *Configuring Multiband Plus's Routing for SNMP Traps, Syslog, and Telnet,* for information on how to set up the default route.

⇒⇒ **Def Rte** [an **Ethernet Profile** (30-200 Mod Config/Ether Options..) parameter] defines the IP address of Multiband Plus's default router. This router must be on the same LAN as Multiband Plus. **Def Rte** follows the dotted decimal format, n.n.n.n, where n is a number from *0* to *255*.

6.0.4 AUI Ethernet Interface Note

✓ A note should be inserted in Chapter 4 that states an Ethernet transceiver is required when interfacing through the AUI port:

- For connection to the *AUI* Ethernet port: You need a transceiver and transceiver cable.

6.0.5 T1 Wiring

✓ The following description of T1 wiring replaces the corresponding description in Chapter 4:

Use only cables specifically constructed for transmission of T1/PRI signals. It should meet standard T1 attenuation and transmission requirements. The following specifications are recommended:

Two twisted pairs, Category 3 or better

NOTE: Category 3 is an informal recommendations for 100 Ohm twisted-pair cables.

7 Software Field Upgrades

✓ This procedure describes the steps to upgrading your Multiband Plus system software.

Multiband Plus software executes out of a Flash-EEPROM. Flash-EEPROMs work like standard ROMs except that they can be reprogrammed under software control.

Ascend uses the XModem file-transfer protocol to upgrade system software in the field. You can reprogram Multiband Plus's Flash-EEPROM by uploading new system software using a standard communications software package and a PC.

Before Starting

In order to upgrade your Multiband Plus, you must have the following equipment and software:

- a personal computer (PC) with a hard drive (and a high density 3 1/2" disk drive if you receive the upgrade software on a floppy disk)
- an available serial port on the PC capable of connecting to Multiband Plus's **Control** port (DE-9 connector), which is on the back of the Multiband Plus
- a data communications software package which supports XModem CRC/1K; Procomm Plus from Intuitive Communications (PC) or ZTerm from Global Village (Macintosh) have been tested. (XModem CRC/1K is sometimes referred to as XModem 1K.)

  NOTE: Do not use WINDOWS-based communication software packages. A conflict with the mouse port causes these packages to not work in this application.
- The upgrade software binary file supplied by Ascend (If this file is on a floppy, transfer it to the hard disk before starting. Upgrading from a floppy takes much longer.)

WARNING: This upgrade procedure erases all Call Profiles, Line Profiles, and the System Profile from Multiband Plus's memory. Make a backup of all profile parameters before starting the upgrade process. Follow the Backup and Restore procedures in Chapter 3 of the *Multiband Plus T1/PRI User Documentation Guide.*

In order to upgrade your Multiband Plus, the **Field Service** parameter of the current Security Profile must be enabled.

- Use the **Sys Options** status menu to determine which Security Profile is in current use (Chapter 6).
- Go to the current Security Profile under the 00-300 Security menu and determine whether **Field Service** is set to *Yes* or *No*. (See Chapter 5 for the menu structure.)

- If **Field Service**=*No* in the current Security Profile, either use the **DO P** (password) command to go to a profile with Field service enabled or edit the current profile. (See **DO P** and **Security Profiles** Chapter 6.)

The Upgrade Process

To upload new software into your Multiband Plus, follow these steps:

1 Start up the PC communications software package. The parameters to use are no parity, 8 data bits, 1 stop bit, or N81. There is no software or hardware flow control on the **Control** port. The **Term Rate** parameter controls the speed of the **Control** port. Set the speed to 2400 bit/s.

2 Verify that you can communicate with the Multiband Plus by checking the terminal screen. Try typing **CTRL L** once or twice. The screen should refresh and you should see the Multiband Plus T1/PRI user interface.

3 Once you are communicating with the Multiband Plus, type the following four-character escape sequence. The escape sequence must be typed very, very quickly, one after the other. If you type the keystrokes too slowly, they will not be recognized by Multiband Plus and you will have to retype them:

ESC [ESC -
(escape, left bracket, escape, minus)

4 Now, type an uppercase **D**.

5 If you have successfully typed the escape sequence followed by D, the Multiband Plus display should prompt "XMODEM UPLOADER. TYPE ANY KEY TO CONTINUE".

6 Type a **SPACE** character at the prompt.

7 Multiband Plus then begins transmitting a series of XModem control characters, which appear on the screen as a string of **CK**s.

8 Start the upload process from your XModem communications program. When asked for a file name, enter the name of the binary file that you copied to your hard disk. Ascend binary files typically use the BIN suffix. Your file name might be different.

MB1T1.BIN

9 Your communications program should start the upload process. Don't worry if your program has to retry the first block of data transmitted or if similar types of errors occur —this is normal behavior. The upload process can take anywhere from 5 to 15 minutes. Under worst case conditions upload can take up to 45 minutes.

10 After the upload process is complete, Multiband Plus restarts and initiate its power-on self tests (POST). At this point, Multiband Plus is running with the new software.

11 If the upload fails during transfer, contact Ascend customer service.

NOTE: When you load a new software release, Multiband Plus returns to its factory default state. As a result, Multiband Plus loses any configuration information defined under the previous release. If you need to restore this configuration, use the Backup and Restore procedures in Chapter 3 of the *Multiband Plus T1/PRI User Documentation Guide*.

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8 Problems Corrected

Software revision 4.4B corrects the following problems:

- The SNMP object *ifAdminStatus* did not correctly show the desired state of the interface, but showed the current state instead and there was no way of differentiating between lines which were supposed to be down from lines that were not supposed to be down.
- The default Security Profile allowed access to MIF. The default Security Profile factory setting had **Sys Diag**=*Yes*, which did not block access to MIF.
- The Multiband Plus did not send Ethernet packet information.
- If the parameter **Fail Action**=*Retry*, Multiband Plus continued indefinitely to try to reach the requested number of channels in an AIM call. The retries should cease after 30 seconds.
- The SNMP object *ifAdminStatus* did not correctly show the desired state of the interface, but showed the current state instead and there was no way of differentiating between lines which were supposed to be down from lines that were not supposed to be down.