MAX 2000 T1/PRI Getting Started

Ascend Communications

Part Number 7820-0431-003 July 3, 1997

Important safety instructions

The following safety instructions apply to the MAX:

1 Read and follow all warning notices and instructions marked on the product or included in the manual.

2 The maximum recommended ambient temperature for MAX models is 104˚ Fahrenheit (40˚ Celsius). Care should be given to allow sufficient air circulation or space between units when the MAX is installed in a closed or multi-unit rack assembly, because the operating ambient temperature of the rack environment might be greater than room ambient.

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 Installation of the MAX in a rack without sufficient air flow can be unsafe.

5 If installed in a rack, the rack should safely support the combined weight of all equipment it supports.

6 The connections and equipment that supply power to the MAX should be capable of operating safely with the maximum power requirements of the MAX. In the event of a power overload, the supply circuits and supply wiring should not become hazardous. The input rating of the MAX is printed on its nameplate.

7 Models with AC power inputs are 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.

8 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).

9 If a three-wire grounding type power source is not available, consult a qualified electrician to determine another method of grounding the equipment.

10 Models with DC power inputs must be connected to an earth ground through the terminal block Earth/Chassis Ground connectors. This is a safety feature. Equipment grounding is vital to ensure safe operation.

11 Prior to installing wires to the MAX's DC power terminal block, verify that these wires are not connected to any power source. Installing live wires (that is, wires connected to a power source) is hazardous.

12 Connect the equipment to a 48 VDC supply source that is electrically isolated from the AC source. The 48VDC source should be reliably connect to earth.

13 Install only in restricted access areas in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA 70.

14 Do not allow anything to rest on the power cord and do not locate the product where persons will walk on the power cord.

15 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.

16 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.

17 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.

18 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. There is a remote risk of electric shock from lightning.
- Do not use a telephone or other equipment connected to telephone lines to report a gas leak in the vicinity of the leak.

Warning: To reduce the risk of fire, communication cable conductors must be 26 AWG or larger.

Attention: Afin de reduire les risques d'incendie, les fils conducteurs du cable de communication doivent etre d'un calibre minimum de 26 AWG (American Wire Gauge), cest-a-dire d'un minimum de 0,404 mm.

Warnung: Um Feuerrisiken zu reduzieren, müssen die Kommunikationskabel-Anschlüße 26 AWG oder größer sein.

Contacting Ascend Customer Service

When you contact Ascend Customer Service, make sure you have this information:

- The product name and model
- The software and hardware options
- The software version
- Whether you are routing or bridging with your Ascend product

- The type of computer you are using
- A description of the problem

How to contact Ascend Customer Service

If you need Technical Assistance, contact Ascend in one of the following ways:

Telephone in the United States	800-ASCEND-4 (800-272-3634)
Telephone outside the United States	510-769-8027 (800-697-4772)
- UK	(+33) 492 96 5671
- Germany/Austria/Switzerland	(+33) 492 96 5672
- France	(+33) 492 96 5673
- Benelux	(+33) 492 96 5674
- Spain/Portugal	(+33) 492 96 5675
- Italy	(+33) 492 96 5676
- Scandinavia	(+33) 492 96 5677
- Middle East and Africa	(+33) 492 96 5679
E-mail	support@ascend.com
E-mail (outside US)	EMEAsupport@ascend.com
Facsimile (FAX)	510-814-2312
Customer Support BBS by modem	510-814-2302

You can also contact the Ascend main office by dialing 510-769-6001, or you can write to Ascend at the following address:

Ascend Communications
One Ascend Plaza
1701 Harbor Bay Parkway
Alameda, CA 94502-3002

Need information on new features and products?

We are committed to constantly improving our products. You can find out about new features and product improvement as follows:

- For the latest information on the Ascend product line, visit our site on the World Wide Web:
  `http://www.ascend.com/`
- For software upgrades, release notes, and addenda to this manual, visit our FTP site:
  `ftp.ascend.com`

Contents

Figures

Tables

About This Guide

This guide explains how to install and test the MAX 2000 T1/PRI (referred to as the MAX) hardware. It also explains how to navigate the user interface. When you finish with the instructions in this guide, you will be ready to configure the MAX.

What is in this guide?

This guide contains these chapters:

- Chapter 1, “Getting Acquainted with the MAX,” describes the main features and provides a list of package contents.
- Chapter 2, “Setting Up and Testing the MAX Hardware,” explains install and test the MAX hardware.
- Chapter 3, “Navigating the User Interface,” tells you how to navigate the MAX user interfaces.
- Appendix A, “Provisioning the Switch,” gives you information that your T1 or BRI service provider needs to properly provision the Central Office switch.
- Appendix B, “MAX Specifications,” lists the technical specifications of the MAX itself and the pin assignments for each interface.
- Appendix C, “FCC and Canadian Notices,” provides the appropriate notices for the MAX.
- Appendix D, “Warranty,” is the MAX product warranty.

The guide also includes an index.

What you should know

This guide is intended for the person who will install the MAX. At a minimum, you should understand these items:

- Communications hardware
- Wide area network (WAN) concepts and terms
- Local area network (LAN) concepts and terms, if applicable

Documentation conventions

This section shows the documentation conventions used in this guide.

Convention	Meaning
Monospace text	Monospace text represents information that you enter exactly as shown and it identifies onscreen text, such as statistical information.
[]	Square brackets indicate an optional attribute that you append to a command. To include an attribute, type only the information inside the brackets. Do not type the brackets unless they appear in bold type.
italics	Italics represent variable information. Do not enter the words themselves in the command; enter the information they represent.
Note:	A note signifies important additional information.
 **Caution:**	A caution means that a failure to follow the recommended procedure could result in a loss of data or damage to equipment.
 **Warning:**	A warning means that a failure to take appropriate safety precautions could result in physical injury.

Documentation set

The MAX T1/PRI Documentation Set consists of the following manuals:

- *Getting Started* (this guide)
- *Internet Service Provider & Telecommuting Configuration Guide*
- *Security Supplement*
- *RADIUS Configuration Guide*
- *MIF Supplement*
- *Reference Guide*

Related publications

This guide and documentation set do not provide a detailed explanation of products, architectures, or standards developed by other companies or organizations.

Here are some related publications that you may find useful:

- *Data Link Protocols*, Uyless Black
- *Firewalls and Internet Security*, William R. Cheswick and Steven M. Bellovin
- *The Basics Book of ISDN*, Motorola University Press
- *ISDN*, Gary C. Kessler
- *The Guide to T1 Networking*, William A. Flanagan
- *TCP/IP Illustrated*, W. Richard Stevens

Getting Acquainted with the MAX

1

This chapter covers these topics:

What is the MAX 2000 T1/PRI?

The MAX 2000 T1/PRI is a WAN access switch designed for central site remote access applications. It has these main features:

- Supports digital WAN access for numerous WAN services
- Allows digital and analog modems to dial in over a channelized T1/PRI access line
- Provides IP and IPX routing, bridging, and terminal server functions
- Aggregates multiple calls for Bandwidth-on-Demand
- Supports multiple security methods
- Has various management and control features

What items are included in your package?

The MAX package contents vary, depending on the expansion cards you order. This section helps you confirm the items in your package.

Checking the MAX base unit

Open your package and look at the back panel of the unit, to make sure you received the MAX 2000 T1/PRI unit you ordered. See the following figure.

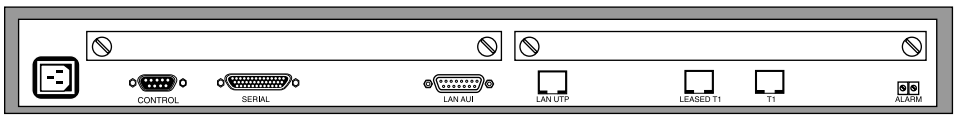

Figure 1-1. MAX 2000 T1/PRI back panel

Checking other package contents

After you verify that you have received the right base unit, make sure your package contains these items:

- A console cable (null-modem)
- A power cable
- Separately packaged expansion modules, if you ordered them separately
- One or more of the following manuals, depending on the options you ordered:
  - *MAXDial User's Guide*
  - *MAXLink Client User's Guide*

If you are missing any items, contact your MAX distributor.

Checking the expansion cards

The MAX can accommodate up to two expansion cards (also referred to as expansion modules or slot cards). Use this section to identify your expansion cards.

Digital Modem Card

The Digital Modem Card provides twelve V.34/V.42 digital modems (called Digital Modem12, or DM12 cards). You can install a maximum of two Digital Modem Cards in the MAX. See the following figure.

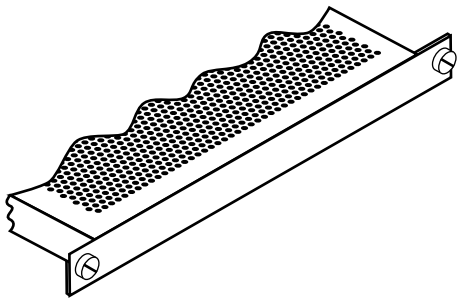

Figure 1-2. Digital modem card

V.110 Card

The V.110 card provides up to eight V.110 WAN sessions. You can install a maximum of two V.110 cards in the MAX. See the following figure.

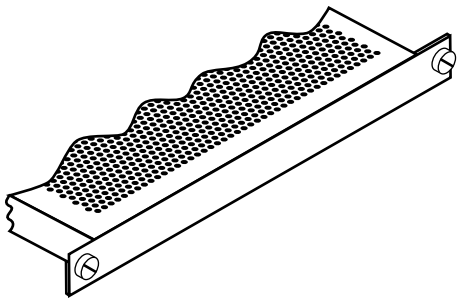

Figure 1-3. V.110 Card

Multiband Inverse Multiplexing Card

The Multiband Inverse Multiplexing Card has two or six user-selectable RS-449, V.35, or X.21 serial host ports with inverse multiplexing and RS-366 capability, V.25bis, or control-lead signaling. The following figure shows the two-port card.

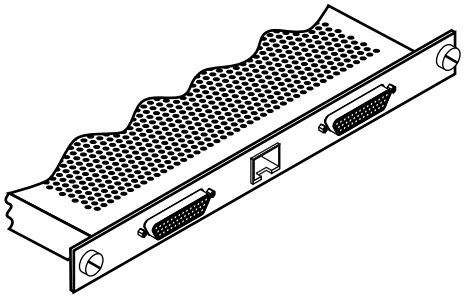

Figure 1-4. Multiband Inverse Multiplexing Two-Port Card

Host/6 Card

The Host/6 card, also known as the AIM/6 card, supports up to 32 online channels. You can install a maximum of two Host/6 cards in the MAX. See the following figure.

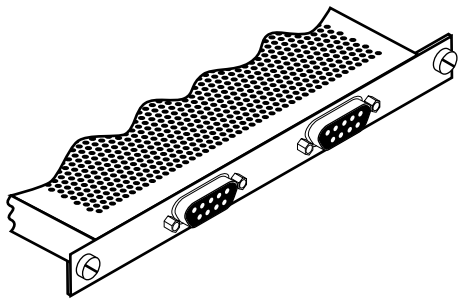

Figure 1-5. Host/6 Card

Now that you have verified the contents of your package, continue with the next chapter.

Setting Up and Testing the MAX Hardware 2

This chapter covers these topics:

What you need before you start

Before you install the MAX, make sure have these items:

- A suitable location to install the MAX hardware.
- If you are rack-mounting the MAX hardware, make sure you have a one-unit air gap for cooling (approximately one inch) between the MAX and other rack-mount hardware.
- An active T1 line, set for bidirectional calling.
  Bidirectional calling allows you to test the MAX hardware, by having the MAX dial out on one channel and answer on another channel.
- If necessary, you need the appropriate cables and connectors to set up and test your Ethernet LAN connection.
- A locally-connected host or workstation that can PING or TELNET the MAX.
- A VT100 terminal or a communications package that supports VT100 emulation installed on your workstation and an Ethernet interface.
- A remote Ascend or compatible unit to which you can PING or TELNET over a dial-up Point-to-Point Protocol (PPP) connection.
- If applicable, expansion modules that were shipped separately.

If you ordered MAX expansion cards separately, continue with the next section. If all of your expansion cards are preinstalled, skip to the section “Setting up the hardware” on page 2-4.

If you need detailed cable information (such as, pin assignments), refer to Appendix B, “MAX Specifications.”

Inserting an expansion card

If your MAX package includes expansion modules that are not already installed in your MAX, insert the modules now. Follow these steps:

1 Make sure the MAX power is off and the power cord is unplugged.

Warning: Failure to turn off the MAX power and unplug the power cord could result in injury to you.

2 Hold the expansion card with the network ports facing you and insert the card into a back panel slot as shown in the following figure. Make sure you insert the card into the guides within the same plane.

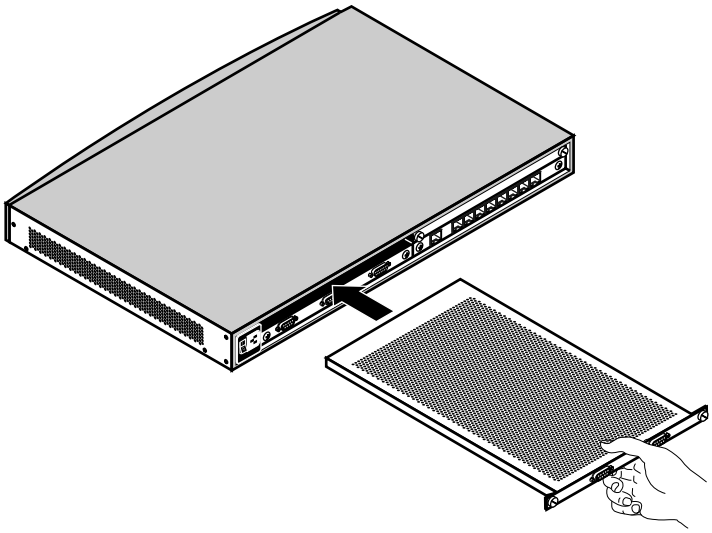

Figure 2-1. Inserting an expansion card into a MAX slot

3 Push the card along the internal guides until it is secure. The face plate of the expansion card should touch the back panel of the MAX.

Caution: Do not force the expansion card into the slot. Doing so can damage the card or slot connector.

4 Tighten the screws on either side of the card as shown in the following figure.

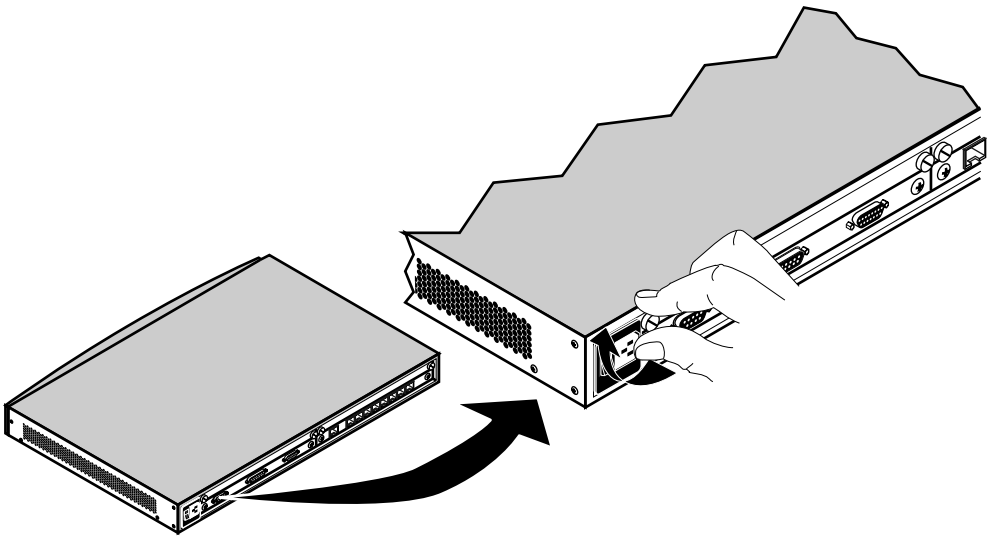

Figure 2-2. Tightening slot card thumbscrews

Now you are ready to set up the hardware.

Setting up the hardware

To set up the MAX hardware, follow these steps:

1. If you are installing the MAX in a rack, insert the unit in the rack and secure it. See the following figure.

   If you are not rack-mounting the MAX, place it where you can have full access to the front and back panels.

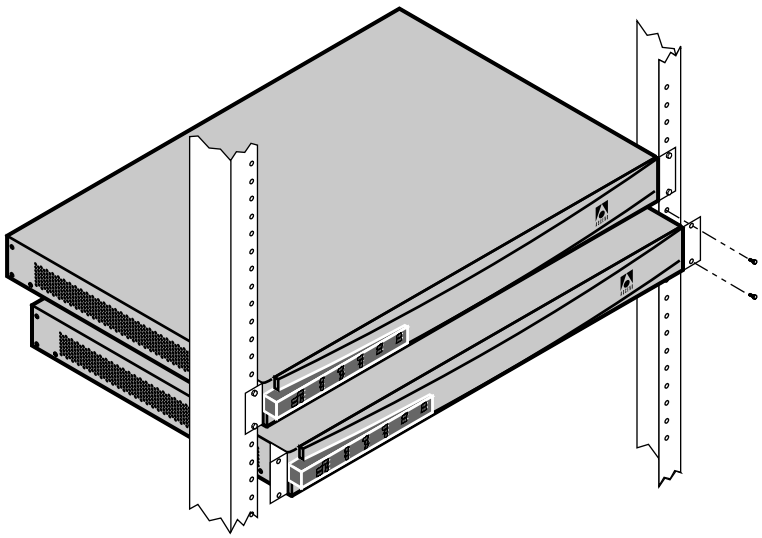

Figure 2-3.Mounting the MAX in a rack

2. Connect your VT100 terminal or workstation with VT100 terminal emulation software to the MAX Control port, using the null-modem cable provided in your package.

Because you can configure the MAX without connecting it to your LAN or WAN, you can choose which section to read next. If you want to connect your LAN or WAN cables to the MAX, read the next section,“Connecting the MAX to your LAN or WAN” on page 2-4. Otherwise, you can skip to the section “Interpreting the MAX LEDs” on page 2-5 and connect the LAN or WAN cables at a later time.

Connecting the MAX to your LAN or WAN

To connect the MAX to your LAN or WAN, follow these steps:

1. If applicable, connect your Ethernet LAN cable to the Ethernet interface on the MAX.
2. Connect the MAX either directly to the T1/PRI line or through other network interface equipment.

   Note: To connect to the demarcation point, where the T1/PRI line’s metallic interface connects to other equipment, the MAX T1/PRI port must be equipped with internal CSUs. Otherwise, external CSUs or other network (WAN) interface equipment must be installed between the MAX and the demarcation point.
3. Inform your T1/PRI service provider that your equipment is connected, so they can bring up the line.

Now that you have set connected the MAX to your LAN or WAN, you are ready to learn about the LEDs.

Interpreting the MAX LEDs

Before you start up the MAX, you need to understand the LEDs on the MAX front panel. The following figure shows the location of LEDs on the front panel.

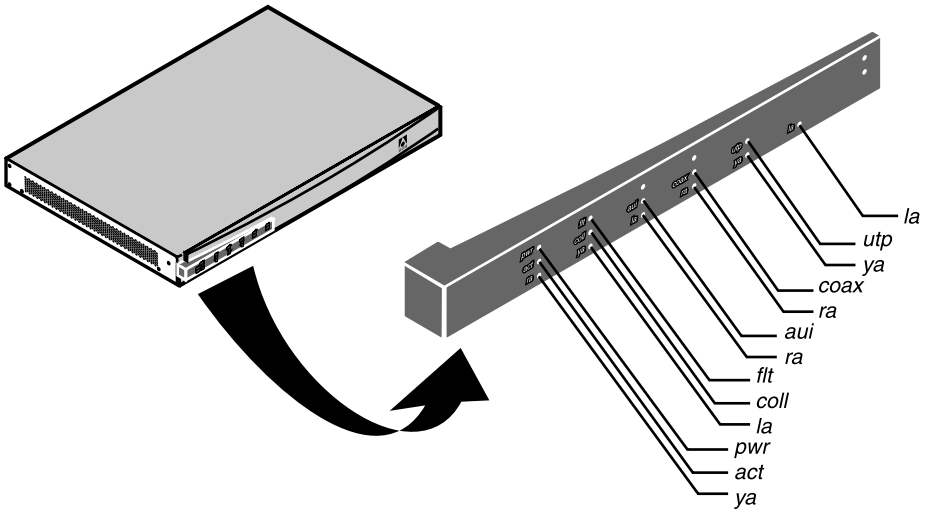

Figure 2-4. Location of the MAX LEDs

Refer to the following table to understand each LED.

Table 2-1. MAX LEDs

LED	Description
pwr	This LED is on when the MAX power is on.
act	This LED is ON if there is activity on the Ethernet interface.
ya (leftmost—for Line 1)	This LED is ON when the MAX is receiving a Yellow Alarm pattern, indicating that the other of the of the line cannot recognize signals transmitted from the MAX.
flt	This LED is ON in one of two cases—either a hardware self-test is in progress or there is a hardware failure. When a hardware self-test is in progress, the LED is ON. If any type of hardware failure occurs, the LED flashes. If the failure is isolated to an expansion card, the MAX may continue functioning without the expansion card.
coll	This LED is ON if there are collisions on the Ethernet.

Table 2-1. MAX LEDs

LED	Description
la (leftmost—for Line 1)	This LED is ON when the link is active and there are no pending alarms or tests. If a PRI is active and using D-channel signaling, this LED blinks when the unit is unable to establish layer 2 and 3 protocol communications with the central office switch. This may indicate a configuration error.
aui	This LED is ON to reflect the AUI interface.
ra (leftmost—for Line 1)	This LED is ON when the MAX is receiving a Red Alarm pattern, indicating 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 ON and a Yellow Alarm is transmitted toward the WAN.
coax	This LED is ON if the 10Base-2 interface is chosen.
utp	This LED is ON if the 10BaseT interface is chosen.
ra, ya, and la (righmost—for Line 2)	These LEDs have the same meanings as their leftmost counterparts, except they apply only to Line 2.

Now that you know about the MAX LEDs, you are ready to start up the MAX.

Starting up the MAX

To start up the MAX, follow these steps:

1 From your PC, set your terminal emulation package in your communications software as follows:

- 9600 bps
- 8 data bits
- No parity
- 1 stop bit
- No flow control
- Direct connect

2 Position yourself so you can watch the LEDs on the front panel, while you view the VT100 display.

3 Connect one end of the AC power cord to a power source and the other end to the MAX.

The power-on self-test (POST) starts and finishes within one minute. While the POST is running watch the LEDs, and the VT100 display.

If the pwr LED is ON and the flt LED is OFF the MAX is operating properly. You can continue with the next step.

If either LED is incorrect, remove the power cord and do not continue. Contact your Ascend distributor.

Also, notice the VT100 display during the POST. When the POST is successful, this mesage appears:

```
MAX
Power-On Self Test
PASSED
PRESS ANY KEY...
```

4 Press any key. This reminder screen appears, instructing you to edit your line configuration before you dial:

```
Edit Line Config
before dialing
 Press any key...
```

5 Press any key again to display the MAX Main Edit menu as shown.

```
Main Edit Menu
>00-000 System
 10-000 Net/T1
 20-000 Host/Dual
 30-000 Ethernet
 40-000 Empty
 50-000 Serial WAN
```

Continue with the next chapter, to learn how to navigate the MAX user interface.

Navigating the User Interface

3

This chapter contains these sections:

Using the configuration menus

You can access the MAX configuration menus in a VT100 emulation window from a computer connected to the Control port, as described in “Starting up the MAX” on page 2-6. When you see the configuration menus, you have established a Console session.

You can also establish a Console session from any Telnet workstation by opening a Telnet session with the MAX. From a Telnet session you can perform all of the configuration, diagnostic, management, and other functions that could be performed from a computer connected to the MAX Control port. See “About MAX passwords” on page 3-5 for related information.

You can also use the Rem Mgmt command to enable a caller at the far end of an AIM or MPP call to access the MAX configuration menus.

The main edit menu

The configuration interface consists of a Main Edit Menu and eight status windows. The left part of the screen is the Main Edit Menu, which is used to configure the MAX. See the following figure.

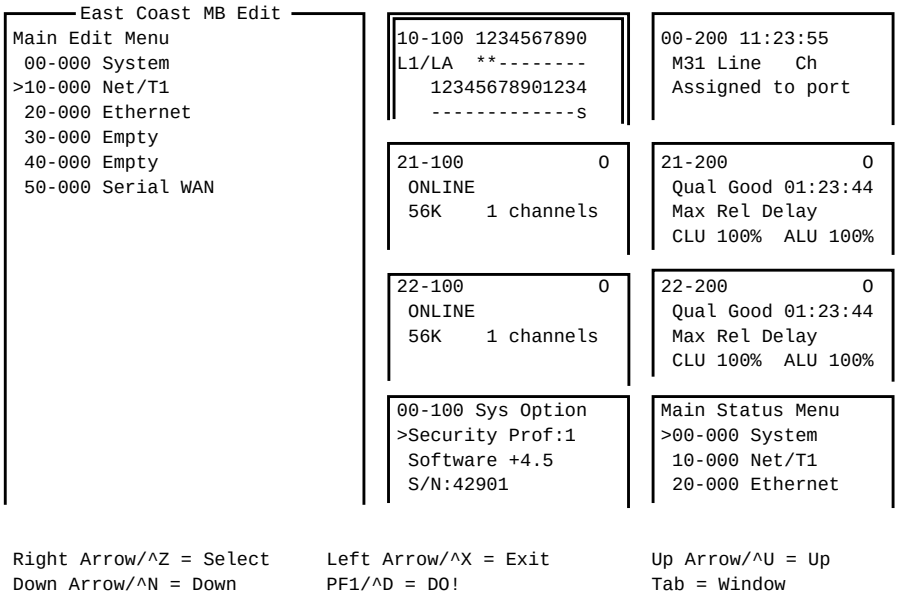

Figure 3-1. Example MAX configuration menus

The Empty items represent expansion slots that do not contain an expansion card. See “Understanding menu numbers” on page 3-7 for related information.

Making a menu or status window active

You can interact with only one display at a time. The active display has a thick double line border on the left, right, and top sides.

If you press the Tab key, the thick double lines move to 00-200, the next screen to the right. If you continue pressing the Tab key, you activate each window from left to right and down, until you reach the last display in the lower right-hand corner. Back-Tab or Ctrl-O moves you in the opposite direction.

Opening menus and profiles

The Main Edit Menu contains a list of menus, each of which can contain profiles and submenus. In the menu that is currently open, the cursor character (>) points to one item in the menu. To move the cursor down, press Ctrl-N (next) or the down-arrow key. To move it up, press Ctrl-P (previous) or the up-arrow key. (Some VT100 emulators do not support the use of arrow keys.)

```
Main Edit Menu
>00-000 System
 10-000 Net/T1
 20-000 Ethernet
 30-000 Empty
 40-000 Empty
 50-000 Serial WAN
```

To open a menu, move the cursor to the menu's name and press Enter. For example, press Ctrl-N until the cursor points to 20-000 Ethernet, and press Enter. The Ethernet menu opens.

```
20-000 Ethernet
>20-100 Connections
 20-200 Bridge Adrs
 20-300 Static Rtes
 20-400 Filters
 20-500 Frame Relay
 20-600 Answer
 20-700 SNMP Traps
 20-800 IPX Routes
 20-900 IPX SAP Filters
 20-A00 Mod Config
```

The Ethernet menu contains submenus and profiles related to network functionality, such as bridging, routing, WAN connections, and so forth. The Mod Config Profile in this menu relates to the configuration of the Ethernet interface itself, as shown next.

```
90-900 Mod Config
>Module Name=
 Ether options...
 WAN options...
 SNMP options...
 TServ options...
 Bridging=Yes
 IPX Routing=No
 Shared Prof=No
```

```
 Telnet PW=*SECURE*
 RIP Policy=Split Horzn
 RIP Summary=Yes
 ICMP Redirects=Accept
 DNS...
 Auth...
 Accounting...
 Log...
```

Note: With the exception of parameters designated N/A (not applicable), you can edit all parameters in any profile. A profile is a group of parameters listed under a particular menu entry. N/A means that a parameter does not apply within the context of how some other parameter(s) or profile has been set.

Opening edit fields

To open an edit field for a text-based parameter (such as a password, for example), move the cursor to that parameter and press Enter. An edit field opens, delimited by brackets, as shown for the Telnet PW parameter, next.

```
90-900 Mod Config
 Module Name=
 Ether options...
 WAN options...
 SNMP options...
 TServ options...
 Bridging=Yes
 IPX Routing=No
 Shared Prof=No
Telnet PW:
 []
```

Note: See “About MAX passwords” on page 3-5 for related information.

A blinking text cursor appears in the brackets, indicating that you can start typing text. If the field already contains text, it is cleared when you type a character. To modify only a few characters of existing text, use the arrow keys to position the cursor and then delete or overwrite the characters.

To close the edit field and accept the new text, press Enter.

Setting enumerated parameters

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

Saving your changes

When you exit a profile, you are prompted to confirm that you want to save changes.

```
 EXIT
>0=ESC (Don’t exit)
```

```
1=Exit and discard
2=Exit and save
```

You can save the profile values by choosing the Exit and Save option and pressing Enter, or by pressing 2.

About MAX passwords

The MAX has up to nine security levels, each of which is defined in a Security Profile. When shipped from the factory, all nine levels are wide open, with no defined restrictions. To see the list of Security Profiles, open the System menu in the Main Edit Menu, and then select Security and press Enter.

```
00-300 Security
>00-301 Default
 00-302
 00-303
 00-304
 00-305
 00-306
 00-307
 00-308
 00-309 Full Access
```

Whenever the MAX is powered on, it activates the first Security Profile in this list, which is always named Default and always has no password. One of the first thing most administrators do is to reset the privileges in the Default profile to restrict what can be done by anyone accessing the MAX configuration menus. This is an important four-step process:

1 Open the Default Security Profile and set the Operations privilege to No.

2 Assign a password to the Full Access Security Profile. (Do not restrict privileges in the Full Access Profile.)

3 Activate the Full Access Security Profile and proceed to configure the MAX.

See the *MAX Security Supplement* for more information on security, including full details on modifying Security Profiles and assigning passwords.

Note: If you reset or power-cycle the MAX, it activates the new, restrictive Default profile. You will not be able to perform any configuration tasks until you activate and supply the password for the Full Access Profile, described next. The default password for the Full Access Profile is `Ascend`.

To activate the Full Access Security Profile, press Ctrl-D. A context-sensitive menu, called the DO menu, is displayed.

```
00-300 Security
DO...
>0=ESC
 P=Password
```

In the DO menu, press P (or select P=Password). The list of Security Profiles will be displayed. Select Full Access and press Enter. The MAX prompts for that profile's password.

```
00-300 Security
Enter Password:
```

```
[]

Press > to accept
```

Type the password and press Enter to accept it. (We recommend that you modify the Full Access Profile to assign a password other than the default “Ascend” as soon as possible.)

A message states that the password was accepted and the MAX is using the new security level, or if the password you entered is incorrect, you are prompted again to enter the password.

Note: For a Console session established via Telnet, the caller must first supply the Telnet password to establish a Telnet session. Then, the Default security level is set for that session. To configure the MAX via Telnet, the caller must activate the appropriate Security Profile.

Special display characters and keys

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 that the MAX is truncating it for display purposes.
- Ellipses (...) mean that a submenu displays the details of a menu option.
  The MAX displays the submenu when you select the menu option.

The following table lists the special-purpose keys and key combinations you can use in the Control Monitor display.

Table 3-1. Special purpose keys for Control Monitor display

Control Monitor	Operation
Right-Arrow, Return, Enter, Ctrl-Z, Ctrl-F	Enumerated parameter: Select the next value. String value: Move one character to the right or enter the current input. Menu: Open the current selection.
Left-Arrow, Ctrl-X, Ctrl-B	Enumerated parameter: Select the previous value. String value: Move left one character or exit the current input. Menu: Close the current selection.
Down-Arrow, Ctrl-N	Move down to the next selection.
Up-Arrow, Ctrl-U, Ctrl-P	Move up to the previous selection.
Ctrl-V	Move to the next page of the list.

Table 3-1. Special purpose keys for Control Monitor display (continued)

Control Monitor	Operation
Tab, Ctrl-I	Move to the next window.
Back-Tab, Ctrl-O	Move to the previous window.
N/A	Toggle to a status menu from the edit menu and vice versa.
Delete	Delete the character under the cursor.
Backspace	Delete the character to the left of the cursor.
none	Overwrite the character under the cursor with a space.
Ctrl-D	Open the DO menu.
Ctrl-T	Return from or go to the Simplified Menus.
Ctrl-L	Refresh the VT-100 screen.
Ctrl-C	Return from the MIF to the normal menus.
D	Dial the currently selected profile.

Note: You always use the Control and Shift keys in combination with other keys. This document represents key combinations as two characters separated by a hyphen, such as Shift-T, which types the capital letter T.

Understanding menu numbers

Every configuration menu is identified by a five-digit menu number in the format *XN-nnn*:

- *X* is the module number, and indicates a real or virtual module.

  Virtual modules (0-2) reflect the system and serial host functions of the MAX. Real modules plug into specific expansion slots of the MAX. SNMP management systems refer to the first digit *X* as the SlotIndex field.

  – Menus beginning with the digit 0 describe the virtual Module 0, which runs overall system functions.

  – Menus beginning with the digit 1 describe the virtual Module 1.

    The expansion slots are numbered from left to right.

- *N* is the port number.

  If this number is not 0, it specifies the serial host port on the module to which the menu applies. For serial host-port menus, the digit 0 indicates information pertinent to any portion of the module. For the system menus, the second digit is always 0.

- *-nnn* specifies 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 submenu type. The second and third digits identify

items in the submenu. For example, the upper level menu 10-000 Net/T1 has several submenus including 10-100 Line Config. When you select 10-100 Line Config, control moves to a list of Line Profiles, numbered from 10-101 to 10-103.

Now that you understand the MAX user interface, proceed to the *MAX ISP & Telecommuting Configuration Guide*.

Provisioning the Switch

A

This appendix provides the information necessary for properly provisioning a switch for T1 access, T1 PRI access, and ISDN BRI access to the WAN. This appendix contains these sections:

Provisioning the switch for T1 access

Note: These settings do not apply to the Serial Port T1-CSU. Refer to "Provisioning the Serial Port T1-CSU line," below for information on provisioning the switch for the Serial Port T1-CSU line.

If you use an inband signalling line, the T1 circuit at the Point-of-Presence (POP) must support the translations listed in Table A-1 for compatibility with the MAX.

Table A-1. T1 access provisioning information

Translation	Optional or required
Two-state DTMF (Dual-Tone Multifrequency) dialing	Required
Outgoing wink start	Required
Incoming Immediate seizure	Optional for a switch Does not apply on T1 lines to a PBX
Incoming wink start	Optional for a switch Required on T1 lines to a PBX
Incoming digits suppressed	Required, except when a PBX is connected to T1 line supplied by the MAX through PRI-to-T1 conversion
Answer supervision	Required
Switched data	Required No voice/digital loss plan is allowed, but the drop-and-insert channels to a PBX and the channels to digital modems can be voice channels

Four-state A bit signalling, four-state B bit signalling, and pulse dialing are not supported.

For further information on wink-start and inband signalling, see the description of the Rob Ctl parameter in the *MAX Reference Guide.*

Provisioning the Serial Port T1-CSU line

The Serial Port T1-CSU line DS0 channels must start with 0 and be contiguous. You must also know:

- whether the line uses B8ZS or AMI line encoding
- whether the line uses ESF or D4 framing

Provisioning the switch for T1 PRI access

Request the following information from your WAN provider about your WAN interface:

- Whether the line uses inband or ISDN D-channel signalling
- Whether the line uses B8ZS or AMI line encoding
- Whether the line uses ESF or D4 framing
- Each phone number assigned to the line on a channel-by-channel or service-by-service basis
- The number of nailed-up channels, if any
- The number of unused channels, if any
- The types of call-by-call services (also called NSF identifiers) on the switched channels
- Whether the line uses B channel, H0 channel, or H11 channel provisioning
- The D-channel assignment
- The NFAS ID number (if the T1 PRI line is provisioned for NFAS)

Keep this additional information in mind:

- In general, ESF framing and B8ZS line encoding are both recommended for T1 PRI-based applications; in addition, channel 24 must be the D channel, except for applications using Non-Facility Associated Signalling (NFAS).
- Applications that require NFAS must be connected to an AT&T or Northern Telecom switch provisioned with NFAS.

  The service provider supplies guidelines for NFAS ID assignments and D-channel assignments. Note that the MAX must have D-channel signalling functionality and at least two WAN ports to use NFAS.
- The MAX can receive multichannel calls using Combinet or MP encapsulation only if all channels of the call share a common phone number (namely, a hunt group).

  You can request that your service provider supply you with a hunt group.

Provisioning the switch for ISDN BRI access

The tables that follow supply provisioning information for the ISDN BRI interface when a Net/BRI module (MX-SL-8BRIN) is installed. These requirements vary by switch type. Table A-2 provides information for AT&T 5ESS® switches operating in Point-to-Point (PTP), Multi-Point (MP), or National ISDN-1 (NI-1) mode.

Table A-2. AT&T 5ESS provisioning information

Element	Value	Comments
Terminal Type	A	
Number of CSD (circuit switched data)	2	Except when it handles calls to digital modems, the MAX is a data device, and you can substitute voice service for data service only if end-to-end data integrity is guaranteed. Voice service is required if digital modems are installed.

Table A-2. AT&T 5ESS provisioning information (continued)

Element	Value	Comments
Number of CSV (circuit switched voice)	1	Except when it handles calls to digital modems, the MAX is a data device, and you can substitute voice service for data service only if end-to-end data integrity is guaranteed. Voice service is required if digital modems are installed.
Number of Call Appearances	1	This value is not relevant for proper operation of the MAX.
Ringing/Idle Call Appearances	Idle	This value is the default for Terminal Type A.
Autohold is Y/N	No	This value is the default for Terminal Type A.
Onetouch is Y/N	No	This value is the default for Terminal Type A.

Table A-3 provides provisioning information for Northern Telecom switches.

Table A-3. Northern Telecom provisioning information

Element	Value	Comments
Signaling	Functional	
Protocol version control (PVC)	1 or 2	1 is NTI custom. 2 is NI-1 (National ISDN-1), which requires a TID to be assigned as a suffix to the SPID.
TEI assignment	Dynamic	
Release Key	No	This value is not relevant for proper operation of the MAX.
Ringing Indicator	No	This value is not relevant for proper operation of the MAX.
EKTS (electronic key telephone system)	off	

Note: The MAX can receive multichannel calls using Combinet or MP encapsulation only if all channels of the call share a common phone number (namely, a hunt group). You can request that your service provider supply you with a hunt group.

Information required from the ISDN BRI provider

If a Net/BRI module (MX-SL-8BRIN) is installed, your ISDN BRI provider must provide you with the following information:

- The phone number assigned to your ISDN BRI line.
- The SPIDs assigned to your ISDN BRI line (for lines running in any mode other than AT&T Point-to-Point)
- Which channels are nailed up or unused, if any

SPIDs for AT&T 5ESS switches

If your ISDN BRI line comes from an AT&T 5ESS switch operating in Multi-Point (MP) or National ISDN-1 (NI-1) mode, each SPID has the following format:

`01 NNNNNNN 0 TT`

- *NNNNNNN* is the 7-digit phone number of the ISDN BRI line.
- *TT* is the 2-digit TID (required only for NI-1).
  The TID can be a value from 00 to 62. It is assigned by your carrier. Ascend recommends that you use 00 as the TID for all SPIDs.

For example, suppose that 555-1212 is the 7-digit phone number of an ISDN BRI line using Multi-Point mode. The telephone company gives you the following SPID:

`0155512120`

Now, suppose that 555-6001 and 555-6002 are the 7-digit phone numbers of an ISDN BRI line using NI-1 mode. You choose TID=00 for both numbers and the telephone company gives you the following SPIDs:

`017696001000`

`017696002000`

If your ISDN BRI line operates in Point-to-Point (PTP) mode, SPIDs are not required.

SPIDs for Northern Telecom DMS-100 switches

If your ISDN BRI line comes from a Northern Telecom (NTI DMS-100) switch, each SPI has the following format:

`AAANNNNNNN SS TT`

- *AAA* is the 3-digit area code of your ISDN BRI line.
- *NNNNNNN* is the 7-digit phone number of your ISDN BRI line.
- *SS* is the SPID suffix, which can contain zero, one, or two digits as follows:
  - Empty
  - 1 and 2 for each ISDN BRI line
  - 01 and 02 for each ISDN BRI line
- *TT* is the 2-digit TID (required only for NI-1 [PVC=2])
  The TID can be a value from 00 to 62. It is assigned by your carrier. Ascend recommends you use 00 as the TID for all SPIDs.

For example, suppose you are using Northern Telecom in NTI Custom mode [PVC=1]). 415-555-1212 is the phone number of your ISDN BRI line, including the area code. The telephone company gives you the following SPID:

```
415555121201
```

Now, suppose you are using Northern Telecom in NI-1 mode [PVC=2]). 510-555-6001 and 510-555-6002 are the phone numbers of your ISDN BRI line. You choose TID=00 for both numbers and the telephone company gives you the following SPIDs:

```
5107690010100
```

```
5107690020200
```

EAZ (Terminal Identification Number in Germany)

EAZ is a German 1TR6 ISDN BRI protocol that uses the last digit of a phone number being called (the called-party number) as a subaddress. EAZ in the called-party number allows devices sharing an ISDN BRI S-bus to answer incoming calls distinguished by their EAZ subaddresses. EAZ also applies a subaddress to the phone number of the call originator (the calling-party number).

MAX Specifications

B

This appendix describes specifications for different facets of the MAX, and discusses cabling requirements. This appendix contains these sections:

General specifications

Battery

The MAX contains an internal 3V lithium battery. The normal operating life of this battery exceeds five years.

Only Ascend-authorized personnel should open the MAX's case for testing, maintenance, installation, or any other purpose. Furthermore, only Ascend-authorized personnel should replace components inside the MAX.

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

ATTENTION: IL Y A DANGER D'EXPLOSION S'IL Y A REMPLACEMENT INCORRECT DE LA BATTERIE. REMPLACER UNIQUEMENT AVEC UNE BATTERIE DU MÉME TYPE OU D'UN TYPE RECOMMANDEÉ PAR LE CONSTRUCTEUR. METTRE AU RÉBUT LES BATTERIES USAGÉES CONFORMÉMENT AUX INSTRUCTIONS DU FABRICANT.

Power requirements

The MAX's source power requirements are listed in the following table.

Table B-1. MAX source power requirements

Element	Value
Voltage	90-240 VAC
Phase	Single
Frequency	47-63 Hz
Power	80W (nominal)-200W (maximum)

The MAX's configuration profiles are stored in battery-protected memory. When the MAX is turned off, the profiles are not lost.

Note: Use a protected AC power source, or add surge protection between the power source and the MAX.

Environmental requirements

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

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

You can operate the MAX at altitudes of 0 to 14800 ft. (0-4500 m).

The MAX base system weighs 10 lbs (4.536 kg); a fully loaded system weighs 15 lbs (6.8 kg). The MAX has these dimensions: 1.75" x 17" x 12" (4.45 cm x 43.2 cm x 30.5 cm).

User interface specifications

This sections covers cabling pin assignments for the Control Monitor and MIF interfaces.

Control port and cabling pin assignments for the 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. All MAX models use the RS-232 pin assignments listed in the following table.

Table B-2. Control Monitor and MIF Control port and cabling pin assignments

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).

Ethernet interface specifications

A MAX supports the physical specifications of IEEE l802.3 with Ethernet 2 (Ethernet/DIX) framing. It provides a single Ethernet interface and can support any one of the following Ethernet types:

- 10Base-T (Unshielded Twisted Pair): Twisted pair Ethernet and IEEE 802.3 (10Base-T) with an RJ-45 connector.
- AUI (Attachment Unit Interface): Standard Ethernet and IEEE (10Base-5) with a 15-pin AUI connector.

The Ethernet address used to identify the Ethernet interface resides in the MAX's motherboard, allowing replacement of the Ethernet module without changing its Ethernet address.

Required equipment

To install the Ethernet interface, you must have the equipment described in the sections below.

10Base-T

You need a twisted-pair Ethernet cable and a dual twisted-pair cable terminated with RJ-45 modular jacks.

Use an EIA/TIA 568 or IEEE 802.3 10Base-T cable. Some installations require a crossover cable, as when connecting directly to the Ethernet port of a PC.

AUI

You need a transceiver and transceiver cable.

T1/PRI interface specifications

This section provides the specifications for the MAX's T1/PRI interface and covers cabling requirements.

T1/PRI CSU requirements

Your requirements differ depending on whether a T1/PRI port on the MAX is equipped with an internal Channel Service Unit (CSU).

- If the T1/PRI port on the MAX has an internal CSU, you can connect the port directly to the metallic interface of the WAN.

  To avoid harming the WAN, you must contact your carrier for approval before installation. Once you install the MAX, you must notify the carrier before disconnecting the MAX from the WAN. If you disconnect or turn off the MAX without prior notification, the carrier might temporarily discontinue your T1/PRI service.

  The MAX's internal CSUs are compatible with dry-loop T1/PRI lines, and with span-powered or wet-loop powered T1/PRI lines.

- The T1/PRI port of the MAX that does not have an internal CSU cannot connect directly to the WAN.

  You must connect the port to other equipment that provides the interface to the WAN, such as an external CSU. Your carrier determines the correct setting for the line buildout setting of the CSU. You configure this parameter during installation. For more information, see the *MAX Reference Guide*.

The following table lists CSU specifications.

Table B-3. CSU specifications

Information	Value
CSU Registration	2CZUSA-74421-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

Note: During loss of power or whenever the MAX restarts, a relay closure returns the T1 PRI signal to the WAN; that is, the T1 PRI line is looped back. Note that line #1 and line #2 of a MAX expansion module always loop back on loss of power, regardless of how they are configured.

T1/PRI cable specifications

The maximum cable distance between the T1/PRI WAN interface equipment and the MAX should not exceed 655 feet (200 m) for a MAX without CSUs. Measure the line length and record it when you install the MAX. You must specify this length when you configure the Line Profile parameters. For more information, see the *MAX Reference Guide*.

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

- 100 Ohm
- Two twisted pairs, Category 3 or better

The WAN interface cables and plugs described in the following sections are available for the MAX's WAN interfaces.

T1/PRI crossover cable: RJ48C/RJ48C

Install this cable when the WAN transmits on pins 5 and 4 and receives on pins 2 and 1. Refer to the following figure and table.

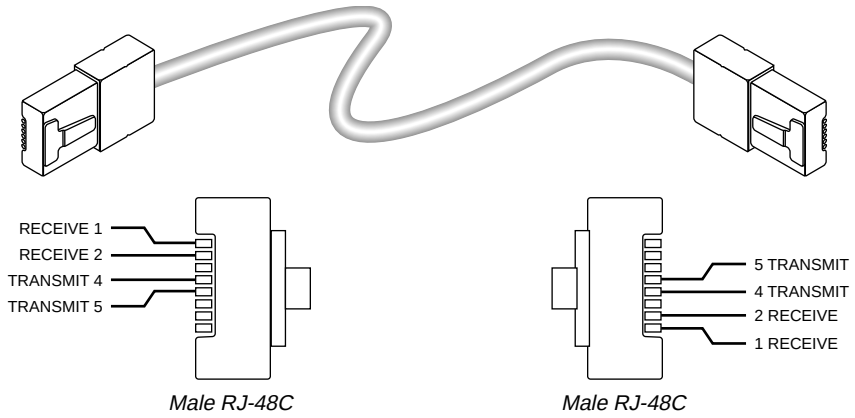

Figure B-1. RJ48C/RJ48C crossover cable.

Table B-4. RJ48C/RJ48C crossover cable specifications

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

T1/PRI straight-through cable: RJ48C/RJ48C

Before installing this cable, verify that the WAN transmits on pins 2 and 1 and receives on pins 5 and 4. Refer to the following figure and table.

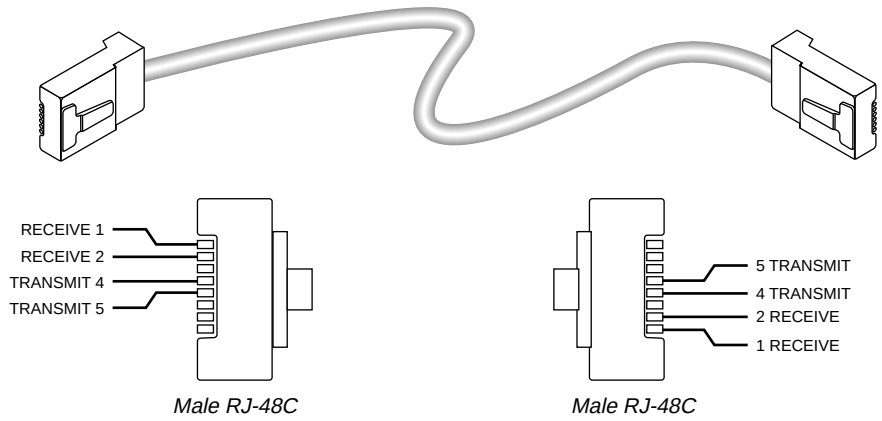

Figure B-2. RJ48C/RJ48C straight-through cable specifications

Table B-5. RJ48C/RJ48C straight-through cable specifications

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

T1/PRI straight-through cable: RJ48C/DA-15

Before installing this cable, verify that the WAN transmits on pins 3 and 11 and receives on pins 1 and 9. Refer to the following figure and table.

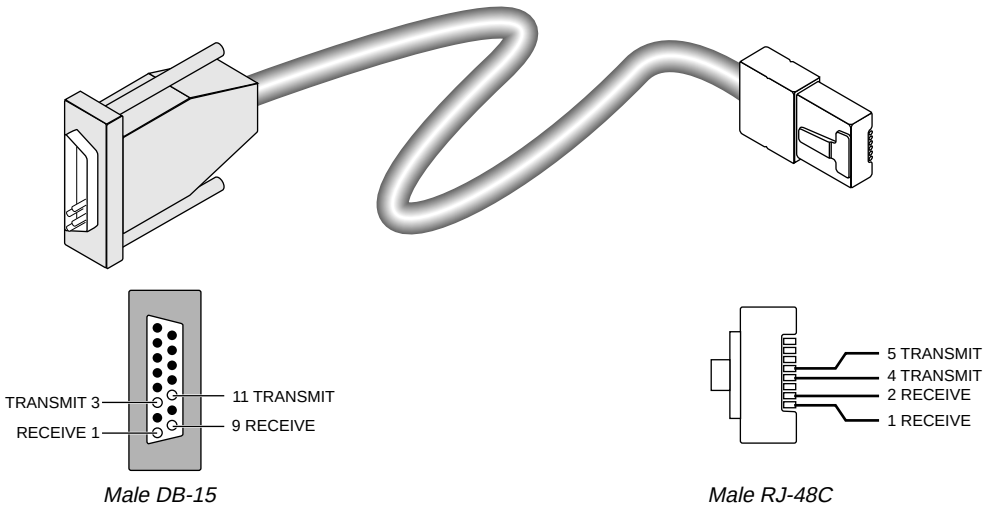

Figure B-3. RJ48C/DA-15 straight-through cable

Table B-6. RJ48C/DA-15 straight-through cable specifications

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

T1/PRI crossover cable: RJ48C/DA

Before installing this cable, verify that the WAN transmits on pins 1 and 9 and receives on pins 3 and 11. Refer to the following figure and table.

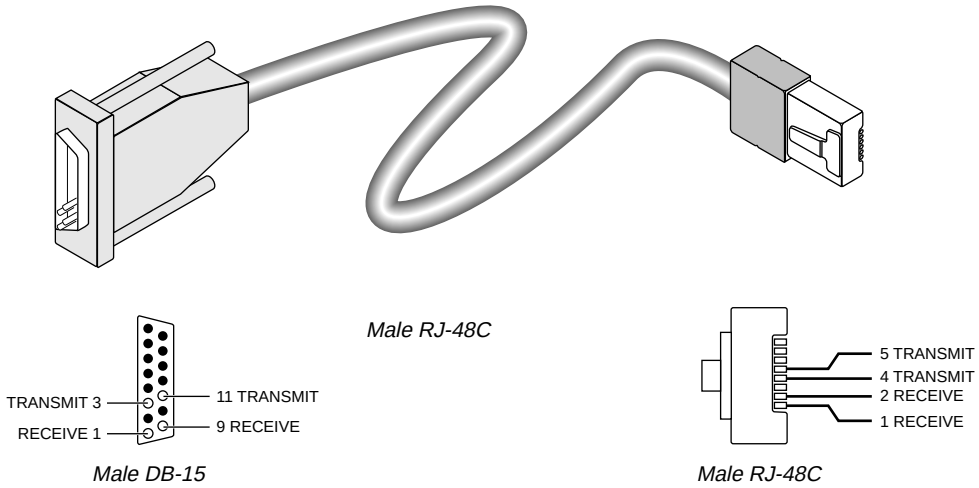

Figure B-4. RJ48C/DA crossover cable

Table B-7. RJ48C/DA crossover cable specifications

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

T1/PRI straight-through cable: RJ48C/Bantam

The WAN side of the cable connects to dual bantam jacks. Refer to the following figure and table.

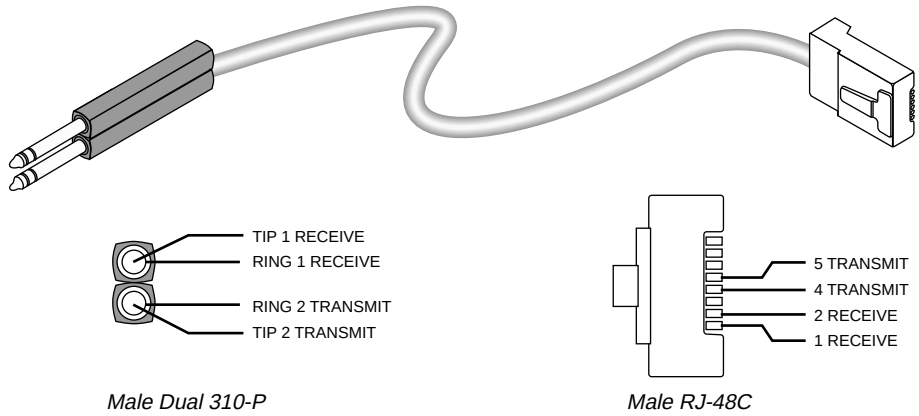

Figure B-5. RJ48C/Bantam straight-through cable

Table B-8. RJ48C/Bantam straight-through cable specifications

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

T1 RJ48C-Loopback plug

This plug loops the transmit signal back to the MAX.

Table B-9. RJ48C-Loopback plug specifications

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

T1/PRI WAN connectors

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

Table B-10. Transmit and Receive pins

MAX T1/PRI interface	RJ48C DTE
Receive (input) pair, Tip (T1) Receive (input) pair, Ring (R1)	Position 2 Position 1
Transmit (output) pair, Tip (T) Transmit (output) pair, Ring (R)	Position 5 Position 4

WAN switched services available to the MAX

The MAX is compatible with both AT&T and Northern Telecom central office switches, and can access all T1/PRI switched digital services offered by AT&T's ACCUNET Switched Digital Services:

- MCI 56 kbps and 64 kbps services
- Sprint Switched 56 kbps and 64 kbps services
- MultiRate and GloBanD (and GVPN in CCITT countries) PRI network services

Note: The MAX can access only Switched-56 kbps services on a T1 access line or a Switched-56 line.

For a listing of the compatible switch types, see the Switch Type parameter in the *MAX Reference Guide*. In addition to switched circuits, the MAX can connect to nailed-up circuits, and to aggregate nailed-up and switched circuits.

ISDN BRI interface specifications

This section provides the specifications for the MAX's ISDN BRI interface.

Warning: To reduce the risk of fire, communication cable conductors must be 26 AWG or larger.

Attention: Afin de reduire les risques d'incendie, les fils conducteurs du cable de communication doivent etre d'un calibre minimum de 26 AWG (American Wire Gauge), cest-a-dire d'un minimum de 0,404 mm.

Warnung: Um Feuerrisiken zu reduzieren, müssen die Kommunikationskabel-Anschlüße 26 AWG oder größer sein.

For the Net/BRI module

The Net/BRI module (MX-SL-8BRIN) connects to the WAN through a network termination (NT1) device. You must install a cable from the NT1 that ends in a 100 Ohm termination. The maximum distance between the NT1 and its termination is 3280 feet (1000 m). You can install the Net/BRI module anywhere along the length of the cable. Use only cable specifically constructed for ISDN BRI interfaces.

Note: In Belgium, install 10 m of cable between the Net/BRI module and the NT1. Significant data errors can result from using shorter cables.

For the Host/BRI module

Each ISDN BRI line provided by the Host/BRI module (MX-SL-8BRIT) must end in a 100 Ohm termination. The maximum cable distance between the Host/BRI and its termination is 3280 feet (1000 m). You can install the local ISDN BRI device anywhere along the length of the cable. Use only cable specifically constructed for ISDN BRI “S” interfaces.

Serial host interface specifications

This section describes the cabling requirements, timing requirements, and interface types for the serial host ports on the MAX.

The MAX’s serial host ports are compatible with the following three electrical standards:

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

The MAX also supports the following dialing/answering protocols at any of its serial host ports:

- V.25 bis
- RS-366
- X.21

Selection of the proper cable between a serial host port and the serial device ensures:

- The proper mapping of pin assignments from the MAX to the application equipment
- Proper voltage levels

In the cable wiring tables that follow, the MAX is the DCE (Data Circuit-Terminating Equipment) device, while the host equipment is the DTE (Data Terminal Equipment) device. The serial host interface cabling tables use the abbreviations listed in the following table. Note that the Send timing and Receive timing clocks are supplied to the host by the MAX.

Table B-11. Serial host interface cabling abbreviations

Abbreviation	Explanation
FGND	Chassis Ground

Table B-11. Serial host interface cabling abbreviations (continued)

Abbreviation	Explanation
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)

V.35 cabling

The pin assignments for different types of V.35 cabling are listed in the sections that follow.

V.35/V.25 bis cable to Cisco router

This cable connects the MAX to the V.35 port of a Cisco router that uses V.25 bis dialing. It has the pin assignments shown in the following figure and table.

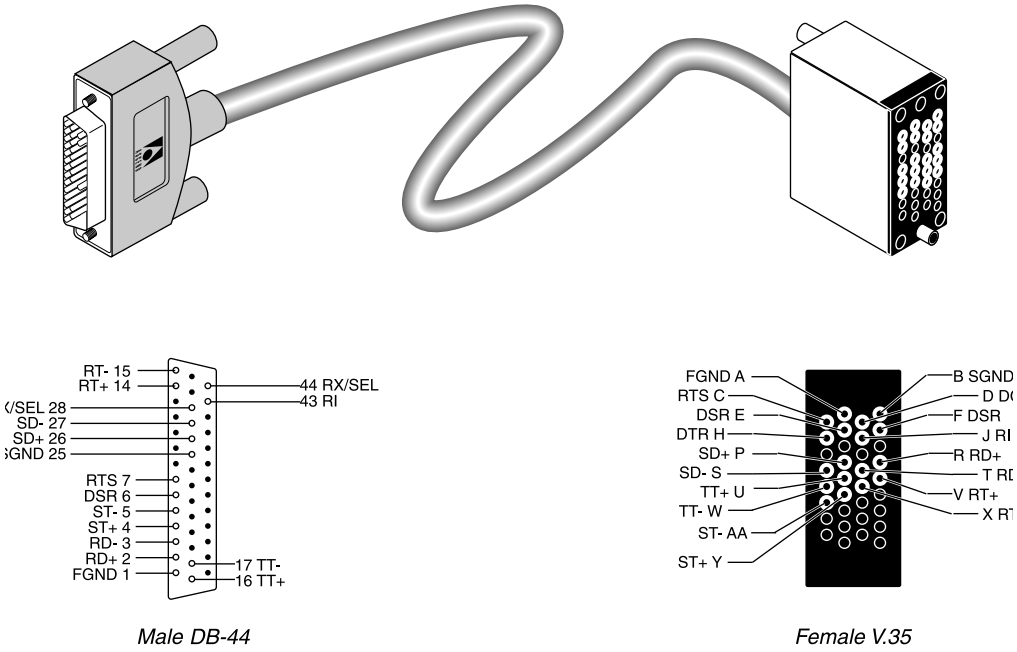

Figure B-6. V.35/V.25 bis cable to Cisco

Table B-12. V.35/V.25 bis cable to Cisco pin assignments

Model number MBHD-V.35-CISCO **Part number 2510-0099-001**			
Pair #	**Signal**	**MAX 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

Table B-12. V.35/V.25 bis cable to Cisco pin assignments

Model number MBHD-V.35-CISCO Part number 2510-0099-001			
Pair #	**Signal**	**MAX male DB-44**	**Host female V.35**
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.

V.35 cable to generic serial host

This cable connects the MAX to the 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 pin assignments listed in the following table.

Table B-13. V.35 cable to generic serial host pin assignments

Model number MBHD-V35 Part number 2510-0079-001			
Pair #	**Signal**	**MAX 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

Table B-13. V.35 cable to generic serial host pin assignments

Model number MBHD-V35 Part number 2510-0079-001			
Pair #	**Signal**	**MAX male DB-44**	**Host female V.35**
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.

V.35/RS-366 cable to generic serial host

This cable connects the MAX to the V.35 ports of a wide variety of equipment using RS-366 dialing. A female-to-male V.35 gender changer is included when you order the cable. It has the pin assignments shown in the following figure and table.

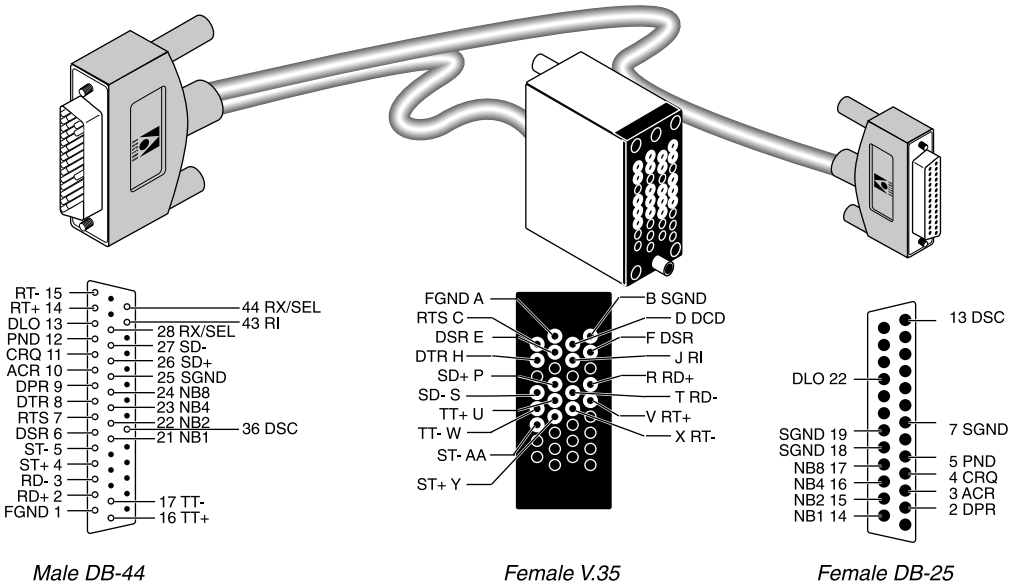

Figure B-7. V.35/RS-366 cable to generic serial host

Table B-14. V.35/RS-366 cable to generic serial host pin assignments

Model number MBHD-V35-366 **Part number 2510-0077-001**			
Pair #	**Signal**	**MAX 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/CTS	6 36	E D, F*
7	RTS RI	7 43	C J

Table B-14. V.35/RS-366 cable to generic serial host pin assignments

Model number MBHD-V35-366 Part number 2510-0077-001			
Pair #	**Signal**	**MAX male DB-44**	**Host female V.35**
8	DTR SGND	8 25	H B
9	TT+ TT-	16 17	U W
10	DPR ACR	9 10	
11	CRQ PND	11 12	
12	DLO SGND	13 25	
13	NB1 NB2	21 22	
14	NB4 NB8	23 24	
15	DSC	36	
16	RX/SEL	28, 44*	

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

V.35/RS-366 cable to CLI

This cable connects the MAX to the V.35 port of the Compression Labs Rembrandt II codec with support for RS-366 dialing. It has the pin assignments listed in the following figure and table.

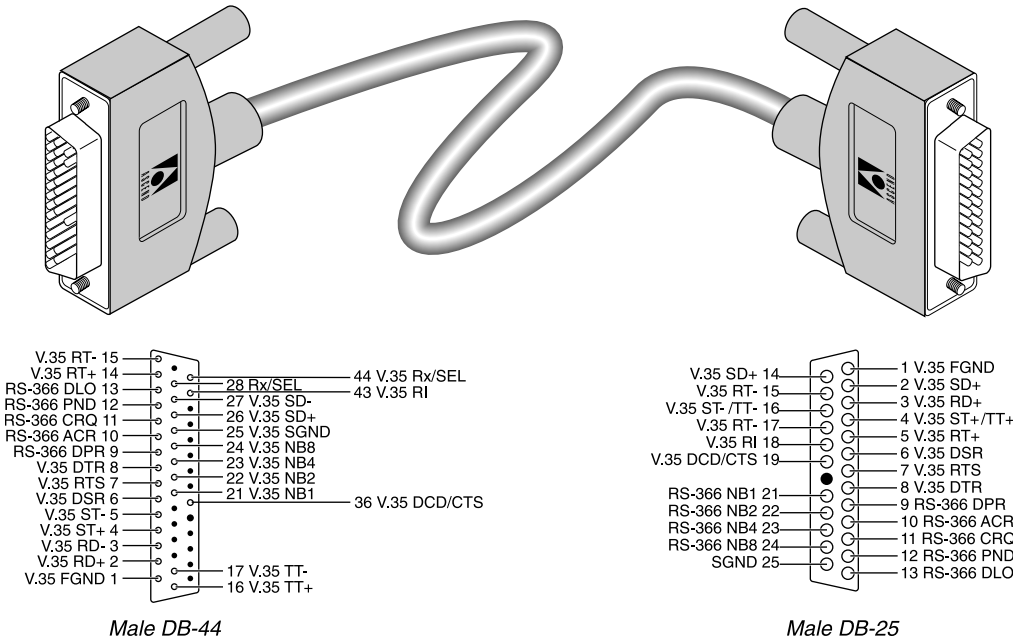

Figure B-8. V.35/RS-366 cable to CLI codec

Table B-15. V.35/RS-366 cable to CLI pin assignments

Model number MBHD-V35CLI **Part number 2510-0094-001**			
Pair #	**Signal**	**MAX 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

Table B-15. V.35/RS-366 cable to CLI pin assignments

Model number MBHD-V35CLI Part number 2510-0094-001			
Pair #	**Signal**	**MAX male DB-44**	**Host V.35/RS-366 male DB-25**
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.

V.35/RS-366 cable to PictureTel

This cable connects the MAX to the V.35 port of the PictureTel codec with support for RS-366 dialing. It has the pin assignments listed in the following figure and table.

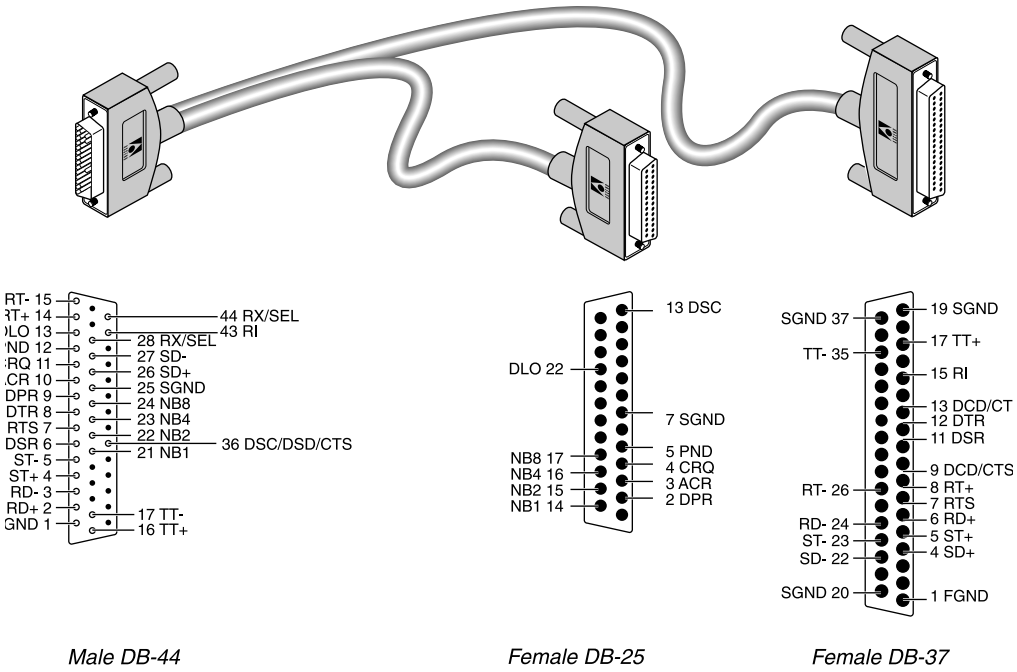

Figure B-9. V.35/RS-366 cable to PictureTel

Table B-16. V.35/RS-366 cable to PictureTel pin assignments

Model number MBHD-449PT **Part number 2510-0093-001**			
Pair #	**Signal**	**MAX male DB-44**	**Host female DB-37**
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

Table B-16. V.35/RS-366 cable to PictureTel pin assignments

Model number MBHD-449PT **Part number 2510-0093-001**			
Pair #	**Signal**	**MAX male DB-44**	**Host female DB-37**
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	
11	CRQ PND	11 12	
12	DLO SGND	13 25	
13	NB1 NB2	21 22	
14	NB4 NB8	23 24	
15	DSC	36	
16	RX/SEL	28, 44*	

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

RS-366 cabling

Ascend supplies a variety of RS-366 cables. The pin assignments for different types of RS-366 cabling are listed in the sections that follow.

RS-449 / RS-366 / DB-37 cable to Video Telecom

This cable connects the MAX to the RS-449 port of a Video Telecom codec with support for RS-366 dialing. It has the pin assignments listed in the following figure and table.

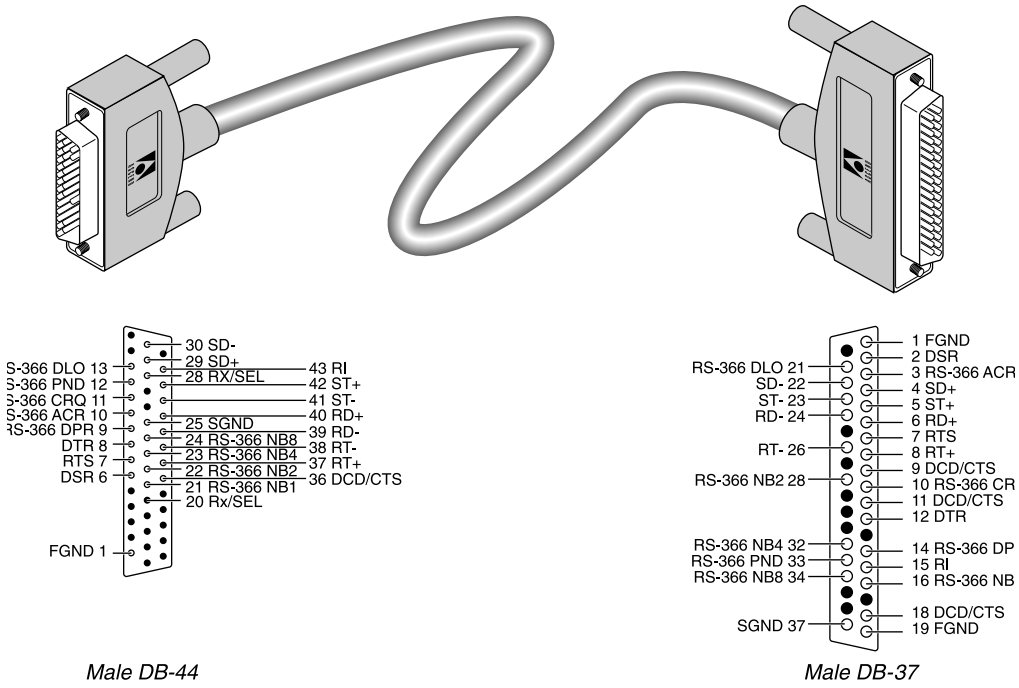

Figure B-10. RS-449/RS-366/DB-37 cable to Video Telecom codec

Table B-17. RS-449 / RS-366 / DB-37 cable to VTC pin assignments

Model number MBHD-449VTC **Part number 2510-0081-001**			
Pair #	**Signal**	**MAX 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

Table B-17. RS-449 / RS-366 / DB-37 cable to VTC pin assignments

Model number MBHD-449VTC Part number 2510-0081-001			
Pair #	**Signal**	**MAX male DB-44**	**Host RS-449/RS-366 male DB-37**
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. This cable does not support terminal timing.

RS-449/RS-366 cable to generic serial host

This cable connects the MAX to the RS-449 ports of a wide variety of equipment using RS-366 dialing. A female-to-male DB-37 gender changer is included when you order the cable. It has the pin assignments shown in the following figure and table.

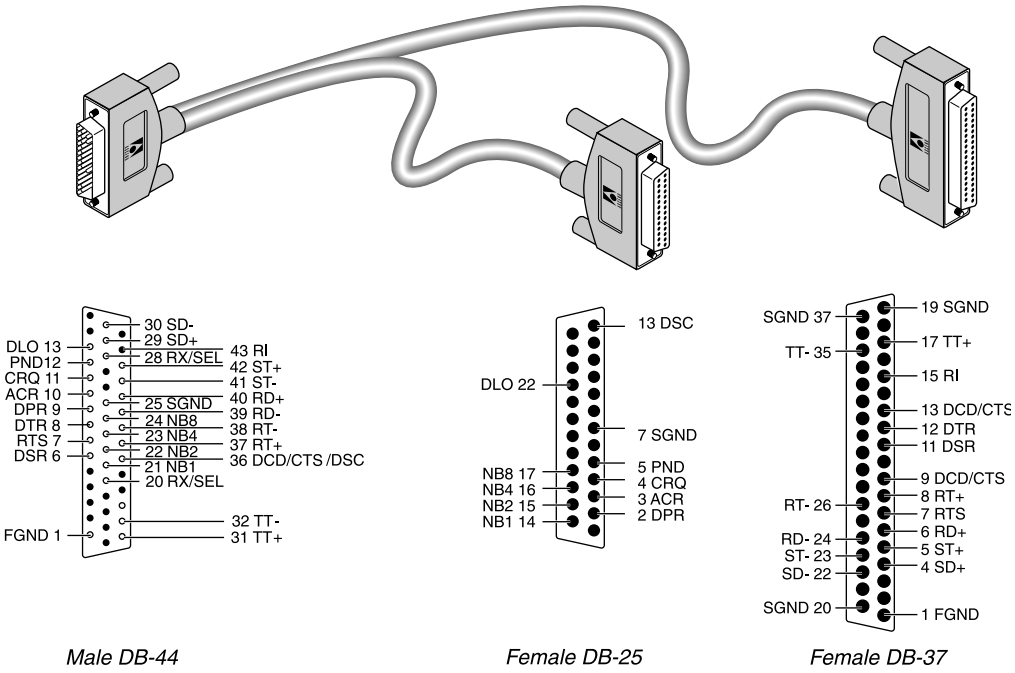

Figure B-11. RS-449/RS-366 cable to generic serial host

Table B-18. RS-449/RS-366 cable to generic serial host pin assignments

Model number MBHD-449-366 **Part number 2510-0078-001**			
Pair #	**Signal**	**MAX 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

Table B-18. RS-449/RS-366 cable to generic serial host pin assignments

Model number MBHD-449-366 **Part number 2510-0078-001**			
Pair #	**Signal**	**MAX male DB-44**	**Host female DB-37**
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	
11	CRQ PND	11 12	
12	DLO SGND	13 25	
13	NB1 NB2	21 22	
14	NB4 NB8	23 24	
15	DSC	36	
16	RX/SEL	20, 28*	

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

RS-449 cable to generic serial host

This cable connects the MAX to the 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 pin assignments shown in the in the following figure and table.

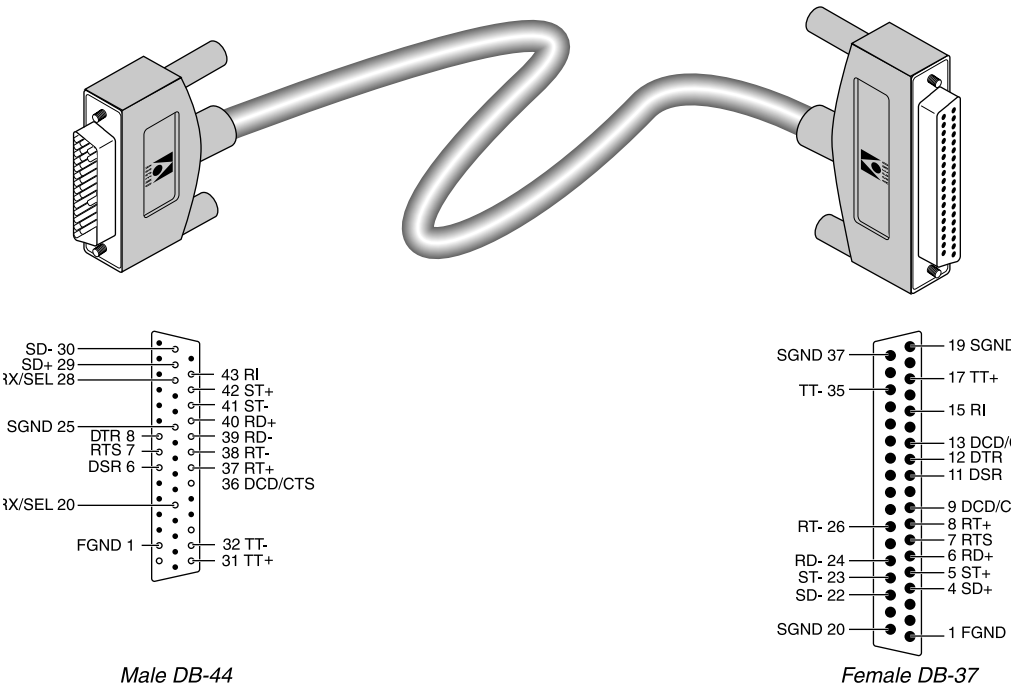

Figure B-12. RS-449 cable to generic serial host

Table B-19. RS-449 cable to generic serial host pin assignments

Model number MBHD-449 **Part number 2510-0080-001**			
Pair #	**Signal**	**MAX 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

Table B-19. RS-449 cable to generic serial host pin assignments

Model number MBHD-449 Part number 2510-0080-001			
Pair #	**Signal**	**MAX male DB-44**	**Host female DB-37**
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)
- CTS- (pin 27).

X.21 cabling

Ascend supplies a single X.21 cable. Refer to the following figure and illustration for information about the cable.

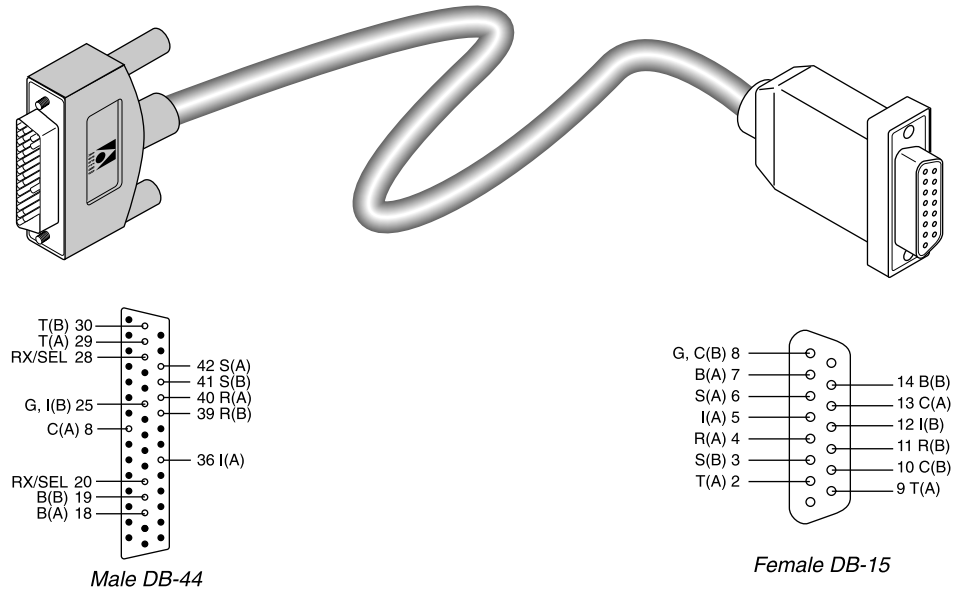

Figure B-13. X.21 cable pin assignments

X.21 cable to generic serial host

Table B-20. X.21 cable to generic serial host pin assignments

Model Number MBHD-X21 Part number 2510-0098-001			
Pair #	**X.21 signal name**	**Equivalent V.35/ RS-449 signal name**	**MAX male DB-44**
1	G*	SGND*	25*
2	T(A) T(B)	SD+ SD-	29 30
3	R(A) R(B)	RD+ RD-	40 39
4	S(A) S(B)	ST+ ST-	42 41
5	C(A) I(A)	DTR DCD	8 36
6	RX/SEL I(B)*	RX/SEL SGND*	20, 28** 25***
7	B(A) B(B)	BT+ BT-	18 19
8	C(B)		

* 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 are jumped 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.

Cable length requirements

The following table specifies the recommended maximum length of the cable between the MAX and the serial host equipment. Longer distances at the specified data rates are possible when you use terminal timing, 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 the MAX and the serial host equipment.

Table B-21. Cable length requirements

Max cable length	Serial data rate
25 feet	3 Mbps
75 feet	2 Mbps
150 feet	512 kbps

Serial WAN cabling specifications

The MAX's serial WAN interface supports nailed-up connections to the WAN. Data packets from the MAX's bridge/router module can use this interface, but bit streams from devices connected to the MAX's serial host ports cannot.

The MAX's serial WAN port is compatible with the following two electrical standards:

- V.35
- RS-449/422

In the cable wiring tables that follow, the MAX is the DTE (Data Terminal Equipment) that connects to a DCE (Data Circuit-Terminating Equipment) device through its serial WAN port. The MAX receives the Send timing and Receive timing clocks from the DCE device.

V.35 cable to WAN

You connect a V.35 cable to the V.35 port of a DCE device. The V.35 cable has the pin assignments described in The following table.

Table B-22. V.35 cable pin assignments

Part number 2510-0202-001			
Pair #	**Signal**	**MAX male DB-44**	**Host male V.35**
1	FGND RI	1 8	A J
2	SD+ SD-	39 40	P S
3	RD+ RD-	30 29	R T

Table B-22. V.35 cable pin assignments (continued)

Part number 2510-0202-001			
Pair #	**Signal**	**MAX male DB-44**	**Host male V.35**
4	ST+ ST-	41 42	Y AA
5	RT+ RT-	32 31	V X
6	TT+ TT-	38 37	U W
7	DTR DSR	6 11	H E
8	DCD SGND	9 25	F B
9	CTS RTS	7 36	D C
Pair #	Signal	MAX Male DB-44	Host Male V.35

RS-449 cable to WAN

You can connect an RS-449 cable to the RS-449 port of a DCE device. The RS-449 cable has the pin assignments described in the following table.

Table B-23. RS-449 cable pin assignments

Part number 2510-0203-001			
Pair #	**Signal**	**MAX male DB-44**	**Host female DB-37**
1	FGND RI	1 8	1 15
2	SD+ SD-	39 40	4 22
3	RD+ RD-	30 29	6 24

Table B-23. RS-449 cable pin assignments (continued)

Part number 2510-0203-001			
Pair #	**Signal**	**MAX male DB-44**	**Host female DB-37**
4	ST+ ST-	41 42	5 23
5	RT+ RT-	32 31	8 26
9	TT+ TT-	38 37	17 35
8	DTR DSR	6 11	12 11
6	DCD SGND	9 25	13 19, 20, 37*
7	CTS RTS	7 36	9 7

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

FCC and Canadian Notices

C

This appendix contains FCC and Canadian Notices.

FCC Part 68

Ascend Communications MAX models: MAX-DSX/DSX, MAX-CSU/CSU, and MAX-CSU/DSX, have been tested to comply with Part 68 of FCC Rules. Please note the following:

1 Upon request of the telephone company, you should provide the FCC registration number of the equipment that is connected to your line. The MAX's registration number for the CSU interface(s) of the MAX-CS/DSU and MAX CSU/DSX is 2CZUSA-74422-XD-N. The MAX's registration number for the DSX interface(s) of the MAX DSX/DSX and MAX-CSU/DSX models is 2CZUSA-74421-DE-N.

2 The MAX operates with a 1.544 Mbps digital channel, using RJ48 USOC jacks. The service code is 6.0N. The Facility Interface Code is 04DU9-BN for lines using the Superframe Format (SF); 04DU9-DN for lines using the 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 MAX connects to the network using eight-pin modular plugs, wired per FCC Part 68, USOC RJ48C.

3 The telephone company must be notified before removal of a MAX connected to 1.544 Mbps 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.

FCC Part 15

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

Canadian Notice

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

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

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

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

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

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

Warranty

D

This appendix contains warranty information.

Product warranty

1. Ascend warrants that the MAX 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
   - 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
   - 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 OF 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.

Index

R

S

T

U

V

X