MAX 4000 Series E1
Getting Started

Ascend Communications

Part Number 7820-0412-002 May 23, 1997

Important safety instructions

The following safety instructions apply to the MAX:

Warning: To be installed and maintained by service personnel as defined by AS/NZS 3260 Clause 1.2.14.3 Service Personnel. Incorrect connection of this or connected equipment to the General Purpose Outlet could result ina hazardous situation.

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. A fully loaded redundant-power MAX weighs 56 lbs (25.5 kg). A fully loaded single-power MAX weighs 30 lbs (13.6 kg).
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.

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`

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About This Guide

This guide explains how to install and test the MAX E1/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 E1 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.

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 (bold) and it identifies onscreen text (plain), 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 E1/PRI Documentation Set consists of the following manuals:

- *Getting Started* (this guide)
- *Internet Service Provider and Telecommuting Configuration Guide*
- *Security Supplement*
- *RADIUS Supplement*
- *SNMP Supplement*
- *MIF Supplement*
- *Reference Guide*
- *Master Index*

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
- *The Basics Book of ISDN*, Motorola University Press
- *ISDN*, Gary C. Kessler
- *TCP/IP Illustrated*, W. Richard Stevens
- *Firewalls and Internet Security*, William R. Cheswick and Steven M. Bellovin

Getting Acquainted with the MAX

1

This chapter covers these topics:

What is the MAX E1/PRI?

The MAX E1/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 channelized E1/PRI access lines
- 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 base unit and expansion cards you order. This section helps you confirm the items in your package.

Checking the MAX base unit

Open the shipping package and make sure you have received the base MAX unit that you ordered—either the MAX E1/PRI, MAX HP, or Redundant MAX. Figure 1-1 shows the MAX E1/PRI base unit, Figure 1-2 shows the MAX HP; and Figure 1-3 shows the Redundant MAX.

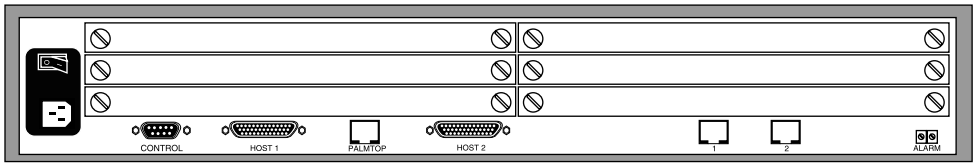


Figure 1-1. MAX E1/PRI base unit

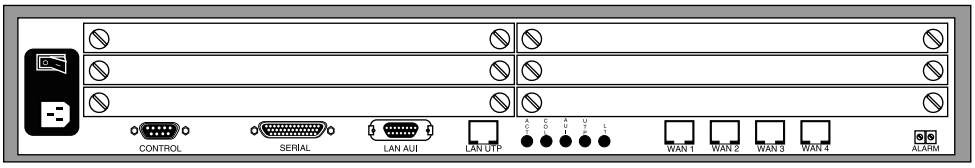


Figure 1-2. MAX HP base unit

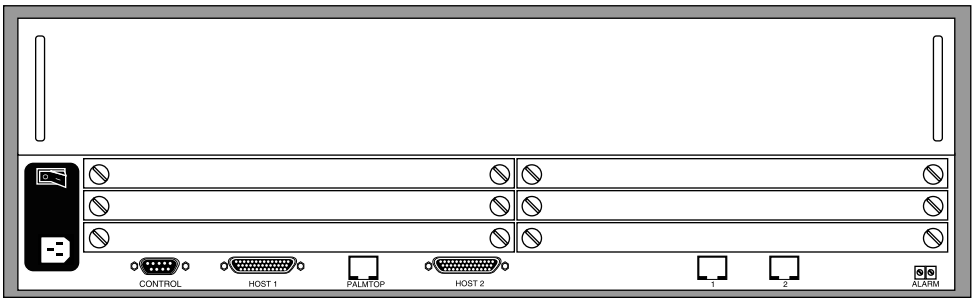


Figure 1-3. Redundant MAX base unit

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

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

Checking the expansion cards

The MAX can accommodate up to six 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 eight, twelve, or sixteen V.34/V.42 digital modems. You can install a maximum of 72 digital modem in the MAX. See the following figure.

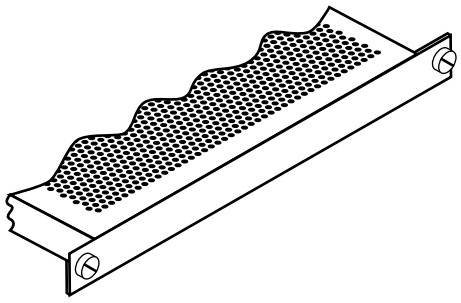


Figure 1-4. Digital modem card

Series56 digital modem card

The Series56 digital modem card provides eight, twelve, or sixteen digital modems per card. You can install a maximum of 72 digital modems in the MAX. See the following figure.

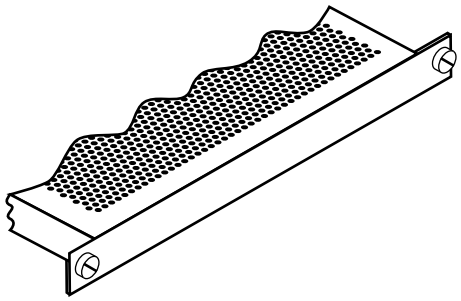


Figure 1-5. Series56 Digital modem card

E1/ISDN PRI WAN Network Interface Card

The E1/ISDN PRI Network Interface Card provides an additional two E1 or ISDN PRI WAN interfaces for the standard MAX. This card is not available for the MAX 4000. You can install a maximum of two E1 cards in the MAX. You can also use this card to support frame relay connections over E1 access lines. See Figure 1-6.

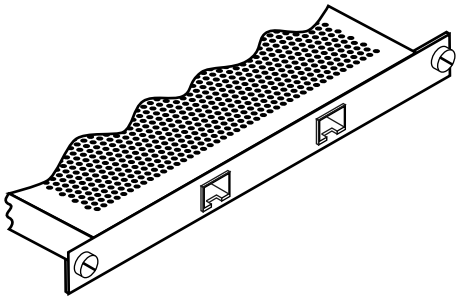


Figure 1-6. E1/ISDN PRI WAN Network Interface Card

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 Figure 1-7.

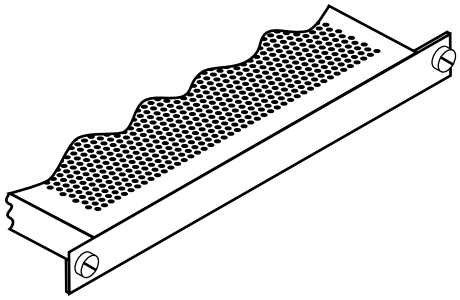


Figure 1-7. V.110 Card

ISDN BRI Network Interface and Terminal Interface Cards

The ISDN BRI Network Interface Card and ISDN Terminal Interface Cards have eight ISDN BRI ports. You can install a maximum of four ISDN BRI Network Interface Cards in the MAX. See Figure 1-8.

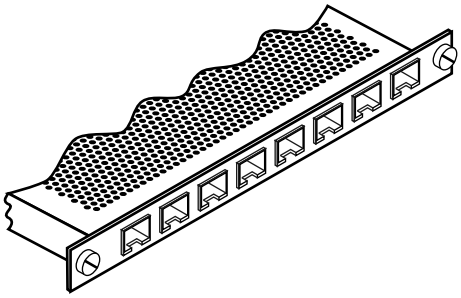


Figure 1-8. ISDN BRI Network Interface or Terminal Interface Cards

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. Figure 1-9 shows the two-port card.

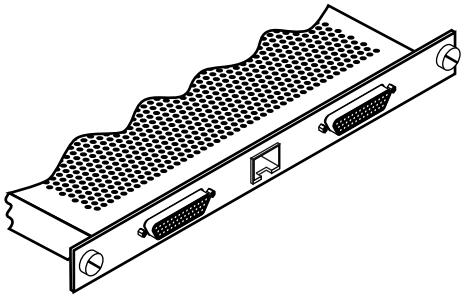


Figure 1-9. Multiband Inverse Multiplexing Two-Port Card

Ethernet Interface Card

The Ethernet Interface Card provides access routing and bridging, SNMP, and TELNET management access for the standard MAX. This card is not available for the MAX 4000. It connects to an Ethernet LAN with an AUI, BNC, or 10Base-T connector. You can install a maximum of one Ethernet Interface in a MAX. You cannot install this card if your MAX has a built-in Ethernet interface. See Figure 1-10.

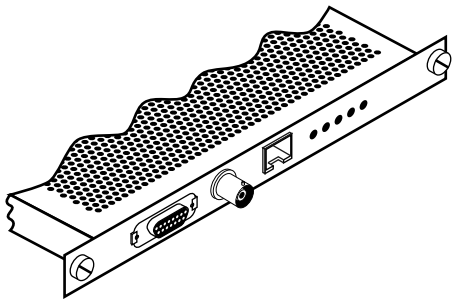


Figure 1-10. Ethernet Interface Card

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 Figure 1-11.

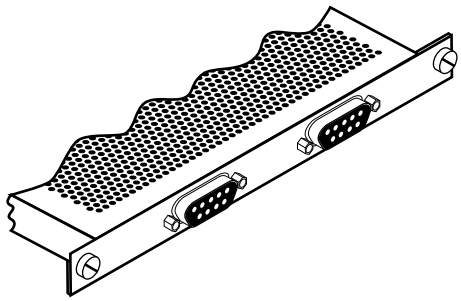


Figure 1-11. Host/6 Card

32-Channel HDLC Card

The 32-Channel HDLC Card (also referred to as Ether-Data) provides 32 additional HDLC channels to increase the number of simultaneous digital user connections of a single Ethernet Interface. See Figure 1-12.

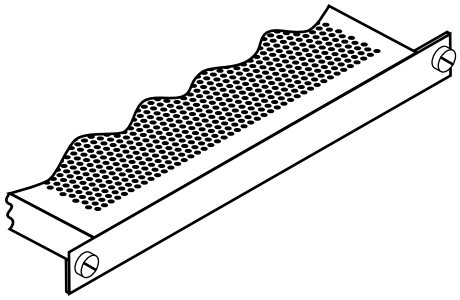


Figure 1-12. Pipeline 32-Channel HDLC Card

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:

Planning the hardware installation

This section explains what you need before you install the MAX hardware.

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.
- One or more active E1 lines, with at least one 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 applicable, one or more active BRI lines.
- If you have an Ethernet interface, 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 applicable, a hand-held Palmtop terminal and associated cable less than 10 feet (3 meters) in length.

Guidelines for installing digital modems

- The Series56 architecture requires that all modem modules within a MAX chassis be homogeneous. That is, Series56 modules may not be mixed with non-Series56 digital modem modules.
- The Series56 architecture also requires that the modem density be homogeneous. Modem modules with mixed densities (for example, 8-port and 12-port modem modules) cannot be combined in a single chassis.
- The MAX can support a total of 72 digital modems.

Guidelines for installing MAX units in a rack

This section provides installation guidelines for installing MAX units in a rack. Figure 2-1 illustrates an example installation.

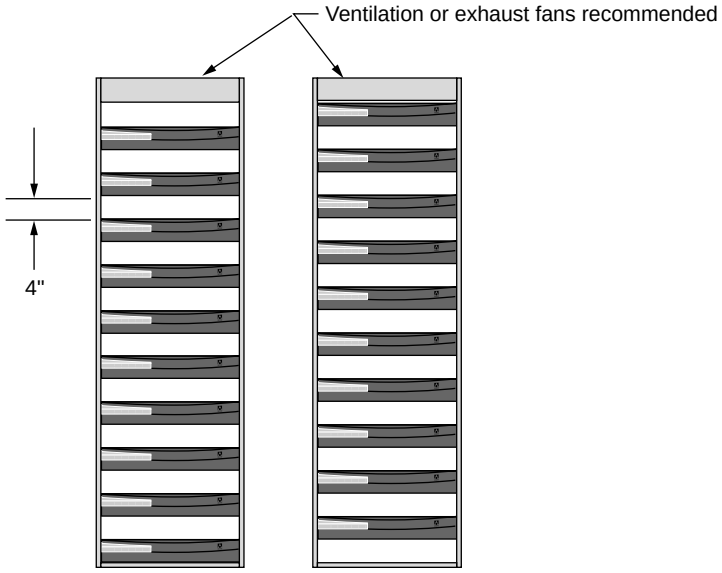


Figure 2-1. Installing MAX units in a rack.

- Leave approximately 4" vertical space between MAX units. This allows for air flow between units and leaves room for handling the MAX units if they need to be removed.
- In an open MAX leave approximately 1 foot between MAX units for air flow dissipation.
- Stair step MAX in adjacent open racks.

  The MAX intake fans are on the right (as viewed from the front); the exhaust fans on the left. Stair-stepping the MAX units in the racks ensure that hot air from one MAX isn't being blown into adjacent MAX units.
- Ensure adequate cooling in the room.
  - Because the MAX fans vent on the side of the unit, racks with open sides are recommended.
  - In enclosed racks make sure there are openings in the floor underneath each cabinet to allow the air conditioning up into the cabinet.
  - Exhaust fans at the top of the cabinet are recommended but not required. At a minimum the cabinets must be ventilated at the top.

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 2-5.

Inserting an expansion card

Warning: When installing any equipment, make sure to use proper procedures for static electricity, such as using a grounding mat and a wrist strap.

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 Figure 2-2. Do not grab the slot cards from both ends. Make sure you insert the card into the guides within the same plane.

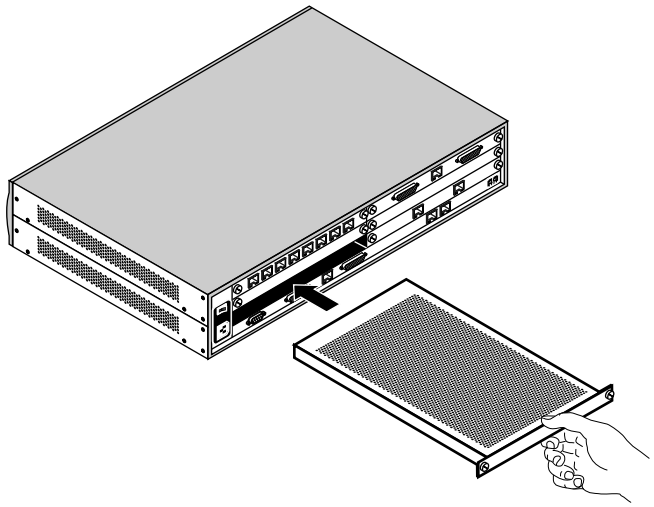


Figure 2-2. Inserting an expansion card into a MAX slot

3 Push the card along the internal guides until the 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 module as shown in the following figure.

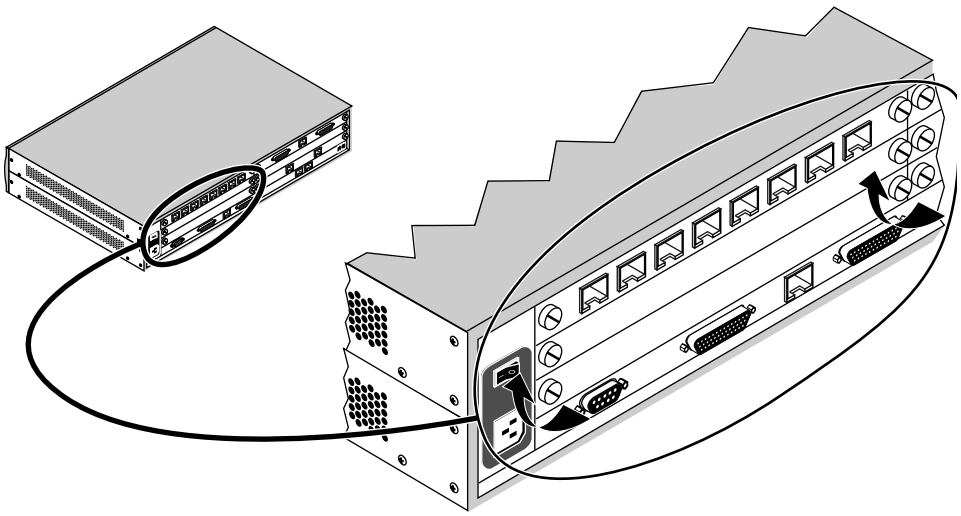


Figure 2-3. Tightening slot card thumbscrews

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 Figure 2-4.

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

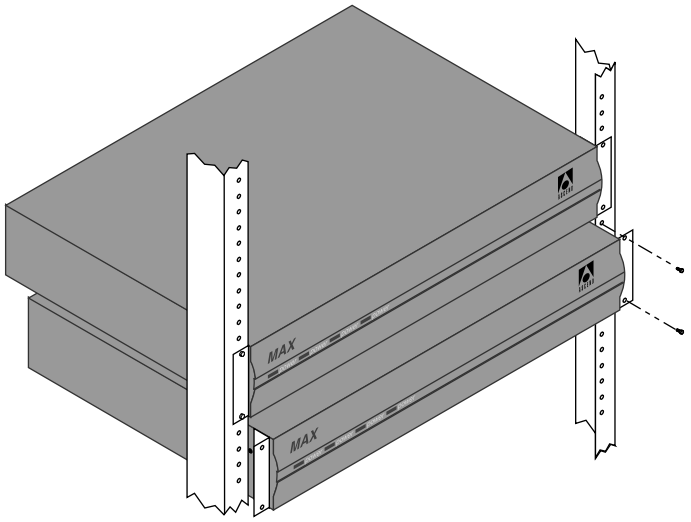


Figure 2-4. Mounting the MAX in a rack

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.

3 If applicable, connect your hand-held Palmtop terminal to the Palmtop port.

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 2-5. Otherwise, you can skip to the section “Interpreting the MAX LEDs” on page 2-6 and connect the LAN or WAN cables at a later time.

Connecting the MAX to your LAN or WAN

This section explains how to connect your MAX to the LAN or WAN. Use cable that is specifically constructed for transmission of E1/PRI signals (CCITT G700 series recommended).

The MAX can connect to any DPNSS access point on a Private Branch Exchange (PBX) or directly to E1 digital services. The MAX can also connect to G.704 framed leased (non-switching) services for 75 Ω.

Note: When installing the E1 line, the screen of the transmit and receive coaxial cable must be earthed at one end of the line only. LInks (jumpers) are provided on the MAX to earth the coaxial screens. The default position of the grounding links on the network line interface, when used with coaxial cable adapter, is on the transmit side (Tx) for 1680 kbps network operations.

For a daisy chain connection of the MAX E1/PRI unit, only line 1 needs an earth link (jumper), as line 1 is the only port connected tot he telecommunications network.

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 E1/PRI line or through other network interface equipment.

   The maximum distance between the E1/PRI WAN interface equipment and the MAX should not introduce attentuation of more than 6db, when measured at half the maximum data rate (1024 kbps). Also, the cable must have a root F characteristic.
3. Inform your E1/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. Figure 2-5 shows the location of LEDs on the front panel.

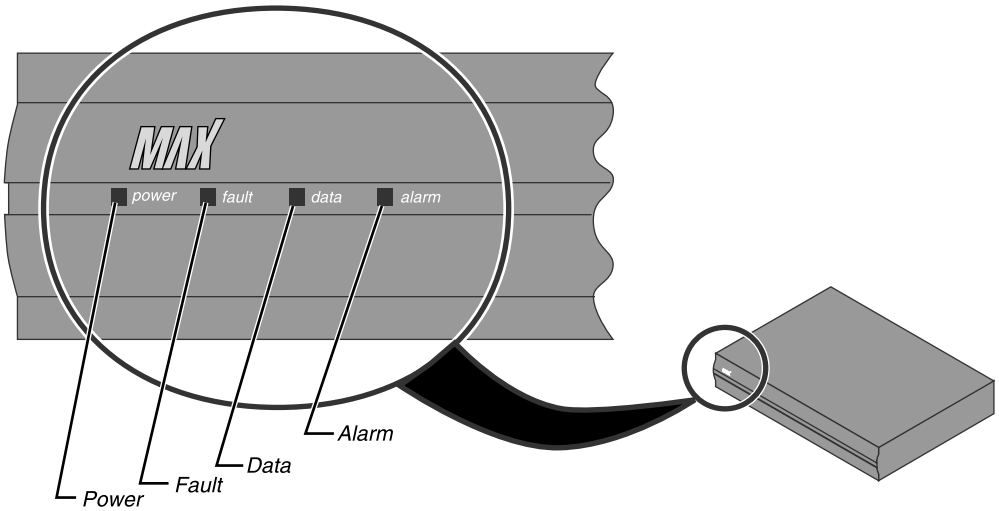


Figure 2-5. Location of the MAX LEDs

Refer to Table 2-1 to understand each LED.

Table 2-1. MAX LEDs

LED	Description
Power	This green LED is on when the MAX power is on.
Fault	This amber 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 a expansion card, the MAX may continue functioning without the expansion card.
Data	This green LED is ON when calls are active.
Alarm	This amber LED is ON when there is a WAN alarm or a trunk is out of service, such as during line loopback diagnostics. WAN alarms include Loss of Sync, Red Alarm, Yellow Alarm, and All Ones (or AIS).

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 If you are using a PC, set your terminal emulation package in your communications software as follows:

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

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

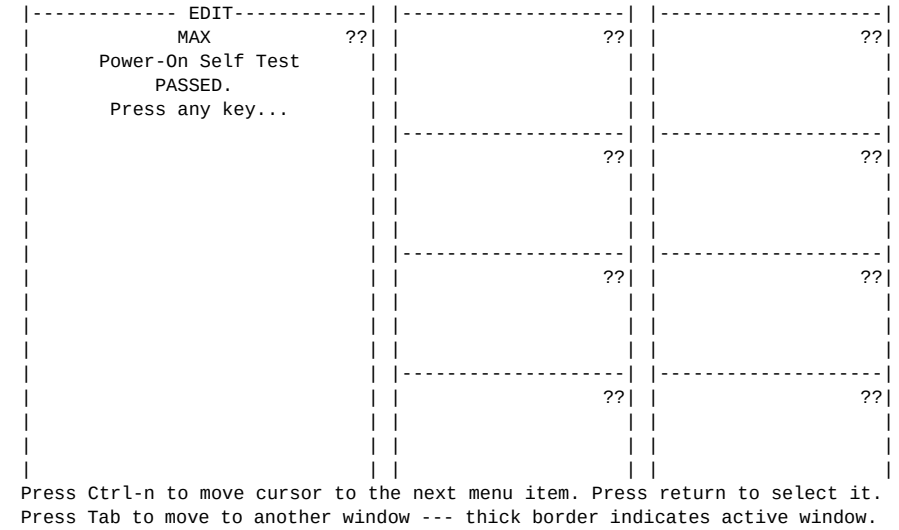
3 Connect one end of the AC power cord to a power source and the other end to the MAX.

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

If the Power LED is ON and the Fault 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 or Palmtop display during the POST. When the POST is successful, this screen appears:



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/E1
  20-000 Host/Dual
  30-000 Ethernet
  40-000 Empty
  50-000 Empty
  60-000 Host/Dual
  70-000 Empty
  80-000 Empty
```

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, or from a Palmtop Controller, as described in “Starting up the MAX” on page 2-7. 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 3-6 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 consist the 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. The items listed in the Main Edit Menu differ depending on the system configuration. The Empty items represent expansion slots that do not contain a card. See “Understanding menu numbers” on page 3-8 for related information.

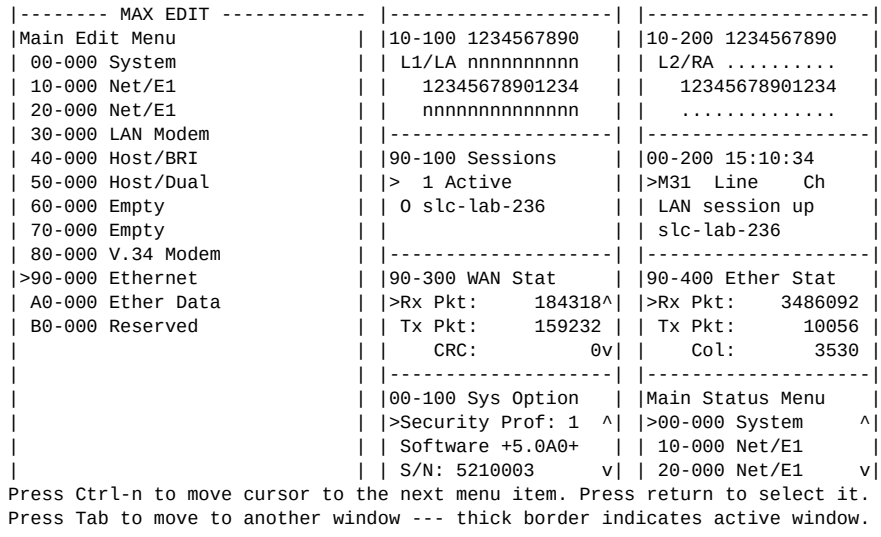


Figure 3-1. MAX 4000 series configuration menus

Note: For an overview of how the MAX menus and profiles are organized, see the *MAX Reference Guide*.

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. In Figure 3-1, the 10-100 status display is active (near the top-middle of the screen).

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.) For a complete list of key combinations used to navigate the interface, see Table 3-1 on page 3-7.

```
Main Edit Menu
     00-000 System
     >10-000 Net/E1
     20-000 Net/E1
     30-000 Empty
     40-000 Empty
     50-000 V.34 Modem
     60-000 V.34 Modem
     70-000 Net/E1
     80-000 V.34 Modem
     90-000 Ethernet
     A0-000 Ether Data
     b0-000 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 90-000 Ethernet, and press Enter. The Ethernet menu opens.

```
    90-000 Ethernet
    90-100 Connections
    90-200 Names/Passwords
    90-300 Bridge Adrs
    90-400 Static Rtes
    90-500 Filters
    90-600 Firewalls
    90-700 Frame Relay
    90-800 Answer
    90-900 SNMP Traps
    90-A00 IPX Routes
    90-B00 IPX SAP Filters
    90-C00 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-B00 Mod Config
  Module Name=
  Ether options...
  WAN options...
  SNMP options...
  OSPF options...
  OSPF global options...
  Route Pref...
  TServ options...
  Bridging=No
  Shared Prof=No
  Telnet PW=
  RIP Policy=Poison Rvrs
  RIP Summary=Yes
  ICMP Redirects=Accept
  BOOTP Relay...
  DNS...
```

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 that means 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-B00 Mod Config
  Module Name=
  Ether options...
  WAN options...
  SNMP options...
  OSPF options...
  OSPF global options...
  Route Pref...
  TServ options...
  Bridging=No
  Shared Prof=No
  Telnet PW:
  [ ]

  ICMP Redirects=Accept
  BOOTP Relay...
  DNS...
```

Note: See “About MAX passwords” on page 3-6 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 accept
```

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

Using the Palmtop Controller

If you have a standard MAX unit, or if you purchased the Palmtop Controller expansion card for the MAX 4000, you can plug in the 4-line LCD display called the Palmtop Controller to establish a Console Session.

In the Palmtop Controller, each menu displays only four lines, and each line displays a maximum of 20 characters. The Palmtop Controller screen contains a single display.

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

The process of editing from the Palmtop Controller is nearly identical to the process of editing from the Control Monitor, except that the Right-Arrow key replaces the functions of the Enter/Return key. That is, after you position the cursor (>) in front of a parameter, you must press the Right-Arrow key to begin to edit. In the window shown immediately below, the cursor is in front of the Name parameter:

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

When you press the Right-arrow key, an edit field opens, and the current value is shown within the brackets:

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

See “Opening edit fields” on page 3-4 for more details about how to enter text.

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 full details on modifying Security Profiles and assigning passwords.

Caution: 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.

```
90-C00 Mod Config
DO...
  >0=Esc
  P=Password
  C=Close TELNET
  E=Termsrv
  D=Diagnostics
```

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 and Palmtop Controller displays.

Table 3-1. Special purpose keys for Control Monitor and Palmtop Controller displays

Palmtop Controller	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.
v	Down-Arrow, Ctrl-N	Move down to the next selection.
^	Up-Arrow, Ctrl-U, Ctrl-P	Move up to the previous selection.

Table 3-1. Special purpose keys for Control Monitor and Palmtop Controller displays

Palmtop Controller	Control Monitor	Operation
N/A	Ctrl-V	Move to the next page of the list.
N/A	Tab, Ctrl-I	Move to the next window.
	Back-Tab, Ctrl-O	Move to the previous window.
TOGGLE STAT	N/A	Toggle to a status menu from the edit menu and vice versa.
Shift->	Delete	Delete the character under the cursor.
Shift-<	Backspace	Delete the character to the left of the cursor.
Shift-^	none	Overwrite the character under the cursor with a space.
DO	Ctrl-D	Open the DO menu.
N/A	Ctrl-T	Return from or go to the Simplified Menus.
N/A	Ctrl-L	Refresh the VT-100 screen.
N/A	Ctrl-C	Return from the MIF to the normal menus.
D	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. 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.

Understanding menu numbers

The MAX comes with four built-in T1 or E1 lines and a V.35 serial port for WAN access. It also has eight expansion slots, which can support additional bandwidth (BRI lines), AIM ports modules to support videoconferencing, or digital modems to support analog modem connections over digital lines.

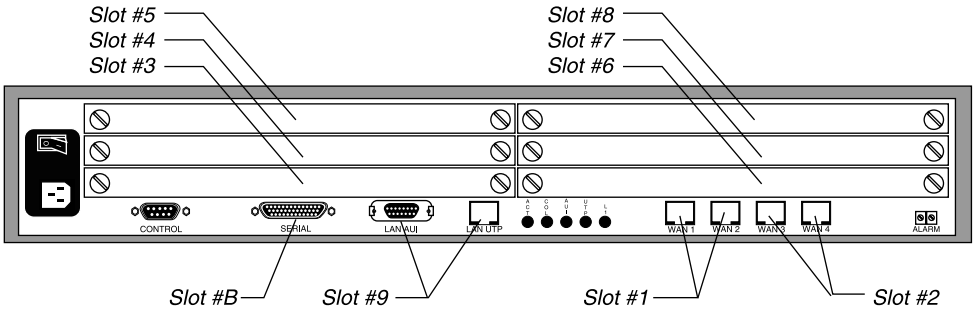


Figure 3-2. Slot and port numbering in the MAX 4000 series

The numbers in the vt100 menus relate to slot numbers in the MAX unit, which may be an actual expansion slot or a "virtual" slot on the unit's motherboard.

- The system itself is assigned slot number 0 (menu 00-000).

  The System menu contains these profiles and submenus, which are all related to system-wide configuration and maintenance:

  ```
  00-000 System
     00-100 Sys Config
     00-200 Sys Diag
     00-300 Security
     00-400 Destinations
     00-500 Dial Plan
  ```

- The built-in T1 or E1 lines are slot 1 and slot 2 (menu 10-000 and 20-000).

  Each T1 or E1 slot contains two lines. The menus for configuring and testing the lines are organized like this:

  ```
  10-000 Net/T1 (Net/E1)
     10-100 Line Config
     10-200 Line Diag
  20-000 Net/T1 (Net/E1)
     20-100 Line Config
     20-200 Line Diag
  ```

- The six expansion slots are slots 3 through 8 (menus 30-000 through 80-000), with the numbering shown in Figure 3-2.
- The Ethernet is slot 9 (menu 90-000). The Ethernet menu contains submenus and profiles related to the local network, routing and bridging, and WAN connections.
- EtherData is slot A (menu A0-000). For the MAX with built-in Ethernet, this menu is not applicable.
- The serial WAN port is slot B (menu B0-000).

This is an example Main Edit Menu at the top level, which shows expansion modules installed in slots 3 through 8. (Note that slot A is not applicable to the MAX with built-in Ethernet.)

```
Main Edit Menu
   00-000 System
   10-000 Net/E1
   20-000 Net/E1
   30-000 Host/Dual
   40-000 Host/BRI
   50-000 Net/BRI
   60-000 BRI/LT
```

```
70-000 V.34 Modem
80-000 V.110
90-000 Ethernet
A0-000 Ether Data
B0-000 Serial WAN
```

Now that you understand the MAX user interface, proceed to the *MAX 4000 Series ISP & Telecommuting Configuration Guide*.

Provisioning the Switch

A

This appendix provides the information necessary for properly provisioning a switch for E1 access, E1 PRI access, and ISDN BRI access to the WAN. The appendix contains these sections:

What you need from your E1/PRI service provider

You need the following information from your E1/PRI service provider:

- The phone numbers assigned to your E1/PRI interface, channel-by-channel
- Nailed-up channels (also called private WAN), if any
- Unused channels, if any
- Switch type (or emulation)—DPNSS only
- Switch layers 2 and 3 configuration—DASS 2 and DPNSS only (A/B end, X/Y end)
- Rate adaption protocol—DASS 2 and DPNSS only (X.30 and V.110)

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.

Supported WAN switched services

The MAX E1/PRI supports the following WAN switched services:

- 56 kbps and 64 kbps data services
- GloBanD (and GVPN in CCITT countries) PRI network services—multiples of 64 kbps

When ordering a data service, make sure it is available end-to-end. Otherwise, the data carried by the call will be corrupted or the carrier will reject the call. For example, a GloBanD 512 kbps call made at a PRI interface is rejected when the called end is BRI, because GloBanD does not support BRI.

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-1 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-1. 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-1. AT&T 5ESS provisioning information

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-2 provides provisioning information for Northern Telecom switches.

Table A-2. 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	

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 SPID 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. The 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 trained engineers authorized by Ascend should open the MAX's case for testing, maintenance, installation, or any other purpose. Furthermore, only trained engineers should replace MAX components.

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 Table B-1.

Table B-1. MAX source power requirements

Element	Value
Voltage	90-240 VAC
Phase	Single
Frequency	47-63 Hz
Power	MAX 4000: 80W (nominal)-200W (maximum) Standard MAX: 80W (nominal)-120W (maximum)

The power requirements for the redundant power standard MAX are listed in Table B-2.

Table B-2. Redundant power standard MAX requirements

Element	Value
Voltage	90-135 VAC/180-270 VAC
Phase	Single
Frequency	47-63 Hz

Table B-2. Redundant power standard MAX requirements

Element	Value
Power	MAX 4000: 80W (nominal)-200W (maximum) Standard MAX: 80W (nominal)-120W (maximum)
Fuse	5 Amp slow-blow for 120 VAC input 2.5 Amp slow-blow for 240 VAC input

The redundant power requirements for the MAX 4000 are listed in Table B-3.

Table B-3. Redundant power MAX 4000 requirements

Element	Value
Voltage	-43 to -60 VDC
Power	MAX 4000: 80W (nominal)-200W (maximum) Standard MAX: 80W (nominal)-120W (maximum)
Fuses	7.5 Amp GMT (two fuses)

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 15 lbs (6.81 kg); a fully loaded system weighs 30 lbs (13.6 kg). The MAX has these dimensions: 3.0" x 17" x 12" (8.9 cm x 43.2 cm x 30.5 cm).

The base system of a redundant power standard MAX or MAX 4000 weighs 41 lbs (18.6 kg); a fully loaded system weighs 56 lbs (25.5 kg). The redundant power MAX has the dimensions 7.0" x 17.5" x 12" (17.8 cm x 44.5 cm x 30.5 cm).

User interface specifications

This sections covers cabling pinouts for the Control Monitor, Palmtop Controller, and MIF interfaces.

Control port and cabling pinouts 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 pinouts listed in Table B-4.

Table B-4. Control Monitor and MIF Control port and cabling pinouts

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).

Pinouts for the Palmtop Controller

Table B-5 specifies the pins and corresponding functions of the Palmtop Controller jacks (applies to the MAX 4000 only).

Table B-5. Palmtop Controller pinouts

MAX RJ12 pin	Function	I/O
1	Power to Palmtop, +5V	O
2	Control Out	O
3	Control In	I
4	Serial Transmit Data	O

Table B-5. Palmtop Controller pinouts

MAX RJ12 pin	Function	I/O
5	Serial Receive Data	I
6	Ground	

Note: O is Out (from the MAX toward the Palmtop).

Palmtop port and cabling pinouts for the 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 illustration in specifications listed in Table B-6.

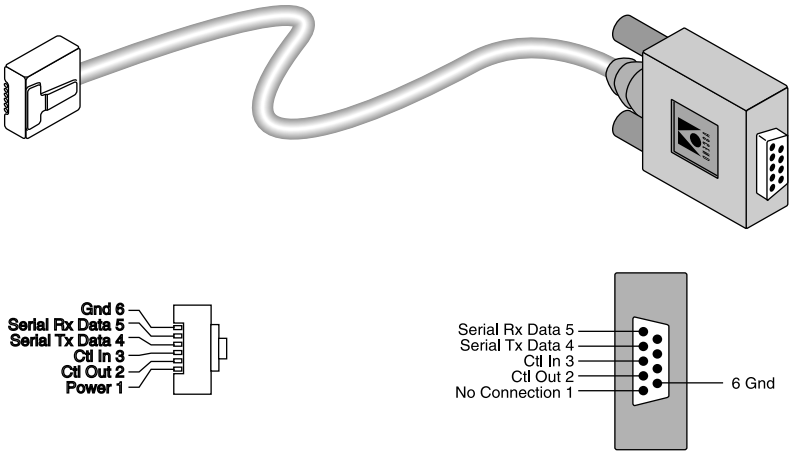


Figure B-1. Control Monitor and MIF Palmtop port and cable

Table B-6. Control Monitor and MIF Palmtop port and cabling pinouts

Model number HHT-VT-100 **Part number 2510-0088-001**	
MAX RJ12 pin number	**VT-100 female DE-9 pin number**
1	not connected
2	1
3	4
4	2
5	3
6	5

Ethernet interface specifications

A MAX installed 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 and can support any one of the following Ethernet types:

- Coax (Coaxial): Thin Ethernet and IEEE 802.3 (10Base-2) with a BNC connector.

  Note: The MAX 4000 is not equipped with a Coax Ethernet interface.
- 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.

Coax

You need a BNC T-connector. If your connection is at the end of a cable segment, you need a 50 Ohm terminator as well.

To install, attach a LAN BNC T-connector to the BNC port on the back of the MAX. Use a standard 10Base-250 Ohm cable, such as RG-58 A/U or RG58 C/U.

Caution: Breaking the LAN's continuity by inserting a cable segment or removing either of the 50 Ohm terminations disrupts and disables the Ethernet.

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.

E1/PRI interface specifications

This section provides the specifications for the MAX's E1/PRI interface and covers cabling requirements.

During loss of power or whenever the MAX restarts, a relay closure returns the E1 PRI signal to the WAN; that is, the E1 PRI line is looped back. However, if the MAX is configured for framing-compatible drop-and-insert functionality, all channels of line #1 are passed to line #2. Note that line #1 and line #2 of a MAX Net/E1 expansion module always loop back on loss of power, regardless of how they are configured.

E1/PRI cable specifications

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

Use only cable specifically constructed for transmission

E1/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 Figure B-2 and Table B-7.

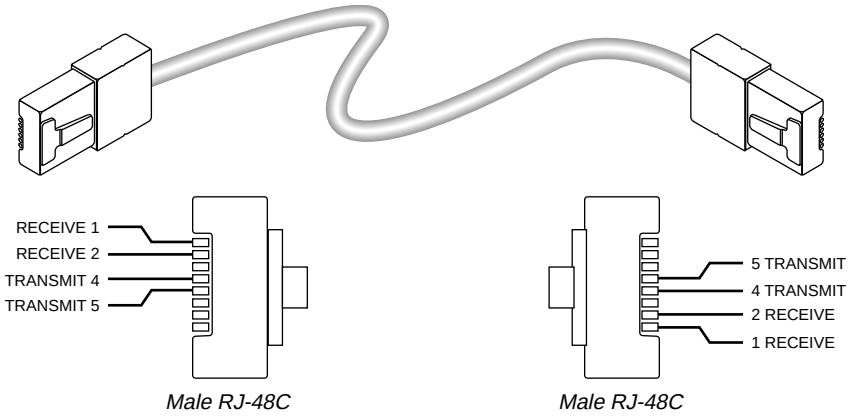


Figure B-2. RJ48C/RJ48C crossover cable.

Table B-7. 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

E1/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 Figure B-3 and Table B-8.

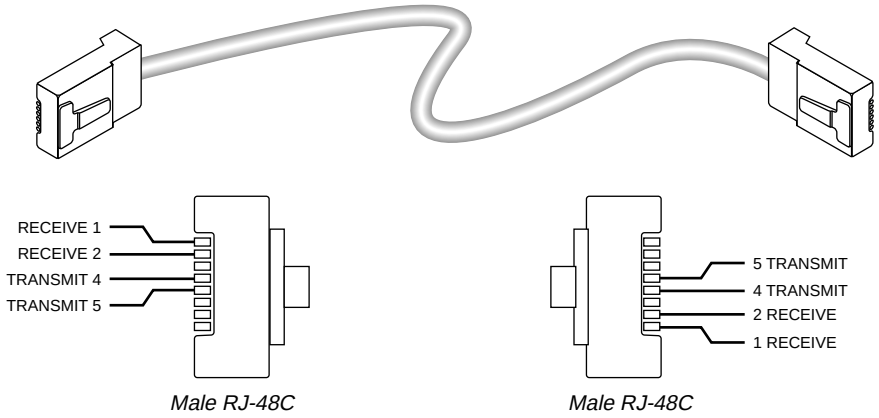


Figure B-3. RJ48C/RJ48C straight-through cable specifications

Table B-8. 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

E1/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 Figure B-4 and Table B-9.

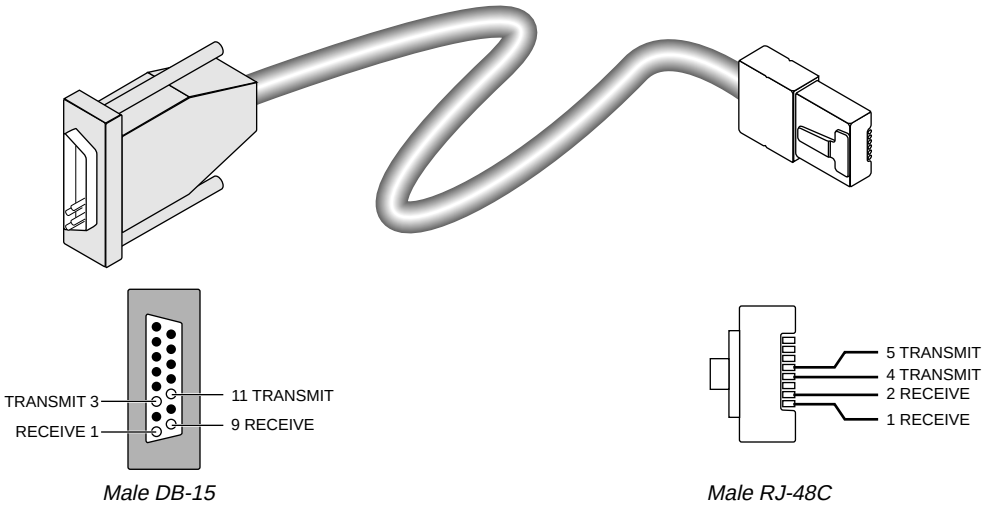


Figure B-4. RJ48C/DA-15 straight-through cable

Table B-9. 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

E1/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 Figure B-5 and Table B-10.

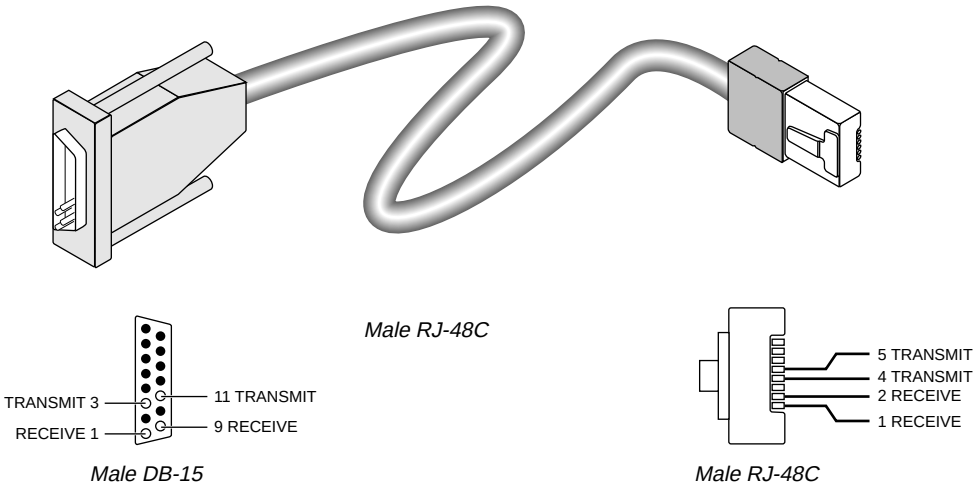


Figure B-5. RJ48C/DA crossover cable

Table B-10. 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

E1/PRI straight-through cable: RJ48C/Bantam

The WAN side of the cable connects to dual bantam jacks. Refer to Figure B-6 and Table B-11.

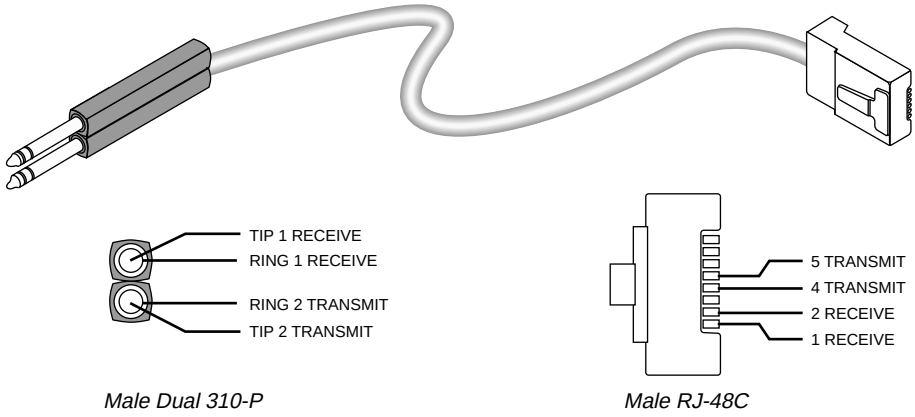


Figure B-6. RJ48C/Bantam straight-through cable

Table B-11. 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

E1/PRI WAN connectors

Table B-12 lists the pins on the E1/PRI WAN port used for Transmit and Receive. The remaining pins are not connected.

Table B-12. Transmit and Receive pins

MAX E1/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

ISDN BRI interface specifications

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

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 100Ω 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 100Ω 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 pinouts 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 Table B-13. Note that the Send timing and Receive timing clocks are supplied to the host by the MAX.

Table B-13. Serial host interface cabling abbreviations

Abbreviation	Explanation
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

Table B-13. Serial host interface cabling abbreviations

Abbreviation	Explanation
NB8	RS-366 Call Digit or Tone
RX/SEL	Select Interface Jumper (not a signal to or from host)

V.35 cabling

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

V.35/V.25 bis cable to Cisco

This cable connects the MAX to the V.35 port of a Cisco router that uses V.25 bis dialing. It has the pinouts shown in Figure B-7 and Table B-14.

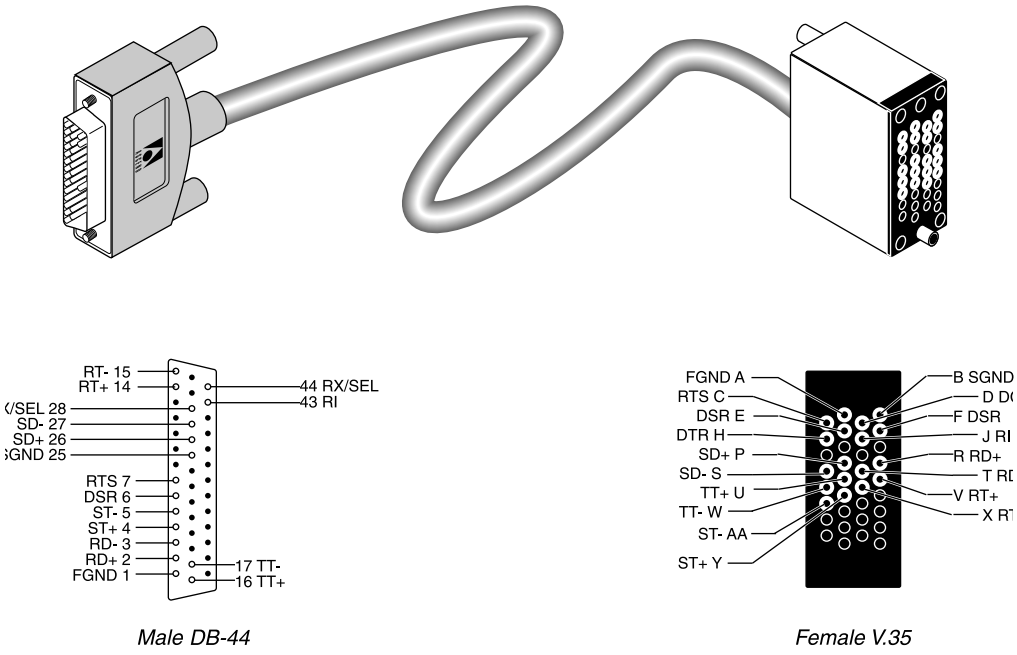


Figure B-7. V.35/V.25 bis cable to Cisco

Table B-14. V.35/V.25 bis cable to Cisco pinouts

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

Table B-14. V.35/V.25 bis cable to Cisco pinouts

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

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 pinouts listed in Table B-15.

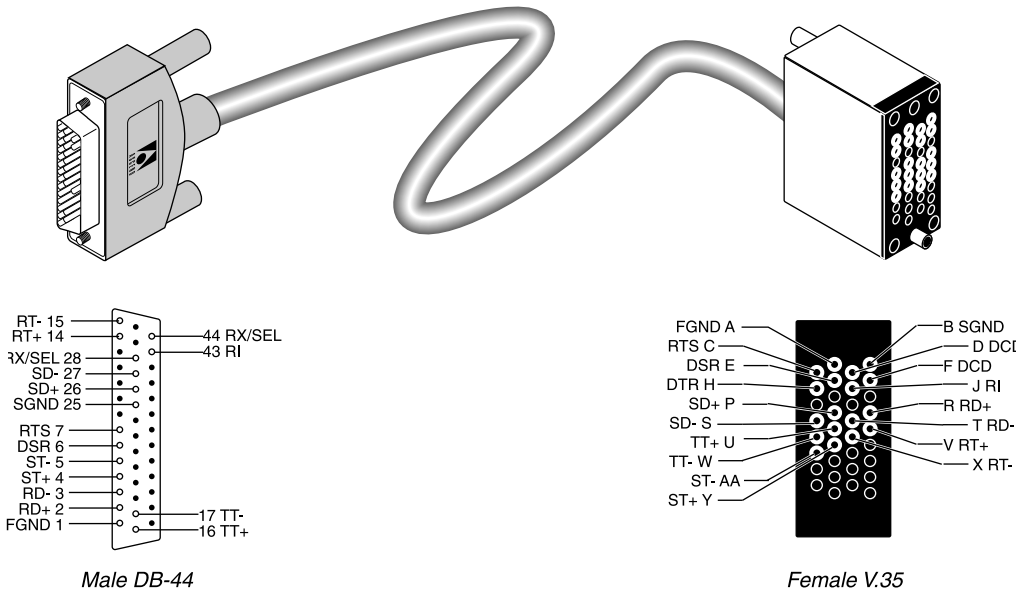


Figure B-8. V.35 cable to generic serial host

Table B-15. V.35 cable to generic serial host pinouts

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
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

Table B-15. V.35 cable to generic serial host pinouts

Model number MBHD-V35 Part number 2510-0079-001			
Pair #	**Signal**	**MAX male DB-44**	**Host female V.35**
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 pinouts shown in Figure B-9 and Table B-16.

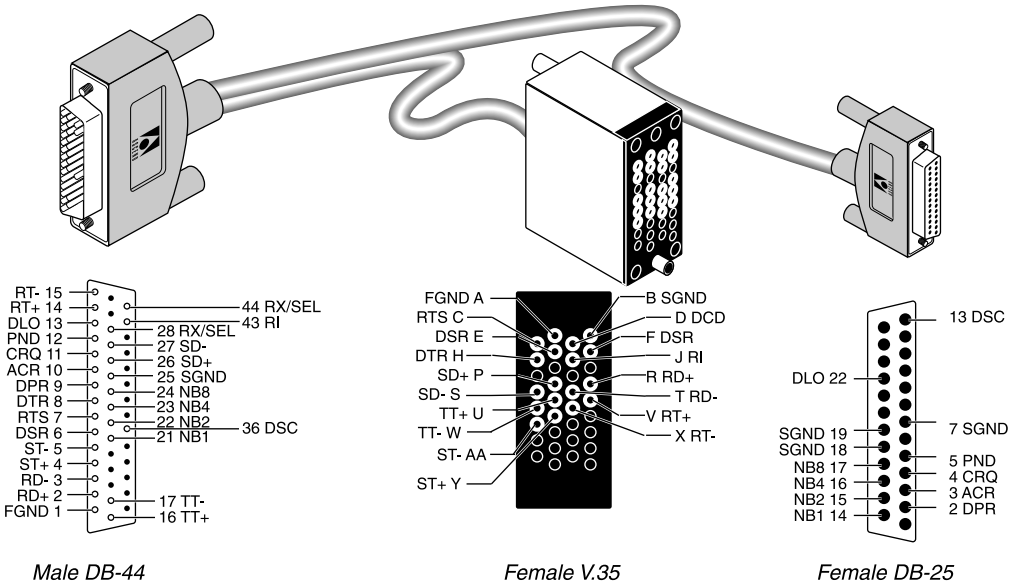


Figure B-9. V.35/RS-366 cable to generic serial host

Table B-16. V.35/RS-366 cable to generic serial host pinouts

Model number MBHD-V35-366 Part number 2510-0077-001			
Pair #	**Signal**	**MAX male DB-44**	**Host female V.35**
1	FGND	1	A

Table B-16. V.35/RS-366 cable to generic serial host pinouts

Model number MBHD-V35-366 **Part number 2510-0077-001**			
Pair #	**Signal**	**MAX male DB-44**	**Host female V.35**
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	
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*	

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 pinouts listed in Figure B-10 and Table B-17.

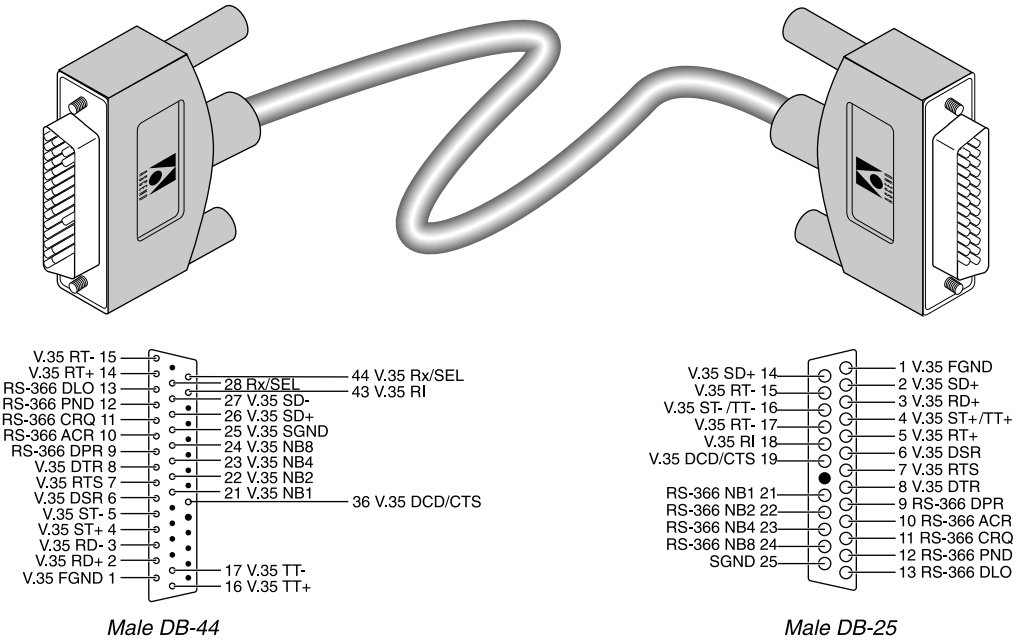


Figure B-10. V.35/RS-366 cable to CLI codec

Table B-17. V.35/RS-366 cable to CLI pinouts

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-17. V.35/RS-366 cable to CLI pinouts

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 pinouts listed in Figure B-11 and Table B-18.

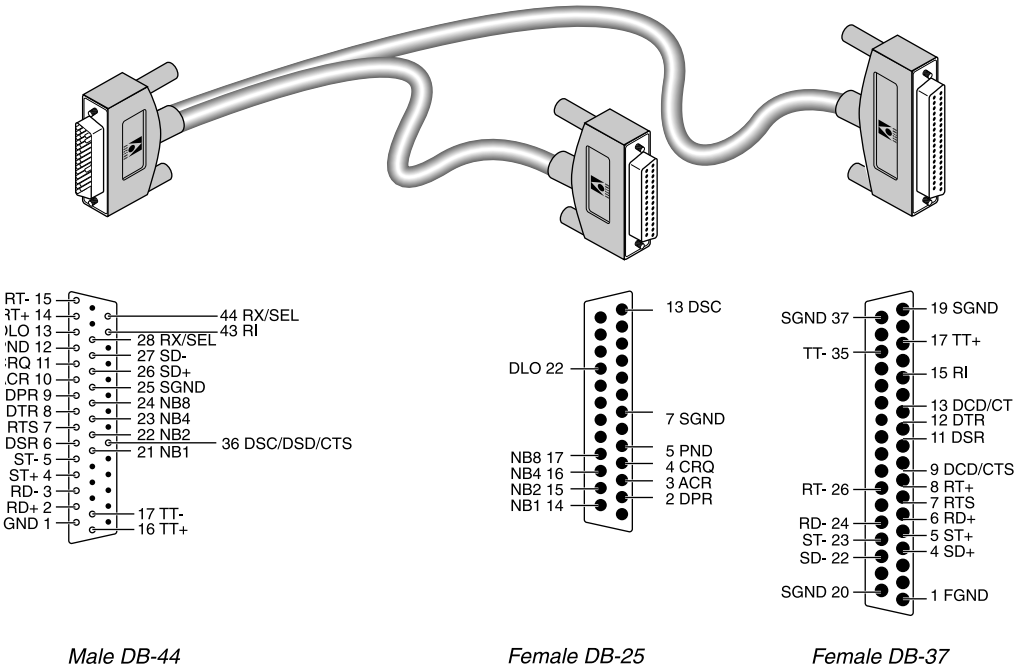


Figure B-11. V.35/RS-366 cable to PictureTel

Table B-18. V.35/RS-366 cable to PictureTel pinouts

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-18. V.35/RS-366 cable to PictureTel pinouts

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 pinouts 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 pinouts listed below.

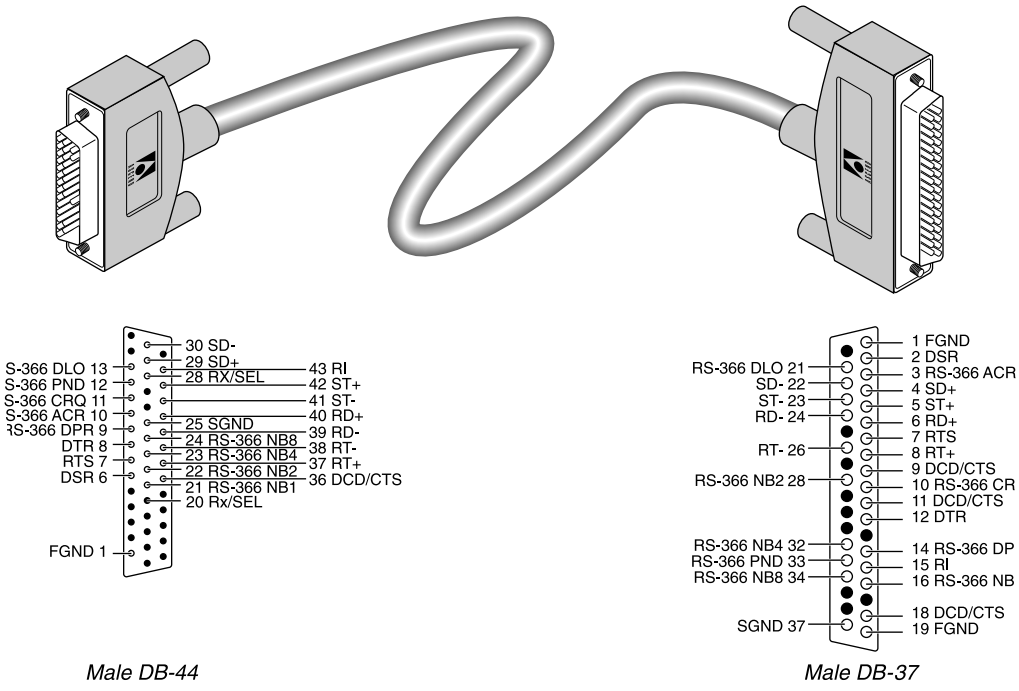


Figure B-12. RS-449/RS-366/DB-37 cable to Video Telecom codec

Table B-19. RS-449 / RS-366 / DB-37 cable to VTC pinouts

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-19. RS-449 / RS-366 / DB-37 cable to VTC pinouts

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 pinouts shown in Figure B-13 and Figure B-20.

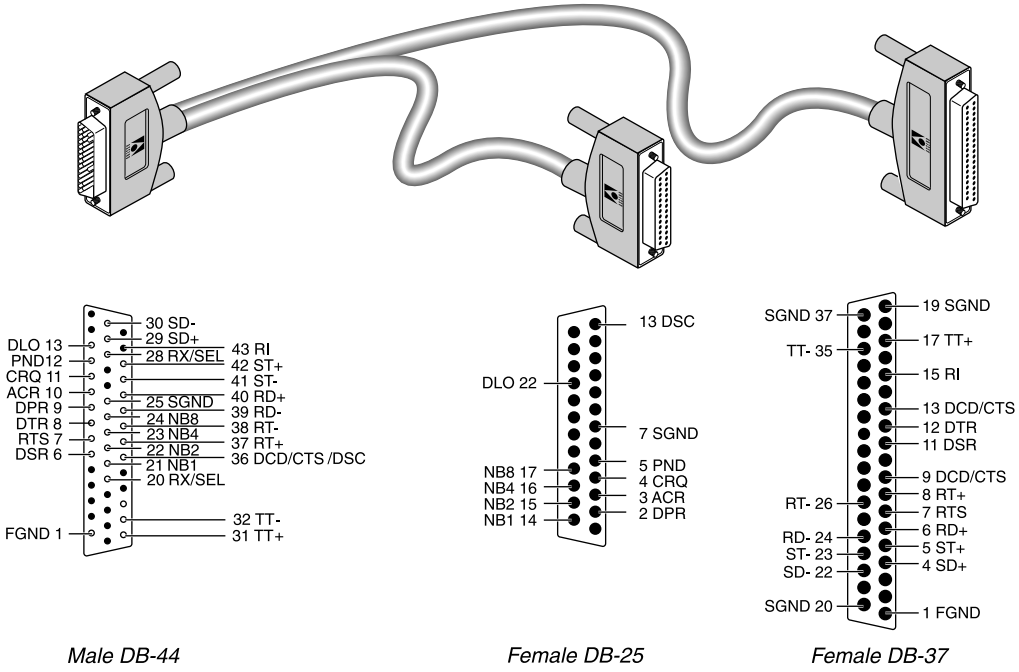


Figure B-13. RS-449/RS-366 cable to generic serial host

Table B-20. RS-449/RS-366 cable to generic serial host pinouts

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-20. RS-449/RS-366 cable to generic serial host pinouts

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 pinouts listed in Table B-21.

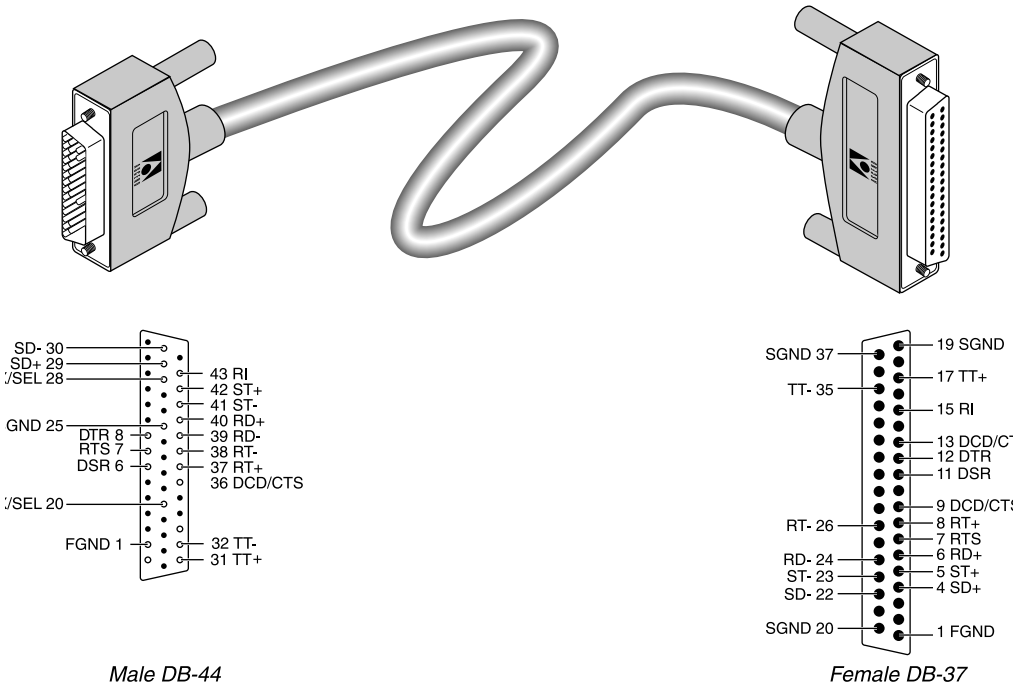


Figure B-14. RS-449 cable to generic serial host

Table B-21. RS-449 cable to generic serial host pinouts

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-21. RS-449 cable to generic serial host pinouts

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.

X.21 cable to generic serial host

If your host is equipped with an X.21 interface, the host cable has the pinouts listed in

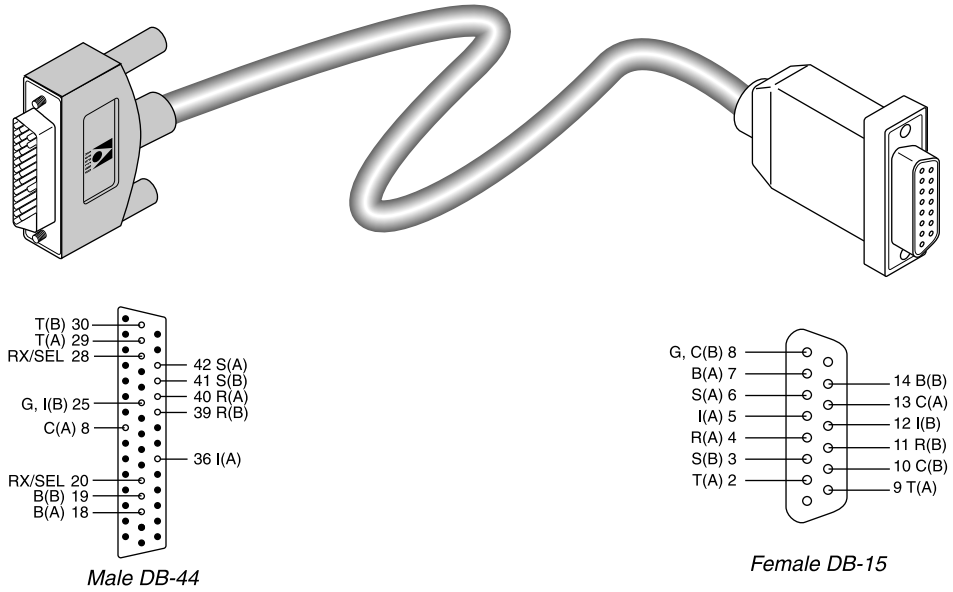


Figure B-15. X.21 cable to generic serial host

Table B-22. X.21 cable to generic serial host pinouts

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

Table B-22. X.21 cable to generic serial host pinouts

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**
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

Table B-23 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-23. 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 pinouts described in Table B-24.

Table B-24. V.35 cable pinouts

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
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

Table B-24. V.35 cable pinouts

Part number 2510-0202-001			
Pair #	**Signal**	**MAX male DB-44**	**Host male V.35**
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 pinouts described in Table B-25.

Table B-25. RS-449 cable pinouts

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
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*

Table B-25. RS-449 cable pinouts

Part number 2510-0203-001			
Pair #	**Signal**	**MAX male DB-44**	**Host female DB-37**
7	CTS RTS	7 36	9 7

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

FCC and International Notices

C

This appendix contains FCC and International Notices.

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.

Line Connection and Signaling - CE Notice

The MAX E1/PRI has been approved for connection to the Public Switched Telecommunication Network using interfaces compatible with CCITT recommendations I.421 (Primary Rate ISDN user access), G.703 (DASS2 user access), and I.420 (Basic Rate ISDN user access). The MAX E1/PRI complies with the following Council Directives:

1 Council Directive 73/23/EEC of 19 February 1973 on the harmonisation of the laws of the Member States relating to electrical equipment designed for use within certain Voltage limits. (The Low Voltage Directive)

2 The Council Directive 89/336/EEC of 3 May 1992 on the approximation of the laws of the member states relating to ElectroMagnetic Compatibility. (The EMC Directive)

3 Council Directive 91/263/EEC of 29 April 1991 on the approximation of the laws of the Member States concerning telecommunication terminal equipment. (The Telecom Terminal Equipment Directive)

4 The Council Directive 92/31/EEC of 28 April 1992 amending directive on the approximation of the laws of the member states relating to ElectroMagnetic Compatibility.

5 93/68/EEC of 22 July 1993 amending the Directives 89/336/EEC, 91/263/EEC and 92/31/EEC. (The Marking Directive)

Line Connection and Signaling - BABT Requirements

MAX model MX-2E1 and MAX 4000 models MX-2E1, MX-2E1-ALC1, and MX-2E1-GPT1 can only be connected to either a 2.048 Mbit/s leased line (OTR 001 port type 2DS), or a PABX 2.048 Mbit/s port (OTR 001 port type 3DS) using DASS2 or DPNSS1 signaling or directly to the public network. If necessary, contact your MAX supplier for a list of compatible exchanges.

It cannot be guaranteed that MAX/MAX 4000 will operate correctly under every possible condition of connection to compatible PABXs. In case of difficulty, refer to your MAX supplier.

Application for suitable connection should be made directly to your PABX supplier or to the local sales office of a public network provider, quoting this information.

Installation of lines into MAX/MAX 4000 can only be completed by trained engineers authorized by Ascend.

MAX/MAX 4000 can store network telephone numbers for autocalling; you must ensure that all stores are correctly programmed. Program stores are not volatile and power loss will not affect numbers stored. You cannot adjust the autodial characteristics.

MAX/MAX 4000's round trip delay for non-voice PSTN calls is not greater than 200 msec.

Where the reference tinming signal of the PBX may be derived from a port other than the specific port under test, the manufacturer shall have designed the PBX so that the port under test shall function without error when a digital signal having electrical characteristics in accordance with the requirements of CCITT recommendation G.703, but modulated by wander whose peak-to-peak value does not exceed 18 microseconds relative to the timing signal, is applied to the input port. The manufacturer shall declare how this requirement is met.

United Kingdom Safety Warning

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

The ports marked as "CONTROL", "PALMTOP", HOST 1", "HOST 2", "ALARM", and if fitted "HOST 3", "HOST 4", "HOST 5", and "HOST 6" are SELV ports and as such can only be connected to SELV ports on other equipment.

The BNC connectors labelled TX and RX on the MAX-E1/PRI versions are TNV circuits and as such may only be connected to the appropriate telecommunications network as detailed earlier.

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.

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