PortMaster®

Communications Server Hardware Installation Guide

PM-2,PM-2E,PM-2ER,PM-2R,PM-25,PM-2i-U,
PM-2i-ST,PM-2Ei-10I-U,PM-2Ei-10I-ST

Lucent Technologies
Remote Access Business Unit
4464 Willow Road
Pleasanton, CA 94588
510-737-2100
800-458-9966

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FCC Class A Notice - United States

Computing devices and peripherals manufactured by Lucent Technologies generate, use, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions contained in this manual, may cause interference to radio communications. Such equipment has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of the FCC Rules, which are designed to provide reasonable protection against radio interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user — at his own expense — will be required to take whatever measures may be required to correct the interference.

Some components may not have been manufactured by Lucent Technologies, Inc. If not, Lucent Technologies has been advised by the manufacturer that the component has been tested and complies with the Class A computing device limits as described above.

IC-CS03 Notice - Canada

The Industry Canada 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 situations.

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.

European Terminal Marking

CE188X

The PortMaster Communications Server carries the CE188X approval marking in accordance with the CE Marking Directive 93/68/EEC. This marking may be found on the base of the unit.

This equipment has been tested and is compliant with the following European Directives:

- 91/263/EEC (Telecommunications Terminal Equipment)
- 73/23/EEC (Low Voltage Directive)
- 89/336/EEC (ElectroMagnetic Compatibility) as amended by 92/31/EEC

Pan-European Approval

BTZ, the German Notified Body, has issued Pan-European Approval to the PortMaster in accordance with the TTE Directive (91/263/EEC). This approval is valid throughout the European Economic Market.

This approval is valid in the following European Union Countries: Belgium, Denmark, Finland, France, Germany, Great Britain, Greece, Holland, Iceland, Ireland, Italy, Luxembourg, Portugal, Spain, and Sweden.

European CE approvals are automatically recognized by Norway.

In addition to compliance with the ETSI-based European standards, I-CTR 3 (Net 3 + Bridging Measures) NET 3 and ETS 300 047, the PortMaster has been tested and complies with the following National Delta requirements:

- French delta requirements CSE P 10-21 A
- German delta requirements BAPT 223 ZV 25

Contents

About This Guide

This guide provides instructions for installing and troubleshooting the PortMaster® Communications Server from Lucent Technologies, Inc., as well as pinout, electrical, and physical specifications.

Audience

This guide is designed to be used by qualified system administrators and network managers. Knowledge of UNIX and basic networking concepts is required to successfully install the PortMaster Communications Server.

PortMaster Documentation

The following manuals are available from Lucent Technologies. The hardware installation guides are included with most PortMaster products; other manuals can be ordered through your PortMaster distributor or directly from Lucent.

The manuals are also provided as PDF and PostScript files on the *PortMaster Software CD* shipped with your PortMaster.

In addition, you can download PortMaster information and documentation from **http://www.livingston.com**.

- *ChoiceNet® Administrator's Guide*

  This guide provides complete installation and configuration instructions for ChoiceNet server software.

- *Command Line Administrator's Guide*

  This guide provides the complete description and syntax of each command in the ComOS® command set.

- *Configuration Guide for PortMaster Products*

  This guide provides a comprehensive overview of networking and configuration issues related to PortMaster products.

- Hardware installation guides

  These guides contain complete hardware installation instructions. An installation guide is available for each PortMaster product line—IRX™, Office Router, Communications Server, and Integrated Access Server.

- *PMconsole™ for Windows Administrator's Guide*

  This guide covers PMconsole Administration Software for Microsoft Windows, a graphical tool for configuring the PortMaster. The majority of the material in this guide also applies to the UNIX version of PMconsole.

- *PortMaster Routing Guide*

  This guide describes routing protocols supported by PortMaster products, and how to use them for a wide range of routing applications.

- *RADIUS Administrator's Guide*

  This guide provides complete installation and configuration instructions for Lucent Remote Authentication Dial-In User Service (RADIUS) software.

Additional References

RFCs

Use any World Wide Web browser to find a Request for Comments (RFC) online.

RFC 768, *User Datagram Protocol*
RFC 791, *Internet Protocol*
RFC 792, *Internet Control Message Protocol*
RFC 793, *Transmission Control Protocol*
RFC 854, *Telnet Protocol Specification*
RFC 950, *Internet Standard Subnetting Procedure*
RFC 988, *Host Extensions for IP Multicasting*
RFC 1058, *Routing Information Protocol*
RFC 1144, *Compressing TCP/IP Headers for Low-Speed Serial Links*
RFC 1157, *A Simple Network Management Protocol (SNMP)*
RFC 1166, *Internet Numbers*
RFC 1213, *Management Information Base for Network Management of TCP/IP-based Internets: MIB-II*
RFC 1256, *ICMP Router Discovery Messages*
RFC 1321, *The MD5 Message-Digest Algorithm*

RFC 1332, *The PPP Internet Protocol Control Protocol (IPCP)*
RFC 1334, *PPP Authentication Protocols*
RFC 1362, *Novell IPX Over Various WAN Media (IPXWAN)*
RFC 1413, *Identification Protocol*
RFC 1490, *Multiprotocol Interconnect Over Frame Relay*
RFC 1583, *OSPF Version 2*
RFC 1587, *OSPF NSSA Options*
RFC 1597, *Address Allocations for Private Internets*
RFC 1627, *Network 10 Considered Harmful (Some Practices Shouldn't be Codified)*
RFC 1634, *Novell IPX Over Various WAN Media (IPXWAN)*
RFC 1661, *The Point-to-Point Protocol (PPP)*
RFC 1700, *Assigned Numbers*
RFC 1717, *The PPP Multilink Protocol (MP)*
RFC 1771, *A Border Gateway Protocol 4 (BGP-4)*
RFC 1812, *Requirements for IP Version 4 Routers*
RFC 1814, *Unique Addresses are Good*
RFC 1818, *Best Current Practices*
RFC 1826, *IP Authentication Header*
RFC 1827, *IP Encapsulating Payload*
RFC 1877, *PPP Internet Protocol Control Protocol Extensions for Name Server Addresses*
RFC 1878, *Variable Length Subnet Table for IPv4*
RFC 1918, *Address Allocation for Private Internets*
RFC 1965, *Autonomous System Confederations for BGP*
RFC 1966, *BGP Route Reflection, An Alternative to Full Mesh IBGP*
RFC 1997, *BGP Communities Attribute*
RFC 2003, *IP Encapsulating Security Payload*
RFC 2138, *Remote Authentication Dial In User Service (RADIUS)*
RFC 2139, *RADIUS Accounting*

Document Conventions

The following conventions are used in this guide:

Convention	Use	Examples
Bold font	Indicates a user entry—a command, menu option, button, or key—or the name of a file, directory, or utility, except in code samples.	• Enter **version** to display the version number. • Press **Enter**. • Open the **permit_list** file.
Italic font	Identifies a command-line placeholder. Replace with a real name or value.	• **set** *Ether0* **address** *Ipaddress* • Replace *Area* with the name of the OSPF area.
Square brackets ([ ])	Enclose optional keywords and values in command syntax.	• **set nameserver** [**2**] *Ipaddress* • **set** *S0* **destination** *Ipaddress* [*Ipmask*]
Curly braces ({ })	Enclose a required choice between keywords and/or values in command syntax.	**set syslog** *Logtype* {[**disabled**] [*Facility.Priority*]}
Vertical bar (|)	Separates two or more possible options in command syntax.	· **set** *S0*|*W1* **ospf on**|**off** · **set** *S0* **host default**|**prompt**|*Ipaddress*

Contacting Lucent Remote Access Technical Support

The PortMaster comes with a 1-year hardware warranty.

For all technical support requests, record your PortMaster ComOS version number and report it to the technical support staff.

New releases and upgrades of PortMaster software are available by anonymous FTP from **ftp://ftp.livingston.com.pub/le/**.

You can schedule a 1-hour software installation appointment in advance by calling the technical support telephone number listed below. Appointments must be scheduled at least one business day in advance.

For Europe, Middle East, and Africa (EMEA)

Contact the Lucent Remote Access EMEA Support Center Monday through Friday between the hours of 8 a.m. and 8 p.m. (GMT+1), excluding French public holidays.

- By voice, dial +33-4-92-92-48-88.
- By fax, dial +33-4-92-92-48-40.
- By electronic mail (email) send mail to **emeasupport@livingston-ent.fr**

For North America, Latin America, and the Asia Pacific Region

Contact Lucent Remote Access Monday through Friday between the hours of 6 a.m. and 5 p.m. (GMT –8).

- By voice, dial 800-458-9966 within the United States (including Alaska and Hawaii), Canada, and the Caribbean, or +1-510-737-2100 from elsewhere.
- By fax, dial +1-510-737-2110.
- By email, send mail as follows:
  - From North America and Latin America to **support@livingston.com**.
  - From the Asia Pacific Region to **asia-support@livingston.com**.
- Using the World Wide Web, see **http://www.livingston.com/**.

Subscribing to PortMaster Mailing Lists

Lucent maintains the following Internet mailing lists for PortMaster users:

- **portmaster-users**—a discussion of general and specific PortMaster issues, including configuration and troubleshooting suggestions. To subscribe, send email to **majordomo@livingston.com** with **subscribe portmaster-users** in the body of the message.

  The mailing list is also available in a daily digest format. To receive the digest, send email to **majordomo@livingston.com** with **subscribe portmaster-users-digest** in the body of the message.

- **portmaster-radius**—a discussion of general and specific RADIUS issues, including configuration and troubleshooting suggestions. To subscribe, send email to **majordomo@livingston.com** with **subscribe portmaster-radius** in the body of the message.

  The mailing list is also available in a daily digest format. To receive the digest, send email to **majordomo@livingston.com** with **subscribe portmaster-radius-digest** in the body of the message.

- **portmaster-announce**—announcements of new PortMaster products and software releases. To subscribe, send email to **majordomo@livingston.com** with **subscribe portmaster-announce** in the body of the message. All announcements to this list also go to the portmaster-users list. You do not need to subscribe to both lists.

PortMaster Communications Server 1

The PortMaster Communications Server is a high-speed network communication server designed to operate in a multiprotocol network environment. It provides shared network access to printers, modems, and other attached peripherals, as well as access to terminals, X terminals, and remote users using dial-up networking.

PortMaster Communications Server Product Line

Table 1-1 gives product line information on the PortMaster Communications Server.

Table 1-1 PortMaster Communications Servers

Model	Description
PM-2	Offers 10 asynchronous ports. Permits access to parallel devices (such as printers) via a parallel port.
PM-2E	Expandable server. Up to two expansion boards can be added for a total of up to 30 asynchronous ports or 10 asynchronous ports and 10 Basic Rate Interface (BRI) ports. Expansion boards are described in Table 1-2.
PM-2R PM-2ER	The PM-2R and PM-2ER can extend networks over long distances using leased lines, Frame Relay, ISDN, or switched 56Kbps circuits. These models include a synchronous port that can be configured for RS-232 or V.35 signaling to provide WAN connectivity at speeds up to T1 (1.544Mbps) or E1 (2.048Mbps). The PM-2ER is an expandable server. Up to two expansion boards can be added for a total of up to 20 asynchronous ports or 10 asynchronous ports and 5 BRI ports. Expansion boards are described in Table 1-2.

Table 1-1 PortMaster Communications Servers *(Continued)*

Model	Description
PM-25	Offers 25 asynchronous ports, consisting of one console port and three high-density 68-pin connectors, each of which support eight asynchronous serial devices.
PM-2i-U PM-2i-ST	ISDN models. These servers each have 5 BRI channels providing, respectively, either a U interface with integrated NT1, or an S/T interface requiring an external NT1.
PM-2Ei-10I-U PM-2Ei-10I-ST	Expandable ISDN models. These servers each have room for up to two expansion boards (5 BRI ports each), for a total of up to 15 BRI ports (30 B channels). Expansion boards are described in Table 1-2.

Table 1-2 gives information on PortMaster Communications Server expansion boards.

Table 1-2 Expansion Boards

Expansion Board	Description
MOD-2E-10A MOD-2E-10B	This board provides 10 asynchronous ports (S10 through S19). This board provides 10 asynchronous ports (S20 through S29).
MOD-10I-U	This board provides 5 BRI ports (10 B channels) and one high-density 10-pin RJ-45 connector supporting all five BRIs in one cable. This board provides an integrated network termination (NT1) device that attaches directly to the ISDN line; an external NT1 is not necessary. U interface products are intended for use in the United States and Canada. Revisions A and B of the MOD-10I-U board can be used only in the PortMaster 2E. Revision C or later boards can be used in any expandable PortMaster.

Table 1-2 Expansion Boards *(Continued)*

Expansion Board	Description
MOD-10I-ST	Offers 5 BRI ports (10 B channels). This board provides an S/T interface for countries that follow international ISDN standards.

Figure 1-1 shows the front panel of the PortMaster Communications Server. The product name displayed on the figure applies to the PM-2 model; the model number varies for each unit.

Figure 1-1 PortMaster Communications Server Front Panel

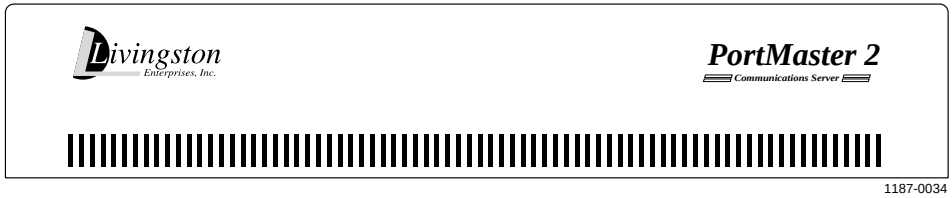


Table 1-3 shows the available ports on each PortMaster Communications Server model. Table 1-4 on page 1-4 shows how to upgrade your PortMaster Communication Server. Physical specifications are listed in Appendix B.

Table 1-3 Available Port Types by PortMaster Model

	Ports					
Model	**Ethernet**	**Asynchronous**	**Synchronous**	**Parallel**	**BRI U**	**BRI S/T**
PM-2	Ether0	S0–S9		P0		
PM-2E-10	Ether0	S0–S9		P0		
PM-2E-20	Ether0	S0–S19[1]		P0	S10–S19[1]	S10–S19[1]
PM-2E-30	Ether0	S0–S29[1]		P0	S10–S29[1]	S10–S29[1]
PM-2ER-10	Ether0	S0–S9	W1			

Table 1-3 Available Port Types by PortMaster Model *(Continued)*

	Ports					
Model	**Ethernet**	**Asynchronous**	**Synchronous**	**Parallel**	**BRI U**	**BRI S/T**
PM-2ER-20	Ether0	S0–S19[1]	W1		S10–S19[1]	S10–S19[1]
PM-2ER-30	Ether0	S0–S29[1]	W1		S10–S29[1]	S10–S29[1]
PM-2R	Ether0	S0–S9	W1			
PM-25	Ether0	S0–S24[2]				
PM-2i-U	Ether0	C0			S0–S9	
PM-2i-ST	Ether0	C0				S0–S9
PM-2E-10I-U	ether0	C0			S0–S29[1]	
PM-2E-10I-ST	ether0	C0				S0–S29[1]

[1)]Ports S10 through 19 are ISDN B channels if a MOD-10I-U or MOD-10I-ST board is placed in the first expansion slot. Ports S20 through 29 are ISDN B channels if a MOD-10I-U or MOD-10I-ST board is placed in the second expansion slot.

[2)]A single asynchronous serial port (S0) is provided, as well as three high-density 68-pin connectors, each of which supports eight asynchronous serial devices.

Table 1-4 PortMaster Communications Server Upgrades

Model	**Can Be Upgraded to Model**	**By Installing**
PM-2E-10	PM-2E-20	1 MOD-2E-10A
PM-2E-20	PM-2E-30	1 MOD-2E-10B
PM-2E-10	PM-2E-10 with 5 or 10 BRI U ports	1 or 2 MOD-10I-U
PM-2E-10	PM-2E-10 with 5 or 10 BRI S/T ports	1 or 2 MOD-10I-ST
PM-2ER-10	PM-2ER-10 with 5 or 10 BRI U ports	1 or 2 MOD-10I-U (Revision C or later)
PM-2ER-10	PM-2ER-10 with 5 or 10 BRI S/T ports	1 or 2 MOD-10I-ST

Table 1-4 PortMaster Communications Server Upgrades *(Continued)*

Model	Can Be Upgraded to Model	By Installing
PM-2ER-10	PM-2ER-20	1 MOD-2E-10A
PM-2ER-20	PM-2ER-30	1 MOD-2E-10B
PM-2ER-20	PM-2ER-20 with 5 BRI U ports	1 MOD-10I-U (Revision C or later)
PM-2ER-20	PM-2ER-20 with 5 BRI S/T ports	1 MOD-10I-ST
PM-2Ei-U	PM-2E-10I-U with 10 or 15 BRI U ports	1 or 2 MOD-10I-U
PM-2E-10I-ST	PM-2E-10I-ST with 10 or 15 BRI S/T ports	1 or 2 MOD-10I-ST

PortMaster Software

Every PortMaster product comes with Lucent ComOS operating system software installed in nonvolatile RAM. This software is periodically updated; new releases are announced on the PortMaster mailing lists and are available by anonymous FTP from **ftp://ftp.livingston.com.pub/le/.** See "Subscribing to PortMaster Mailing Lists" on page xiv for information on mailing lists.

ComOS version 3.7.2 or later is recommended for all PortMaster models. Table 1-5 lists the earliest ComOS version that can be used with each PortMaster.

Table 1-5 PortMaster Software Compatibility

Product	Earliest Compatible ComOS Release
PM-2	Any ComOS release can be used.
PM-2E	Any ComOS release can be used.
PM-2ER	ComOS 3.1
PM-2R	ComOS 3.1
PM-25	ComOS 3.1.4

Table 1-5 PortMaster Software Compatibility *(Continued)*

Product	Earliest Compatible ComOS Release
PM-2i-U	ComOS 3.3.1
PM-2i-ST	ComOS 3.3.2
PM-2Ei-U	ComOS 3.3.1
PM-2Ei-ST	ComOS 3.3.2
MOD-2E	Any ComOS release can be used.
MOD-10I-U	ComOS 3.3.1
MOD-10I-ST	ComOS 3.3.2

To configure the PortMaster, you can use either of the following:

- **Lucent's Command Line Interface.** If you are using the command line interface to configure the PortMaster Communications Server, refer to the *Command Line Administrator's Guide* and the *Configuration Guide for PortMaster Products* for instructions.
- **Lucent's PMconsole Software.** PMconsole guides you through configuration using a simple graphical user interface (GUI). It is available for Windows 95, Windows NT 4.0 or later, and for many versions of UNIX. You can install PMconsole from the *PortMaster Software CD* or from the Lucent Remote Access FTP site.

  Refer to the *PMconsole for Windows Administrator's Guide* for configuration instructions.

Note – You must use the command line interface to configure certain ComOS features such as the Open Shortest Path First (OSPF) protocol on the PortMaster Communications Server.

Installing the PortMaster 2

Installation Checklist

- ❑ 1. Choose a Site
- ❑ 2. Prepare the Work Area
- ❑ 3. Install a Rack Mount (Optional)
- ❑ 4. Connect a Console
- ❑ 5. Connect a T1/E1 line
- ❑ 6. Connect an ISDN BRI Line
- ❑ 7. Connect an Ethernet Cable
- ❑ 8. Turn On Power
- ❑ 9. Log In
- ❑ 10. Set the Network Address

1. Choose a Site

Follow these guidelines to select a site for your PortMaster.

Environment

- ❑ Choose a clean and dust free environment.
- ❑ Choose a secure, flat surface area for desktop installation.
- ❑ Choose an air conditioned area if possible.
- ❑ Choose an area without direct sunlight, close proximity to heat sources, or high levels of electromagnetic interference (EMI).

Chassis Accessibility

- ❑ Provide 3 inches (8cm) clearance at the rear of the PortMaster for cabling purposes.

Air Flow and Cooling

- ❑ Provide 3 inches (8cm) around all vent openings of the PortMaster for proper air flow.

Power Guidelines

- ❑ Ensure that the power source of the PortMaster is properly grounded and falls within the internal power supply rating. The PortMaster 2 series operates correctly at any AC voltage from 100V to 260V and frequencies from 50Hz to 60Hz.

2. Prepare the Work Area

Prepare for installation by gathering the following equipment and following these safety recommendations.

Required Equipment

- ❑ Number 1 Phillips screwdriver
- ❑ 5/32-inch flathead screwdriver

Safety Recommendations

- ❑ Keep the chassis area clean and dust free during and after installation.
- ❑ Disconnect the PortMaster from the power source before working near power supplies, changing a fuse, or upgrading memory.
- ❑ Before applying power, look for possible hazards such as moist floors, ungrounded power extension cables, or missing safety grounds and locate the emergency power switch for the room in which you are working.
- ❑ Wear safety glasses when working under any conditions that might be hazardous to your eyes.
- ❑ Keep tools away from walk areas where you and others could fall over them.
- ❑ Do not work alone if potentially hazardous conditions exist.
- ❑ Wear a grounding strap when handling the internal components of the PortMaster.

Warning – Before working on equipment that is connected to power lines, remove jewelry including rings, necklaces, and watches. Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals.

If an electrical accident occurs, turn off the emergency power switch for the room in which you are working, cautiously unplug the system's power, and get medical assistance for any injured person.

3. Install a Rack Mount (Optional)

Table 2-1 shows which PortMaster Communications Servers are shipped with a rack ears rack-mounting kit and which require a RACK-1 rack-mounting kit.

Order RACK-1 rack-mounting kits from Lucent by specifying ordering code RACK-1.

Table 2-1 Rack-Mounting-Kits

Model	**Rack-Mounting Kit and Instructions**
PM-2i-U PM-2i-ST PM-2Ei-U PM-2Ei-ST PM-25	Shipped with the rack ears rack-mounting kit.
PM-2 PM-2E PM-2ER PM-2R	Order the RACK-1 rack-mounting kit.

Rack Ears Rack-Mounting Kit

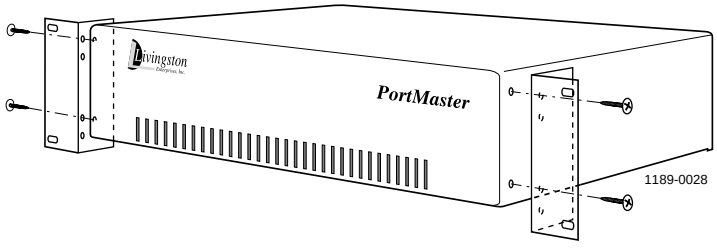
Follow these instructions to attach the PortMaster to a rack with the rack ears rack-mounting kit.

Required Equipment

- ❑ Two angle brackets (included)
- ❑ Eight 12-24 screws (included)
- ❑ Flathead screwdriver
- ❑ Number 1 Phillips screwdriver
- ❑ Rack with universal Electronic Industries Association (E.I.A.) spacing

Procedure

1. **Remove the plastic plugs from the mounting holes in the chassis by inserting a flathead screwdriver under the plug edge and prying the plug loose.**
2. **Mount the angle brackets to the sides of the PortMaster using four 12-24 screws, so that the top edge of the angle bracket is aligned with the top of the PortMaster.**



3. **Attach the PortMaster to a rack using four 12-24 screws, so that the front of the PortMaster is flush with the front of the rack.**

RACK-1 Rack-Mounting Kit

Follow these instructions to attach the PortMaster Communications Server to a rack with the RACK-1 rack-mounting kit.

Required Equipment

- ❑ Four 12-24x1/2-inch pan head screws
- ❑ Four 4x3/4-inch sheet metal screws
- ❑ Flathead screwdriver
- ❑ Number 1 Phillips screwdriver
- ❑ Rack with universal Electronic Industries Association (E.I.A.) spacing

Procedure

1. **Unscrew (counterclockwise) the black plastic screws that secure the feet to the bottom of the PortMaster.**

   Retain the feet and the center expansion sleeve in each foot in place on the bottom of the PortMaster.

2. **Turn the rack mount unit upside down and align its four holes with the centers of the holes in the PortMaster feet.**

   The front of the PortMaster case sits about 1/8 inch in front of the mounting shelf flanges.

3. **Press—do not screw—a 4x3/4 inch sheet metal screw into four mounting shelf holes.**
4. **Turn the unit right side up by lifting from the front and rear of the PortMaster.**
5. **Install the unit in the rack with the four 12-24x1/2-inch pan head screws.**

4. Connect a Console

All PortMaster Communications Servers have an ansyncronous port designated the console port. On ISDN models the console port is C0. On all other models it is S0.

Follow these instructions to connect a console.

Required Equipment

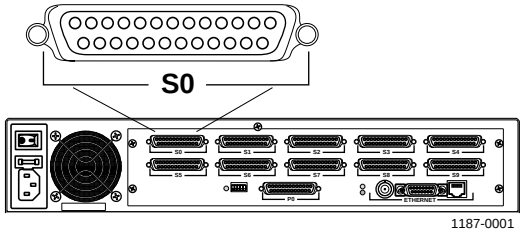
- ❑ DB-25 male-to-male serial null modem cable, with a 25-to-9-pin female adapter if you are using a PC. (See "Male-to-Male Null Modem Cable" on page B-2 for pinout information.)

  This cable and adapter are available from most computer equipment suppliers.

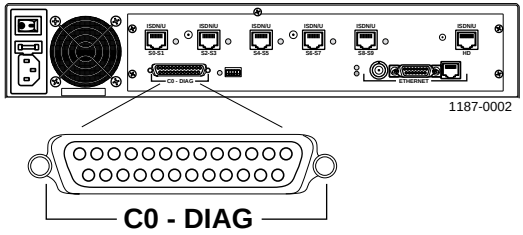
- ❑ PC or terminal

Procedure

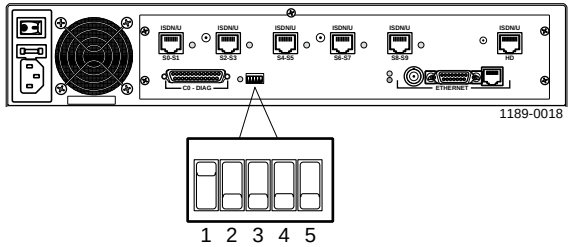
1. **Attach one end of the cable to the PortMaster console port, and attach the other end to the serial port of a PC or terminal.**
   - S0 console port (PM-2 rear panel shown)



   - C0 console port (PM-2i-U rear panel shown)



2. **Ensure that DIP switch 1 is up.**



3. **Set the terminal to 9600 baud, 8 data bits, 1 stop bit, no parity, and software flow control (XON/XOFF).**

5. Connect a T1 /E1 line

Follow these instructions to connect a T1 or E1 line to the W1 port of the PM-2R and PM-2ER if you have already ordered the service from the telephone company.

Call your local telephone service provider to order T1 or E1. Typically you must pay an installation charge, a monthly flat-rate service charge, and usage charges.

Note – The W1 port requires an external clock signal provided by the telephone company or a channel service unit/digital service unit (CSU/DSU).

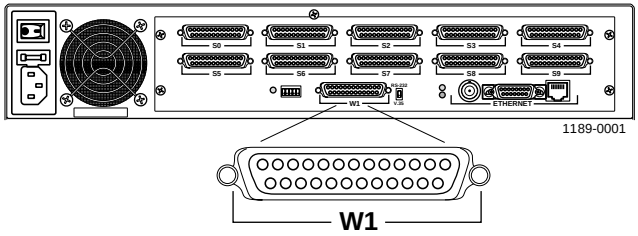
Required Equipment

- ❑ A V.35, RS-530, or X.21 cable

  One V.35 cable is included. (See "RS-232 Cable" on page B-10 for pinout information.)

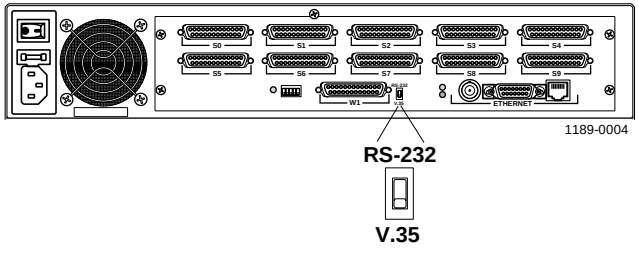
Procedure

1. **Connect a line to the W1 port (PM-2R shown).**



2. **Ensure that the W1 port switch is set to V.35. This is the default (PM-2R shown).**

   Set the switch to RS-232 for an RS-232 cable.



6. Connect an ISDN BRI Line

Follow these instructions to connect an ISDN BRI line to the PM-2i, PM-2E, PM-2Ei and PM-2ER if you have already ordered the service from the telephone company.

Required Equipment for the BRI S/T Interface

- ❑ One 8-pin category 5 twisted pair cable with RJ-45 connectors for each ISDN BRI port. (See "Category 5 Twisted Pair Cable for the S/T Interface" on page B-14 for pinout information.) Five of these cables are included.
- ❑ One NT1 device for each ISDN BRI S/T interface (if not supplied by the telephone company). NT1 devices are available from most computer equipment suppliers.

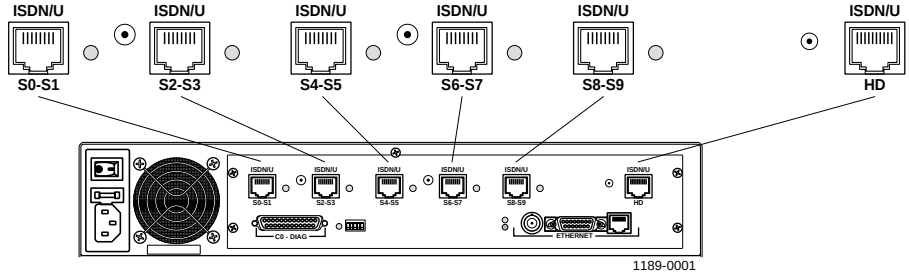
Required Equipment for the BRI U Interface

- ❑ One category 5 twisted pair cable with RJ-45 connectors for each ISDN BRI port. (See "Category 5 Twisted Pair Cable for the U Interface" on page B-14 for pinout information.) Five of these cables are included.
- ❑ One 20-foot high-density cable with an RJ-45 connector and 10 loose wires for connecting to a punchdown block via the high-density (HD) 10-pin RJ-45 port. This port supports all five ISDN BRI ports on 10 wires (See "High-Density 10-Pin Cable for the U Interface" on page B-15 for pinout information.) One of these cables is included.

Caution – Do not use the 10-pin RJ-45 cable in an 8-pin RJ-45 port. Incorrect cable insertion can damage the PortMaster.

Procedure

1. Connect ISDN BRI lines to ISDN BRI ports (PM-2i shown).



7. Connect an Ethernet Cable

The following Ethernet cables can be connected to the PortMaster. (See "Ethernet Interface" on page B-5 for specifications.)

- Ethernet 10BaseT
- Ethernet 10Base5 (AUI)
- Ethernet 10Base2 (BNC)

Ethernet 10BaseT

Follow these instructions to connect an Ethernet cable to the Ethernet 10BaseT port.

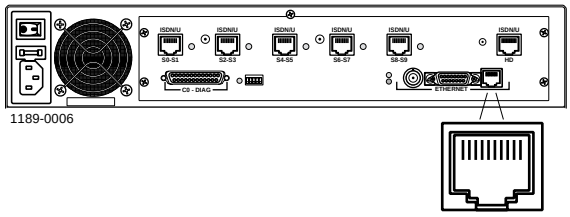
Required Equipment

❑ A category 5 twisted pair cable, as specified by the EIA/TIA-568-B wiring standard, with an RJ-48C connector

This cable is available from most computer equipment suppliers.

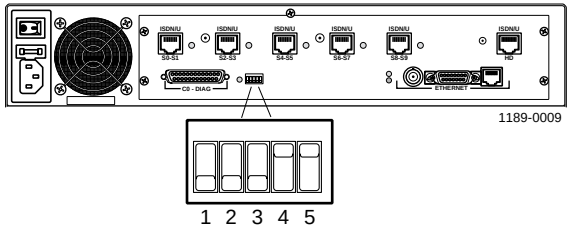
Procedure

1. Connect the cable to the Ethernet 10BaseT port (PM-2i shown).



1189-0006

2. Set DIP switches 4 and 5 up (PM-2i shown).



1189-0009

Ethernet 10Base5

Follow these instructions to connect an Ethernet cable to the Ethernet 10Base5 (AUI) port.

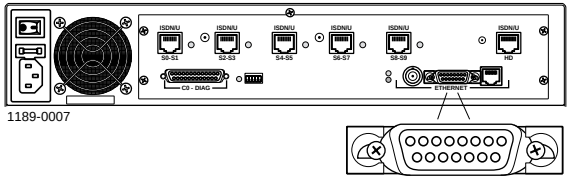
Required Equipment

- ❑ An RG-11 50-ohm coaxial cable with a DB-15 female connector

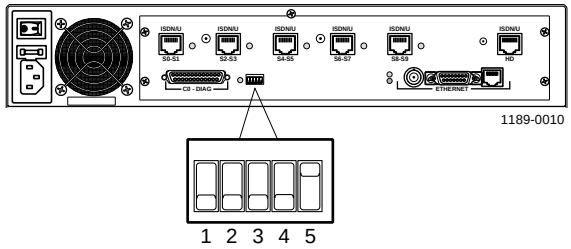
  This cable is available from most computer equipment suppliers.

Procedure

1. Connect the cable to the Ethernet AUI port (PM-2i shown).



2. Set DIP switch 4 down and DIP switch 5 up (PM-2i shown).



Ethernet 10Base2

Follow these instructions to connect an Ethernet cable to the Ethernet 10Base2 (BNC) port.

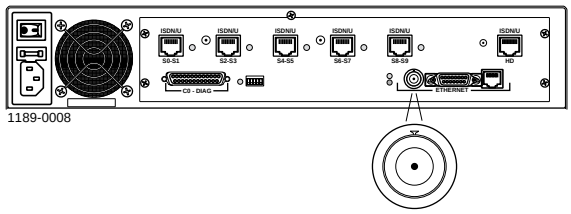
Required Equipment

- ❑ A 10Base2 (thin Ethernet) RG-58 A/U50-ohm coaxial cable with a BNC T-adapter

  This cable is available from most computer equipment suppliers. The BNC T-adapter is included with the PortMaster.

Procedure

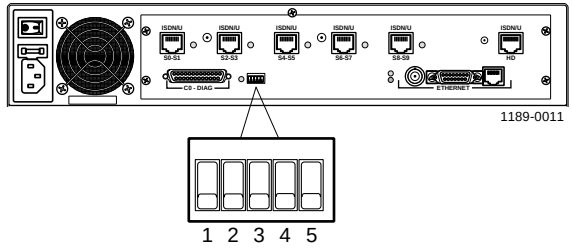
1. Connect the cable to the Ethernet BNC port using the BNC T-adapter (PM-2i shown).



2. Terminate the 10Base2 cable at both ends using a 50-ohm terminator cap.

Warning – One terminator cap of a 10Base2 Ethernet chain must be grounded to prevent damage to Ethernet equipment.

3. Set DIP switches 4 and 5 down (PM-2i shown).

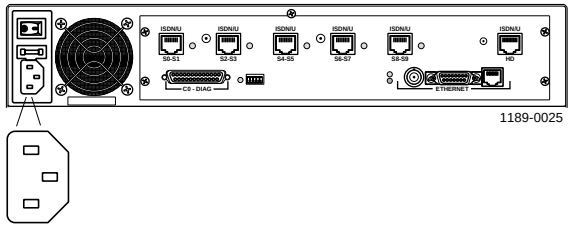


8. Turn On Power

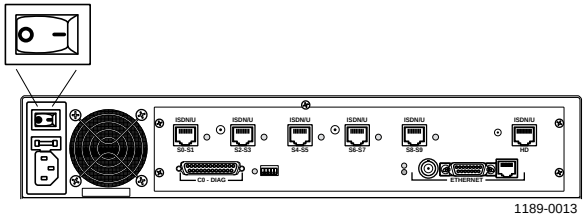
Follow these instructions to start the PortMaster.

Procedure

1. **Attach the power cord to the PortMaster and to a properly grounded electrical outlet (PM-2i shown).**

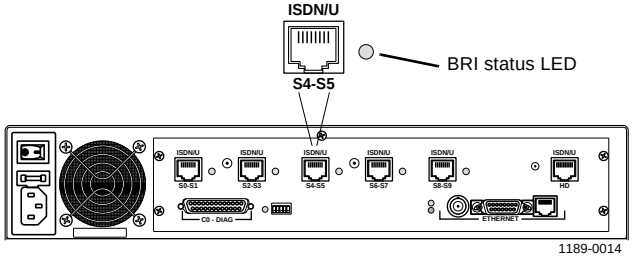


2. **Turn the power switch on (PM-2i shown).**

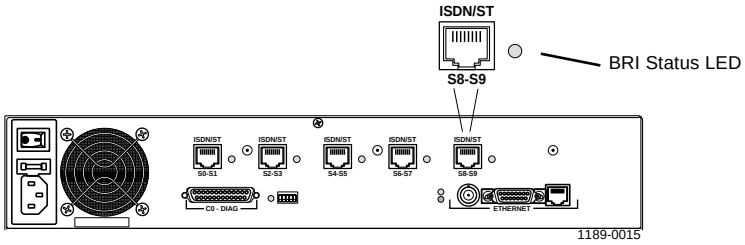


3. **If you are using BRI, verify the following:**

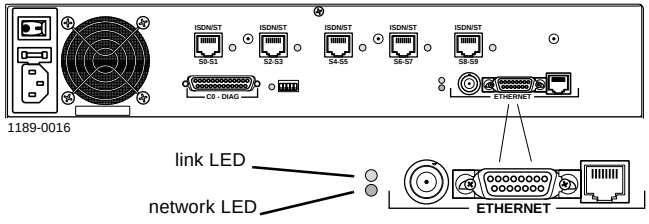
   – U interface. The BRI status LED flashes once at startup then flashes twice per second. After the service profile identifier (SPID) is set, the BRI status LED stays solidly lit.



– S/T interface. The BRI status LED flashes once at startup and then stays solidly lit for an active link (PM-2i shown).



4. **If you are using a 10Base2 (BNC) Ethernet connection, verify the following:**
   – Link LED. Flashes once at startup
   – Network LED. Flashes when Ethernet traffic is present
5. **If you are using a 10Base5 (AUI) Ethernet connection, verify the following:**
   – Link LED. Flashes once at startup
   – Network LED. Flashes when Ethernet traffic is present
6. **If you are using a 10BaseT Ethernet connection, verify the following:**
   – Link LED. Flashes twice at startup
   – Network LED. Flashes when Ethernet traffic is present



9. Log In

Follow these instructions to log in to the PortMaster.

1. **From the login prompt, type !root and press the Enter key.**
2. **From the password prompt, press the Enter key—no password is needed.**

```
login: !root
Password:
Command>
```

10. Set the Network Address

Set an IP address and netmask for an IP network and/or an IPX network number and frame type for an IPX network.

IP Address

Follow these instructions to set an IP address and netmask for the PortMaster.

From the command prompt, enter the following information, pressing the Enter key after each line.

Replace the *italicized* values with values appropriate for your network.

```
Command> set ether0 address 172.168.200.1
Command> set netmask 255.255.255.0
Command> save all
Command> quit
```

IPX Address

Follow these instructions to set an IPX address and frame type for the PortMaster.

From the command prompt, enter the following information, pressing the Enter key after each line.

Replace the *italicized* values with values appropriate for your network.

```
Command> set ether0 ipxnet AFAF0808
Command> set ether0 ipxframe ethernet_802.2
Command> save all
Command> quit
```

To configure the PortMaster, you can use either of the following:

- **Lucent's Command Line Interface.** If you are using the command line interface to configure the PortMaster, refer to the *Command Line Administrator's Guide* and the *Configuration Guide for PortMaster Products* for instructions.
- **Lucent's PMconsole Software.** PMconsole guides you through configuration using a simple graphical user interface (GUI). It is available for Windows 95, Windows NT 4.0 or later, and for many versions of UNIX. You can install PMconsole from the *PortMaster Software CD* or from the Lucent FTP site.

  Refer to the *PMconsole for Windows Administrator's Guide* for configuration instructions.

Note – You must use the command line interface to configure certain ComOS features such as the Open Shortest Path First (OSPF) protocol on the PortMaster Communications Server.

Installing Optional Equipment 3

This chapter provides information on installing the following optional upgrades:

- Installing external modems
- Adding memory
- Installing PortMaster expansion boards
- Removing PortMaster expansion boards

Installing External Modems

Follow these instructions to install external modems.

Required Equipment

❑ A standard male-to-male straight-through RS-232 cable (See "Male-to-Male Straight-Through RS-232 Cable" on page B-3 for pinout information.)

This cable is available from most computer equipment suppliers.

❑ For the PM-25, a 4-foot (120cm) cable that splits into eight DB-25 straight-through cables

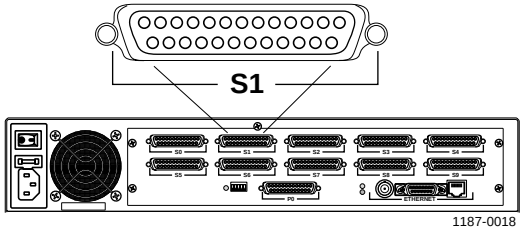
❑ For attaching the PM-25 model to a U.S. Robotics Quad modem rack, a 3-foot (90cm) cable that splits into two 50-pin high-density connectors

❑ External modems

Note – External modems can be connected to any asynchronous port. If a modem is connected to the C0 or S0 port, set DIP switch 1 down and turn the power off and on.

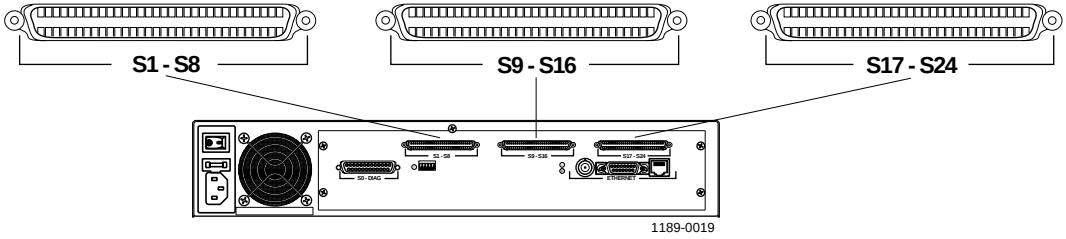
Procedure

- **Asynchronous port.** Attach one end of the cable to any asynchronous port and the other end to an external modem. Repeat for each modem (PM-2R shown).



- **High-density 68-pin connectors.** Attach one end of the cable to a 68-pin high-density connector, and attach the other eight ends to external modems. Repeat for each connector.

  Use a 3-foot (90cm) cable that splits into two 50-pin high-density connectors to connect to a U.S. Robotics Quad modem rack.



For modem configuration information, refer to one of the following:

- If you are using the command line interface to configure the PortMaster, refer to the *Configuration Guide for PortMaster Products*.
- If you are using PMConsole to configure the PortMaster, refer to the *PMconsole for Windows Administrator's Guide*.

Adding Memory

Follow these instructions to add memory.

The PortMaster is shipped from the factory with four 30-pin, 1MB (1x30), 70-nanosecond-or-better single inline memory modules (SIMMs) of RAM installed. The memory can be increased to 8MB (2x30) or 16MB (4x30).

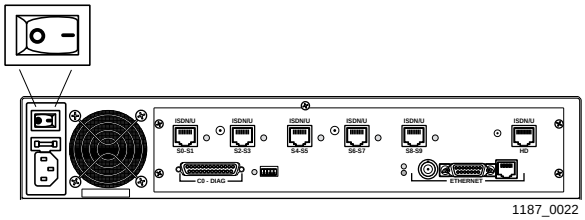
Required Equipment

- ❑ Four 30-pin single inline memory modules (SIMMs) rated at 70 nanoseconds or better.

Procedure

Caution – Wear a grounding strap when handling the internal components of the PortMaster.

1. **Turn the power switch off and disconnect the PortMaster from the power source.**



1187_0022

2. **Lay the PortMaster down on a hard, flat, static free surface.**

   Ensure that the LEDs and ports are facing you.

3. **Using a Phillips screwdriver, remove the screw from the top center of the PortMaster.**

4. **Remove the lid.**

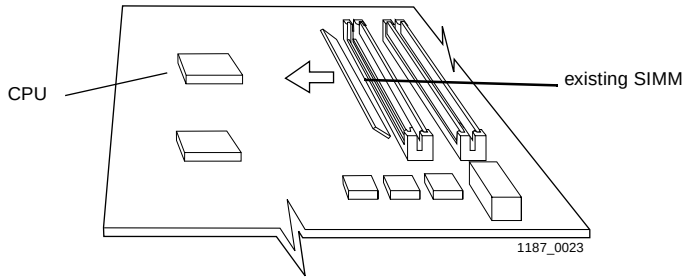
   With both hands on the sides of the PortMaster, push the lid firmly until it slides approximately 3 inches back. Lift the lid up and remove it.

5. **Locate the existing SIMM boards.**

   The SIMM boards are located in the upper right corner of the motherboard approximately 3.5 inches to the right of the CPU.

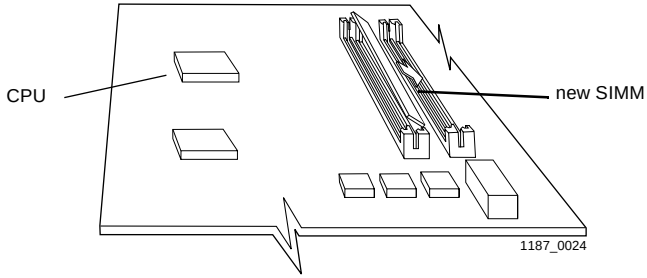
6. **Remove the existing SIMM boards.**

   Place your finger on the top center of the SIMM closest to the CPU and gently push it in the direction of the CPU until the SIMM is free from its socket. Repeat with each SIMM board until all four SIMM boards are removed.



7. **Insert the new SIMM boards.**

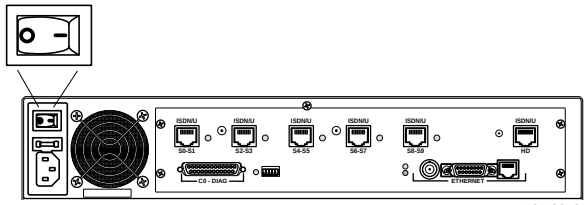
   Starting with the socket farthest from the CPU, slide a new SIMM board, gold side down, into the socket at a 45-degree angle. Once the SIMM board is seated, place your finger on the top center of the SIMM board and gently push it away from the CPU until it clicks into place. Repeat with each SIMM board until all four SIMM boards are inserted.



8. **Replace the lid.**

   Slide the lid over the outside edges of the PortMaster, and slide it towards you until it clicks into place.

9. **Using a Phillips screwdriver, replace the screw in the top center of the PortMaster.**
10. **Connect the PortMaster to the power source and turn the power switch on.**



Installing PortMaster Expansion Boards

Follow these instructions to install PortMaster expansion boards on the PM-2E, PM-2ER, PM-2Ei-10I-U, and PM-2Ei-10I-ST.

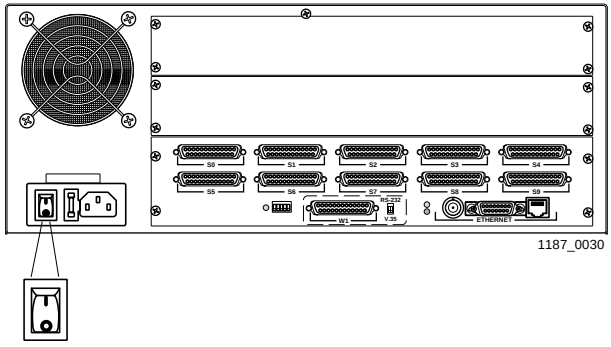
Required Equipment

- ❑ PortMaster expansion boards (See "PortMaster Communications Server Product Line" on page 1-1 for expansion board compatibility and model information.)
- ❑ Number 1 Phillips screwdriver

Procedure

Caution – Wear a grounding strap when handling the internal components of the PortMaster.

1. **Turn the power switch off and disconnect the PortMaster from the power source.**



2. **Lay the PortMaster down on a hard, flat, static free surface.**

   Ensure that the LEDs are facing you.

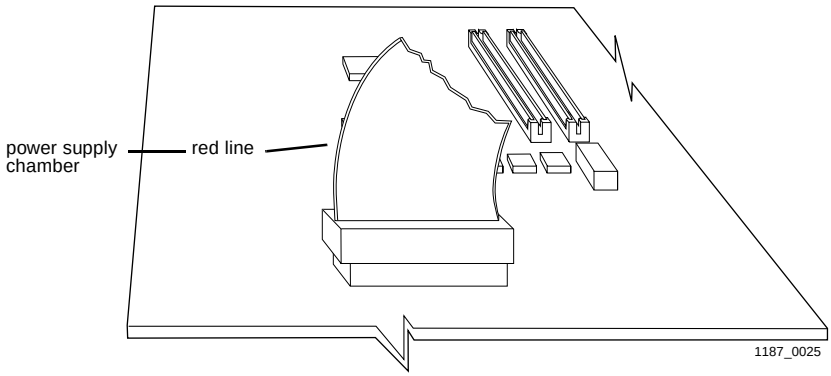
3. **Using a Phillips screwdriver, remove the screw from the top center of the PortMaster.**
4. **Remove the lid.**

   With both hands on the sides of the PortMaster, push the lid firmly until it slides approximately 3 inches back. Lift the lid up and remove it.

5. **Ensure that a 60-pin ribbon has been installed in the center of the PortMaster motherboard.**

   – If the ribbon is installed, proceed to Step 6.

   – If the ribbon is not installed, insert the connector with the white strip on top into the main board. Ensure that the red line is closest to the power supply chamber.



6. **If you are installing the MOD-101-U board, verify the board's revision number.**

   The PortMaster 2ER requires revision C or later of the MOD-101-U board. Any version of the MOD-101-U board can be used in the PortMaster 2E and PortMaster 2Ei.

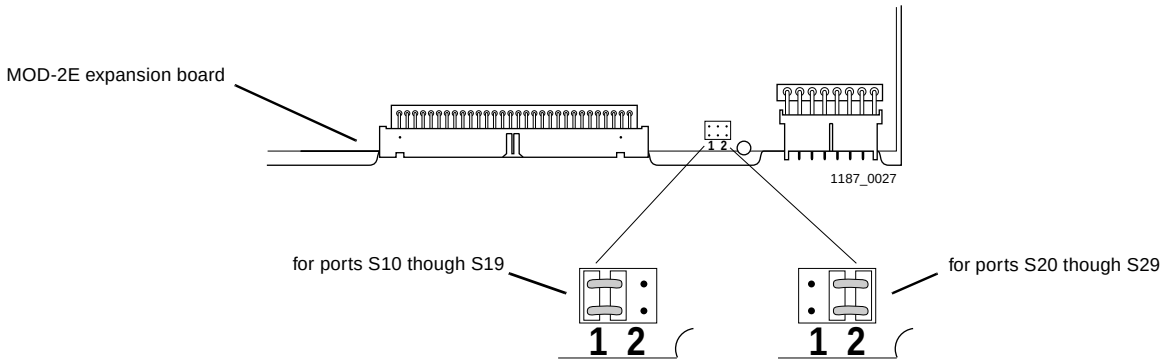
7. **Verify the position of the expansion board jumper.**

   The jumper pin is located between the two cable connectors on the expansion board.

   – **M0D-2E-10A and M0D-2E-10B asynchronous expansion boards.** On these boards, the jumper pins are marked 1 and 2.

     For an S10 through S19 expansion board, verify that the jumper connects the pair of pins marked 1 to the middle pair of pins.

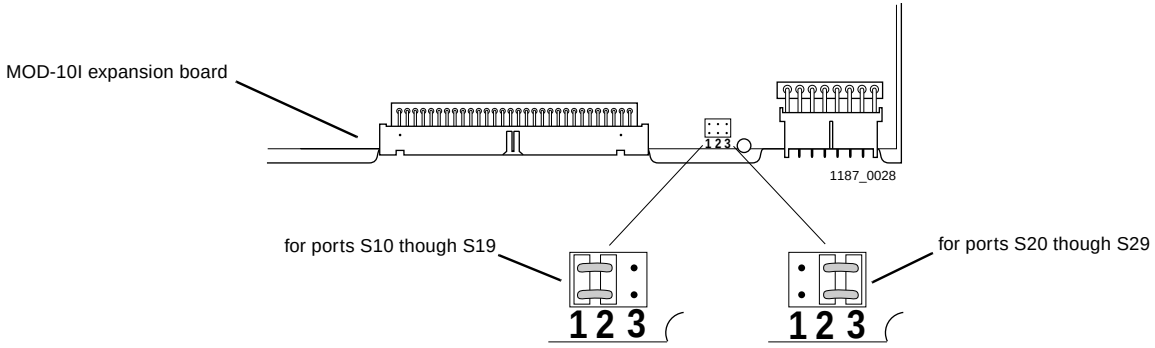
For an S20 through S29 expansion board, verify that the jumper connects the pair of pins marked 2 to the middle pair of pins.



– **MOD-10I-U and MOD-10I-ST ISDN.** On these boards, the jumper pins are marked 1, 2, and 3.

  For an S10 though S19 expansion board, verify that the jumper connects the pins 1 and 2.

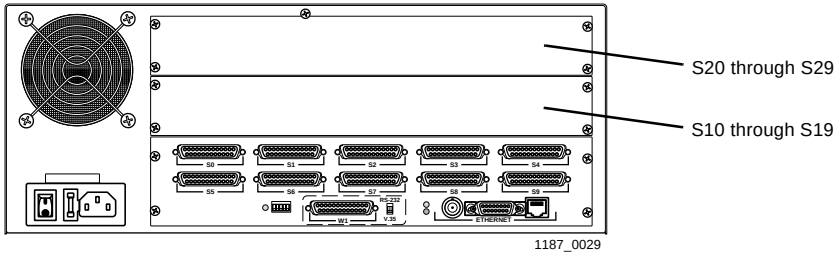
  For an S20 through S29 expansion board, verify that the jumper connects pins 2 and 3.



8. **Using a Phillips screwdriver, remove the back cover plates from the rear of the PortMaster.**

   – **S10 through S19 expansion board.** Insert this expansion board directly above the rear face plate containing ports S0 through S9.

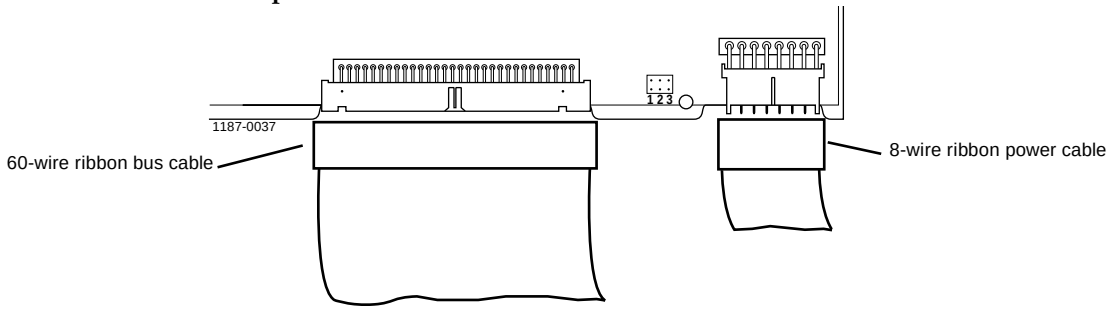
– **S20 through S29 expansion board.** Insert this expansion directly board above the rear face plate containing ports S10 through S19.



9. **Attach the rear face plates with the screws provided.**

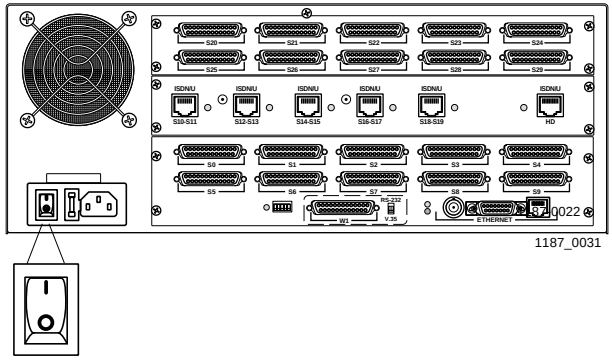
   Ensure that each face plate is aligned before tightening the screws.

10. **Plug the 8-wire ribbon power cable and 60-wire ribbon bus cable into the front of each expansion board.**



11. **Replace the lid of the PortMaster case, and using a Phillips screwdriver, replace the screw.**

12. **Connect the PortMaster to the power source and turn the power switch on.**



Removing PortMaster Expansion Boards

Follow these instructions to remove PortMaster expansion boards.

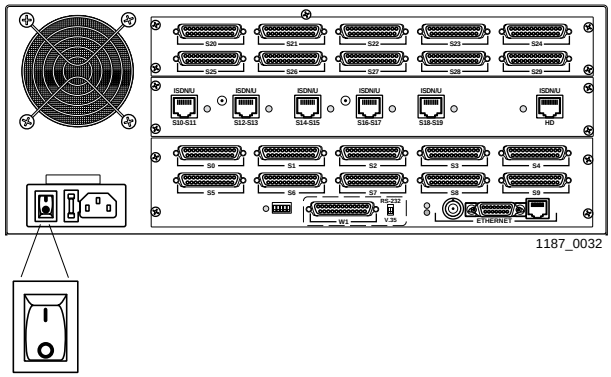
Required Equipment

- ❑ Number 1 Phillips screwdriver

Procedure

Caution – Wear a grounding strap when handling the internal components of the PortMaster.

1. **Turn the power switch off and disconnect the PortMaster from the power source.**



2. **Lay the PortMaster down on a hard, flat, static free surface.**

   Ensure that the LEDs are facing you.

3. **Using a Phillips screwdriver, remove the screw from the top center of the PortMaster.**

4. **Remove the lid.**

   With both hands on the sides of the PortMaster, push the lid firmly until it slides approximately 3 inches back. Lift the lid up and remove it.

5. **Unplug the 8-wire ribbon power cable and 60-wire ribbon bus cable from the front of the expansion board.**

6. **Place the expansion board into an electrostatic discharge (ESD) bag.**

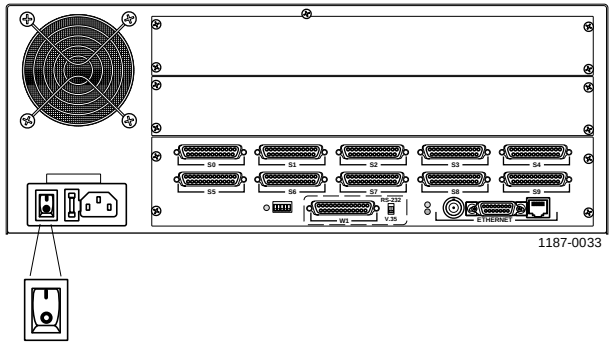
   To ship or store the expansion board, ensure that it is in a ESD bag, and cushion it with foam in a sturdy box.

7. **Using a Phillips screwdriver, reinstall the back cover plates shipped with the PortMaster.**

   The PM-2E-30 and PM-2ER-30 are shipped with expansion boards installed and have no back cover plates. In this case, leave the slot open until the expansion board is reinstalled.

8. **Replace the top of the PortMaster case, and using a Phillips screwdriver, replace the screw.**

9. **Connect the PortMaster to the power source and turn the power switch on.**



Troubleshooting A

This appendix provides the following troubleshooting procedures for the PortMaster Communications Server:

- Observing LED behavior
- Observing boot messages
- Replacing a fuse

Observing LED Behavior

Table A-1 identifies LED behavior, possible causes of the behavior, and potential solutions.

For information on contacting Lucent Remote Access Technical Support, see "Contacting Lucent Remote Access Technical Support" on page xiii.

Table A-1 Hardware Problems and Solutions

LED Behavior	Possible Cause	Solution
System LED does not light.	Power is not present.	Check the power switch, power cable, outlet, and fuse. For instructions on checking and changing the fuse in the AC version, see "Replacing a Fuse" on page A-7.
During startup, the system LED fails to light, stays lit, or blinks three times per second continuously.	A hardware problem has occurred.	Contact Lucent Remote Access Technical Support.

Table A-1 Hardware Problems and Solutions *(Continued)*

LED Behavior	Possible Cause	Solution
During startup, the system LED blinks once per second for more than a minute.	• DIP switch 2 is up and no boot server is present. • Nonvolatile RAM contents are corrupt.	• If no boot server is available, verify that DIP switch 2 is down and reboot; otherwise, see the network booting procedure in the *Configuration Guide for PortMaster Products*. • If nonvolatile RAM contents are corrupt, follow the *Configuration Guide for PortMaster Products* procedure for network booting and rewriting the contents of nonvolatile RAM.
Immediately after booting, the system LED stays solidly lit or does not light. Note: This behavior does not refer to the boot sequence, during which the system LED is not lit for between 5 and 7 seconds.	A component might have loosened during shipping.	Open the PortMaster using antistatic precautions (see "Safety Recommendations" on page 2-3). Verify the following: • All four SIMMs are firmly seated. • The PROM is firmly in place. • The Ethernet card is firmly in place, and the standoff screws are tight. • The expansion board jumpers are positioned correctly. • The 60-wire ribbon bus cable is firmly seated. If all items have been verified and the problem is not fixed, refer to "Observing Boot Messages" on page A-5, and boot in console mode. If the boot messages do not suggest a solution, record the information and contact Lucent Remote Access Technical Support.

Table A-1 Hardware Problems and Solutions *(Continued)*

LED Behavior	Possible Cause	Solution
After an ISDN S/T unit boots, an ISDN S/T status LED turns off.	The BRI is not able to synchronize with the attached NT1.	Ensure that the correct directory numbers have been assigned to each port of the BRI. Ensure that the cable connecting the BRI and the NT1 is securely attached. If the problem persists, contact your service provider.
After an ISDN U unit boots, an ISDN U status LED blinks once per second or turns off.	No SPID is set on the port.	Verify that the correct SPID has been assigned to the port and that the correct switch type is set. See the *Command Line Administrators Guide* for the appropriate ISDN BRI commands.
	There is no circuit to the telephone company.	Verify that the BRI cable is securely attached. If the problem persists, contact your service provider.
During operation, the system LED remains solidly on or completely off.	A hardware problem might have been caused by an external device.	Disconnect all external devices except the diagnostics terminal or PC. If the LED is still solidly lit or completely off, contact Lucent Remote Access Technical Support.
No console login prompt is displayed.	Console terminal settings are incorrect, or a connection or cable is inoperable.	• Verify terminal settings of 9600bps, 8 data bits, 1 stop bit, a parity of none, and software control (XON/XOFF). • Verify that DIP switch 1 is UP. • Verify that you have a working null modem cable and that it is properly connected at both ends. For cable information see "Pinout Specifications" on page B-1.

Table A-1 Hardware Problems and Solutions *(Continued)*

LED Behavior	Possible Cause	Solution
The Link LED is not lit when connected to a 10BaseT Ethernet hub.	There is no link integrity.	Verify that DIP switches 4 and 5 are up and that you have a working 10BaseT cable properly connected to the PortMaster and to the hub. Turn the power off and on to activate the DIP switch setting.
Network LED is solidly lit.	Heavy traffic can cause the network LED to blink so rapidly that it appears to be solidly lit. However, if packets cannot be passed, you might have an incorrectly cabled network.	Verify that the network cabling is correct.
Network LED is not lit.	If the PortMaster is not receiving, or sending traffic, the network LED is not lit.	Verify that the network cabling is correct.
	If packets cannot be passed, the network might be cabled incorrectly.	Verify that the network cabling is correct.
An undefined difficulty occurred at startup, but the cause cannot be determined from LED behavior.	Refer to the solution column.	Try booting in console mode, and observe the boot messages. See "Observing Boot Messages" on page A-5. If the boot messages do not suggest a solution, record the information and contact Lucent Remote Access Technical Support.

Observing Boot Messages

If you are having difficulty booting the PortMaster and are unable to isolate the problem by observing LED behavior, boot the PortMaster in console mode and check the boot messages.

Follow these instructions to check boot messages:

1. **Attach a console (see "Connect a Console" on page 2-7).**
2. **Turn on power (see "Turn On Power" on page 2-14).**
3. **Observe the boot messages displayed on the console screen.**

Note – Boot messages vary slightly, depending on the version of the PROM and ComOS.

PortMaster Diagnostic Boot Messages:

```
Testing Low Memory....
Testing System Clock....
Testing System Memory.... 1024K
Checking Boot Rom....
Calibrating.... 33MHz
Starting FLASH Boot.....
Booting From Flash Type AM29F040
Loading Image at 0fff0000
17082 flash copy complete
Verifying Load Module Checksum...
Starting Load Module...
Loading kernel...586988 bytes
Testing High Memory... . 1024K
ISDN found in slot 1 - Testing memory.. 512K
Found 11 ports....
ether0 active... 64K burst-IO
Running ComOS...


PortMaster Console login:
```

Use Table A-2 to interpret possible diagnostic boot messages.

Table A-2 Interpreting the Diagnostic Boot Messages

Field	Possible Message	Explanation
Testing Low Memory	ERROR	This error indicates a boot failure. Record all information to this point and contact Lucent Remote Access Technical Support.
Testing System Clock	ERROR	This error indicates a boot failure. Record all information to this point and contact Lucent Remote Access Technical Support.
Testing System Memory	ERROR at *failed memory address*	This error indicates a boot failure. Record all information to this point and contact Lucent Remote Access Technical Support.
Checking Boot Rom	ERROR	This error indicates a boot failure. Record all information to this point and contact Lucent Remote Access Technical Support.
Calibrating	33MHz	Processor speed.
Starting FLASH Boot	N/A	N/A
Booting from FLASH type	AM29F040	Nonvolatile memory brand name.
Loading Image at	0fff0000	RAM address.
flash copy complete	17082	Counter for nonvolatile memory bytes transferred to RAM. If the counter freezes, record all information to this point and contact Lucent Remote Access Technical Support.
Verifying Load Module Checksum	Invalid Length for Flash at *RAM address*	This error indicates a boot failure. Record all information to this point and contact Lucent Remote Access Technical Support.
Starting Load Module	N/A	N/A

Table A-2 Interpreting the Diagnostic Boot Messages *(Continued)*

Field	Possible Message	Explanation
Loading kernel	506000	Size of kernel image in bytes.
Testing High Memory	ERROR at *failed memory address*	This error indicates a boot failure. Record all information to this point and contact Lucent Remote Access Technical Support.
Async found in slot ISDN found in slot Testing memory	512K	ISDN or asynchronous interface found. Test of memory in progress.
Found *x* Ports	11, 21, 25, or 31	Number of ports found, including C0, P0, or W1.
ether0 active	64K burst - IO	Ethernet interface found.
Running ComOS	N/A	If the system becomes suspended at this point and does not print the next message, the configuration nonvolatile RAM has been corrupted. Refer to the troubleshooting chapter of the *Configuration Guide for PortMaster Products* for instructions on nonvolatile RAM recovery.
PortMaster Console login:	N/A	System is up and running.

Replacing a Fuse

If your PortMaster loses power while connected to an active power source, check the fuse.

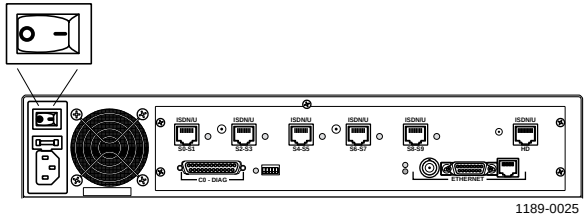
Follow these instructions to check and replace the fuse in the PortMaster.

Required Equipment

- 5/32-inch flathead screwdriver
- 250V, 2A fuse

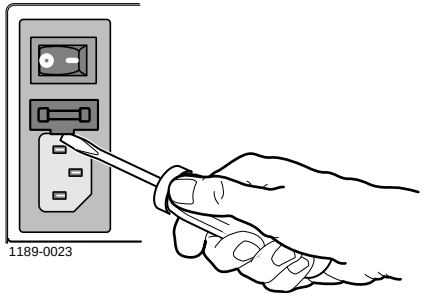
Procedure

1. **Turn the power switch off and disconnect the PortMaster from the power source (PM-2i shown).**



1189-0025

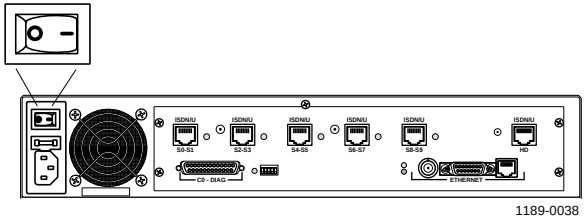
2. **Detach the power cord from the PortMaster.**
3. **Insert a 5/32-inch flathead screwdriver between the fuse door and the chassis, and gently pull the fuse door open.**


1189-0023

4. **If the white outer coating of the fuse is discolored (burned), replace the fuse.**

   The fuse can be inserted from either end.

5. **Press the fuse door shut until it clicks.**
6. **Reconnect the power cord to the PortMaster.**
7. **Turn the power switch on (PM-2i shown).**



1189-0038

Cable and Ethernet Specifications B

This appendix gives specifications for the following:

- **Male-to-male null modem cable**—connects a data terminal equipment (DTE) device (terminal or PC) to the C0 port (See page B-2.)
- **Male-to-male straight-through RS-232 cable**—connects a data communications equipment (DCE) device (modem) to the C0 port (See page B-3.)
- **High-density 68-pin cable**—connect modems to the high density ports on the PortMaster 25 (See page B-4.)
- **High-density 50-pin cable that splits into 50-pin connectors**—connects U.S. Robotics Quad modems to a PortMaster 25 (See page B-7.)
- **RS-232 cable**—connects external modems to an asynchronous ports (See page B-10.)
- **V.35 cable**—connects a T1/E1 line to a W1 port (See page B-11.)
- **X.21 cable**—connects a T1/E1 line to a W1 port (See page B-12.)
- **RS-530 cable**—connect a T1/E1 line to a W1 port (See page B-13.)
- **Category 5 twisted pair cable for the S/T interface**—connects an ISDN BRI line to the S/T interface (See page B-14.)
- **Category 5 twisted pair cable for the U interface—**connects an ISDN BRI line to the U interface (See page B-14.)
- **High-density 10-pin cable for the U interface—**connects all four BRI ports on the U interface to a punchdown block via the high density (HD) port (See page B-15.)
- **Ethernet interface specifications.** (See page B-16.)

Male-to-Male Null Modem Cable

Table B-1 gives pinout information for a DB-25 serial male-to-male null modem cable. Pins not listed have no connection.

Table B-1 Male-to-Male Null Modem Cable Pinout

PortMaster Serial Port (C0)				**Terminal Serial Port**		
DB-25 (DTE)	**Signal**	**Definition**	**Direction to or from the PortMaster**	**DB-25 (DTE) Pin**	**DB-9 (DTE) Pin**	**Signal**
2	TXD	Transmit Data	Output	3	2	RXD
3	RXD	Receive Data	Input	2	3	TXD
4	RTS	Request to Send	Output	5	8	CTS
5	CTS	Clear to Send	Input	4	7	RTS
6, 8	DCD	Data Carrier Detect	Input	20	4	DTR
7	GND	Signal Ground		7	5	GND
20	DTR	Data Terminal Ready	Output	6, 8	6, 1	DCD

Male-to-Male Straight-Through RS-232 Cable

Table B-2 gives pinout information for a male-to-male straight-through RS-232 cable. Pins not listed have no connection.

Table B-2 Straight-through Cable Pinout

PortMaster Serial Port (C0)				**Terminal Serial Port**		
DB-25 (DTE)	**Signal**	**Definition**	**Direction to or from the PortMaster**	**DB-25 (DCE) Pin**	**DB-9 (DCE) Pin**	**Signal**
2	TXD	Transmit Data	Output	2	3	TXD
3	RXD	Receive Data	Input	3	2	RXD
4	RTS	Request to Send	Output	4	7	RTS
5	CTS	Clear to Send	Input	5	8	CTS
6	DSR	Data Set Ready		6	6	DSR
7	GND	Signal Ground		7	5	GND
8	DCD	Data Carrier Detect	Input	8	1	DCD
20	DTR	Data Terminal Ready	Output	20	4	DTR

High-Density 68-Pin Cable

Table B-3 gives pinout information for eight straight-through RS-232 cables with a 68-pin high-density connector and eight DB-25 connectors. This cable is used on the PortMaster 25 only.

To order this cable from Lucent, specify product code DC-8DB.

Table B-3 High-Density 68-Pin-to-Eight DB-25 Cable–PM-25 only

Port	Signal	Definition	68-Pin Connector Pin	RS-232 Cable	DSub (male) Pin
1	RTS	Request to Send	2	1	4
	DTR	Data Terminal Ready	36	1	20
	TXD	Transmit Data	3	1	2
	SGND	Signal Ground	37	1	7
	DSR	Data Set Ready	4	1	6
	RXD	Receive Data	38	1	3
	DCD	Data Carrier Detect	5	1	8
	CTS	Clear to Send	39	1	5
2	RTS	Request to Send	6	2	4
	DTR	Data Terminal Ready	40	2	20
	TXD	Transmit Data	7	2	2
	SGND	Signal Ground	41	2	7
	DSR	Data Set Ready	8	2	6
	RXD	Receive Data	42	2	3
	DCD	Data Carrier Detect	9	2	8
	CTS	Clear to Send	43	2	5
3	RTS	Request to Send	10	3	4
	DTR	Data Terminal Ready	44	3	20
	TXD	Transmit Data	11	3	2

Table B-3 High-Density 68-Pin-to-Eight DB-25 Cable–PM-25 only *(Continued)*

Port	Signal	Definition	68-Pin Connector Pin	RS-232 Cable	DSub (male) Pin
	SGND	Signal Ground	45	3	7
	DSR	Data Set Ready	12	3	6
	RXD	Receive Data	46	3	3
	DCD	Data Carrier Detect	13	3	8
	CTS	Clear to Send	47	3	5
4	RTS	Request to Send	14	4	4
	DTR	Data Terminal Ready	48	4	20
	TXD	Transmit Data	15	4	2
	SGND	Signal Ground	49	4	7
	DSR	Data Set Ready	16	4	6
	RXD	Receive Data	50	4	3
	DCD	Data Carrier Detect	17	4	8
	CTS	Clear to Send	51	4	5
5	RTS	Request to Send	18	5	4
	DTR	Data Terminal Ready	52	5	20
	TXD	Transmit Data	19	5	2
	SGND	Signal Ground	53	5	7
	DSR	Data Set Ready	20	5	6
	RXD	Receive Data	54	5	3
	DCD	Data Carrier Detect	21	5	8
	CTS	Clear to Send	55	5	5
6	RTS	Request to Send	22	6	4
	DTR	Data Terminal Ready	56	6	20
	TXD	Transmit Data	23	6	2
	SGND	Signal Ground	57	6	7

Table B-3 High-Density 68-Pin-to-Eight DB-25 Cable–PM-25 only *(Continued)*

Port	Signal	Definition	68-Pin Connector Pin	RS-232 Cable	DSub (male) Pin
	DSR	Data Set Ready	24	6	6
	RXD	Receive Data	58	6	3
	DCD	Data Carrier Detect	25	6	8
	CTS	Clear to Send	59	6	5
7	RTS	Request to Send	26	7	4
	DTR	Data Terminal Ready	60	7	20
	TXD	Transmit Data	27	7	2
	SGND	Signal Ground	61	7	7
	DSR	Data Set Ready	28	7	6
	RXD	Receive Data	62	7	3
	DCD	Data Carrier Detect	29	7	8
	CTS	Clear to Send	63	7	5
8	RTS	Request to Send	30	8	4
	DTR	Data Terminal Ready	64	8	20
	TXD	Transmit Data	31	8	2
	SGND	Signal Ground	65	8	7
	DSR	Data Set Ready	32	8	6
	RXD	Receive Data	66	8	3
	DCD	Data Carrier Detect	33	8	8
	CTS	Clear to Send	67	8	5

High-Density 50-Pin Cable

A 3-foot (90cm) long cable that splits into two 50-pin high-density connectors is required for use with a U.S. Robotics Quad modem rack. To order this cable from Lucent, specify product code DC-HDM.

Table B-4 gives pinout information for this cable.

Table B-4 High-Density 50-Pin Cable

Quad	Port	Signal	Definition	68-Pin Number	Connection	Pin
A	1	RTS	Request to Send	2	1	3
		DTR	Data Terminal Ready	36	1	5
		TXD	Transmit Data	3	1	1
		SGND	Signal Ground	37	1	7
		DSR	Data Set Ready	4	1	11
		RXD	Receive Data	38	1	2
		DCD	Data Carrier Detect	5	1	6
		CTS	Clear to Send	39	1	4
	2	RTS	Request to Send	6	1	28
		DTR	Data Terminal Ready	40	1	30
		TXD	Transmit Data	7	1	26
		SGND	Signal Ground	41	1	32
		DSR	Data Set Ready	8	1	36
		RXD	Receive Data	42	1	27
		DCD	Data Carrier Detect	9	1	31
		CTS	Clear to Send	43	1	29
	3	RTS	Request to Send	10	1	40
		DTR	Data Terminal Ready	44	1	42
		TXD	Transmit Data	11	1	38

Table B-4 High-Density 50-Pin Cable *(Continued)*

Quad	Port	Signal	Definition	68-Pin Number	Connection	Pin
		SGND	Signal Ground	45	1	44
		DSR	Data Set Ready	12	1	48
		RXD	Receive Data	46	1	39
		DCD	Data Carrier Detect	13	1	43
		CTS	Clear to Send	47	1	41
	4	RTS	Request to Send	14	1	17
		DTR	Data Terminal Ready	48	1	17
		TXD	Transmit Data	15	1	13
		SGND	Signal Ground	49	1	19
		DSR	Data Set Ready	16	1	23
		RXD	Receive Data	50	1	14
		DCD	Data Carrier Detect	17	1	18
		CTS	Clear to Send	51	1	16
B	5	RTS	Request to Send	18	2	3
		DTR	Data Terminal Ready	52	2	5
		TXD	Transmit Data	19	2	1
		SGND	Signal Ground	53	2	7
		DSR	Data Set Ready	20	2	11
		RXD	Receive Data	54	2	2
		DCD	Data Carrier Detect	21	2	6
		CTS	Clear to Send	55	2	4
	6	RTS	Request to Send	22	2	28
		DTR	Data Terminal Ready	56	2	30
		TXD	Transmit Data	23	2	26
		SGND	Signal Ground	57	6	32

Table B-4 High-Density 50-Pin Cable *(Continued)*

Quad	Port	Signal	Definition	68-Pin Number	Connection	Pin
		DSR	Data Set Ready	24	2	36
		RXD	Receive Data	58	2	27
		DCD	Data Carrier Detect	25	2	21
		CTS	Clear to Send	59	2	29
	7	RTS	Request to Send	26	2	40
		DTR	Data Terminal Ready	60	2	42
		TXD	Transmit Data	27	2	38
		SGND	Signal Ground	61	2	44
		DSR	Data Set Ready	28	2	48
		RXD	Receive Data	62	2	39
		DCD	Data Carrier Detect	29	2	43
		CTS	Clear to Send	63	2	41
	8	RTS	Request to Send	30	2	15
		DTR	Data Terminal Ready	64	2	17
		TXD	Transmit Data	31	2	13
		SGND	Signal Ground	65	2	19
		DSR	Data Set Ready	32	2	23
		RXD	Receive Data	66	2	14
		DCD	Data Carrier Detect	33	2	18
		CTS	Clear to Send	67	2	16

RS-232 Cable

Table B-5 gives pinout information for a 25-pin RS-232 cable with two DB-25 connectors. Pins not listed have no connection.

Note – RS-232 only supports signaling at speeds up to 56Kbps. If the connected device supports RS-423 signaling, use an RS-423 cable to obtain speeds up to 128Kbps.

This cable is not supplied, but can be ordered from Lucent. Specify product code MC-6.

Table B-5 RS-232 Cable with DB-25 Connectors

Pin	Name	Definition	Direction
2	TXD	Transmit Data	Output
3	RXD	Receive Data	Input
4	RTS	Request to Send	Output
5	CTS	Clear to Send	Input
6	DSR	Data Set Ready	Input
7	SGND	Signal Ground	
8	DCD	Data Carrier Detect	Input
15	ST	Send Timing	Input
17	RT	Receive Timing	Input
20	DTR	Data Terminal Ready	Output

V.35 Cable

Table B-6 gives pinout information for a V.35 cable with DB-25 and V.35 connectors. Pins not listed have no connection.

This cable is not supplied, but can be ordered from Lucent. Specify product code CBL-V.35-6.

Table B-6 Synchronous V.35 Cable

DB-25 Pin	Name	V.35 Pin	Definition	Direction
2	TXD	P	Transmit Data	Output
14	TXD-	S		
3	RXD	R	Receive Data	Input
16	RXD-	T		
4	RTS	C	Request to Send	Output
5	CTS	D	Clear to Send	Input
6	DSR	E	Data Set Ready	Input
7	SGND	B	Signal Ground	
8	DCD	F	Data Carrier Detect	Input
15	ST	Y	Send Timing	Input
13	ST-	AA		
17	RT	V	Receive Timing	Input
19	RT-	X		
20	DTR	H	Data Terminal Ready	Output

X.21 Cable

Table B-7 gives pinout information for an X.21 cable with DB-25 and DB-15 connectors. Pins not listed have no connection.

This cable is not supplied, but can be ordered from Lucent. Specify product code CBL-X21-6.

Table B-7 Synchronous X.21 Cable

PortMaster Port W1	V.35 DB-25 Pin	Name	Definition	X.21 DB-15 Pin	Name
7	B	SGND	Signal Ground	8	SGND
				10	Control B
4	C	RTS	Request to Send	3	Control A
5	D	CTS	Clear to Send		
8	F	CD	Carrier Detect	5	Indicate A
3	R	RXA	Receive Data	4	RXA
16	T	RXB	Receive Data	11	RXB
17	V	RX CLKA	Receive Timing	6	CLKA
15	Y	TX CLKA	Send Timing		
19	X	RX CLKB	Receive Timing	13	CLKB
13	AA	TX CLKB	Send Timing		
2	P	TXD A	Transmit Data	2	TXA
14	S	TXD B	Transmit Data	9	TXA

RS-530 Cable

Table B-8 gives pinout information for a synchronous RS-530 cable with DB-25 connectors. Pins not listed have no connection.

This cable is not supplied, but can be ordered from Lucent. Specify product code CBL-530-6.

Table B-8 Synchronous RS-530 Cable

PortMaster Port W1	RS-530 CSU/DSU Pin	Name	Definition	Direction
2	2	TXD	Transmit Data	Output
14	14	TXD-		
3	3	RXD	Receive Data	Input
16	16	RXD-		
4	4	RTS	Request to Send	Output
5	5	CTS	Clear to Send	Input
6	6	DSR	Data Set Ready	Input
7	7	SGND	Signal Ground	
8	8	DCD	Data Carrier Detect	Input
15	15	ST	Send Timing	Input
13	12	ST-		
17	17	RT	Receive Timing	Input
19	9	RT-		
20	20	DTR	Data Terminal Ready	Output

Category 5 Twisted Pair Cable for the S/T Interface

Table B-9 gives pinout information for an 8-pin, category 5 twisted pair cable with RJ-45 connectors for the S/T interface. Pins not listed have no connection.

Five of these cables are included.

Table B-9 Category 5 Cable for the S/T Interface

RJ-45 Pin	Name	Definition	Direction
3	TXD	Transmit Data	Output
6	TXD-		
4	RXD	Receive Data	Input
5	RXD-		

Category 5 Twisted Pair Cable for the U Interface

Table B-10 gives pinout information for an 8-pin, category 5 twisted pair cable with RJ-45 connectors for the U interface. Pins not listed have no connection.

Additional cables are available from most computer equipment suppliers.

Table B-10 Category 5 Cable for the U Interface

ISDN/U Port	Direction
4	Input/Output
5	Input/Output

High-Density 10-Pin Cable for the U Interface

Table B-11 gives pinout information for a 20-foot (6m), high-density 10-pin, unshielded, 24-gauge solid level 1 wiring cable with an RJ-45 connector and 10 loose wires.

Caution – Do not use the 10-pin RJ-45 cable in an 8-pin RJ-45 port. Incorrect cable insertion can damage the PortMaster.

This cable is supplied with the MOD-10I-U expansion board and with models PM-2i-U and PM-Ei-U. Additional cables can be ordered from Lucent. Specify product code CBL-HD45. Punchdown blocks are available from electronic supply stores that carry telephone equipment.

Table B-11 High-Density 10-Pin Cable

Pin	Color	Ports S0-9	Ports S10-19	Ports S20-29
1	White-gray	5	S18-19	S28-29
2	White-brown	4	S16-17	S26-27
3	White-green	3	S14-15	S24-25
4	White-orange	2	S12-13	S22-23
5	White-blue	1	S10-11	S20-21
6	Blue-white	1	S10-11	S20-21
7	Orange-white	2	S12-13	S22-23
8	Green-white	3	S14-15	S24-25
9	Brown-white	4	S16-17	S26-27
10	Gray-white	5	S18-19	S28-29

Disregard any solid red or solid blue lines because they are not used.

Ethernet Interface Specifications

Table B-12 gives specifications for the 10Mbps baseband IEEE 802.3-compatible Ethernet interface.

Table B-12 Ethernet Interface Specifications

Ethernet Type	Connector Type	Cable Type	Transmission Distance
10Base5 (AUI)	15-pin DEC-Intel-Xerox (DIX) for connection to external transceiver	RG-11 50 ohm coaxial	Trunk segment—1,640ft (500m) maximum Transceiver cable—164ft (50m) maximum Network trunk—8,200ft (2,500m) maximum
10Base2 (BNC)	BNC T-connector	RG-58 A/U 50 ohm coaxial	Trunk segment—984ft (300m) maximum Station distance—1.5ft (0.5m) maximum Network trunk—3,035ft (925m) maximum
10BaseT (RJ-45)	RJ-45 for 10BaseT	Unshielded twisted pair	Hub distance—328ft (100m) maximum Repeaters—four maximum

To obtain a product list and prices for optional Ethernet accessories available from Lucent, contact the dealer from which you purchased your PortMaster.

Physical Specifications C

This appendix describes the following PortMaster Communications Server specifications:

- Interface
- Size and weight
- Environmental
- Electrical Specifications

Interface Specifications

Table C-1 gives interface specifications.

Table C-1 Interface Specifications

Interface	Description	2	2E	2ER	2R	25	2i	2E-I0I
Ethernet	10BaseT (RJ-45), AUI (DB-15), or BNC	1	1	1	1	1	1	1
Asynchronous Serial	RS-232/423, with data rates up to 115,200 bps	10	10, 20, or 30	10, 20, or 30	10	25*	1	1
Synchronous Serial	RS-232, V.35, RS-530, or X.21; capable of up to T1/E1 speeds	-	-	1	1	-	-	-
Parallel	Centronics-compatible parallel device	1	1	-	-	-	-	-
ISDN U	RJ-45 BRI with integrated NT1 (U interface), each providing two 64Kbps B channels and one 16Kbps D channel	-	0, 5, or 10	0, 5, or 10	-	-	5	5, 10, or 15

Table C-1 Interface Specifications *(Continued)*

Interface	Description	2	2E	2ER	2R	25	2i	2E-I0I
ISDN S/T	RJ-45 BRI with ISDN S/T interface, providing two 64Kbps B channels and one 16Kbps D channel	-	0, 5, or 10	0, 5, or 10	-	-	5	5, 10, or 15

* One RS-232/423 (console) port and three high-density 68-pin connectors, each supporting eight RS-232/423 asynchronous serial devices

Size and Weight Specifications

Table C-2 gives size and weight specifications.

Table C-2 Physical Specifications

Description	PM-2, PM-2R, PM-25, PM-2i	PM-2E, PM-2ER, PM-2Ei-10I
Dimensions (HxWxD)	3.2 inches x 16.8 inches x 11.5 inches (8.1cm x 42.7cm x 29.2cm)	6.5 inches x 16.8 inches x 11.5 inches (16.5cm x 42.7cm x 29.2cm)
Weight	12.2lb. (5.5kg)	18.5lb. (8.4kg)

Environmental and Electrical Specifications

Table C-3 gives environmental and electrical specifications.

Table C-3 Environmental and Electrical Specifications

Description	Design Specifications
Operating temperature	41 to 113°F (5 to 45°C)
Storage temperature	-40 to 185°F (-40 to 85°C)
Operating humidity	20 to 80%, noncondensing
Input Voltage	110VAC +/-10%, 47 to 63Hz, 1.0A 220VAC +/-10%, 47 to 63Hz, 0.6A
Power Dissipation	20W to 40W
Memory	512KB NVRAM, 4MB RAM expandable to 8MB or 16MB

Ordering ISDN Service D

This appendix applies only to PortMaster users installing ISDN U interface models in the United States and Canada.

Call your local telephone service provider to find out about ISDN service availability, pricing, and features. Typically there is an ISDN installation cost, a monthly flat-rate service cost, and usage costs.

Ordering Instructions

Complete the following steps to order ISDN basic rate interface (BRI) service from your telephone service provider:

1. **Call your local service provider to find out about ISDN BRI service availability, pricing, and features.**

   Typically you are charged an ISDN installation cost, a monthly flat rate for service, and usage costs.

2. **When ordering channel provisioning, compare the costs of circuit-switched voice/circuit-switched data (CSV/CSD) service and CSD-only service, and select the less expensive service.**

   Although Communication Server ISDN models can be used for data transmission only, many ISDN providers offer data and voice service at a lower rate than data-only service. Because the Communications Server transmits data over B channels configured for both voice and data as well as for data only, you can choose the cheaper alternative.

3. **Determine the ISDN switch type.**

   Ask your provider what type of ISDN switch you will be connected to.

4. **Check the switch type and refer to one of the tables in this appendix for switch type translations.**

   Fax or read the appropriate table to the sales representative.

   - **National ISDN-1 or NI-1 Compliant,** see Table D-1 on page D-3
   - **AT&T 5ESS Custom Multi-Point,** see Table D-2 on page D-4
   - **AT&T 5ESS Custom Point-to-Point,** see Table D-3 on page D-5
   - **Northern Telecom DMS-100 or DMS-100 Custom,** see Table D-4 on page D-6

   After you have completed Step 4, proceed to Step 5 on page D-7.

National ISDN-1 or NI-1 Compliant

Table D-1 gives National ISDN-1 or NI-1 Compliant switch translation information.

Table D-1 National ISDN-1 or NT-1 Compliant

Attribute	**Setting**
Line	2B+D
Line code	2B1Q
Terminal type (TERMTYP)	A
Maximum number of channels (MAXB)	2
B1	CSD (or CSVD)
B2	CSD (or CSVD)
D	Signaling
Number of channels simultaneously connected (CSD)	2
Channel to be used for data calls (CSD CHL)	Any
Number of data calls that can be made simultaneously (CSD LIMIT)	2
ACT USR	Yes
Dynamic terminal endpoint identifier (TEI)	Yes
Electronic key telephone service (EKTS)	No
Maximum number of terminals active on the BRI line (MTERM)	1
CA PREF	1
Call appearances	Idle
Protocol version control	2
Release key	No
Ringing indicator	No

AT&T 5ESS Custom Multi-Point

Table D-2 gives AT&T 5ESS Custom Multi-Point switch translation information.

Table D-2 AT&T 5ESS Custom Multi-Point

Attribute	Setting
Line	2B+D
Line code	2B1Q
Terminal type (TERMTYP)	A
Maximum number of channels (MAXB)	2
B1	CSD (or CSVD)
B2	CSD (or CSVD)
D	Signaling
Number of channels simultaneously connected (CSD)	2
Channel to be used for data calls (CSD CHL)	Any
ACT USR	Yes
Dynamic terminal endpoint identifier (TEI)	Yes
EKTS	No
Maximum number of terminals active on the BRI line (MTERM)	1
CA PREF	1
Autohold	No
OneTouch	No
Display	No
Call appearances	Idle

AT&T 5ESS Custom Point-to-Point

Table D-3 gives AT&T 5ESS Custom Point-to-Point switch translation information.

Table D-3 AT&T 5ESS Custom Point-to-Point

Attribute	Setting
Terminal type (TERMTYP)	A
Call appearances	1
Display	No
Channels for circuit-switched voice (CSV) per dial number (DN)	1
Channels for circuit-switched data (CSD) per DN	1

Northern Telecom DMS-100 or DMS-100 Custom

Table D-4 gives Northern Telcom DMS-100 or DMS-100 Custom switch translation information.

Table D-4 Northern Telcom DMS-100 or Custom DMS-100

Attribute	Setting
Line	2B+D
Line code	2B1Q
Terminal type (TERMTYP)	A
Maximum number of B channels (MAXB CHL)	2
Circuit-switched service	Yes
CSD/CSV channel	Any
Signaling	Functional
Dynamic TEI	Yes
EKTS	No
Protocol version control	1
Maximum number of programmable keys	3
Release key	No
Ringing indicator	No

5. **Choose a service provider for long-distance ISDN service.**

   Staying with the telephone company that provides your existing analog long-distance service might be easier than choosing another carrier, although this is not a requirement.

6. **Configure your site wiring to support ISDN service.**

   Ask your provider what additional wiring is necessary to support ISDN on your premises.

   Depending on your existing wiring, you might need to have an extra pair of copper wires brought to your premises or additional inside wiring installed.

   If your ISDN wall jack is an RJ-11 jack (four pins, like a standard telephone jack), use an RJ-11-to-RJ-45 cable. If it is an RJ-45 jack (eight pins), use an RJ-45-to-RJ-45 cable.

7. **Get your service profile identifiers (SPIDs) and directory numbers.**

   You need this information to configure the Communication Server.

   The SPID identifies your equipment to the ISDN switch. Directory numbers are the telephone numbers assigned to your ISDN B channels by the telephone company.

   To configure the ISDN switch type, SPID, and/or port directory numbers on the PortMaster, see the chapter on ISDN connections in the *Configuration Guide for PortMaster Products*.

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