EMULEX Performance™ 2500 Ethernet Terminal Server Hardware Installation and Configuration Manual

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Effective: October 15, 1990

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Section 1
INTRODUCTION

1.1 Overview

This manual and the *Performance™ Series TCP/IP-LAT Protocol and Command Reference* comprise the documentation for the Performance 2500. Enough information is provided here to install the Performance 2500 hardware and the TCP/IP-LAT protocol software quickly. The command reference manual describes network software configuration as well as reference and user information for the TCP/IP-LAT protocol command set.

A brief summary of this manual's contents follows:

- **Section 1 (Introduction)** describes the server and provides ordering information for standard server hardware models, software distribution media, and optional accessories. In addition, hardware and software requirements for server operation are provided, along with a list of server features.
- **Section 2 (Hardware Installation)** offers procedures for physically installing the server unit, mounting the server in a rack-mount shelf, and installing Ethernet and port cabling.
- **Section 3 (Software Installation)** provides instructions for installing the server's operational software. For a network-load server, this includes copying files from the distribution media to DECnet and/or UNIX network load host(s), and may also require that you run a server database utility on the network host. For *all* servers, this includes completing the power-up self-test and downloading operational software to the server.
- **Section 4 (Introduction to Server Functions)** explains how to log on to the server, use the HELP utility, enter privileged mode, and reset the server to its factory defaults. The numbering for server ports is also described.

- **Section 5 (Troubleshooting)** outlines problems that might arise within the hardware, suggests how to isolate hardware problems, and discusses server limitations and cabling problems. Solutions are discussed.
- **Appendix A (Cable Schematics)** offers an overview of server cabling that includes tables of pin and signal assignments for each type of server port. In addition, cabling schematic illustrations and descriptions for some of the more commonly used cables are included.
- **Appendix B (Specifications)** provides specifications for the Performance 2500.
- **Appendix C (Self-Test and Loader Messages)** describes the 900-series messages that provide status information during the power-up self-test and software downloading process.

A glossary with definitions of technical terms is included after the appendices, along with an index.

NOTE: Throughout the manual, the Emulex Local Transport (ELT) protocol is referred to as LAT-compatible or LAT. LAT is an acronym for local area transport.

1.1.1 Related Documentation

The Performance 2500 software offers many sophisticated features that are not documented in this manual. Please refer to the *Performance™ Series TCP/IP-LAT Protocol and Command Reference (PN ER2054301-00)* for detailed reference and user information concerning the TCP/IP-LAT protocol software, network software configuration guidelines, protocol command set summaries, application examples, and software troubleshooting suggestions.

Emulex sells several Ethernet accessories for the Performance 2500 that have their own instruction manuals. These include Ethernet plug-in transceiver-adapters, multiport transceivers, and Ethernet repeaters. You will need to refer to the instruction sheet or manual packaged with each accessory if you are installing one on your network.

1.2 General Description

The Performance 2500 is an Ethernet terminal server designed to connect asynchronous terminals to host computers manufactured by Digital Equipment Corporation or to host computers that support the UNIX operating system and the TCP/IP protocol. The server is supported on all DEC Ethernet networks and can generally take the place of a DECserver 100, 200, 300, or any other member of the DECserver family. In addition, the server is supported on UNIX host systems that meet the requirements for TCP/IP protocol support, as described in subsection 1.4.3.1.

There are six models of the Performance 2500 server available, three Network-Load models and three Self-Load models. Network-Load servers require that operational software be installed on one or more network load host CPUs, then downloaded to the server. Self-Load servers have the operational software installed on PROM chips residing on the server motherboard, so that installing operational software on a network load host is optional.

The Performance 2500 server supports up to eight asynchronous terminals, with three possible server port configurations. The following three port configurations are available for either a Self-Load or Network-Load server, as follows:

- Four DB25 full-modem serial ports and one parallel printer port
- Two DB25 full-modem serial ports and six partial-modem RJ12 serial ports, without a parallel port; the RJ12 ports provide support for shielded RJ12 cables
- Two DB25 full-modem serial ports and six partial-modem MMJ serial ports, without a parallel port

The Performance 2500 connects to any DEC or TCP/IP Ethernet network. The server provides support for a Thickwire, ThinWire or Twisted Pair Ethernet connection. A 15-pin Ethernet connector

on the back of the server can accommodate the following three types of connections to the Ethernet:

- Ribbon cable from the 15-pin connector on the server to an external Thickwire transceiver such as the Emulex multiport transceiver (Emulex model number 4902)
- Plug-in ThinWire DB15-to-BNC transceiver-adapter for ThinWire cabling (Emulex model number P2901TBNC)
- Plug-in 10BaseT DB15-to-RJ45 transceiver-adapter for Twisted Pair coaxial cabling (Emulex model number P2901TUTP)

Users with terminals connected to the server can connect to any device on the network, including host CPUs, printers, other terminal servers, and anything else you wish to make accessible. Unlike ordinary asynchronous controllers, which limit terminal users to connections with a single CPU, terminal servers allow users to connect to several CPUs and to keep multiple sessions with different CPUs active at the same time. This allows ordinary users to make full use of the benefits of the Ethernet network.

Multiple sessions are possible because users connected to the server can break out of CPU sessions and enter other sessions from local server mode. In local server mode, commands may be given to the server itself. Typical server commands allow users to change port parameters, connect to other CPUs, view active sessions, and so forth. Devices on the network are usually referred to as hosts, nodes, and services. Definitions for these terms follow:

- **Host.** A host is a CPU on the network. A host is often referred to as a CPU, a host CPU, a remote host, or simply a computer. They all mean the same thing.
- **Node.** A node is any device on the network. A host is a node, for example, and so is a terminal server, a printer server, and so forth.
- **Service.** A service is anything you can connect to on your network. For example, a host is typically configured as a named LAT service so that users can connect to it by name. A terminal server port can also be configured as a service (although this is optional) if other nodes will be connecting to it. Frequently, for example, a terminal server port connected

to a printer is defined as a service so that host CPUs can queue print jobs to it.

- **TCP Port.** A TCP port is the endpoint for a communications link on a TCP/IP network, identified by a TCP port number or TCP port name. A host typically has several ports active at any time including a TELNET port (23) ready to accept connections from the network. A terminal server port connected to a printer is often defined as a TCP port so that host CPUs can send print jobs to it.

  NOTE: The word SERVICE is used in several server commands as a synonym for TCP port, for compatibility with LAT terminology. The SET/DEFINE/CHANGE SERVICE command, for example, sets parameters for TCP ports as well as for LAT services.

Figure 1-1 shows a Performance 2500 server.

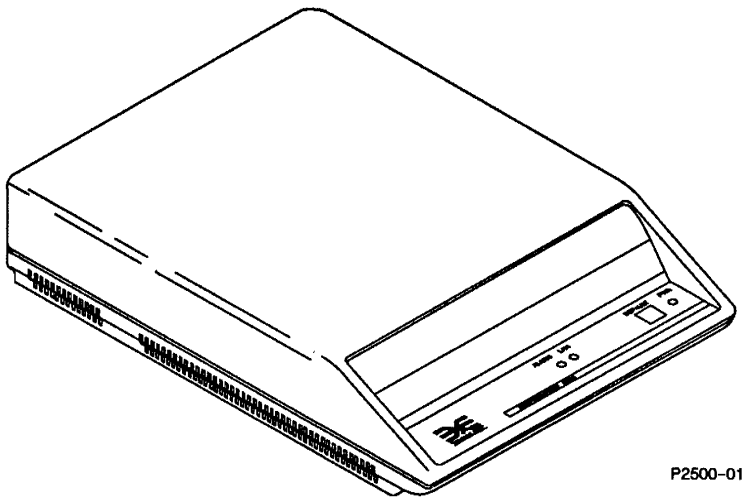


Figure 1–1. The Performance 2500 Ethernet Terminal Server

1.3 Ordering Information

The basic Performance 2500 requires a combination of the items listed in Table 1–1. Table 1–2 lists the software kits available for the Performance 2500. Table 1–3 lists optional items and accessories. Consult Emulex for details about new models and options not listed.

Table 1–1. Performance 2500 Required Components

Quantity	Model Number	Description
1	P2504M-NLTL	5-port TCP/IP-LAT Network-Load server with 4 DB25 full–modem serial ports and one parallel printer port.
	P2508M-NLTL	8-port TCP/IP-LAT Network-Load server with 6 RJ12 serial ports and 2 DB25 full-modem ports.
	P2508MJ-NLTL	8-port TCP/IP-LAT Network-Load server with 6 MMJ serial ports and 2 DB25 full-modem ports.
	P2504M-SLTL	5-port TCP/IP-LAT Self-Load server with 4 DB25 full–modem serial ports and one parallel printer port.
	P2508M-SLTL	8-port TCP/IP-LAT Self-Load server with 6 RJ12 serial ports and 2 DB25 full-modem ports.
	P2508MJ-SLTL	8-port TCP/IP-LAT Self-Load server with 6 MMJ serial ports and 2 DB25 full-modem ports.
1	5010152	BNC ThinWire "T" adapter
1	----	Power cord
1	----	Software (see Table 1–2)
1	ER2053204-00	*Performance™ 2500 Hardware Installation and Configuration Manual* (this manual)
1	ER2054301-00	*Performance™ Series TCP/IP-LAT Protocol and Command Reference* (included in documentation kit, P/N ER2050004–00)

Table 1–2. Performance 2500 Software Kits

Quantity	Model Number	Description
1	PS2506MT1600	TCP/IP-LAT software, VMS load, MT1600
1	PS2506TK50	TCP/IP-LAT software, VMS load, TK50
1	PS2507TK50	TCP/IP-LAT software, TFTP load, TK50
1	PS2507MT1600	TCP/IP-LAT software, TFTP load, MT1600
1	PS2507SUN	TCP/IP-LAT software, TFTP load, .25-inch cartridge tape
1	PS2507PC3	TCP/IP-LAT software, TFTP load, 3.5-inch floppy

Table 1–3. Performance 2500 Options and Accessories

Model Number	Description
P0007RMS	Rack-mount shelf
P4901TNI	Transceiver (non-intrusive cable piercing)
P4901TNS	Transceiver (N-series tap)
PS2901TUTP	Plug-in Twisted Pair transceiver adapter (RJ45)
PS2901TBNC	Plug-in ThinWire transceiver adapter (BNC Cheapernet)
P4902	Multiport transceiver, connects up to eight devices to a single Ethernet tap
P4903/05	Transceiver cable, 5 meters
P4904	Ethernet repeater, connects multiple Ethernet segments
P4905	Multiport Ethernet repeater, connects up to six ThinWire segments and two Thickwire segments
P0002/10	Serial port modem cable, 10 feet (25-pin plug to socket)
P0005M	RJ12 to 25-pin adapter (male)
P0005F	RJ12 to 25-pin adapter (female)

(Continued on next page)

Table 1–3. Performance 2500 Options and Accessories (Continued)

Model Number	Description
P0006/1	RJ12 crossover (terminal) unshielded cable, 1 foot
P0006/25	RJ12 crossover (terminal) unshielded cable, 25 feet
P0006/100	RJ12 crossover (terminal) unshielded cable, 100 feet
P0008/1	RJ12 straight (modem) unshielded cable, 1 foot
P0008/25	RJ12 straight (modem) unshielded cable, 25 feet
P0008/100	RJ12 straight (modem) unshielded cable, 100 feet
P4906SK	Cable starter kit: Includes 12 P0005M adapters, 12 P0008/1 one-foot cables, and one P4903/05 transceiver cable

1.4 System Requirements

Descriptions of the hardware and software requirements for the Performance 2500 are provided in the following subsections.

1.4.1 Hardware Requirements

The Performance 2500 is compatible with both Ethernet Version 2 and IEEE 802.3. It connects to most Ethernet or 802.3 transceivers (Thickwire, ThinWire, or Twisted Pair).

1.4.2 Server Software Requirements

The Emulex operational software used with the Performance 2500 must be from Release 2.1 or later. Software from earlier releases is incompatible with this server.

1.4.3 Host Software Requirements

The Performance 2500 is supported under several operating systems. Your software requirements will differ depending on whether you intend to use your host system for connections only, or, in addition, for downloading and uploading Performance 2500 software. In order for a host to connect to the server, it should be running VMS (Version 4.5 or later) and DECnet (Phase IV or later), or any operating system listed below. (Call Emulex for information about operating systems that are not listed.)

- SunOS (Version 4.0 and later)
- BSD UNIX (Version 4.3 and later)
- AT&T System V UNIX (Version 3 and later)
- Ultrix-32 (Version 3.0 and later)
- RSX-11M-Plus (Version 3.0 and later)
- RSTS/E (Version 9.4 and later)

Unless you have a Self-Load server, you must install an Emulex host software kit on at least one host on your network. This *load* host may be running any one of the operating systems listed above except RSX-11M-Plus and RSTS/E.

In addition to the operating systems listed above, any operating system that supports the following parts of the TCP/IP protocol can support the TCP/IP portion of the Performance 2500 TCP/IP-LAT-compatible software:

- RFC 791 (TCP)
- RFC 793 (IP)
- RFC 854 (TELNET)

The following subsection provides additional information on host software required for TCP/IP protocol support.

1.4.3.1 Host Software Required for the TCP/IP Protocol

In order to use the TCP/IP protocol, your host system must support certain functions that are required for hosts on a TCP/IP network. Use Table 1–4 to help determine the software needed to support the functions that you want your host system to perform. Emulex provides source code files for both the BOOTP and TFTP modules that are described in Table 1–4.

Table 1–4. Required Host Software for the TCP/IP Protocol

Server Function	Host Software Required
Network Load using a TFTP Host	Requires a TFTP module on the host supporting the UDP protocol. In addition to the TFTP module, you can optionally use a BOOTP module on the host. BOOTP simplifies the load process by reducing the amount of information you must enter to configure the Performance 2500. Emulex provides source files for both TFTP and BOOTP.
Network Load using a DECnet host	Requires a DECnet-compatible process on the host. You can use this type of network load as an alternative to network loading with TFTP.
User-initiated connection to a host	Requires a TELNET or rlogin module on the host that supports the TCP protocol.
Host-initiated connection to the Performance 2500	Requires a TELNET or rlogin client module on the host, or an equivalent, that supports the TCP protocol. The Performance 2500 will service connection requests from host-resident TELNET modules.
NOTE: The Performance 2500 requires the TCP/IP and Ethernet protocols to be running on each host with which communication is desired.	

1.4.4 Serial and Parallel Ports

Different models of the Performance 2500 contain different numbers and types of I/O ports. The following types of ports are supported:

- **Full-modem serial ports.** These ports use DB25 plug connectors and support five modem signals. They can be connected to local terminals, serial printers, full-duplex modems, data switches, and computer ports.

- **Partial-modem serial ports.** These ports use modular RJ12 or MMJ jacks and support two modem signals. They can be connected to local terminals, serial printers, full-duplex modems, data switches, and computer ports. The RJ12 jacks are shielded and can be used with shielded RJ12 cables.
- **Parallel port.** This port uses a DB25 socket connector and can be configured as either a Centronics or Dataproducts port.

Table 1–5 summarizes the port configurations for the server.

Table 1–5. Performance 2500 Port Configurations

Total Serial Ports	DB25 Full-Modem Serial Ports	RJ12 or MMJ Partial-Modem Serial Ports	Parallel Printer Port
4	4	0	Yes
8	2	6	No
8	2	6	No

Appendix A contains pin and signal assignments for the Performance 2500 serial and parallel ports.

1.5 Features

The Performance 2500 contains a variety of features designed to enhance system performance and make configuration and maintenance simple. These include:

- **DECserver compatibility.** The Performance 2500 supports ELT, a LAT-compatible protocol that makes it directly compatible with DECservers and all popular DEC operating systems.
- **TCP/IP compatibility.** The Performance 2500 supports the TCP/IP network protocol as defined by the U.S.A. Department of Defense (D.O.D.). For a more detailed description of the Performance 2500 TCP/IP protocol support, refer to the *Performance™ Series TCP/IP-LAT Protocol and Command Reference.*
- **Small size.** The Performance 2500 supports up to 8 serial ports in a package with a height of only 2.25 inches. A rack-mount shelf is available, allowing the Performance 2500 to be mounted in any standard 19-inch equipment rack.
- **Standard Thickwire Ethernet connections.** The Performance 2500 connects to Thickwire Ethernet cable via a 15-pin connector on the back of the server. The server supports the RS-232 standard.
- **ThinWire and Twisted-Pair Ethernet connections.** In addition to supporting Thickwire connections, the server can accommodate ThinWire and Twisted Pair Ethernet connections via plug-in transceiver-adapters provided by Emulex.
- **RJ12 shielded cables.** The Performance 2500 RJ12 connectors provide support for shielded RJ12 cables. If shielding is required, shielded RJ12 connectors and cables are available from vendors such as Stewart Stamping.
- **Multiple sessions.** Users connected to the Performance 2500 can connect to any host CPU on the network and can switch between hosts without using any CPU processing power. Users can keep multiple sessions active on different hosts (or

the same host) and switch between sessions with the touch of a key.

Alternatively, user ports can be configured so that they are dedicated to a single CPU. This simplifies login for users who need access to only one CPU.

- **Nonvolatile memory.** All parameters on the Performance 2500 can be saved in nonvolatile memory, if desired. Changes to server parameters can be temporary or permanent.
- **Multi-level help system.** The Performance 2500 contains help screens for all server commands.
- **Easy configuration.** The Performance 2500 uses a simple, yet powerful, command structure that gives both users and system managers quick access to all server features.
- **PC file transfers.** The Performance 2500 supports file transfers between PCs connected to different ports on the server and between PCs and host CPUs.
- **Host-initiated connections.** Host CPUs on the network may request connections to ports on the server. This allows CPUs to contend for a printer connected to the server and for these requests to be queued within the server.
- **Typeahead.** The Performance 2500 contains a typeahead buffer that is active in all modes for all serial ports.
- **Command line recall.** Like VMS, the Performance 2500 remembers previous command lines and can recall them with a touch of the up-arrow key. Recalled command lines can be edited before they are re-entered.
- **Remote Console Facility.** The Performance 2500 can be reconfigured from either a host CPU or from another Performance 2500. This feature is compatible with DECnet NCP, DEC TSM, and UNIX.
- **Power-up diagnostics.** A complete set of internal diagnostics and Ethernet cable diagnostics are run when the Performance 2500 is powered up. The result of the diagnostics is displayed on the server's console terminal.
- **Complete statistics.** The Performance 2500 maintains complete statistics for every port. This includes traffic and error counts that can be continuously monitored or printed.

- **Load balancing (LAT only)** If more than one node is able to respond to a connect request, the server chooses the least busy node with which to connect. In a cluster environment, the Performance 2500 automatically logs users in to the least busy host in the cluster. This balances the number of users connected to each host and optimizes processing power.
- **Automatic failover (LAT only).** The Performance 2500 can be configured to reconnect a user to a different host automatically in case of a host failure.
- **Group codes (LAT only).** Ports on the Performance 2500 can be individually configured so that they have access only to services with certain group codes.
- **Verbose Mode (TCP/IP only).** Performance 2500 ports can be enabled for Verbose mode. This port option displays all TELNET option negotiations with a remote node on the user's terminal.
- **Raw TCP Mode (TELNET disabled).** This feature, when enabled on a connection, inhibits the TELNET command and option negotiation.

1.6 Functional Block Diagrams

Figure 1-2 is a hardware block diagram for the Performance 2500. Figure 1–3 is a software block diagram for the Performance 2500.

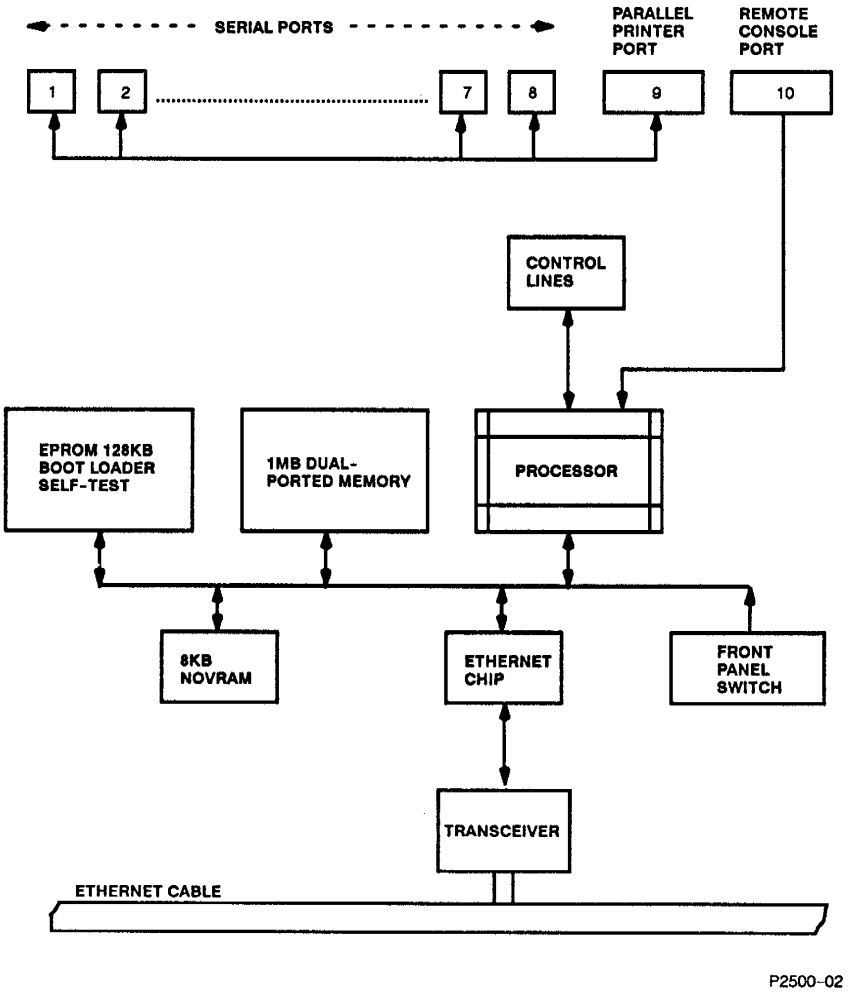


Figure 1–2. Performance 2500 Hardware Block Diagram

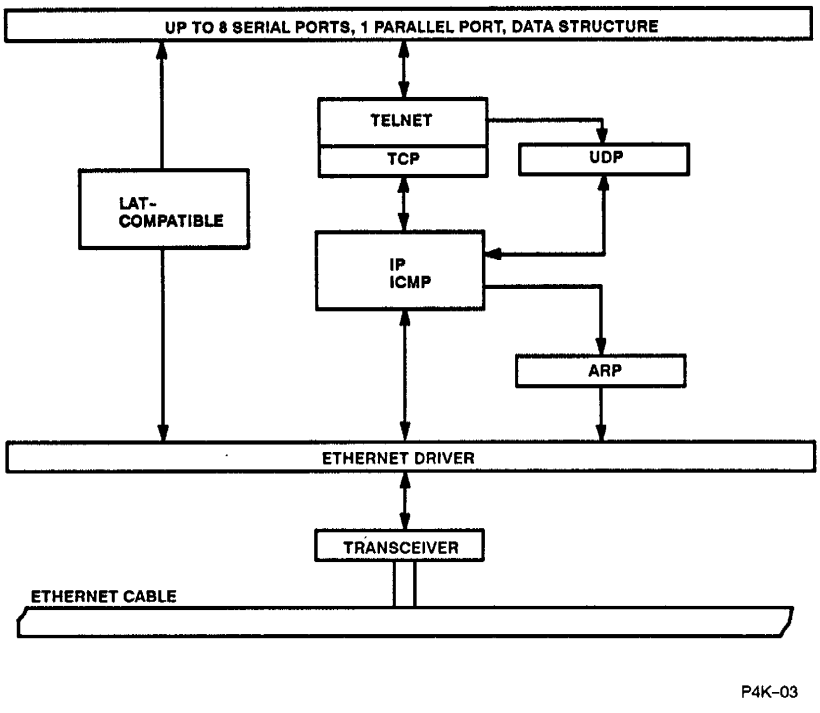


Figure 1–3. Performance 2500 Software Block Diagram

Section 2
HARDWARE INSTALLATION

2.1 Overview

This section describes how to install and cable the Performance 2500 server unit. Use the checklist below to make sure that you do not skip any steps.

HARDWARE INSTALLATION CHECKLIST

- ☐ 1. **Install the server (subsection 2.2).** Pick a location that has adequate ventilation and air conditioning and install it in a rack-mount shelf if desired.
- ☐ 2. **Install cabling to the Ethernet (subsection 2.3).** Install cabling to an external Ethernet Thickwire transceiver, or use plug-in transceiver-adapters to connect to a ThinWire or Twisted Pair network.
- ☐ 3. **Attach a console terminal and cabling for peripheral devices (subsections 2.4 and 2.5).** You may either cable peripheral devices to the server now, or wait until the server's operational software has been installed.
- ☐ 4. **Determine the server port configuration required for the devices that you plan to attach (subsection 2.6).** Refer to the manufacturer's manual for each type of device that you plan to connect to the Performance 2500. Keep this information for when you are ready to configure the network.

Figure 2-1 shows what the completed physical installation should look like.

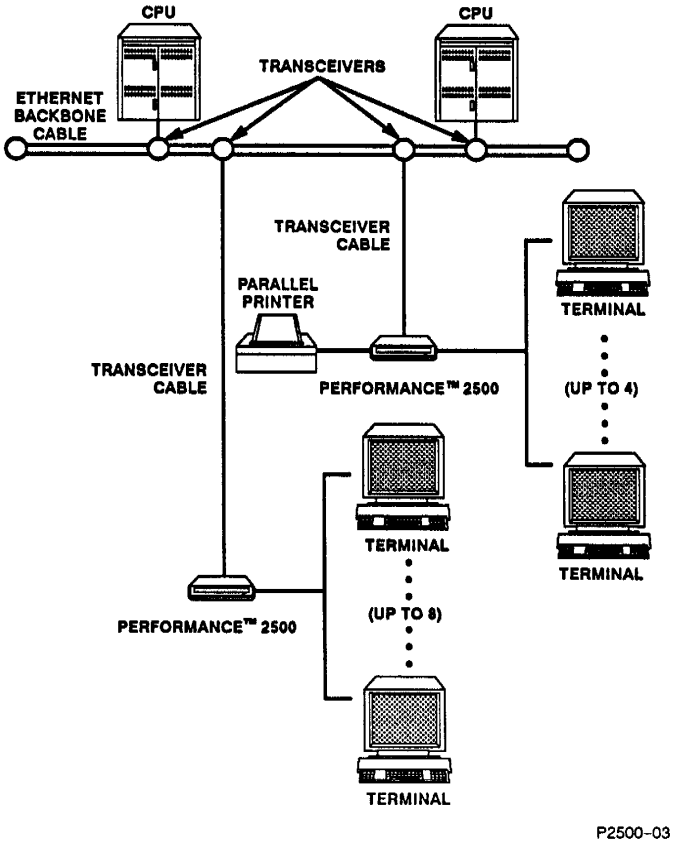


Figure 2–1. Typical Performance 2500 Installation

2.2 Installing the Server

Installing the server consists of finding a location for it, installing it in a rack-mount shelf (optional), and cabling it to the Ethernet network. You may connect the Performance 2500 to the Ethernet via Thickwire, ThinWire or Twisted Pair cabling, as described in subsection 2.2.2.

2.2.1 Selecting a Location for the Server Unit

Select a location for the server that has adequate cooling and power. Note that the Performance 2500 will operate correctly from any power line input voltage within the range of 100 VAC to 240 VAC. There are no jumpers or switches to set for voltage selection. See the previous subsection for instructions on installing the server in a rack-mount shelf.

Before installing the server, it is recommended that you copy down the unit's Ethernet address, located on the rear panel just above the Ethernet port. You will need this address later during the configuration process. Figure 2–2 shows the location of the Ethernet address on the rear panel.

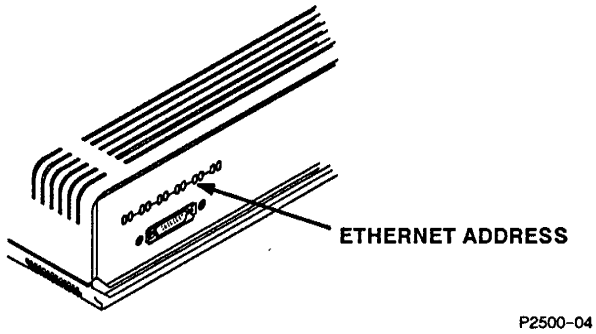
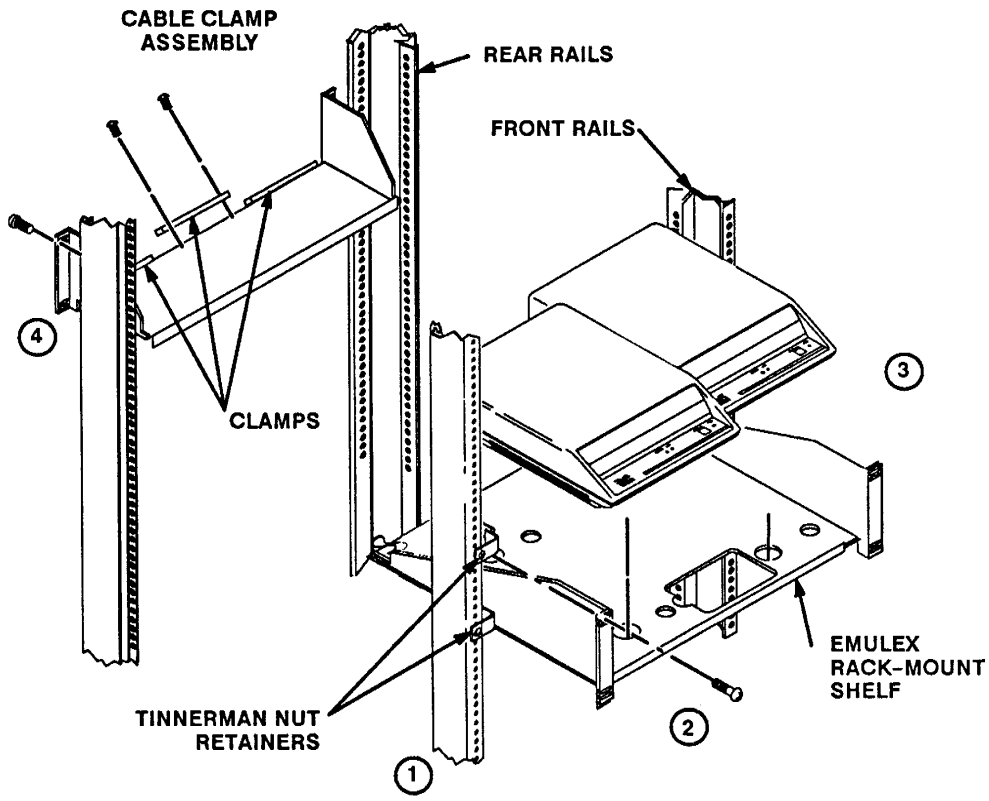


Figure 2–2. Locating the Ethernet Address

You may wish to install the server in a rack-mount shelf. This is an optional step. Follow the instructions in Figure 2–3 in order to install the server in a rack-mount shelf.



DIRECTIONS

1. INSERT TWO TINNERMAN NUT RETAINERS ON EACH SIDE OF THE FRONT RAILS OF YOUR EQUIPMENT RACK.
2. HOLD THE RACK-MOUNT SHELF IN PLACE AND INSERT THE SCREWS THROUGH THE SHELF AND THE NUT RETAINERS.
3. PLACE THE SERVER ON THE SHELF SO THAT THE RUBBER FEET FIT IN THE HOLES IN THE SHELF.
4. ATTACH THE CABLE CLAMP ASSEMBLY TO THE RAIL OF YOUR EQUIPMENT RACK, LEVEL WITH THE SHELF. LATER ON WHEN YOU CABLE THE DEVICES TO THE SERVER, YOU CAN USE THE CLAMPS TO HOLD THE CABLES SECURELY IN PLACE.

P2500-05

Figure 2–3. Installing the Performance 2500 in the Rack-Mount Shelf

2.2.2 Connecting the Server to the Ethernet

The Performance 2500 supports connection to the Ethernet via Thickwire, ThinWire, or Twisted Pair Ethernet cabling. The three Ethernet connections are described briefly below:

- Attaching cabling from the 15-pin Ethernet connector to an external Thickwire transceiver such as the Emulex 4905 multiport transceiver, as described in subsection 2.2.2.1
- Plugging a DB15-to-BNC ThinWire transceiver-adapter (model number P2901TBNC) into the 15-pin Ethernet connector at the back of the server, as described in subsection 2.2.2.2
- Plugging a DB15-to-RJ45 Twisted Wire transceiver-adapter into the 15-pin Ethernet connector at the back of the server (model number P2901TUTP)

Ethernet transceivers and cables are available from Emulex (see subsection 1.2 for model numbers and ordering information).

Figure 2–4 shows the location of the 15-pin Ethernet connector on the server's back panel, along with one of the plug-in Ethernet transceivers available from Emulex.

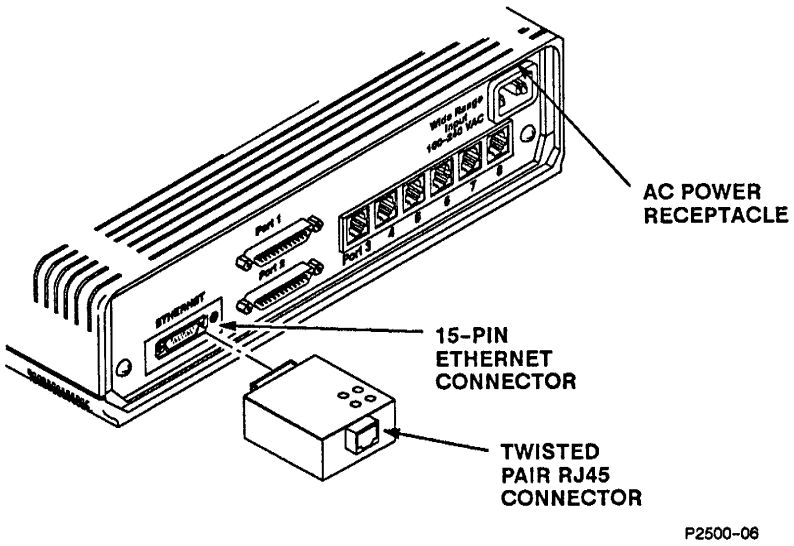


Figure 2–4. Ethernet Connector and Transceiver

2.2.2.1 Connecting Thickwire Cabling

To connect Thickwire cabling to the 15-pin Ethernet connector, run a transceiver cable from the 15-pin connector on the rear panel of the Performance 2500 to either an Ethernet transceiver, or a port on an Ethernet multiport transceiver. Subsection 1.2 provides ordering information for transceivers and cables that are available from Emulex.

Refer to the transceiver user's manual for detailed instructions on how to install the transceiver and cable it to the Performance 2500.

2.2.2.2 Connecting ThinWire Cabling

To connect ThinWire cabling to the BNC Cheapernet connector, attach the DB15-to-BNC transceiver-adapter to the 15-pin connector on the back panel of the server. Then attach a "T"

adapter to the BNC connector, and attach ThinWire cabling to the "T" adapter, as described in the following paragraphs.

CAUTION! If you are connecting the server to an active ThinWire Ethernet network, the following connection must be performed quickly to avoid interrupting the network for very long.

If you are connecting within a length of ThinWire Ethernet, connect the two ThinWire segments to the two sides of the BNC "T" adapter. If you are connecting at the end of a segment of ThinWire Ethernet, connect the Ethernet cable with either side of the BNC "T" adapter and connect an Ethernet terminator (not supplied by Emulex) to the other side.

Figure 2-5 shows how to attach ThinWire Ethernet cabling to a "T" adapter.

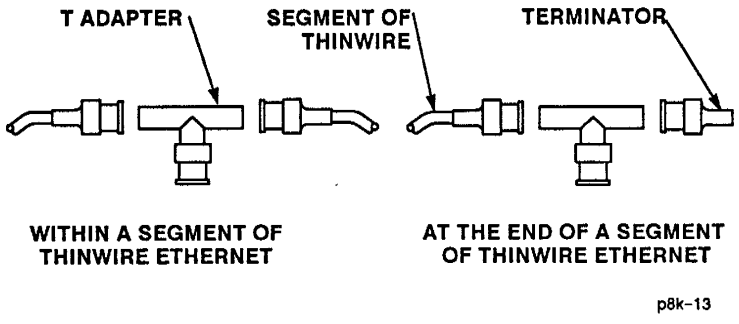


Figure 2-5. Attaching ThinWire Ethernet Cable to a BNC "T" Adapter

2.3 Installing the Console Terminal

Although it is not necessary to cable all your terminals at this time, you should connect a terminal to the lowest-numbered serial port. This port is set at the factory to be the console port and displays all status messages during initialization. Set the terminal for 9600 baud, 8-bit characters, and no parity. (These parameters, as well as the console port number, can be changed after the server is installed and operating.)

A console terminal will provide the operator with status information regarding several processes. For example, the console terminal displays messages from the diagnostic tests that take place during the power-up self-test and from the software download process.

2.3.1 Software Installation without a Console Terminal

Since the Performance 2500 terminal server is most commonly used with terminal devices, it is assumed that there is a terminal available for the console port. However, if the user prefers to attach only non-terminal devices to the server, it is possible to install the operational software without having a terminal attached to the console port.

The Loader firmware (with either a Self-Load or a Network-Load PerformancePak) along with load host software configuration (for a Network-Load server) provide the ability to download operational software to the server without requiring a console terminal. The operator may configure the network software from remote terminals, via the Terminal Server Manager (TSM) on TELRCF. This is accomplished via the RCF port, as described in the *Performance™ Series TCP/IP–LAT Protocol and Command Reference.*

2.4 Installing Cables

Different models of the Performance 2500 contain different numbers and types of I/O ports. The following types of ports are supported:

- **Partial-modem serial ports (RJ12 or MMJ).** These ports support data signals plus two modem signals and can be connected to local terminals and most full-duplex modems.
- **Full-modem serial ports (DB25 plug).** These ports have five modem controls and support full-duplex modems, terminals, and a wide range of devices that require modem controls. Note that half-duplex modems are not supported on either type of serial port.
- **Parallel port (DB25 socket).** This port can be configured as either a standard Centronics or Dataproducts parallel printer port.

Figure 2–6 shows an example of the port locations and cabling for one of the rear panels of the Performance 2500. Refer to Appendix A for pin/signal assignments for these ports and for sample cabling diagrams for common applications.

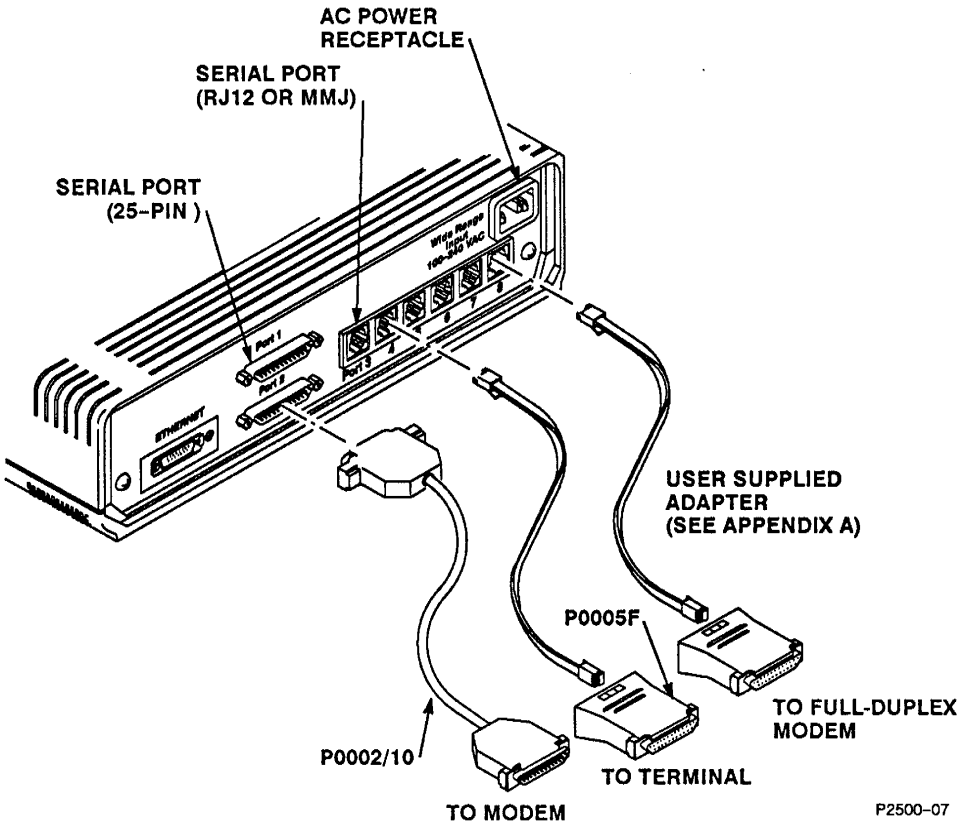


Figure 2–6. Example of Port Locations and Cabling for the Performance 2500

There are several models of Performance 2500 server base unit. Each model has a different arrangement of port connectors. Figure 2–7 shows the two basic arrangements of port connectors on the base units. The partial-modem connectors can be either RJ12 or MMJ.

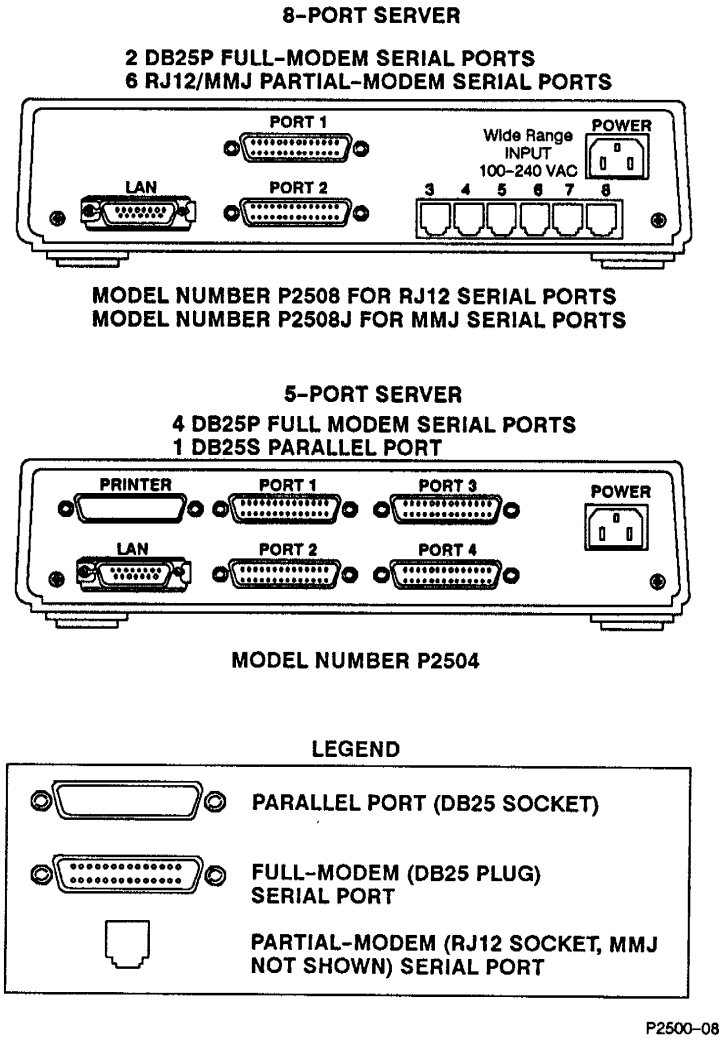


Figure 2–7. Locations of Ports on Server Units

2.4.1 Configuring Server Ports for Peripheral Devices

Be sure to configure each server port so that it is compatible with the device you wish to attach. Refer to the manufacturer's manual for each device that you plan to connect to the Performance 2500, and verify that the port settings are correct for the device. The configuration process for server ports is fully described in the "Configuration" section of the *Performance™ Series TCP/IP–LAT Protocol and Command Reference.*

CAUTION! Incorrect configuration of a server port to which a device is connected, or incorrect configuration of the device itself, could cause the device to operate improperly, erratically, or not at all.

Ports to which serial printers and terminals will be attached must have their serial parameters (baud rate, number of data bits per character, etc.) set to match corresponding parameters of the attached devices.

The Performance 2500 has a maximum of 8 serial ports, one parallel port, and one local RCF port. To maintain consistency of configuration, the server port numbers are fixed in the server hardware. The port numbering is silkscreened on the server's back panel. Even if one or more server ports are not currently in use, this does not affect the numbering of the ports.

For all Performance 2500 models, the parallel printer port is port number 9 and the RCF port is always port number 10.

Section 3
SOFTWARE INSTALLATION

3.1 Overview

This section describes how to install the Performance 2500 software. The software installation checklist summarizes this process.

SOFTWARE INSTALLATION CHECKLIST

- ☐ 1. **Add the LAT activation command to the system startup files on each VMS host** (subsection 3.2).
- ☐ 2. **Install host software on one or more DECnet hosts (optional with Self-Load server).** Install the Emulex host software kit on a host and run the server configuration utility ESVCONFIG.COM (subsection 3.3).
- ☐ 3. **Install host software on one or more UNIX hosts (optional with Self-Load server).** Install the Emulex host software kit on a host and run the server configuration utility **load_config** if you are planning to use the BOOTP program (subsection 3.4).
- ☐ 4. **Complete the software installation.** Run the power-up self-test, download the operational software, and if required, run Boot Configuration Mode (subsection 3.5).
- ☐ 5. **Log in to a host.** Verify configuration parameters (subsection 3.6).

If you have a Self-Load server, you do not have to install software on a network load host. However, if you think that you may at some time in the future want to configure your server for network loading (even if it has the Self-Load capability), you may want to install the software on one or more hosts. If you have a Network-Load server, you must install host software on DECnet network load host(s) and/or UNIX network load host(s). The steps described in subsection 3.5, "Completing the Software Installation," must be completed for all types of server.

In addition to software installation, this section describes the DEFAULT button on the front of the server and the Lan, Power, and Alarm LEDs.

3.1.1 Format Notation

This section lists many UNIX and DEC-compatible filenames. It also provides example DEC and UNIX operating system commands, along with Performance 2500 TCP/IP-LAT protocol commands. Different format conventions are used for each type of software, as follows:

- **DEC (VMS) operating system notation:** VMS operating system filenames and commands are not case-sensitive. By convention, filenames are shown in capital letters in the standard text type style (e.g. ESVCONFIG.COM). Example commands are shown in capital letters in typewriter font.

  Example command format: `$ @SYS$UPDATE:VMSINSTAL`

- **UNIX operating system notation:** UNIX (and Ultrix) filenames, operating system daemons, and processes are case-sensitive, and are generally lowercase. They are shown in **bold** in the standard text type style (for example, **bdskt.c**). Example commands are shown in lowercase and occasionally uppercase letters, as required, in typewriter font.

  Example command format: `tar xvf /dev/rst0 <Return>`

- **TCP/IP-LAT protocol software notation:** Emulex protocol software commands are not case-sensitive. By convention, they are shown in capital letters in the standard text type style

when they occur in a paragraph of text (for example, SET SERVER SUBNET). Example commands to be entered by the user are shown in typewriter font capital letters.

Example command format: `SET SERVER SUBNET <Return>`

Server system messages are shown in typewriter font, such as downloading messages shown on the console terminal.

3.2 Activating the LAT Driver

DEC operating systems communicate with Ethernet terminal servers via a protocol called LAT (Local Area Transport). The Performance 2500 uses a LAT-compatible protocol.

To enable LAT support on a VMS node, make sure that the following command is executed in the system-specific startup file:

```
@SYS$MANAGER:LTLOAD.COM
```

NOTE: The above command applies only to VMS nodes, not to Ultrix nodes.

A default version of the LTLOAD.COM command file is supplied with all DEC operating systems that support LAT. If you wish to modify this file to enable special features, refer to the LAT documentation supplied with your operating system (for example, the *LAT/VMS Management Guide*).

3.3 Installing Performance 2500 Software on a DECnet Host

The VMS host software kits enable a VMS or Ultrix node to become a load host for the Performance 2500. If you have a Network-Load PerformancePak and you have ordered one of the VMS software kits, then you must install it on at least one host running either DECnet or Ultrix-32 version 3.0 (or later).

The most important part of the Emulex host software kit is a file named P2KTL0E.SYS, the operational software for the server. This file is automatically downloaded into the server whenever the server powers up. Since the server will not work unless this file is present, you might wish to install the host software kit on more than one host in order to have an auxiliary load host.

The host software runs under either Ultrix-32 version 3.0 (or later), or under VMS V4.5 (or later). (Consult Emulex for information about other revisions.) The VMS version of the host software requires that Phase IV or later of DECnet be up and running on the host. Once the software is installed, it needs to be reinstalled only after major operating system upgrades (5.0, 6.0, etc.).

If you are *updating* your software kit (that is, this is not the first time it has been installed on your network), be sure to update all copies on all load hosts. Otherwise, servers might load unpredictable software revisions. One way to do this is to find the old version of the file named P2KTL0E.SYS, rename it, and then power up the server. If it powers up normally, the old software is still present on some other host and must either be renamed (for example, P2KTL0EOLD.SYS) or deleted. When the server reports that it cannot find P2KTL0E.SYS, you can be sure that you have found all the copies. You can now install the new software as described below and power up the server. If the new software works normally, delete the copies of the old software.

Subsection 3.3.1 explains how to install the Emulex-supplied Performance 2500 software on a VMS host. Subsection 3.3.2 describes how to add the server to the DECnet host database using the Emulex-supplied ESVCONFIG utility.

3.3.1 Installing the Emulex Software on a VMS Host

The following steps explain how to install the Emulex software on a VMS host:

1. Make sure you have at least 1000 blocks free on your system disk.
2. Mount the distribution media and enter the following command:

   ```
   $ @SYS$UPDATE:VMSINSTAL
   ```

   The VMSINSTAL utility asks some introductory questions. Answer them appropriately.
3. VMSINSTAL asks which products should be installed. Answer with an asterisk.
4. Several paragraphs of instructions are printed out as the software is being installed. VMSINSTAL then asks if you wish to install anything more. Type EXIT <Return>.
5. If it does not already exist, VMSINSTAL creates the directory SYS$COMMON:[DECSERVER]. When VMSINSTAL is finished, the following files have been copied into this directory:
   - P2KTL0E.SYS. This file is the operational software that is downloaded into the server when it powers up.
   - ESVCONFIG.COM. This is the Server Configuration Utility. It must be run whenever a terminal server is removed or installed on the network.
   - ESVCONFIG.DAT. This data file is created when you run the Server Configuration Utility. It contains all server parameters.
   - P2K_010_DEFAULTS.COM. This command file may be used with the DEC Terminal Server Manager program to change all server options back to their factory defaults. It can be edited to set the server to different defaults, if you wish.

- P2K000_010.RELEASE_NOTES. This file contains release notes for the software. You may delete it after printing, if you wish.

6. The instructions printed out by VMSINSTAL tell you to do two things:

   a. First, if it has not already been done, insert in your system startup file[1] the following logical definition, which equates the logical name MOM$LOAD to a search string equal to SYS$SYSROOT:[DECSERVER] as well as its current definition[2] (this is not necessary if you already have DECservers on your network):

```
DEFINE/SYSTEM/EXEC/NAME_ATTRIBUTE=NO_ALIAS/NOLOG -
MOM$LOAD (current_defin),SYS$SYSROOT:[DECSERVER]
```

   b. Second, add the newly-installed Performance 2500 to the DECnet NCP database by using the Emulex server configuration utility, ESVCONFIG.COM. This is described in the next subsection.

NOTE: As of VMS 5.0, the logical name MOM$LOAD must be defined as a two-element search list (see DEFINE Statement). If this is not done, the DECNET Startup procedure will redefine MOM$LOAD as SYS$SYSROOT:[MOM$SYSTEM].

[1] For VMS 5.0 and later, the name of the system startup file is SYS$MANAGER:STARTUP_V5.COM. For previous versions of VMS, the name of the system startup file is SYS$MANAGER:SYSTARTUP.COM.

[2] To find the current definition of MOM$LOAD, use the following command: SHOW LOGICAL MOM$LOAD.

3.3.2 Adding Servers to the DECnet Database

The VMSINSTAL procedure places the Emulex Server Configuration (ESVCONFIG) utility in the directory MOM$LOAD. If you are running DECnet, you must run the configuration utility to add the Performance 2500 to the permanent DECnet database. You must also run this utility if you need to remove a server from the network or modify its parameters.

To run the configuration utility, enter the following:

```
@ESVCONFIG <Return>
```

The main menu then appears, as shown in Figure 3–1.

```
        Server Configuration Utility

   1.  Show known servers
   2.  Add a server
   3.  Modify an existing server
   4.  Delete a server
   5.  Restore known server
   6.  Import servers from DECserver database
   7.  Export servers to DECserver database

   ^Z  Exit command procedure


    Enter desired function, 1 - 7:
    For Help with a menu option, enter ?
    followed by the number
```

Figure 3–1. Server Configuration Utility Main Menu (LAT-DECnet)

At any time, press "?" for help or <Ctrl-Y> to return to the main menu. The following paragraphs explain each menu option:

- **Option 1. Show Known Servers.** This option lists all Emulex terminal servers that have been configured by the program so far. The parameters listed are the same ones entered by Option 2, Add a Server.
- **Option 2. Add a Server.** This option asks the following questions about the server you are adding:

```
Enter server type for new server:
Enter DECnet name for new server:
Enter DECnet ID for new server:
Enter Ethernet address for new server:
Enter service circuit for new server:
```

Server type is normally P2500 for the Performance 2500. You may also configure a DECserver100 or 200 (DS100 and DS200). The designation UNKNW (Unknown) is reserved for future use.

DECnet name may be one to six characters long. The first character must be alphabetic. Be sure to choose different names for every server on your network.

DECnet ID is the address DECnet uses for the server. You must specify an area number (2-63) and a node number (1-1023). For example, the ID 2.31 designates area 2, node 31. The area number may be omitted if you use only node numbers.

Ethernet address for the Performance 2500 is stamped directly above the Ethernet port on the server's rear panel.

Service circuit refers to the type of Ethernet adapter on the load host. Your choices are BNT-0 for BI Bus adapters, QNA-0 for Q-Bus adapters, UNA-0 for UNIBUS adapters, and SBA-0 for MicroVAX 2000 adapters. Use the number 1 instead of 0 if you are using the second Ethernet controller on a system.

- **Option 3. Modify Existing Server.** This option allows you to change any of the parameters you entered when you added a server. The questions asked are exactly the same as the questions for Option 2, Add a Server.
- **Option 4. Delete a Server.** This option allows you to delete a Performance 2500 from the DECnet database. It asks only for the DECnet name of the server you wish to delete. Respond with the name you assigned to the server when you added it to the DECnet database.
- **Option 5. Restore Known Server.** This option restores servers that have been deleted directly via an NCP command. It does not restore servers that have been deleted using this program.
- **Option 6. Import Servers from the DECserver Database.** This option allows you to include all DEC terminal servers in the Emulex database. This is useful for two reasons: (1) the conversion utility checks to make sure no two servers have the same name, and (2) it is sometimes convenient to have all servers in a single database. This allows you to manipulate all your servers from within the ESVCONFIG program.
- **Option 7. Export Servers to the DECserver Database.** This is the opposite of Option 6; it adds Performance 2500 servers to the DEC database, DSVCONFIG.DAT (the Performance 2500 is exported as server type DECserver 200). This is useful because certain DEC utilities (for example, the Terminal Server Manager) get configuration information from the DEC database. If the Performance 2500 servers are not included, the DEC utilities do not know they exist.

3.4 Installing Performance 2500 Software on a UNIX Host System

This installation procedure is intended for use by system managers who are knowledgeable regarding the UNIX or "UNIX-like" systems at your site.

This procedure addresses systems that are derived from BSD 4.3 or AT&T System V UNIX. However, all systems are not alike, and you may have to make modifications to fit your system. The description of software installation on UNIX host systems provided here is based on the 2.1 software release. Significant changes in subsequent software releases are described in the release notes provided on the software distribution tape.

NOTE: The BSD 4.3 instructions for installing UNIX Performance software may also be used for an Ultrix-32 system with the TFTP distribution media.

3.4.1 BOOTP Software Provided by Emulex

In order for the server to use the TFTP protocol to download its operational software, it must have a minimum amount of information including the IP addresses of itself and the load host and the name of the file containing the software. This can be accomplished by configuring the server either through Boot Configuration Mode, or, once the server is loaded, through normal server commands. A standard way of obtaining this information, however, is by using the BOOTP protocol.

Since some host systems *do not* provide a BOOTP module, Emulex provides a BOOTP server utility (**bootpd.c**) on the distribution media. You must compile the source file before you can use it to download operational software to the server.

Emulex provides a configuration utility program that forwards network information to the BOOTP program provided by Emulex. The source files **load_config** (for BSD UNIX) and **load_config.v** (for AT&T System V UNIX), written in Bourne shell script, are provided on the distribution tape. You need to run **load_config** only if you plan to use the BOOTP program provided by Emulex.

3.4.2 Getting Started

Log on to your host system as a superuser. The software on the Emulex distribution media is set up to be extracted into a subdirectory **emlx** under the current working directory. You do not have to create the **emlx** subdirectory; it will be created by the tar command when the files are copied from the distribution media, as described in subsection 3.4.3.

If you already have another Performance server installed at your site, check to see whether you already have a subdirectory named **emlx** by entering the following command from your working directory:

```
ls ./emlx
```

If you get an error message of "directory or file not found" or a similar message, then continue with the installation. If you do *not* get an error message, and a list of files in this subdirectory is displayed, then you already have a subdirectory with this name. You must either rename the existing subdirectory or move all of the files from this subdirectory to a safe location now. This is because the installation procedure will overwrite any files currently there.

If you receive an error different from "directory or file not found", check the command you have entered for syntax errors and try again. Once you have ensured that there is no subdirectory **emlx**, or that any data in a pre-existing **emlx** subdirectory is in a safe place, then continue.

3.4.3 Moving the Software to Your Disk with 'tar'

The tar command allows you to copy the distribution media to your UNIX network load host. Before entering the tar command, however, make sure that you are in the working directory under which you wish to have the files reside. The tar procedure will create a subdirectory **emlx** under your current working directory, in which the files will be placed. For example, if your current working directory is **/usr**, then the distribution media files will reside in the subdirectory **/usr/emlx**.

NOTE: On many UNIX systems, the home or root directory ('/') will not easily accommodate all of the files on the distribution media.

Enter the following command from your working directory to initiate the tar procedure:

```
tar xvf device
```

where *device* is a variable that represents the system-specific expression that identifies your tape or floppy drive.

On many UNIX systems, the tar command would be similar to the following example:

```
tar xvf /dev/rst0 <Return>
```

where `/dev` is the directory in which device IDs are stored and `/rst0` stands for raw SCSI tape number 1.

To switch from your working directory to the subdirectory where the files are located, then list the files from the distribution media, enter the following commands when the system prompt returns:

```
cd emlx
ls
```

The following files should be included on the tape (there may also be additional files that are described in the release notes):

P2KTL0E	
release.notes	
bootpd.c	(for System V and BSD)
bootpd.1	(for System V and BSD)
load_config.v	(for System V)
load_config	(for BSD)
utilities.doc	(for System V and BSD)
environ.h	(for System V and BSD)
emlx.install	(for System V and BSD)
gencfg.c	(for System V and BSD)
gencfg.scr	(for System V and BSD)
gencfg.1	(for System V and BSD)
host.c	(for System V and BSD)
ip.awk	(IP validation shell script)
lp_emlx1	(for System V)
printcap	(Sample printcap file)
rprint.c	(for System V and BSD)
rprint.1	(for BSD)
rprintv.1	(for System V)
telrcf.c	(for System V and BSD)
telrcf.1	(for System V and BSD)

- The file **P2KTL0E** contains the operational software for the Performance 2500 server. Subsection 3.4.4 describes how to install **P2KTL0E** in your UNIX file system.
- The **release.notes** file provides very recent information about the software on the distribution tape and the software installation process that may not be included in the published documentation yet. Be sure to read the release notes carefully before you begin your host software installation.
- **bootpd.c** is the source file for Emulex's BOOTP software, which may be invoked in order to help download operational software from a network load host to the Performance 2500 server. Subsection 3.4.8 describes how to compile BOOTP. **bootpd.1** contains the UNIX manual pages for **bootpd.c**.
- **load_config** (for BSD) and **load_config.v** (for System V) are shell script-based load file configuration utilities. The

load_config utility allows you to identify the Performance 2500 server to the BOOTP software provided by Emulex (**bootpd.c**). Subsection 3.4.5 describes **load_config**.

- **utilities.doc** describes several of the utility programs that are included as part of the host software.
- **environ.h** is a "C" source include file used with **bootpd.c**, **rprint.c**, and **telrcf.c**. It contains constant definitions, which are used to configure the above three source programs for a System V or BSD host system.
- **emlx.install** is an interactive Bourne Shell script used to automate the host software installation process for both System V and BSD UNIX host system.
- **gencfg.c** is a host-resident program that takes the output of server LIST commands and creates the appropriate DEFINE commands to restore a server's configuration. **gencfg.1** provides UNIX manual pages for **gencfg.c**.
- **gencfg.scr** is a script file that is used as input to **telrcf** to generate the input to **grabcfg**. This file should be modified to fit the needs of particular servers.
- **host.c** is a program for converting **/etc/hosts** data into SET NODE commands for the server.
- **ip.awk** is a shell script-based utility that verifies that the IP address provided to the **load_config** utility is valid and legal.
- **lp_emlx1** is a System V printer interface program.
- **printcap** is a sample printcap file for System V-based UNIX hosts. BSD-based hosts should provide a printcap file.
- **rprint.c** is a multi-queued BSD-based or System V-based host print filter source file. **rprint.1** provides BSD UNIX manual pages for **rprint.c**. **rprintv.1** provides System V manual pages for **rprint.c**.
- **telrcf.c** is a host-resident program that can be used to access the RCF port by optionally taking commands from script files and sending the output to trace files. **telrcf.1** provides UNIX manual pages for **telrcf.c**.

3.4.4 Operational Software Directory and Filename

NOTE: Be sure to read the **release.notes** file and the **utilities.doc** file before continuing. These files provide current information that affects the software installation instructions described in the following pages.

The operational software file **P2KTL0E** is placed on the Emulex distribution media in the **emlx** directory. It is installed via the tar procedure into the **emlx** subdirectory of your working directory on the UNIX host. This subsection describes conditions that may require you to move the operational software to a different directory from the subdirectory **emlx**, and provides guidelines for modifying the operational software filename.

NOTE: To ensure that the software can be downloaded, be sure to verify that the load software has "public" read access.

- Make sure that the **P2KTL0E** file is located in a host directory that TFTP can access. If your host system has no restrictions on which directories can hold TFTP applications, you can leave the operational software in the **emlx** subdirectory of the working directory you have selected. However, many systems restrict TFTP to a particular TFTP root directory for security access purposes.
- TFTP access is often restricted via the -s or -r option in a TFTP definition statement placed in the **inetd.conf** or other UNIX system file. The statement format and the system file in which the directory restriction is located varies among different UNIX systems. On many UNIX systems, TFTP applications are restricted to the directory **/tftpboot**.

  Following is an example of a definition statement in an **inetd.conf** system file that restricts TFTP applications to the directory **/tftpboot**:

  ```
  tftp dgram udp wait root /usr/etc/in.tftpd
  in.tftpd -s /tftpboot
  ```

  If TFTP access is restricted to a particular directory such as **/tftpboot**, then move or link the operational software file (**P2KTL0E**) to the directory that is defined as the TFTP root

directory (in the example above, this would be the **/tftpboot** directory).

- The Performance 2500 can save the load filename, but it is limited to 16 characters. If a default directory approach cannot be used and the complete pathname exceeds 16 characters, then either BOOTP should be used as described in the following paragraph, or a link to the proper directory should be established.
- The BOOTP program supplied by Emulex allows you to select longer filenames (up to 128 characters). The **load_config** program, however, defines the name for the file containing the operational software file as **P2KTL0E** by default.

NOTE: Most **tftpd** implementations change their root directory to that directory which is set as the restricted directory. Thus, the name P2KTL0E is sufficient to locate the file while loading. If the **tftpd** program on the host does not change its root directory, the entire pathname must be specified. You can do this by editing the **bootpd.conf** file, or by giving the directory to **bootpd** as the "default" directory by editing **environ.h**.

3.4.5 Running the load_config Utility

The **load_config** utility provides information about the Performance 2500 server to the BOOTP program provided by Emulex. For BSD 4.3 and later, enter the following command to run the utility:

```
./emlx/load_config
```

For AT&T System V users, the file for the utility program is named **load_config.v**. Enter the following command to run the utility:

```
./emlx/load_config.v
```

The **load_config** utility main menu presents several options, as shown in Figure 3-2.

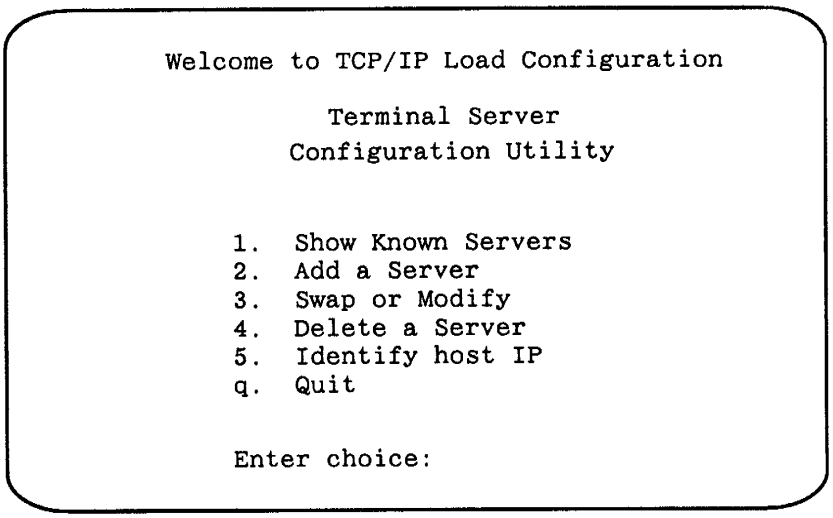


Figure 3–2. Emulex load_config Utility Main Menu (UNIX)

3.4.5.1 Selecting Options from the load_config Main Menu

The first time you run the **load_config** utility, select options in the following order:

1. **bootpd** requires knowledge of its own IP address in order to work properly. There are several methods by which it determines its address. The normal way is through the use of functions available in the sockets library on most systems. On systems that do not have these functions, or if a particular address of many assigned to the system is desired, the address can be configured as a constant in **environ.h**, or set through Option 5. Refer to the **release.notes** file for details.

2. Select the Option 2 on the Main Menu next, in order to identify the server you wish your UNIX network load host to support. To do this, you need to know the server's name, Ethernet address, server type, and so on, as described below. The information you provide identifying the server is saved to the **bootpd.conf** file on the host before you quit the program.

3. Choose Option 1 to verify that you have added the information for your server correctly.

If you need to correct or change any of the configuration information that is displayed, select Option 3 to modify an existing server definition in the server database, or Option 4 to delete a server from the server database.

Descriptions follow for the options on the **load_config** main menu:

- **Option 1. Show Known Servers.** This option allows you to see the server(s) that you have already configured with the utility. Initially the database will be nonexistent, since you are just now creating it.
- **Option 2. Add a Server.** This option allows you to add a server to the database. Once selected, it prompts you for information that identifies the server, as follows:

  Enter server name for new server:
  Enter Ethernet address for new server:
  Enter IP address:
  Enter server type for new server:
  Enter protocol type:

  Server name. The server name is a user-defined ASCII string less than 60 characters that identifies the server. The name entered should correspond to the name defined in the SET SERVER NAME command.

  Ethernet address. The Ethernet address for each server is provided on the back panel of the server, above the 15-pin Ethernet connector.

  IP Address. The IP address is an assigned address in the form *xxx.xxx.xxx.xxx*. This address must be unique, that is, it must differ from IP addresses assigned to other network nodes.

  Server type. The Server type is normally P2500 for the Performance 2500.

  Protocol type. Since the Performance 2500 is provided with the combined protocol software, specify **TL** for the load software. Other Emulex server products allow you to specify **L** for LAT-only protocol, or **T** for TCP/IP protocol only.

- **Option 3. Swap or Modify a Server.** This option allows you to modify information about a server that already exists in the database.
- **Option 4. Delete a Server.** This option allows you to delete a server that you no longer wish to load.
- **Option 5. Identify Host IP.** This option is needed only once. It provides your host IP address to the **bootpd** program.

3.4.6 Checking the /etc/inetd.conf File

Check the **/etc/inetd.conf** file to make sure that the **tftpd** daemon is present and configured properly. To do this, enter the following:

```
cat /etc/inetd.conf
```

There should be an entry for **tftp**. If there is no entry, then consult your host documentation under **inetd** and add a new entry for the **tftpd** daemon.

In order for the edited **tftp** entry to become active, you must reinitialize the **inetd** daemon. This is accomplished by determining the process ID for **inetd** and setting it to sleeping, as described in the following subsection.

3.4.7 Starting the inetd Daemon

This subsection provides instructions for checking on whether the **inetd** daemon is running, and for starting it if it is not running. First, check to see whether the **inetd** daemon is running by entering the following:

```
ps -ax  (BSD), or
ps -ef  (System V)
```

The resulting display will list all the active processes. The entry for **inetd** will look similar to the following (for BSD UNIX):

```
146 ? I 0.00 inetd
```

The number 146 identifies the **inetd** process. The `I` indicates that the **inetd** process is running. If it is running and you have not made any changes to the file **inetd.conf**, you may skip to subsection 3.4.8.

If the **inetd** daemon is running and you have made changes to it, you must send it a SIGHUP signal to cause it to reconfigure. Enter the following command to send a SIGHUP signal to the daemon:

```
kill -HUP n
```

where *n* is the number of the task seen for the daemon when you entered the "`ps -ax`" (or "`ps -ef`") command. If the **inetd** process ID is 146 as shown in the example above, then you would enter `kill -HUP 146`.

The **inetd** daemon will now restart, read the file **inetd.conf**, and make the appropriate updates. If the **inetd** daemon was not running, start it by typing the following:

```
/usr/etc/inetd &
```

AT&T System V users should enter:

```
nohup /etc/inetd &
```

You can confirm that the **inetd** daemon is running by entering one of the following:

```
ps -ax (BSD),
ps -ef (System V)
```

Look for the **inetd** daemon in the display that results. If you have sent the **inetd** daemon a SIGHUP signal, you must wait until it returns to the idle state. If the **inetd** daemon remains in the sleeping state more than a few minutes, consult your system manual regarding the stopping and starting of the **inetd** daemon.

3.4.8 Compiling bootpd.c

Before compiling **bootpd.c**, edit the **environ.h** file and verify that all the constants are set to their desired value. Of particular interest is the SOCK constant. If the host system supports BSD sockets, set SOCK to 1 (this is the preferred setting). If SOCK is 0, a TLI interface is assumed.

To compile **bootpd.c** for the BOOTP utility, first run the **load_config** utility and select Option 5 on the **load_config** utility main menu. Next, select the "Identify Host IP Option". After entering the host IP address, exit the **load_config** utility.

Type the following to compile the **bootpd.c** utility:

```
cc bootpd.c -o bootpd
```

If this does not work on your system, consult your host documentation.

An example of the syntax that you could use for compiling **bootpd.c** on a System V follows:

```
cc bootpd.c -o bootpd -l nsl_s
```

The compile syntax for the **bootpd.c** utility may also be different for a System V, as follows:

```
cc bootpd.c -o bootpd -l socket
```

3.4.9 Starting bootpd

If **bootpd** was compiled with sockets interface, it can be started by **inetd** in a similar manner as for **tftpd**. This is the normal way for it to be invoked. However, it may also be invoked manually (the sockets or TLI version), as described below.

To start **bootpd** and send messages to the host console as the server loads, enter the following command(s) as appropriate:

For BSD 4.3 systems--

```
bootpd &
```

For AT&T System V--

```
nohup bootpd &
```

For BSD 4.3 systems, enter the following command to start **bootpd** and throw away console messages from **bootpd**:

```
bootpd > /dev/null &
```

For AT&T System V, enter the following alternate command:

```
nohup bootpd > /dev/null &
```

3.4.10 Downloading Software

You are now ready to download operational software to your server. Proceed to subsection 3.5 for instructions on how to power up the server and download the Performance 2500 operational software from the network load host to your server. If there is insufficient information to download operational software, you may invoke Boot Configuration Mode in order to provide the missing information.

As the operational software is downloaded to the server, status messages from the **bootpd** program will display on your host system console, unless the output from these programs has been redirected.

3.5 Completing the Software Installation

The rest of this section describes how to complete the software installation process. It includes descriptions of how to prepare for the power-up self-test (subsection 3.5.1); how to configure the server for downloading operational software via Boot Configuration Mode (subsection 3.5.6); and how to verify that the software has been downloaded and the server is operational (subsection 3.5.5).

3.5.1 Preparing for the Power-Up Self-Test

To prepare for powering up the server, confirm that you have completed the following steps of preparation (if you have not completed an item, go back to the subsection shown in parentheses for instructions):

- **The server has been installed and cabled to the Ethernet.** This includes installing the server in a rack-mount shelf (optional) and installing Thickwire, ThinWire, or Twisted Pair Ethernet cabling (subsection 2.2).
- **A terminal has been attached to the server port designated as the console port.** The factory default console port is port 1 on the main unit. The terminal should be configured so that it is compatible with the console port. The factory default configuration for the console port is 9600 baud, 8-bit characters, and no parity (refer to the documentation provided for your terminal). The cabling of the other serial devices should take place after the server has been successfully powered up.
- **The operational software files have been installed on the DECnet- or TFTP-compatible network load host.** This step is required only if the server is to be downloaded from a network load host, not for self-loading (subsection 3.3 for DECnet hosts, subsection 3.4 for UNIX hosts). If the network load host is a Trivial File Transfer Protocol (TFTP) host, TFTP must be running on the host.

- **The BOOTP software has been installed (required only with a TFTP network load host).** The BOOTP program allows the TFTP network load host to determine information required for downloading operational software without operator intervention. See subsection 3.4.8 for instructions on compiling the BOOTP software provided by Emulex. If BOOTP is not installed, you will be required to run Boot Configuration Mode to provide information required for downloading operational software.

If all of these steps have been completed, you are ready to power up the server.

3.5.2 The Power-Up Self-Test Sequence

The power-up self-test sequence is a series of tests for verifying that the hardware modules in the server are in working order before the operational software is downloaded to the server. As the tests are run, status messages display on the console terminal only if one of the tests has ended with an error condition.

The power-up self-test results are displayed via the Alarm, Lan, and Power LEDs on the server's front panel. The Default push-button is also used to start the self-test. Figure 3–3 shows the location of the LEDs and push-button on the front panel.

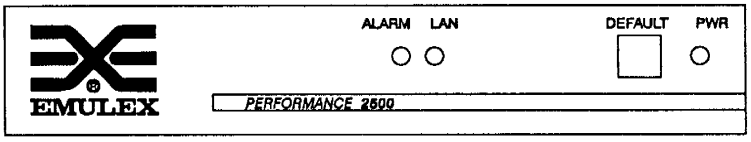


Figure 3–3. Server Front Panel LEDs and DEFAULT Push-Button

When you power up the server the first time, Emulex recommends that you also reset the server to the factory default settings. To accomplish both of these tasks, press the DEFAULT push-button on the server's front panel while applying AC power and hold for 5 seconds minimum. Resetting the server values also causes the server to try downloading operational software to the server, as described in subsection 3.5.3.

NOTE: If the server configuration parameters stored in nonvolatile memory have already been changed from the factory default, and you wish to retain the current configuration parameters, you may power up the server by simply applying AC power without holding down the DEFAULT button on the front of the server. *This is not recommended for the first time you power up the server.*

Upon power-up, the server runs a series of internal self-tests. The test names appear on the console terminal only if one of the tests fails. Table 3-1 lists the Performance 2500 tests and the failure messages. Some of the tests listed have several subtests.

Table 3–1. Power-Up Self-Test Descriptions

Test Order	Terminal Console Display (if test fails)	Description
1	PROM *xxxx* FAIL	EPROM tests
2	RAM *xxxx* FAIL	RAM tests
3	EAROM LOCK FAIL	EAROM (NOVRAM) test
4	INTRP *xxxx* FAIL	Interrupt controller tests
5	DMAC DMAC FAIL	DMA controller test
6	ASYNC *xxxxx* FAIL	Asynchronous circuitry tests
7	LAN *xxxxx* FAIL	LAN tests, XLP FAIL indicates a possible cable or transceiver problem

If the PROM or RAM test fails, this is a fatal error. When a fatal error occurs, the server halts. The user may at that point press the DEFAULT button, which will restart the diagnostics from the beginning. If a fatal error recurs, then the server may need to be returned to Emulex for service. If either a fatal or nonfatal error occurs, refer to Section 5, Troubleshooting, for further help.

If one of the remaining tests fails, this is a nonfatal error. A nonfatal error indicates a partial malfunction that may reduce the server's functionality but does not halt the server. A nonfatal error results in a 922 message that describes the error condition (refer to Appendix C).

The power-up sequence proceeds as follows:

1. The Power LED lights up at the beginning of the self-test.
2. If a fatal error occurs during the self-test, the red Alarm LED lights. The user may at that point press the DEFAULT button, which will restart the diagnostics from the beginning. If a fatal error recurs, you may need to return the server to Emulex for service, as described in Section 5.
3. If a nonfatal error occurs, diagnostics will display the failure as a 922 error message on the console terminal.
4. If the self-test completes without halting, the server will proceed to download operational software. Subsection 3.5.3 describes the downloading process in detail. Once operational software has been downloaded successfully to the server and the server is operational, the front panel LEDs are in the following state:

Alarm LED:	Off
Lan LED:	Flickering (shows LAN activity)
Power LED:	On

3.5.3 Overview of Downloading Operational Software

After the power-up self-test completes, downloading of the operational software to the server takes place. Figure 3–4 is a composite flowchart that shows the different paths that the downloading process may take.

The path that the server follows through the flowchart is different for a first-time power-up or reset-to-factory defaults than it is for subsequent reinitializations.

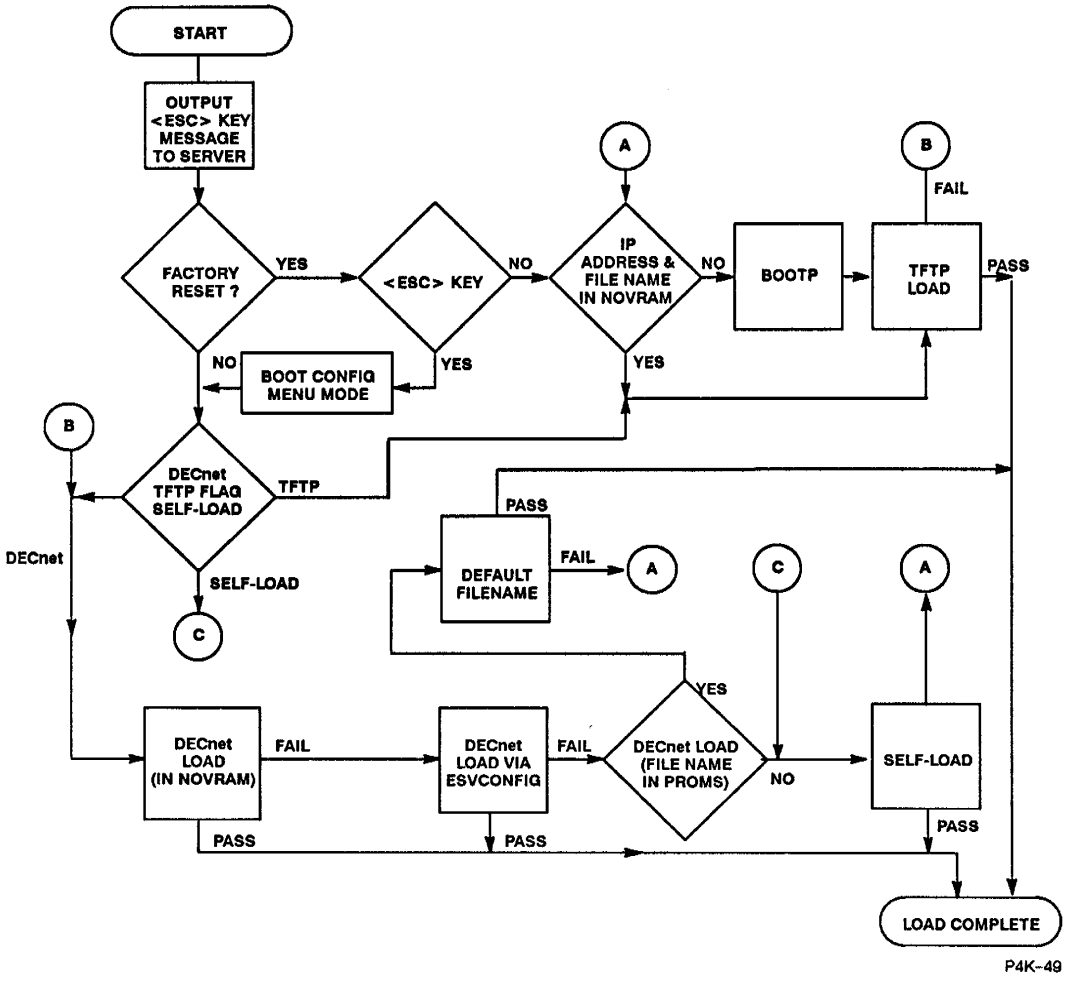


Figure 3–4. Flowchart for Downloading Operational Software

3.5.3.1 Description of the Software Download Process

The software downloading methods that the server tries are described below, in the order in which they are shown in the flowchart. The flowchart has an introductory sequence that is followed by attempts to download in three ways, in the following order:

1. Download from a TFTP network load host
2. Download from a DECnet network load host
3. Download via Self-Load

If all three methods of downloading fail, the server will start over with method 1, and will continue retrying all three methods until either a successful download has occurred or you have pressed the <Esc> key to enter Boot Configuration Mode.

Once the server has successfully downloaded software, it stores loading information in the server's NOVRAM, which is used for subsequent downloads. In addition, server commands that store downloading instructions in the NOVRAM may be entered once the server is operational.

For a first-time power-up of the server or upon a reset-to-factory defaults, there is no information stored in the server NOVRAM that identifies the network load host or the operational software filename. The server must locate information from the database of information created by running either ESVCONFIG (for DECnet) or **load_config** (for TFTP) on the network load host.

A detailed description of each step in the downloading process follows:

1. **Introductory Prompt to Invoke Boot Configuration Mode**

   The server begins the boot loading routine by displaying the following message:

   ```
   Server -905- Starting load, press ESC at any time
   to enter Boot Config Mode
   ```

Subsection 3.5.6 describes Boot Configuration Mode in detail. Briefly, this mode allows you to instruct the server explicitly how to download software by displaying a series of prompts to identify the operational software filename, network load host, and other information needed for downloading operational software.

The server will attempt to locate loading information for the server without Boot Configuration Mode. If all of the server's attempts to download software fail due to inadequate information, you may enter Boot Configuration Mode by pressing the <Esc> key at any time during the load process.

You may choose to invoke Boot Configuration Mode immediately to force the server to load by a particular method (such as Self-Load) without trying the other downloading methods first.

2. **Server detects if the DEFAULT push-button has been pressed to reset the EAROM to factory default settings.**

   If the server has been powered OFF and ON without the DEFAULT push-button being held down, and it has downloaded software previously, it will reload the software according to information it has stored in NOVRAM, branching directly to either TFTP network load (Step 3), DECnet network load (Step 4), or Self-Load (Step 5), depending on the information in the NOVRAM.

   If this is a first-time power-up of the server, or if the DEFAULT push-button is held down while the server is being powered up, this indicates that all of the software downloading information stored in EAROM (NOVRAM) has been erased along with all of the port and server configuration parameters set via previous server commands. Without information in NOVRAM, the server will always start by attempting a TFTP network load first, as described in Step 3.

3. **The server will attempt to download operational software from a TFTP network load host (path A in the flowchart).** How the TFTP network load proceeds depends on what information is available in the NOVRAM, or from BOOTP and **load_config**. The TFTP download will take place if either condition a or b is met successfully, as follows:

   a. If correct information identifying the TFTP network load host and the operational software filename is available in the NOVRAM from a previous network load or server commands, the load will proceed immediately.

   b. If there is no information in NOVRAM (or it is incorrect), the server will attempt to locate TFTP load information via BOOTP and **load_config**. This will only succeed if the following conditions have been met:

      - You have copied the Performance software from the distribution media onto a TFTP network load host (subsection 3.4)
      - You have run the **load_config** utility on the network load host, and have provided correct information identifying the server and the TFTP host (subsection 3.4.5)
      - You have compiled and started the Emulex-supplied BOOTP module on a TFTP network load host (subsections 3.4.8 and 3.4.9)

   NOTE: The Emulex-supplied BOOTP software must be installed in order to use the **load_config** utility. A user-provided BOOTP can be used in place of the Emulex-supplied **load_config** and BOOTP modules. However, you may need to edit files used by other BOOTP programs to provide the necessary parameters required for operation with the Performance 2500. As BOOTP software may vary between systems, the exact editing process cannot be documented here.

   If neither condition a nor b is met, the server will attempt a DECnet load, as described in Step 4.

4. **The server will attempt to download from a DECnet network load host (path B in the flowchart).** How the DECnet network load proceeds depends on what information is available in the NOVRAM, or from ESVCONFIG. The download will take place successfully if either condition a, b, or c is met, as follows:

   a. If correct information identifying the DECnet network load host and the operational software filename is available in the NOVRAM from a previous network load or server commands (such as SET SERVER SOFTWARE), the load will proceed immediately.

   b. If there is no information in the NOVRAM (or it is incorrect), the server attempts to locate the DECnet network load host database entry created via the ESVCONFIG utility. The ESVCONFIG-based download will be successful only if you have completed the following steps as part of your software installation procedure:

      - You have copied the Performance software from the distribution media onto a DECnet network load host (subsection 3.3)
      - You have run the ESVCONFIG utility on the network load host, and have provided correct information identifying the server (subsection 3.3.2)

   c. If a DECnet download based on ESVCONFIG information also fails, the server will attempt to load a file based on information stored in the Loader PROMs. The server will try the following three filenames:

      - P2KTL0E.SYS
      - P2KT00E.SYS
      - P2KL00E.SYS

      If the DECnet network load also fails, the server will attempt a Self-Load, as described in Step 5.

5. **The server will attempt to load software from a Self-Load server (path C in the flowchart).** A Self-Load can take place only if you have a Self-Load-type server installed.

6. **If the Self-Load fails, the server will return to path A in the flowchart and retry the TFTP network load (as described in Step 3).** If the server has to retry the entire downloading cycle twice, then you should consider pressing the <Esc> key to invoke Boot Configuration Mode (subsection 3.5.6) in order to provide download information.

3.5.4 Operational Software Download Status Messages

The messages displayed on the console terminal as operational software downloads to the server may vary considerably, depending on how you have installed the network load host software and whether you have a Self-Load or Network-Load server.

Figures 3–5 and 3-6 are examples of the download messages that result if TFTP network load software including BOOTP is installed on a TFTP host and **load_config** has been run on the TFTP host. Figure 3-5 shows messages from powering the server OFF and then ON without resetting the NOVRAM, or from a first-time powerup of the server. Figure 3-6 is an example of the software download messages when the server is reset to the factory default values by pressing the DEFAULT push-button while powering off and on the server.

```
Server -905- Starting load, press ESC at any time to enter Boot Config Mode
Server -901- Performance 2500 (NLX.XX) Hardware Address 00-00-C9-00-50-08
.........................................
Server -918- Attempting BOOTP
Server -919- Starting TFTP (image load)
Server -902- Seeking load host for P2KTL0E
Server -903- Loading from host 00-00-83-02-01-26
Server -904- Load Complete

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All rights reserved.

Server -990- Server Version X.XX initializing - please wait
Server -993- Server ready for logins
```

Figure 3–5. Status Messages for TFTP-BOOTP Load (Initial Installation)

```
Server -931- Permanent configuration parameters reset to factory defaults
  due to operator request
Server -905- Starting load, press ESC at any time to enter Boot Config Mode
Server -901- Performance 2500 (NLX.XX) Hardware Address 00-00-C9-00-50-08
.........................................
Server -918- Attempting BOOTP
Server -919- Starting TFTP (image load)
Server -902- Seeking load host for P2KTL0E
Server -903- Loading from host 00-00-83-02-01-26
Server -904- Load Complete

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Server -990- Server Version X.XX initializing - please wait
Server -999- EAROM factory default request by switches
Server -991- Resetting system configuration
Server -994- Resetting extended features configuration
Server -992- Resetting port configuration
Server -993- Server ready for logins
```

Figure 3–6. Status Messages for TFTP-BOOTP Load (EAROM Reset to Defaults)

In the 901 message shown in the two examples above, the letters "NL" in the phrase (NLX.XX) identify the software load as being a network load. The number X.XX identifies the version of the *loader* software. In the 902 message, "P2KTL0E" is the name of the server program file. In the 990 message shown above, the phrase "Version X.XX" identifies the version of the *operational* software that was loaded.

Figures 3–7 and 3–8 are examples of the download messages that display when DECnet network load software is installed on a DECnet host and ESVCONFIG.COM has been run on the DECnet host. Figure 3-7 shows messages that display when the server is powered OFF and then ON, or after a first-time powerup of the server. In both of these cases, the server is reinitialized *without* having its NOVRAM reset to default values.

Figure 3-8 is an example of the software download messages that display if the server is powered on while the DEFAULT push-button is pressed, causing the server's NOVRAM parameter values to be reset to the factory default values.

```
Server -905- Starting load, press ESC at any time to enter Boot Config Mode
Server -901- Performance 2500 (NLX.XX)
Server -918- Attempting DECnet compatible load
Server -902- Seeking load host for P2KTL0E
Server -903- Loading from host AA-00-04-00-28-04
.........................................
Server -904- Load Complete at 15:02:32 on 05-Jan-1991

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All rights reserved.

Server -990- Server Version X.XX initializing - please wait
Server -993- Server ready for logins
```

Figure 3–7. Status Messages for DECnet Load (Initial Installation)

```
Server -905- Starting load, press ESC at any time to enter Boot Config Mode
Server -901- Performance 2500 (NLX.XX)
Server -918- Attempting DECnet compatible load
Server -902- Seeking load host for P2KTL0E
Server -903- Loading from host AA-00-04-00-28-04
.........................................
Server -904- Load Complete at 15:02:32 on 05-Jan-1991

Copyright 1987, 1988, 1989, 1990, 1991 by Emulex Corporation
All rights reserved.

Server -990- Server Version X.XX initializing - please wait
Server -999- EAROM factory default request by switches
Server -991- Resetting system configuration
Server -994- Resetting extended features configuration
Server -992- Resetting port configuration
Server -993- Server ready for logins
```

Figure 3–8. Status Messages for DECnet Load (EAROM Reset to Defaults)

In the 901 message shown in the two examples above, the letters "NL" in the phrase (NLX.XX) identify the software load as being a network load. The number X.XX identifies the version of the *loader* software.

In the 902 message, "P2KTL0E" is the name of the server program file. In the 990 message shown above, the phrase "Version X.XX" identifies the version of the *operational* software that was loaded.

If you are downloading from an Ultrix-32 host, enter the following command at the host to see if the download was successful:

```
more /usr/spool/mqueue/syslog
```

If the Ultrix download was successful, you should see system log entries similar to the following:

```
Jan 13 12:22:17 localhost: 2459 mop_dumpload:
sending volunteer assistance for system load,
(target node Ethernet address = 00-00-C9-00-50-00)
Jan 13 12:22:18 localhost: 2459 mop_dumpload:
sending system image, (target node Ethernet
address = 00-00-C9-00-50-00)
```

3.5.5 Load Complete, Server Becomes Operational

After the Network-Load (or Self-Load) completes, the front panel display should be in the state shown in Figure 3–3, indicating that the server is now operational:

Alarm LED:	Off
Lan LED:	Flickering (shows LAN activity)
Power LED:	On

If your server has downloaded operational software successfully, you may proceed to subsection 3.6 to verify server configuration parameters. If you find it advisable to invoke Boot Configuration Mode, proceed to subsection 3.5.6, which describes Boot Configuration Mode.

3.5.6 Boot Configuration Mode

Boot Configuration Mode is a server-resident interactive utility program that allows the network manager to *select* a method for downloading Performance 2500 operational software to the server, and to identify the network load host and the operational software filename. It is the responsibility of the network manager to decide whether to invoke Boot Configuration Mode. A serial terminal attached to the console port of the server is required for displaying and answering the utility prompts.

The server is often able to download operational software successfully during a first-time power-up of the server via the

server's Loader firmware, without requiring Boot Configuration Mode (described in subsection 3.5.3.1). However, the network manager may choose to invoke Boot Configuration Mode in order to control what downloading method is used. In addition, if the server's Loader firmware is *unable* to locate sufficient information to download the server software, the Loader firmware will continue to retry different downloading methods until the operator invokes Boot Configuration Mode and provides enough information to complete the download.

NOTE: Once the server is operational, the network manager may choose to reconfigure the method for downloading operational software via server commands, as described in the *Performance™ TCP/IP-LAT Protocol and Command Reference.*

Boot Configuration Mode allows you to choose from DECnet network load and TFTP network load.

3.5.6.1 Invoking Boot Configuration Mode

Boot Configuration Mode may be invoked by typing either <Esc> or <Ctrl-[> when the following prompt displays on the console terminal:

```
Server -905- Starting load, press ESC or Ctrl-[ at
any time to enter Boot Config Mode
```

NOTE: The <Ctrl-[> key sequence is provided for terminals without an <Esc> key. Typing function keys programmed with <Esc> followed by other characters may produce undesirable results.

To display the 905 Boot Configuration Mode prompt, choose one of the following actions to start downloading operational software:

- Power up the server for the first time. This runs the power-up self-test and then downloads operational software to the server via the server's Loader firmware.
- Once the server is operational, you may simply power it OFF and then back ON. This runs the power-up self-test and then

downloads operational software to the server without changing the current values stored in NOVRAM.

- Once the server is operational, you may enter an "INIT" command at the Server> > prompt. This is equivalent to powering the server OFF and then ON.
- Apply AC power to the server while holding down the DEFAULT push-button on the front panel. This resets the server's NOVRAM to the default values, runs the power-up self-test, then downloads operational software to the server.

The 905 message that prompts you to enter Boot Configuration Mode is immediately followed by the 901 message:

```
Server -901- Performance 2500 (NL X.XX)
Hardware Address XX-XX-XX-XX-XX-XX
```

Following the 901 message, the server pauses for about 3 seconds. If you type <Esc> or <Ctrl-[> within this time, the server will enter Boot Configuration Mode before the load protocol starts. You may also type <Esc> or <Ctrl-[> as software download messages display anytime before the load completes, to stop it and start Boot Configuration Mode.

3.5.6.2 Boot Configuration Mode Prompts

Boot Configuration Mode displays a series of prompts. The sequence in which prompts are displayed varies depending on previous responses. Default responses are shown directly after each prompt. The default response is the server's best guess, but it may not be the correct response for your network environment. Simply enter <Return> to select a default response. To change the default response, enter the new response and <Return>.

Two examples follow of the sequence of Boot Configuration Mode prompts that may display. The first example shows the Boot Configuration Mode prompts that display when the DECnet load protocol is selected. The second example shows the Boot Configuration Mode prompts that display when the TFTP load protocol is selected. Descriptions for all of the prompts are provided following the two example dialogues.

```
Performance 2500 Boot Configuration Mode....Revision X.XX

Load parameters can be modified in the following prompts. Current or
default values are displayed at the end of each prompt. If the host has
been set up to determine the correct software for this server, a null
file name may be entered. Note that the load protocol is independent of
the protocol(s) supported by the operational software to be loaded. When
retry expires or a failed load attempt, other load protocol will be
automatically tried.

Enter <RETURN> only if no change is required.
Enter Y or y for yes and N or n for no.
Enter <CONTROL-Z> to erase input line and repeat question.
Enter <SPACE><RETURN> to enter NULL response & advance to next question.
Save information obtained via BOOTP? Y

Enter Load Protocol (D=DECnet compatible, T=TFTP): D
Enter protocol supported by the software to be loaded
 (L=LAT compatible, T=TCP/IP and TL=Both): TL
Enter software filename (no extension) (9 char max): P2KTL0E
Enter Performance 2500 IP address (d.d.d.d): 255.255.0.0
Are all entries correct? Y
```

Figure 3–9. Boot Configuration Mode Prompts with DECnet Protocol Selected

```
Performance 2500 Boot Configuration Mode....Revision X.XX

Load parameters can be modified in the following prompts. Current or
default values are displayed at the end of each prompt. If the host has
been set up to determine the correct software for this server, a null
file name may be entered. Note that the load protocol is independent of
the protocol(s) supported by the operational software to be loaded. When
retry expires or a failed load attempt, other load protocol will be
automatically tried.

Enter <RETURN> only if no change is required.
Enter Y or y for yes and N or n for no.
Enter <CONTROL-Z> to erase input line and repeat question.
Enter <SPACE><RETURN> to enter NULL response & advance to next question.

Enter Load Protocol, (D=DECnet compatible, T=TFTP): T
Enter protocol supported by the software to be loaded
(L=LAT compatible, T=TCP/IP and TL=both): TL
Allow BOOTP to determine load parameters: including load filename? N
Enter Software /path/filename (16 char max): /emlx/P2KTL0E
Enter Performance 2500 IP address (d.d.d.d): 123.234.111.222
Enter Performance 2500 subnet mask (d.d.d.d): 255.255.0.0
Enter Load Host IP address (d.d.d.d): 111.222.233.1
Load host IP address not on local network
Enter Load Gateway IP address (d.d.d.d): 111.122.222.211
Enter Load Host node name (16 char max): pegasus
Are all entries correct? Y
Save answers? Y
Save information obtained via BOOTP? Y
```

Figure 3–10. Boot Configuration Mode Prompts with TFTP Protocol Selected

Descriptions follow for each of the prompts shown in the two example dialogues:

- **Enter Load Protocol (D = DECnet compatible, S = Selfload, T = TFTP):**

  Enter "D" if the network load host is DECnet-compatible. Enter "T" if the network load host is TFTP-compatible. Enter "S" if you have a Self-Load server and you want the server to self load from its onboard PROMs.

- **Enter protocol supported by the software to be loaded (L = LAT compatible, T = TCP/IP and TL = both):**

  Enter "TL <Return>" if you are installing the standard Performance 2500-TL terminal server software. Generally, you would enter "L" if you wish to support the LAT protocol only, and "T" if you wish to support the TCP/IP protocol only. (You can load the TCP/IP-specific parameters later via the CHANGE SERVER command.)

- **Allow BOOTP to determine load parameters: including load filename?**

  This prompt will display only if you have selected the TFTP load protocol. Enter "Y" if you wish for the BOOTP protocol to determine the correct information required for network loading, provided that your network load host supports the BOOTP protocol.

  If you answer "Y" at this prompt, the "Save changes?" prompt will be displayed, skipping the prompts for the software filename, server and host IP addresses, and subnet mask. In this case, the BOOTP program will get the software filename, the IP address, and subnet mask from the host.

  Early versions of the host portion of the BOOTP program provided by Emulex did not support the subnet mask. The server, upon getting IP addresses from the host, will determine a default subnet mask. The desired subnet mask can be configured once the server becomes operational via the CHANGE SERVER SUBNET command (as described in the *Performance™ Series TCP/IP-LAT Protocol and Command Reference).*

NOTE: If you select TFTP network load, answer No to this prompt, then enter incorrect responses for one or more subsequent prompts, the BOOTP software may still be able to correct the information and allow a download to proceed, provided that it is installed.

- **Enter software filename (no extension) (9 char max):**

  This prompt will display only if you have selected the DECnet load protocol. Enter the filename of the Performance 2500 operational software to be loaded (excluding the extension). The default filename is "P2KTL0E".

- **Enter software /path/filename (16 char max):**

  This prompt will display only if you have selected the TFTP load protocol. Enter the full path/filename of the Performance 2500 operational software to be loaded. The default /path/filename is "/emlx/P2KTL0E".

  NOTE: TFTP load hosts are commonly UNIX-based, and therefore the /path/filename may be case sensitive.

- **Enter Performance 2500 IP address (d.d.d.d):**

  Enter the server's assigned IP address in the format *ddd.ddd.ddd.ddd,* where *ddd* is a decimal number with a range from 0 to 255. All nodes within a network must have unique IP addresses.

- **Enter Performance 2500 subnet mask (d.d.d.d):**

  This prompt displays only if you have selected the TFTP load protocol. Enter the server's subnet mask in the format *ddd.ddd.ddd.ddd,* where *ddd* is a decimal number with a range from 0 to 255.

- **Enter Load Host IP address (d.d.d.d):**

  This prompt displays only if you have selected the TFTP load protocol. Enter the load host's assigned IP address in the format *ddd.ddd.ddd.ddd,* where *ddd* is a decimal number with a range from 0 to 255.

- **Enter Load Gateway IP address (d.d.d.d):**

  This prompt displays only when the load host IP address is not in the same network as that of the server IP address. Enter the Load Gateway IP address for the server's network in the format *ddd.ddd.ddd.ddd*. Note that the gateway IP address must be in the same network as the server. This Gateway IP address, if saved, will also be used for storing dumps.

- **Enter Load Host node name (16 characters max):**

  This prompt displays only if you have selected the TFTP load protocol. Enter the network load host's node name.

- **Are all entries correct ?**

  Enter "Y" if all entries are correct. Enter "N" if any entry needs to be changed. This will cause all prompts to be displayed again, along with their current setting.

- **Save answers ?**

  Enter "Y" to save all entries in nonvolatile memory. Enter "N" to inhibit saving entries in nonvolatile memory.

- **Save information obtained via BOOTP?**

  This prompt displays only if you have selected the TFTP load protocol and answered "Y" to the earlier prompt, "Allow BOOTP to determine load parameters, including load filename?" If BOOTP is invoked to determine loading information and the information from BOOTP is different from what the user has entered, the BOOTP information will overwrite the user-entered data.

As soon as you have completed Boot Configuration Mode, the server will proceed to download software according to the parameters you have specified. Refer to subsection 3.5.4 for an example of the software downloading messages that will display.

3.6 Verify Server Configuration Values

The network manager should verify that the server is configured properly and should reinitialize the server before starting to configure the ports and services for the network. A procedure for doing this follows. This procedure applies to TCP/IP parameters. It is not necessary to verify LAT parameters in this manner.

It is assumed that the network manager has logged in to the server, entered privileged mode, and set a privileged password before starting this procedure. Refer to subsection 4.2 for instructions on logging in to the server and setting a privileged password.

To verify the server configuration parameters, the manager should enter the commands SET PORT PAUSE ENABLED in order to display information one screen at a time. The SET PORT PAUSE ENABLED command forces the server to pause after each SHOW command screen display, and display the next screen only after a particular key is pressed (the required key is listed at the bottom of the screen). Next, enter the command SHOW SERVER NETWORK. The display that results from this command shows the current server configuration parameters that should be verified, one screen at a time. A list of configuration items that should be checked follows, including example commands that you can issue to correct the configuration information.

Server Name	Verify that the server name shown in the SHOW SERVER NETWORK display is correct. (The server name is the same for the TCP/IP and the LAT protocols.)
Example:	To set the server name to KING, enter: `CHANGE SERVER NAME KING`
IP address	Verify that the server's IP address shown in the SHOW SERVER NETWORK display is valid.
Example:	To set the IP address to 203.202.201.200, enter: `CHANGE SERVER IP 203.202.201.200`
Subnet Mask	Be sure that your subnet mask is valid for your IP address class.

Example: To set the subnet mask 255.255.255.0, enter:
```
CHANGE SERVER SUBNET 255.255.255.0
```

Domain Name Verify that the domain name shown in the SHOW SERVER NETWORK display is valid.

Example: To set the server's domain name to ABCINC.COM, enter:
```
DEFINE SERVER DOMAIN ABCINC.COM
```

The last step before starting the software configuration is to initialize the server. The command to accomplish this follows. This assumes that you are still in privileged mode, as described in subsection 4.2.3.

```
Server>> INIT DELAY 0
```

After the server initializes, runs its self-test, then reloads its software, verify that the server is operational by trying to connect to a node on the network. Issue the following command using an IP address that is valid on your network (this is a TCP/IP protocol command, which initiates a TELNET connection by default).

```
CONNECT IP ddd.ddd.ddd.ddd <Return>
```

You may want to return to subsection 2.4 at this point for instructions on completing the cabling of parallel and serial devices to the server.

NOTE: If you have a four-port server and you enter a SHOW PORT command at this time, you may see a display that lists eight ports instead of only four. This is due to protocol software compatibility requirements relating to other server products. Disregard information on ports 5 through 8.

Section 4
INTRODUCTION TO SERVER FUNCTIONS

4.1 Overview

This section provides some introductory information on basic server functions such as logging in to the server and editing command lines.

The *Performance™ Series TCP/IP-LAT Protocol and Command Reference* contains much more information about configuring the server than is provided in this section. Refer to the command reference manual for detailed information on configuring the server, the server command set, and examples of various applications such as modem and printer setup.

4.2 Getting Started

The following is an introduction to the simplest server functions that you will need to know before beginning the configuration process. Subsections are included that describe how to log on to the server and set a password; how to set a couple of basic port configuration parameters; how to gain access to privileged commands; and how to edit command lines.

4.2.1 Logging in to the Server -- Local Mode

The first step in configuring the Performance 2500 is to plug a terminal into the lowest numbered port on the rear of the server. The terminal must be set to 9600 baud, 8-bit characters, and no parity (this can be changed later, if you wish).

Use the following steps to complete the login process:

1. Press the <Return> key several times until the server responds.
2. If this is the first time the server has been powered up, no password is required. Go to step 3.

   If password protection has been previously enabled, the server displays a pound sign (#). Type in the login password (the factory default password is ACCESS). The password is not echoed on the screen.
3. Unless a permanent username has been configured for the port, you are asked for a username:

   ```
   Enter username, or HELP>
   ```

   You may enter a username of 1 to 16 characters, or <Ctrl-z> which assigns the port name PORT_*n* as the username, where *n* is the server port number. Later on, you may wish to use the CHANGE PORT USERNAME command to assign a permanent name to the port so that you no longer get the username prompt upon login.

4. The server displays the server prompt:

```
Server>
```

You are now in Local mode and ready to begin configuring the server.

4.2.2 Basic Port Configuration Commands

Complete configuration instructions are given later in this section, but you may want to enter the following commands immediately:

- **SET PORT TYPE VT100.** Enter this command if you are using a VT-series terminal or compatible.
- **SET PORT PAUSE ENABLED.** This command affects the way screens display when you enter SHOW commands. The SHOW commands, such as SHOW SERVER and SHOW PORT, display current server settings and status information; several screens of information may display rapidly, depending on the command parameters you have specified.

  The SET PORT PAUSE ENABLED command forces the server to pause after each SHOW command screen display, and display the next screen only after a particular key is pressed (the required key is listed at the bottom of the screen). If PORT PAUSE is enabled, remember that you must press the <Return> key to stop displaying screens and return to Local mode. The SHOW commands and display screens are described fully in the *Performance™ Series TCP/IP-LAT Protocol and Command Reference.*

4.2.3 Gaining Access to Privileged Commands

NOTE: In the examples that appear throughout the rest of this manual, all user input is shown in `TYPEWRITER FONT`.

Server configuration commands can be issued only by privileged users. To gain access to privileged commands, type the following

command and enter the privileged password. Note the prompt change when you are in privileged mode:

```
Server> SET PRIVILEGED
Password> (enter password here)
Server>>
```

The privileged password is set at the factory to SYSTEM. After entering this, you should change it immediately by typing:

```
Server>> CHANGE SERVER PRIVILEGED PASSWORD
Privileged password>
```

If you have forgotten the privileged password, you may restore the password to SYSTEM by resetting the server to its factory defaults (see section 3.2.5). Be sure to return the port you are using to nonprivileged access as soon as you are finished configuring the server. This is done by typing:

```
Server>> SET NOPRIVILEGED

Server>
```

4.2.4 Command Line Editing

Command line entry and editing is similar to the method used by the DEC operating system VMS:

- The <Delete> key erases the previous character. The <Backspace> key takes you to the beginning of the line.
- The <Left-arrow> and <Right-arrow> keys move the cursor without erasing any characters.
- The <Up-arrow> key recalls the last command line entered. The <Down-arrow> key reverses this after successive <Up-arrow>s until you are back to a blank command line. Recalled command lines may be edited in the usual manner.

Table 4-1 summarizes the functions of all special command line editing keys.

Table 4–1. Command Line Editing Keys

Key	Function
Return	Causes the current command line to be executed. Note that the **entire** command line will be executed, including characters to the right of the current cursor position, if any.
Rubout or Delete	Erases the character immediately to the left of the cursor (this is usually the last character entered).
Backspace or Ctrl-H	Moves the cursor to the beginning of the line without erasing any characters on the line.
Break	Aborts the command line or any display that might be in progress. (This key can be disabled later via the SET PORT BREAK command.)
Ctrl-B	Recalls the previous command line.
Ctrl-E	Moves the cursor to the end of the line without erasing any characters on the line.
Ctrl-R	Redisplays the current command line, with any line editing changes incorporated. This is useful to verify the effects of command line editing.
Ctrl-U	Erases all characters to the left of the cursor. If the cursor is at the end of the command line, this action effectively aborts the entering of the command without causing it to be executed.
Ctrl-Z	Aborts the entering of a password.
The following features are available on ANSI and VT100 terminals only if the server port has been configured as type VT100 or ANSI. Some keys function differently during server displays; see the SHOW command for details.	
Up Arrow	Same as Ctrl-B. Recalls the previous command line.
Down Arrow	Recalls the subsequent command line (after one or more up-arrows).
Left Arrow or Ctrl-D	Moves the cursor left without erasing any characters.
Right Arrow or Ctrl-F	Moves the cursor right without erasing any characters.
Ctrl-A	Toggle Insert Mode. Insert mode causes characters to be "inserted" into the command line at the cursor position. Pressing <Return> or <Ctrl-A> returns you to overstrike mode.

4.2.5 The HELP Command

You can get on-line information about server commands at any time by using the help command. To activate it, type HELP:

```
Server> HELP
```

The server displays a list of commands. To get information about a command, type HELP followed by the command name:

```
Server> HELP SET
```

The server displays a screen of information about the command. You may also specify a particular command option by typing the option name:

```
Server> HELP SET PORT BROADCAST
```

Note that information about privileged commands is available only to privileged users. A hints screen is available to help new users. Simply type HELP HINTS to display a screen of introductory information about the Performance 2500.

4.2.6 Returning to the Factory Settings

If you make a mistake while you are configuring options (or at any other time) and want to start over, you can erase the server's internal memory and get back the original factory settings as follows:

1. Remove power from the Performance 2500.
2. Hold down the DEFAULT key on the server's front panel about five seconds and restore power to the server, then release the key while the server reboots.

When you do this, you completely erase any option changes you may have made. All service options, server options, and port options are reset to their original factory settings.

After the EAROM is reset, the server will run its power-up self-test and download operational software.

4.3 Default Server Port Numbering

The default values for the port options are the values that are set after the server has executed a factory reset. For some port options, the default values differ, depending on the type of port (serial port, parallel port, or the RCF port). For these options, the default values are listed separately for each type of port.

The parallel port for the Performance 2500 is always number 9. The RCF port is always number 10.

Section 5
TROUBLESHOOTING

5.1 Overview

This section explains how to isolate problems you may have with the hardware portion of the Performance 2500. Most common problems are discussed and resolutions are suggested.

5.1.1 Emulex Service

If, after following the instructions in this section, you are unable to solve your problem, call Emulex Technical Support at the number below. They can suggest further troubleshooting procedures and can also authorize return of your Performance 2500 to the factory for repair, if that is necessary.

Do not return a component to Emulex without authorization. Before returning a component to Emulex, whether it is under warranty or not, you must contact the factory or the factory's representative for instructions and a Return Materials Authorization (RMA) number. A component returned for service without an authorization will be returned to you at your expense.

In the continental United States, Alaska, and Hawaii contact:

Emulex Technical Support
3545 Harbor Boulevard
Costa Mesa, CA 92626

Outside California: (800) 854-7112
Inside California: (714) 662-5600
FAX: (714) 966-1299

Outside of the United States, contact the distributor from whom the server was initially purchased.

After you have contacted Emulex and received an RMA, package the component (preferably using the original packing material) and send it postage paid to the address given to you by the Emulex representative. You must also insure the package.

5.2 Isolating Problems

The most important step in troubleshooting a problem with the server is isolating the component that has either failed or has been configured incorrectly. Figure 5–1 illustrates a typical Performance 2500 installation and shows possible trouble areas.

There is one common procedure for isolating problem areas. That is to figure out which component is causing problems by swapping components one at a time. For example, if a terminal cannot connect to a service:

- Try a different terminal on the same port (maybe the terminal is bad or configured incorrectly).
- Try the same terminal on a different port (maybe the server port is bad or configured incorrectly).
- Using the same terminal and port, try connecting to a different service (maybe the problem is with the service).
- Try connecting to the same service from a different server (maybe the entire server is bad).

Potential problems and solutions are discussed in the next few sections. Table 5-1 lists the most common problem areas and directs you to the specific section that discusses the problem.

Table 5–1. Performance 4000 Troubleshooting Guide

Problem Area	Section
Initialization and Downloading	**Subsection 5.3.** This subsection discusses problems that occur when the server is powering up. This includes self-test errors, software downloading problems, and hardware problems.
Logging In	**Subsection 5.4.** This subsection discusses problems logging in to the server. This includes terminal-related problems, server limitations, and cabling problems.
Connecting to TCP Ports	**Subsection 5.5.** This subsection discusses problems connecting to local and remote services. Note, however, that if the connection failure generates an error message, you can refer directly to Appendix D for an explanation of the message.
Error Messages	Refer to the *Performance™ Series TCP/IP-LAT Protocol and Command Reference.*

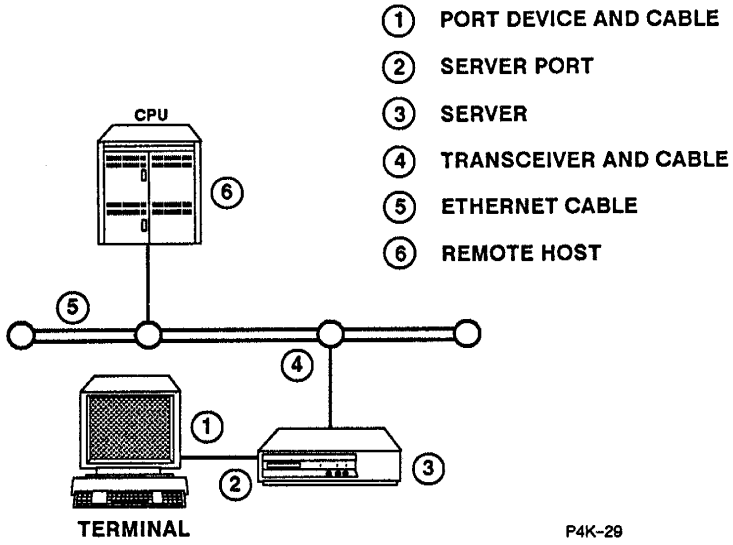


Figure 5–1. Components in a Terminal Server Network

5.2.1 The Console Port

When a problem occurs, always check the server's console port for error messages. All fatal error messages and server-wide status messages are directed to the console port. Error and status messages that affect only a single port are normally directed to the affected port.

If you have disabled the console port (via the SET SERVER CONSOLE command), you should re-enable it, then try to recreate your problem. (Issue the command SET SERVER OPTIONS 5-6 ENABLED to receive all console informational and warning messages.) The error messages generated may lead you directly to the problem's cause. Refer to the *Performance™ Series TCP/IP-LAT Protocol and Command Reference Manual* for an explanation of how the console port operates and for a description of all Performance 2500 status and error messages.

5.3 Initialization and Downloading Errors

This section describes in detail the entire procedure the Performance 2500 goes through when it is powered up. At every stage, potential errors are discussed and resolutions suggested.

5.3.1 Step 1 - Power Up

When you plug in the server, the green Power LED lights. If the green Power LED does not light, try plugging the server into another outlet.

If your AC power outlet is OK but the server still refuses to power up, it has a hardware failure. Call Emulex Technical Support and return the unit for repair (see subsection 5.1.1).

5.3.2 Step 2 - Self-Test

NOTE: Emulex strongly recommends that you attach a terminal to the console port on the server before running the power-up self-test. This will allow you to monitor the error messages and other status messages that display as the power–up self-test proceeds.

After the server is powered up, it begins its self-test immediately. As the series of tests in the self-test proceeds, the console terminal displays messages only if one of the test fails. Table 3–1 lists the Performance 2500 tests and the fail messages.

In order for the network portion of the self-test to pass, the server must be connected to an Ethernet transceiver or have the Ethernet loopback connector installed. See Appendix A, Ethernet Loopback Connector.

- If the self-test detects an error with the LAN interface, it will display a LAN XLP FAIL message on the console terminal. This indicates that there is a problem with either your transceiver or your transceiver cable. Check the transceiver connection and reinitialize the server.
- If the PROM or RAM test fails, this is a fatal error. You may have to return the server to Emulex for repair.
- If one of the remaining tests fails, this is a nonfatal error. If the self-test detects a nonfatal error, the console terminal displays a 922 message, which indicates the nature of the problem.
- If the server's TDR test detects a cable break, the console terminal displays message 910, indicating the approximate position of the break. The position is listed for both Thickwire and ThinWire cable.

NOTE: Appendix C describes the 900-series status and error messages. The *Performance™ Series TCP/IP-LAT Protocol and Command Reference* describes the complete set of server status and error messages.

5.3.3 Step 3 - Downloading

The server begins downloading its internal software when the self-test is complete. Messages that indicate the status of the download are displayed on the console port.

- If there is no activity on the console port, check the following:
  - The terminal you are using must be connected to the correct port. The number of the console port is displayed on the server's front panel at the end of the power-up self-test (it is usually port 1, the factory default).
  - The terminal must be set for 9600 baud, 8-bit characters, no parity, and XON/XOFF flow control. Note, however, that if this is **not** the first time the server has been used since the server was initialized to the factory settings, then these parameters may have been changed.

  - Make sure the terminal and the terminal cable are working properly. If the cables are bad, refer to Appendix A to make sure you are using the right cable type.
- If the console device sends an XOFF and does not shortly thereafter send an XON, the download will continue, but at a reduced rate.
- If the console port is working normally, the following messages should appear:
  - -901- Performance 2500 Network Load
  - -903- Loading from host: address
  - -904- Load complete at time and date
- If there are any problems with the download, error messages appear on the console port.
- If you receive an error message, follow the suggestions in the *Performance™ Series TCP/IP-LAT Protocol and Command Reference* and see if they resolve the problem. If they don't, or if you have a server hardware failure, call Emulex Technical Support for further help.

5.4 Login Problems

To log in from an interactive terminal, you must press the <Return> key to get a response from the server.

1. **If you get no prompt from the server at all,** press <Return> a second or third time. This is required if the port is configured for autobaud operation.

2. **If you still get absolutely no response,** check the following:

   - Make sure the server is powered up by checking the green Power LED on the front panel.
   - Make sure your terminal is working by plugging it into another port and trying to log in.
   - Verify the correct cable type shown in Appendix A.
   - From another port, check to make sure the access for the suspected port is set to LOCAL or DYNAMIC (via the SET PORT ACCESS command).
   - From another port, check to see if MODEM CONTROL is enabled for the suspected port. If so, the port will not respond unless it detects DSR, CTS, and DCD (DSR only for partial modem ports) from the terminal. If your terminal cannot supply the necessary modem signals, you must disable the MODEM CONTROL via SET PORT x MODEM DISABLED.
   - Finally, from another port or from the front panel, check the port status via the SHOW PORT STATUS command. It should be "idle." If it is not, issue a LOGOUT PORT command for the port and then try logging in again.

3. **If you receive garbled characters on the screen but no prompt,** check the terminal's serial parameters (baud rate, character size, and parity). They must match the settings of the port. If AUTOBAUD is enabled for the port, the terminal must be configured for 7-bit characters with even parity or 8-bit characters with no parity. You can check the settings of the port via the SHOW PORT command or the server's front panel display.

4. **The server displays a message depending on how the port is configured.** If server passwords are enabled, you see a pound sign prompt (#) and you must enter a password (the default password is ACCESS, but may have been changed).

5. **If you tried to log in before,** but exceeded the maximum allowed number of password attempts, the port will lock out for one minute. Try again when the minute is up. (If the SERVER SECURITY feature is enabled, the port stays locked out permanently until a privileged user logs it out from another port.)

   If no username has been assigned, you are asked for a username. You then receive the local mode prompt:

   ```
   Server>
   ```

   When you receive the local mode prompt, the server is ready for use.

6. **If you occasionally receive garbled characters on the screen after logging in,** check to see if the port is configured for the correct terminal type. If you have a VT-series terminal or compatible, it should be set to VT100. Other options are SOFTCOPY (the default), ANSI, and HARDCOPY (for hardcopy-style terminals). Refer to the SET PORT TYPE command for further details.

   Also check to make sure the port and the terminal are configured for the same type of flow control (VT terminals and compatibles normally use XON/XOFF flow control).

   If you log in successfully but have problems executing server commands or connecting to services with your TCP/IP server, refer to the next section.

5.5 Connection Problems

Depending on what protocol you have selected for your server, the following sections delineate connection problems for either TCP ports or LAT services. The steps for these different connections are not interchangeable; read the section that pertains to your protocol.

5.5.1 LAT Services

Once you have logged in successfully, you are assured of the following:

- Your terminal is working.
- Your server port is working.
- The server itself is working.

Thus, if you have problems connecting to services after a successful login, there are only a few options left:

- **Your port is not authorized to connect to the service.** At least one of the group codes authorized for your port must match a group code that belongs to the service. If you are not authorized for the service, message number 716 ("Access to service denied") is displayed on your terminal. Group codes must be authorized for a port by a privileged user via the SET PORT AUTHORIZED GROUPS command and then enabled via the SET PORT GROUPS command.
- **The service does not exist.** Issue the SHOW SERVICE command and see if the desired service appears. If a dash appears before the service name, it is not currently available. Check with the system manager to find out why.
- **The service has no ports left.** If the service is offered only on specific ports, issue the SHOW SERVICE *name* STATUS command and check the service's rating. If it is zero, all ports offering the service are currently in use or are improperly configured.

- **There is a problem with the service on the host end.** Privileged users may issue the TEST LOOP command to check the physical connection between the server and the remote node that offers the service.

If the service is a set of ports on a terminal server (either local or remote), make sure the service is defined correctly and the server ports are configured properly. See subsection 3.4 for detailed port configuration requirements for specific types of devices.

If the service appears to be functioning correctly (i.e., you can connect to it from another port or another server), you may have an unusual server or port hardware failure. Call Emulex Technical Support for further help.

5.5.2 TCP Ports

Once you have logged in successfully, you are assured of the following:

- Your terminal is working.
- Your server port is working.
- The server itself is working.

The following error conditions may be encountered when attempting to connect to a TCP port:

- `CONNECTION REQUEST REFUSED`
  - A nonexistent TCP port was specified.
  - There is a problem with the TCP port on the target node; this can be caused by one of the following:
    - Incorrect access mode specified on the port; access should be dynamic or remote.
    - Connections are disabled on the service where the TCP port is defined.

- `TIME LIMIT EXPIRED`
  - The node requested is not responding. This can occur for a number of reasons, including the following:
    - The IP address specified in the CONNECT command is not correct.
    - The network on which the target node is located has a problem.
    - The node requested is unavailable to the network.
- `NODE` *name* `NOT KNOWN`
  - The server was unable to obtain an IP address for the node name specified.
    - If the Name Server is not in use on the network: the node was not in the server's node table, and the IP address was not specified for that node.
    - The node is in the server's node table, but the IP address is not specified for that node.
    - A Name Server was not available to provide the IP address of the node specified. This can occur because: 1) a Name Server does not exist; 2) a Name Server does exist, but it is not configured into the server's node table.

5.5.3 Host Connection Problems

Host-initiated connections are most often made to printers, but they can also be made to modem pools, data switches, and other devices. If a host in your network is trying to make connections to services (LAT) or TCP ports but has been failing, check the following:

- **Issue the SHOW NODE *name* COUNTERS command,** described in the command section of the *Performance™ Series TCP/IP-LAT Protocol and Command Reference.*
- **If the number of solicitations accepted and rejected are both zero,** the server is not receiving the host requests. Check to make sure the remote host is requesting the connections with

the server's name, not the server's DECnet or TFTP name. The server name is defined by the SET SERVER NAME command.

- **If solicitations are being received but rejected**, check the following:

The port that offers the requested service must be defined as either REMOTE or DYNAMIC and cannot be configured for autobaud. Refer to Section 3 for port configuration requirements for specific types of devices.

If the host is making the request by service name, rather than port name, the service must be correctly named and defined and connections enabled, as described in Section 3.

Passwords are not allowed on host-initiated connections. If the host is requesting a service with a password, you may disable the password by entering CHANGE SERVICE *name* PASSWORD "". Alternatively, if you wish to keep the password, the host can connect directly to the port name rather than the service name.

The remote host must be authorized to access at least one of the group codes that belong to the server. The server's group codes are defined by the SET SERVER SERVICE GROUPS command.

A port can accept only one connection from a remote host at a time. If host requests are being rejected because the requested service or port is busy, the host must simply retry at a later time.

If queuing is enabled for the requested service, operating systems that support queuing, such as VMS, may have their requests stored in the server's internal queue for connection at a later time.

Appendix A
CABLE SCHEMATICS

A.1 Overview

Tables A–1 and A–2 list pin and signal assignments for the Performance 2500 serial ports. Table A–1 describes the pin and signal assignments for full-modem control ports (DB25 connectors). Table A–2 describes the pin and signal assignments for partial-modem control ports (RJ12 and MMJ connectors). Subsection 1.2 describes the different server models and their port configurations.

Table A–3 lists the pin and signal assignments for the Performance 2500 parallel port, which is compatible with standard PC printer cables. Cabling schematics for some of the cables commonly used with the Performance 2500 are provided following the tables.

All signals on the serial ports are electrically RS-232 compatible.

A.1.1 MMJ Connectors

If you have ordered a Performance 2500 that has MMJ serial port connectors for compatibility with DEC equipment, then you will need to use MMJ connectors on the cabling devices. Cables that require MMJ connectors are footnoted in the cable schematics.

If MMJ cable connectors are required for compatibility with DEC equipment, you can either modify the RJ12 cables provided by Emulex by replacing the RJ12 connectors with MMJ connectors, or purchase MMJ cables from another source. MMJ-to-DB25 adapters are not included as part of the Performance 2500 package, but may be ordered from Emulex (model number P0009).

Table A–1. Full-Modem Serial Port (25-Pin) Pin/Signal Assignments

Pin	Signal Name	CCITT No.	Mnemonic
1	Chassis Ground	101	Ground
2	Transmit Data	103	TXD
3	Receive Data	104	RXD
4	Request to Send	105	RTS
5	Clear to Send	106	CTS
6	Data Set Ready	107	DSR
7	Signal Ground	102	SG
8	Data Carrier Detect	109	DCD
20	Data Terminal Ready	108.2	DTR

Table A–2. Partial-Modem Serial Port (RJ12) Pin/Signal Assignments

Pin	Signal Name	CCITT No.	Mnemonic
1	Data Terminal Ready	108.2	DTR
2	Transmit Data	103	TXD
3	Signal Ground	102	SG
5	Receive Data	104	RXD
6	Data Set Ready	107	DSR

Table A–3. Parallel Port Pin/Signal Assignments

Pin	Signal Name	Mnemonic
1	Data Strobe	Strobe
2	Data 0	D0
3	Data 1	D1
4	Data 2	D2
5	Data 3	D3
6	Data 4	D4
7	Data 5	D5
8	Data 6	D6
9	Data 7	D7
10	Printer Acknowledge	ACK
11	Printer Busy	Busy
12	Paper End	P End
13	Printer Select Status	Select
14	Auto Line Feed	Auto Feed
15	Printer Error	Error
16	Printer Initialize	Init Printer
17	Inhibit Decode of Select/Deselect	Sel Inh
18-25	Ground	Gnd

A.2 Making Cables

The cabling diagrams on the following pages show how to connect a variety of devices to the serial ports on the Performance 2500. Each cable shown is a specific type with a specific purpose, and may or may not require an adapter to make it work. It is important that you understand the following points:

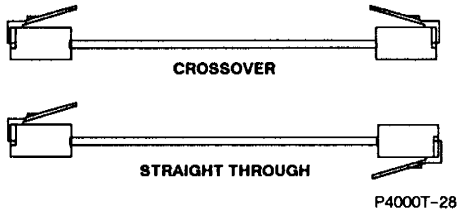
- **DB25 vs. RJ12 (or MMJ).** Although all serial ports on the Performance 2500 are configured as DTE, some use DB25 connectors and some use RJ12 (or MMJ) modular connectors. Most terminals, printers, and modems use DB25 connectors. Thus, most of the cabling diagrams show two cable types: DB25-to-DB25 and DB25-to-RJ12 (or MMJ). Be sure to use the correct type for your application.
- **Modular cable vs. standard cable.** RJ12 (or MMJ) connectors can be attached only to modular cable. This cable is typically flat, silver colored, and nonshielded. To attach an RJ12 (or MMJ) connector to modular cable, you must use a special crimping tool (available at most electronics stores). Modular cable has six conductors.

  Standard cable is usually round and comes with as many conductors as you wish. You cannot attach an RJ12 (or MMJ) connector to standard cable. Use standard cable if you are making your own cable with DB25 connectors on both ends.
- **Crossover vs. straight-through.** To connect a terminal (a DTE device) to a server port (also a DTE device), you must use a cable that crosses the input and output signals. This is required so that the terminal's transmit pin is connected to the server's receive pin.

  The simplest way to determine if your cable is crossover is to hold the RJ12 (or MMJ) connectors side by side, tabs up. If the wiring's color order is the same from left to right in both connectors, the wire is straight. If not, the cable is crossover.
- **RJ12 shielded cables.** The Performance 2500 has shielded RJ12 jacks. If shielding is required, shielded RJ12 connectors and cables are available from Stewart Stamping or from AMP.

When connecting a server port (DTE) to a modem (DCE) it is not necessary to cross signals. Use a straight pin-to-pin cable. Be sure to use the correct cable for each device.

- **Crossing a modular cable.** There is a simple way to add a crossover to a modular cable: simply crimp the connector in the same direction on both ends (see illustration). This crosses all the wires in the cable.



- **The Emulex adapter.** Whenever you require a DB25-to-RJ12 cable, you must use an adapter that converts the DB25 to an RJ12. This gives you DB25 on both ends so that you can use ordinary modular cable to connect them.

  Emulex makes an adapter (model number P0005x--for terminals only) that converts DB25 to RJ12. It is shown in Figure A–1, and pin assignments are shown in some of the cabling diagrams (for example, Figure A–2). If you wish, you may buy your own adapter kits instead. Be sure to wire them correctly.

One more note: The cables shown in this appendix are designed to be compatible with most applications, regardless of what options are used or what devices are connected. In many cases, simpler cables are possible depending on the requirements of your device. The simplest terminals, for example, require only a three-wire cable (with TXD, RXD, and Signal Ground).

It is impossible to cover every possible type of cable here. If you think you can get by with a simpler cable for some of your applications, refer to the instruction manuals for your serial devices for information about their requirements.

Figure A–1 illustrates the locations of pins on the Performance 2500 I/O ports.

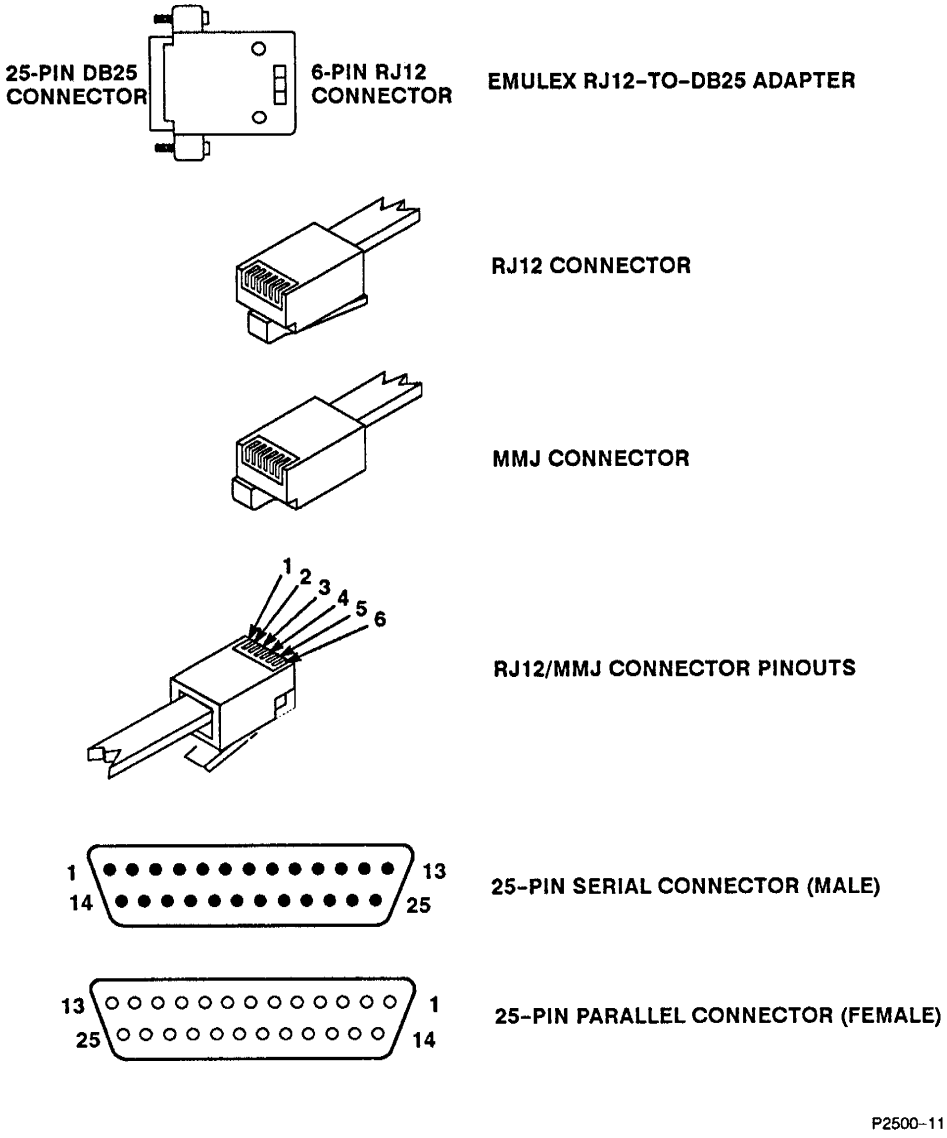


Figure A-1. Pin Locations on the Performance 2500 I/O Ports

A.2.1 RS-232 Terminal Cable – Full-Modem/Modular

Function Connects full-modem server port to terminal or serial printer.

Connectors RJ12 to RJ12

Cable Type 6-wire modular crossover cable, with Emulex adapters

This diagram shows how to cable a terminal, data switch, or printer to a full-modem port using Emulex adapters on each end to convert the DB25 connectors to RJ12. The cable itself is a modular cable with RJ12 connectors on each end.

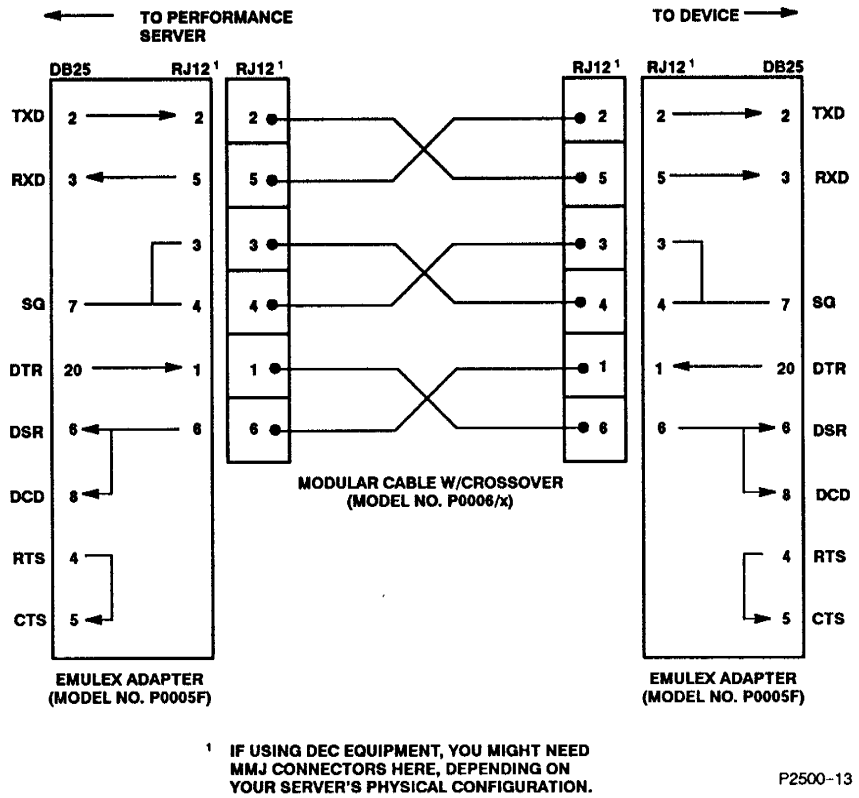


Figure A–2. RS-232 Terminal Cable – Full-Modem/Modular

A.2.2 Terminal Cable – Full-Modem/Standard

Function Connects full-modem server port to terminal or serial printer.

Connectors DB25S to DB25S

Cable Type 6-wire standard with crossover

This diagram shows how to cable a terminal, data switch, or printer to a full-modem port. No adapters are necessary. Note that although this cable can be used with most terminals, printers, and data switches, you may be able to get by with a simpler cable. Refer to the instruction manual for your device to see if you can use a cable with fewer connections.

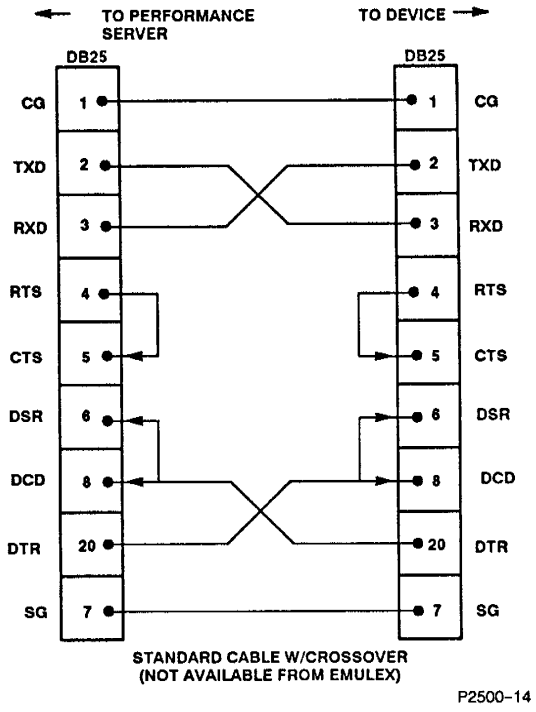


Figure A–3. Terminal Cable – Full-Modem/Standard

A.2.3 Terminal – Partial-Modem/Modular

Function Connects partial-modem server port to terminal or serial printer.

Connectors RJ12 to RJ12

Cable Type 6-wire modular, crossover, with Emulex adapter on terminal end

This diagram shows how to cable a terminal, data switch, or printer to a partial-modem port using an Emulex adapter on the terminal end that converts the DB25 connector to RJ12. The cable itself is a modular cable with RJ12 connectors on each end.

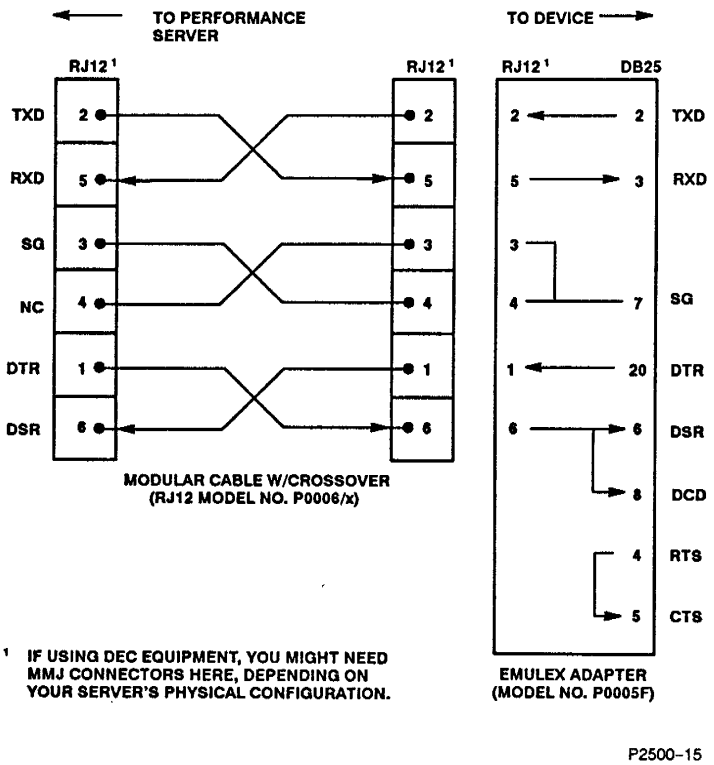


Figure A–4. Terminal – Partial-Modem/Modular

A.2.4 Modem Cable – Full-Modem/Standard

Function Connects full-modem server port to modem.

Connectors DB25S to DB25P

Cable Type 12-wire standard cable

Notes For all modems, the connection on pin 23 must be eliminated.

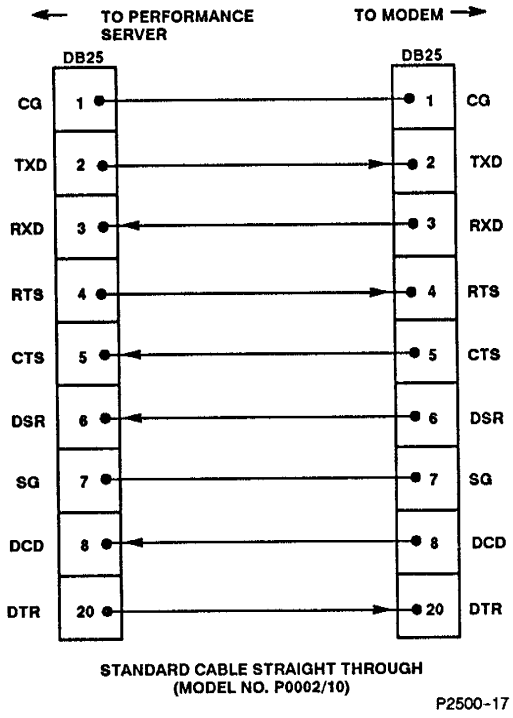


Figure A–5. Modem Cable – Full-Modem/Standard

A.2.5 Modem Cable – Partial-Modem/Modular

Function Connects partial-modem server port to modem.

Connectors RJ12 to RJ12

Cable Type 6-wire modular cable with user-supplied adapter on modem end.

partial-modem ports support full-duplex modems only. Multispeed modem operation is not supported. Refer to the *Performance™ Series TCP/IP-LAT Protocol and Command Reference* for details about how the modem signals work.

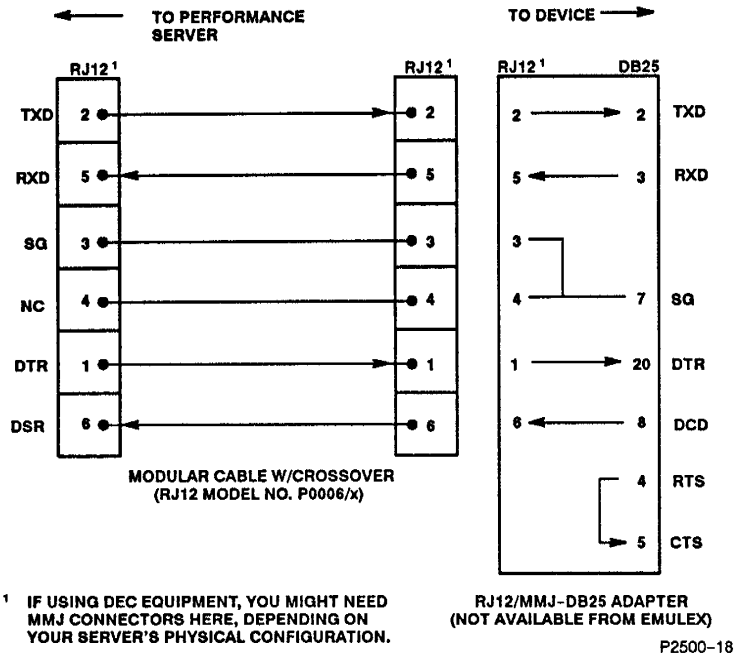


Figure A–6. Modem Cable – Partial-Modem/Modular

A.2.6 Serial Printer Cable with CTS/RTS Flow Control – Full-Modem/Standard

Function Connects full-modem server port to serial printer using CTS/RTS flow control.

Connectors DB25S to DB25S

Cable Type 6-wire standard cable with crossover

Printers that use XON/XOFF or DSR/DTR flow control can use the standard terminal cables on the previous pages. Only printers that use CTS/RTS flow control need to use the cable shown below.

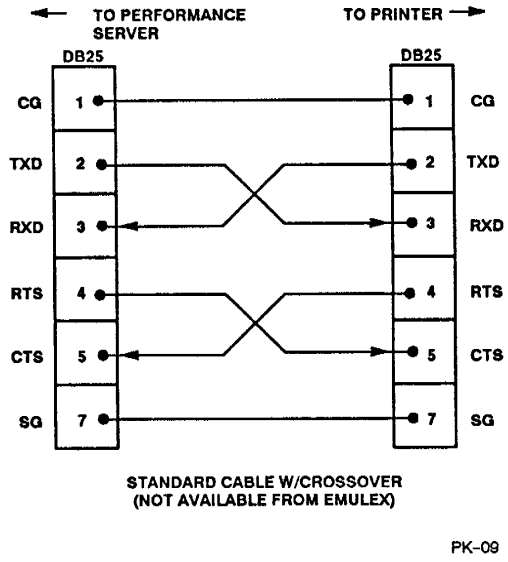


Figure A–7. Serial Printer Cable with CTS/RTS Flow Control – Full-Modem/Standard

A.2.7 Serial Printer Cable with CTS/RTS Flow Control – Partial-Modem/Modular

Function Connects partial-modem server port to serial printer using CTS/RTS flow control.

Connectors RJ12 to DB25S

Cable Type 6-wire modular crossover, with user-supplied adapter

Printers that use XON/XOFF or DSR/DTR flow control can use the standard terminal cables on the previous pages. Only printers that use CTS/RTS flow control need to use the cable shown below. Note that although partial-modem ports support CTS/RTS printers using this cable, the port itself must be configured for DSR/DTR flow control.

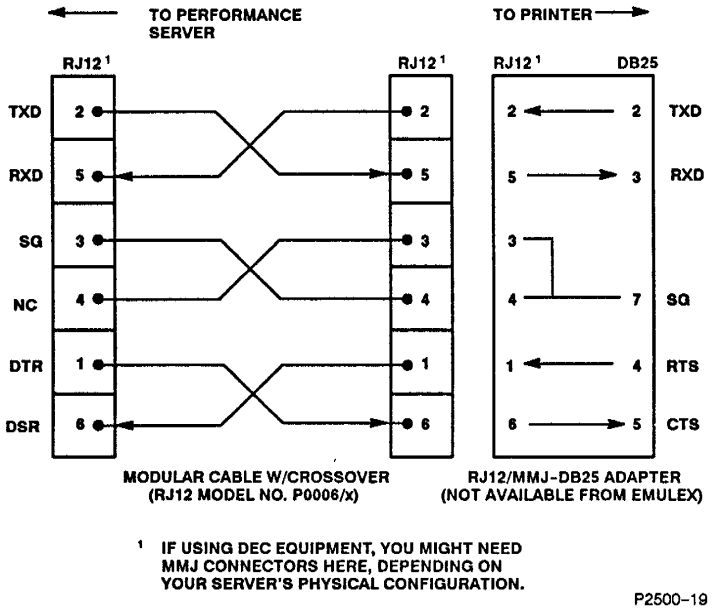


Figure A–8. Serial Printer Cable with CTS/RTS Flow Control – Partial-Modem/Modular

A.2.8 Serial Loopback Connectors

Function Loopback connector for diagnostic testing

Connectors Full-modem ports: DB25S. Partial-modem ports: RJ12.

Cable Type None

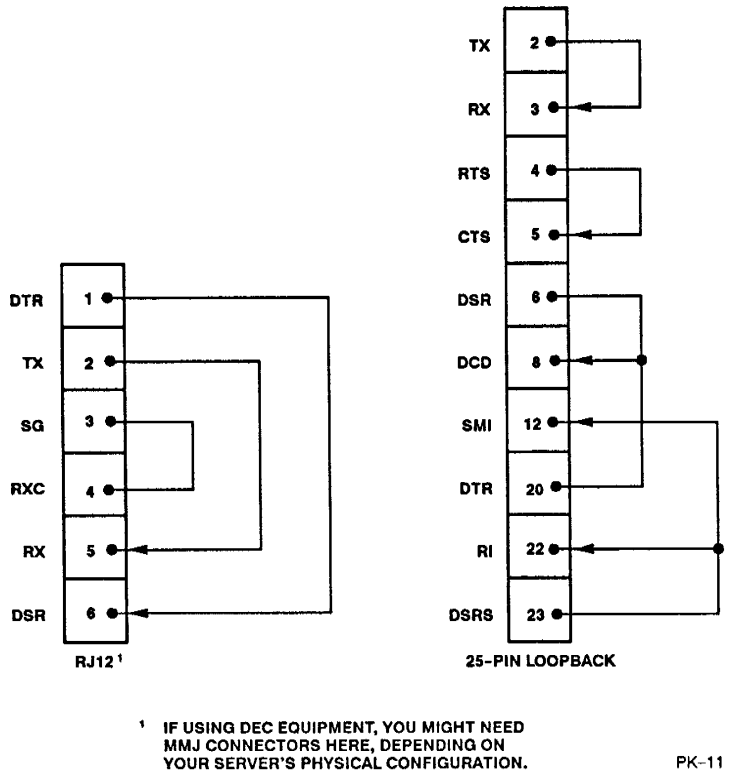


Figure A–9. Serial Port Loopback Connectors

A.2.9 Parallel Printer Cable – Centronics-style

Function Connects parallel port to Centronics-type printer.

Connectors DB25P to 36-pin Centronics

Cable Type 25-wire

Notes The maximum cable length is typically 30 feet with this interface.

Figure A–10 shows the pinouts for the Centronics-style parallel printer cable.

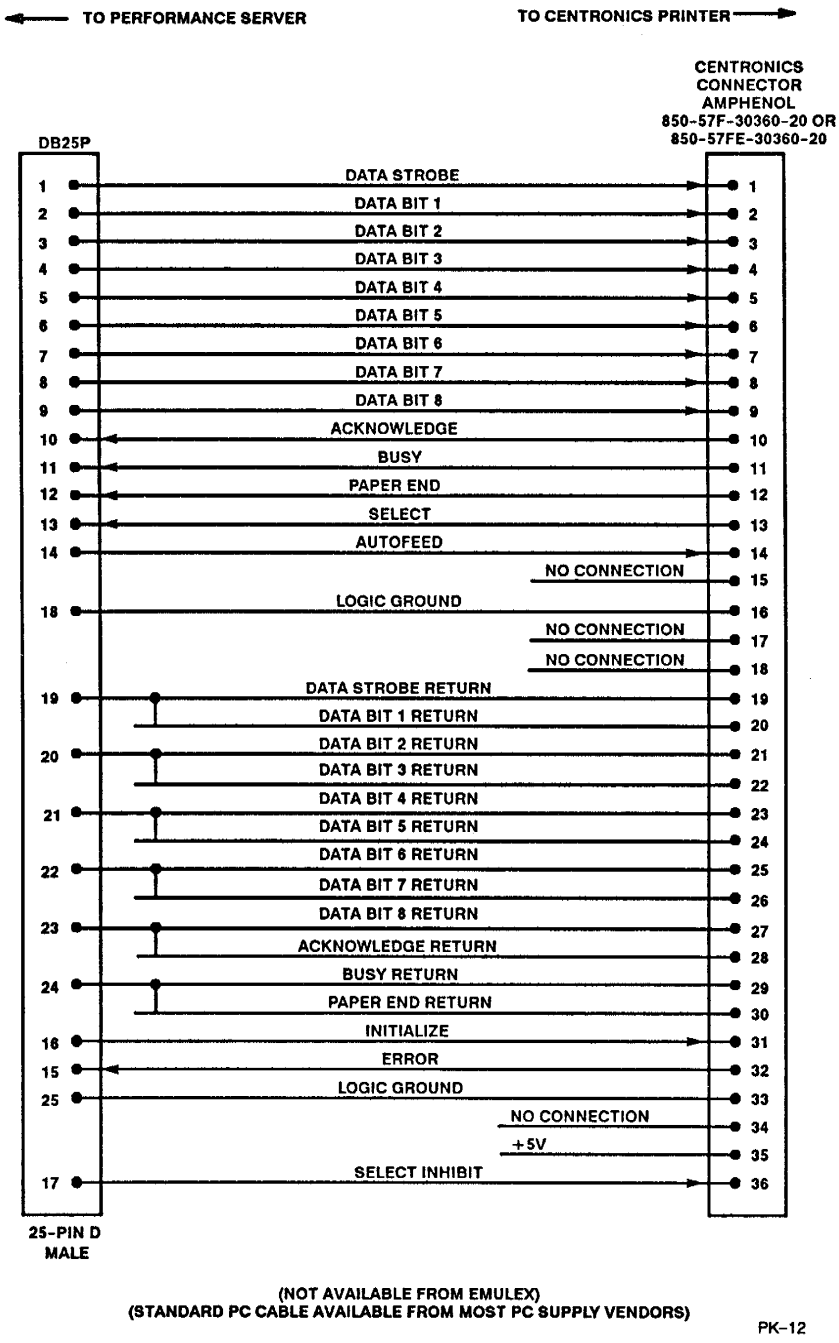


Figure A–10. Parallel Printer Cable – Centronics-Style

A.2.10 Parallel Printer Cable – Dataproducts-Style, With DAVFU options

Function Connects parallel port to Dataproducts-style printer

Connectors DB25P to 50-pin Dataproducts

Cable Type 25-wire

Notes Two different cabling arrangements for Dataproducts-style parallel printers are provided. The first cable has the additional features (over the cable described in the following subsection) of detecting that the cable is not connected, and of better control of printer vertical formatting (DAVFU) options. If you do not need these features, then you can use the alternate Dataproducts cable described in subsection A.2.11 with no degradation in performance.

The polarity of the BUFFER CLEAR signal is low true. (This is the opposite from previous versions of Performance servers.) This signal is low true on most printers. You must match the polarity expected by the printer, or else do not include this line in your cable. (Some printers have jumper options to set the polarity of this signal.)

In the cable shown, DATA BIT 8 of the Performance 2500 is connected to the PAPER INSTRUCTION signal of the printer. This is normal for most DEC-type installations. Some printers, however, have jumper-selectable options for the DATA BIT 8 and PAPER INSTRUCTION signals. In addition, some printers use bit 8 to enable printing of graphics. Check with your printer supplier or application software supplier for correct jumper settings and cabling requirements.

The maximum cable length is typically 50 feet with this interface.

This interface does not support the long-line interface. Your printer must have the short-line interface.

Figure A–11 shows the pinouts for the Dataproducts-style parallel printer cable.

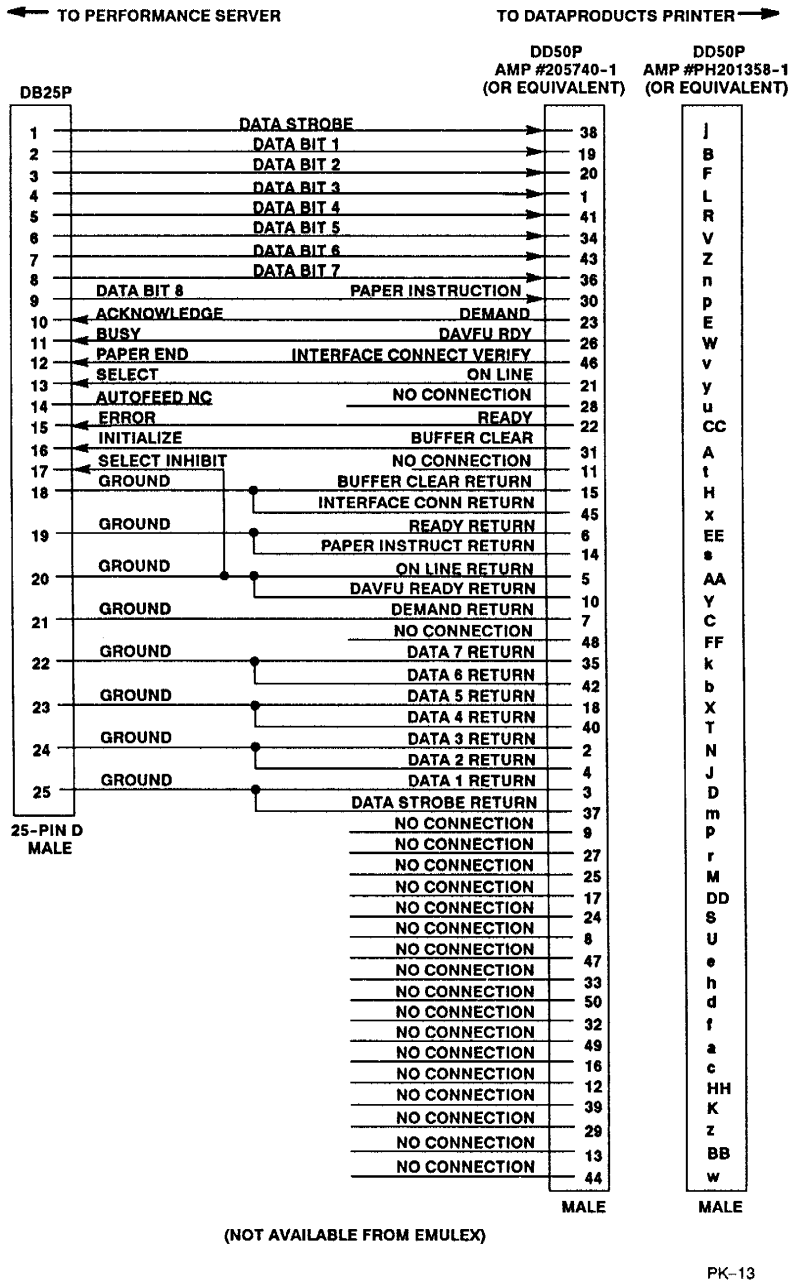


Figure A–11. Parallel Printer Cable – Dataproducts-Style, With DAVFU Options

A.2.11 Parallel Printer Cable – Alternate Dataproducts-style

Function Connects parallel port to Dataproducts-style printer.

Connectors DB25P to 50-pin Dataproducts

Cable Type 25-wire

Notes Buffer Clear is active low true on the Performance 2500. (This is the opposite from previous versions of Performance servers.) The polarity of the BUFFER CLEAR signal is low true on most printers. You must match the polarity of this signal to the printer, or do not include this line in your cable. This cable does not provide the DAVFU vertical formatting options.

Figure A–12 shows the pinouts for the alternate Dataproducts-style parallel printer cable.

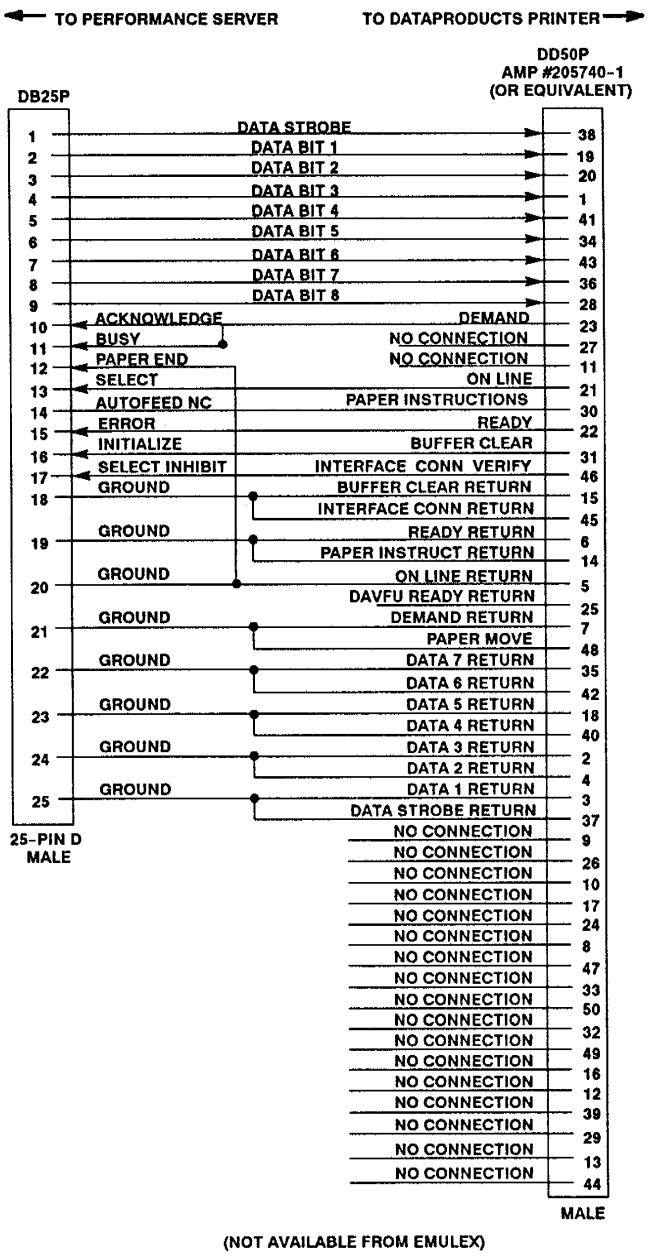


Figure A–12. Parallel Printer Cable – Alternate Dataproducts-Style

A.2.12 Thickwire Ethernet Loopback Connector

Function AUI loopback connector for Ethernet diagnostic testing.

Connectors DB15S

Cable Type Not applicable. Converts to AUI 15-pin Ethernet connector on the server.

Table A–4. Ethernet Port Pin/Signal Assignments

Pin	Signal Name
1	Ground
2	Collision +
3	Transmit +
4	Ground
5	Receive +
6	Power -
7	Not Used
8	Ground
9	Collision -
10	Transmit -
11	Ground
12	Receive -
13	Power +
14	Ground
15	Not Used

Figure A–13 shows the pinouts for the Thickwire Ethernet loopback connector.

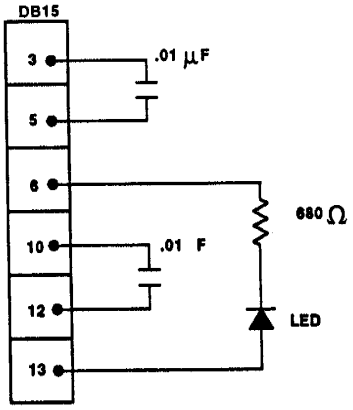


Figure A–13. Thickwire Ethernet Loopback Connector

A.2.13 ThinWire Ethernet Loopback Connector

Function BNC ThinWire loopback connector for ThinWire diagnostic testing.

Connectors Two BNC coaxial 50-Ohm terminators (not available from Emulex); one BNC coaxial "T" adapter (supplied with the Performance 2500).

Cable Type None

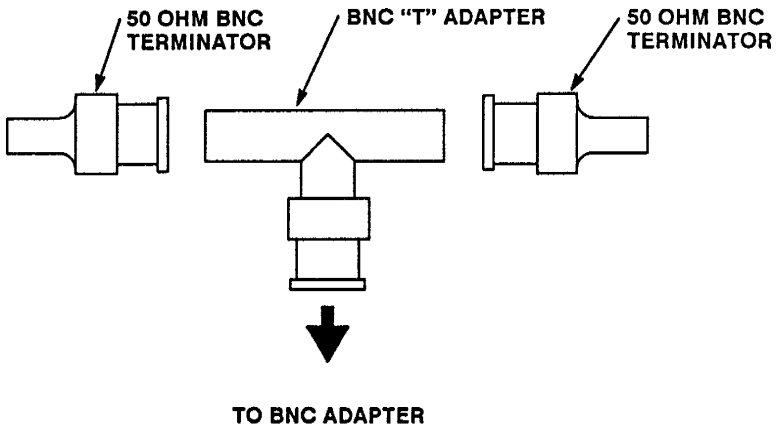


Figure A–14. ThinWire Ethernet Loopback Connector

Appendix B
SPECIFICATIONS

B.1 Overview

This appendix provides specifications for the Performance 2500. Table B-1 contains the server specifications, and Figure B–1 illustrates the server's dimensions.

Table B–1. Performance 2500 Specifications

Parameter	Description
Functionality	Allows up to 8 asynchronous terminals or 4 terminals and 1 parallel printer to connect to an Ethernet network.
Supported Protocols	TCP/IP, LAT
General	
Operating System Compatibility	AT&T System V UNIX, BSD UNIX, VMS, Ultrix, RSX-11M-Plus, MicroRSX, RSTS/E, SCO UNIX, SCO Xenix
Agency Approvals	FCC Class A UL, TUV, VDE, CSA, DOC, FTZ Class A, IEC 950, IEC 389, PTT
Memory Size	1 Megabyte
Processor	80186 9.8304-MHZ, Zero Wait states
Co-Processor	None
Dimensions and Weight	8.25 inches, 11 inches deep, 2.25 inches tall; 5 lbs.
Performance	Aggregate throughput of 14,000 characters/second

(Continued on next page)

Table B–1. Performance 2500 Specifications (Continued)

Parameter	Description
Electrical	
Voltage	90-135 VAC or 180-270 VAC 50 or 60Hz
Power	30 watts maximum (A/C)
Environmental	
Operating Temperature	5 to 43 degrees C (41 to 109 degrees F)
Storage Temperature	-40 to 66 degrees C (-68 to 151 degrees F)
Relative Humidity	10% to 95% noncondensing
LAN Interface	
Ethernet Compatibility	Ethernet Version 2, IEEE 802.3, (Thickwire) External 10base5, 10base2
Connectors	Standard 15-pin DB15 on Performance 2500 External 10Base2 transceiver with DB15 and BNC External 10BaseT transceiver with DB15 and RJ45
Software	
Protocol Software Release Level Minimum	Release 2.1 TCP/IP-LAT
Server Maximums	
Simultaneous Sessions	64
Known Services	750[1]
Known Nodes	750[1]
Local Services	16
Virtual Circuits	64
Queue Entries	64

(Continued on next page)

Table B–1. Performance 2500 Specifications (Continued)

Parameter	Description
Serial Port Interface	
Number	8 or 4
Connectors Full-modem ports Partial-modem ports	 DB25P (25-pin male) RJ12 (6-pin) or MMJ
Supported Data Raters	All standard rates: 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, 19200, 38400 bps
Supported Modem Signals	RJ12/MMJ: TXD, RXD, DTR, DSR, DB25: TXD, RXD, DTR, DSR, CTS, RTS, DCD
Interface	RS-232, V.24, V.28, V.10, X.26
Character Lengths	5, 6, 7, or 8 bits
Stop Bits	1, 1.5, or 2
Parity	ODD, EVEN, MARK, SPACE, or none
Split Speed	All serial ports
Parallel Port Interface	
Max. number of ports	1 on 4-port model only
Printers supported	Centronics or Dataproducts
Printer connector	IBM PC parallel DB25S (25-socket)

[1]These numbers are dynamic. The server maximums on "Services" can be limited, which will allow the remaining memory to go to "Nodes", or vice-versa. This is subject to change on subsequent protocol software release levels.

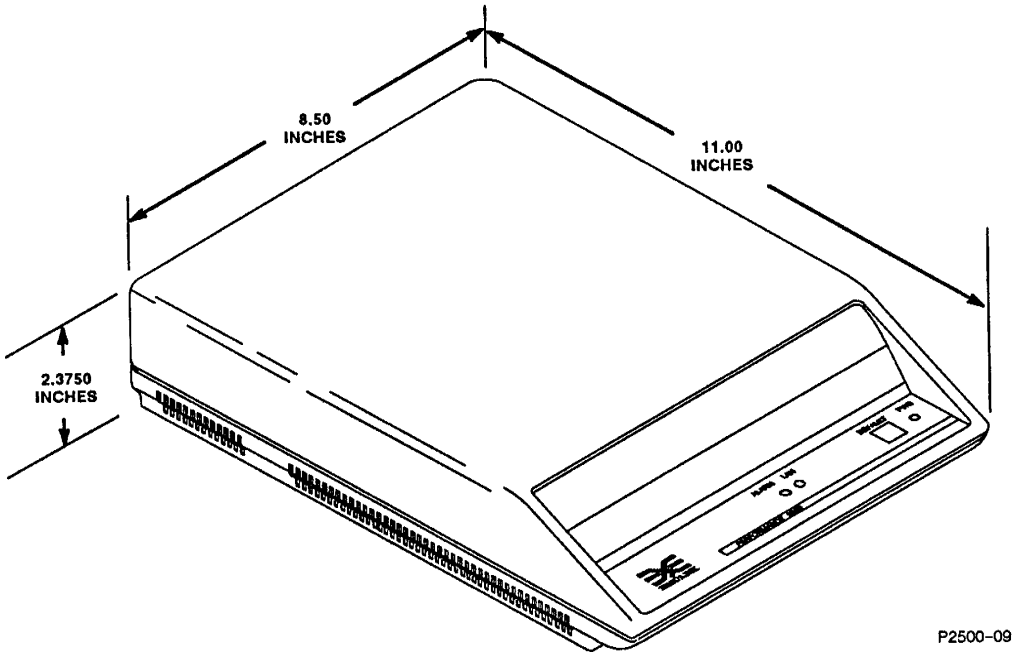


Figure B–1. Performance 2500 Dimensions

Appendix C
SELF-TEST AND LOADER MESSAGES

C.1 Overview

This appendix lists and describes the 900-series messages that may display on the console terminal during the server's power-up self-test and software downloading process. The 900-series error messages relate to server-wide status and errors.

900-series messages are displayed on the terminal attached to the console port as defined by the SET SERVER CONSOLE PORT command. All server messages contain an optional numeric message code and a message. For example:

```
Server -901- Seeking load host for filename
```

If you wish, you can change the word "Server" with the CHANGE SERVER PROMPT command; you may also suppress the numeric code portion of the message with the CHANGE PORT MESSAGE CODES command.

There are several other types of error messages that may display either at a device attached to a server or at the console terminal. These are described in detail in the *Performance™ Series TCP/IP-LAT Protocol and Command Reference.*

C.2 Description of Messages

The 900-series messages are listed below in ascending numerical order. Some of the messages pertain to the power-up self-test while others pertain to the software downloading. The software downloading messages may vary depending on whether DECnet or TFTP software is being loaded, as noted in the error message description.

901 Performance 2500 (NLX.XX) Hardware Address *ethernet_address*

This message is displayed during server initialization.

It indicates that the server is beginning the download process and displays the server's Ethernet address and the revision level of the PerformancePak.

902 Seeking load host for *filename*

Indicates that the server is multicasting a download request for the specified file to all hosts on the network.

903 Loading from host *node__name*

Indicates that the specified node is downloading software to the server. It is followed by a series of dots that shows the progress of the download.

904 Load complete at *hh:mm:ss* on *dd:mm:yyyy*

Indicates that the download was completed successfully. Message 990 normally follows.

905 Starting load, press ESC at any time to enter Boot Config Mode

Indicates that software downloading will proceed by whatever parameters are stored in EAROM. In order to change the loading procedure from the factory default or to override previously stored loading information, press ESC to enter Boot Configuration Mode. Prompts from the Boot Configuration Mode allow you to set software downloading parameters.

910 Ethernet cable possibly open at *xx* ns (*yy* ft thin, *zz* ft thick)

This indicates that the server's TDR test detected a cable break. *xx*, *yy*, and *zz* are values that help to figure out where the break in the cable is. *xx* is the number of nanoseconds of delay to reflect the signal from the cable break. *yy* is the distance of the break from the server for ThinWire cable. *zz* is the distance of the break from the server for Thickwire cable.

911 Port *n* out of service

Indicates that the power-up self-test detected a bad port. The other ports can still be used, but the server should be returned for service as soon as possible. Call Emulex Technical Support for further help.

912 Load host timeout

Indicates that the load host stopped the download for more than 30 seconds. This can indicate a host problem or heavy loading on the host. The server automatically retries the download when this happens.

915 Download error – transmission limit exceeded

Indicates that the download transmission failed ten times. The entire download procedure is restarted. The most likely cause of this error is a hardware failure in (1) the host, (2) a transceiver, (3) the Ethernet cable, or (4) the server.

916 Unexpected data in received software, aborting

Indicates that the download software is corrupted. This can mean that you have out-of-date download software that is not compatible with your server. Make sure your software installation is correct and make sure that no other host has a copy of old software that the server might be mistakenly trying to download.

918 Attempting BOOTP
or
Attempting DECnet compatible load

Indicates which protocol is being tried for downloading operational software, either TFTP (BOOTP) or DECnet.

919 Starting TFTP (image load)

Indicates that a TFTP load is in process.

920 Parameter checksum error, default parameters apply to port *n* at *time/date*

Start-up message. Indicates an internal problem that forced the server to reset a port to its factory default settings. The server should be returned for service as soon as possible. Call Emulex Technical Support for further help.

921 Invalid port type error, default parameters applied to port *n* at *time/date*

922 Non-fatal error detected by self-test, code = *nn*

This message is displayed if the server's power-up self-test detects an error that does not prevent the server from beginning operation. The code at the end of the message is a series of plusses and minuses that indicates which test(s) failed. Wherever a plus (+) appears, the server has passed the test successfully. Wherever a minus appears (-), the test has failed. Results from tests 1 to 5 are displayed from left to right. For example, + + + - + indicates that test 4 has failed and all of the other tests have passed. The name of the test(s) that failed also appears, as listed below. If you receive a 922 message, you should call Emulex Technical Support for further help.

EAROM test failure *(test 1)*

Indicates a problem with the NOVRAM.

Internal interrupt hardware error *(test 2)*

Indicates an internal problem with the microprocessor's interrupt hardware.

Internal DMA controller hardware error *(test 3)*

Indicates an internal problem with the microprocessor's DMA controller.

Async I/O port error, port code = *nn* *(test 4)*

Indicates a problem with one or more of the server's serial ports. The code at the end of the message is a series of 8 plusses, minuses, and periods, which corresponds to the server's serial ports: a plus indicates a port is good, a minus indicates a port is bad, and a period indicates the port does not exist. Note that a bad port does not generally prevent you from bringing the server up and using the remaining ports, if you wish.

LAN error, check cables and transceiver *(test 5)*

Indicates a possible transceiver or cable problem.

930 Server parameters checksum error, default parameters applied at *time/date*

Start-up message. Indicates a hardware problem that forced the server to reset itself to its factory default settings. The server should be returned for service as soon as possible. Call Emulex Technical Support for further help.

931 Permanent configuration parameters reset to factory defaults due to ...

This message is displayed during initialization and indicates that all server option settings are being reset to their factory defaults. There are two possible reasons for this:

...operator request

Indicates that you requested a return to the factory defaults when you initialized the server (by holding down the Next and Last keys on the server front panel). This message is displayed when the reset is started; message 999 is displayed when the reset is finished.

Internal configuration checksum error

Indicates a possible problem with the server's internal nonvolatile memory (EAROM). Try resetting the server to its factory defaults and trying again. If this message appears more than once, call Emulex Technical Support for further help.

940 **Extended features checksum error, default parameters applied at *time/date***

950 **...internal error, aborting load, code = *nn***

Indicates a server hardware error found during initialization. The specific problem is specified by the code at the end of the line.

If this message appears, try resetting the server to its factory defaults (by pressing the Next and Last keys on the front panel as you plug in the server) and reinitializing. If this doesn't work, report the error code to Emulex Technical Support and ask for further help.

951 **No response to load request, will try again in *n* minutes**

This message indicates that the server is retrying the download after an initial failure. After three retries, downloads are requested every five minutes and then every 15 minutes. You can restart the load process yourself at any time by pressing any key on the console port or the server's front panel.

955 **Resetting TCP/IP configuration**

This message is displayed after message 990 if the TCP/IP parameters are being reset (for example, if the server is reset to its factory defaults).

980 **Fatal software error, code = *nnn* at *date/time***

This code indicates a problem with the server's software. If AUTOREINIT is enabled, the server resets itself and reboots. Write down the code number and call Emulex Technical Support for further help.

981 **Non-fatal software warning, code = *nnn* at *date/time***

This code indicates a problem with the server's software. Write down the code number and call Emulex Technical Support for further help.

982 **Software Exception Information code = *xxxxx* at *date/time***

983 **Parallel printer (port 9) Status: *status* at *date/time***

If the PORT LOGGING option is enabled, this message is displayed whenever the status of a parallel printer port changes. The possible statuses are power off, offline, and paper out.

984 **Parallel printer (port 9) Error: *type* at *date/time***

This message is displayed only if the PORT LOGGING option is enabled. It indicates a hardware problem with a parallel printer port. Check to make sure you are using the proper cable and that the port is configured for the correct printer type (Centronics or Dataproducts). If the problem persists, call Emulex Technical Support for help.

990 **Server version *x.x* initializing – please wait at *date/time***

Start-up message. This message is displayed after the download is completed and the server is building its internal configuration tables.

991 **Resetting system configuration**

Start-up message. This message is displayed after message 990 if system parameters are being reset (for example, if the server is reset to its factory defaults).

992 **Resetting port configuration**

Start-up message. This message is displayed after message 990 if any port parameters are being reset.

993 **Server ready for logins**

Start-up message. This message is displayed after all internal configuration is finished and the server is ready for use.

994 **Resetting extended features configuration**

995 **Resetting TCP/IP configuration at *date/time***

This message is displayed after message 990 if the TCP/IP parameters are being reset (for example, if the server is reset to its factory defaults).

997 **Insufficient memory for software loaded (1 megabyte required) CPU halted at *date/time***

998 **Permanent configuration is not compatible with received software. Reset configuration or abort load (R/A)?**

Indicates that your version of the download software is not compatible with the server's nonvolatile memory (EAROM) (namely, its permanent configuration parameters). You are asked if you wish to reset the server and continue anyway, or abort the load. If you answer "R", all server settings are returned to their factory defaults. If you answer "A", the download is halted.

999 **EAROM factory default request by switches at *date/time***

This message is displayed if the server was reset to its factory defaults by pressing the Next and Last switches while powering up. It indicates the reset has been completed (see also message 931).

GLOSSARY

Active session Any connected session. A user can have several active sessions at one time. A list of all active sessions is available via the SHOW SESSIONS command.

See also **session.**

AUI The name given by the IEEE 802.3 standard to the cable (physical interface) between an Ethernet transceiver and a 15-pin Ethernet connector on an Ethernet device (such as the 15-pin connector located on the rear panel of the Performance 2500 servers). AUI stands for Attachment Unit Interface.

Current session The session in which a user is currently engaged. If a user is in local mode, his current session is the one he was most recently in. A user has only one current session at a time.

See also **session.**

DECnet A layered software product sold by Digital Equipment Corporation that controls communication between CPUs on a single Ethernet network. DECnet is also used for other purposes (for example, downloading operational software to terminal servers).

Download The process of transferring the server's operational software from a host CPU to the server's internal memory. The server requests a download every time it is powered up or initialized.

EAROM A type of internal memory that stores data permanently (that is, it is not affected by removing power from the server). EAROM is also called NOVRAM or nonvolatile memory, since data is stored even while power is removed.

EAROM stands for Electrically Alterable Read Only Memory.

See also **RAM.**

ELT The protocol used by the Performance™ Series-TL servers to communicate over the Ethernet with DEC host CPUs and other LAT-compatible servers. ELT stands for Emulex Local Transport. It is compatible with LAT (Local Area Transport), the protocol used by DECservers.

See also **LAT** and **protocol**.

Hardware flow control See **flow control**.

Host CPU on the network. The word is generally interchangeable with CPU, host CPU, host processor, VAX, remote host, etc.

LAT The protocol used by DECservers to communicate with DEC host computers. LAT stands for Local Area Transport. It is compatible with ELT, the protocol used by the Emulex Performance™ Series-TL servers.

See also **ELT** and **protocol**.

LAT service See **service**.

Load host Any host CPU on the local network whose database contains the download software that the server requests when it is powered up. The download software is the server's operational software. The files containing the operational software are supplied by Emulex with the purchase of a Performance™ Series server. A network might have one load host or several (for backup in case one of the load hosts is unavailable).

Local mode The mode your server port is in which allows you to communicate directly with the server and enter server commands. It is indicated by the local mode prompt: `Server>` . Your port is in local mode when you first log in to the server. When you connect to a TCP port or to a LAT-compatible service, your port is in service mode.

See also **service mode**.

Local service See **service**.

See also **AUI**.

Modem An electronic device that allows computers to communicate over telephone lines. The word is derived from the term MOdulator-DEModulator. Modems normally work in pairs, with a telephone circuit or line connecting them.

Each modem has two sections: the modulator and the demodulator.

The modulator section of a local modem converts digital data originating from a local device (computer or terminal) into signals that are suitable for transmission over a telephone line, and sends these signals over the telephone line to a distant modem. The demodulator section in the distant modem reverses this process, converting the signals from the telephone line into digital data and sending this data to the computer or terminal at the far end.

Data originating at the far end is sent from the far end to the local device in a similar manner: first the modulator section of the distant modem converts the data into telephone signals, then the distant modem sends the telephone signals over the telephone line to the local modem, and finally the demodulator in the local modem converts these signals back into digital data and sends this data to the local device.

NCP DEC utility that allows you to monitor and control nodes on an Ethernet Network. NCP stands for Network Control Program.

Node A device directly connected to a network. This includes host CPUs, terminal servers, printer servers, file servers, gateways, etc. It does not include devices such as terminals and printers, which are connected to a server rather than directly to the network.

Nonvolatile memory See **EAROM.**

NOVRAM See **EAROM.**

Protocol A formal description of message formats and the rules for exchanging the messages.

RAM A type of internal memory that stores data temporarily (that is, the data is lost when power is removed from the server). RAM is also called volatile memory, since data is stored only while power is applied. When a SET command is used to modify server parameters, the changes are made to the server's RAM. The changes are erased when the server is initialized (individual port changes are also erased when the port is logged out).

RAM stands for Random Access Memory.

See also **EAROM.**

RCF RCF stands for Remote Console Facility. The Remote Console Facility of the Emulex Performance™ Series-TL servers allows you to log in to a server remotely. The RCF feature lets you control all the servers on your network from a single central terminal.

You can log in remotely to a Performance™ Series-TL server from any LAT-compatible host on your network that has either VMS V4.5 (or later) and DECnet up and running, or Ultrix-32 version 3.0 (or later) up and running. Alternatively, you can log in remotely to a Performance™ Series-TL server from any TCP/IP host on your network that supports the TELNET protocol.

Server port A physical hardware port on the server, having a cable connector on the rear of the server. Connectors are numbered J1, J2, etc. on the rear of the server. Connector J1 is server port 1, J2 is server port 2, etc.

See also **service port.**

Service A service is anything on a network to which users or host CPUs can connect. A host CPU itself, for example, is a service. Likewise, a port on a terminal server or printer server with a printer attached to it is usually defined as a service since host CPUs might want to connect to it.

On terminal servers and printer servers, local services are services offered by the server itself (for example, a printer or modem to which other ports or nodes can connect). A remote service is a service offered by another network node (for example, a host CPU or another Emulex Performance™ Series server).

A LAT service is a service offered by a node that supports the LAT-compatible protocol.

A TCP/IP service is a service offered by a node that supports the TCP/IP protocol. The terms "TCP/IP service" and "TCP port" have the same meaning. ("TCP port" is the abstraction that TCP/IP uses to distinguish among multiple destinations within a given TCP/IP node. A TCP port is an abstract destination point on a TCP/IP node.)

Service mode The mode your server port is in when you are connected to a service. Your port enters this mode from local mode when you issue a CONNECT command. For example, if you connect to a VAX and log in, your port is in service mode.

See also **local mode** and **service.**

Session A connection to a service. On the Performance™ Series-TL servers, each session can be either a LAT-compatible session or a TCP/IP session. A user can have several sessions active at a time, and they can be a mixture of LAT-compatible sessions and TCP/IP sessions. The number of sessions per port is configurable.

TCP port See **service.**

TCP/IP The protocol used by the Performance™ Series-TL servers to communicate (via the Ethernet) with other devices that also support the TCP/IP protocol, such as host CPUs and other servers. TCP/IP stands for Transmission Control Protocol/Internet Protocol. These two protocols, TCP and IP, are part of a collection of protocols called the Internet protocol suite. The Internet protocol suite is frequently referred to as TCP/IP because TCP and IP are its two most fundamental protocols.

See also **protocol.**

TCP/IP service See **service.**

TELNET A TCP/IP remote terminal access protocol supported by the Performance™ Series-TL servers. TELNET is the Internet standard protocol for remote terminal connection service. TELNET allows a terminal user at one site to interact with a remote computer system at another site as if the user's terminal were connected directly to the remote computer. In the Internet layering model, TELNET is an application layer protocol.

See also **protocol.**

Virtual circuit A logical connection between the server and a remote node. A single virtual circuit carries data for all sessions between the server and the remote node. Thus a virtual circuit exists between the server and a node only if there is at least one user connected to the node.

Volatile memory See **RAM.**

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