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The revision date for this manual is July 13, 1994.

Part Number: 900-036

WARNING

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

Operation of this equipment in a residential area is likely to cause interference in which case the user, at his or her own expense, will be required to take whatever measures may be required to correct the interference.

Warning: Changes or modifications to this device not explicitly approved by Lantronix will void the user's authority to operate this device.

Cet appareil doit se soumettre avec la section 15 des statuts et règlements de FCC. Le fonctionnement est subjecté aux conditions suivantes:

(1) Cet appareil ne doit pas causer une interférence malfaisante.
(2) Cet appareil doît accepter n'importé quelle interférence reìue qui peut causer une opération indésirable.

ETS/EPS Installation Guide

For Lantronix Models
ETS8, ETS16, EPS4, and EPS12

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1 Introduction

About This Manual

This manual explains how to install, configure, and use the Lantronix Ethernet Terminal Server (ETS) and Ethernet Print Server (EPS.) The appendices contain information about pinouts, the Boot Configuration program, and downloading software from Lantronix.

NOTE *Throughout this manual, the terms **ETS** and **Server** refer to the ETS8/16 and EPS4/12 units unless otherwise noted.*

- The remainder of this chapter is an introduction to the ETS functionality.
- Chapter 2 explains hardware installation and software downloading.
- Chapter 3 shows how to configure the ETS for normal operation. It covers both network protocol setup and port setup for logins and modems.
- Chapter 4 is a short introduction to login sessions for the ETS.
- Chapter 5 shows basic setups needed to print to the ETS products from the various supported host types.
- Appendices are provided for troubleshooting, cable pinouts, environmental and cabling restrictions, and details on downloading new software from the Lantronix development systems.

What are the ETS and EPS?

The Ethernet Terminal Server (ETS) is a device that can connect computing equipment such as personal computers, terminals, modems, or printers to an Ethernet network. The ETS supports a serial device on each of its ports and the Ethernet simultaneously. It is configurable and can offer its attached devices as services to the network, and conversely, can provide connections to other devices on the network.

The Ethernet Printer Server (EPS) provides the same functionality as the ETS with the addition of one parallel port for connections to a Centronics or Dataproducts-compatible printer.

Protocols

The ETS supports five major protocols:

- AppleTalk (EtherTalk)
- LAT
- LAN Manager
- Netware
- TCP/IP

The ETS can use and interpret all 5 protocols at once, and can queue print requests from hosts using any of the protocols simultaneously. The ETS also allows connections to network hosts via LAT and TCP/IP.

ETS Configuration

There are several ways to configure the ETS settings:

- ♦ Using the ETS command line via a terminal attached to a serial port.
- ♦ Logging into the ETS over the network, via AppleTalk, NetWare, Telnet/Rlogin, or TSM/NCP/LAT. Logins via AppleTalk and NetWare require the included MACCON (AppleTalk) and EPSCON (Netware) utility programs.
- ♦ BOOTP replies from a TCP/IP network host. The IP address, load host, and download filename are definable this way.
- ♦ RARP replies from a TCP/IP host. The IP address is definable this way.
- ♦ A configuration file, downloaded from a TCP/IP, LAT, or NetWare host at boot time, containing ETS commands.

ETS Software

Flash-based ETS units store their executable code in Flash (rewritable) ROMs; software does not need to be downloaded from a host at boot time. Host software downloading is necessary only when booting a non-flash server, or when updating the code in the Flash ROMs with a new version of the software.

NOTE *For more information, refer to Chapter 3, **Flash ROM Units**, and Chapter 4, **Download Units**.*

2 Hardware Installation

Introduction

This chapter contains information the system manager needs to install the ETS hardware.

The ETS was designed to be installed with a minimum of effort. The use of universal connectors on the serial lines makes wiring and connection simple; the Ethernet AUI connector allows the use of 10BASE5 (thickwire), 10BASE2 (thinwire), 10BASEFL (FOIRL fiber) or 10BASET media via external transceivers. See Appendix F for more information on the serial cables necessary for connecting devices to the ETS.

Installation

Figure 2-1 shows a sample hardware layout. It shows an ETS and two hosts on a segment of network cable. Your installation may be more or less complex than this, but the basic steps involved will still be the same. The idea is that the server is an interface between the network and local users.

Figure 2-1: Sample ETS Layout

The following sections detail the hardware installation.

Unpack the ETS

Check to make sure everything listed on the Packing List is present. Inspect the ETS for any external damage. If any part is missing or appears damaged, contact your dealer.

If the ETS is not equipped with Flash ROM, a software media kit is required. If the software was ordered, verify that the media kit is included in the package.

Select a location for the ETS

The server's position should be close to the terminals/printers it will be servicing, but out of the way of everyday activity. Since powering down the unit will terminate any active sessions, it may be desirable to place the server in a location secure from user access. Also, be aware of its environmental operating limits and cabling limits, described in Appendix F.

Connect to the Ethernet

Depending on the type of cable you have to connect to the AUI port on the ETS, you may need a transceiver (or **MAU**, Medium Attachment Unit) to connect the ETS to the Ethernet backbone. If you have thinwire (10BASE2) cable, you can use an LTX-2 thinwire to AUI adapter. The LTX-T will convert the AUI signals for use with 10BASE-T media. The LTX-5 will convert AUI signals for use with 10BASE5 media; you can also use an AUI cable to connect the ETS to the MAU.

Determine the type of Ethernet to be used, and complete the corresponding instructions (discussed on the following page.) An AUI cable can be used between a transceiver and the ETS if the server is to be located some distance from the Ethernet cable.

♦ Thinwire Ethernet	Install an LTX-2 transceiver (or equivalent) on your server. The LTX-2 connects between the AUI port and a BNC "T" connector on the network segment. You will have two ends of cable to connect to the "T" of the T-connector. If you are connecting the LTX-2 to the very end of the network cable, you will have one end of cable to connect to one of the T-connector's sockets and you must put a 50 terminator on the other end.

NOTE *Cable **cannot** be used between the transceiver and the "T" connector. The transceiver **must** be connected directly to a T-connector, and either the ETS or an AUI cable must be connected to the transceiver.*

♦ Thickwire installations	Use a transceiver (AUI) cable to connect the ETS' AUI port to the LTX-5 transceiver and the thickwire tap.
♦ 10BASE-T media	Install an LTX-T on the ETS. Then connect the LTX-T MAU to the 10BASE-T hub with a UTP cable.

To lock the MAU (if used) onto the ETS, slide the MAU onto the server's AUI port and then lock it into place by pushing the AUI port's sliding lock toward the power connector. Be certain the MAU or any other cables are securely locked onto the server. If the Ethernet cable becomes detached during normal operation, the server may have to be reset for normal operation to resume.

CAUTION *Care should be used when attaching devices to the network, as breaks in Ethernet communications can cause system crashes. If a tap ("T" style connector, transceiver, or repeater) is already present, connecting the ETS should have no effect on the network.*

Connect the Console Terminal

The ETS designates one of its ports as a “console” where diagnostic messages and initial configuration messages are sent. The console device must initially be connected to Port 1, but this can be changed after the server is booted.

The server’s ports are initially configured for 9600 baud, 8 bit characters, no parity. The console device also must be set to operate this way. If it is not, it will not be usable, so ensure that the console device is set up properly.

Printers and terminal devices frequently do not come with RJ connectors on their cables, so adapters may be needed to attach them to the server. See Appendix C for a description of the universal connector pinouts.

Provide Power and Turn on the Server

Attach the power cable to the ETS and plug it in to a wall outlet. At this point, there is power to the server, so please use appropriate care when handling the unit. Press the power switch located on the front of the unit.

Check to see if the LEDs on the front of the server light. If not, power down the server, check the power supply and connections, and try turning the server on again. If it still does not power up, check the fuse in the back of the server.

Power-up Diagnostics

In order to successfully complete power-up diagnostics, the AUI port must be connected in one of the following ways:

- Connected to a properly terminated transceiver
- Connected to an AUI cable connected to a thickwire tap
- Not connect to anything
- At power-up time, the terminal server does not care if there are any devices connected to the serial ports However, if any errors are detected, it will report the problem to the console device connected to port 1.

Where to Go From Here

Hardware installation is now complete.

- ♦ If your ETS is a Flash ROM unit (flash-based ETS8/16 and EPS4/12 models), software will not need to be downloaded when the unit is booted; no software installation is necessary. Continue to Chapter 3, *Flash ROM Units*.

NOTE *If RTEL functionality is desired on TCP/IP hosts, the RTEL software will have to be installed.*

- ♦ If your unit does not have Flash ROM, software will need to be downloaded when the unit is booted. Continue to Chapter 4, *Download Units*.

3 Flash ROM Units

Introduction

This chapter contains instructions for booting ETS units equipped with Flash ROM (models ETS8F/16F and EPS4F/12F.) In these models, the server stores its code and "downloads" from Flash ROM; no network assistance is necessary. Downloading from the network is only necessary if the stored flash code needs to be upgraded. See Appendix D for the procedure for doing this.

NOTE *If your unit is not equipped with Flash ROM, you will need to load the ETS software . Refer to Chapter 4, **Download Units**, for instructions.*

Diagnostic and Startup Messages

When the server is powered on, it will execute its Power-Up Test procedure. The 4 LEDs should light in various sequences, and messages are printed to the console device. This process takes approximately 10 seconds. If the messages appear garbled or nonsense characters appear on the console, check the terminal device's setup and restart the server by cycling its power. The console must initially be set to 9600 baud, 8 bit characters and no parity. If the message that appears indicates an error, note the error message and try restarting the server. If the failure persists, contact your dealer.

NOTE *The server will not pass its startup diagnostics if the MAU is attached to the ETS but not connected properly to the network. If you suspect a problem with your connection to the network, you can remove the MAU completely and restart the server. It should pass startup diagnostics.*

NOTE *Pressing the* **<***Return***>** *key on the console port while the server is booting will put the server in boot mode. It will then enter the Boot Configuration Program, (BCP) and accept input from the console.*

When the unit has booted, the following text will be displayed:

```
Flash ROM Version 2.2 (June 10, 1993)
Ethernet Address: 00-80-a3-03-16-c6  Internet Address 192.73.220.

Flash Version: V3.2/1 (940601)

Skipping BOOTP.
Skipping RARP.
Checking 5 sections from flash:
    From address 0x20004 to 0x100000, 1704 bytes) ->
    From address 0x206c0 to 0x100a54, 72 bytes) ->
    From address 0x2071c to 0x180000, 82424 bytes) -> ++++
    From address 0x34928 to 0x140000, 77956 bytes) -> ++++++++
    From address 0x60060 to 0x19cd38, 53855 bytes) -> ++
Loaded 46864 bytes.

%% Lantronix EPS-12
%% Ethernet Address: 00-80-a3-03-16-c6 Internet Address 192.73.22
```

Figure 3-1: Flash ROM Boot Sequence

NOTE *The server sends out BOOTP and RARP queries before it boots; for information about these queries, see the ETS/EPS Reference Manual.*

The server is up and running. Proceed to Chapter 5, *System Administration Logins*.

4 Download Units

Introduction

This chapter is for ETS units without Flash ROM; it contains information the system manager needs to load the software for the ETS. Please be sure you have read through and understand the entire software installation procedure before you start it.

NOTE *If your ETS is a Flash-based ETS8/16 or EPS 4/12 model, software does not need to be installed unless you wish to use the RTEL functionality. Proceed to Chapter 5,* ***System Administration Logins.***

Host Software Installation

NOTE *The ETS software distribution requires approximately five megabytes of disk space; you will need at least this much space to load the software. After the software installation is complete, extra files can be deleted to reclaim disk space.*

When the ETS powers up, it will attempt to download its executable file from a network host. The server will only attempt to load code if it has enough information to request the file. There are three cases illustrated in this chapter:

- ETS software will be loaded from a VMS host via MOP
- ETS software will be loaded from a TCP/IP host via TFTP
- ETS software will be loaded from a NetWare file server

Installation for all 3 protocols involves installing the software on a host computer, and then telling the ETS how to access it.

Needed information is as follows:

♦ MOP load hosts	Load file name
♦ TCP/IP load hosts	Load file name and IP addresses for server and network host (these must be sent or the information must be discovered using the BOOTP or RARP protocols)
♦ Netware load hosts	File server and path

Contents of the software distribution

The following files are provided as part of the software distribution:

- ETS.SYS - ETS8/16
- EPS.SYS - EPS4/12
- TSCODE.SYS - 512 Kbytes memory ETS8/16
- PSCODE.SYS - 512 Kbytes memory EPS4
- RTEL_SRC.TAR (on Unix media, this will be a source tree)
- RELEASE.NOT
- ETS$CONFIGD.C (VMS download file handler program)
- ETS$STARTUP.COM (VMS config daemon startup command procedure)
- ETSF.SYS - ETS8/16
- EPSF.SYS EPS4/12
- TSCODEF.SYS - ETS8/16
- PSCODEF.SYS EPS4

NOTE *The files in the software distribution are binary (not ASCII text) so they need to be handled carefully if FTP or Kermit are used to transfer them. Both FTP and Kermit provide a binary mode option which MUST be enabled, or file corruption will result.*

ETS8's with 320 kbytes of memory (serial numbers below 3000) require the download file TSCODE8.SYS. This file is no longer shipped as part of the normal distribution. Contact Lantronix technical support if an older version of this software is needed.

NOTE *The servers will automatically request the correct download file, however, the pathname to the file (if applicable) must be specified. The default filename is in all capital letters; be sure that the filename specified in the pathname is also in all capital letters.*

The RTEL source code is included as a single tar archive file (RTEL_SRC.TAR) on non-Unix distribution media. On Unix distribution media, the RTEL software is restored when loading the media onto the Unix machine. If the RTEL_SRC.TAR file is moved with FTP, remember to set the file transfer type to **binary**. Otherwise, the files will be corrupted by the transfer.

The *F.SYS executables are identical to the *.SYS files with one important difference. They will **require** that a startup file be available via TFTP at boot time, even the first time they boot. If a loadhost hasn't been specified (i.e. the server was MOP downloaded) the startup file will not be loaded, and the server will not finish booting.

These executables are intended for sites where is it desirable that the server not be allowed to boot unless a specific startup file resides on the TFTP loadhost. See the ETS/EPS Reference Manual for more information.

VMS Hosts

Follow these instructions for VMS hosts. The following instructions apply to VMS Version 5.0 and higher.

The distribution software for the ETS will arrive on a TK50 tape cartridge or 9-track tape. The software is installed using the VMSINSTAL procedure. When the installation is completed, the download files will be on your system in the SYS$SYSROOT:[MOM$SYSTEM] directory:

Pre-installation

The VMS host must be set up to answer MOP requests. Before beginning this procedure, make sure DECnet has been installed and is running on the system. Refer to the appropriate DEC documentation for installation instructions.

NOTE *In the examples below, we will use QNA-0 as the host Ethernet controller's device name. Your device name may be different. Use the NCP command **Show Known Circuits** to find actual device names. See the NCP documentation for details.*

The necessary commands are as follows:

```
$ RUN SYS$SYSTEM:NCP
NCP> SHOW CIRCUIT QNA-0 CHARACTERISTIC
NCP> SET CIRCUIT QNA-0 STATE OFF
NCP> SET CIRCUIT QNA-0 SERVICE ENABLE
NCP> SET CIRCUIT QNA-0 STATE ON
NCP> DEFINE CIRCUIT QNA-0 SERVICE ENABLE
NCP> SHOW CIRCUIT QNA-0 CHARACTERISTIC
NCP> EXIT
```

Figure 4-2: Configuring VMS Host

♦ Show Circuit Characteristic	Shows the current state of the Ethernet circuit. If **Service** is already enabled, the circuit is ready to download servers and no further NCP configuration is needed - skip down to the exit command.
♦ Set Circuit State Off	Sets the circuit state off so that circuit characteristics can be changed. Note that if any users are using the network, their sessions will be aborted. Use the **Show Known Links** command to show current network users.
♦ Set Circuit Service Enable	Allows the circuit QNA-0 to respond to download requests.
♦ Set Circuit State On	Restarts the Ethernet circuit QNA-0.
♦ Define Circuit Service Enable	Defines the circuit QNA-0 with service enabled in the permanent network database.
♦ Show Circuit Characteristic	Displays the circuit characteristics for circuit QNA-0. Verify that service is enabled.

Software Installation

Load the tape in the tape drive and execute VMSINSTAL (you must have SYSTEM privileges). Refer to the VMS manuals for more instructions or type a question mark when you are prompted for information.

The process should look similar to Figure 4-3 and Figure 4-4.

```
$ @SYS$UPDATE:VMSINSTAL

(welcome information, DECnet questions, backup options,
etc.)

* Where will the distribution volumes be mounted:

> MUAO: (name of tape drive)

Enter the products to be processed from the
distribution set:

> TSCODE
```

Figure 4-3: VMSINSTAL Commands

There will be a brief pause while the tape is read. Note that the installation procedure will also install the download file for the EPS as well as the ETS files.

```
The following products will be processed:
TSCODE Vn.n
Beginning installation of ETS Vn.n at (time)
```

Figure 4-4: Installation of Software

After a few more minutes, VMS will report that it has finished the installation of the software.

At this point, exit VMSINSTAL. Type **<CTRL-Z>** at any prompt and unload the distribution tape.

The installation procedure has loaded the software files from tape into the SYS$SYSROOT:[MOM$SYSTEM] directory. (Any other download files for other products will also be there.) This directory now needs to be added to the search list for download requests. The system logical MOM$–LOAD points to the directories to be searched for requested download files. If this logical is not set correctly, any load attempts will fail. To correct this problem, verify (and insert if necessary) the following line in your site startup file [Figure 4-5]:

```
$ DEF/SYSTEM/EXEC/NOLOG MOM$LOAD -
                            SYS$SYSROOT:[MOM$SYSTEM]
```

Figure 4-5: Setting System Logical

If this line already exists in a startup file, simply add the server directory, separated by commas, to the search list already there. Note that for VMS versions 5.2 and greater, this is done automatically.

If the host system will not be rebooted at this time, execute the DEFINE command shown in Figure 4-5 interactively to immediately change MOM$LOAD.

At this point, the host VMS installation is complete. When the ETS attempts to boot, it will broadcast a request for this file and the host should download the file to the server.

Power on the ETS, or, if it was still running, type the following [Figure 4-6]:

```
Boot> INIT 451
```

Figure 4-6: Initializing Server

The **Init** command will reboot the server and enable it to request the software file. If it cannot access the file for some reason, you will see a message on the server's console device. If this happens, check the file's protection and location on the host to ensure it was installed properly.

The server will continue trying to download until it is successfully loaded or the boot cycle is stopped. While in boot mode, the ETS cannot be fully configured, as the server has not downloaded operational software.

NOTE *Pressing the* <*Return*> *key on the console port while the server is waiting between retry attempts will put it in boot mode. It will then enter the Boot Configuration Program, (BCP) and accept input from the console.*

Figure 4-7, page 4-9 displays a sample MOP boot sequence.

```
Lantronix ETS8
Boot Rom Version 2.2 (June 10, 1993)
Ethernet Address: 00-80-a3-02-00-03   Internet Address (undefine

Request BOOTP: no valid reply received.
Request RARP:  no valid reply received.

Attempting MOP boot:  File <ETS.SYS>
     Downloading from aa-00-04-00-64-1c

     .text  @00100000  (2644   bytes): .
     .vers  @00100a54  (72     bytes):
     .excess @00180000 (78492  bytes): .......................
     .data  @0019329c  (84640  bytes): .......................
     .code  @00140000  (259236 bytes): .......................
     %Loader: Entry point: 0x100000
Loaded image from host aa-00-04-00-64-1c (425084 bytes)

Load completed - Boot in Progress


%%
%% Ethernet Address: 00-80-a3-02-00-03 Internet Address (undefin



Version V3.1/2 (940207)

Type HELP at the 'Local_1> ' prompt for assistance.

Username>
```

Figure 4-7: Sample MOP Boot Sequence

Proceed to Chapter 6, *Configuration*.

TCP/IP Hosts

Follow these instructions if your host uses the TCP/IP protocol. The Trivial File Transfer Protocol (TFTP) is used for downloading the software to the server.

To download using TFTP, the server must be configured with its own IP address as well as which machine to query for its software. This can be done automatically if the load host supports the BOOTP or RARP protocols and can be configured to use them.

The installation is divided into three parts:

- ♦ Loading the software onto the UNIX system
- ♦ Configuring the host for downloading
- ♦ ETS configuration and downloading

The server software file will generally come on one of the following media: a TK50 tape cassette, Sun or HP-compatible 1/4” cartridge tape, 9-track (1600 bpi) reel tape, or floppy diskettes (3.5” or 5.25”).

NOTE *If the wrong media format was included, please contact your dealer.*

If you received DOS-style floppy diskettes, you will need to copy the contents of the diskettes onto the loadhost machine. Ensure that the copy is done in binary mode or the *.SYS files will be corrupted.

Loading the Software onto the UNIX System

Log into the host machine as the super-user. Create the directory **/tmp/rtel** and set your default to this directory using the command **cd /tmp/rtel**. Approximately 5 MB of disk space is required for the distribution; use the **df** command to ensure this space is available. The distribution can actually be loaded anywhere there is sufficient disk space. The install procedure will move files into the appropriate directories.

Mount the distribution tape on the tape drive and read the software file from the tape using the **tar** utility. For example, if **/dev/rmt0** is the special device name for the tape drive, the command would be as follows:

```
# cd /tmp/rtel
# tar xvf /dev/rmt0
```

Figure 4-8: Reading File From Tape

In Figure 4-8, the pound (#) sign is the system's prompt.

NOTE *On some machines, the **dd** command will have to be used to load the TAR tape properly. (i.e. dd if=/dev/rmt0 conv=swab | tar xvf -) Refer to your system's documentation for more information regarding **dd**. (Some Silicon Graphics systems need to use **dd** to read the tape.)*

When the file has been read from the tape, the server load files (ETS.SYS, EPS.SYS, PS1.SYS, TSCODE.SYS, PSCODE.SYS and all of the *F.SYS versions) will be on the system. There should also be a source directory for the RTEL software, as well as a README file and two shell scripts, **lpinstall** and **uninstall**.

List the contents of the current directory and be certain the load files are present and the files' sizes are in the range from 400 to 500 Kbytes (800 to 1000 blocks on most machines). In addition to the load file, the directory should contain other files for the Reverse Telnet package. The names of the load files are in uppercase letters.

NOTE *Once the load files have been moved into the TFTP download directory, all the files in the **/tmp/rtel** directory can be deleted. If you do not plan to install Reverse Telnet on the host, delete these (non .SYS) files. Unneeded load files can also be deleted.*

Configuring the Host for Downloading

The first two steps below apply whether you are using BOOTP or interactive setup for the ETS.

The ETS attempts to load its software using TFTP; TFTP must be installed and enabled on the loadhost. See the host's documentation (*man* entries for **tftp** and **tftpd**, for example) for this information. Some systems require modifying the TFTP setup in one or more system startup files (**/etc/services, /etc/inetd.conf,** or **/etc/rc**) to enable TFTP service. Some implementations of TFTP also have a default directory that is searched for requested files. This is where the file from the distribution tape must be placed if the system cannot specify other search directories. This directory must have world (other) read privileges enabled.

If the loadhost does not provide a default directory for TFTP, the full pathname of the file must be specified on the ETS (see *Server Configuration and Downloading*, on page 4-14.) The pathname, without filename, cannot exceed 15 characters in length. Case is important; the file and path will be requested exactly as typed.

NOTE *A path should not be provided on the ETS for hosts that provide a default directory.*

Move the server's load file from the /tmp/rtel directory to the directory where the ETS will expect it. In the example shown in Figure 4-9, the directory **/tftpboot** is used.

```
# mv /tmp/rtel/ETS.SYS /tftpboot
# chmod 444 /tftpboot/ETS.SYS
```

Figure 4-9: Moving Load File

NOTE *ETS.SYS applies to the ETS8/16 units. Use EPS.SYS for the EPS4/12.*

The server will attempt to use BOOTP to configure its IP parameters when it is booted. The BOOTP protocol allows the ETS to broadcast a message on the network asking for configuration information. If a network host has been configured as a BOOTP server, it will provide the ETS with its own IP address (as a loadhost), the IP address for the ETS, and the name of the download file to request. The server can then attempt a TFTP load without having to be configured interactively.

NOTE *The sending of BOOTP and RARP queries at boot time can be disabled with the **Define Server** (BOOTP, RARP) **Disabled** commands. See the ETS/EPS Reference Manual for more information about this command.*

See the host documentation or man pages for information on setting up BOOTP. The process generally involves setting up a configuration file (**/usr/etc/bootptab**, for example) with the terminal server's hardware address, an IP address to give to the server, and a download file and pathname. For example [Figure 4-10, page 4-14]:

```
#Note that #'s are typically comment characters.
#host ht hardware address IP address bootfile
ets1 1 00:80:a3:00:55:88 192.0.1.240 ETS.SYS
```

Figure 4-10: Setting Up Configuration File

The software file and path names must contain less than 11 characters of filename (without the .SYS extension) and 15 characters of path information. The host will generally not answer a BOOTP query if it cannot find or read the bootfile specified.

Some operating systems or hosts do not support the BOOTP process; in addition, some network managers may not wish to enable it. The server can always be configured using a terminal attached to the serial port.

Server Configuration and Downloading

If BOOTP was not used to configure the server, the ETS must be told its own IP address, the name of the file to request, and which host to request it from. This is done from the terminal attached to the ETS' console port (while in boot mode). The commands are as follows [Figure 4-11]:

```
Boot> SET SERVER SOFTWARE /tftpboot/ETS.SYS
Boot> SET SERVER IPADDRESS ip_address
Boot> SET SERVER LOADHOST ip_address
Boot> SHOW SERVER
Boot> INIT 451
```

Figure 4-11: Specifying Download Information

An explanation of each of the commands is given on the following page.

♦ Set Server Software **file_name**	Specifies a download file. **file_name** is the name of the file that came from the tape.
♦ Set Server IPaddress **ip_address**	Sets the IP address of the server. **ip_address** is the network address of this ETS in numeric w.x.y.z format.
♦ Set Server Loadhost **ip_address**	Sets the IP address of the host to load from. **ip_address** is the network address of the download host.
♦ Show Server	Verifies the commands typed. The server will display its configuration. Check the path name and the case of the boot file name. Commands can be reissued to change parameters that are not correct. Show Server can then be used again to double-check the commands.
♦ Init 451	Reboots the server and enables it to download its software.

If there is a problem loading the boot file, a message will be printed on the console terminal. Depending on the severity of the problem, the ETS will either wait a short period of time and then re-attempt the load, or return the **Boot>** prompt. (For more information about the Boot Configuration Program, refer to Appendix D.)

The server will continue trying to download until it is successfully loaded or the boot cycle is stopped. While in boot mode, the ETS cannot be fully configured, as the server has not downloaded operational software.

NOTE *Pressing the* <Return> *key on the console port while the server is waiting between retry attempts will put it in boot mode. It will then enter the Boot Configuration Program, (BCP) and accept input from the console .*

Figure 4-12, page 4-17 displays a sample TFTP boot sequence.

```
Lantronix ETS8
Boot Rom Version 2.2 (June 10, 1993)
Ethernet Address: 00-80-a3-02-00-03  Internet Address 192.0.1.240

Request BOOTP: no valid reply received.
Request RARP:  no valid reply received.

Attempting TFTP boot:
    Host  192.0.1.12 File:  </tftpboot/ETS.SYS
    Downloading from 00-00-6b-81-38-c6


    .text    @000100000 (2644 bytes) : .
    .vers    @00100a54  (72   bytes) :
    .excess  @00180000  (119440 bytes) : .........................
    .data    @0019d290  (87716 bytes): .........................
    .code    @00140000  (257764 bytes): ........................
    %Loader: Entry point: 0x100000
Loaded image 192.0.1.12:/tftpboot/ETS.SYS (467636 bytes)

Load Completed - Boot in Progress

%%
%% Ethernet Address: 00-80-a3-02-00-03 Internet Address: 192.0.1.24


Version V3.2/1 (940601)

Type HELP at the 'Local_1> ' prompt for assistance.

Username>
```

Figure 4-12: Sample TFTP Boot

NOTE *If the ETS cannot load the boot file, refer to TFTP Troubleshooting Tips in Appendix B.*

NOTE *If you wish to configure and use the Reverse Telnet software, refer to TCP/IP Hosts on page 4-10.*

Proceed to Chapter 5, *Configuration*.

NetWare Hosts

Follow these instructions if you have a NetWare fileserver. The following instructions apply to NetWare versions 2.2, 3.1x, and 4.x.

The installation is divided into three parts:

- ♦ Pre-installation
- ♦ Software distribution and installation
- ♦ Server configuration and downloading

Pre-installation

The ETS, when it boots, will attempt to read its download file from the fileserver. Since it does not have a username and password, however, the download files must be in the login directory (generally SYS:\LOGIN). There is a 15-character limit on the path name (11-character limit for the filename) \on the ETS, so the drive name and login directory must fit in that limit. Finally, each download file is roughly 500Kbytes long, so ensure you have enough space on the fileserver for the necessary files.

Software Distribution and Installation

The distribution software for the ETS will arrive on a set of 3.5" or 5.25" floppy diskettes. These disks contain the download files (ETS.SYS, EPS.SYS, PS1.SYS) along with an RTEL archive, EPSCON utility, and the release notes. Copy the appropriate download files onto your fileserver [Figure 4-13]. The EPSCON and QINST utilities should also be copied to the hard drive.

```
F:> COPY A:ETS.SYS SYS:\LOGIN
F:> COPY A:EPSCON.EXE F:\PUBLIC
F:> COPY A:QINST.EXE F:\PUBLIC
```

Figure 4-13: Copying Download Files

Server Configuration and Downloading

The terminal server must be configured with the fileserver to use and the name and path of the download file. This is done from the terminal attached to the ETS′ console port. Issue the following commands on the console port [Figure 4-14].

```
Boot> SET SERVER NETWSERVER RFS4_M2
Boot> SET SERVER SOFTWARE SYS:\LOGIN\ETS.SYS
Boot> SHOW SERVER
Boot> INIT 451
```

Figure 4-14: Pathname of Download File

♦ Set Server Netwserver **fileserver**	Specifies a Netware fileserver from which to load the download file
♦ Set Server Software **volume:\path\filename**	Specifies the name and path of the download file. Path and filenames are not case-sensitive.
♦ Show Server	Displays the server configuration. Check the fileserver name and the path name of the boot file. Commands can be reissued to change parameters that are not correct.
♦ Init 451	Reboots the server and enables it to download its software.

The server will continue trying to download until it is successfully loaded or the boot cycle is stopped. While in boot mode, the ETS cannot be fully configured, as the server has not downloaded operational software.

NOTE *Pressing the* **<***Return***>** *key on the console port while the server is waiting between retry attempts will put it in boot mode. It will then enter the Boot Configuration Program, (BCP) and accept input from the console .*

Figure 4-15 displays a sample NetWare boot sequence.


```
Lantronix ETS8
Boot Rom Version 2.2 (June 10, 1993)
Ethernet Address: 00-80-a3-02-00-03  Internet Address: 192.73.220

Request BOOTP: no valid reply received.
Request RARP: no valid reply received.

Attempting NetWare boot: file server RFS4_M2 found.
     Loading file sys: \login\ETS.SYS: downloading from node
                                                   00-00-c0-cd-5

     .text     @00100000 (2644   bytes):  .
     .vers     @00100a54 (72     bytes):
     .excess   @00180000 (78492  bytes):  ....................
     .data     @0019329c (84640  bytes):  ......................
     .code     @00140000 (259236 bytes):  .......................
     %Loader:  Entry point: 0x100000


Load Completed - Boot in Progress


%%
%% Ethernet Address: 00-80-a3-02-00-03 Internet Address 192.73.22

 Version V3.2/1 (940601)

 Type HELP at the 'Local_1> ' prompt for assistance.

 Username>
```

Figure 4-15: Sample NetWare Boot

NOTE *If the ETS displayed an error message while booting, or the* ***Boot>*** *prompt is displayed on the console terminal, refer to Appendix B, Troubleshooting.*

Proceed to Chapter 5, *Configuration*.

5 System Administration Logins

Introduction

The ETS enables a system manager to log into and configure the unit. Configuration can be done using a terminal connected to the serial console port, or remotely using the remote console port. Remote console logins are supported from AppleTalk, LAT, NCP/TSM, Netware, and TCP/IP.

It is important to consider the following points before configuring the unit:

- Only one person at a time may be logged into the remote console port, regardless of the protocol being used. This eliminates the possibility of several people simultaneously attempting to configure the ETS.
- Remote console logins cannot be disabled. This is for your protection; although all other login sessions may be disabled, the system manager should always be able to access the unit.
- Logging into the remote console port does not automatically create privileged user status; you must use the **Set Privileged** command in order to configure the unit.
- Like the other ETS ports, the remote console port is password protected. The default access password is **access**. The default privileged password is **system**.

AppleTalk Console Connections

The MACCON utility allows users on Macintosh computers to configure an ETS unit via AppleTalk. It requires a Macintosh with access to the network (either with an Ethernet card, or a LocalTalk to EtherTalk router) and System 6.0.2 or higher. The utility is provided on a floppy disk; it can be run from the floppy or copied to the Macintosh hard drive. It is strongly recommended to make a backup copy of this disk.

To install the utility on the hard disk, drag the file from the floppy disk to the appropriate folder on the hard drive. MACCON does not use any system or other resources, so it can be anywhere on the drive. To run the utility (either on floppy or the hard drive) double-click the MACCON icon, or select it and choose Open from the File menu.

The MACCON Connect window will appear, listing all configurable Lantronix devices [Figure 5-1].

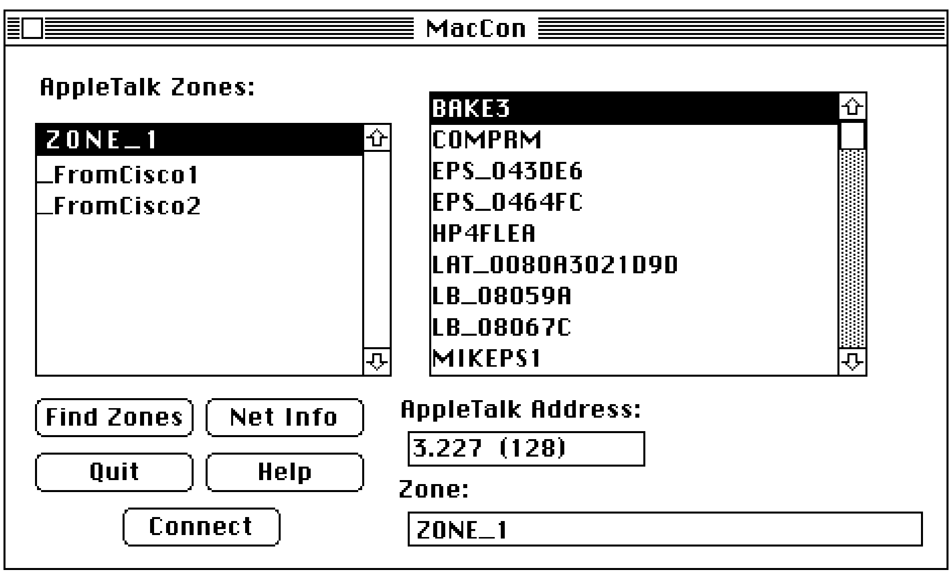

Figure 5-1: MACCON Connect Window

System Admin. Logins

Double-clicking on one of the available nodes will open a login window for that unit.

Note that making configurations requires being a privileged user (sometimes called “superuser”) on the server. To become a privileged user, use the **Set Privileged** command [Figure 5-2].

```
Local_1> SET PRIVILEGED
Password>
```

Figure 5-2: Set Privileged Command

You will be queried for the privileged password. The factory default privileged password is **system**; this password can be changed with the Set Server Privileged Password command. See the ETS/EPS Reference Manual for details on this command.

Once you’ve become the privileged user, click the **Configure** button to configure the unit [Figure 5-3].

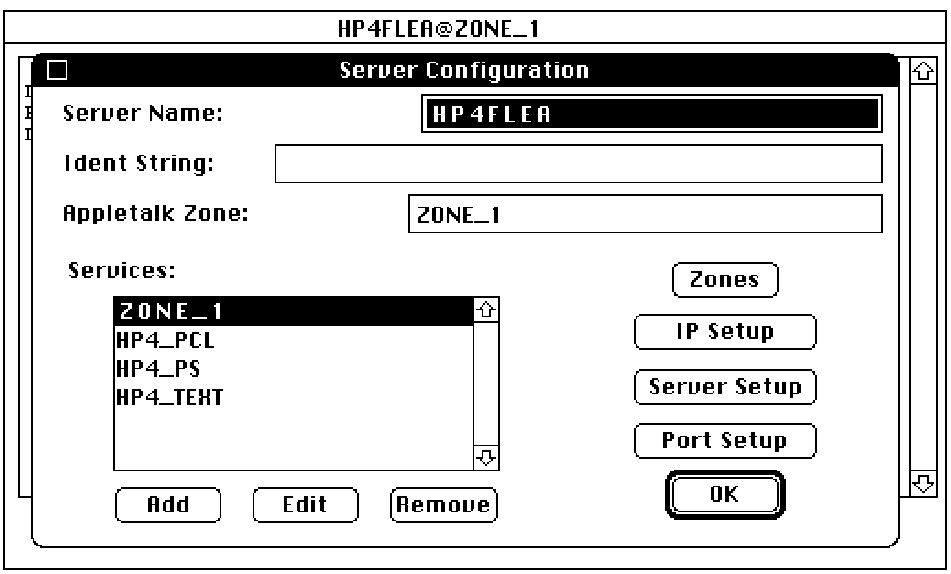

Figure 5-3: Configuration Window

The MACCON configuration window will appear. Using the edit bars and buttons in this window, you can change the server's name, service names, and serial port settings (make sure they match with what any attached printers expect.)

NOTE *Settings changed with MACCON take effect immediately and are permanent.*

NOTE *If you reboot your Macintosh while running MACCON, there will be a short delay (approximately two minutes) before another MACCON session can be started. MACCON cannot detect that the machine was rebooted, and will require the two-minute timeout period before permitting another session.*

When you have finished configuring the unit, click the **Quit** button. A **Help** button is also provided to show basic features and any keyboard shortcuts.

NetWare Console Connections

The EPSCON utility enables Netware users to log into the ETS from a Netware client PC.

To use the utility, copy the EPSCON.EXE file from the floppy disc onto the fileserver. Make sure it is in your path or the path is changed to include the directory where it resides.

To use EPSCON, type EPSCON at the prompt [Figure 5-4.]

```
F:\PUBLIC> EPSCON
```

Figure 5-4: EPSCON Command

A list of all available commands will be displayed [Figure 5-5].

```
Epscon          Ver. 1.2
------------------------
epscon list                     list available print servers
epscon <PsName> [port]          establish a console connection
epscon <PsName> reset           force rescan of queues
epscon <PsName> show            show Netware protocol info
epscon <PsName> show [...]      send show command to server
epscon <PsName> netstat         display server network status
epscon <PsName> name newname    set the server name
epscon <PsName> serial          set serial port parameters
epscon <PsName> reload          reload a print server

F: PUBLIC> EPSCON EPS_xxxxxx
Connection established (Ctrl-break to terminate)
# access (not echoed)

Lantronix EPS4 Version n.n/n (yymmdd)

Type Help at the ‘Local_4’ prompt for assistance.

Enter Username> xxxx
```

Figure 5-5: EPSCON Connection

Note that the **#** prompt requires that the login password be entered before the connection can be made. The default login password is **access**. This password can be changed with the Set Server Login Password command. See the ETS/EPS Reference Manual for details on this command.

NOTE *Settings changed with EPSCON take effect immediately and are permanent.*

To end the EPSCON connection (and log out of the ETS), press Ctrl-D or type **logout**.

TCP/IP Connections

Setting the IP address

The ETS's IP address must be configured before any TCP/IP functionality is available. The address can be defined using a terminal connected to the serial port, via a host BOOTP or RARP server, or by forcing an ARP entry on a host machine.

To define the IP address via the serial port, connect a terminal to the ETS, become the privileged user and issue the **Set** and **Define Server IPaddress** commands [Figure 5-6].

```
Local_1> SET PRIVILEGED
Password> SYSTEM (not echoed)
Local_1>> SET SERVER IPADDRESS xxx.xxx.xxx.xxx
Local_1>> DEFINE SERVER IPADDRESS xxx.xxx.xxx.xxx
```

Figure 5-6: Setting IP Address

The ETS's IP address can be configured when the unit boots by using information supplied by a host based RARP or BOOTP server. See host based man pages for configuration information. Keep in mind that many BOOTP daemons will not reply to a BOOTP request if the download filename in the configuration file does not exist. If this is the case, create a file in the download path to get the BOOTP daemon to respond.

If the ETS has no IP address, it will set its address from the first directed IP packet it receives. To generate such a packet, create an entry in the host's ARP table. Note that this requires superuser privileges [Figure 5-7].

```
# arp -s 192.0.1.228 00:80:a3:xx:xx:xx
```

Figure 5-7: Generating IP Packet

Substitute the intended IP address and the hardware address of the server. Then ping the server [Figure 5-8].

```
unix% ping 192.0.1.228
```

Figure 5-8: Pinging the Server

When the server receives the ping packet, it will notice that its IP address is currently not set and will send out broadcasts to see if anyone else is using this address. If no duplicates are found, the server will use this IP address, and will respond to the ping packet. The ETS will not save this learned IP address permanently. It is intended as a temporary measure to let the administrator telnet into the ETS's console port and issue the command Define Server IPaddress w.x.y.z to make the address permanent.

Console Connections

The ETS enables a TCP/IP user to configure the server via a single telnet connection to the remote console port. The remote console port is designate as **port 7000**. To make a connection to this port, use the **telnet** command [Figure 5-9].

```
% telnet xxx.xxx.xxx.xxx 7000
Trying xxx.xxx.xxx.xxx
Connected to xxx.xxx.xxx.xxx
Escape character is '^]'

# access (not echoed)

Lantronix EPS4 Version n.n/n (yymmddd)

Type Help at the 'Local_4>' prompt for assistance.

Enter Username> xxxx
```

Figure 5-9: Connecting to Console Port

Note that the **#** prompt requires that the login password be entered before the connection can be made. The default login password is **access**. This password can be changed with the Set Server Privileged Password command. See the ETS/EPS Reference Manual for details on this command.

Incoming User Connections

The ETS can be configured to allow incoming Telnet virtual sessions. This will enable a user to make a Telnet connection directly to the ETS and configure the unit without using a port number or an access password.

Incoming Telnet virtual sessions are enabled by default.

VMS Console Connections

From a VMS host machine, a connection to the remote console port can be established using NCP or TSM.

First, the node must be configured in the NCP database. To accomplish this, use the following commands [Figure 5-10]:

NOTE *The NCP name cannot exceed six characters.*

```
$ RUN SYS$SYSTEM:NCP
NCP> SHOW KNOWN CIRCUIT

Known Circuit Volatile Summary as of <date time>

      Circuit    State

      QNA-0      on

NCP>
NCP> SET NODE server_name
Node Address      (1.1-63.1023):  13.241
Node Name      (1-6 characters): server_name
NCP> SET NODE server_name SERVICE CIRCUIT QNA-0
NCP> SET NODE server_name HARDWARE ADDRESS 00-80-A3-xx.xx.xx
NCP> EXIT
```

Figure 5-10: Configuring Node

This defines the server only in the temporary database; Define commands must be used in order to make a permanent entry in the database.

Once the node has been created in the database, the **Connect** command can be used to establish a session [Figure 5-11].

```
$ RUN SYS$SYSTEM:NCP
NCP> CONNECT NODE server_name
# access (not echoed)

Lantronix EPS4 Version n.n/n (yymmdd))

Type Help at the 'Local_4>' prompt for assistance.

Enter Username> xxxx
```

Figure 5-11: Establishing a Connection

NOTE *For more information on configuring the NCP database and establishing a remote console connection, see the NCP and TSM documentation.*

6 Configuration

Introduction

This chapter explains how to configure the ETS for operation. Please refer to the ETS/EPS Reference manual for more information on unfamiliar terms and commands. Remember that commands and parameters can be abbreviated to the fewest letters needed to uniquely identify them.

NOTE *For instructions on remote console logins, refer to Chapter 5,* ***System Administration Logins****.*

Configuring the ETS

When the server powers up for the first time it may need to be configured for everyday use. There are three types of configuration:

- ♦ Server — These parameters affect the entire server. They control downloading information, network addresses, etc. They are configured with the **Set/Define Server** commands.
- ♦ Port — These parameters affect individual physical ports. They include serial settings (baud rate, parity), flags (modem control, dedicated connections, preferred hosts), and session control characters. All port configuration is done with the **Set/Define Port** commands.
- ♦ Service — These parameters are used for network connections to the ETS (primarily for printing.) For a description of Service parameters, see Chapter 8, *Printing*.

Even if the ETS will only be used with terminals, we suggest taking a few minutes to look over the following examples of how the ports, server, and sessions can be configured.

A few important points about configuration commands are listed below:

- Commands and options can be abbreviated to their shortest unique name, and more than one option can be included in **Set** and **Define** command lines.
- ETS commands are case-insensitive (except for strings enclosed in quotes), and are therefore displayed in all capital letters.
- The difference between the **Set** and **Define** commands is important. **Set** commands are put into effect immediately but not permanently, while **Define** changes characteristics permanently, but do not take effect until the server is rebooted. (**Define Port** commands take effect when the port is logged out.
- The **Show** and **List** commands will display current and permanent settings (respectively) on the server.

Many of the commands discussed in this chapter require being a privileged user (sometimes called “superuser”.) To become a privileged user, use the **Set Privileged** command [Figure 6-1].

```
Local_1> SET PRIVILEGED
Password>
```

Figure 6-1: Set Privileged Command

You will be queried for the privileged password. The factory default privileged password is **system**; this password can be changed with the Set Server Privileged Password command. See the ETS/EPS Reference Manual for details on this command.

Server Configuration

Setting the IP Address

If TCP/IP connections are needed, (Telnet, Rlogin, LPD or RTEL support), the ETS must have an IP address. If one was set at boot time, it does not need to be re-entered.

There are three ways to specify the IP address. The first is at boot time, by a BOOTP or RARP reply, or from the Boot> command line. The second is with the **Set/Define Server IPaddress** command from the ETS command line [Figure 6-2]:

```
Local_1> SET SERVER IPADDRESS 192.0.1.228
Local_1> DEFINE SERVER IPADDRESS 192.0.1.228
```

Figure 6-2: Specifying IP Address

If the ETS has no IP address, it will set its address from the first directed IP packet it receives. To generate such a packet, create an entry in the host's ARP table [Figure 6-3]. Note that this requires superuser privileges.

```
# arp -s 192.0.1.228 00:80:a3:xx:xx:xx
```

Figure 6-3: Generating IP Packet

Substitute the intended IP address and the hardware address of the server. Then ping the server [Figure 6-4].

```
unix% ping 192.0.1.228
```

Figure 6-4: Pinging the Server

When the server receives the ping packet, it will notice that its IP address is currently not set and will send out broadcasts to see if anyone else is using this address. If no duplicates are found, the server will use this IP address, and will respond to the ping packet. The ETS will not save this learned IP address permanently. It is intended as a temporary measure to let the administrator telnet into the ETS's console port. and issue the command **Define Server IPaddress w.x.y.z** to make the address permanent.

NOTE *See page 7-3, **Incoming Logins,** for instructions for logging into the server.*

Outgoing Session Support

This section covers server settings related to outgoing sessions.

A nameserver host can be specified to allow text TCP/IP hostnames to be resolved, and a default domain name to use in case a domain is not specified. Specifying a gateway host allows TCP/IP connections to other connected network segments. For example [Figure 6-5]:

```
Local_1>> DEFINE SERVER NAMESERVER 192.0.1.2
Local_1>> DEFINE SERVER DOMAIN “weasel.ctcorp.com”
Local_1>> DEFINE SERVER GATEWAY 192.0.1.188
```

Figure 6-5: Outgoing Session Configurations

NOTE *The examples above use the **Define** command, so they will not take effect until the server is rebooted. Use the **Set** command to make them take effect immediately.*

NOTE *Backup hosts can be specified in case the primary nameserver or gateway fail; see the ETS/EPS Reference Manual for details.*

The TCP/IP security table can be used to restrict incoming or outgoing TCP/IP connections. Managers can restrict connections by address or network on a port by port basis. See *IPSecurity* in the ETS/EPS Reference manual, or **Help Set IPSecurity** on the server's on-line help system.

LAT Server Parameters

The LAT parameters should not need to be modified. The server may be given a more descriptive nodename and identification string if desired.

NOTE *See the **Set Server Name** and **Set Server Identification** commands in the ETS/EPS Reference Manual for details.*

Port Configuration

There are various attributes associated with each physical port that may need to be changed. In general, they are configured with the **Set/Define Port** **<n>** command, where **<n>** is the port number to modify (and defaults to the current port). **Show/List Port** **<n>** will display the current and saved settings for the specified port. Note that unlike server settings, port settings are re-initialized each time the port logs out, or each time a print job completes. For this reason, Define commands are the recommended method for configuring port settings.

Most commonly changed settings are the serial parameters: Speed (baud rate), Character Size, Parity, and Flow Control. The default for all serial ports is 9600, 8-bit, None, and Xon/Xoff. Some examples of changing the port settings [Figure 6-6]:

```
Local_1>> DEFINE PORT SPEED 38400
Local_1>> DEFINE PORT 2 SPEED 2400
Local_1>> DEFINE PORT 2 PARITY EVEN
Local_1>> DEFINE PORT 2 CHARACTER SIZE 7
Local_1>> DEFINE PORT 3 FLOW XON
```

Figure 6-6: Define Port Commands

NOTE *Refer to the ETS/EPS Reference Manual or the **Help Set Port** display for a list of all configurable parameters for the ports.*

Access Mode

A port's **access mode** controls how the port can be connected to, and can prevent services from working if mis-configured. A port's access can be one of 4 settings:

- None — This setting means the port is not usable. This is typically only used if the device attached to the port is out of service.
- Local — This setting enables users to log into that port via the serial line and form connections to network hosts. Network users cannot form connections to the port.
- Remote — This setting allows only network connections. Logins from the serial port are prevented. If the port is only used for printing, it should be defined to access Remote.
- Dynamic — This setting enables ports to accept serial logins OR network connections. If a user is logged into a Dynamic port, network connections to that port will fail (unless a queued connection was requested) until the user logs out.

ETS8/16 and EPS4/12 serial ports default to access **Local**. Parallel ports always default to access remote.

7 User Sessions

Introduction

The chapter covers sessions from the ETS serial ports to other network hosts, and logins from network hosts into the ETS.

NOTE *For information on remote console logins, see Chapter 5, System Administration Logins.*

Outgoing Sessions

The ETS and EPS4/12 servers provide the ability for local serial users to connect to hosts on the network. These connections, or sessions, can be to hosts using either LAT or TCP/IP protocols. Users can have multiple sessions open simultaneously, and toggle between them with single keystrokes. There are three aspects of using sessions: initiating, pausing/resuming, and closing.

Initiating a Connection

To start a connection, the basic format is **Connect <name>**. This will attempt to start a session to node <name> using LAT. To use Telnet or Rlogin, use **Connect (Telnet, Rlogin) <name>**. This can also be shortened to just Telnet <name> or Rlogin <name>. For TCP/IP sessions, <name> can be either a hostname or a numeric IP address. For example [Figure 7-1]:

```
Local> CONNECT LABVAX
Local> CONNECT TELNET labsun
Local> RLOGIN 192.0.1.29
```

Figure 7-1: Connect Commands

If a text TCP/IP host name is used, the ETS will first try to use the local host table to resolve the name into a numeric IP address. If that fails, it will query any configured nameservers for the name resolution. If the ETS cannot resolve the name into a numeric IP address, the connection attempt will fail.

If the connection is successful, an informational message will be displayed and the user will be connected.

Pausing/Resuming a Session

- To return to the Local> prompt (“local mode”) from a session, press either the <Break> key, or the defined local switch.
- To return to a session from local mode, use the **Resume** command. It will return to the last-used session.

NOTE *For more advanced pausing and resuming functionality, refer to the ETS/EPS Reference Manual.*

Disconnecting a Session

To disconnect a session, use the **Disconnect** command. This will close the last-used session, and leave any others intact. Users can also specify **All** (closes all open sessions for that user) or a number (to close a session other than the last-used). Also, if the user logs out (or is logged out by the administrator) all sessions are closed.

The **Show Session** command will show all open connections for the current user. The session numbers displayed are those used with the **Disconnect** and **Resume** commands.

Global and per-port session limits are provided to restrict the number of sessions a user can initiate. They are configurable with the Set Server Session Limit and Set Port Session Limit commands, respectively.

Incoming Sessions

The ETS servers also allow logins into the server from the network. These are typically used for remote management, so that the administrator does not have to have a dedicated serial line to the server. It also allows an easy way for users to connect between TCP and LAT hosts; for example, they can Telnet into the ETS, and then LAT out. This gives easy access to hosts running either protocol.

Incoming sessions can be restricted or prevented with the **Set Server Incoming** command. It can be used to prevent LAT or TCP logins (or both) or require entering a password before using the command line.

The NetWare, AppleTalk, and LanManager implementations of the ETS do not provide for interactive sessions to hosts, since these would be of limited usefulness. Most hosts running these protocols are single-user, with no provision for logging in multiple network users. Only print spooling from hosts is provided for these two protocols.

8 Printing

Introduction

With few exceptions, setting up a print queue on the ETS requires the use of a **service**. A service specifies a set of attributes for a particular port on the server. As services are primarily used for printing, the set of attributes are often customized for a particular printer or modem. In general, there must be at least one service associated with a port before the port can be used by network users.

Setting Up a Service

To set up a service, you will need to use the **Set/Define Service** commands. **Set Service** commands change the service's characteristics immediately, but the effects are temporary, lasting only until the server is reset. If the specified service does not currently exist, one will be created and configured according to the command's specifications. If the specified service exists, it will be modified.

Define Service commands specify permanent changes. These changes will not take effect until the server is reset.

Possible attributes for services are listed in the following sections.

Service Name

Each service must have a name.

Ident String

Each service may have an identification string. This string typically contains a more verbose description of the service and will be displayed by LAT when a Show Services command is issued. It is ignored by all other protocols.

Rating

The rating describes the current state of the service. A non-zero value means that the service is available. Zero means that the service is either in use or not available.

Ports

The port list shows the port(s) this service is associated with.

Service Characteristics

These parameters specify how the ETS will appear to network hosts and how it will treat print data. Characteristics consist of the following:

NOTE *Services are created with connections, queueing, and formfeed enabled by default.*

- Banner — This parameter only affects banner pages that the ETS generates when printing via LPD or NetWare. If a host generates its own banner, the ETS will treat it as print data. The default setting is to print banner pages.
- Binary — If the binary parameter is specified, the ETS will not perform character processing on the data. By default (binary disabled) the ETS will expand linefeeds into carriage return/linefeeds and will perform tab expansion for LPD jobs. This parameter is typically used for printing graphics jobs (PCL files.)
- Connections — Disabling connections prevents connections to a particular service. The service will still be advertised on the network, but connection attempts will fail.

- FormFeed — If Formfeed is enabled (the default), the server will append a formfeed to the end of LPD jobs.
- Password — Specifies a 1 to 6 character service access password that the user must supply in order to connect to the service.
- PostScript — If enabled, the ETS will send a small PostScript job to the printer before the user print data to force auto-selection printers into PostScript mode. it will also attempt to confirm that the printer finished a job before starting the next one. If the printer attached to this service will be used only for PostScript, this option must be enabled.
- Queuing — Disabling queueing will cause any print job request received while the service is in use to be rejected, rather than queued. Disabling this parameter is not recommended.

Each service is associated with a protocol list. This list controls which protocols can access the service. Protocol parameters include the following:

- AppleTalk — Enables or disables AppleTalk access to the service. AppleTalk is **disabled** by default.
- DLC — Sets the service as the handler for NT DLC print connections. ONLY ONE SERVICE PER SERVER MAY HAVE DLC ENABLED.
- LanManager — Enables or disables LanManager access to the service. LanManager is **disabled** by default.
- LAT — Enables or disables LAT access to the service. LAT is **disabled** by default.
- NetWare — Enables or disables NetWare access to the service. NetWare is **disabled** by default.

- ♦ RTEL — Enables or disables RTEL access to the service. RTEL is **enabled** by default.
- ♦ TCPPort — Associates a TCP socket with the service. Connections to this socket will be accepted only if the service is currently available.
- ♦ TelnetPort — Associates a TCP socket with the service. Telnet IAC interpretation will be done on the connection. Connections to this socket will be accepted only if the service is currently available.
- ♦ Virtual — Specifies that the service is actually a Telnet host that should become a proxy service. LAT hosts will be able to transparently connect to the Telnet host as if it were a LAT service.

Command Format

All Set/Define Service commands require being a privileged user (sometimes called "superuser") on the server. To become a privileged user, use the **Set Privileged** command [Figure 8-1].

```
Local_1> SET PRIVILEGED
Password> SYSTEM (not echoed)
```

Figure 8-1: Set Privileged Command

You will be queried for the privileged password. The factory default privileged password is **system**; this password can be changed with the Set Server Privileged Password command. See the ETS/EPS Reference Manual for details on this command.

The format for Set/Define Service commands is shown in Figure 8-2.

$$\left\{\begin{array}{c}\text{SET}\\ \text{DEFINE}\end{array}\right\}\text{SERVICE } \mathit{ServiceName}\ \mathit{option}\ [\mathit{option}]\ \mathit{port}$$

Figure 8-2: Set/Define Command Format

For example [Figure 8-3]:

```
Local_1> SET SERVICE BACKUPPRINTER LAT ENABLED PORT 2
```

Figure 8-3: Set Service Example

AppleTalk Configuration

Printing from a Macintosh simply requires selecting a printer attached to the ETS from the Chooser. Since the ETS advertises printers as LaserWriters, the printer attached to the ETS must be PostScript compatible.

Macintoshes that do not support EtherTalk will need either an Ethernet card or a LocalTalk-to-EtherTalk router to use the ETS. In addition, Macintoshes must have the LaserWriter driver installed; otherwise no LaserWriters will be available in the Chooser.

Printing via a Macintosh requires a PostScript printer and bi-directional communication with that printer. Most parallel printers only accept data from a host and are not able to send status messages back to that host, so printing from a Macintosh would fail.

AppleTalk Zone

If the ETS is attached to a network without an AppleTalk router, all devices should be visible to all Macintosh Chooser clients.

NOTE *The ETS will not accept AppleTalk print jobs for 60 seconds after booting while it listens for the nonexistent router.*

If there is a router on the network, the ETS will appear in the default zone specified by the router. The zone name can be changed if the default zone is not the desired zone by using the following commands [Figure 8-4]:

```
Local_1> SET PRIVILEGED
Password> SYSTEM (not echoed)
Local_1>> SET PROTOCOL APPLETALK ZONE "radon_lab"
Local_1>> DEFINE PROTOCOL APPLETALK ZONE "radon_lab"
```

Figure 8-4: Changing AppleTalk Zone

PostScript Printing From AppleTalk

Before a Macintosh can be used to print, a service must be created. See Figure 8-5, below, for an example.

Since printing from a Macintosh requires a PostScript printer, the PostScript attribute must be enabled on the service being used [Figure 8-5]:

```
Local_1> SET PRIVILEGED
Password> SYSTEM (not echoed)
Local_1>> SET SERVICE NTX APPLETALK ENABLED PORT 4
Local_1>> SET SERVICE NTX POSTSCRIPT ENABLED
Local_1>> DEFINE SERVICE NTX POSTSCRIPT ENABLED PORT 4
```

Figure 8-5: Enabling PostScript

All the Macintoshes printing to the ETS must be running the same version of LaserPrep. Print jobs can be lost if Macintoshes are using different Laserprep versions, as reloading the Laserprep file repeatedly can prevent jobs from printing reliably.

Ensure that the laser printer being used is configured to use 8-bit characters. If special characters or bitmaps are not printing correctly, it is typically because the printer is configured to use 7-bit characters.

LanManager Configuration

The following sections cover print configuration for LanManager hosts. These instructions are designed for Windows NT and OS/2 users.

NOTE *Sending print jobs to the ETS from Windows for Workgroups hosts via LanManager will not work reliably. It is recommended that Windows for Workgroups users spool their print jobs to a Windows NT host and print from that machine.*

Windows NT Users

To send print jobs from a Windows NT host to the ETS, the ETS must be added as a Windows NT printer. This can be done in two ways: using DLC, or using NetBios. DLC configuration is simpler than NetBios configuration; however, NetBios is more flexible. (Note that the ETS does not support NetBios over TCP/IP.) Both methods are discussed in the following sections.

NOTE *For more information on DLC and NetBios configuration, refer to the ETS/EPS Reference manual.*

DLC Configuration

To install DLC, a service must be created with DLC enabled. Figure 8-6, below, displays an example.

```
Local_1> SET PRIVILEGED
Local_1> system (not echoed)
Local_1>> SET SERVICE NTX DLC ENABLED PORT 4
```

Figure 8-6: Enabling DLC

Open the NT PrintManager; its icon is located in the Main window on the desktop. Choose **Create Printer** from the Printer menu. In the dialog that is displayed, choose the following:

- Name of the queue on the NT host
- A description string
- Type of printer driver required

NOTE *If the printer driver isn't already installed, you'll need the Windows NT installation disks.*

If applicable, choose the **Share this printer on the network option**. (This is not recommended until the print queue is confirmed to be running properly.)

Click the Print To menu arrow to view its pull-down menu. Scroll to the **Network Printer** option. From the dialog that appears, choose the **Hewlett Packard Network Port** option and click the OK button.

Click the Card Address menu arrow to view its pull-down menu; all known DLC nodes will be listed. Select the ETS' hardware address. Enter a name to be associated with this address at the prompt.

Click the **Timers** button. In the dialog that appears, click the **Job Based** radio button. Click the OK button in each print dialog displayed.

If you'd like this printer to be the default printer, click the **Default** menu arrow on the Create Printer window's title bar and scroll to the printer's name.

NetBios Configuration

To install NetBios, create a service with LanManager enabled [Figure 8-7]. Note that in the example below, we've also used the Set Server command to give the server a name.

```
Local_1> SET PRIVILEGED
Local_1> system (not echoed)
Local_1>> SET SERVER NAME GRAPHICSERVER
Local_1>> SET SERVICE NTX LANMANAGER ENABLED PORT 4
```

Figure 8-7: Enabling LanManager

Choose one of the lpt ports to redirect (typically the ports to choose from will be lpt1, lpt2, or lpt3.) Before you select a port to redirect, ensure that it doesn't currently have a printer connected to it.

Double-click the DOS Command Prompt icon to open a DOS session. At the DOS prompt, use the NET USE command to indicate that the lpt port will be redirected to the ETS service [Figure 8-8].

```
C:> NET USE LPTn: \\GRAPHICSERVER\NTX
```

Figure 8-8: Net Use Command

The Windows NT node will attempt to connect to the ETS. (If it cannot connect to the ETS, it will inform you of the problem.) At this point, all references to LPTn (the port specified with the NET USE command above) will go to the service that you created. For testing purposes, you can try to use a copy command, if the ETS is ready to accept data.

Exit the MS/DOS shell. Open the NT Print Manager; its icon is located in the Main window on the desktop. Choose **Create Printer** from the Printer menu.

In the dialog that is displayed, choose the following:

- ♦ Name of the queue on the NT host
- ♦ A description string
- ♦ Type of printer driver required

Click the **Print To** menu arrow to view its pull-down menu, and select the LPT port you wish to redirect. Click the **OK** button in each print dialog displayed.

If you'd like this printer to be the default printer, click the **Default** menu arrow on the Create Printer window's title bar and scroll to the printer's name.

NOTE *Windows NT does not ship with a basic, text-only printer driver. If you wish to print to a terminal, you'll need to use some type of line printer driver and will see the embedded print codes.*

OS/2 Users

OS/2 does not support the DLC protocol; NetBios must be used. To install NetBios, create a service with LanManager enabled [Figure 8-9]. Note that in the example below, we've also used the Set Server command to give the server a name.

```
Local_1> SET PRIVILEGED
Local_1> system (not echoed)
Local_1>> SET SERVER NAME GRAPHICSERVER
Local_1>> SET SERVICE NTX LANMANAGER ENABLED PORT 4
```

Figure 8-9: Enabling LanManager

Choose one of the lpt ports to redirect (typically the ports to choose from will be lpt1, lpt2, or lpt3.) Before you select a port to redirect, ensure that it doesn't currently have a printer connected to it.

Open an OS/2 session. At the OS/2 prompt, use the NET USE command to indicate that the lpt port will be redirected to the ETS service [Figure 8-10].

```
C:> NET USE LPTn: \\GRAPHICSERVER\NTX
```

Figure 8-10: Redirecting LPT Port

The OS/2 node will attempt to connect to the ETS. (If it cannot connect to the ETS, it will inform you of the problem.) At this point, all references to LPTn (the port specified with the NET USE command above) will go to the service that you created. For testing purposes, you can try to use a copy command, if the ETS is ready to accept data.

Exit the OS/2 shell. Open the OS/2 PrintManager. Choose **Printer install** from the Setup pull-down menu. In the Printer Installer dialog box, select the printer driver to use, enter a queue name, and enter a description string. Click the **Connect To** menu arrow to view its pull-down menu, and scroll down to the name of the redirected lpt port. Click the OK button.

A dialog box will appear containing configuration options. Change the configuration if desired; when you're satisfied with your changes, click the OK button.

LAT Configuration

Creating a LAT print queue can be done by printing directly to an ETS port, or printing to a service. Both methods are discussed in the following sections.

Printing Directly to a Port

Configuring a LAT print queue on a VMS host machine is a two- step process. First, a LAT application port that references the ETS print resource must be created. Second, a print queue that uses the LAT application port must be created.

The simplest method of creating a LAT print queue is printing directly to a port on the ETS. The serial ports are named “Port_1”, “Port_2”, etc.

Use the following commands [Figure 8-11]:

```
$ RUN SYS$SYSTEM:LATCP
LCATCP> CREATE PORT LTAnnn/APPLICATION
LATCP> SET PORT LTAnnn/node=barney/port=Port_2
LCATCP> EXIT
```

Figure 8-11: Creating LAT Application Port

LATCP ports are not permanently configured on a host. Add the commands necessary to create required LAT devices to the SYS$MANAGER:-LAT$STARTUP file so that they will be recreated after each host reboot.

Note that LAT terminal device characteristics may have to be changed to correctly print some files. For example, by default the VMS terminal driver will change form feeds into an equivalent number of line feeds. To disable this behavior, create and start the queue [Figure 8-12, page 8-13]:

```
$ SET TERMINAL/PERM/FORM LTAnnn:
$ INITIALIZE/QUEUE/START/ON=LTAnnn:/PROCESSOR=LTASYM/
                             RETAIN=ERROR queue_name
```

Figure 8-12: Creating Queue

NOTE *See the VMS documentation for more information about terminal characteristics.*

A print request would then look like [Figure 8-13]:

```
$ PRINT/QUEUE=queue_name filename.txt
```

Figure 8-13: Print Request

Printing Using LAT Services

Printing using a LAT service requires the creation of three items:

- ♦ A LAT service
- ♦ The LAT application port that references the ETS print resource
- ♦ A print queue that uses the LAT application port

LAT services can be created and connected to using the commands below [Figure 8-14, page 8-14]:

```
Local_1> SET PRIVILEGED
Password> SYSTEM (not echoed)
Local_1>> SET SERVICE NTX LAT ENABLED PORT 4
Local_1>> DEFINE SERVICE NTX LAT ENABLED PORT 4
```

Figure 8-14: Creating LAT Service

A LAT device (to the serial port, here) can then be created using the following commands [Figure 8-15]:

```
$ RUN SYS$SYSTEM:LATCP
LATCP> CREATE PORT LTAnnn/APPLICATION
LATCP> SET PORT LTAnnn/node=barney/service=NTX
LATCP> EXIT
```

Figure 8-15: LAT Device to Serial Port

The rest of the procedure for creating the print queue is the same as discussed in *Printing Directly to a Port*, page 8-12.

PostScript Printing From LAT

PostScript printing from VMS requires that the PostScript attribute be enabled on the service being used [Figure 8-16]:

```
Local_1> SET PRIVILEGED
Password> SYSTEM
Local_1>> SET SERVICE NTX POSTSCRIPT ENABLED PORT 4
Local_1>> DEFINE SERVICE NTX POSTSCRIPT ENABLED PORT 4
```

Figure 8-16: Enabling PostScript

Using PostScript printers with LAT queues adds two extra steps to the host queue setup. An application LAT port still needs to be created via LATCP. In addition, a PostScript form and a reset module need to be created on the host. The reset module will contain the Ctrl-D that the printer needs to see to finish and eject the job. To create the form, use the following commands [Figure 8-17]:

```
$ DEF/FORM POSTFORM formnum /STOCK=DEFAULT/WIDTH=4096/WRAP
```

Figure 8-17: Creating PostScript Form

formnum is any unused form number (use **Show Queue/Form/All** to see the form numbers that are currently in use). The longer width prevents the spooler from truncating long (and legal) PostScript command lines.

To create the reset module, use an editor to create a file named EOJ.TXT. Place a Ctrl-D (ASCII 0x4) in this file and insert it into the system device control library [Figure 8-18].

```
$ LIBRARY/REPLACE SYS$LIBRARY:SSYDEVCTL.TLB EOJ.TXT
```

Figure 8-18: Creating Reset Module

Finally, the INIT/QUEUE command creates the queue itself [Figure 8-19]:

```
$INIT/QUEUE/START/DEFAULT=(NOFEED,NOFLAG,FORM=POSTFORM) -
              ON=LTAnn:/PROCESSOR/LATSYM/RETAIN=ERROR -
  -           /SEPARATE=(RESET=EOJ)  ETS_POST
```

Figure 8-19: Creating Queue

Note the addition of the form specification and the reset module. A print request would then look like the following [Figure 8-20]:

```
$ PRINT/QUEUE=ETS_POST filename.ps
```

Figure 8-20: Print Request

Printing Using CPS Software

The CPS software supplied by DEC requires a bidirectional data path, therefore, the parallel ports on the EPS4 and EPS12 will not support this software. On the parallel port, this is only available if the printer supports the Bitronics extensions to the Centronics interface. See the Macintosh bi-directional printing requirements for more information.

NetWare Configuration

The ETSCON and QINST utilities, provided on floppy disk, are the recommended way to communicate with the ETS and configure NetWare print queues. ETSCON is used for logging into the ETS and is described more fully in Appendix D, “Network Logins.” The QINST utility should be used to actually create a NetWare print queue.

NOTE *To see the steps QINST uses to install the queue, see the ETS/EPS Reference Manual.*

The QINST utility requires being logged into the **Supervisor** (NetWare 2.2/3.11) or **Admin** (NetWare 4.0) account on the target file server. To use the utility, simply copy the QINST.EXE file from the included floppy disk into the **Public** directory on the file server, ensure it is in the executable path and type **QINST**.

When using NetWare Version 4.0 and greater, the following requirements must be met:

- ♦ The QINST program requires access to UNICODE tables to provide character translation. To ensure the utility runs properly, copy it into the NetWare **Public** directory or ensure that the PATH variable includes the required UNICODE tables.

- ♦ The ETS requires that Binary emulation be enabled. A future version of the ETS software will directly support Novell's Network Directory Services.

The following example shows creating a Novell print queue named **ETS_PRT** on an ETS's serial port [Figure 8-21, page 8-18].

```
F:\> QINST
Q-Install     Ver. 1.0

Logged in as ADMIN
Installing on GONZO, NetWare V4.01
Select a volume to install queue on: (only for NetWare 4.x)

Number    Name
-----------------
0         Sys
Volume number: 0 <CR>
Enter the name of the print server.
: GRAPHICSERVER <CR>
Enter the name of the queue to create.
: ETS_PRT <CR>
Adding print queue ETS_PRT on volume GONZO_SYS
Enter the service name on GRAPHICSERVER which will service
  this queue.
[GRAPHICSERVER_P1]: NTX
Adding print server GRAPHICSERVER. Please wait...
Attaching GRAPHICSERVER to ETS_PRT
Adding print server NTX. Please wait...
Attaching NTX to ETS_PRT

Print queue installed successfully. Resetting GRAPHICSERVER.
Resetting print server.

Install another queue [y/n]? n

F:\>
```

Figure 8-21: Creating Novell Print Queue

Use the NPRINT command to print a job to the ETS [Figure 8-22].

```
F:\> NPRINT C:\AUTOEXEC.BAT /QUEUE=ETS_PRT
```

Figure 8-22: NPRINT Command

NetWare Access List

By default, the ETS will only scan local file servers (file servers one hop away) for print queues to service. File servers on non-local Ethernets, i.e. with a IPX router between them and the ETS, can be enabled using the following command [Figure 8-23]:

```
Local_1> SET PRIVILEGED
Password> SYSTEM (not echoed)
Local_1>> SET PROTOCOL NETWARE ACCESS fileserver
Local_1>> DEFINE PROTOCOL NETWARE ACCESS fileserver
Local_1>> SET PROTOCOL NETWARE RESET
```

Figure 8-23: Enabling Non-local File Servers

To enable scanning for jobs on all file servers in the extended network, replace the file server name with the keyword **All**. However, on an extended (wide or local-area) network with many file servers, specifying **All** can severely impact the time between jobs and the overall printing performance.

NetWare Queue Password

The default login password on the ETS is used as the password that the ETS logs into NetWare file servers with. If the login password is changed, NetWare print queue setups must also be changed to reflect the new password.

NOTE *See the PCONSOLE instructions in the ETS/EPS Reference Manual.*

PCL Printing From NetWare

Printing PCL jobs requires an 8-bit clean data path between the NetWare file server and the printer. If printing via the serial port, hardware flow control must be used. In addition, the Binary attribute must be enabled on the service being used [Figure 8-24].

```
Local_1> SET PRIVILEGED
Password> SYSTEM
Local_1>> DEFINE PORT 1 FLOW CTS
Local_1>> SET SERVICE NTX NETWARE ENABLED PORT 4
Local_1>> SET SERVICE NTX BINARY ENABLED
Local_1>> DEFINE SERVICE NTX BINARY ENABLED PORT 4
```

Figure 8-24: Enabling Binary

PostScript Printing From NetWare

PostScript printing from Novell requires that the PostScript be enabled on the service being used [Figure 8-25]:

```
Local_1> SET PRIVILEGED
Password> SYSTEM
Local_1>> SET SERVICE NTX NETWARE ENABLED PORT 4
Local_1>> SET SERVICE NTX POSTSCRIPT ENABLED PORT 4
Local_1>> DEFINE SERVICE NTX POSTSCRIPT ENABLED PORT 4
```

Figure 8-25: Enabling PostScript

TCP/IP Configuration

The ETS provides two major methods of printing via TCP/IP: Berkeley Remote LPR and the RTEL host software. Both methods provide queuing of jobs on the host if the ETS is busy with another job. The remote-LPR software allows the ETS to look like another host that can print files.

The Lantronix-supplied RTEL software, which requires installation and configuration on the host, provides more functionality than RemoteLPR. It allows the host's printing system to transparently use the ETS's print devices, and also allows the creation of named pipe devices on the host that map to the ETS's ports.

NOTE *See the man pages included with the software distribution for a full discussion of RTEL functionality and configuration.*

The server must have an IP address before print configurations can be made. (See *Setting the IP address* on page 5-6 for details.) Any host wishing to access the ETS will have to be informed of this IP address; this is typically configured in the Unix file /etc/hosts or via a nameserver. Refer to the host's documentation for additional information.

LPR on Generic Unix Hosts

The Berkeley remote printing system is supported on many machines, and is simple to configure for the ETS. Add the host print queue name into /etc/printcap, and then specify the remote nodename (the host name of the ETS) and the service name on the ETS.

For example, to add a serial port print queue for an ETS add the ETS's name and IP address to the /etc/hosts file [Figure 8-26]:

```
xxx.xxx.xxx.xxx          graphicserver
```

Figure 8-26: Adding Name and IP Address

Edit the /etc/printcap file and add an entry in the following format [Figure 8-27]:

```
eps_prt|Print on LAB ETS:\
      :rm=graphicserver:\
      :rp=ntx:\
      :sd=/usr/spool/lpd/ets_prt:
```

Figure 8-27: Editing /etc/printcap File

Note that the punctuation shown is required, and whitespace should be avoided within each option. This will create queue named ets_prt. The **rm** parameter is the name of the ETS in the host's address file, the **rp** parameter is the name of the service as it exists on the ETS, and the **sd** parameter specifies the name of a directory used to hold temporary spooling files.

The spooling directory will have to be created using the mkdir command and should be world writable [Figure 8-28].

```
# mkdir /usr/spool/lpd/ets_prt
# chmod 777 /usr/spool/lpd/ets_prt
```

Figure 8-28: Creating Spooling Directory

The **mx** option may be used to allow unlimited size files to be printed and the **sh** option may be used to prevent header pages from being generated.

NOTE *See the host's documentation or man pages for more information on the format of the printcap file and how to create the spool directory.*

After adding the queue entry to the printcap file, it should be visible via the lpc status command [Figure 8-29]:

```
% lpc status
ets_prt:
      queuing is enabled
      printing is enabled
      no entries
      no daemon present
```

Figure 8-29: LPC Status Command

Print to the queue using normal lpr commands [Figure 8-30]:

```
% lpr -Pets_prt /etc/hosts
```

Figure 8-30: Printing to Queue

Notes about LPR

Because of the way the LPR protocol is typically implemented on the host, the processing options and the banner page are sent after the job data itself. Because of this, the ETS will print a banner page at the end of a job, and cannot support most of the LPR options. If it is necessary to have the banner page at the beginning of the printout, install and use the RTEL software.

If banners are not needed, they can be disabled using the following ETS commands [Figure 8-31]:

```
Local_1>> SET SERVICE service_name BANNER DISABLED
Local_1>> DEFINE SERVICE service_name BANNER DISABLED
```

Figure 8-31: Disabling Banners

Many LPR spoolers are not intelligent about using multiple queues on one host. If two queues on the print host refer to two services on the same ETS, they must use separate spooling directories. If only the default directory is used, data from the 2 queues can be intermixed or sent to the wrong ETS service.

No special purpose input or output filters can be used when printing via LPR. If this functionality is necessary, use the named pipe interface program in the RTEL software.

LPR on Ultrix Hosts

Ultrix hosts will need the following additional information added to the printcap entry [Figure 8-32].

```
ets_prt|Printer on LAB ETS:\
       :lp=:ct=remote:\
       :rm=graphicserver:\
       :rp=NTX:\
       :sd=/usr/spool/lpd/ets_prt:
```

Figure 8-32: Adding to Printcap Entry

The additional options will show that there is no physical device for this queue and tell the host that this is a remote connection.

LPR on AIX Hosts

LPR is available on machines running IBM's AIX operating system, but has only been tested on AIX versions 3.2 and higher. Using LPR on AIX hosts involves a slightly different configuration procedure. The queue configuration file is /etc/qconfig and the format of the entry is different [Figure 8-33, page 8-25]. Note the lack of colons (:) and the required white space.

```
ets_prt:
     device = ets_prtd
     up = TRUE
     host = graphicserver
     s_statfilter = /usr/lpd/bsdshort
     l_statfilter = /usr/lpd/bsdlong
     rq = NTX
ets_prtd:
     backend = /usr/lpd/rembak
```

Figure 8-33: Adding to Printcap Entry

Note that the device name is simply the queue name with a "d" appended. To print, the normal lp syntax is used [Figure 8-34]:

```
% lp -dets_prt filename
```

Figure 8-34: Printing to Queue

LPR on HP Hosts

LPR is supported in HP/UX Version 9.0 and greater. To configure a print queue using LPR, become the superuser and issue the following commands [Figure 8-35]:

```
# /usr/lib/lpshut
# /usr/lib/lpadmin -pets_prt -v/dev/null -mrmodel \
  -ocmrcmodel -osmrsmodel -ormgraphicserver orpNTX
# /usr/lib/accept ets_prt
# /usr/bin/enable ets_prt
# /usr/lib/lpsched
```

Figure 8-35: Configuring Print Queue

Note that issuing the "lpshut" command will stop the HP spooling system, so this command should not be performed when print jobs are active. To print to this queue, normal lp syntax is used [Figure 8-36]:

```
# lp -dets_prt filename
```

Figure 8-36: Printing to Queue

LPR on SCO Unix Hosts

LPR is supported in SCO V3.2 release 4 with TCP/IP Version 1.2 and greater. To configure a print queue using LPR first issue the following command [Figure 8-37]:

```
# mkdev rlp
```

Figure 8-37: Installing Printing Files

This will install the Berkeley remote printing files and executable programs. Note that this should only be done once. To actually create a remote printer, use the following command [Figure 8-38]:

```
# rlpconf
```

Figure 8-38: Creating Remote Printer

This command will ask a series of questions and create a printcap entry for the specified queue. To print to this queue, normal lp syntax is used [Figure 8-39]:

```
# lp -dets_prt filename
```

Figure 8-39: Printing to Queue

RTEL Functionality

If the LPR method of printing is not adequate for an application (banners needed before jobs, more flexibility needed in printing, etc.), Lantronix-supplied RTEL software can be configured on the host. RTEL enables a host to send a print job to the ETS, rather than directly to a tty device. After installing the software and configuring connections to the ETS, normal UNIX print commands can be used and normal queue utilities (lpc, lpstat, etc.) will be usable.

RTEL's processing of print jobs is somewhat limited. If you require complex formatting of print jobs in a backend program supplied by your host (for example, post-application processing of a WordPerfect file), it may be desirable to use RTEL in conjunction with your host's program.

In order for RTEL to interface with your host's backend program, (without lp or lpr) it may be necessary to create "print pipes" on the host. The RTEL software provides this functionality by providing a unix named-pipe interface. Installing print pipes is described in detail in the RTEL man pages, provided with the RTEL source files.

To recreate the RTEL source files, copy the file RTEL_SRC.TAR from the distribution media to the Unix host. If on a Unix distribution media, look in the source subdirectory. If copying via the network a binary copy must be performed. Untar the archive using the following command [Figure 8-40]:

```
# tar xvf rtel_src.tar
```

Figure 8-40: Getting Files From Tape

NOTE *In the created directories, there will be RTEL man pages that describe the contents of the RTEL distribution and various man pages that describe the actual software functionality and installation procedures.*

PostScript Printing from TCP/IP

PostScript printing from TCP/IP requires that the PostScript attribute be enabled on the service being used [Figure 8-41]:

```
Local_1> SET PRIVILEGED
Password> SYSTEM (not echoed)
Local_1>> SET SERVICE NTX POSTSCRIPT ENABLED PORT 4
Local_1>> DEFINE SERVICE NTX POSTSCRIPT ENABLED PORT 4
```

Figure 8-41: Enabling PostScript

A very common problem when printing PostScript jobs from UNIX queues is including non-PostScript data (i.e. header or banner pages) as part of the job. Verify that when printing from a UNIX host machine, header and trailer pages are not sent.

NOTE *See the host's man pages for information on preventing header and trailer pages.*

TCP Socket Connections

If custom queuing software has been designed on a host, raw TCP/IP (or Telnet) connections can be made directly to the physical EPS ports. Opening a TCP session to port 300n will attempt a direct connection to port n on the EPS. The 30nn range of ports is 8-bit clean. If Telnet IAC interpretation is needed, form a connection to ports 200n.

If the port is in use or its access is set to **Local**, the connection will be refused at the TCP level. It is the resonsibility of the host software to retry the connection attempt.

Connections can be formed to a specific port on the ETS by using the Telnet command with the "port number" parameter. For example, to connect to serial port 3 on the ETS, first make sure the port is set to Access Remote or Access Dynamic, then issue the following command [Figure 8-42]:

```
% telnet server_name 2003
```

Figure 8-42: Telnet Command to Connect to Specific Port

A TCP socket number can also be associated with a multi-port service. This allows an application program to request a connection to a single socket and be given the next available port.

NOTE *For more information about TCP socket connections, refer to the ETS/EPS Reference Manual.*

A Technical Support

If you have reached this point, we'll assume the ETS is installed and working correctly. Congratulations! The ETS/EPS Reference Manual covers in much greater detail additional capabilities of the ETS.

Terminal Server Error Messages

In the case of a detected software error, the terminal server will attempt to report the cause and circumstances of the error to the console port to aid in tracking down the problem. A typical error message would be [Figure A-1]:

```
Panic: Out of Memory Error ....
Stack dump follows: ....
```

Figure A-1: Error Message Example

You should write down the error and these values before cycling power to the terminal server to clear the error. You should also note the current version of code running on your server (do a **Show Server** and look at the first line of the display). Please call your dealer with this error information.

Lantronix Problem Report Procedure

If you are experiencing problems with your ETS, have suggestions for additional functionality or suggestions for improving the product, please contact Lantronix Technical Support at (800) 422-7044 or (714) 453-3990. We are also reachable via Internet email, at **support@lantronix.com**.

If you are submitting a problem, please provide the following information:

- ♦ Your name, company name, address, phone number, and email address.
- ♦ Product name
- ♦ Unit serial number
- ♦ Software version (available by issuing the **Show Server** command)
- ♦ Network configuration including the output from a Netstat command
- ♦ Description of the problem
- ♦ Provide a Debug report (stack dump) if applicable
- ♦ Product status when the problem occurred. Please try to include information on user and network activity at the time.
- ♦ If the problem is with a particular port, please have the results of a **Show Port Counters** and **Show Port Characteristics** for that port.

Enjoy your ETS, and thank you.

LANTRONIX
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B Troubleshooting

Introduction

This Appendix discusses the following types of troubleshooting:

- Printing
- Power-up
- MOP
- BOOTP
- RARP
- TFTP
- NetWare

NOTE *For other types of troubleshooting (PostScript, etc.), refer to the ETS/ EPS Reference Manual.*

Printing Troubleshooting

The procedures discussed in this section begin at the most basic troubleshooting level: verifying the physical connect ion between the printer and the ETS. After these fundamental procedures are explained, more complex troubleshooting (printing from a particular host system) is covered.

Verifying the Physical Connection

The first step in troubleshooting a printer problem is verifying the physical connection between the ETS and the printer. To test a non-PostScript printer use the “**Test Port n**” command where **n** is 1 for a serial printer and 2 for a parallel printer [Figure B-1].

```
Local_1> SET PRIVILEGED
Password> SYSTEM (not echoed)
Local_1>> TEST PORT 2 COUNT 100
```

Figure B-1: Testing For PostScript Printer

This command will generate 100 lines of test data and send it out port 2.

If print data has been lost or corrupted on the serial printer, verify that transmit and receive ground (see Pinouts, Appendix C) have both been connected to DB25 pin 7, signal ground. On a parallel printer, verify that a Lantronix-supplied cable is being used.

Verifying Serial Flow Control

Verify that the printer and the ETS agree on the method to be used for flow control. The ETS defaults to XON/XOFF flow control.

To verify that flow control is working, issue a test port command and take the printer off-line momentarily. This will cause the printer to stop accepting data and will “flow control” the ETS. When the printer is placed back on-line, printing should continue with no disruption in the data.

Verifying Service Characteristics

One of the most common printing problems in the ETS service not being available. Use the **Show Service Local Characteristics** command, either from a terminal attached to port 1 or from a network login to the ETS to see service characteristics [Figure B-2].

```
Local_4> SHOW SERVICE LOCAL CHAR
Service: ETS_xxxxxx_S1      Ident: EPS1 Serial Port
      Rating: 255           Ports: 1
      Characteristics:      Queuing Rtel Connections
                            AppleTalk Netware
      Enabled Groups: 0
Service: ETS_xxxxxx_P1      Ident: EPS4 Parallel Port
      Rating: 255           Ports: 2
      Characteristics:      Queuing Rtel Connections Netware
      Enabled Groups: 0
```

Figure B-2: Show Service Command

In order for a service to be accessible from the network, its rating must be non-zero. If it is zero, the physical port is either inaccessible (access is defined as **Local**) or is in use, either by a local user or by another network host.

In addition, verify that the protocol list for the service in question has the appropriate protocols enabled.

Verifying IP address

One of the most common problems encountered is that of duplicate IP addresses on the network. Signs of this problem are Telnet/Rlogin connections that fail soon after connecting, or ARP requests that do not resolve a host known to be working. If these problems occur, make sure that the ETS has a unique IP address on the network.

If the server either loses its IP address when booting or will not allow a new IP address to be configured, it is probably an indication that another host is using that address.

ETS Queue Status

On the host system, print a file using the appropriate print command. The use the **Show /Monitor Queue** command to see if a queue entry appears in the ETS queued job list [Figure B-3].

```
Local_1> SHOW QUEUE
Posn Entry Source Node  Service    Port   Status   Source
  --       192.0.1.10   LABEPS_P1 Port2  Active   RLpr
  2  2     LAB_VAX      LABEPS_P1 N/A    Queued   RLat
  3  3     ACCT_FSERVER LABEPS_P1 N/A    Queued   Netware
```

Figure B-3: Show/Monitor Queue Command

Figure B-3 shows several entries for the parallel port. The first entry is **active**, meaning that it currently **owns** the printer attached to the parallel port. Entries numbered 2 and 3 have been queued, meaning that they are waiting for the parallel port to become available.

When printing from a host, if a queue entry never appears on the ETS, see the appropriate host section in this chapter.

Troubleshooting

Monitoring Port Counters

If an active queue entry appears, the next step is verifying that data is actually being sent to the serial or parallel port. This is accomplished by examining the port counters. Issue the command **Monitor Port <n> Counters** and examine the output bytes count [Figure B-4].

```
Local_1> SET PRIVILEGED
Password> SYSTEM
Local_1>> MONITOR PORT 2 COUNTERS
```

Figure B-4: Monitor Port Counters Command

If the output byte counter is incrementing, data is being sent to the print device. If not, verify the connection between the ETS and the printer.

AppleTalk Host Troubleshooting

Verify that the printer is actually available and selectable in the Chooser. If it is not visible, either it is configured in the wrong zone or AppleTalk is not enabled on the appropriate service.

NOTE *See Chapter 6,* ***Configuration****, for details on changing service characteristics.*

If printing via AppleTalk, make sure a consistent version of the LaserPrep file is used. If this is not possible, try testing from only one workstation to reduce version conflicts until printing is working.

Verify that both the printer and the ETS are configured to user 8-bit characters and agree on the type of flow control being used. See Chapter 6, *Configuration*, for ETS port configuration and refer to the printer's documentation for instructions on configuring the printer.

If the queue was working and stops, try reinstalling the LaserWriter driver. (The LaserWriter driver modifies itself to save configuration information and may become corrupted.)

NOTE *Refer to* ***PostScript Troubleshooting*** *in the ETS/EPS Reference Manual.*

VMS Host Troubleshooting

When configuring a LAT device on a VMS host machine using a port name, verify that:

- ♦ The nodename specified matches the server's node name. Use the Show Server command on the ETS.
- ♦ The port name specified matches the appropriate port's name. Use the List Port <n> command on the ETS. The default port names are in the format Port_X.

When configuring a LAT device on a VMS host machine using a service, verify that:

- ♦ The nodename specified matches the server's node name. Use the Show Server command on the ETS.
- ♦ The service name used matches the appropriate service name. Use the Show Service Local Characteristics command on the ETS.
- ♦ The service rating is non-zero.
- ♦ The LAT characteristic has been enabled on the service.
- ♦ On the VMS host, the LAT symbiont was specified as the queue process when the queue was created. Use the VMS command Show Queue/Full queue_name to see the queue characteristics.

If a connection attempt has been unsuccessful when initially configuring a LTA device, the LAT host software may get confused. Deleting and re-creating the LTA port is often required to clean things up.

By default, the LAT error message codes are not translated into text error messages. If a LAT job fails and appears in the queue with an eight-digit hex result code, the code can be translated by issuing the following commands [Figure B-5]:

```
$ SHOW QUEUE/FULL/ALL queue_name
(note the error code nnnnnnnn)
$ SET MESSAGE SYS$SYSTEM:LATMSG.EXE
$ EXIT %Xnnnnnnnn
```

Figure B-5: Translating LAT Error Codes

NetWare Host Troubleshooting

The troubleshooting section assumes the Novell queue was created using the Qinst utility. If the queue was created manually using PCONSOLE, either delete the queue and re-create it using Qinst or re-verify the steps.

Us the PCONSOLE utility to examine the queue and server information and verify that they match the server and service name on the ETS.

Verify that the NetWare access table will allow access to the specified file server. By default, only local (non-routed) file servers are scanned for queues. See page 8-19 for more information on manipulating the NetWare access lists.

If the login password on the ETS has been changed, ensure that the queue password on the file server has also been changed. If the passwords do not match, the ETS will not be able to log into the file servers to scan for jobs.

If there is a significant delay between NetWare jobs, it may be a result of scanning too many file server. This will be especially true if these file servers are distributed across a wide-area network. Configure the NetWare access list to only allow scanning for jobs on the file servers of interest. See page 8-19 for more information.

Power-Up Troubleshooting

If the ETS encountered a problem while booting, it will display an error message and wait at the Boot> prompt. The most common error encountered is that of a network/cabling fault so that the ETS cannot use the Ethernet correctly. It will also display an error message if its Ethernet address somehow becomes invalid.

If the Boot> prompt is displayed, type <Return> on the console terminal. If you get no response after pressing <Return> once or twice, check the terminal's setup and its connection to Port 1. If the problem persists, try another terminal or cable or try powering the ETS off, waiting 5 seconds, and then powering it on again. Also check the wiring for the terminal to ETS connection. If these suggestions do not help, call your dealer for assistance. If the terminal is usable, try to correct the problem reported by the diagnostics and cycle power to the server.

When the terminal server is powered up, it goes through the power-up diagnostics. These diagnostics first blink the LEDs to indicate that the processor can execute firmware correctly and that the LEDs are individually visible. It then tests RAM, the serial channels, and the Ethernet controller. After this, it checks the NVR (non-volatile RAM) to verify that the saved data, including its Ethernet address, has not been corrupted. If the test fails, the ethernet address is set to 00-00-00-00-00-00 (which is a known invalid address) and other server parameters are rest to factory default values.

Upon completion of the power-up diagnostics, the terminal server will attempt to boot. If the installed Ethernet address is not valid, as in the case above, the terminal server will enter the boot monitor (see Appendix D, *Boot Configuration Program*.)

MOP Troubleshooting

If the server is not booting using MOP, check the following items:

- Verify that the download file is in the directory specified by the logical named MOM$LOAD. This is the directory that will be searched by the download process.
- Verify that the file protection allows world-read permission for the download file itself and all directories in the pate. (Note that the protections should be adequate unless these directories were created by hand.) Use the **Directory/Owner/Protection** command to display the access rights to the files.
- Verify that service is enabled on the Ethernet circuit used for booting (using the NCP command **Show Circuit Characteristics**.)
- Messages are logged to the VMS system's console (and any operator consoles enabled) using the command Reply/Enable when a node requests a download file. Check these messages to verify the ETS hardware address and download filename are correct. One message should appear when the ETS requests the download file, and another when the file loading is complete.

NOTE *If the server does not boot after verifying these conditions, contact Lantronix technical support for assistance.*

BOOTP Troubleshooting

If the BOOTP request is failing and you have configured your host to respond to the request, there a few areas you can quickly check:

- ♦ Ensure that BOOTP is in your system's **/etc/services** file as a real TCP/IP service.
- ♦ In general, the terminal server needs to be in the loadhosts' **/etc/hosts** file for a host to answer either a BOOTP or TFTP request.
- ♦ The download file also has to be in the correct directory and must be world-readable for the BOOTP request to be answered. Note that BOOTP implementations frequently add a default pathname to the download filename if no explicit path is present in the configuration file. You should in general, specify the complete pathname for the download file in the BOOTP configuration file.
- ♦ Some hosts will not allow BOOTP replies across IP networks. For example, if the ETS' IP address is 192.0.1.100 and the host's is 192.0.2.30, some host operating system swill not provide BOOTP replies to the ETS. Either use a host running a different operating system, or change the ETS to be in the same IP network as the host.

In the event that the aforementioned tips don't solve the problem, the following sections detail some additional troubleshooting suggestions.

RARP Troubleshooting

If the RARP request is failing, check the host configuration. In general, the ETS' name and hardware address must be in the host's **/etc/ethers** file, and the ETS and its IP address must be in the **/etc/hosts** file. Also, many operating systems do not start a RARP server at boot time. Check the host's RARPD documentation for details, or use the **ps** command to see if there is a RARPD process running.

TFTP Troubleshooting

Verify that the TFTP has been enabled on the loadhost (i.e. the machine the ETS is using to get its boot code) by ensuring that the file **/etc/inetd.conf** has an uncommented line enabling the TFTP daemon. The **inetd.conf** file is the file most hosts use to configure their TCP/IP services. Most machines have the TFTP daemon line commented out in their default configuration file.

If the **/etc/inetd.conf** file has to be modified, the TCP/IP server process (daemon) has to be told of this via a signal. In general, find the process ID (PID) of the inet daemon using one of the following commands, and then signal the process [Figure B-6]:

```
% ps -aux | grep inetd (for Berkeley BSD UNIX systems)
% ps -ef | grep inetd (for System V UNIX systems)
```

Figure B-6: Finding Process ID of Daemon

Normally, the process is signalled by sending it a HUP signal (**kill -HUP** *inetd_pid*). For example [Figure B-7]:

```
% ps -ef | grep inetd
root   ||   1   0     ttyc0  /usr/etc/inetd
% kill -HUP 117
```

Figure B-7: Sending HUP Signal

The **/etc/inetd.conf** file is re-read whenever the UNIX host boots.

NOTE *See the man pages (**man inetd**) for more information.*

Verify Filenames

Verify that the name and case of the software download file are correct. The software file names are uppercase, but can be renamed if necessary. Note that the default action for the terminal server is to look for uppercase names.

Verify IP Addresses

Verify that the correct IP addresses have been set for both the terminal server and the download host. To do this, use the **Show Server** command at the Boot Configuration Program prompt. Both addresses should be in the same network, as gateway support is not built into the boot code. If you need to correct the IP addresses, us the **Set Server IPaddress** and **Set Server Loadhost** commands at the Boot**>** prompt to do so.

Verify the Condition of the Download File

Verify that the download file has not been corrupted. If the server appears to download properly, but does not run when the boot procedure is complete, the download file has probably been corrupted. Likely causes of corruption include downloading from the Lantronix dialup service without using binary mode or transferring a file using FTP between machines without first enabling binary mode. Loading the EPS code into an ETS model (or vice versa) will also cause this behavior.

NOTE *If the server still does not boot after verifying these conditions, contact Lantronix technical support for assistance.*

NetWare Troubleshooting Tips

If the server is not booting using NetWare, it will distinguish between 2 errors:

- Couldn't find the fileserver - the message reads "File server xxxxxx not found." Check that the fileserver name is correct, and that the fileserver is up and running. Also check that the server is on the same network as the file server.
- Couldn't get the file. Check that the path and name of the file are correct on the ETS; a forward slash (/) could accidentally been substituted for a back slash (\ ). Also, the drive must be in the pathname. Check that the directory on the fileserver is readable by the world. Verify that the download file is in the login directory itself.

If the server still does not boot after verifying these conditions, contact Lantronix technical support for assistance.

C Pinouts

When making MMJ or RJ-style cables, note that flat cable frequently has a rib or seam on one side of the cable. To create a swapped (twisted) cable, for use with most terminals, the seam should be on that same side of the MMJ/RJ jack at both ends of the cable. If the seam is on the same side as the locking tab at one end, it should be on the tab side at the other end of the cable. For modem connections, the tabs will be on opposite sides of the cable.

Figure C-1: Swapped and Straight-through Cables

A few notes about pinouts:

- Keep in mind cable length limits (discussed in Appendix G) when making serial cables.
- In the examples below, the term ETS typically refers to the ETS8, ETS16, EPS4, and EPS12.
- The modem examples below assume the use of the DSR signal from the modem. If DCD is used (see the Modem Configuration section), substitute DB25 pin 8 (DCD) for pin 6 (DSR) in the examples on page C-2.

Figure C-2: Modem Pinout Examples

Figure C-3: Printer and Modem Pinouts

A small square connector is provided with many MMJ-to-DB25 and RJ12-to-DB25 adapters. This connector is used to connect both transmit and receive grounds from the MMJ/RJ cable to the single signal ground on the DB25. See the pinouts above for details. The connector internally "splices" the two wires together and provides one wire into the DB25 connector. It consists of 2 pieces - the top half has a small metal punch-block in it, while the bottom half holds the 2 wires to be spliced. It is used as shown [Figure C-4]:

Figure C-4: Using "Splicer"

Note that it does not matter which wire extends to the DB-25 connector, only that both are connected within the "splicer". To splice the wires, insert both wires into the bottom half of the connector. You will have to cut off the end of the wire that does NOT extend through the connector. Make sure that the wire that does not extend out is in the connector as far as possible to ensure a solid connection. Carefully put the top half over the wires and press together tightly. Use a pair of pliers to make sure the connector is fully latched.

If this connector is not provided, you must insert both MMJ/RJ wires into the DB25 connector at pin 7. Ensure that both wires are in securely - intermittent serial errors may result otherwise.

The following tables give the actual pin-to-pin connections for the ETS, regardless of cable configuration. These are for use if you are making your own cables from scratch. Note that some of the table entries do not apply to the EPS1 and EPS2, as they support both DSR/DTR and CTS/RTS simultaneously. The DB25 pin numbers are the same in both cases, however.

To provide RTS/CTS flow control, the CTS output (Clear to Send) is driven by the ETS, while the RTS output (Request to Send) is driven by the modem/terminal device [Table C-1].

ETS Pin #	ETS Signal Name/ Direction	DB25 Signal Name/Pin DTR/DSR	RTS/CTS
1	DTR (out)	DSR (in) 6	RTS (in) 4
2	Transmit	Receive 3	Receive 3
3	Transmit Return	Signal Ground 7	Signal Ground 7
4	Receive Return	Signal Ground 7	Signal Ground 7
5	Receive	Transmit 2	Transmit 2
6	DSR (in)	DTR (out) 20	CTS (out) 5

Table C-1: MMJ/RJ12 to DB25 Pinout for Terminal Connections

To connect a modem to the ETS, simply reverse the cabling for a terminal [Table C-2]:

ETS Pin #	ETS Signal Name/ Direction	DB25 Signal Name/Pin DTR/DSR	RTS/CTS
1	DTR (out)	DTR (in) 20	CTS (in) 5
2	Transmit	Transmit 2	Transmit 2
3	Transmit Return	Signal Ground 7	Signal Ground 7
4	Receive Return	Signal Ground 7	Signal Ground 7
5	Receive	Receive 3	Receive 3
6	DSR (in)	DSR (out) 6	RTS (out) 4

Table C-2: MMJ/RJ12 to DB25 Pinout for Modem connections

Also, DSR can be wired to Carrier Detect, if your modem cannot force DSR to follow CD.

NOTE *Refer to your terminal equipment User's Manual for special cases.*

To connect a DB-9 style 9-pin connector to MMJ or RJ-12 connectors, use the following tables. Note 2 things: the transmit and receive returns are ALWAYS connected to Ground on the DB-9, and pins 1 and 9 (DCD and RD, respectively) are not used.

ETS Pin #	ETS Signal Name/ Direction	DB-9 Signal Name/Pin DSR/DTR	RTS/CTS
1	DTR (out)	DSR (in) 6	RTS (in) 7
2	Transmit	Receive 2	Receive 2
3	Transmit Return	Ground 5	Ground 5
4	Receive Return	Ground 5	Ground 5
5	Receive	Transmit 3	Transmit 3
6	DSR (in)	DTR (out) 4	CTS (out) 8

Table C-3: MMJ/RJ12 to DB-9 Pinout for Terminal Connections

ETS Pin #	ETS Signal Name	DB-9 Signal Name/Pin DSR/DTR	RTS/CTS
1	DTR (out)	DTR (in) 4	CTS (in) 8
2	Transmit	Transmit 3	Transmit 3
3	Transmit Return	Ground 5	Ground 5
4	Receive Return	Ground 5	Ground 5
5	Receive	Receive 2	Receive 2
6	DSR (in)	DSR (out) 6	RTS (out) 7

Table C-4: MMJ/RJ12 to DB-9 Pinout for Modem connections

Serial Limits

- ♦ Note that the Lantronix servers are RS-423 compliant, and are thus limited by the equipment at the remote end of the serial line. If the ETS is connected to an RS-232 device, it is subject to the RS-232 limits shown below. If connected to an RS-423 device, it is subject to the RS-423 limitations.
- ♦ RS-232 lines are limited to 15m (50 ft) in length. They will generally work at longer lengths, however.
- ♦ RS-423 lines are limited to 300m (1000 ft).

Figure C-5: Serial Limits

Potential Problems

When converting from a RS-423 signal to a RS-232 signal, the length and noise immunity of the connection is degraded to the least common denominator. This means that the RS-232 specification of 50 feet at 9600 baud is the maximum supported cable length. Note that in practice this distance is often exceeded, but potential noise problems may result. When cabling directly from an ETS server to a RS-423 terminal, use of twisted pair cabling is recommended for maximum noise immunity. Use of long flat cables can result in noise problems.

Some terminals act as DCE devices rather than DTE devices. When connecting these terminals to an ETS, be aware that the wiring must treat the terminal as a modem. (i.e. a DCE device) Refer to your terminal's documentation for details.

Centronics 36-Pin Parallel Cable Pinouts

The chart below shows the pin connections that are provided with Lantronix supplied Centronics parallel cables. Note that many manufacturers have changed pin functions or polarity on their own printers, and thus custom cables may be necessary. Refer to printer documentation for interfacing details.

Centronics cables can be no longer than 3m (10 ft) Signals marked by an asterisk in these charts are active-low.

DB25 Pin #	DB25 Signal Name	Centronics Signal Name	Connect to Centronics Pin
1	Data Strobe *	Data Strobe *	1
2	Data Bit 1	Data Bit 1	2
3	Data Bit 2	Data Bit 2	3
4	Data Bit 3	Data Bit 3	4
5	Data Bit 4	Data Bit 4	5
6	Data Bit 5	Data Bit 5	6
7	Data Bit 6	Data Bit 6	7
8	Data Bit 7	Data Bit 7	8
9	Data Bit 8	Data Bit 8	9
10	Acknowledge *	Acknowledge *	10
11	Busy	Busy	11
12	Paper End	Paper End	12
13	Select	Select	13
14	Autofeed	Autofeed	14
15	Error *	Error *	32
16	Initialize *	Initialize *	31
17	Select Inhibit	Select Inhibit	36
18	Ground	Logic Ground	16
19	Ground	Ground	19, 20
20	Ground	Ground	21, 22
21	Ground	Ground	23, 24
22	Ground	Ground	25, 26
23	Ground	Ground	27, 28
24	Ground	Ground	29, 30
25	Ground	Ground	33

Table C-5: Centronics 36-Pin Parallel Cable Pinouts

Dataproducts 50-Pin Parallel Cable Pinouts

The chart below shows the pin connections that are provided with Lantronix supplied Dataproducts parallel cables. Note that many manufacturers have changed pin functions or polarity on their own printers, and thus custom cables may be necessary. Refer to printer documentation for interfacing details.

Dataproducts cables can be no longer than 3m (10 ft) Signals marked by an asterisk in these charts are active-low. Digital LP32 pinouts (DEC Dataproducts version) are noted in parentheses.

DB25 Pin #	DB25 Signal Name	Dataproducts Signal Name	Connect to Dataproducts Pin
1	Data Strobe	Data Strobe	38
2	Data Bit 1	Data Bit 1	19
3	Data Bit 2	Data Bit 2	20
4	Data Bit 3	Data Bit 3	1
5	Data Bit 4	Data Bit 4	41
6	Data Bit 5	Data Bit 5	34
7	Data Bit 6	Data Bit 6	43
8	Data Bit 7	Data Bit 7	36
9	Data Bit 8	Data Bit 8	28 (30)
10	Acknowledge *	Demand	23
11	Busy	Demand	23 (26)
12	Paper End	On Line Return	5 (46)
13	Select	On Line	21
14	Autofeed	Paper Instructions	30
15	Error *	Ready	22
16	Initialize *	Buffer Clear *	31
17	Select Inhibit	Interface Conn. Verify	46
18	(Logic) Ground	Buffer Clear Return	15, 45
19	Ground	Ready Return	6, 14
20	Ground	On Line Return	5
21	Ground	Demand, Data 8 Return	7, 48
22	Ground	Data 7,6 Return	35, 42
23	Ground	Data 5,4 Return	18, 40
24	Ground	Data 3,2 Return	2,4
25	Ground	Data 1, Strobe Return	3, 37

Table C-6: Dataproducts 36-Pin Parallel Cable Pinouts

Pinouts

D Boot Configuration Program

The Boot Configuration Program (BCP) executes at power-up and provides the commands necessary to configure the ETS to boot up and function normally. The Boot Configuration Program stores parameters in the server's non-volatile memory.

For example, a typical TCP/IP configuration might use the following commands [Figure D-6]:

```
Boot> SET SERVER IPADDRESS 192.0.1.229
Boot> SET SERVER SOFTWARE /tftpboot/ETS.SYS
Boot> SET SERVER LOADHOST 192.0.1.188
Boot> SET SERVER SECONDARY 192.0.1.22
Boot> INIT 451
% Initialization begins in 5 seconds.....
```

Figure D-1: BCP Command Examples

These commands set the ETS' address, set the software load file name, and set the load host's IP address (as well as that of a backup loadhost). The server then reboots using the Init 451 command. (At this point the ETS attempts to load the file ETS.SYS from the host at 192.0.1.188.)

Until the server has been able to load its complete set of code from a load host, only a small subset of the server's full command set is available. Any unknown characters will end the line and cause the command to be aborted.

Commands

These are the commands that are available to you from within the Boot Configuration Program (BCP).

Help

Displays a one-page summary of the commands available and what they do.

Init 451

Reboots the ETS after it has been configured. If it can find the file you specified (with **Set Server Software**) it will load that file and then restart itself with full functionality. If there are no errors but the loadfile is not found, the server will attempt to load continuously (with longer intervals between attempts.) If there are errors or if the <Return> key is pressed on the console, the BCP will be reentered.

Set Server *option*

Used to tailor your configuration. LAT-loading servers only need to use the **Software** option to specify the name of the file to load. TCP/IP loaders also have to specify their own network address and that of the host to load from.

BOOTP {Enabled, Disabled}

Enables or disables the sending of BOOTP queries during the boot sequence. Default is enabled.

Hardware *xx-xx-xx*

Specifies this server's hardware address. *xx-xx-xx* is the last three numbers of the server's hardware address. The first three numbers will be supplied automatically.

CAUTION *The hardware address should have been set at the factory. Setting an incorrect address could cause serious network problems.*

Ipaddress *ip_address*

Specifies this server's IP address. Uses the standard numeric w.x.y.z format.

Loadhost *ip_address*

Specifies the host to attempt to load the file from. *ip_address* should be in the standard numeric w.x.y.z format (no text names are allowed).

Netwserver *fileserver*

Specifies the NetWare fileserver to attempt to load the file from.

RARP {Enabled, Disabled}

Enables or disables the sending of RARP queries during the boot sequence. Default is enabled.

Secondary *ip_address*

Specifies a backup host to attempt to load the file from. *ip_address* should be in the standard numeric w.x.y.z format (no text names are allowed). The backup host will be queried if the primary host does not (or cannot) load the server.

Software *filename*

Specifies the name of the file to load. The ETS will automatically add ".SYS" to the filename you specify. Note that all protocols must have a filename specified (either the default or set by the user). The defaults are ETS.SYS and EPS.SYS for the ETS and EPS, respectively.

For NetWare and TFTP loaders, you can specify the complete path name of the file (15 characters or fewer) if the file is located in a directory other than the default. For TFTP, the case of the filename must match that of the filename loaded onto your host computer.

Show Server

Show is used to display the current settings of the parameters. You should use this command before and/or after you issue other commands to see what the current setup is or has been changed to.

Flush NVR

This command is used to restore the ETS' non-volatile RAM to its factory default settings. It will reset **everything** that is configurable on the server, including the unit's IP address.

Flash

(Flash ROM equipped units only.) This command will force the ETS to download its operational code and reprogram it into Flash ROM. This is necessary, for example, if a new version of software is released and you wish to upgrade your units to this version. If the server cannot download the file, the code in Flash ROM will still be usable.

NOTE *See Appendix E for more information.*

E Updating Software

The latest version of the Lantronix Terminal Server Software, its associated release notes and manuals can be downloaded directly from the Lantronix development systems in one of two ways, via dial-in modem or using anonymous ftp through the Internet.

Comments and/or requests for help via e-mail are welcome - send them to **support@lantronix.com** and they will be routed appropriately. Questions or comments regarding the ftp/download process itself can be sent to **ftp@lantronix.com**. Mail can also be sent from within the dial-in modem menu access.

Note that due to space and bandwidth considerations, the RTEL archive available from FTP or Kermit includes source code but no executables. Machine specific binaries are available in files named *machinetype*_bin.tar. (i.e. aix executables would be in a file named aix_bin.tar) If the target machine has a C compiler and the appropriate libraries and include files, it is simplest to simply get the source code and recompile on the target system.

NOTE *See the man pages for details on building the RTEL code.*

Downloading via FTP

The server software resides on the Lantronix FTP server (ftp.lantronix.com). The current IP address of the server is 192.73.220.81, but this is subject to change at any time and the text name should be used if at all possible. The files are stored in normal and Unix compress formats (filename.Z); if you have access to the Unix uncompress utility you should get the compressed versions. Also, these files are binary data, so you must use the binary option to ftp whenever transferring the files.

To log into the FTP server, use a username of **anonymous** and enter your full email address as the password. If the FTP server cannot verify the username or email address, you will be denied access. The machine issuing the ftp command must be resolvable via the INADDR.ARPA DNS record for the connection to succeed. If access is denied, try using a "known" machine, i.e. a gateway or nameserver.

When connected to the Lantronix FTP server, the following text will be displayed [Figure E-1, page E-3].

```
% ftp ftp.lantronix.com
Connected to ftp.lantronix.com
220-Welcome to the Lantronix Ftp Server.
220-
220-To log in, type anonymous at the Name(): prompt and enter
220- your e-mail address as a password. Invalid e-mail addresses
220- will result in no access.
220-
220-Machines not resolvable via DNS will be refused all access.
220-
220-IMPORTANT: Please get the README file before proceeding.
220-IMPORTANT: Set BINARY mode before transferring executables.
220-
220-Direct questions to support@lantronix.com or 1.800.422.7044.
220-   Questions about this ftp account only to ftp@lantronix.com
220-
220 gordius FTP server (Version 2.OWU(11) Mon Feb 21 17:27:06 PST
     1994) ready.
Name (ftp.lantronix.com:susan): anonymous
331 Guest login ok, send your complete e-mail address as password.
Password: xxxx@domain.com [your e-mail address here]
230-
230-
230-          Please get the README file before proceeding.
230-
230-
230 Guest login ok, access restrictions apply.
Remote system type is UNIX. [your type will be displayed here]
Using binary mode to transfer files.
ftp>
```

Figure E-1: Lantronix FTP Session

All released files are in the pub directory. Always download the README file in the pub directory before downloading anything else as it contains a directory of available versions. It also has complete instructions for downloading the server executables, RTEL sources, release notes, etc.

Downloading from the Lantronix Bulletin Board

The Lantronix system uses Telebit T2500 modems capable of v.32, v.42, v.42bis, 9600/2400/1200 baud operation for the physical connection and the KERMIT software package for the file transfer. The modem phone number is USA (714) 367-1051. The account name is **ETS** and the password is **SERVER** [Figure E-2, page E-5].

Remember that the download files (*.SYS) are image data and should only be transferred in binary mode. If binary mode is not used, the files will be corrupted.

```
      Welcome to the Lantronix software distribution system.

File Name            Version       File Name
---------            -------       --------------------
READ.ME                ---         READ.ME
PS1.SYS              V3.1/2        [.v312]ps1.sys
ETS.SYS              V3.1/2        [.v312]ets.sys
EPS.SYS              V3.1/2        [.v312]eps.sys
ETS.SYS              V2.2/42       [.v2242]ets.sys
EPS.SYS              V2.2/42       [.v2242]eps.sys
TSCODE.SYS           V2.2/42       [.v2242]tscode.sys
PSCODE.SYS           V2.2/42       [.v2242]pscode.sys

RTEL source code (V4.1) and binaries are available in [.rtel_41]
Old RTEL source code (V3.2) is available in [.rtel_32]

Please download and read the release notes before installing
new terminal server code. (Note: this is important...)

NOTE: All software is also available via anonymous ftp at
      ftp.lantronix.com. Questions and/or comments can be
      mailed to support@lantronix.com.

Please enter your first name:   john
Please enter your last name:    smith
Please enter your company name: Widgets Inc.

                  ETS Terminal Server Main Menu
                 ------------------------------

1) Use KERMIT to Download ETS Software
2) Use KERMIT to Download Release Notes
3) Send Mail Message to Lantronix
4) List the Currently Available Uploadable Files
5) Logout

Please enter option:
```

Figure E-2: Lantronix BBS System

When downloading has been completed, use option 5 to logout of the bulletin board system.

F ETS/EPS Specifications

This appendix lists the power requirements, temperature requirements, altitude limitations, relative humidity limitations, and electrical limits of the ETS. Check these values to make sure the ETS will be able to operate correctly.

Power Specifications

Listed below are the power requirements for the ETS. Note that the unit can operate using either 110 Vac or 220 Vac voltages. There are no switches or jumpers to change for international use.

Voltage	95-250 Vac 3-wire single phase, autoranging
Frequency	47 to 63 Hz
Operating Current	0.5 Amp (maximum)
Power	30 Watts
Fuse (field replaceable)	Time-delay 2 Amp 250 V

WARNING *To reduce the risk of electric shock, in countries using an IT power system or where protective earth ground connection is not made, the ground conductor of the power cable should be connected to earth ground.*

Power Supply Cord Specifications

Cord type:	3 conductors, 1.0 mm^2 minimum conductor size (approx. 18 AWG)
Rated for:	250 Volts AC, 10 Amps
Length:	3.0 meters

The cord should have a harmonized cable type number.

NOTE *"Harmonized" refers to an internationally standardized cable description, and is prefixed by the letters HAR.*

An example of a valid harmonized cord type is:

HAR HO5VV-F 3G1.00

Connectors

The cord should terminate in a molded-on IEC 320-C13 female connector body at one end for proper insertion into the terminal server. The other end should be of a plug configuration appropriate to the country in question.

Approvals

The cord connectors you use should bear the approval mark of at least one of the following regulatory and safety agencies [Figure F-1, page F-3]:

Figure F-1: Approval Marks

ETS8/16 and EPS4/12 Fuse

Under normal use, the fuse should not need to be replaced. If it does, ensure that the proper replacement fuse is used. Never replace the fuse with the unit plugged in.

CAUTION *For continued protection against the risk of fire, replace only with the same type and rating of fuse: T2A / 250V.*

AVIS *Pour la protection continuante contre le risque d'incendie remplacer seulement par le même type et le cote de fusible: T2A / 250V.*

VORSICHT *Zum Schutz gegen das Risiko eines Brandes darf die Sicherung nur mit einer mit gleichen technischen Daten ersetzt werden: T2A / 250V.*

Temperature Limitations

Operating range:	5 to 50 C (41 to 122 F)
Storage range:	-40 to 66 C (-40 to 151 F)
Maximum temperature change per hour:	20 C (36 F)

Rapid temperature changes may affect operation. Therefore, do not operate the ETS near heating or cooling devices, large windows, or doors that open to the outside. Also, do not mount the unit on its side.

Altitude Limitations

Operating:	2.4 km (8000 ft)
Storage:	9.1 km (30,000 ft)

If you are operating the ETS above 2.4 km (8000 ft), decrease the operating temperature rating by 1.8 C for each 1000 m (1 F for each 1000 ft).

Relative Humidity Limitations

Operating:	10% to 90% (noncondensing) (40% to 60% normal recommended)
Storing:	10% to 90% (noncondensing)

There are various limits the network wiring must obey to function correctly and consistently:

- Thinwire (10BASE2) segments can be no longer than 185m (600 ft), and can have taps no closer together than 0.5m (1.5 ft) apart. There can be no more than 30 taps per segment.
- Thickwire segments can be no longer than 500m (1650 ft). Taps must be 2.5m (8 ft) apart. There can be no more than 100 taps per segment.
- 10BASE-T segments can be no longer than 100m (330 ft). Cable must be phone-grade (or better) unshielded twisted-pair (UTP) cable, RJ45 connectors.
- AUI cables can be no longer than 50m (165 ft).

Relative Humidity Limitations (cont.)

- For all media types, a total of 4 repeaters are allowed between any two nodes, connected by 5 segments of cable. A maximum of 3 segments between any two nodes can have taps on them - the others must be point-to-point links (10BASE-T or fiber). For example, if 5 segments are used to go across 4 repeaters between 2 nodes, 2 of the segments (5 - 3 = 2) must have **NO** taps on them.

Warranty Statement

Lantronix warrants for a period of FIVE YEARS from the date of shipment that each Lantronix Terminal Server and transceiver supplied shall be free from defects in material and workmanship.

During this period, if the customer experiences difficulties with a product and is unable to resolve the problem by phone with Lantronix Technical Support, a Return Material Authorization (RMA) will be issued. Following receipt of a RMA number, the customer is responsible for returning the product to Lantronix, freight prepaid. Lantronix, upon verification of warranty will, at its option, repair or replace the product in question, and return it to the customer freight prepaid.

If the product is not under warranty, Lantronix will contact the customer who then has the option of having the unit repaired on a fee basis or having the unit returned.

No services are handled at the customer's site under this warranty.

Lantronix warrants software for a period of sixty (60) days from the date of shipment that each software package supplied shall be free from defects and shall operate according to Lantronix specifications. Any software revisions required hereunder cover supply of distribution media only and do not cover, or include, any installation. The customer is responsible for return of media to Lantronix and Lantronix for freight associated with replacement media being returned to the customer.

Lantronix shall have no obligation to make repairs or to cause replacement required through normal wear and tear of necessitated in whole or in part by catastrophe, fault or negligence of the user, improper or unauthorized use of the Product, or use of the Product in such a manner for which it was not designed, or by causes external to the Product, such as, but not limited to, power or failure of air conditioning.

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Warranty claims must be received by Lantronix within the applicable warranty period. A replaced product, or part thereof, shall become the property of Lantronix and shall be returned to Lantronix at the Purchaser's expense. ALL RETURN MATERIAL MUST BE ACCOMPANIED BY A RETURN MATERIAL AUTHORIZATION NUMBER ASSIGNED BY LANTRONIX.

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