COMPUTERVISION

NTS User's Guide

Revision 23.0

DOC10117-3LA

NTS User's Guide

Third Edition

Marion Shepp

This manual documents the software operation of the PRIMOS operating system on 50 Series computers and their supporting systems and utilities as implemented at Master Disk Revision Level 23.0 (Rev. 23.0).

Printing History

First Edition (DOC10117-1LA) July 1987 for Revision 21.0
Second Edition (DOC10117-2LA) October 1988 for Revision 22.0
Third Edition (DOC10117-3LA) September 1990 for Revision 23.0

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ABOUT THIS BOOK

PURPOSE

The *NTS User's Guide* explains how to use the Network Terminal Service (NTS) software that runs on a LAN Terminal Server (LTS). The book presents an overview of NTS and explains how to use it to communicate with 50 Series™ hosts. For more advanced users, it describes how to tailor the characteristics of terminal lines and explains how to use NTS assignable lines.

AUDIENCE

The following list shows three types of NTS users and the appropriate Prime NTS manuals for each group.

Terminal users   Use an LAN Terminal Server (LTS) to connect their terminals to a 50 Series computer. Read this book.

Operators   Monitor and control NTS. Read *Operator's Guide to Prime Networks.*

System administrators   Plan, install, and configure an NTS network. Read *NTS Planning and Configuration Guide.*

ORGANIZATION

The *NTS User's Guide* contains the following six chapters, three appendices, and a glossary.

Chapter 1: What is NTS?
    Introduces NTS and the LAN network. Also explains how to use NTS in conjunction with other Prime network products.

Chapter 2: Basic LTS Commands
    Outlines the commands that all NTS users need to know in order to communicate with Prime host computers.

Chapter 3: LTS Parameters
Describes the configuration parameters that allow advanced users to customize their terminal's communication over the network.

Chapter 4: Setting Parameters
Explains how to use the commands that display and change the LTS parameters.

Chapter 5: Status Commands
Presents the commands that show the status of the LTS and the LAN network.

Chapter 6: NTS Assignable Lines
Contains information on NTS assignable lines that support printers, tape drives, and other asynchronous devices.

Appendix A: LTS Command Summary
Summarizes the LTS commands, displays their syntax, and briefly describes how to use them.

Appendix B: LTS Parameter Summary
Provides quick reference charts on the LTS parameters.

Appendix C: Administration Mode
Describes the functionality of administration mode.

Appendix D: Glossary
Defines LAN network terminology.

NEW FEATURES AT REV. 23.0

Two new features at Rev. 23.0 are modem control support and administration mode. The LTS PAD software provides basic modem control support between a server port and a connected device such as a modem or a port selector. The LTS and the attached device use RS-232-C modem signals to control communications between port and device.

Administration mode is an extension of command mode that allows a server manager to perform management functions on an LTS unit. The manager views and changes existing parameter values and establishes security levels for any port on the server.

RELATED DOCUMENTATION

These documents and their updates and release notes provide related information:

- *LTS Installation Guide* (DOC11034-3LA)

- *PRIMOS TCP/IP Guide* (DOC10155-3LA)

- *User's Guide to Prime Network Services* (DOC10115-1LA)

- *PRIMOS User's Guide* (DOC4130-5LA)

- *PRIMOS Commands Reference Guide* (DOC3108-7LA)

- *PRIMOS User's Release Document* (DOC10316-1PA)

- *NTS Planning and Configuration Guide* (DOC7532-4LA)

- *NTS Quick Reference Card* (IDR10218-1XA)

- *System Administrator's Guide, Volume II: Communication Lines and Controllers* (DOC10132-2LA)

PRIME DOCUMENTATION CONVENTIONS

The following conventions are used in command formats, statement formats, and in examples throughout this document. Examples illustrate the uses of these commands and statements in typical applications.

Convention	Explanation	Example
UPPERCASE	In command formats, words in upper-case bold indicate the names of commands, options, statements, and keywords. Enter them in either uppercase or lowercase.	**SET_ASYNC**
italic	In command formats, words in lower-case bold italic indicate variables for which you must substitute a suitable value. In text and in messages, variables are in non-bold lowercase italic.	**PORTS** *n* Supply a value for *x* between 1 and 10.
Abbreviations in format statements	If a command or option has an abbreviation, the abbreviation is placed immediately below the full form.	**STATUS** **ST**
Brackets []	Brackets enclose a list of one or more optional items. Choose none, one, or several of these items.	**LD** $\begin{bmatrix} \texttt{-BRIEF} \\ \texttt{-SIZE} \end{bmatrix}$
Braces {}	Braces enclose a list of items. Choose one and only one of these items.	**CLOSE** $\begin{Bmatrix} \textit{filename} \\ \texttt{-ALL} \end{Bmatrix}$
Braces within brackets [{}]	Braces within brackets enclose a list of items. Choose either none or only one of these items; do not choose more than one.	**BIND** $\begin{bmatrix} \begin{Bmatrix} \textit{pathname} \\ \textit{options} \end{Bmatrix} \end{bmatrix}$
`monospace`	Monospace indicates system output, for examples, prompts, error messages, and text in screens.	At the `login:` prompt

<u>Underscore in examples</u>	In examples, user input is underscored but system prompts and output are not.	`OK,` <u>`TYPE (one two three)`</u>
		`one`
		`two`
		`three`

Hyphen -	Wherever a hyphen appears as the first character of an option, it is a required part of that option.	**ESCAPE -ALL**
Asterisk in tables *	The asterisk indicates the default value.	Enabled * Disabled
Key symbol	In examples and text, the name of a key enclosed by a rectangle indicates that you press that key.	Press `[Return]`

1

WHAT IS NTS?

This chapter introduces Network Terminal Service (NTS). NTS enables your terminal to communicate with host computers over a Prime® local area network, a LAN. The chapter also shows you the range of network possibilities available through NTS. Your network can use NTS alone, or in conjunction with other Prime network products.

INTRODUCING NTS

NTS is a combination of hardware and software that allows asynchronous terminals to communicate with 50 Series computers on a LAN. (PT250™, PT200™, PST100™, and PT45™ terminals are all asynchronous terminals.) LAN products comply with IEEE 802.3, an industry standard for local area networks defined by the Institute of Electrical and Electronics Engineers (IEEE).

Ordinarily, user terminals connect by direct wiring to a single computer. On a LAN, however, all the computers and terminals connect to a common transmission medium, one network cable. A terminal attaches to the cable through an interface unit called a LAN Terminal Server (LTS). Any terminal can communicate with any computer attached to the network cable. These computers are called remote hosts because you connect to them remotely over the LAN and then use their services as a guest.

Figure 1-1 shows the difference between direct-wired terminals and terminals that connect to remote hosts over a LAN.

Note

For simplicity's sake, the drawings in this manual do not show any peripherals connected to LAN hosts.

Direct Wiring

A LAN

Q0101D10117.XA
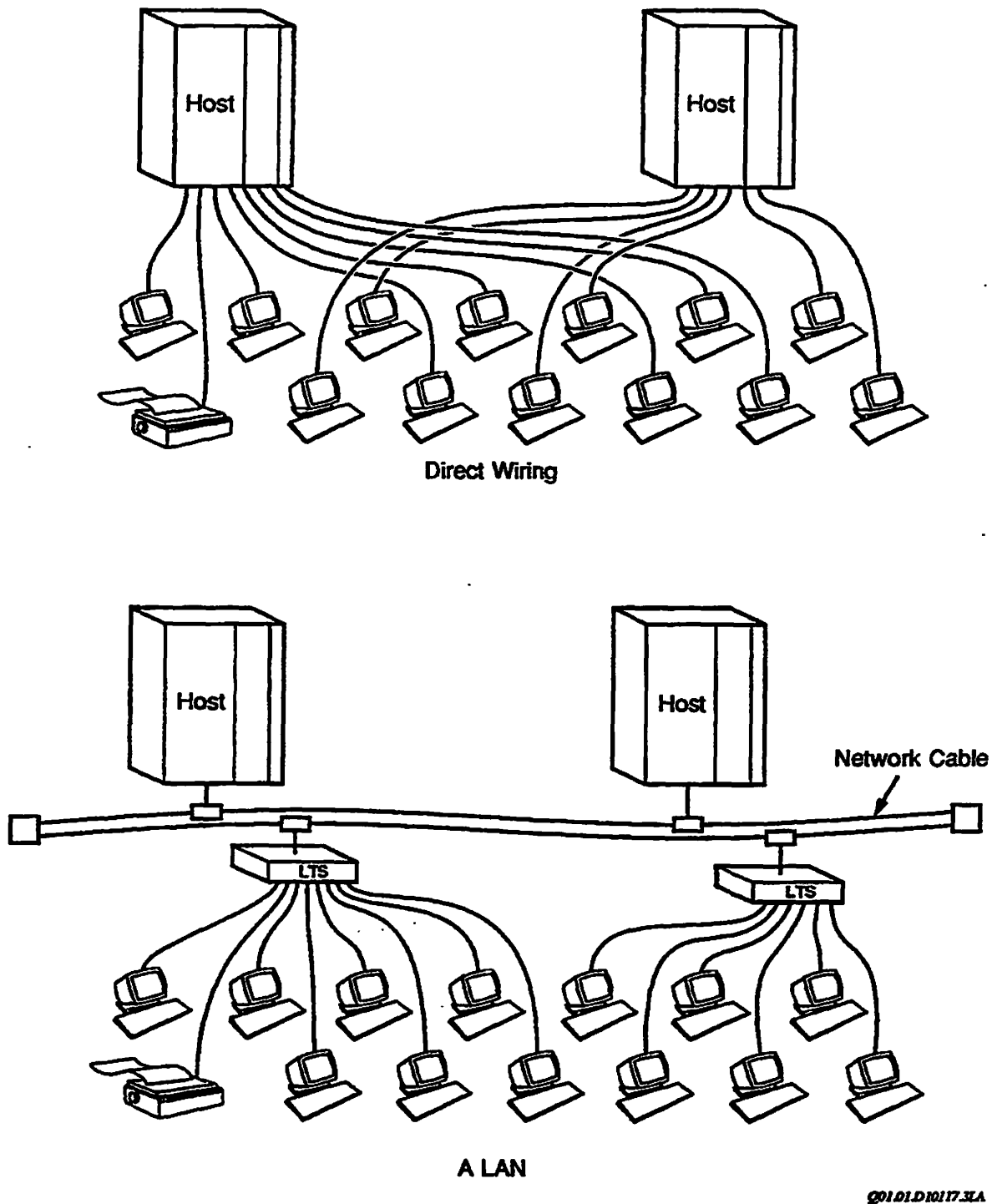
FIGURE 1-1.   Comparison of Direct-wired Terminals and a Local Area Network

To use one of the LAN computers, enter a CONNECT command and type the name of the computer you want to use. NTS establishes a connection between your terminal and that computer. When that connection is made, you can log in and start to work, as if you were using a direct-wired terminal.

To break the connection, just log out. You can then connect to a different computer on the LAN. Chapter 2, Basic LTS Commands, describes other methods to break NTS connections, but the simplest method is to log out.

Use the CONNECT command to connect to any of the computers on the LAN that your administrator has granted you access to.

The CONNECT command is the only NTS command that some users need to know. For other users, the commands in Chapter 2, Basic LTS Commands, are sufficient. To make use of the full range of NTS features, consult Chapter 4, Setting Parameters, and Chapter 5, Status Commands.

A Typical NTS Session

A typical NTS session might look like this:

```
<1>CMD: CONNECT SYSA                              1. Connect to a LAN host.


SYSA Connected.
LOGIN DAVE                           .            2. Log in.


Password?
SYSA>                                             3. Enter your password.
    .
  . .                        .
    .
LOGOUT                                            4. Log out.


SYSA Disconnected on session 1.
```

Benefits of NTS

NTS offers a number of benefits:

● Users can access multiple computers from one terminal.

● Users can establish as many as eight connections at once to the same or different hosts. Each connection is a separate session; the user can switch to another session and then return to the same place in the file or application program in the first session.

● Terminals that are not in use do not tie up valuable computer lines. NTS terminals use a line only while a connection is active.

● If one computer stops functioning, users can connect to another computer.

● Fewer cables are required, so there is less wiring congestion.

● To relocate a terminal does not require expensive rewiring between the terminal and the computer. Instead, you just plug the terminal into a LAN Terminal Server at the new location.

NTS INTERFACE UNITS

NTS uses two types of interface units to link equipment to a network cable. These units allow the network equipment to communicate over the shared network cable. Terminals, modems, and printers attach to the network cable through one type of interface unit, a LAN Terminal Server (LTS). 50 Series computers use a different type of interface unit, a LAN Host Controller (LHC), in order to attach to the network cable.

LAN Terminal Server (LTS)

A LAN Terminal Server (LTS) is a small standalone unit that supports as many as eight asynchronous terminals or printers. RS-232 cables from these devices attach to ports on the LTS, and a LAN cable from the LTS attaches to the network cable. See Figure 1-2.

Caution

Do not touch the controls on the front panel of the LTS. If you touch the controls, you can unintentionally reinitialize (restart) the LTS and disrupt communication between the LTS and any attached terminals.

Q0102DI0117.ZA
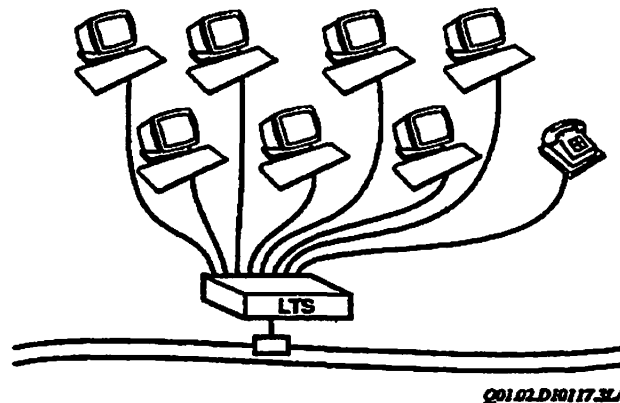
FIGURE 1-2. LAN Terminal Server

LAN Host Controller (LHC)

A LAN Host Controller (LHC) is a board that is installed inside a 50 Series host computer. The LHC controller connects the host to the network cable. See Figure 1-3.

Each LHC controller allows as many as 128 LAN terminal connections to the host at one time. (Only 32 connections are allowed if you run PRIMENET™ software on that LHC controller; see the section NTS and PRIMENET, later in this chapter.) Each host can have as many as four LHC controllers for NTS (and two more for PRIMENET). Multiple LHC controllers can attach to the same LAN cable or they can attach to different LAN cables. (More information on attaching a host to multiple LAN cables is available later in this chapter.)

LAN
Host
Controller

Q0103D10117.3LA
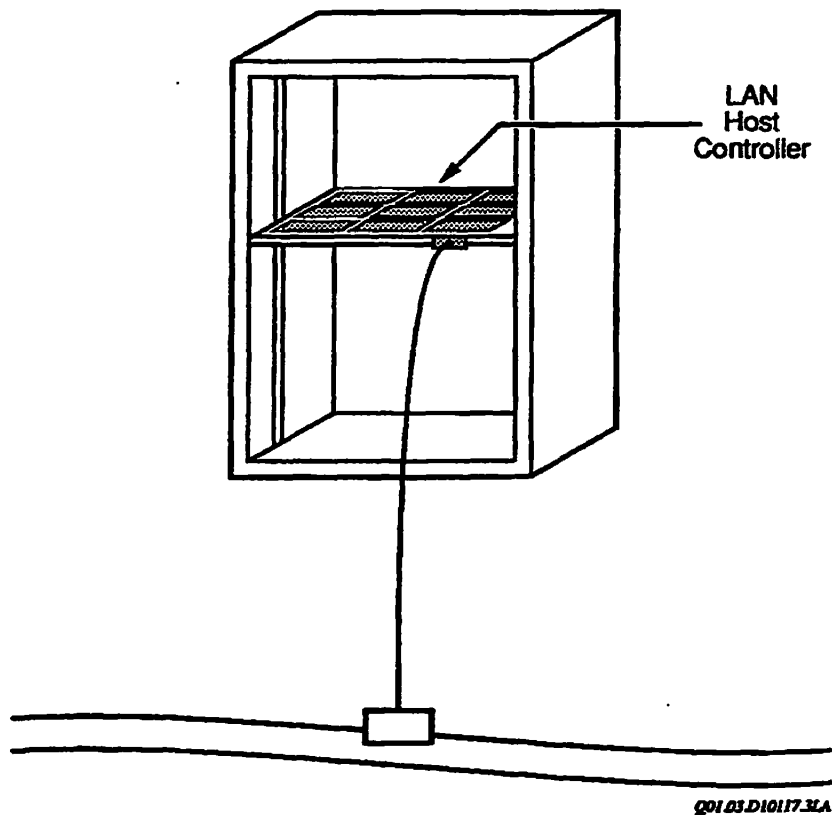
FIGURE 1-3.   LAN Host Controller Installed Inside a Host

A typical LAN network, as shown in Figure 1-4, contains 50 Series hosts (each with at least one LHC controller), several LTS units, terminals, and printers.

Q01.04.D1.0117.32A
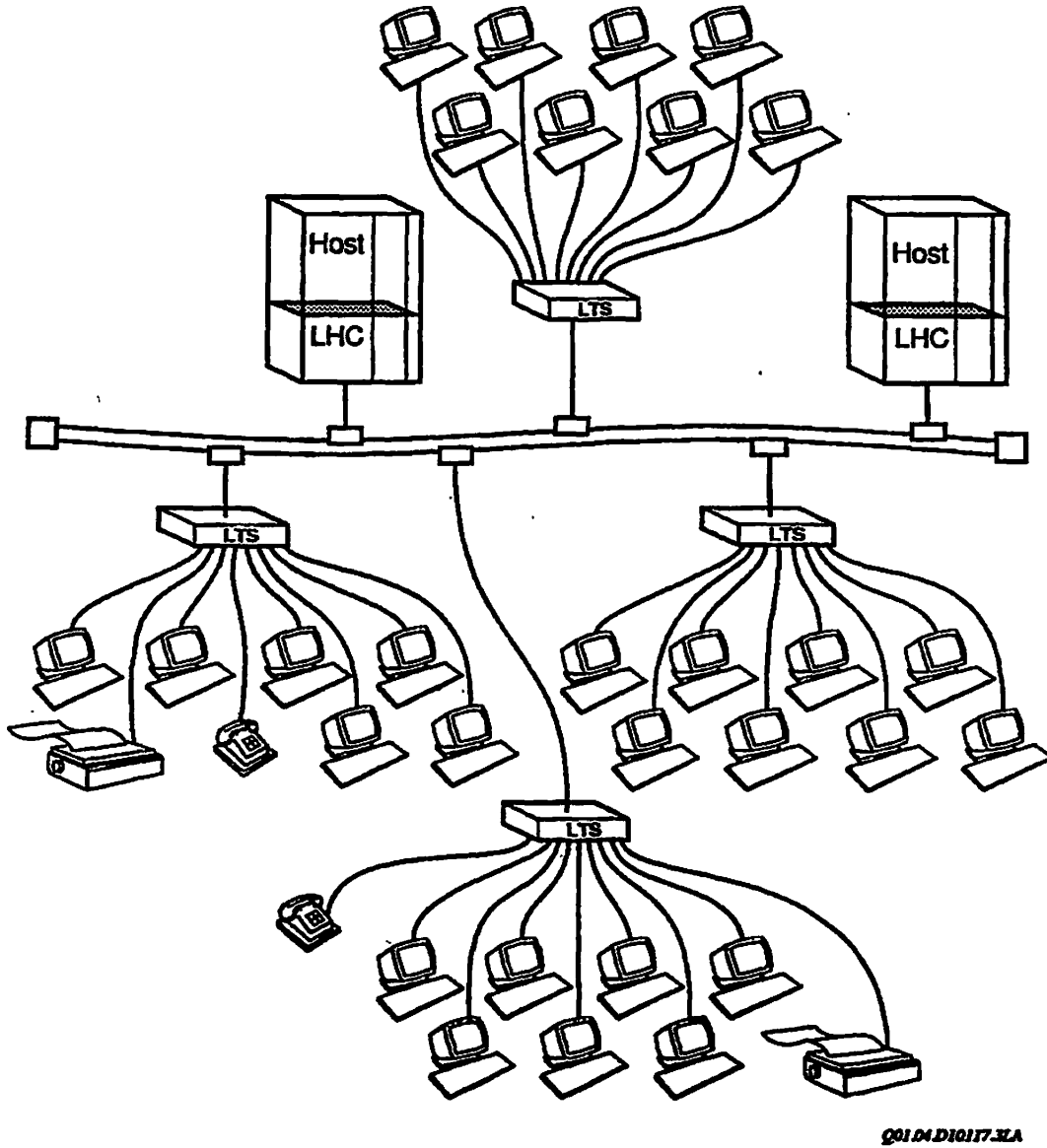
FIGURE 1-4.   A Typical LAN

MULTIPLE LAN CABLES

You can attach a host to as many as four LAN cables, provided there is a separate LHC controller for each LAN. In Figure 1-5, Host A is a 50 Series computer with two LHC controllers, each attached to its own LAN.
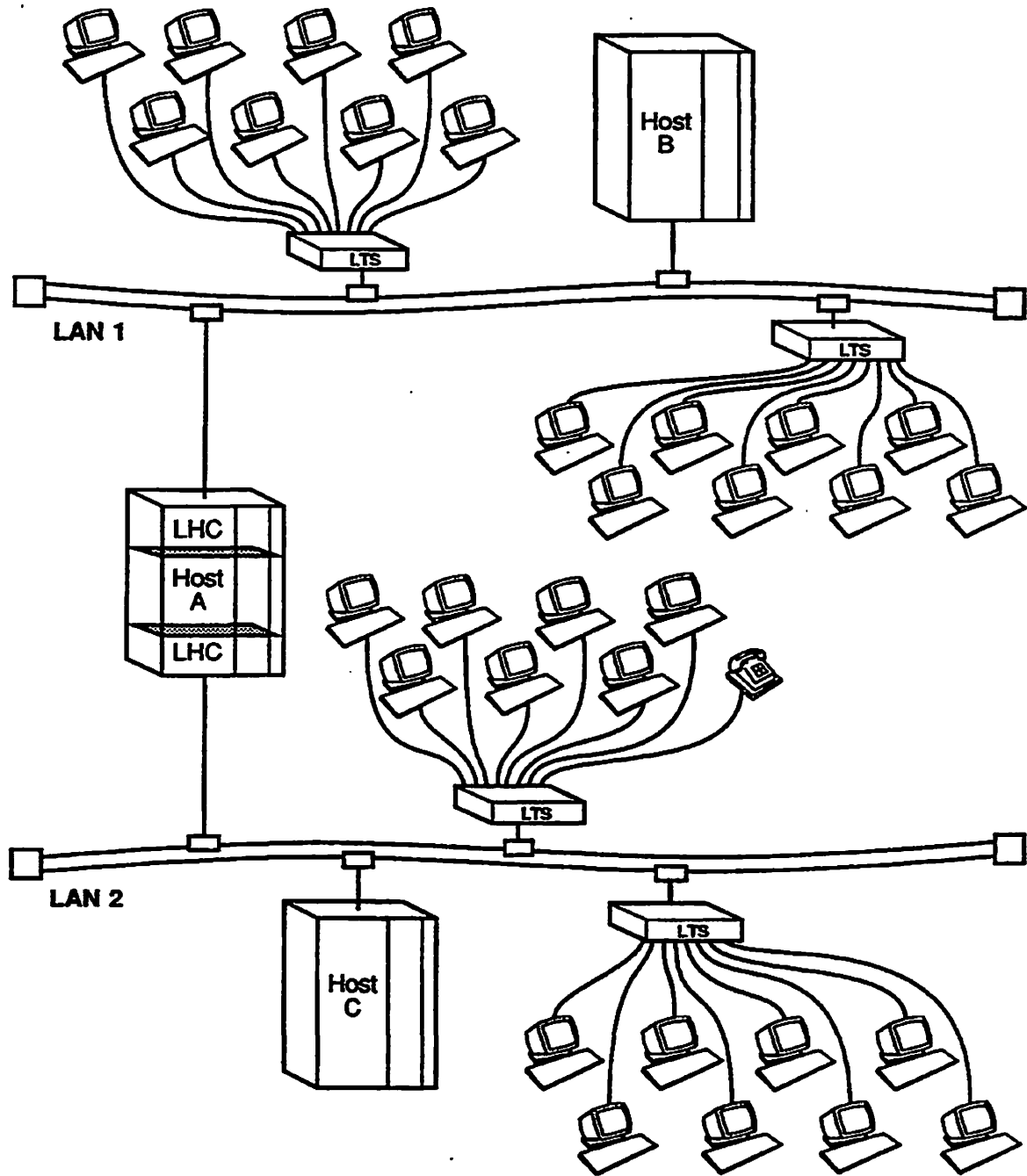
Q01.05.D10117.31A

FIGURE 1-5.   *Host Attached to Two Local Area Networks*

Terminal users on either LAN can communicate with Host A. NTS does not support connections from one LAN to hosts on another LAN. In Figure 1-5, terminal users on LAN 1 cannot connect to Host C; terminal users on LAN 2 cannot connect to Host B. (PRIMENET remote login allows terminals to access computers across LAN cables; see the next section, NTS and PRIMENET.)

Although terminal users cannot make NTS connections across LAN cables, multiple LAN cables can be useful for other purposes:

Security   Systems that need extra security can be placed on separate LAN cables.

Improved performance   A single overused LAN can be split into two networks.

NTS AND PRIMENET

NTS allows terminals to make connections to hosts; in other words, NTS supports terminal-to-host (LTS-to-LHC) connections as shown in Figure 1-6. (NTS also supports LHC-to-LTS connections for assignable lines. For more information, see Chapter 6, NTS Assignable Lines.)
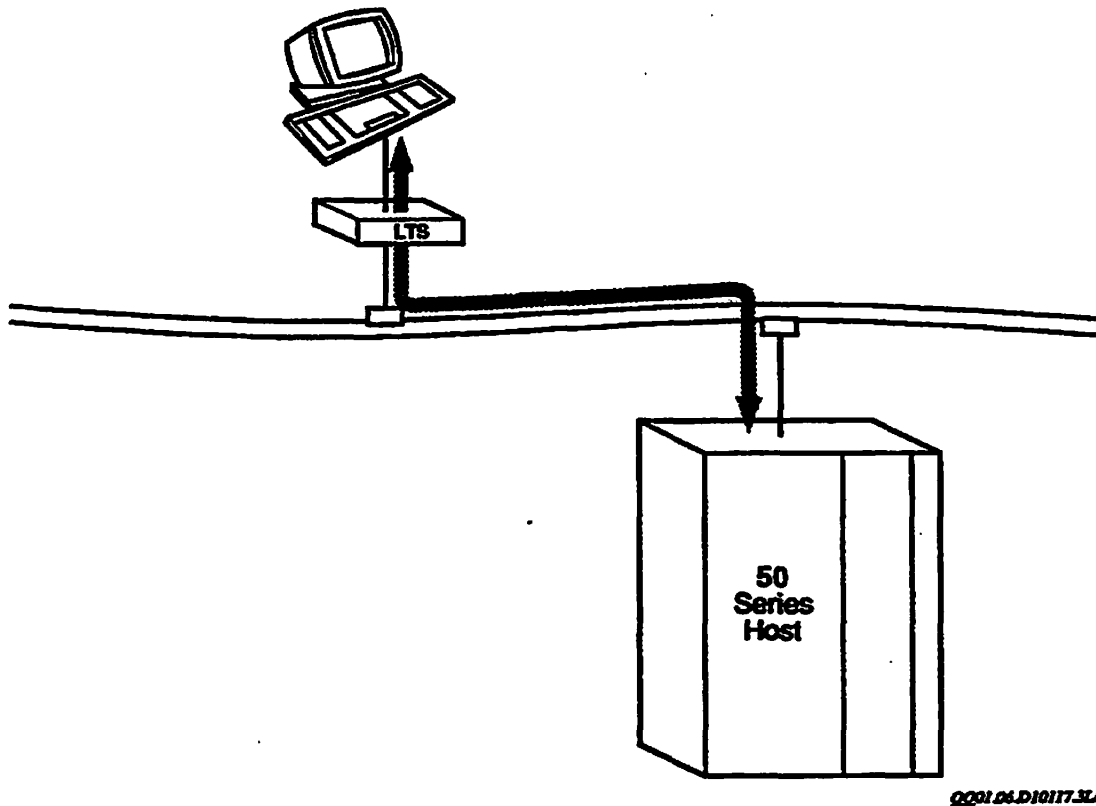
FIGURE 1-6.   NTS Allows Terminal-to-host Communication

QOI.O7.DIOII7.3LA
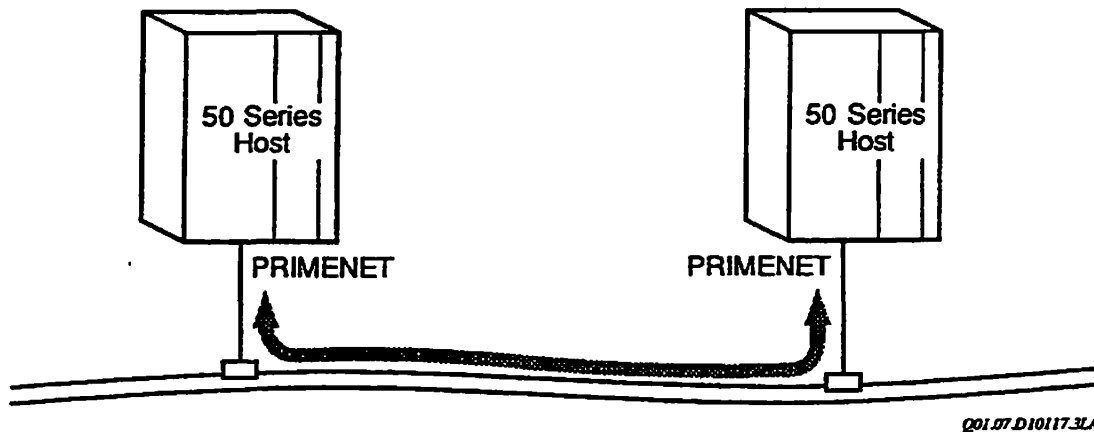
FIGURE 1-7. Host-to-host Communication Requires PRIMENET

NTS does not support connections between terminal servers (LTS to LTS) or host-to-host connections (LHC to LHC). Host-to-host connections over a LAN require PRIMENET (see Figure 1-7).

For host-to-host communication on a LAN, both hosts must run PRIMENET software and they must be configured as part of a PRIMENET network. (PRIMENET also supports communications with hosts from other vendors across LAN cables and full-duplex lines. The hosts must run network software that complies with the X.25 1984 standard.) PRIMENET can run on a LAN, a Prime ring network, a full-duplex or half-duplex synchronous line, or across a Packet Switched Data Network (PSDN). Gateway systems can route data among hosts that are not directly connected (for example, between PRIMENET hosts on a LAN and PRIMENET hosts on a ring network).

PRIMENET gives you access to PRIMENET hosts that are not part of your LAN network; for example, to PRIMENET hosts on a ring network or to PRIMENET hosts on another LAN.

Figure 1-8 shows a PRIMENET network. One part of the PRIMENET network is a LAN with Hosts A, B, C, and D.

The other part of the PRIMENET network in Figure 1-8 is a ring network. Ring networks are local area networks. The Prime ring network is called a RINGNET™ network. Hosts D, X, Y, and Z belong to a RINGNET. Host D serves as the gateway between the LAN and the RINGNET.
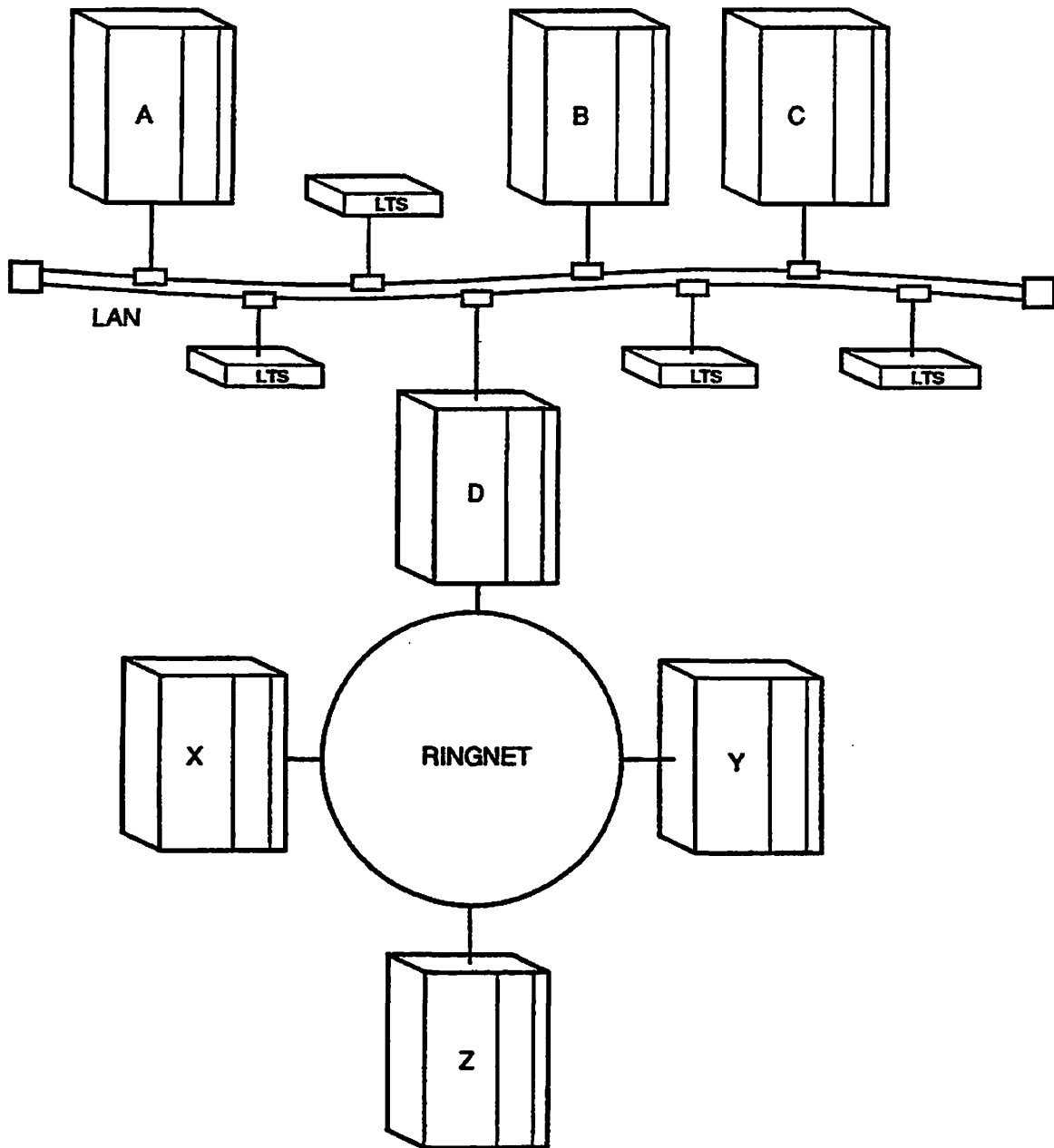
Q01.08.D10117.3LA

FIGURE 1-8.   A PRIMENET Network With a LAN and a RINGNET

If your LAN hosts are also PRIMENET hosts, you can take advantage of these PRIMENET services:

Remote file access (RFA)   To use files stored on a remote host. (You log in to one host and use files stored on another host.)

Remote login   To log in to a remote PRIMENET host. (You connect to a LAN host and, instead of logging in to that host, you log in to another PRIMENET host.)

File Transfer Service(FTS)   To transfer files between PRIMENET hosts.

NETLINK   To access another PRIMENET host or a host on a Packet Switched Data Network (PSDN), a type of public data network that offers wide-area communications to its subscribers.

For full information on these PRIMENET features, see the *User's Guide to Prime Network Services*.

Note

This discussion of PRIMENET describes potential access. In practice, the administrator at any site decides what limitations to place on access to a Prime host.

To use any PRIMENET features from an NTS terminal, first use the CONNECT command to establish a connection with a LAN host that runs PRIMENET. Then, without logging in to that host, you can use PRIMENET to log in to another PRIMENET host. For example,

```
<1>CMD: CONNECT SYSA

SYSA Connected.
LOGIN SANDY -ON SYSY
```

If you want to access a file on a remote host from a LAN terminal, use NTS to connect to a LAN host, log in, and ask for access to the file you want. PRIMENET routes your request through the gateway to another host. Figure 1-9 illustrates this process.
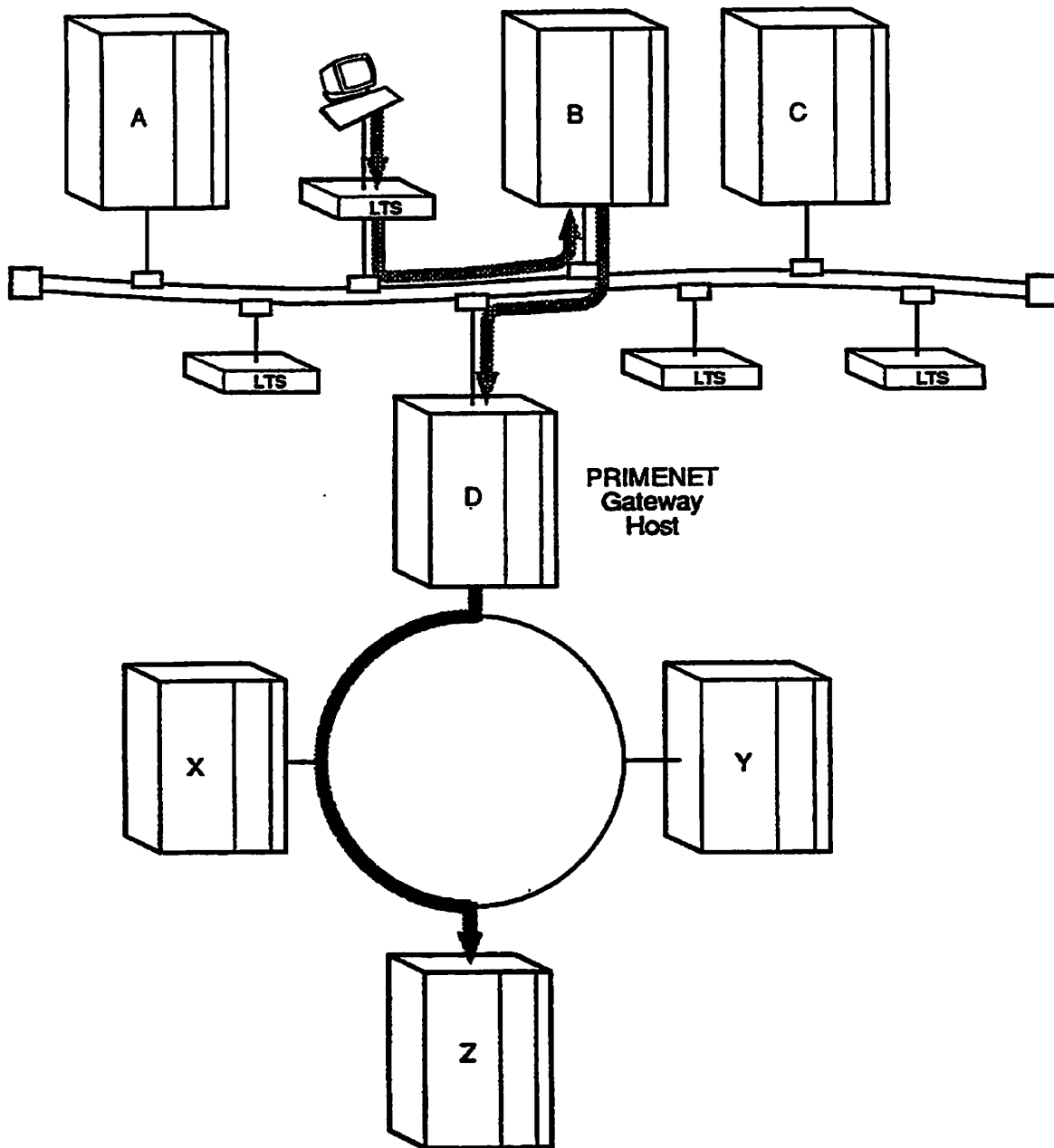
FIGURE 1-9.   Accessing a Remote File Using NTS and PRIMENET

If you want to use the PRIMENET remote login feature from an NTS terminal, first use the CONNECT command to establish a connection with a LAN host that runs PRIMENET. Then you can log in and use PRIMENET to gain access to files on other PRIMENET hosts, transfer files between PRIMENET hosts, or use NETLINK to talk to hosts on a PSDN. If a LAN host is not part of a PRIMENET network, you can connect to that host and log in, but you cannot access files on hosts that do not support PRIMENET. Similarly, you cannot transfer files between that LAN host and hosts that do not support PRIMENET.

PRIMOS TCP/IP

TCP/IP is a Prime network product that enables communication between a 50 Series host and a workstation or system running the Transmission Control Protocol (TCP) and the Internet Protocol (IP) over a LAN. Although TCP/IP uses some of the same hardware and software as NTS, TCP/IP has its own commands and functions. See the *PRIMOS TCP/IP Guide* for more information.

OTHER VENDOR'S NETWORK APPLICATIONS

An NTS host can also communicate with computer systems made by other vendors. You use NTS to connect to the appropriate LAN host, log in, and then use the host software to communicate with the destination system.

Prime products that enable communication with other systems include the following:

- NETLINK (a PRIMENET command) communicates with a Packet Switched Data Network (PSDN). Both Prime systems and systems from other vendors can subscribe to a PSDN. In Figure 1-10, Host C connects to a PSDN.

- PRIME/SNA™ enables communication between Prime computers and IBM® systems that use IBM Systems Network Architecture (SNA). In Figure 1-10, Host B uses PRIME/SNA.

- Prime Remote Job Entry (RJE) emulation packages submits jobs to other systems from Prime terminals.

- Distributed Processing Terminal Executive (DPTX) supports Prime terminals in an IBM environment.

- TELNET is the terminal communications facility that connects a local host to another host on the LAN by emulating a standardized terminal to which both hosts can connect.

- File Transfer Protocol (FTP) transfers files between dissimilar computer systems.
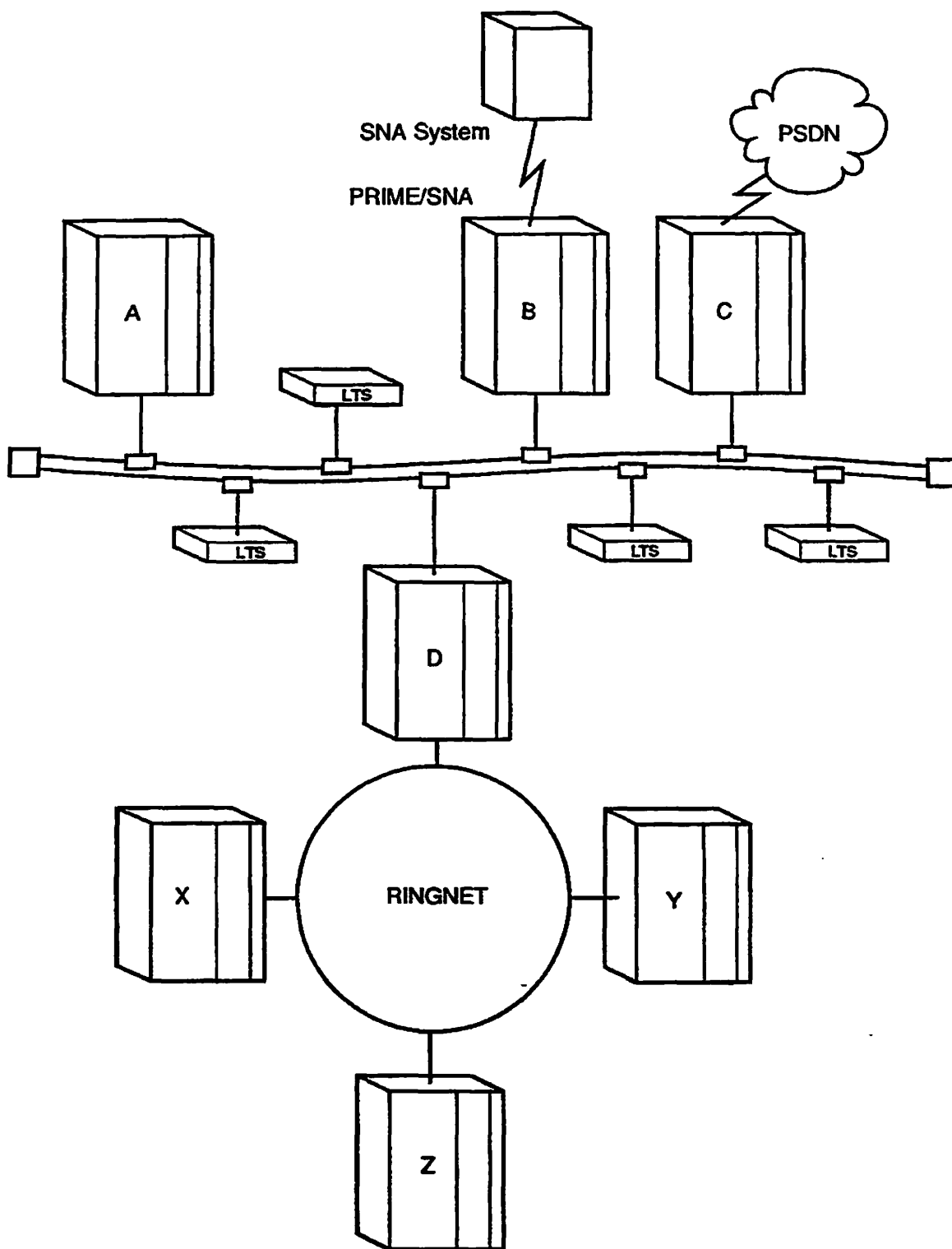
FIGURE 1-10.   A LAN With Other Prime Network Services

Q01.10.D10117.3LA

BASIC LTS COMMANDS

This chapter explains how to use the basic LTS commands to communicate with your terminal's LTS, and connect with LAN hosts. The chapter shows you how to

- Establish communication between your terminal and the LTS, in case no one has prepared your line

- Correct typing mistakes in LTS commands

- Make and break connections with host computers

- Make more than one connection to the same or different hosts

- Switch between connections

- Display the status of your connections

- Display, change, or disable the LTS escape character

- Switch from one LTS operating mode to another

- Change the LTS prompt

SUMMARY OF COMMON LTS USER COMMANDS

Table 2-1 contains a summary of the commands in this chapter. Appendix A, LTS Command Summary, contains a complete list of LTS commands.

TABLE 2-1. Common LTS Commands for NTS Users

LTS Commands (Command Mode)	Function
CONNECT	Make a connection.
DISCONNECT	Break a connection.
STATUS	Display session status.
CONTINUE	Continue a session.
SWITCH	Switch between sessions.
[Backspace]*	Erase a character.
[?]*	Erase a line.
[Ctrl] [L]*	Display the command line.
PROMPT	Change the prompt.
ESCAPE	Display, change, disable or enable the escape character.

* Or whatever character you have defined for this function.

BEFORE YOU BEGIN

After your administrator installs the network and NTS is operational, you can establish connections over the network from your terminal. Your administrator will provide you with

- The name of each LAN host you can connect to

- A user ID and password for each host

- Appropriate access rights to host files and directories

This guide assumes that you can use a 50 Series system and perform basic functions. For information on PRIMOS®, see the *PRIMOS User's Guide*, the *PRIMOS Commands Reference Guide*, and the *PRIMOS User's Release Document*.

LTS OPERATING MODES

A terminal connected to an LTS has two modes of operation: LTS command mode and data transfer mode. Figure 2-1 illustrates these two modes.

LTS Command Mode

When you turn on your terminal and press the carriage return key, you are in LTS command mode. In LTS command mode, you enter LTS commands that request connections to host computers, break connections, and change terminal parameters.

In LTS command mode, your terminal communicates only with your LTS. If you try to use PRIMOS commands during LTS command mode, the LTS cannot understand them and displays the error message Illegal command.

When you see the LTS prompt (<1>CMD: by default), you are in LTS command mode. (The number in the prompt varies depending on your current session number, as described in the section entitled LTS Sessions. You can change the text portion of the prompt with the PROMPT command, described later in this chapter.) In LTS command mode, the LTS receives your commands, interprets them, and takes the appropriate actions without needing to transmit any data over the network.

Administration Mode: Administration mode is an extension of LTS command mode. It allows a privileged user, called the server manager, to perform management functions on the LTS device. For information about administration mode, see Appendix C, Administration Mode.

Data Transfer Mode

When you establish a connection to a host computer, you enter data transfer mode. The PRIMOS prompt (OK, by default) appears on your screen. In data transfer mode, you communicate with the host over the LAN, through the LTS. Use data transfer mode to log in and accomplish whatever work you want to do at the host.

While you are in data transfer mode, the LTS does not try to interpret the characters that you type at your terminal. Instead, the LTS passes everything you type directly to the host (with two exceptions, noted below). The host then interprets the text.

For example, when you type LOGIN during data transfer mode, the LTS passes the characters to the host, which interprets them as a PRIMOS command. In the opposite direction, the LTS passes to your terminal all messages and responses sent to you from the host; the LTS does not try to interpret them.

Note

In data transfer mode, the LTS forwards all characters to the host except the LTS escape character (if the escape character is enabled) and the XON/XOFF characters (if you enable character flow control). The LTS escape character is explained later in this chapter. Chapter 3, LTS Parameters, contains information on XON/XOFF flow control.

QO2.01 D10117.32A
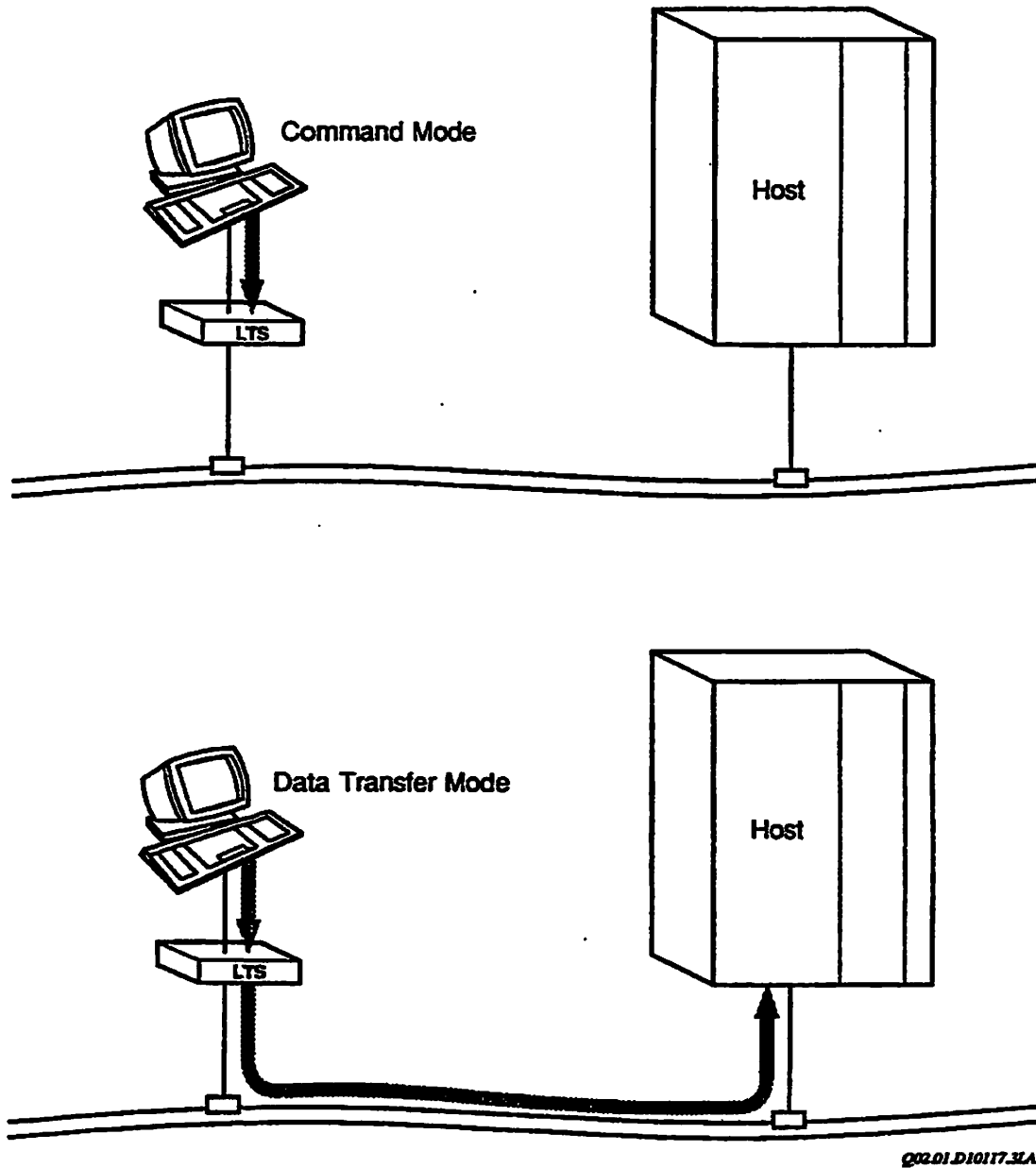
FIGURE 2-1.   LTS Command Mode and Data Transfer Mode

LTS SESSIONS

You can establish as many as eight sessions on the LTS from your port. A session is the same as a connection to a host. You can make as many as eight connections at once, or one per session. The connections can be to the same host, or to different hosts.

For example, to use a spreadsheet application to prepare a financial report on HOST A, you can make a connection to HOST A on one of your sessions. Then, you can return to LTS command mode (described in more detail later) and establish connections with HOST B for a second session, and later with HOST C, which contain databases of financial information, for a third session. You can then switch back and forth between the connections with the SWITCH command (also described later in this chapter), manually gathering information from HOST B and HOST C to type into your spreadsheet on HOST A. Figure 2-2 illustrates this scenario.

Note

You cannot pick up data from one session and place it in another session. Instead, you must manually record the data from the source session and then type it into the target session.

When you return to a session with a host, you do not have to repeat the login dialog. NTS returns you to the same position in the file or application program. However, NTS does *not* save the state of the terminal. Therefore, when you return to certain screen-oriented application programs, the cursor position and other features of the screen display can be different.
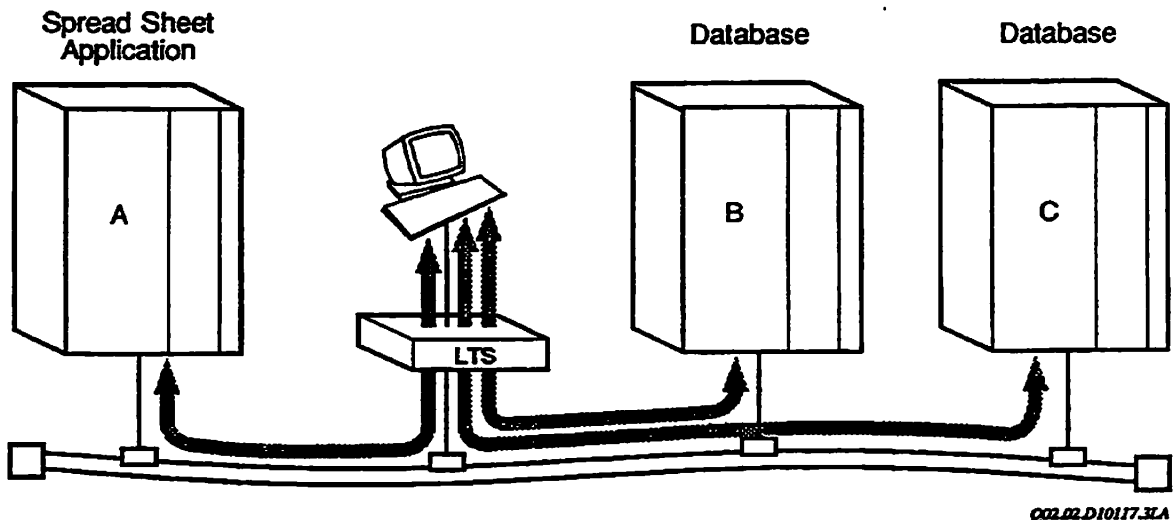
FIGURE 2-2.   Three Simultaneous LTS Sessions

Each session has a number from 1 to 8. A session is free if you have not established a connection to a host on it. It is active when you communicate with a host in data transfer mode, or active but suspended if you established a connection and then returned to LTS command mode. The STATUS command, described later in this chapter, displays the status of your sessions. The term *current session* appears frequently in this manual. When you are in data transfer mode, your current session is the one on which you actively communicate with the host. Remember, you can communicate with only one host at a time. Any other connections are active but suspended. In LTS command mode, the number of your current session is indicated in the first part of the LTS prompt, <1>CMD: by default. For example, if your LTS prompt is <3>CMD:, your current session is 3. This is important because many of the LTS commands, such as CONTINUE, DISCONNECT, and DEFAULT, act on your current session unless you specify another session.

To customize each session, you can change the text portion of the prompt with the PROMPT command, described later in this chapter. You also can establish and enable a different escape character. For more information, see the section entitled Defining the Escape Character: The ESCAPE Command. You can also change the configuration parameters for each session, as described in Chapter 3, LTS Parameters, and Chapter 4, Setting Parameters.

COMMUNICATING WITH THE LTS

If your terminal is ready to communicate with the LTS unit, your screen displays the default LTS command mode prompt, <1>CMD:. If you see this prompt, someone has already prepared your line and you can skip the next section, Preparing LTS Lines.

If you do not see the <1>CMD: prompt when you turn on your terminal and press the carriage return key (CR, RETURN, or ENTER), you may need to prepare the line yourself.

PREPARING LTS LINES (AUTO SPEED DETECT)

Before you can use an LTS line, the LTS needs to know the operating speed (baud rate) of the terminal.

1. The first person to use the line must set the baud rate by pressing the carriage return key (CR, RETURN, or ENTER) two or three times.

2. When the LTS receives the carriage return characters, it determines the terminal's operating speed.

3. The LTS then sets the baud rate parameter of your line so that it matches your terminal's baud rate. This function is called Auto Speed Detect (AUTO).

From then on, the LTS uses that baud rate to communicate with your terminal, unless you or the administrator change the baud rate parameter. See The PORT Command and Auto Speed Detect section in Chapter 4, Setting Parameters, for information about how to change the baud rate parameter.

You need to set Auto Speed Detect only once. Even if the administrator reinitializes (restarts) the LTS for network troublesooting or repair, the LTS remembers your terminal's baud rate. If an administrator or an operator has done a front panel boot and has reconfigured the EAROM, you need to perform Auto Speed Detect after the reinitialization is complete.

Note

LTS Auto Speed Detect can work correctly with the default settings on PT200, PT250, PST100, and PT45 terminals. If someone changes the terminal settings, or if you use some other type of terminal, set up the terminal as follows:

1. Set PT200, PT250, PST100, and PT45 terminals for seven bits per character with space parity or with parity ignored. (Seven bits per character with space parity or with parity ignored is the default setting for these terminals.) On these terminals, do not use the settings for eight-bit characters, because those settings are for special international character sets. For terminals made by other vendors, seven bits per character with space parity or with parity ignored should also work correctly.

2. The terminal must use one stop bit.

3. The terminal must operate at one of the following speeds:

110	2400
300	4800
600	9600
1200	19200

You can tell that Auto Speed Detect has been set successfully if you see the LTS welcome banner and startup information followed by the LTS command mode prompt. For example,

```
[LTS Rev 23.0]
Copyright (c) 1990 Prime Computer, Inc.

<1>CMD:
```

The LTS also displays the welcome banner when you issue the BANNER command (see Chapter 5, Status Commands), or whenever someone reinitializes the LTS. If the welcome banner appears after you have used your terminal for awhile, it means that the LTS has been reinitialized. If you changed any LTS parameters before the reinitialization, you may need to set the parameters again. Chapter 4, Setting Parameters, provides instructions.

As soon as you see the prompt <1>CMD:, you can issue LTS commands. (If you do not see the prompt, ask your administrator for help.)

After Auto Speed Detect is complete, you can change the baud rate, bits per character, parity, or number of stop bits to other settings. Changing these terminal characteristics is a two-step process:

1. Set the appropriate LTS parameter with the PORT or SET command. (For instructions, see Chapter 4, Setting Parameters.)

2. Change the terminal settings. Terminal settings are controlled by physical switches on some terminals and by software functions on others. For example, the PT45 terminal uses physical switches, the PST100 terminal uses physical switches and software functions, and the PT200 and PT250 use software functions only. If you do not know how to set your terminal's operating characteristics, check the manual that came with your terminal or ask your administrator for assistance.

CORRECTING TYPING MISTAKES (LTS EDIT CHARACTERS)

The LTS edit characters include

● Erase character

● Line erase character

● Line display character

See the sections below for a discussion of each character.

Use the default LTS edit characters, or define your own. If you want to define your own edit characters, read about the parameters for the edit characters in Chapter 3, LTS Parameters, and about the SET command in Chapter 4, Setting Parameters.

The LTS edit characters work only in LTS command mode. After you connect to a host computer and log in, your PRIMOS erase and line erase characters take over. Use the PRIMOS TERM command to define the PRIMOS erase and line erase characters. The -ERASE option defines the PRIMOS erase character, and the -KILL option defines the PRIMOS line erase character.

Erase Character

The LTS erase character, sometimes called the character delete character, deletes the last character you typed. The default LTS erase character is the backspace key. The PRIMOS default erase character is the double quotation mark.

For example, if you type CONNECD instead of CONNECT in LTS command mode, press the backspace key to move the cursor back over the D, and then type a T to complete the word CONNECT. Or, if you type CONNEXT, press the backspace key twice and then type the two correct characters, CT. When the command line is correct, press the carriage return key.

If you wish, you can change your LTS erase character from the backspace character to some other character with the SET command (see Chapter 4, Setting Parameters). If you use a different erase character, the cursor does not move backward on your screen as it does when you use the backspace character. Instead, the erase character appears on the command line along with the command characters. It does not visually erase anything.

For example, if you define an exclamation point as your erase character and you want to change CONNEXT to CONNECT, type two exclamation points and then the correct characters, CT. The command line then contains the prompt, the incorrect characters, the erase characters, and the correct characters.

    <1>CMD: CONNEXT!!CT

After you press CR, the LTS interprets this command correctly as CONNECT.

Line Erase Character

The line erase character, sometimes called the kill character, deletes all the characters on the command line. Use this edit character when it is easier to start the command over than to fix the mistakes. The default LTS line erase character is the question mark (?). (This is the same as the default PRIMOS kill character.)

The line erase character does not move the cursor or remove any characters from your screen display. Instead, a question mark appears on the command line, where it marks the start of a *new* line. The LTS acts on anything you type after the question mark, but it ignores anything before the question mark.

For example, if you want to enter the CONNECT command, but you type DONNECT instead, use the ? to cause the LTS to ignore all the characters you have typed so far. Then type CONNECT. The command line then contains the prompt, the incorrect characters, the line erase character, and the correct characters:

    <1>CMD: DONNECT?CONNECT

After you press carriage return, the LTS interprets this command correctly as CONNECT and ignores everything else.

To change your line erase character to some character other than the question mark, change the line erase character parameter. (Chapter 4, Setting Parameters, provides instructions.)

Line Display Character

Use the line display character to redisplay an edited command line. When you press the line display character, the LTS displays all the active characters on your current command line. The default line display character is CONTROL-L. To enter this character, hold down the key labeled CONTROL or CTRL while you press the L key.

When you use the line erase character, or when you use an erase character other than the backspace key, the command line can appear confusing. When you edit your command line, the command line can contain erased characters, edit characters, and correct characters. Sometimes it is difficult to tell which characters are which. Use the line display character to display only the characters that the LTS will act upon. The following example shows an edited command line (with the exclamation point used as the erase character), and the results of pressing the line display character:

    <1>CMD: <u>CONNEXT!!CT</u>   `Ctrl`   `L`

    CONNECT

You can tell at a glance whether your command line is now correct.

Like the other LTS edit characters, you can change the line display character. Chapter 4, Setting Parameters, provides instructions.

CHOOSING A HOST (LIST_HOSTS COMMAND)

When you are in LTS command mode, you can request a connection to a 50 Series host computer. You can connect to any 50 Series host that meets the following criteria:

- The host is attached to the same LAN as your LTS.

- The administrator has configured the network so that your LTS can make connections to that host.

- The administrator has started NTS on the host.

- You know the name of the host. (The administrator defines host names.)

After you connect to a host, you need a user ID and a password to log in, and appropriate access rights to use the files and directories on the host. To display the available hosts on your LAN, use the LIST_HOSTS command.

Command Syntax:

    LIST_HOSTS
    LH

When you issue the LIST_HOSTS command, your LTS checks to find out what host computers are currently active on its LAN. The LTS then sends your terminal a list of those hosts.

The display indicates in parentheses the number of LHC controllers in each host that runs NTS on your LAN, if the number is more than one. For example,

```
<1>CMD: LIST_HOSTS

ADMIN              ENG1 (4)           GROUP7
GROUP3             SYS36 (2)          SYS38 (3)
SYS39
```

Use this list to find out the correct names of LAN hosts or to find out which hosts run NTS. Under normal circumstances, you can connect to any host on the list. A host may fail to respond to a connect request for a number of reasons; see the section entitled CONNECT Error Messages later in this chapter.

If there are many hosts on the LAN, the list can require more than one screen. If so, you see a More? prompt at the bottom of the screen. To go to the next screen, enter Y or YES, or press CR. To cancel the rest of the display, enter N, NO, or Q. If you do not enter one of these valid responses, the LTS displays the message Please enter yes, no, quit, or just hit CR.

MAKING CONNECTIONS (CONNECT COMMAND)

To connect to a host when you are in LTS command mode, use the CONNECT command. You cannot execute the CONNECT command from administration mode. See Appendix C, Administration Mode, for more information.

Command Syntax:

CONNECT *host-name*
C

host-name is defined by the System Administrator.

To connect to a host named SYSA, enter one of the following commands:

```
<1>CMD: CONNECT SYSA
```

```
<1>CMD: C SYSA
```

Note

If you want to know what your escape character is, type the ESCAPE -ALL command before you enter the CONNECT commands. To return to LTS command mode for an application program, type the escape character for your current session. If you do not know the escape character on the session used for the connection, or if the escape character is disabled, you cannot return to LTS command mode conveniently. Instead, you must leave the host application program and enter the PRIMOS command NTS_LINE -CMD. For more information on the escape character and the ESCAPE -ALL command, see the section entitled Changing Your LTS Escape Characters, later in this chapter.

The LTS then tries to establish a connection over the LAN with SYSA. The LTS uses your current session if it is free. If your current session is active, that is, you established a connection and then escaped to LTS command mode, the LTS uses the first free session, starting at session 1. The LTS rejects the command and displays an error message if you have no free sessions. If the connection attempt is successful, the LTS displays an acknowledgment message. For example, SYSA Connected.

If you receive a similar message, you are connected to the host computer and you are in data transfer mode. You can log in and begin to work. If your attempt to log in is unsuccessful (for example, if you do not enter a valid user ID), the connection is broken automatically. You can make as many as eight connections or sessions. These connections can be to different hosts, or to the same host. Refer to the earlier section LTS Sessions for a discussion of how to use different sessions for different applications.

CONNECT Error Messages

If the LTS cannot establish the connection you requested, it displays a message that explains the reason for the problem. Some of the messages indicate a typing error or some other mistake in the CONNECT command. Other messages indicate that you need assistance from the administrator or, in some cases, from PRIME SERVICE^SM.

The messages listed below are grouped according to the probable source of the problem: user mistakes, configuration problems, or network component malfunctions. The messages within each group are listed in alphabetical order.

User Errors: The following messages usually occur because you made a mistake when you entered the CONNECT command. If you receive one of these messages, try the CONNECT command again. If necessary, use the LIST_HOSTS command to find out the correct spelling of host names.

A command line delimiter was found where one was not expected.
> No delimiters (commas, semicolons, or colons) are expected in the CONNECT command. Enter the command again, without any delimiters.

Host name is too long.
> Host names cannot contain more than six characters. Enter the CONNECT command again, with a correctly spelled host name.

Host name must start with a letter.
> Valid host names cannot begin with a number. Enter the CONNECT command again, with a correctly spelled host name.

Invalid host name.
> The host name in your connect request is incorrect. Enter the CONNECT command again, with a correctly spelled host name.

Must specify host name.
> You did not include a host name in the CONNECT command. Enter the command again and include the name of a host as part of the command.

```
Connection request rejected - No connections exist.
```
Connections are established on all eight of your sessions. Use the DISCONNECT command to disconnect one of the sessions, and then enter the CONNECT command again.

```
Only alphanumeric, . / _ $ # & are allowable host name characters.
```
You entered an illegal character (an exclamation point, for example) as part of the command. Enter the CONNECT command again, with a correctly spelled host name.

Configuration Problems: The following messages usually mean that there is a problem with the host or network configuration. Try the CONNECT command again. If you receive the same message, contact your administrator. Tell the administrator which message you received; the specific message can help the administrator locate and correct the problem.

```
Connection request rejected - Host controller(s) not responding.
```

```
Connection request rejected - Host not responding.
```

```
Connection request rejected - LTS disallowed.
```

```
Connection request rejected - NTS has not been started.
```

```
Connection request rejected - No NTS PRIMOS connections available.
```

```
Connection request rejected - Version number mismatch.
```

```
No available connections at the requested host.
```

```
Unable to locate the requested host.
```

Network Component Malfunctions: The following messages can indicate a temporary problem somewhere on the network. Try the CONNECT command again. If you continue to receive one of these messages, some network component may not be operating correctly. Report the specific message to your administrator.

```
Connection request rejected by host controller(s).
```

```
Connection request rejected - NME could not log the connection.
```

```
Connection request rejected - No resources available.
```

```
Connection request rejected - Protocol error.
```

```
No buffers available to make the request.
```

CHECKING SESSION STATUS (STATUS COMMAND)

The STATUS command displays information about all of your active sessions; that is, the sessions on which you have a connection to a host. It also displays your current session and marks it with an arrow even if it is free. For each connection, STATUS tells you the host to which you are connected (node name is the same as host name), its LAN address, and the number of packets received and transmitted during the connection. Only active sessions can transmit and receive packets. The LAN address and the number of packets assist the administrator to troubleshoot problems. STATUS also indicates the state of each session: not active, connecting, connected, or disconnecting. For a complete description of these session states, refer to Chapter 5, STATUS Commands. If you enter STATUS when you have no connections established, the LTS displays No active connections. In the example below, the user enters the STATUS command on session 3, a free session.

```
<3>CMD: STATUS
    Session                                              Packets
Number  State        Host Name    Network Address    Transmitted/Received
    1   connected    PAUL         08-00-2F-01-18          141/18
    2   connected    PETER        08-00-2F-03-F1         23632/1384
  ->3   not active
    4   disconnecting JOHN        08-00-2F-03-1D        5848393/25032
    5   connected    TOM          08-00-2F-04-32          503/487
    8   connected    DICK         08-00-2F-05-2C         9163/205
```

BREAKING CONNECTIONS (LOGOUT AND DISCONNECT COMMANDS)

You can end a session with a LAN host in one of three ways:

● The PRIMOS command LOGOUT.

● The LTS command DISCONNECT.

● Turn off your terminal for at least ten seconds.

Turning off your terminal does not work if you disable the DTR connection control parameter. For information on DTR connection control, see Chapter 3, LTS Parameters.

Note

At Rev. 22.0, the QUIT command is no longer supported. Use DISCONNECT -ALL instead.

LOGOUT Command

The PRIMOS command LOGOUT is the recommended way to break your connection to an NTS host when you are in data transfer mode. LOGOUT logs you out of the host computer and breaks your NTS connection in one step. After the connection is broken, the line you used becomes available for other NTS users. In the following example, the user logs out of the host computer called SYSA. LO is an abbreviation for LOGOUT.

```
OK, LO
SYSA Disconnected on session 1.
<1>CMD:
```

DISCONNECT Command

The DISCONNECT command breaks an NTS connection when you are in command mode. You cannot execute this command from administration mode. See Appendix C, Administration Mode. You can break the connection on your current session, another session, or all sessions at once. Once a session is disconnected, it is free. You can then use it to make another connection.

Command Syntax:

$$\text{DISCONNECT} \atop \text{D} \qquad \begin{bmatrix} \text{-ALL} \\ n \end{bmatrix}$$

After you break the connection, PRIMOS automatically logs you out. However, because the connection is already broken, you do not receive any logout messages.

The Current Session: When you enter DISCONNECT without a session number or with the -ALL option, the LTS breaks the connection on your current session. In the following example, the user enters DISCONNECT to break the connection to the host BIXBY on the current session, session 2. The first part of the prompt indicates the session number.

```
<2>CMD: D
BIXBY Disconnected on session 2.
```

A Specific Session: To break the connection on a session that is not your current session, enter DISCONNECT followed by the number of the target session. To list the session numbers of all your connections, use the STATUS command, described in the earlier section entitled Checking Session Status (STATUS Command). For more information about switching see the section entitled Switching Between Sessions (SWITCH Command). For example, to break the connection on session 8 when session 2 is your current session, enter the following command:

```
<2>CMD: D 8
BOBO Disconnected on session 8.
<2>CMD:
```

All Sessions: To break the connections on all of your sessions at once, enter DISCONNECT -ALL. The LTS terminates all open connections and makes session 1 your current session. DISCONNECT -ALL prevents you from having to break each connection individually when you are finished with your work. PRIMOS automatically logs you out as the connections are broken. In the following example, the user had three active connections before entering DISCONNECT -ALL.

```
<3>CMD: DISCONNECT -ALL
BIXBY Disconnected on session 1.
BOBO Disconnected on session 2.
ZIPPO Disconnected on session 3.
<1>CMD:
```

DISCONNECT Error Messages: The DISCONNECT command can fail for the following reasons:

`A command line delimiter was found where one was not expected.`
The DISCONNECT command does not accept delimiter characters.

`No connection exists.`
You entered a disconnect request when you were not connected on the current session (DISCONNECT), or the target session *n* (DISCONNECT *n*).

`No connections exist.`
You entered DISCONNECT -ALL when you were not connected on any sessions.

`No resources available to make the disconnect request.`
The LTS cannot process your request because it is busy. Try the command again. If the problem persists, contact your administrator.

`Option other than those allowed has been specified.`
You entered an option other than -ALL, the only one accepted by DISCONNECT.

`Session number out of range (1 - 8).`
You entered a session number other than 1 through 8.

Messages on Unrequested Disconnects: During normal operation, you stay connected to a LAN host until you break the connection. In special situations, however, the LTS may break a connection on its own. If you receive any of the following messages, the LTS has broken your connection. The messages are listed in alphabetical order.

`Disconnecting because DTR disappeared.`
The LTS broke the connection because the Data Terminal Ready (DTR) signal from your terminal disappeared for more than 10 seconds. For more information, see the section DTR Connection Control in Chapter 3, LTS Parameters.

`Disconnecting because the host is down.`
The LTS broke the connection because the other end of the connection, the LAN host, is no longer active.

`Disconnecting due to version number mismatch in configuration block.`
The LTS broke the connection because the version of software running at the host (in the LHC) is not compatible with the version of software running in the LTS. Contact the administrator.

`Disconnecting due to protocol error.`
The LTS broke the connection because of a communication failure between the LTS and the LHC at the other end of the connection. Try again. If the problem recurs, contact the administrator.

Turning Off Your Terminal

If the other methods fail, to break a connection turn off your terminal for at least 10 seconds. (This option does not work if you disable the DTR connection control parameter. For information on DTR connection control, see the section, DTR Connection Control, in Chapter 3, LTS Parameters.)

Caution

Do not turn your terminal off and on rapidly. This can damage the device.

DEFINING THE ESCAPE CHARACTER (ESCAPE COMMAND)

The LTS ESCAPE command displays the current LTS escape character, changes the escape character, disables the escape character temporarily so that you can use all characters as data, or reenables the escape character. You can perform all of these functions for your current session, or for all eight sessions at once. Also, you can save the escape character permanently in Electrically Alterable Read-only Memory (EAROM). The SET command also changes or disables the LTS escape character, as explained in Chapter 4, Setting Parameters. You must be in LTS command mode to use it.

Command Syntax:

$$
\text{ESCAPE} \atop \text{ESC}
\quad
\begin{bmatrix}
escape\_character \\
\begin{Bmatrix} -OFF \\ -ON \end{Bmatrix} \\
-ALL \\
-DEFAULT
\end{bmatrix}
$$

Information about all of the above options appears in the following sections.

Using the LTS Escape Character

The default LTS escape character is [Ctrl] [\]. To type this character, hold down [Ctrl] while you press [\].

When you are in data transfer mode, use the LTS escape character to enter LTS command mode. You do not need to break a connection with a LAN host in order to return to LTS command mode. You can maintain the current connection and return to LTS command mode temporarily by using the LTS escape character. The escape character does not need to be the first or only character on a line. For this reason, you need an escape character that you do not use during your normal work. Otherwise, you can switch to LTS command mode when you have no intention of doing so.

Note

If you use the LTS escape character by mistake, use the CONTINUE command to resume your session with the host. (A discussion of the CONTINUE command appears later in this chapter.)

Most of the time, you can probably use [Ctrl] [\], the default LTS escape character, without any problems. Sometimes, however, you may need to use [Ctrl] [\] as an ordinary character in an application. For example, an application program can use [Ctrl] [\] to perform a function within that program. The LTS allows you to change the escape character to some other character, or to disable the LTS escape character entirely. Then you can use [Ctrl] [\] in the program. Information about how to change your LTS escape character appears in the section, Changing Your LTS Escape Characters, later in this chapter.

Examine each application program that you plan to use so that you can determine whether or not you use a particular LTS escape character to perform a function in the program. For example, the default LTS escape character, [Ctrl] [\], has a defined function in PRIMELINK™. If you use PRIMELINK, do not use [Ctrl] [\] as your escape character.

Displaying the LTS Escape Characters

If you forget which character is the escape character or whether it is enabled, you can find out by using the ESCAPE command. You can also type ESCAPE -ALL to display the escape characters and their status (enabled or disabled) for all eight sessions.

A Specific Session: To check the escape character and its status for a specific session, make that session your current one with the SWITCH command and then enter the ESCAPE command. In the following example, the user checks the escape character for session 3. The escape character for session 3 is [Ctrl] [\], (or ^\), the default; it is enabled.

```
<1>CMD: SWITCH 3
<3>CMD: ESCAPE
Session #     Escape Character     Status
    3               ^\             ENABLED
```

All Sessions: To display the escape characters and their status (enabled or disabled) for all of your sessions, type ESCAPE -ALL. In the following example, all of the escape characters are enabled except for the one for session 4. All of them are the default escape character, ⎡Ctrl⎦ ⎡\⎦, except for the ones for sessions 2 and 7, which are # and ?. For information about how to change, disable, and reenable escape characters, see the section entitled Disabling and Reenabling the Escape Character, later in this chapter.

```
<1>CMD: ESCAPE -ALL
Session #     Escape Character    Status
    1                ^\          ENABLED
    2                #           ENABLED
    3                ^\          ENABLED
    4                ^\          DISABLED
    5                ^\          ENABLED
    6                ^\          ENABLED
    7                ?           ENABLED
    8                ^\          ENABLED
```

Changing Your LTS Escape Character

You can define a different escape character and enable or disable it for each of your sessions, or for all sessions at once. For example, you could define an escape character that does not interfere with PRIMELINK for session 1, and then always use session 1 to connect to the host where you use PRIMELINK. In this way, you can set up a set of convenient escape characters once and then use them simply by choosing the right session number for each connection.

A Specific Session: To change the escape character for a session, make the session your current one with the SWITCH command and then type ESCAPE followed by the new escape character. See the section Switching Between Sessions (SWITCH command), later in this chapter, for information about SWITCH. For example, to change the escape character to $ on session 5 from another session, enter the following commands:

```
<2>CMD: SWITCH 5
<5>CMD: ESCAPE $
```

You can use any character as the LTS escape character, except for the following:

● The LTS reserved characters: carriage return, space character, semicolon, colon, comma.

● The LTS command mode edit characters: erase character, line erase character, line display character. The default edit characters are backspace, question mark, and ⎡Ctrl⎦ ⎡\⎦.

● XON or XOFF characters: ⎡Ctrl⎦ ⎡Q⎦, ⎡Ctrl⎦ ⎡S⎦.

A combination of ⎡Ctrl⎦ and any other character counts as only one character. To define ⎡Ctrl⎦ and another character as the LTS escape character, press ⎡Ctrl⎦ and hold it while you type the other character. However, because they have other LTS functions, you cannot use

⌈Ctrl⌉ ⌈Q⌉ or ⌈Ctrl⌉ ⌈S⌉ (or ⌈Ctrl⌉ ⌈L⌉ if that is your line display character). ⌈Ctrl⌉ ⌈A⌉ is often a good substitute for the LTS default escape character, ⌈Ctrl⌉ ⌈\⌉.

Note

If you are a NETLINK user, make sure that your LTS escape character is different from the NETLINK escape character. If the escape characters are the same, typing an escape character always returns you to LTS command mode. You cannot return to NETLINK command mode during a NETLINK session if the two escape characters are the same. The default NETLINK escape character is @.

All Sessions: You can change the escape character for all sessions at once by the same method you use to change it for a single session (described above), except that you must use the -ALL option. To change the escape character to * for all of your sessions, enter the following command:

    <2>CMD: ESCAPE * -ALL

Disabling and Reenabling the Escape Character

To use the LTS escape character as an ordinary character, disable the escape character. For example, you might want to use a host application program that utilizes every character on the keyboard. You can disable or reenable the escape character for a specific session, or for all sessions at once.

Note

After you disable the LTS escape character, you can still return to LTS command mode during a connection. Use the PRIMOS command NTS_LINE -CMD, explained below.

Disabling or Reenabling the Escape Character for a Specific Session: To disable the LTS escape character for your current session, use the escape character to enter LTS command mode and type the ESCAPE command with the -OFF option:

    <1>CMD: ESCAPE -OFF

To reenable the LTS escape character, use the -ON option:

    <1>CMD: ESCAPE -ON

To enable or disable the escape character for a session that is not your current session, first switch to that session with the SWITCH command and then enter ESCAPE -ON or ESCAPE -OFF. For example, to enable the escape character on session 2 when your current session is number 1, enter the following commands.

    <1>CMD: SWITCH 2
    <2>CMD: ESCAPE -ON

You can change your escape character and enable or disable it at the same time. Enter ESCAPE, the new escape character, and then -ON or -OFF. For example, to define an exclamation point as the LTS escape character and turn off the escape character function in a single command, enter

<1>CMD: <u>ESCAPE ! -OFF</u>

Disabling or Reenabling the Escape Character for All Sessions: To disable the escape character for all of your sessions, enter ESCAPE -OFF -ALL. To reenable the escape character for all sessions, enter ESCAPE -ON -ALL. You can also change the escape character and disable or reenable it at the same time:

<1>CMD: <u>ESCAPE ^ -OFF -ALL</u>

It does not matter which session is your current one when you enter the command.

Saving Your Escape Information Permanently

If you use the -DEFAULT option when you define a new escape character, the LTS activates the new character for your current session and also saves the character in Electrically Alterable Read-only Memory (EAROM). Likewise, if you use the -DEFAULT option when disabling or reenabling the escape character, the LTS disables or reenables the escape character for your current session and also records in EAROM that the character is enabled or disabled. You can perform the same function with the SET -DEFAULT command, described in Chapter 4, Setting Parameters. For example, the following command changes the escape character to & for the current session and saves the new escape character in EAROM.

<2>CMD: <u>ESCAPE & -DEFAULT</u>

The following command performs the same functions, but it also disables the escape character, both for the current session and in EAROM.

<2>CMD: <u>ESCAPE & -OFF -DEFAULT</u>

You can save only one escape character and escape character status (disabled or enabled) in EAROM, not one for every session. If the LTS is powered off and then on again, anything stored in EAROM is still available. The LTS gives all sessions the escape character stored in EAROM and enables or disables the escape characters for all sessions, as indicated in EAROM.

Without the -DEFAULT option, however, the new escape character is stored in Random Access Memory (RAM) only. Unlike the contents of EAROM, RAM contents are lost when the LTS is powered off or reinitialized. When the LTS begins to function again, it reactivates the factory default LTS escape character ([Ctrl] [\]) and enables it. If you used the -DEFAULT option previously, the character and status (enabled or disabled) are stored in EAROM. Chapter 4, Setting Parameters, contains more information about EAROM. Figure 2-3 shows the ESCAPE command with and without the -DEFAULT option.
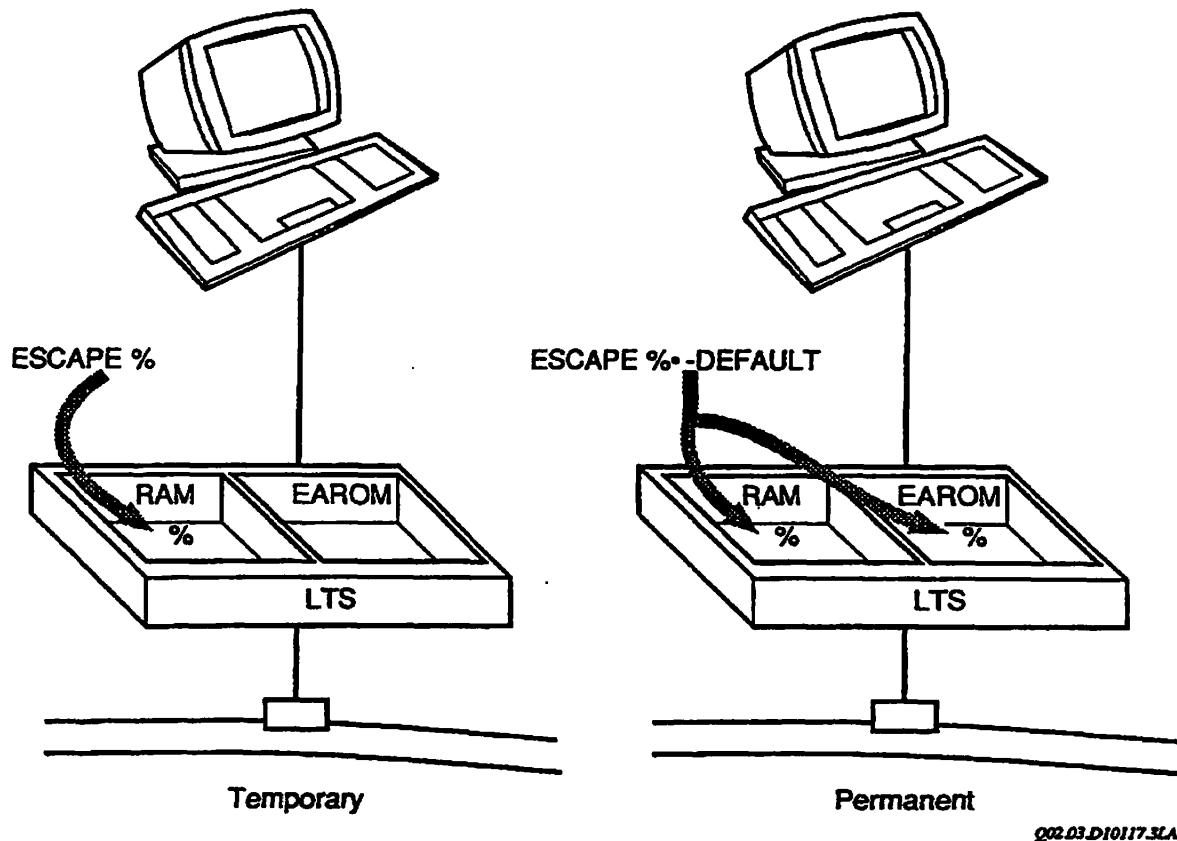
FIGURE 2-3.   *Temporary and Permanent Escape Characters in RAM and EAROM*

What to Do When Problems Occur

To correct most problems with the escape character, change or disable the LTS escape character. The only other problems occur in unusual conditions, when the network is so busy that network traffic slows down or stops. The potential problems, and the steps you can take to avoid or solve them, include the following:

You typed the LTS escape character by mistake.
Type CONTINUE to go back to your session with the host.

You need to use the LTS escape character as an ordinary character.
Define a different character as the LTS escape character using the ESCAPE command.

You use an application that requires the entire character set.   There is no character you can use for an escape character.
Disable the LTS escape character temporarily using the ESCAPE command or use the PRIMOS command NTS_LINE -CMD (explained later in this chapter).

The host did not respond to the last few characters typed before you escaped to LTS command mode.
The host never received those characters because of network congestion. The LTS was not able to forward your characters to the host immediately. When you typed the escape character, the LTS put you into LTS command mode and discarded the characters it was waiting to send. To avoid this problem, do not type the LTS escape character until all the characters you type appear on your terminal screen. If the characters appear on your screen, you can be sure that the host received those characters.

The characters you typed did not appear on your screen and nothing happened when you typed the LTS escape character.
Network traffic has halted. Your terminal is not forwarding any characters to the LTS. To escape to LTS command mode in this situation, turn your terminal off, wait at least ten seconds, and turn it back on. The LTS breaks the connection and returns you to LTS command mode. (If you disabled the DTR connection control parameter, type the escape character again after you turn the terminal on. Then use the DISCONNECT command to break the connection.)

Note

For more detailed information on how network traffic can affect the LTS escape character, see the information on flow control in Chapter 3.

ESCAPE Command Error Messages

If your ESCAPE command does not execute, the LTS displays one of the following error messages. The messages are listed in alphabetical order.

`A command line delimiter has been found where one was not expected.`
You entered a comma, semicolon, or colon. The LTS does not allow you to use any of these characters as an escape character.

`An escape character or the -ON/-OFF options must be entered when the -DEFAULT option is used.`
You used the -DEFAULT option but you forgot to define an escape character or enable or disable it. Try again.

`-ON and -OFF options both specified.`
You cannot use the -ON and -OFF options at the same time. Give the command again, using -ON or -OFF, but not both.

`Option other than those allowed has been specified.`
You specified an option other than -ON, -OFF, or -DEFAULT. Enter the command again.

`No resources available.`
The LTS cannot process your command because it is busy. This condition should be temporary; try again. If the problem persists, notify your administrator.

`The escape character cannot be set to the XON or XOFF characters.`
You cannot use ⌨Ctrl ⌨Q (the XON character) or ⌨Ctrl ⌨S (the XOFF character) as the escape character.

-OFF option specified twice.
   Do not specify -OFF more than once.

-ON option specified twice.
   Do not specify -ON more than once.

SWITCHING MODES (NTS_LINE COMMAND)

The PRIMOS NTS_LINE command is an alternative to the LTS escape character. If you have disabled the LTS escape character during a connection, this command allows you to return to LTS command mode without breaking the connection.

From PRIMOS, enter the NTS_LINE command with the -CMD or -COMMAND option. This command returns you from data transfer mode to LTS command mode, where you can enter any LTS commands.

Command Syntax:

$$\text{NTS\_LINE} \quad \begin{bmatrix} \text{-COMMAND} \\ \text{-HELP} \end{bmatrix}$$

Options

-COMMAND   Returns you to command mode.
-CMD

-HELP   Displays information about the NTS_LINE command.
-H

The NTS_LINE -CMD command does not reenable your LTS escape character. The escape character remains disabled until you reenable it with the LTS ESCAPE or SET command.

NTS_LINE Command Error Messages

If the NTS_LINE command does not succeed, PRIMOS displays one of the following messages. The messages are listed in alphabetical order.

Device output queue full. (NTS_LINE)
   The host is busy. Try the command again. If the problem persists, call your administrator.

Invalid command syntax. (NTS_LINE)
   You issued the NTS_LINE command without any options. You must include either -HELP or -COMMAND in an NTS_LINE command.

Line not connected. (NTS_LINE)
You gave the command from a terminal that is not part of a LAN.

No other option may be specified with -HELP. (NTS_LINE)
You gave the command with both the -HELP and -COMMAND options. Only one is allowed.

No XCB available for request. (NTS_LINE)
This message usually indicates a software failure, either in PRIMOS or in the LAN Host Controller. Try the command again. If the problem persists, call your administrator.

RETURNING TO A CONNECTION (CONTINUE COMMAND)

After you escape to LTS command mode, the LTS CONTINUE command returns you to the current connection, which is now an active but suspended session. You do not have to repeat the login dialog.

Note

You cannot execute this command from administration mode. See Appendix C, Administration Mode, for further information.

Command Syntax:

CONTINUE [n]
CO

You can continue your current session, or the session you indicate with n. The STATUS command, described earlier in this chapter, displays information about the connections you have established on each session.

Returning to the Current Session

To return to the connection on your current session, enter CONTINUE without an argument. The following example shows how to establish a connection to a host named SYSA, return to LTS command mode, and then continue the connection.

```
<1>CMD: CONNECT SYSA
SYSA Connected.

OK, LOGIN GEORGE
Password?

GEORGE (user 16) logged in Thursday, 3 July 90 14:33:56
Welcome to PRIMOS version 23.0
Copyright (c) 1990, Prime Computer, Inc.
OK,
  .
  .
  .

OK, COPY <DISK1>GEORGE   [Ctrl]  [\]
<1>CMD: CONTINUE

>MY_FILE <DISK1>LINDA>NEW_FILE

OK,
```

If you enter CONTINUE when you are not connected to a host on the current session, you receive the message No connection exists.

Returning to a Different Session

To return to a connection on a session other than your current one, enter CONTINUE *n*, where *n* is the number of the target session. The STATUS command, described earlier in this chapter, shows the host to which you are connected on each session. This method is easier than switching to the target session and then entering CONTINUE. For example, if you are communicating with a host on session 1 and want to check something on another host on session 3, enter the following sequence of commands. (# is the escape character for session 1.)

```
OK, #
<1>CMD: CO 3
```

If you enter CONTINUE *n* when you are not connected to a host on session *n*, the LTS displays the message No connection exists. If you enter CONTINUE with an argument other than 1 through 8, the LTS displays the message

```
Session number out of range (1 - 8).
```

SWITCHING BETWEEN SESSIONS (SWITCH COMMAND)

The SWITCH command switches you to another session; that is, it makes another session your current one.

Command Syntax:

SWITCH [n]

where n is number of the session you want to switch to. If you enter SWITCH without a session number, the LTS switches you to the next highest session number, or to session 1 if session 8 is your current session. For example,

```
<8>CMD: SWITCH
<1>CMD:
```

The STATUS command, described earlier in this chapter, shows the host to which you are connected on each session. If you enter a session number other than 1 through 8, the LTS displays the message Session number out of range (1 - 8).

CHANGING THE LTS PROMPT (PROMPT COMMAND)

The default prompt for LTS command mode is <n>CMD:, where n is the current session number. The PROMPT command allows you to change the text portion of the prompt. It also allows you to change back to the default prompt without entering any text.

Command Syntax:

PROMPT [new-prompt]

Changing Your LTS Prompt

To change the text portion of your LTS prompt, enter the PROMPT command followed by the new text. You cannot change the first part of the prompt <n> that indicates the number of your current session. Your new prompt text must be no longer than 16 characters and cannot contain any of the LTS reserved characters: space, comma, semicolon, or colon.

For example, to change the prompt to LTS>, enter the following command:

```
<1>CMD: PROMPT LTS>
<1>LTS>
```

The LTS automatically supplies one blank space after all prompts so that anything you type is separated from the prompt by one space.

When you change the prompt, the LTS does not save the new prompt in EAROM (in other words, there is no -DEFAULT option). When the LTS is reinitialized, it reactivates the default prompt, <1>CMD:.

To avoid confusion, use a different prompt for LTS command mode than for data transfer mode. Otherwise, you may not be able to tell whether you are in LTS command mode or data transfer mode. The default PRIMOS prompt is OK,. During data transfer mode, you can change the PRIMOS prompt to a message of your choice using the PRIMOS RDY command with the -READY_BRIEF option.

If you use NETLINK, use different LTS and NETLINK prompts. Otherwise, you can easily lose track of whether you are in LTS or NETLINK command mode.

If you specify a prompt message over 16 characters long, the LTS sends you the error message Prompt message is too long.

Changing Back to the Default Prompt

If you change the prompt and then want to reactivate the default prompt, <1>CMD:, enter the PROMPT command without any prompt message in the command. For example,

```
<1>LTS> PROMPT
<1>CMD:
```

LTS PARAMETERS

INTRODUCTION

NTS allows you to define 24 parameters for your terminal's LTS line. This chapter discusses these parameters and includes a chart of each parameter's elements within the discussion. These parameter charts also appear in Appendix B for quick reference. Chapter 4 explains how to use this parameter information in commands that set or change parameters for your terminal.

This chapter groups the parameters into the following three parameter sets. The session and command mode sets are further broken down into three subsets.

- Global port parameter set

- Session parameter set

    o Escape character functions

    o Protocol function

    o Flow control functions

- Command mode parameter set

    o Line characteristics functions

    o Edit characters functions

    o Character padding functions

Although this chapter provides information about all of the parameters, you probably do not need to change many of them. Instead, you usually can use the default settings.

Note

Most users need to know about only a few LTS parameters. For example, you should know how to use the following parameter functions:

Escape character
Erase character
Line erase character
Line display character

More information about these parameters is available in Chapter 2, Basic LTS Commands.

LTS parameters allow you to customize communication sessions at your terminal. For example, you can define the port's baud rate to match any of 16 terminal baud rates, change your LTS erase character, or set up different kinds of flow control between your terminal and LTS. Your terminal's LTS stores the parameters for terminals connected to it.

Several options are available for changing these parameters:

● When you are in LTS command mode, you can use the LTS PORT, SET, and ESCAPE commands to change parameter settings.

● In data transfer mode, you can change some of your LTS parameters from the PRIMOS side with the PRIMOS command SET_ASYNC.

● Your administrator can also change your LTS parameters with the SET_ASYNC commands.

Chapter 4, Setting Parameters, tells you how to use these commands.

The sections that follow describe each of the 24 LTS parameters that you can change. Each parameter description includes a chart that lists the following information:

● Parameter function

● Parameter name

● Parameter number

● Factory default setting

● Choices for parameter settings (including code numbers)

● Parameter sets of which the parameter is a member (for more information, see LTS Parameter Sets in Chapter 4)

● LTS commands, used in LTS command mode, that change the parameter setting

● PRIMOS commands, used in data transfer mode, that change the parameter setting

The parameter name, number, and code numbers are important when you use some of the LTS commands (the SET and SHOW commands, for example).

For quick reference to these charts, see Appendix B, LTS Parameter Summary.

GLOBAL PORT PARAMETER SET

The global port parameters are

- Baud Rate (BAUD parameter)

- Bits per Character (BPC parameter)

- DTR Connection Control (DTR_DROP parameter)

- LTS Messages (SRVSGNL parameter)

- Parity Treatment (PARITY_TREATMENT parameter)

- Parity Type (PARITY parameter)

- Stop Bits (SBITS parameter)

- Modem Control (MODEM_CONTROL parameter)

These parameter functions are called global port parameters because whenever you set one of them (with PORT or SET, as explained in Chapter 4, Setting Parameters) it affects LTS command mode and all eight sessions. In other words, these parameters control the entire LTS port that your terminal is attached to. Each of these parameter settings must match the current settings of your terminal. Otherwise, your terminal cannot communicate with the LTS. (The DTR connection control and LTS messages parameters generally do not have corresponding terminal switch or terminal software settings.)

You can control terminal settings by physical switches on some terminals and by software functions on others. For example, the PT45 terminal uses physical switches, the PST100 uses physical switches and software functions, and the PT200 and the PT250 use software functions only. If you do not know how to set your terminal's operating characteristics, check the manual that came with your terminal or ask your administrator for help.

The default settings for these parameters work correctly with the default terminal settings for PT200, PT250, PST100, and PT45 terminals. If your terminal can communicate with your LTS and with PRIMOS, do not change these parameters.

Baud Rate (BAUD Parameter)

The baud rate parameter tells the LTS what baud rate (transmission speed) to use to communicate with your terminal. The LTS supports the following baud rates, in bits per second:

50	150	1200	4800
75	200	1800	7200
110	300	2400	9600
134.5	600	3600	19200
			Auto

Auto Speed Detect (Auto) is the setting for this parameter when the LTS leaves the factory. The first time an LTS line is used, someone enters a series of carriage returns at an attached terminal. The LTS uses those characters to determine the transmission speed of the terminal. The LTS then changes the baud rate parameter to match the terminal's baud rate. The new parameter setting is saved in EAROM, so that it becomes the default setting until you change it, even if the LTS is reinitialized.

LTS Auto Speed Detect can work correctly with the default settings on PT200, PT250, PST100, and PT45 terminals. If someone has changed the terminal settings, or if you use some other type of terminal, change the settings, as explained in the section Preparing LTS Lines: Auto Speed Detect in Chapter 2.

Baud Rate

Parameter name	BAUD		
Parameter number	11		
Default	Auto Speed Detect (32)		
Choices			
	0 - 110	10 - 50	
	1 - 134.5	12 - 2400	
	2 - 300	13 - 4800	
	3 - 1200	14 - 9600	
	4 - 600	15 - 19200	
	5 - 75	30 - 3600	
	6 - 150	31 - 7200	
	7 - 1800	32 - Auto Speed Detect	
	8 - 200		
Parameter set	Global		
LTS commands	PORT, SET		
PRIMOS command	SET_ASYNC -SPEED		

Note

When you use the PORT command to change the baud rate parameter, you specify the actual baud rate (for example, 9600). When you use the SET command, you enter a code number (for example, 14) instead of the actual baud rate. For instructions on how to use the PORT and SET commands, see Chapter 4, Setting Parameters.

Bits per Character (BPC Parameter)

The bits per character parameter tells the LTS how many data bits your terminal uses for one character. This count does not include the parity bit, or the start and stop bits.

Bits per Character

|	
Parameter name	BPC
Parameter number	50
Default	8
Choices	5, 6, 7, or 8
Parameter set	Global
LTS commands	PORT, SET
PRIMOS command	SET_ASYNC -CHAR_LENGTH

DTR Connection Control (DTR_DROP Parameter)

The DTR connection control parameter determines whether the LTS breaks an existing connection after the terminal's Data Terminal Ready (DTR) signal is lost for 10 seconds. DTR is one of the Electronic Industries Association (EIA) standard electrical signals sent over the physical wire from the terminal to the LTS. Usually, a 10-second loss of the DTR signal from the terminal means that the terminal has stopped functioning; someone has turned the terminal off or unplugged the power cord, or the terminal has malfunctioned. You can use this parameter to tell the LTS to break the connection (the default) or not to break the connection. For instructions on how to change the parameter setting, see Chapter 4, Setting Parameters.

In most cases, it is a good idea to break the connection and release the line. With the default setting, the LTS breaks the connection automatically if it does not receive DTR from the terminal for 10 seconds.

However, you might want to keep a connection going if your terminal is accidentally turned off or the power cord is unplugged by mistake; if so, change this parameter setting to tell the LTS to maintain the connection when DTR drops.

You might also want to change this parameter if your terminal is attached to a switch box, with one of the lines connected to the LTS. A switch box allows you to activate physical lines to different devices with physical switches. For example, one of the switch box lines could attach to an LTS, while others might attach to hosts that are not on the LAN (see Figure 3-1).
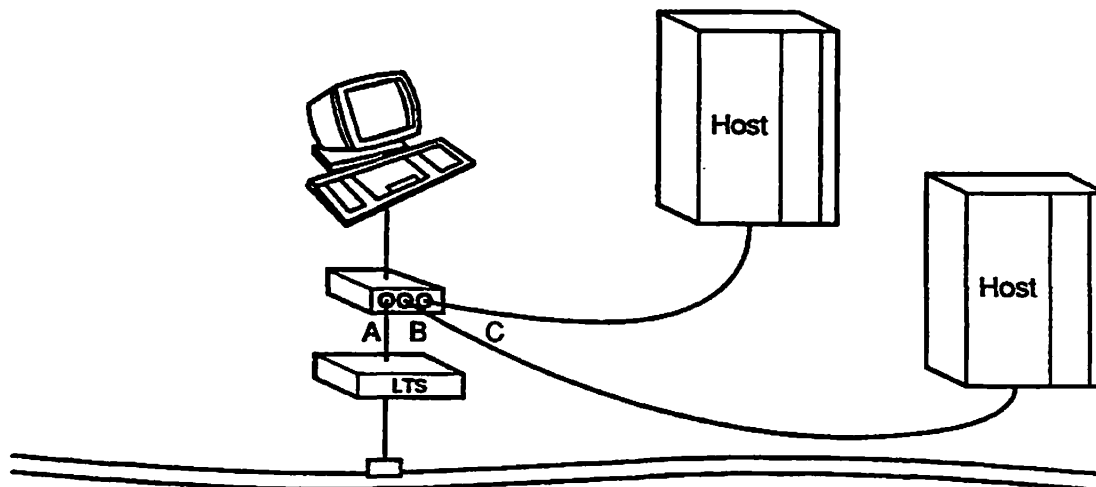
Q03.01.D10117.3LA

FIGURE 3-1.   Terminal Attached to a Switchbox

Switching from Line A to Line B causes DTR to drop on Line A. If you want to keep a connection on Line A while you temporarily activate Line B, you can change this parameter

setting. Change the parameter setting to 0 (do not break the connection when DTR drops) to maintain the connection, even in the absence of DTR from the terminal.

The DTR signal can also be used for flow control. If you enable EIA flow control, the LTS stops sending data to the terminal. You can use DTR for flow control or for connection control, but not for both. If you enable EIA flow control, that parameter takes precedence over the use of DTR for connection control. When DTR changes, the LTS starts or stops flow control instead of breaking connections. If you want to use DTR to control connections, make sure you disable EIA flow control.

This parameter does not necessarily have a corresponding physical switch or software setting on your terminal. Most people use the default setting.

This parameter is used for LTS functions only; it has no PRIMOS counterpart.

> **DTR Connection Control**
> Parameter name   DTR_DROP
> Parameter number   63
> Default   Break the connection when DTR drops (1)
> Choices   0 - Do not break the connection when DTR drops
>   1 - Break the connection when DTR drops
> Parameter set   Global
> LTS command   SET

LTS Messages (SERVSGNL Parameter)

Ordinarily, you want the LTS to send its prompts and messages to your terminal screen. The prompts and messages make it easy for you to communicate with the LTS. Sometimes, however, you might want to suppress the LTS messages. For example, if you write a file to disk during data transfer mode and you want to make sure that no extra data is recorded on the disk, you can tell the LTS to stop sending messages to your terminal. Later, you can reactivate the LTS prompts and messages.

If you want the LTS to inform you of any errors, you can set the parameter to suppress the LTS prompt but transmit other messages. The LTS messages parameter does not have a corresponding physical switch or software setting on your terminal. See Chapter 4, Setting Parameters for instructions.

> **LTS Messages**
> Parameter name   SERVSGNL
> Parameter number   6
> Default   LTS transmits all messages (5)
> Choices   0 - LTS does not transmit any messages
>   1 - LTS transmits all but prompt messages
>   5 - LTS transmits all messages
> Parameter set   Global
> LTS command   SET

Parity Treatment (PARITY_TREATMENT Parameter)

Some devices use an extra bit, the parity bit, to check for errors during transmission of a character. If your terminal uses a parity bit, the LTS needs to know whether it uses even or odd parity.

The parity treatment parameter allows you to enable or disable (default) parity. If you enable parity, the LTS uses the high-order bit of each character for parity purposes.

Parity Treatment

Parameter name	PARITY_TREATMENT
Parameter number	21
Default	Parity disabled (0)
Choices	0 - Parity disabled
	3 - Parity enabled
Parameter set	Global
LTS commands	PORT, SET
PRIMOS command	SET_ASYNC -PARITY

Parity Type (PARITY Parameter)

The choices for parity type are odd or even parity. Use the parity bit to set to 1 or 0 so that the total number of 1-bits in any character is an even number (even parity) or an odd number (odd parity).

For example, if you enable parity with the PARITY_TREATMENT parameter and select even parity by setting PARITY to 1, the LTS checks the number of 1-bits in every character it is preparing to transmit to the terminal. If the character contains an even number of 1-bits, the LTS sets the parity bit to zero. If the character contains an odd number of 1-bits, the LTS sets the parity bit to 1, so that the total number of 1-bits adds up to an even number.

Although the LTS uses two parity parameters, one to enable or disable parity and another to define the parity type, the PRIMOS SET_ASYNC command combines both functions in one option, -PARITY. The PRIMOS -PARITY options are none, odd, or even.

Parity Type

Parameter name	PARITY
Parameter number	52
Default	Odd parity (0)
Choices	0 - Odd parity
	1 - Even parity
Parameter set	Global
LTS commands	PORT, SET
PRIMOS command	SET_ASYNC -PARITY

Stop Bits (SBITS Parameter)

The stop bits parameter tells the LTS how many bits your terminal uses to identify the end of a character. Most terminals use one stop bit, so you probably do not need to change this parameter setting. However, devices that run at 110 baud or less may need two stop bits; see your terminal's manual for your terminal.

Stop Bits

Parameter name	SBITS
Parameter number	51
Default	1 stop bit
Choices	1 - 1 stop bit
	2 - 2 stop bits
Parameter set	Global
LTS commands	PORT, SET
PRIMOS command	SET_ASYNC -STOP_BITS

Modem Control (MODEM_CONTROL Parameter)

The modem control parameter controls modem signals between a port on an LTS device and a connected unit such as a modem and/or a· port selector. The LTS device and the attached unit use RS-232-C modem signals to control communications between the port and the device. When a port is configured for modem control, the server port monitors modem signals from the attached device to determine the state of the connection between port and device and to terminate the connection when the last session disconnects.

Most user and server errors cause the connection to terminate. However, when you enter the CONNECT command to a host that is not known to the LTS device, the connection does not break. In that case, you are returned to LTS command mode in order to make another selection.

When configured for modem control, a server port automatically disconnects all active sessions when the signal is lost for more than one second. As a result, the LTS device ignores the setting of parameter 63 (DTR_DROP), because all active sessions are disconnected when the DTR signal is lost. The timer for DTR_DROP continues to be set at ten seconds if the port is not configured for modem control.

Modem Control

Parameter name	MODEM_CONTROL
Parameter number	64
Default	Connection disabled
Choices	0 - Connection disabled
	1 - Connection enabled
Parameter set	Global
LTS commands	PORT, SET

SESSION PARAMETER SET

There are three types of session parameter functions:

- Escape Character Functions

  o Enable Escape Character (ENTERCMD Parameter)

  o Define Escape Character (ESC Parameter)

- Protocol Function

  o Protocol (PROTOCOL Parameter)

- Flow Control Functions

  o XON/XOFF Flowfrom (FLOWFROM Parameter)

  o XON/XOFF Flowto (FLOWTO Parameter)

  o EIA Flow Control (FLOWCONTROL Parameter)

These parameter functions are called session parameters because they control the operation of your LTS port when you are in data transfer mode during a LTS session. The protocol and flow control parameters are also LTS command mode parameters. The following sections discuss the session parameters in detail.

ESCAPE CHARACTER FUNCTIONS

There are two escape character parameters. One enables or disables the escape character and the other specifies which character the LTS recognizes as the escape character. The LTS escape character allows you to switch from data transfer mode to LTS command mode without breaking your connection to a host computer. Chapter 2, Basic LTS Commands, explains how to use the ESCAPE command with the LTS escape character parameters.

You may find it convenient to set a different escape character for each of your sessions, as explained in Chapter 2, Basic LTS Commands. For example, you may use three or four different host applications, each of which assigns a meaning to certain sequences of characters. Perhaps one application uses control characters for some function. You could decide to always use session 1 for that application and set session 1's escape character to $, a character not used in the application. Each of your other sessions and their escape characters could also be tailored for a specific host application program.

Enable Escape Character (ENTERCMD Parameter)

You can enable or disable the LTS escape character with either the ESCAPE command with the -ON or -OFF option, or the SET command.

You may need to disable the escape character temporarily to run a program that utilizes all available characters. With the escape character disabled, you can transmit the escape character as an ordinary character.

To reenable the escape character, you must return to LTS command mode. Either

- Log out of data transfer mode and break your connection with the host or,

- Use the PRIMOS NTS_LINE command with the -CMD option if you want to return to LTS command mode without breaking the current connection.

When you have returned to LTS command mode, use the ESCAPE command with the -ON option or the SET command to reenable the escape character.

Enable Escape Character

Parameter name	ENTERCMD
Parameter number	· 58
Default	Escape character enabled (1)
Choices	0 - Escape character disabled
	1 - Escape character enabled
Parameter set	Session
LTS commands	ESCAPE, SET

Note

The NTS_LINE -CMD command does not reenable your LTS escape character. The escape character remains disabled until you reenable it with the ESCAPE or SET command.

Define Escape Character (ESC Parameter)

You can define the character that the LTS recognizes as the escape character. Use the ESCAPE or SET command to specify the character you want. [Ctrl] [A] is often a good substitute for the default escape character ([Ctrl] [\]).

You cannot use any of the following characters; they have special LTS functions:

XON or XOFF characters
Carriage return
Space
Semicolon
Colon
Comma

Define Escape Character

Parameter name	ESC
Parameter number	1
Default	[Ctrl] [\]
Choices	Any single ASCII character
Parameter set	Session
LTS commands	ESCAPE, SET

Note

If you are a NETLINK user, make sure that your LTS escape character is different from the NETLINK escape character. The default NETLINK escape character is @.

PROTOCOL FUNCTION

You can select one of five standard Prime communications protocols for each of your NTS sessions. These protocols define certain rules for data transmission on the line. When you establish a connection, the LTS tells the Prime host which protocol to use to communicate with your session. Since the protocol parameter is a member of both the LTS command mode and the session parameter sets, it can have different settings in LTS command mode and in each session. This allows you to tailor your port and sessions for each host and application program that you use. Chapter 4, Setting Parameters, explains how to set LTS parameters.

Note

Do not change protocols that control the physical device unless the system administrator specifically instructs you to do so.

Protocol Parameter

TTY: Use the TTY protocol for most terminals. This protocol tells PRIMOS to echo data to the terminal (if the full-duplex/half-duplex mode parameter is set for full-duplex), add a linefeed to each carriage return when echoing, and force the high-order bit (parity bit) on for each character received from the terminal.

TRAN: The TRAN (for transparent) protocol is generally not used for interactive terminals. Lines connected to printers or other noninteractive devices use the TRAN protocol because it does not echo input or convert carriage returns to carriage return/linefeeds. Instead, it simply passes all characters (except flow control characters) to their destination. The parity setting of the terminal that is using TRAN protocol during data transfer mode determines whether XON and XOFF flow control works. The terminal should be set to seven bits, space parity to guarantee that it responds to the XON, XOFF, and escape to LTS command mode characters.

If you use an assignable line with a printer, the line uses the TRAN protocol. When you assign the line, PRIMOS automatically activates the TRAN protocol. (For information on assignable lines, see Chapter 6, NTS Assignable Lines.)

The TRAN protocol can also be useful for a terminal when you want to copy, file, or print a program that contains control characters.

TT8BIT: Use the TT8BIT protocol for Arabic DM5E/PLUS terminals only. TT8BIT is the same as TTY except that it does not force the high-order bit (parity bit) on. You must set the parity parameter for odd parity when you use the TT8BIT protocol.

TTYUPC: The TTY uppercase protocol tells the LTS to send only uppercase letters to the terminal. Otherwise, this protocol is the same as TTY. Use this protocol if you have a terminal that cannot display lowercase letters (or print them, if it is a hard-copy terminal).

TTY8: Use the TTY8 protocol only for devices that support the Prime Extended Character Set (Prime ECS). TTY8 is the same as TTY except that it does not force the high-order bit on. This eighth bit is used as part of a character in Prime ECS.

Protocol	
Parameter name	PROTOCOL
Parameter number	53
Default	TTY (0)
Choices	0 - TTY
	1 - TRAN
	2 - TT8BIT
	3 - TTYUPC
	4 - TTY8
Parameter sets	Command mode and session
LTS command	SET
PRIMOS command	SET_ASYNC -PROTOCOL

Note

You can override some aspects of these protocols by setting individual parameters. For example, if you use the TTY protocol and then set the parameter for half-duplex mode, the TTY protocol does not use full-duplex mode.

FLOW CONTROL FUNCTIONS

There are three flow control parameters:

- XON/XOFF Flowfrom (FLOWFROM Parameter)

- XON/XOFF Flowto (FLOWTO Parameter)

- EIA Flow Control (FLOWCONTROL Parameter)

These parameters define how flow control requests are handled in your LTS session. Most of the time, the three flow control parameters can use their default setting; if so, you need do nothing about these parameters.

Flow Control Requests

When data is being transmitted, there has to be a way for the receiving device to send a request that the data flow stop. Also, there has to be a corresponding way to request that data flow starts again. For example, sometimes you want to stop your screen from scrolling; sometimes your terminal's buffer (or the buffer of another device) fills up. In either case, you or the device sends a flow control request to the transmitting device to ask that data flow stop. When you or the device is ready for more data, a request to resume data flow notifies the sending device to start sending again.

Devices send flow control requests in one of two forms:

- XON/XOFF characters

- EIA electric signals on the physical line

Note

XON and XOFF are special ASCII characters that devices send and receive in the same way as ordinary characters. XOFF is the ASCII character DC3. XON is the ASCII character DC1. Most devices use XON and XOFF characters for flow control requests between two devices, though some use electric signals. See the EIA Flow Control (FLOWCONTROL) section later in this chapter.

The settings of the three flow control parameters depend on the kind of signal that is used to send flow control requests.

- If you use XON/XOFF characters, accept the defaults:

    o Enable the FLOWFROM and FLOWTO parameters.

    o Disable the FLOWCONTROL parameter.

- If you use EIA signals, you must

    o Disable FLOWFROM and FLOWTO.

    o Enable FLOWCONTROL.

These three parameters do not work unless they are set in one of the above ways. For instance, they cannot work if they are all disabled or all enabled.

The meaning of the FLOWFROM and FLOWTO parameters and their settings is in how the requests relate to your terminal (that is, whether the requests are coming from or coming to your terminal). See Figure 3-2.

- When your terminal wants to request that data flow start or stop, the request goes FROM your terminal to the LTS.

- When the LTS wants to request that data flow start or stop, the request goes TO your terminal.

These two flow control parameters

- Do not control the *direction* of data flow.

- Do not actually *start or stop* data flow. Not until the request has been received and understood by the transmitting device does the data flow start or stop.

- Do *not* tell which device is transmitting data.

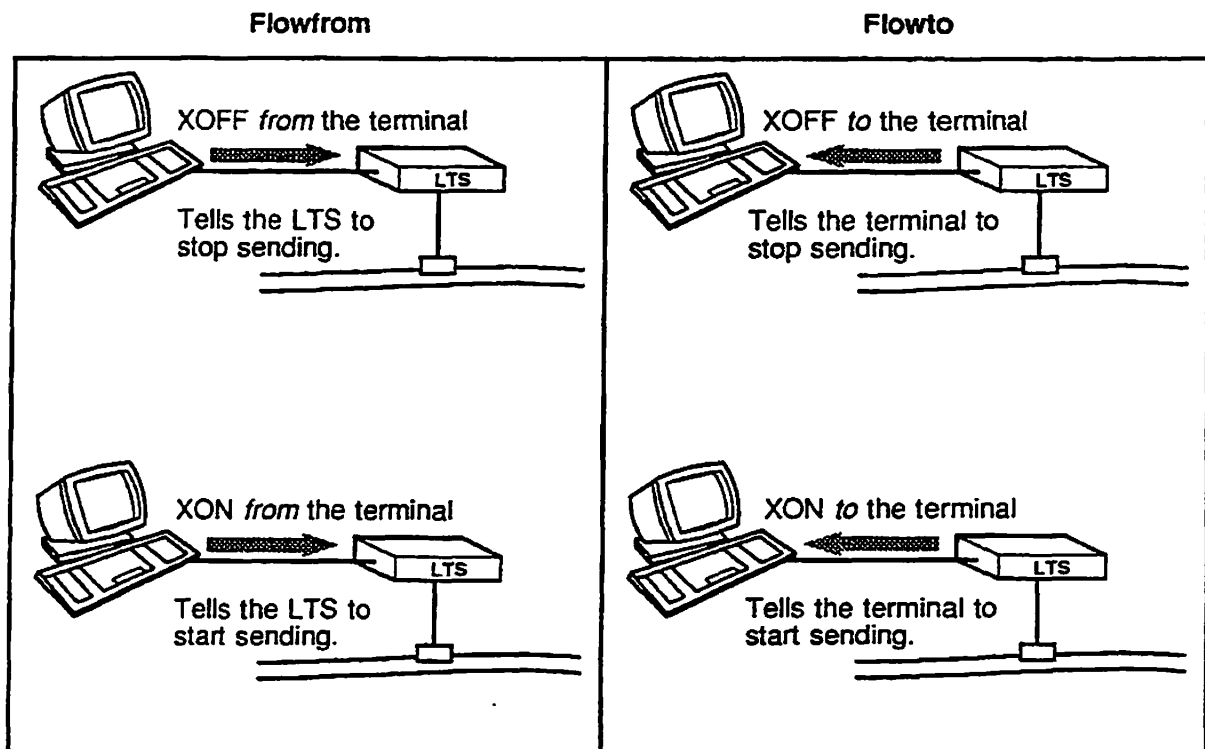Instead, if you have enabled FLOWFROM and FLOWTO (and disabled FLOWCONTROL),

- Flow control requests FROM your terminal tell the LTS to start or stop data flow to your terminal.

- Flow control requests TO your terminal tell your terminal to start or stop data flow to the LTS.

These parameters are members of both the command mode and session parameter sets, so they can have different settings in LTS command mode and in each of the eight sessions that you might have established on each line. This allows you to tailor the port and session for each host and application program that you use. Chapter 4, Setting Parameters, explains how to set LTS parameters.

XON/XOFF Flowfrom (FLOWFROM Parameter)

When you enable the FLOWFROM parameter, the request that the LTS (or other device) start or stop data flow to your terminal comes FROM your terminal to the LTS. If you have set the three flow control parameters correctly, the transmitting device receiving the request from your terminal recognizes and acts upon the request appropriately: it starts or stops data flow to your terminal.

If FLOWFROM is enabled, (the default) the LTS stops transmitting characters to the terminal whenever it receives an XOFF character from the terminal, see Figure 3-2. Most people use the default setting, which enables XON/XOFF flow control from the terminal.

Flowfrom   Flowto

XOFF *from* the terminal   XOFF *to* the terminal

Tells the LTS to   Tells the terminal to
stop sending.   stop sending.

XON *from* the terminal   XON *to* the terminal

Tells the LTS to   Tells the terminal to
start sending.   start sending.

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FIGURE 3-2.   Flow Control Parameters

If FLOWFROM is enabled, press [Ctrl] [S] to send an XOFF character and suspend the flow of data on your line from the LTS device to your terminal. Some devices automatically generate XOFF when their buffers start to fill up. (XOFF is the ASCII character DC3.) When you enter [Ctrl] [S] on an NTS line, the buffer in the LTS device continues to accept data for that line on the network until the buffer becomes full. At that point, the LTS sends a signal to the host controller to stop sending data for that line.

To resume the flow of data to your terminal, press [Ctrl] [Q]. The terminal sends an XON character to the LTS, which then starts to transmit to the terminal again. Devices that automatically generate XOFF also send out an XON character when they are ready to receive data again. (XON is the ASCII character DC1.)

-RESET_XOFF Option: An option to the SET_ASYNC command, -RESET_XOFF, has the same effect on the line as [Ctrl] [Q]. This option works on any ASYNC line, not just LTS lines. The option also works on lines that are assigned by another line, as well as on the line that actually enters the command.

Command Syntax:

SET_ASYNC -LINE _n_ -RESET_XOFF

If you issue a SET_ASYNC -RESET_XOFF command for an NTS line whose buffer is full, the command does not take effect until the buffers empty. The -RESET_XOFF option instructs the LTS to clear the data in the buffer for that line on the LTS and enable output again. You can type the -RESET_XOFF option either at the supervisor terminal or at the terminal that controls the particular line.

This option is useful for serial printers connected to the LAN, where it would not be possible to type [Ctrl] [Q]. In this case, the system administrator can reset the line from the supervisor terminal.

Caution

If you use this option on an NTS line, you receive the following message:

```
Reset_Xoff option on an NTS line may result in data loss.
Do you want to continue (Y/N)?

Type a Y if you wish to continue.
```

XON/XOFF Flowfrom

Parameter name	FLOWFROM
Parameter number	12
Default	Enable flow control character from the terminal (1)
Choices	0 – Disable flow control character from the terminal
	1 – Enable flow control character from the terminal
Parameter sets	Command mode and session
LTS command	SET
PRIMOS commands	SET_ASYNC -XOFF
	SET_ASYNC -NO_XOFF
	SET_ASYNC -RESET_XOFF

XON/XOFF Flowto (FLOWTO Parameter)

The FLOWTO parameter, when enabled, establishes that when an XOFF or XON request is sent TO your terminal, your terminal is to stop or start data flow to the other device. Any request that your terminal start or stop data flow to the LTS (or other device) must come TO your terminal from the LTS, see Figure 3-2. If the three flow control parameters are set correctly, your terminal recognizes and acts upon the request appropriately: it starts or stops data flow to the LTS.

During periods of heavy network traffic when the LTS cannot gain access to the network cable, the LTS can run out of buffer space for data coming from your terminal. When this situation occurs, the LTS can send an XOFF character to the terminal to indicate that the terminal should stop transmission. When buffer space is available again, the LTS sends an XON character to the terminal to indicate that transmission can resume.

In full-duplex mode (when the LTS and the host are echoing characters to your terminal), if the characters you type do not appear on your terminal screen (character echo), the terminal has stopped sending characters to the LTS.

PT200, PT250, PST100, PT45, and many other terminals can recognize XON/XOFF characters and respond .appropriately. If your terminal cannot recognize XON/XOFF characters, disable this parameter. Check the manual that came with your terminal.

XON/XOFF Flowto (FLOWTO)

Parameter name	FLOWTO
Parameter number	5
Default	Enable flow control character to terminal (1)
Choices	0 - Disable flow control character to terminal
	1 - Enable flow control character to terminal
Parameter sets	LTS Command mode and session
LTS command	SET
PRIMOS commands	SET_ASYNC -REVERSE_XOFF
	SET_ASYNC -NO_REVERSE_XOFF

Setting the Flow Control Parameters

In order for a device to recognize the .XON/XOFF characters and act on them, you must have already set the three flow control parameters. They define the guidelines the devices are to follow: that is, from which device will an XOFF or XON come in which situation? These three parameters must be set using the default settings, as shown below, before the devices can recognize an XOFF or XON character:

● Enable FLOWFROM and FLOWTO parameters (default).

● Disable the EIA flow control parameter, FLOWCONTROL (default).

The following two situations should clarify how these ideas work.

Situation A: Your terminal wants to stop data flow from the LTS:

1. XOFF character goes FROM your terminal to the LTS to request that the data stops.

2. LTS recognizes XOFF because the FLOWFROM parameter is enabled, which means that if an XOFF character comes from the terminal, LTS is to stop sending data to the terminal. Therefore, the LTS stops data flow.

3. XON character goes FROM your terminal to the LTS when your terminal is ready to receive data again.

4. The LTS device recognizes that an XON character FROM your terminal means that the LTS is to resume sending data to your terminal.

Situation B: The LTS wants your terminal to stop data flow to the LTS:

1. XOFF goes TO your terminal from the LTS device.

2. Your terminal recognizes that, because the FLOWTO parameter is enabled, an XOFF character coming to your terminal means that your terminal is to stop sending data to the LTS. Therefore, your terminal stops data flow.

3. XON character goes TO your terminal from the LTS to signal that the LTS is ready to receive data again.

4. Your terminal recognizes that, because the FLOWTO parameter setting is enabled, and XON sent TO your terminal means that your terminal is to resume sending data to the LTS.

Preventing Accidental Data Loss: Flow Control and the Escape Character

When flow control is enabled, you can run into problems with the LTS escape character. Problems can occur in two special situations, when either the LTS or the terminal has responded to flow control instructions from the host. Brief instructions on how to get around these problems are included in the section, What to Do When Problems Occur, in Chapter 2, Basic LTS Commands. The following paragraphs provide a more detailed explanation of the problems.

Host to the LTS: A congested host can ask your LTS to wait before it sends any more data to the host. To do this, the host sends a flow control request to the LTS. The LTS then starts to save characters from your terminal rather than transmit them immediately to the host. Nothing appears on your screen during this time.

If you send the LTS an escape character during this waiting period, the LTS recognizes the escape character and puts you into LTS command mode immediately. Any characters from your terminal that the LTS saved are lost.

You can prevent this type of accidental loss of characters. Do not enter an LTS escape character until your terminal screen displays all of the characters you have typed at the keyboard. If you see all of your characters displayed on the screen, you know that the host received them (that is, the LTS sent the characters to the host and the host echoed them back to your terminal). If any characters you typed have not yet appeared on your screen when you type the LTS escape character, you cannot tell whether the host received all your characters.

LTS to the Terminal: During periods of very heavy network traffic (or perhaps because of a problem at the host), traffic over the network can become backed up and stop. When the LTS cannot send any more of your data over the network, it starts saving data from your terminal rather than transmitting it. When the LTS runs out of storage space for data coming from your terminal, it asks the terminal to stop sending (if flow control is enabled).

If you type an LTS escape character in this situation, the LTS cannot receive it because your terminal has responded to the flow control request and stopped forwarding any characters to the LTS. If this problem occurs and you want to return to command mode, turn your terminal off, wait at least 10 seconds, and then turn the terminal on again. The LTS breaks your connection and returns you to LTS command mode if parameter 63 (DTR_DROP) is enabled. The characters from your terminal that the LTS was saving are discarded, so some data is lost. But you are no longer locked into a connection.

Note

What happens when you turn off the terminal for 10 seconds depends on the setting of the DTR parameter. The LTS breaks a connection if the DTR connection control parameter is enabled (the default setting). If you have disabled DTR connection control, you can get back to LTS command mode by turning the terminal back on and then typing the LTS escape character. The LTS can now act on the escape character and return you to LTS command mode. You can then issue the DISCONNECT or QUIT command to break the connection.

EIA Flow Control (FLOWCONTROL Parameter)

When a device does not use XOFF/XON characters to send requests to control data flow, it could use Electronic Industries Association (EIA) RS-232-C interface control signals instead of characters for flow control. The EIA control signals are electrical signals that travel between the LTS and the physical device (your terminal) over the wires that connect them. The signals are called CTS/RTS signals. In this case, the receiving device cannot recognize and act upon these physical signals unless you have already set the flow control parameters in the following way:

1. Enable the EIA flow control parameter, FLOWCONTROL.

2. Disable the other two flow control parameters, FLOWFROM and FLOWTO. The PRIMOS counterparts of these parameter settings are listed below. (Note that this type of flow control requires two SET_ASYNC options for one LTS parameter.)

LTS Setting	*PRIMOS Command*
Disable EIA flow control	SET_ASYNC -NO_DATA_SENSE_ENABLE
Enable EIA flow control on high to low CTS/RTS	SET_ASYNC -DATA_SENSE_ENABLE SET_ASYNC -DATA_SET_SENSE_HIGH
Enable EIA flow control on low to high CTS/RTS	SET_ASYNC -DATA_SENSE_ENABLE SET_ASYNC -DATA_SET_SENSE_LOW

The EIA flow control parameter applies to flow control requests *in one direction only*, from a device to the LTS. The LTS does not send EIA flow control signals to its attached devices. Some devices, especially printers, change the status of these control signals when their buffers begin to fill up. Some devices change the Clear to Send/Request to Send (CTS/RTS) signal from high to low; others may change CTS/RTS from low to high. In either case, the signal change means to stop or start sending (see Figure 3-3).

If you enable the EIA flow control parameter, the LTS responds to these signal changes by ending all transmission to the device until the CTS/RTS signal changes again, indicating that the device is ready to receive data again.

This type of flow control is different from XON/XOFF flow control, which uses specific ASCII characters to control the flow of data. Most terminals do not use CTS/RTS for flow control, so most users can accept the default flow control settings (XON/XOFF flow control enabled and EIA flow control disabled). If you do want to enable EIA flow control, you must also disable XON/XOFF flow control.

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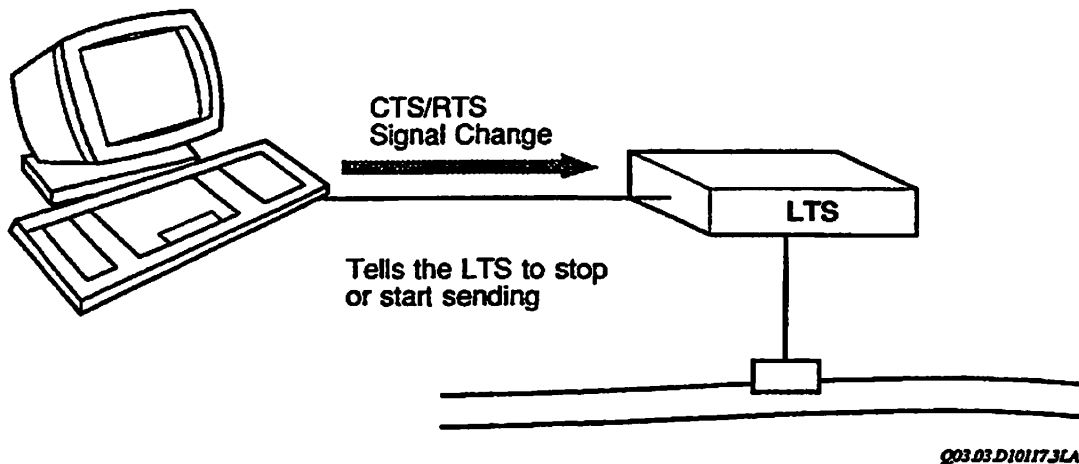
FIGURE 3-3.   EIA Flow Control

EIA Flow Control

Parameter name	FLOWCONTROL
Parameter number	54
Default	Disable EIA flow control (0)
Choices	0 - Disable EIA flow control
	1 - Enable EIA flow control on high to low CTS/RTS
	2 - Enable EIA flow control on low to high CTS/RTS
Parameter sets	Command mode and session
LTS command	SET
PRIMOS commands	SET_ASYNC -NO_DATA_SENSE_ENABLE
	SET_ASYNC -DATA_SENSE_ENABLE
	SET_ASYNC -DATA_SET_SENSE_HIGH
	SET_ASYNC -DATA_SENSE_ENABLE
	SET_ASYNC -DATA_SET_SENSE_LOW

COMMAND MODE PARAMETER SET

The command mode parameters, listed by group, are

- Line Characteristics Functions

    o Full-duplex/Half-duplex Mode (HALFDUPL Parameter)

    o Linefeed After Carriage Return (LF__AFTER__CR Parameter)

- LTS Command Mode Edit Characters Functions

    o Erase Character (ERASE Parameter)

    o Line Erase Character (LINE__ERASE Parameter)

    o Line Display Character (LINE__DISPLAY Parameter)

- Character Padding Functions

    o Carriage Return Padding (CR__PADDING Parameter)

    o Linefeed Padding (LF__PADDING Parameter)

    o Form Feed Padding (FF__PADDING Parameter)

    o Horizontal Tab Padding (HT__PADDING Parameter)

    o Vertical Tab Padding (VT__PADDING Parameter)

These parameters are called command mode parameters because they control only the operation of LTS command mode. The following sections discuss the command mode parameters in detail.

The PROTOCOL, FLOWTO, FLOWFROM, and FLOWCONTROL parameters are also members of the session parameter set and are discussed in the previous section, Session Parameters.

LINE CHARACTERISTICS FUNCTIONS

To control certain characteristics of your LTS line, you can define the parameters that affect character echo and connection control.

Full-duplex/Half-duplex Mode (HALFDUPL Parameter)

When a character that you type appears on your terminal screen (character echo), the source of that screen character is one of the following:

LTS Full-Duplex Mode	During LTS command mode, the LTS can echo your characters back to the screen. The characters travel in both directions — from the terminal to the LTS and then from the LTS back to the terminal. This mode of operation is called full-duplex.
Prime host Full-Duplex Mode	During data transfer mode, PRIMOS or a host application program can echo your characters back to the screen. The characters travel to the host and then back to the terminal. This is host full-duplex mode.
Terminal Half-Duplex Mode	In either LTS command mode or data transfer mode, the terminal itself can echo characters to the screen, if the terminal has this capability and if you adjust the terminal appropriately. If you want the terminal to echo, instruct the LTS and the Prime host not to echo characters to your terminal. The characters travel in one direction only, from the terminal to the LTS and to the Prime host. This mode of operation is called half-duplex.

Figure 3-4 shows what happens to a typed character in full-duplex and half-duplex modes.

Full-duplex operation (LTS or PRIMOS echoes characters to your screen) is the default setting for the LTS, for PRIMOS, and for most terminals. Therefore, full duplex is the most convenient mode to use. Also, with full-duplex mode, you can confirm that your characters reached their destination when you see the characters on your screen. For terminals that do not perform character echoing, full-duplex mode is your only choice.

Half-duplex operation (your terminal echoes characters to the screen) can be useful if a network is very busy. Characters are transmitted in only one direction over the LAN in half-duplex mode: fewer characters travel over the network and network traffic is reduced.

Full Duplex

Half Duplex

Command Mode

Information goes
to the LTS; the
LTS echoes to the
screen.

LTS

Command Mode

Information goes
directly to the
screen; the LTS
does not echo.

LTS

Data Transfer Mode

Information goes
to the host; the
host echoes.

LTS

Host

Data Transfer Mode

Information goes
directly to the
screen; the host
does not echo.

LTS

Host
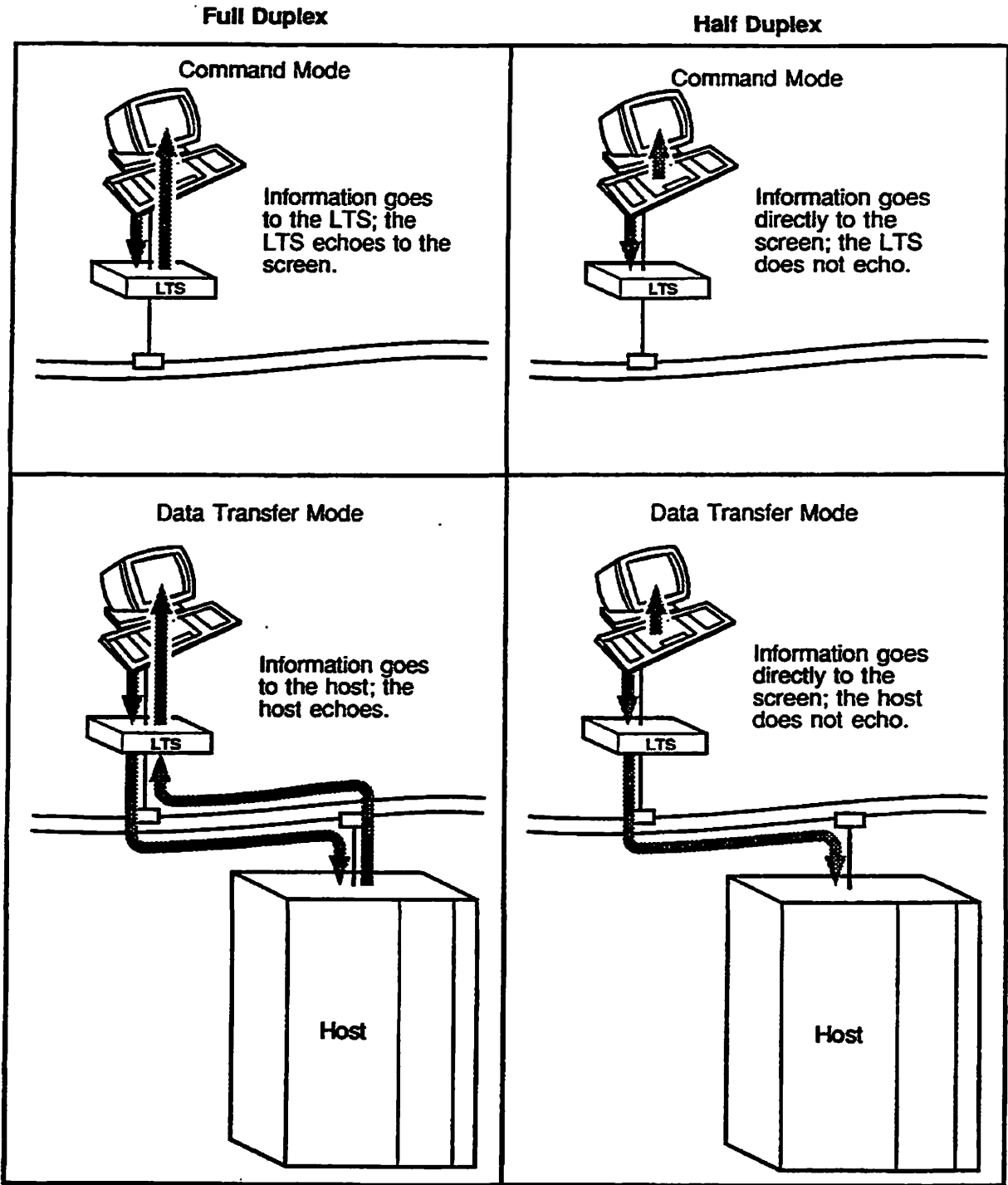
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FIGURE 3-4.   Full-duplex and Half-duplex Operation

For whichever mode you use, you need to coordinate three items: the LTS, PRIMOS, and the terminal. Otherwise, the characters you type may either appear on your screen twice, or not appear at all. The next sections explain how to coordinate the LTS with PRIMOS and with your terminal.

LTS: The LTS full-duplex/half-duplex mode parameter (HALFDUPL) controls whether the LTS echoes characters to your terminal during LTS command mode.

For correct full-duplex operation, use the default setting, full duplex. However, if you want the terminal rather than the LTS to echo characters, set this parameter to half duplex.

PRIMOS: During data transfer mode, the LTS does not echo characters; instead, it merely passes on any characters it receives. For full-duplex operation during data transfer mode, the Prime host echoes the character rather than the LTS.

The PRIMOS commands SET_ASYNC and TERM determine whether or not PRIMOS echoes characters to your terminal.

- Use SET_ASYNC -ECHO or TERM -FULL to have PRIMOS echo your characters (default).

- Use SET_ASYNC -NO_ECHO or TERM -HALF to have your terminal, not PRIMOS, echo your characters.

PRIMOS activates either command as soon as you enter it.

Some application programs echo characters. For example, EMACS shuts off the PRIMOS echo and echoes characters during an EMACS session. If you use applications that echo characters independently of PRIMOS, you may not be able to use half-duplex mode.

Terminal: Many terminals have physical switches you can set to control whether the terminal echoes keyboard characters to the screen. For full-duplex mode, when the LTS or the Prime host is echoing, you do not want the terminal to echo. If the terminal echoes too, all the characters appear on the screen twice. On most terminals, the default setting is no terminal echo.

For half-duplex mode, when neither the LTS nor the host echoes characters, you do want the terminal to echo. Otherwise, the characters you type cannot appear on the screen at all.

PST100 and PT45 terminals use physical switches to turn terminal echo on and off. PT200 and PT250 terminals use software switches. Refer to the manufacturer's manual for more information. The PST100 and PT45 switch settings are shown in Table 3-1.

TABLE 3-1.   Terminal Switches for Character Echo from PRIMOS

Terminal Type	Switch Location	Switch Name	Terminal Echo Off	Terminal Echo On
PST100	Switch 1 in bank 1	Send-receive switch	Switch down	Switch up
PT45	Switch 8 in bank 2	Auto echo switch	Switch down	Switch up

The PRIMOS commands that control echoing (SET_ASYNC and TERM) are not listed as PRIMOS counterparts because the LTS full-duplex/half-duplex mode parameter is active only during LTS command mode.

Full-duplex/Half-duplex Mode

Parameter name	HALFDUPL
Parameter number	57
Default	Full-duplex mode (0)
Choices	0 - Full-duplex mode
	1 - Half-duplex mode
Parameter set	Command mode
LTS command	SET

Note

Figure 3-5 summarizes the requirements for coordinating correct full-duplex and half-duplex operation.

Full Duplex   Half Duplex

Tell the terminal
not to echo.

Define the LTS
parameter for
full duplex.

Tell the terminal
to echo.

Define the LTS
parameter for
half duplex.

Use the
PRIMOS
command
TERM -FULL.

Use the
PRIMOS
command
TERM -HALF.

Host

Host
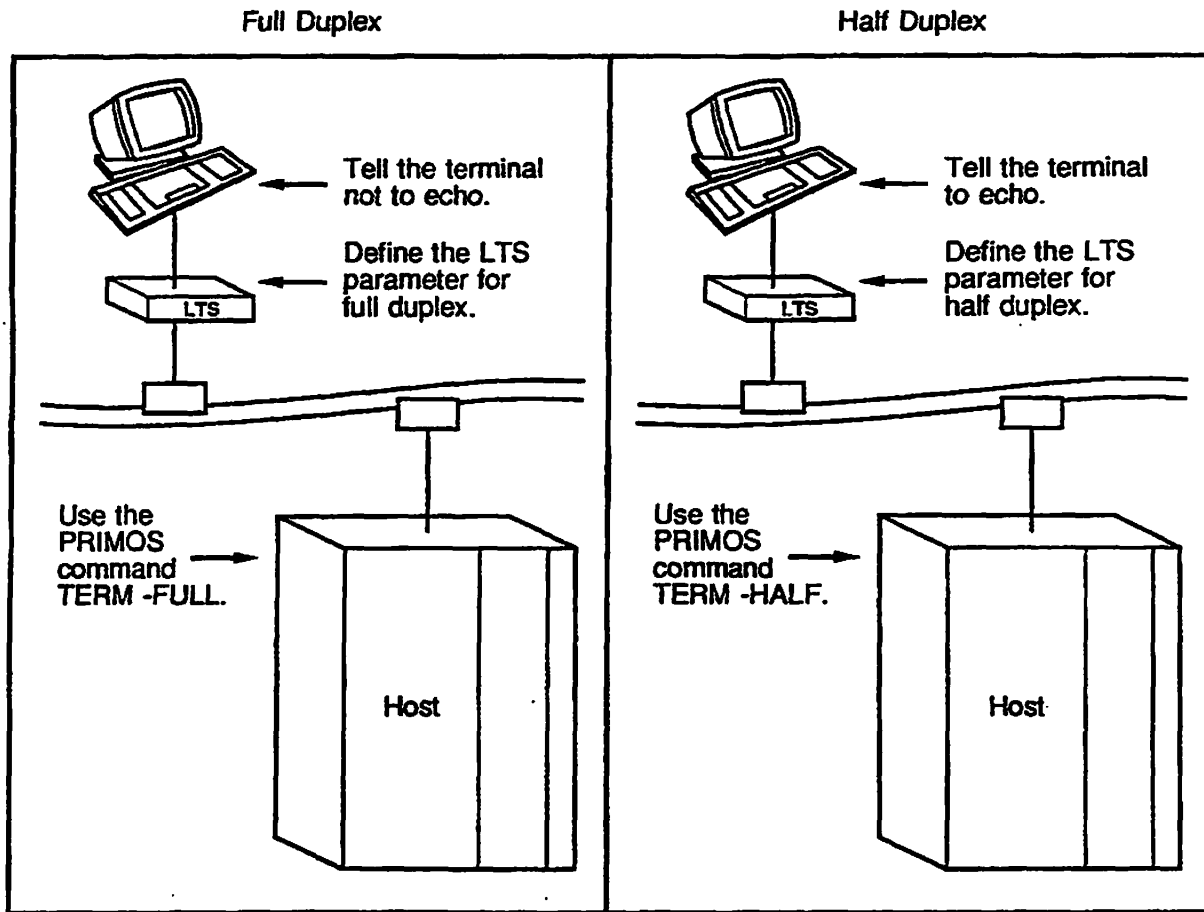
Q0305.D10117.31A

*FIGURE 3-5.   Requirements for Coordinating Full-duplex or Half-duplex
Operation With the TERM Command*

Linefeed After Carriage Return (LF_AFTER_CR Parameter)

The linefeed after carriage return parameter tells the LTS whether to insert a linefeed character after a carriage return character.

When you press the carriage return key, you expect the cursor to move back to the left side of the terminal screen (carriage return) and down one line (linefeed). For most terminals, you can use the default setting for the LF_AFTER_CR parameter, which tells the LTS to insert a linefeed character whenever it echoes a carriage return back to your terminal screen.

Manual switches on some terminals, and software options on others, allow you to set up the terminal so that it adds the linefeed itself. If you set up the terminal to add the linefeed, instruct the LTS not to insert a linefeed. Otherwise, the cursor moves down two lines after a carriage return.

This parameter does not operate during data transfer mode. In data transfer mode, PRIMOS or the host application program is responsible for adding linefeeds. To control linefeed

insertion during data transfer mode, use the SET_ASYNC command. The -LINE_FEED or -NO_LINE_FEED options tell PRIMOS whether or not to insert a linefeed after each carriage return.

Linefeed After Carriage Return

Parameter name	LF_AFTER_CR
Parameter number	13
Default	Insert linefeed after carriage return (1)
Choices	0 - Do not insert linefeed after carriage return
	1 - Insert linefeed after carriage return
Parameter set	Command mode
LTS command	SET

LTS COMMAND MODE EDIT CHARACTERS FUNCTIONS

The three LTS command mode edit characters (erase character, line erase character, and line display character) are LTS parameters that you can change with LTS commands. All of the LTS command mode edit characters that affect only command mode operation are in the LTS command mode parameter set; they have no effect in data transfer mode.

During data transfer mode, the PRIMOS erase and line erase characters are active. To define the erase and line erase characters for PRIMOS, use the TERM command.

Erase Character (ERASE Parameter)

The erase character, sometimes called the character delete character, deletes the last character you typed. The default LTS erase character is the backspace key. The default PRIMOS erase character is a double quotation mark.

Erase Character

Parameter name	ERASE
Parameter number	16
Default	[Backspace]
Choices	Any single ASCII character
Parameter set	Command mode
LTS command	SET
PRIMOS command	TERM

Line Erase Character (LINE_ERASE Parameter)

The line erase character, sometimes called the kill character, deletes an entire line of characters. The default LTS line erase character is the question mark (?). This is the same as the default PRIMOS kill character.

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Line Erase Character

Parameter name	LINE_ERASE
Parameter number	17
Default	[?]
Choices	Any single ASCII character
Parameter set	Command mode
LTS command	SET
PRIMOS command	TERM

Line Display Character (LINE_DISPLAY Parameter)

When you press the line display character, the LTS displays all the active characters in your current command line. You can see your command characters easily, because any erased characters or edit characters that you typed do not appear. The default line display character is [Ctrl] [L].

PRIMOS has no counterpart for this edit character.

Line Display Character

Parameter name	LINE_DISPLAY
Parameter number	18
Default	[Ctrl] [L]
Choices	Any single ASCII character
Parameter set	Command mode
LTS command	SET

CHARACTER PADDING FUNCTIONS

If you use a video display terminal, it is unnecessary for you to use or change the five character padding parameters; you can skip this section. If you use a hard-copy terminal, you need to use the five parameters that control character padding. Some hard-copy terminals need to delay printing while the print head mechanism moves to a new position. The character padding parameters can provide the necessary delay time.

A carriage return, linefeed, form feed, or horizontal or vertical tab causes the print head to move more than a single character position. You do not want the print head to print the next character until it has finished moving. You can build in the extra time required by telling the LTS to transmit extra nonprinting characters after a carriage return, linefeed, form feed, or horizontal or vertical tab.

The number of padding characters needed depends on a number of factors, such as the baud rate of the terminal, the carriage width, and the mechanical speed of the print head. All of the character padding parameters are in the command mode parameter set, because they affect only command mode operation.

Carriage Return Padding (CR_PADDING Parameter)

The carriage return padding parameter defines the number of characters that the LTS inserts following a carriage return when the LTS echoes characters to the terminal in LTS command mode. The default, no padding characters, is automatically in effect.

Carriage Return Padding	
Parameter name	CR_PADDING
Parameter number	9
Default	0
Choices	0 through 255 characters
Parameter set	Command mode
LTS command	SET

Linefeed Padding (LF_PADDING Parameter)

The linefeed padding parameter defines the number of characters that the LTS inserts following a linefeed when the LTS echoes characters to the terminal in LTS command mode. The default, no padding characters, is automatically in effect.

Linefeed Padding	
Parameter name	LF_PADDING
Parameter number	14
Default	0
Choices	0 through 255 characters
Parameter set	Command mode
LTS command	SET

Form Feed Padding (FF_PADDING Parameter)

The form feed padding parameter defines the number of characters that the LTS inserts following a form feed when the LTS echoes characters to the terminal in LTS command mode. The default, no padding character, is automatically in effect.

Form Feed Padding	
Parameter name	FF_PADDING
Parameter number	61
Default	0
Choices	0 through 255 characters
Parameter set	Command mode
LTS command	SET

Horizontal Tab Padding (HT_PADDING Parameter)

The horizontal tab padding parameter defines the number of characters that the LTS inserts following a horizontal tab when the LTS echoes characters to the terminal in LTS command mode. The default, no padding character, is automatically in effect.

Horizontal Tab Padding
Parameter name	HT_PADDING
Parameter number	59
Default	0
Choices	0 through 255 characters
Parameter set	Command mode
LTS command	SET

Vertical Tab Padding (VT_PADDING Parameter)

The vertical tab padding parameter defines the number of characters that the LTS inserts following a vertical tab when the LTS echoes characters to the terminal in LTS command mode. The default, no padding characters, is automatically in effect.

Vertical Tab Padding
Parameter name	VT_PADDING
Parameter number	60
Default	0
Choices	0 through 255 characters
Parameter set	Command mode
LTS command	SET

SETTING PARAMETERS

This chapter contains information about LTS parameter groups. It discusses the factory default settings of parameters in EAROM and explains how you can change the default settings. The chapter also gives information about how you can temporarily change and save a parameter setting in RAM.

Remember that you may not need to change any parameter settings. If you can connect to a host computer and perform the work you need to do, you can probably use the factory default settings without making any changes: the LTS device uses the default settings in the absence of specific instructions from you.

The chapter discusses the commands that change parameter settings:

    PORT
    SET
    DEFAULT
    SET__ASYNC (a PRIMOS command)

The chapter also discusses the commands that help you display current parameter settings:

    HELP
    SHOW
    PORTS

LTS PARAMETER SETS

The LTS parameters are divided into groups depending on whether they affect your terminal's port, LTS command mode operation, or data transfer mode operation. Four parameters apply to both LTS command mode and data transfer mode; these parameters can have different settings in each mode. In addition, a group of parameters is stored in LTS EAROM (Electrically Alterable Read-only Memory). These default parameters, either the factory default settings or the settings you later choose as the defaults, are saved even if you power down or reinitialize the LTS. The sections that follow describe how to change each of the parameter groups.

Global Port Parameter Set

The global port parameters control the operation of your terminal's port on the LTS, regardless of whether you are in command mode or in data transfer mode.

Note

Be careful when you change any of these parameters, because an incorrect setting can disrupt all communication to your terminal.

They must match the current settings of your terminal exactly in order to communicate with the LTS. The global port parameters are listed in Table 4-1 and described in the section entitled Global Port Parameters in Chapter 3, LTS Parameters.

TABLE 4-1.   Global Port Parameter Set

Number	Parameter Function	Name
6	LTS Messages	SRVSGNL
11	Baud Rate	BAUD
21	Parity Treatment	PARITY_TREATMENT
50	Bits per Character	BPC
51	Stop Bits	SBITS
52	Parity Type	PARITY
63	DTR Connection Control	DTR_DROP
64	Modem Control	MODEM_CONTROL

Whenever you change the setting of one of the global port parameters, the change affects LTS command mode and all sessions, whether they are free or active. Figure 4-1 illustrates the effect of changing baud rate, one of the global port parameters.
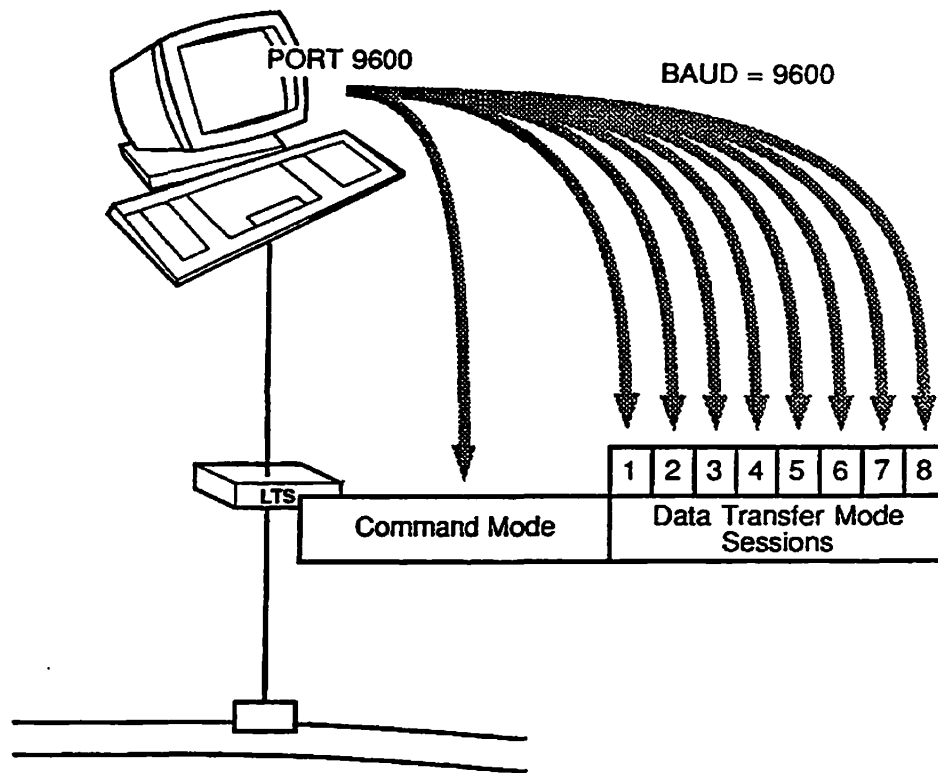
QO4.01.DJ01173LA

FIGURE 4-1.   Changes to Global Port Parameters Affect LTS Command Mode and
All Sessions

Command Mode Parameter Set

The command mode parameters control only the operation of LTS command mode; that is, when you communicate directly with the LTS, rather than transfer data to and from a remote host. See Figure 4-2.
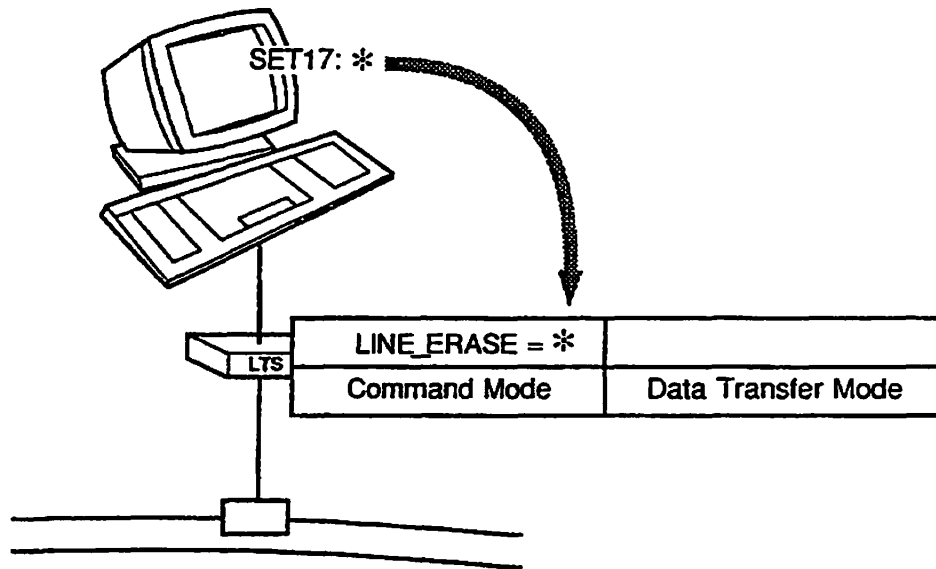
QO4.02.D10117.3LA

FIGURE 4-2. *Changes to Command-mode-only Parameters Do Not Affect Data Transfer Mode*

Table 4-2 contains a list of the command mode parameters.

TABLE 4-2. *Command Mode Parameter Set*

Number		Parameter Function	Name
5	*	XON/XOFF Flowto	FLOWTO
9		Carriage Return Padding	CR__PADDING
12	*	XON/XOFF Flowfrom	FLOWFROM
13		Linefeed After Carriage Return	LF__AFTER__CR
14		Linefeed Padding	LF__PADDING
16		Erase Character	ERASE
17		Line Erase Character	LINE__ERASE
18		Line Display Character	LINE__DISPLAY
53	*	Protocol	PROTOCOL
54	*	EIA Flow Control	FLOWCONTROL
57		Full-duplex/Half-duplex Mode	HALFDUPL
59		Horizontal Tab Padding	HT__PADDING
60		Vertical Tab Padding	VT__PADDING
61		Form Feed Padding	FF__PADDING

* *Also in the session parameter set.*

Four of the command mode parameters, which are indicated with asterisks in Table 4-2, are also members of the session parameter set, which controls the operation of the LTS in data transfer mode. These parameters can have one value for LTS command mode and different values for the sessions. For further information about the four common parameters, see the section entitled Parameters Common to the Command Mode and Session Parameter Sets, later in this chapter.

Session Parameter Set

The session parameters control the operation of your LTS port when you are in data transfer mode; that is, when you communicate with a remote host. (See Figure 4-3.)
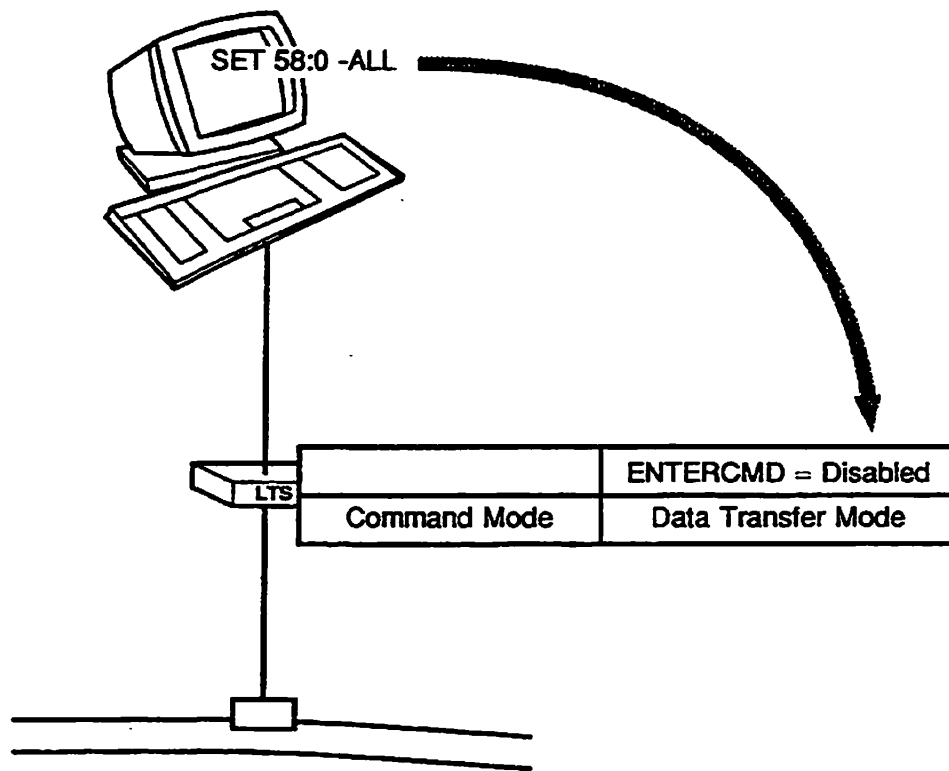
gx.03.D10117.ILA

FIGURE 4-3. Changes to Session Parameters Do Not Affect Command Mode

Table 4-3 lists the session parameters.

TABLE 4-3. Session Parameter Set

Number		Parameter Function	Name
1		Define Escape Character	ESC
5	*	XON/XOFF Flowto	FLOWTO
12	*	XON/XOFF Flowfrom	FLOWFROM
53	*	Protocol	PROTOCOL
54	*	EIA Flow Control	FLOWCONTROL
58		Enable Escape Character	ENTERCMD

* Also in the command mode parameter set.

Four of the session parameters, which are marked with asterisks in Table 4-3, are also in the command mode parameter set. These parameters can have a LTS command mode setting that differs from the session settings. For further information about the four common parameters, refer to the section entitled Parameters Common to the Command Mode and Session Parameter Sets, next in this chapter.

You can define a separate set of session parameter settings for each of your sessions. For example, you might want to define a different escape character for session 5, because you customarily use that session for communication with a remote database application where the default escape character, [Ctrl] [\], has a special meaning in the application. The section entitled The SET Command, later in this chapter, explains how to define a separate set of session parameters for each session.

Parameters Common to the Command Mode and Session Parameter Sets

The four parameters listed in Table 4-4 are members of both the command mode and session parameter sets.

TABLE 4-4. Parameters Common to the Command Mode and Session Parameter Sets

Number	Parameter Function	Name
5	XON/XOFF Flowto	FLOWTO
12	XON/XOFF Flowfrom	FLOWFROM
53	Protocol	PROTOCOL
54	EIA Flow Control	FLOWCONTROL

These parameters have one value for LTS command mode operation and other values for each of the eight sessions, which control LTS operation in data transfer mode. You establish these different settings with the SET command, described later in this chapter.

Figure 4-4 illustrates how the SET command can set different values for the protocol parameter in command mode and data transfer mode. The SET command is fully described later in this chapter; the options to the protocol parameter are listed in Chapter 3, LTS Parameters. In addition, each of the four common parameters has two default settings saved in EAROM, one for LTS command mode and one for data transfer mode (the session parameter sets).
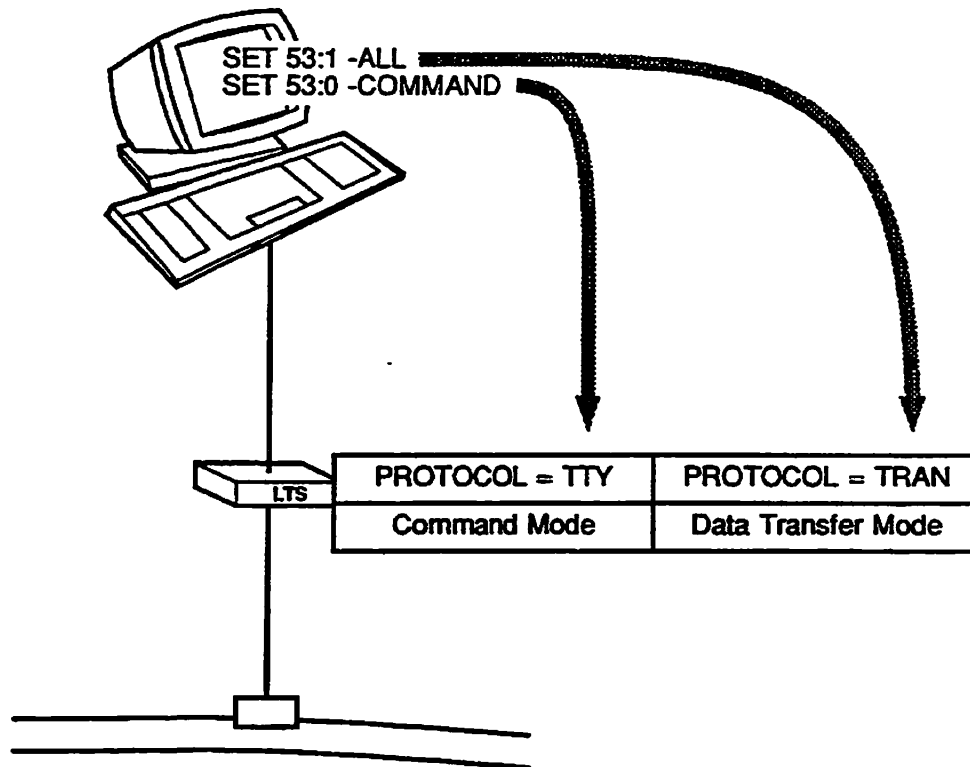
FIGURE 4-4. Settings of Common Parameters Can Vary in Each Mode

Default Parameters, RAM, and EAROM

When an LTS is initialized for the first time, the factory default settings for all parameters that are saved in EAROM are read into LTS RAM and activated. Table 4-5 shows the factory default settings of the LTS parameters. If you change any of the parameter settings later, the LTS overwrites the existing parameter settings in RAM.

TABLE 4-5.   Factory Default Parameter Settings

Number	Parameter Function and Name	Factory Default Setting
1	Define Escape Character (ESC)	[Ctrl] [\]
5	XON/XOFF Flowto (FLOWTO)	1 - Enabled
6	LTS Messages (SRVSGNL)	5 - Transmit all messages
9	Carriage Return Padding (CR_PADDING)	0
11	Baud Rate (BAUD)	32 - Auto Speed Detect
12	XON/XOFF Flowfrom (FLOWFROM)	1 - Enabled
13	Linefeed After Carriage Return (LF_AFTER_CR)	1 - Insert linefeed
14	Linefeed Padding (LF_PADDING)	0
16	Erase Character (ERASE)	[Backspace]
17	Line Erase Character (LINE_ERASE)	[?]
18	Line Display Character (LINE_DISPLAY)	[Ctrl][L]
21	Parity Treatment (PARITY_TREATMENT)	0 - Parity Disabled
50	Bits per Character (BPC)	8
51	Stop Bits (SBITS)	1
52	Parity Type (PARITY)	0 - Odd
53	Protocol (PROTOCOL)	0 - TTY
54	EIA Flow Control (FLOWCONTROL)	0 - Disabled
57	Full-duplex/Half-duplex Mode (HALFDUPL)	0 - Full-duplex mode
58	Enable Escape Character (ENTERCMD)	1 - Enabled
59	Horizontal Tab Padding (HT_PADDING)	0
60	Vertical Tab Padding (VT_PADDING)	0
61	Form Feed Padding (FF_PADDING)	0
63	DTR Connection Control (DTR_DROP)	1 - Break connection
64	Modem Control (MODEM_CONTROL)	0

How Parameters Are Stored in EAROM: If you include the -DEFAULT option when you change a parameter with the ESCAPE, PORT, or SET commands (for example, PORT 4800 -DEFAULT), the LTS records the new setting in LTS EAROM; it becomes your default setting.

You can save settings for all of the parameters in EAROM. For each of the four parameters that are common to the command mode and session parameter sets (5, 12, 53, and 54), you can save one setting for LTS command mode and another for data transfer mode in the sessions. You can save the same value for all the sessions, not a separate value for each session.

When the Parameters in EAROM Are Used: If you turn off or reboot the LTS, all parameter settings in RAM are lost. When the LTS is functional again, it activates any settings stored in EAROM, see Figure 4-5, and uses the factory default settings for any parameters that you have not changed and saved in EAROM.

Q04.05.D10117.ILA
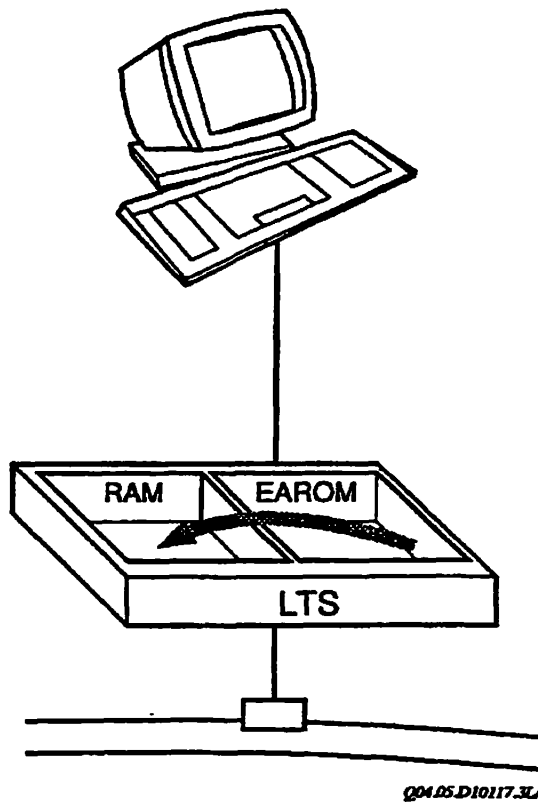
FIGURE 4-5.   Initializing the LTS — Parameters in EAROM Are Copied
Into RAM

The data transfer mode default settings in EAROM for parameters 5, 12, 53, and 54 are
used to reset a session's parameter set after a connection ends. Those parameters are reset to
the default settings if they have been changed by the user or by a host application
program prior to or during the session.

You can also use the DEFAULT command to activate all of the settings stored in EAROM,
except those of the global port parameters. The default values stored in EAROM for the
global port parameters (6, 11, 21, 50, 51, 52, 63, and 64) are used only when the LTS is
reinitialized, because your terminal's parameters may not be the same as those on the LTS.

Figure 4-6 illustrates LTS parameters for each port on the LTS. The default settings and
command mode default settings are in LTS EAROM, while the global port parameters,
command mode parameters, and session parameters are in LTS RAM. Each port has eight
sets of session parameters.

RAM	EAROM
Global Port Parameters 6 SERVSGNL 11 BAUD 21 PARITY_TREATMENT 50 BPC 51 SBits 52 PARITY 63 DTR_DROP 64 MODEM_CONTROL	**Parameter Defaults** 1 ESC 5 FLOWTO 6 SRVSGNL 9 CR_PADDING 11 BAUD 12 FLOWFROM 13 LF_AFTER_CR 14 LF_PADDING 16 ERASE 17 LINE_ERASE 18 LINE_DISPLAY 21 PARITY_TREATMENT 50 BPC 51 SBits 52 PARITY 53 PROTOCOL 54 FLOWCONTROL 57 HALFDUPL 58 ENTERCMD 59 HT_PADDING 60 VT_PADDING 61 FF_PADDING 63 DTR_DROP 64 MODEM_CONTROL
Command Mode Parameters 5 FLOWTO 9 CR_PADDING 12 FLOWFROM 13 LF_AFTER_CR 14 LF_PADDING 16 ERASE 17 LINE_ERASE 18 LINE_DISPLAY 53 PROTOCOL 54 FLOWCONTROL 57 HALFDUPL 59 HT_PADDING 60 VT_PADDING 61 FF_PADDING	**Command Mode Defaults** 5 FLOWTO 12 FLOWFROM 53 PROTOCOL 54 FLOWCONTROL
1 ESC 5 FLOWTO 12 FLOWFROM 53 PROTOCOL 54 FLOWCONTROL 58 ENTERCMD **Session 1 Parameters** **Session 2 Parameters** **Session 3 Parameters** **Session 4 Parameters** **Session 5 Parameters** **Session 6 Parameters** **Session 7 Parameters** **Session 8 Parameters**	

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FIGURE 4-6.   *LTS Parameters in EAROM and RAM*

PORT COMMAND

The PORT command displays or changes four of the global port parameters: baud rate, parity, bits per character, and number of stop bits.

Displaying Parameter Settings With PORT

To display the current settings of the baud rate, parity, bits per character, and number of stop bits parameters, use the PORT command without any options or arguments. For example,

```
<1>CMD: PORT
Port #       Baud        Parity       BPC        Sbits
2            9600        ODD          7          1
```

The number in the column labeled PORT # indicates which LTS port your terminal is attached to. LTS ports are numbered 0 through 7; in the example, the terminal is attached to port 2.

Find out which port your terminal's cable attaches to. If you incorrectly define one of the crucial global port parameters (baud rate, parity, bits per character, or number of stop bits), you must know the port number for your terminal to fix the problem. The section, The PORTS Command, later in this chapter contains instructions.

If your LTS is close by, you can follow the physical cable from your terminal to the back of the LTS and find out which port the cable attaches to. However, if your LTS is installed in an area with restricted access, this is not possible. You can use the PORT command to display your port number no matter where the LTS is located.

Changing Parameter Settings With PORT

To change parameter settings with the PORT command, enter the new settings in the correct order, separated by semicolons.

Command Syntax:

$$\text{PORT} \quad \left[\left\{ \begin{matrix} \textit{baud-rate;parity;bits-per-character;stop-bits} \\ \text{AUTO} \end{matrix} \right\} \text{[-DEFAULT]} \right]$$

Caution

Do not use the PORT command to change terminal-specific parameters. The parameters set with PORT must match the operating characteristics of your terminal. If they are different, you cannot communicate with either the LTS or with a Prime host. Therefore, you cannot issue any LTS or PRIMOS commands to change the parameters back to correct settings. If you do make a mistake and your terminal cannot talk to your LTS, see the section on the PORTS command later in this chapter.

Also, since all of the parameters changed by PORT are global port parameters, any changes you make affect LTS command mode and all sessions, whether they are free or active.

Figure 4-7 summarizes the choices available with the PORT command.

Baud Rate			
50	150	1200	4800
75	200	1800	7200
110	300	2400	9600
134.5	600	3600	19200
			Auto

Parity
Even
Odd
None

Bits per Character
5
6
7
8

Stop Bits
1
2
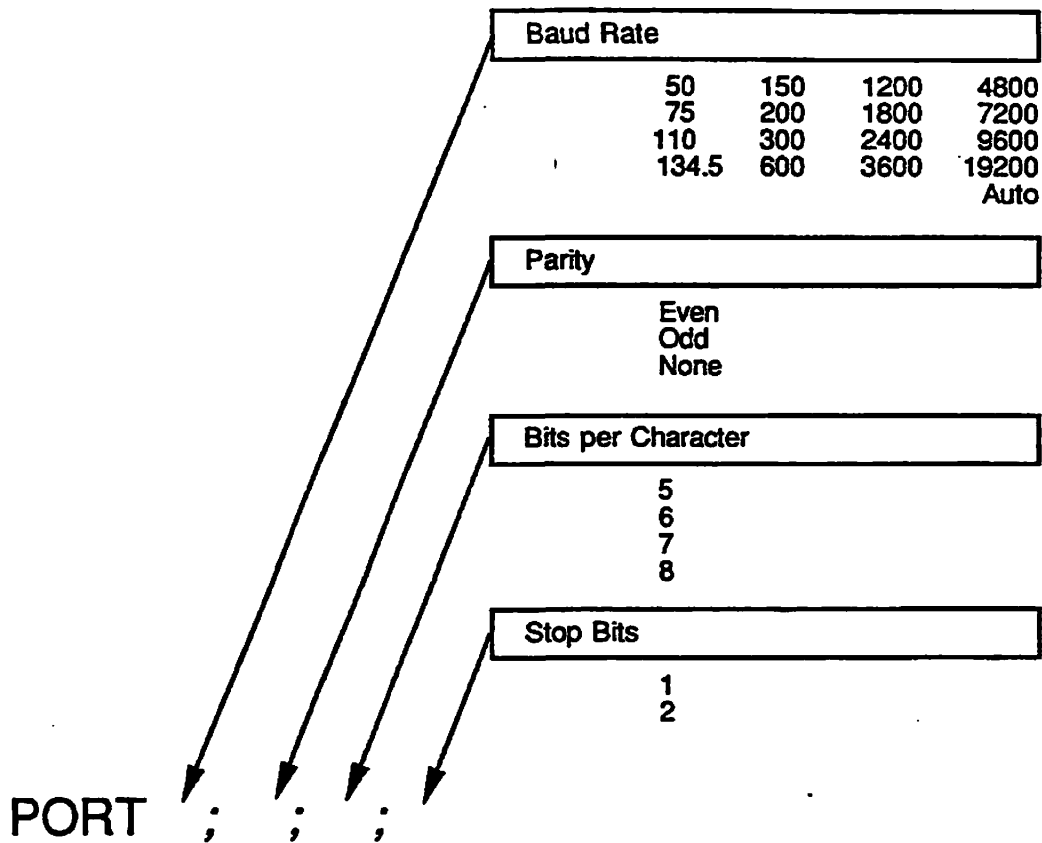
PORT ; ; ;

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FIGURE 4-7. Choices and Syntax for the PORT Command

If you do not want to change all four parameters, enter a semicolon for any parameter you are leaving unchanged, if that parameter precedes one that you want to change. For example, for a teleprinter terminal that runs at 110 baud and uses two stop bits, enter the following command:

<1>CMD: <u>PORT 110;;2</u>

Do not enter a semicolon for a parameter you leave unchanged if the unchanged parameter follows the parameters you want to change. For example, if you want to change the parity from odd to even, enter

<1>CMD: <u>PORT ;EVEN</u>

The PORT command requires only one entry for parity: even, odd, or none. The LTS can set both parity-related parameters, parity treatment and parity type, from your single entry. If you request even or odd parity, the LTS automatically sets the parity treatment parameter to enable parity. If you request no parity, the LTS automatically disables the parity treatment parameter. You do not need to worry about consistency between the two parameters.

Changing Auto Speed Detect: PORT AUTO

You can use the PORT command to change the baud rate parameter to Auto Speed Detect. For example,

<1>CMD: <u>PORT AUTO</u>

When you specify AUTO in the command line, do not enter any of the other parameter settings. The LTS automatically sets the other terminal characteristics parameters to the following settings:

Parity disabled
Eight bits per character
One stop bit

If you try to specify any other settings, the LTS ignores those instructions and puts your terminal line into Auto Speed Detect with the settings listed above.

If you activate Auto Speed Detect, make sure your terminal uses the correct bits per character, parity, and stop bits. For PT250, PT200, PST100, and PT45 terminals, use seven bits per character with space parity or with parity ignored. (Seven bits per character with space parity or with parity ignored is the default setting for PT250, PT200, PST100, and PT45 terminals. The LTS does not recognize space parity; therefore the PORT command display shows 8 bits with NONE parity.) On these terminals, do not use the settings for eight-bit characters because those settings are for special international character sets. For terminals made by other vendors, seven bits per character with space parity or with parity ignored should also work correctly. All terminals must use at least one stop bit.

If you want to change any of those characteristics, wait until you complete the Auto Speed Detect function.

Changing Terminal Settings

If you change any parameters with the PORT command, you must then make the appropriate changes to your terminal so that the parameters match your terminal's baud rate, parity, bits per character, and number of stop bits.

Some terminals (for example, the PT45 terminal) have physical switches that control the terminal's operating characteristics. Some terminals (for example, the PT200 terminal) have menus that allow you to change these characteristics through software. Other terminals (for example, the PST100 terminal) have both permanent physical switches and temporary software settings.

After you issue the PORT command, use the physical switches or the software to make the necessary changes to the terminal. Then, if necessary, restart the terminal to activate the new settings. If you are not sure how your terminal operates, ask your administrator for assistance. If you make a mistake, see the section on the PORTS command.

Follow this sequence:

1. Change the LTS parameter setting.

2. Change the terminal setting to match the parameter.

Saving the Settings in EAROM: PORT -DEFAULT

If you want the changes to be permanent, use the -DEFAULT (or -DEF) option. PORT -DEFAULT saves the new parameter settings in LTS EAROM and also updates the current settings for LTS command mode and all sessions, whether they are free or active. Unless you enter new settings in EAROM with the -DEFAULT option of PORT or SET, the original factory default settings or the last settings saved in EAROM are activated when the LTS is reinitialized. Parameter settings saved in EAROM with PORT -DEFAULT are activated *only* when the LTS is reinitialized. Unlike all of the other parameter settings, the settings of the global port parameters are *not* activated when you issue the DEFAULT command.

Save these crucial global port parameters in EAROM, to ensure that the LTS can communicate correctly with your terminal even after a power failure or reinitialization.

PORT Command Error Messages

The PORT command rejects requests for invalid settings and displays one of the following messages.

The BAUD RATE has been specified incorrectly.
> The command line contains an invalid character, rate, or incorrectly placed delimiters. The only baud rates you can use are 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600, 19200, and AUTO.

The BITS PER CHARACTER has been specified incorrectly.
> The choices for character size are 5, 6, 7, or 8 bits.

Option other than those allowed has been used.
> The -DEFAULT option is the only option allowed for the PORT command.

The STOP BITS has been specified incorrectly.
> The number of stop bits must be 1 or 2.

The PARITY has been specified incorrectly.
> The choices for parity are odd, even, or none.

SET COMMAND

The SET command can change any of the 24 definable LTS parameters.

Command Syntax:

$$\text{SET } \textit{parameter\_number:parameter\_value} \quad \begin{bmatrix} \text{-COMMAND} \\ \text{-ALL} \\ \text{-DEFAULT} \\ \text{-SESSION } n \end{bmatrix}$$

Note

The -COMMAND option works *only* with command mode parameters. The -ALL option works *only* with session mode parameters. The LTS rejects the SET command and displays an error message if you use these options with other parameters.

To change a parameter with the SET command, identify the parameter number and enter a new value. You can define a parameter setting (*parameter_value*), enter a character (for character parameters, like the escape character or the erase character), or a code number. Each parameter has its own identifying number and, for noncharacter parameters, a code number for each possible setting. You can change as many as five LTS parameters at one time provided that they are all members of the same parameter group. Table 4-6 lists parameters by number and shows the choices available for parameter settings with the SET command. The default setting for each parameter is indicated by an asterisk. This information is also available in Appendix B, LTS Parameter Summary.

TABLE 4-6.   LTS Parameter Functions and Valid Parameter Settings

Number	Parameter Function	Choices
1	Define Escape Character	Any single ASCII character ([Ctrl] [\] is the default)
5	XON/XOFF Flowto	0 - Disabled 1 - Enabled*
6	LTS Messages	0 - No messages 1 - Transmit all but prompts 5 - Transmit all messages*
9	Carriage Return Padding	0* through 255
11	Baud Rate	0- 110 4- 600 8- 200 14- 9600 1- 134.5 5- 75 10- 50 15-19200 2- 300 6- 150 12-2400 30- 3600 3- 1200 7-1800 13-4800 31- 7200 32-AUTO*.
12	XON/XOFF Flowfrom	0 - disabled 1 - enabled*
13	Linefeed after Carriage Return	0 - Do not insert linefeed 1 - Insert linefeed*
14	Linefeed Padding	0* through 255
16	Erase Character	Any single ASCII character ([Backspace] is the default)
17	Line Erase Character	Any single ASCII character ([?] is the default)
18	Line Display Character	Any single ASCII character ([Ctrl] [L] is the default)
21	Parity Treatment	0 - Parity Disabled* 3 - Parity Enabled
50	Bits per Character	5 6 7 8*

* Default setting

Table 4-6. LTS Parameter Numbers and Valid Parameter Settings (*Continued*)

Number	Parameter Function	Choices
51	**Stop Bits**	1* 2
52	**Parity Type**	0 - Odd* 1 - Even
53	**Protocol**	0 - TTY* 1 - TRAN 2 - TT8BIT 3 - TTYUPC 4 - TTY8
54	**EIA Flow Control**	0 - Disabled* 1 - Enabled on high to low CTS/RTS 2 - Enabled on low to high CTS/RTS
57	**Full-duplex/half-duplex Mode**	0 - Full-duplex mode* 1 - Half-duplex mode
58	**Enable Escape Character**	0 - Disabled 1 - Enabled*
59	**Horizontal Tab Padding**	0* through 255
60	**Vertical Tab Padding**	0* through 255
61	**Form Feed Padding**	0* through 255
63	**DTR Connection Control**	0 - Do not break the connection when DTR drops 1 - Break the connection when DTR drops*
64	**Modem Control**	0 - Disabled* 1 - Enabled

* Default setting

Examples of Parameter Numbers and Values

To use the SET command, enter the parameter number, a colon, and then the character or code number for the parameter setting. For example, to change the LTS erase character, parameter 16, to a backslash, enter the following command:

<1>CMD: SET 16:\

To disable the XON/XOFF flowfrom parameter, parameter 12, enter the following command:

<1>CMD: SET 12:0

You can change as many as five parameters of the same parameter group with a single SET command. They must all be global port parameters, or all command mode parameters, or all session parameters. Enter the parameters on the same command line, separated with spaces. For example, if you want to change your LTS erase character (parameter 16) to a backslash and change the line erase character (parameter 17) to an exclamation point, enter the following command:

<1>CMD: SET 16:\ 17:!

You can enter parameter numbers in any order when you use the SET command.

Setting the Global Port Parameters

To change as many as five global port parameters at once, enter their numbers and settings in a SET command. For example, the following command changes baud rate, parity treatment, bits per character, stop bits, and parity type:

<1>CMD: SET 11:14 21:3 50:7 51:1 52:0

Do not use the -ALL option, the -COMMAND option, or the -SESSION option with the SET command to change global port parameters. The -ALL option works only with session parameters and the -COMMAND option works only with command mode parameters. Both the -ALL and the -COMMAND options return error messages with global port parameters. If you use the -SESSION option to change a global port parameter, the value affects the setting for *all sessions* instead of just a specific session. The only option that has any effect with the SET command with global port parameters is the -DEFAULT option. See the sections Setting a Parameter for All Eight Sessions: SET -ALL, Setting the Command Mode Parameters: SET -COMMAND, and Setting a Parameter for a Specific Session From Another Session: SET -SESSION later in this chapter.

Caution

If you change any of the global port parameters below by mistake, you can disable all communication between your terminal and the LTS.

11 - Baud rate
21 - Parity treatment
50 - Bits per character
51 - Stop bits
52 - Parity type

Also remember that when you set any of the global port parameters, the changes affect LTS command mode and all sessions, whether they are free or active.

The SET Command and Auto Speed Detect

You can use the SET command to change the baud rate to Auto Speed Detect. For example,

```
<1>CMD: SET 11:32
```

When you specify Auto Speed Detect, do not change the parity, bits per character, or number of stop bits. The LTS automatically changes those parameters to the following settings:

Parity disabled
Eight bits per character
One stop bit

If you try to change any of those parameters in the same SET command, the LTS ignores your instructions and puts your terminal line into Auto Speed Detect with the settings listed above.

If you change the baud rate parameter to Auto Speed Detect, make sure your terminal uses the correct bits per character, parity, and stop bits. For PT200, PT250, PST100, and PT45 terminals, use seven bits per character with space parity or with parity ignored. (Seven bits per character with space parity or with parity ignored is the default setting for these terminals.) On these terminals, do not use the settings for eight-bit characters, because those settings are for special international character sets. For terminals made by other vendors, seven bits per character with space parity or with parity ignored should also work correctly. All terminals must use one stop bit.

If you want to change any of those characteristics, wait until you complete the Auto Speed Detect function.

Setting a Specific Session's Parameters

Each of your eight sessions has six session parameters, as shown in Table 4-7.

TABLE 4-7.   Session Parameter Set

Number	Parameter Function	Name
1	Define Escape Character	ESC
5 *	XON/XOFF Flowto	FLOWTO
12 *	XON/XOFF Flowfrom	FLOWFROM
53 *	Protocol	PROTOCOL
54 *	EIA Flow Control	FLOWCONTROL
58	Enable Escape Character	ENTERCMD

* Also in the command mode parameter set.

You can set these parameters to tailor the characteristics of the session to match those of the target host application program.   To set a specific session's parameters, set the session to your current one with the SWITCH command (described in Chapter 2, Basic LTS Commands) and then enter SET without an option.   (The first part of the LTS prompt displays your current session number.) For example, to change the Protocol parameter (number 53) on session 2 to TRAN (code number 1) when your current session is session 1, enter the following sequence of commands:

```
<1>CMD: SWITCH 2
<2>CMD: SET 53:1
```

The changes that you make in this way affect only the current session. In the case of the session parameters that are also in the command mode parameter set (5, 12, 53, and 54), the changes affect only the current session, not the command mode parameter set.   To change the command mode settings of the common parameters, see the section Setting the Command Mode Parameters: SET -COMMAND, later in this chapter.   Each change takes effect immediately.   Parameters 5, 12, 53, and 54 are reset to the default values stored in EAROM when the session is disconnected. The parameters that define the escape character and its operation, 1 and 58, are *not* reset to the default values upon disconnect. Thus, you can define an escape character and enable or disable it for each session, but changes to parameters 5, 12, 53, and 54 last only for the duration of the connection.   For a full discussion of why you might want to establish a different escape character for each session, refer to the section entitled Defining the Escape Character: the Escape Command, in Chapter 2, Basic LTS Commands.

Setting a Parameter for a Specific Session From Another Session: SET −SESSION

The -SESSION option allows you to change parameters for a session that is not your current session without having to switch sessions. This command works with all parameter sets. For example, you can change a parameter on session 3 from session 1 without switching to session 3. To change the Protocol parameter (number 53) on session 3 to TT8BIT (code number 2) when your current session is session 1, enter the following command. (-SESS is an abbreviation for -SESSION.)

<1>CMD: <u>SET 53:2 −SESS 3</u>

You cannot use the -ALL option with the -SESSION option. If you use the -COMMAND option with the -SESSION option, you change the command mode parameter for the specific session. If you use the -DEFAULT option with the -SESSION option, you change the value of the parameter for the specified session and store it in EAROM.

Setting a Parameter for All Eight Sessions: SET −ALL

SET -ALL changes as many as five session parameters for all sessions at once. This command works only with the session parameters listed in Table 4-7, above. The new parameter settings take effect immediately, whether the sessions are free or active. For example, to change the XON/XOFF flowto parameter (number 5) to disabled (code number 0) for all sessions, enter the following command:

<1>CMD: <u>SET 5:0 −ALL</u>

In the case of the parameters that are also in the command mode parameter set (5, 12, 53, and 54), changes made with SET -ALL affect only the sessions' parameter sets, not the command mode parameter set.

Setting the Command Mode Parameters: SET −COMMAND

SET -COMMAND changes command mode parameters. For example, to change parameter 53 (Protocol) to TTY (code number 0) for LTS command mode only, enter the following command. (-CMD is an abbreviation for -COMMAND.)

<1>CMD: <u>SET 53:0 −CMD</u>

You can change as many as five command mode parameters at once. In the case of the parameters that are also in the session parameter set (5, 12, 53, and 54), changes made with SET -COMMAND affect only the command mode parameter set, not the session parameter sets. Table 4-8 lists the command mode parameters.

TABLE 4-8.   Command Mode Parameter Set

Number		Parameter Function	Name
5	*	XON/XOFF Flowto	FLOWTO
9		Carriage Return Padding	CR_PADDING
12	*	XON/XOFF Flowfrom	FLOWFROM
13		Linefeed After Carriage Return	LF_AFTER_CR
14		Linefeed Padding	LF_PADDING
16		Erase Character	ERASE
17		Line Erase Character	LINE_ERASE
18		Line Display Character	LINE_DISPLAY
53	*	Protocol	PROTOCOL
54	*	EIA Flow Control	FLOWCONTROL
57		Full-duplex/Half-duplex Mode	HALFDUPL
59		Horizontal Tab Padding	HT_PADDING
60		Vertical Tab Padding	VT_PADDING
61		Form Feed Padding	FF_PADDING

* Also in the session parameter set.

Changing and Saving Parameter Settings in EAROM: SET -DEFAULT

SET -DEFAULT stores your parameter changes in LTS EAROM and also updates the current parameters in LTS RAM. The -DEFAULT option works with all 24 of the definable LTS parameters. Parameter settings saved in EAROM are retained even in the event of shutdown or reset. They are activated when the LTS is reinitialized. Unless you enter new parameter settings in EAROM with the -DEFAULT option of ESCAPE, PORT, or SET, the original factory default settings or the last settings saved in EAROM are activated when the LTS is reinitialized.

The data transfer mode default settings for parameters 5, 12, 53, and 54 reset a session's parameter set after a connection ends. If a user or a host applications program changes those parameters prior to or during the session, the parameters are reset to the default settings at the end of that session.

When you issue the DEFAULT command, described later in this chapter, you activate the parameter settings stored in EAROM, except for the global port parameters, which are restored from EAROM only upon reinitialization.

Changing and Saving Global Port Parameters: When you save a global port parameter setting in EAROM with SET -DEFAULT, the change also affects the current setting for LTS command mode and for all sessions, whether they are free or active. For example, the following command changes your baud rate to 19,200 in both RAM and EAROM; that is, the change takes effect immediately and is saved permanently:

```
<1>CMD: SET 11:15 -DEFAULT
```

The global port parameters are 6, 11, 21, 50, 51, 52, 63, and 64. See the earlier section entitled Global Port Parameters and Table 4-1 for more information.

Changing and Saving Session Parameters: Enter SET -DEFAULT for a session parameter to change its setting in both EAROM and in the current session's parameter set. For example, the following command changes the escape character to # in both EAROM and in the current session's parameter set.

```
<1>CMD: SET 1:# -DEFAULT
```

Note

You can save only one setting for the escape character in EAROM, not one for each session.

The settings for the session parameters that you save in EAROM with SET -DEFAULT become the data transfer mode defaults. There is one set of data transfer mode defaults for all sessions, not a separate set for each session. The values for parameters 5, 12, 53, and 54 are used to reset a session's parameter set when a session disconnects, in the case where they were changed before or during the session. The values for the escape character parameters, 1 and 58, are *not* reset upon disconnect.

In the case of session parameters 5, 12, 53, and 54, which are also in the LTS command mode parameter set, the change does *not* affect the current command mode parameters or the command mode defaults in EAROM. See the next section Changing and Saving Command Mode Parameters for an explanation of how to set and save command mode parameters. For example, the following command changes the protocol parameter to TRAN in EAROM and in the current session parameter set, but not in the current command mode parameter set or in the command mode defaults.

```
<1>CMD: SET 53:1 -DEFAULT
```

You can also use the -DEFAULT option together with the -ALL option to change session parameters both in EAROM and in all sessions. The changes take effect immediately. In the case of parameters 5, 12, 53, and 54, the changes do not affect the current command mode parameter set or the command mode defaults in EAROM. For example, the following command disables XON/XOFF flowto and XON/XOFF flowfrom in EAROM and in all sessions.

```
<1>CMD: SET 5:0 12:0 -DEFAULT -ALL
```

The session parameters are 1, 5, 12, 53, 54, and 58. See the earlier section entitled Session Parameters and Table 4-3 for more information.

Changing and Saving Command Mode Parameters: You can enter SET -COMMAND -DEFAULT (or SET -CMD -DEF) to change the setting of a command mode parameter in both the command mode defaults in EAROM and in the current command mode parameter set. In the case of parameters 5, 12, 53, and 54, which are also in the session parameter set, changes made with SET -COMMAND -DEFAULT do *not* affect any of the session parameters in RAM or in EAROM.

For example, the following command changes the protocol parameter to TTYUPC in the command mode defaults in EAROM and in the current command mode parameter set. It does not affect any of the session parameters anywhere.

```
<1>CMD: SET 53:3 -CMD -DEF
```

The command mode parameters are 5, 9, 12, 13, 14, 16, 17, 18, 53, 54, 57, 59, 60, and 61. See the section earlier in the chapter entitled Command Mode Parameters and Table 4-2 for more information.

The SET Command Versus the PORT Command

Although you can use the SET command to change any LTS parameters, we recommend that you use the PORT command to change the crucial global port parameters (baud rate, parity, bits per character, or number of stop bits).

SET Command Error Messages

Any errors in a SET command cause the LTS to reject the entire command. The following messages explain why the LTS rejected a SET command. They are listed in alphabetical order.

A space character is not allowed between the parameter and the parameter value. Use a colon (:). All requests have been ignored.
Type a colon, but no spaces, between the parameter number and parameter value.

A space or a CR must follow a parameter value. All requests have been ignored.
You typed something other than a space between a parameter value and the next parameter number.

Only 5 parameters can be changed with the SET command. All requests have been ignored.
You tried to change more than 5 parameters with one SET command.

Option other than those allowed has been specified. All requests have been ignored.
The only options for the SET command are -ALL, -COMMAND (or -CMD), and -DEFAULT (or -DEF).

Parameters and parameter values must be entered with the SET command.
You tried to enter a SET command without any parameter numbers or parameter values.

Parameters must be entered before command line options. All requests have been ignored.
You typed -ALL, -COMMAND (or -CMD), or -DEFAULT (or -DEF) before the parameter numbers and parameter values. The parameters must come first.

The *n*th parameter cannot be changed when -ALL is entered. Parameter is
global.
> You used the -ALL option when attempting to set a global port parameter. The LTS
> rejects the command in case you have forgotten that changing a global port parameter
> affects LTS command mode and all sessions, whether they are free or active.

The *n*th parameter cannot be changed when -COMMAND is entered. Parameter is
global. All requests have been ignored.
> You entered the -COMMAND option when attempting to set one of the global port
> parameters. The LTS rejects the command in case you have forgotten that changing a
> global port parameter affects LTS command mode and all sessions, whether they are free
> or active.

The *n*th parameter cannot be changed. All requests have been ignored.
> You entered an incorrect parameter number. The *n*th parameter in your list is one of the
> LTS parameters that you cannot change (either the XON character, the XOFF character,
> or the LOOP parameter).

The *n*th parameter cannot be set to the XON or the XOFF character. All
requests have been ignored.
> You tried to define one of the character parameters (erase character, line erase character,
> line display character, escape character) as [Ctrl] [S], the character reserved for XOFF
> (ASCII DC3), or [Ctrl] [Q], the character reserved for XON (ASCII DC1).

The *n*th parameter has been specified more than are supported. All requests
have been ignored.
> You tried to change the same parameter twice in the same command.

The *n*th parameter must be followed by a parameter value. All requests have
been ignored.
> You forgot to specify a parameter value for the *n*th parameter in your SET command.

The *n*th parameter must be valid in data transfer mode in order to change.
All requests have been ignored.
> You attempted to change one of the command mode parameters without including the
> -COMMAND (or -CMD) option. When entered without an option, SET works upon only
> the session and global port parameters.

The *n*th parameter must be valid in LTS command mode in order to change. All
requests have been ignored.
> You entered the -COMMAND (or -CMD) option when attempting to set parameter 1 or
> 58, which are session parameters.

The *n*th parameter must have a parameter value between 0 and 2. All requests
have been ignored.
> The *n*th parameter in your list must be 0, 1, or 2. Either the parameter number or the
> parameter value is incorrect.

The *n*th parameter must have a parameter value between 0 and 255. All requests have been ignored.
The *nth* parameter in your list must be a number from 1 through 255. Either the parameter number or the parameter value is incorrect.

The *n*th parameter must have a parameter value between 0 and 4. All requests have been ignored.
The *nth* parameter in your list must be 0 through 4. Either the parameter number or the parameter value is incorrect.

The *n*th parameter must have a parameter value between 5 and 8. All requests have been ignored.
The *nth* parameter in your list must be 5, 6, 7, or 8. Either the parameter number or the parameter value is incorrect.

The *n*th parameter must have 3 or less digits. All requests have been ignored.
You entered a character instead of a number, or you entered more than three digits for the *nth* parameter value: the maximum parameter number is 255.

The *n*th parameter must have a parameter value of 0 or 1. All requests have been ignored.
The *nth* parameter in your list must be 0 or 1. Either the parameter number or the parameter value is incorrect.

The *n*th parameter must have a parameter value of 0 or 3. All requests have been ignored.
The *nth* parameter in your list must be 0 or 3. Either the parameter number or the parameter value is incorrect.

The *n*th parameter must have a parameter value of 0, 1, or 5. All requests have been ignored.
The *nth* parameter in your list must be 0, 1, or 5. Either the parameter number or the parameter value is incorrect.

The *n*th parameter must have a parameter value of 0 – 8, 10, 12 – 15, or 30 – 32. All requests have been ignored.
You entered an illegal parameter value for the *nth* parameter in your list. Either the parameter number or the parameter value is incorrect.

The *n*th parameter must have a parameter value of 1 or 2. All requests have been ignored.
The *nth* parameter in your list must be 1 or 2. Either the parameter number or the parameter value is incorrect.

The *n*th parameter must have only one character as part of the parameter value. All requests have been ignored.
You tried to define multiple characters for a parameter that is limited to a single character (erase character, line erase character, line display character, or escape character).

The -CONN option is no longer supported. No option needed to change data transfer mode parameters. All requests have been ignored.
You do not need to use the obsolete -CONN option to set session (data transfer mode) parameters. Simply enter SET followed by the parameters to be changed.

The -DEFAULT option can only be used when parameters have been entered.
You tried to use the -DEFAULT option without entering a parameter number and value.

HELP COMMAND

The LTS HELP command displays a list of the LTS commands and their options. The -PAR option lists the LTS parameters, along with their legal and default settings.

Command Syntax:

HELP [-PAR]

Displaying LTS Command Information

Enter the HELP command without an option to display a complete list of LTS command names, syntax, any required information, and options. For example,

```
<1>CMD: HELP
ADMIN
BaNneR
Connect name
COntinue [n]
DEFault [-ALL] [-CoMmanD]
Disconnect [n | -ALL]
ESCape [escape char] [-ON | -OFF] [-ALL] [-DEFault]
Help [-PAR]
List_Hosts
Lts_Addr
PORT [baud;parity;bpc;stopbits | AUTO] [-DEFault]
PORTS
PRompt [prompt_char]
SET parameter:value... [-ALL | -SESSion n] [-CoMmanD] [-DEFault]
SHOW [parameter...] [-DEFault] [SESSion n]
STatus
SWitch [n]
TEST
```

Displaying LTS Parameter Information

To display the LTS parameters, enter HELP -PAR. The LTS provides a list of all the LTS parameters by number, the number codes for the parameter settings, and the factory default settings. For example,

```
<1>CMD: HELP -PAR

 1 - ESC                  Any ascii character.
 5 - FLOWTO               0 - disabled   1 - enabled
 6 - SERVSGNL             0 - no messages   1 - all but prompts   5 - all messages
 9 - CR_PADDING           Number of characters to fill after a CR (0 to 255).
11 - BAUD                 0 - 110    1 - 134.5 2 - 300     3 - 1200   4 - 600
                          5 - 75     6 - 150    7 - 1800   8 - 200    10 - 50
                          12 - 2400 13 - 4800 14 - 9600 15 - 19200 30 - 3600
                          31 - 7200 32 - AUTO
12 - FLOWFROM             0 - disabled   1 - enabled
13 - LF_AFTER_CR          0 - disabled   1 - enabled
14 - LF_PADDING           Number of characters to fill after a LF (0 to 255).
16 - CHAR_DELETE          Any ascii character.
17 - LINE_DELETE          Any ascii character.
18 - LINE_DISPLAY         Any ascii character.
21 - PARITY_TREATMENT 0 - parity disabled   3 - parity enabled
50 - BPC                  5 - 5 bits   6 - 6 bits   7 - 7 bits   8 - 8 bits
51 - SBITS                1 - 1 sbit   2 - 2 sbits
52 - PARITY               0 - odd   1 - even
53 - PROTOCOL             0 - TTY   1 - TRAN   2 - TT8BIT   3 - TTYUPC   4 - TTY8
54 - FLOWCONTROL          0 - NO EIA  1 - EIA-HIGH TO LOW   2 - EIA--LOW TO HIGH
55 - XOFF                 (cannot be changed)
56 - XON                  (cannot be changed)
57 - HALFDUPL             0 - disabled   1 - enabled
58 - ENTERCMD             0 - disabled   1 - enabled
59 - HT_PADDING           Number of characters to fill after a HT (0 - 255).
60 - VT_PADDING           Number of characters to fill after a VT (0 - 255).
61 - FF_PADDING           Number of characters to fill after a FF (0 - 255).
62 - LOOP                 (cannot be changed)
63 - DTR_DROP             0 - do not break connection   1 - break connection
64 - MODEM_CONTROL        0 - disabled  1 - enabled
```

Note

The HELP -PAR command lists three parameters that you cannot change:

   55   XON
   56   XOFF
   62   Loopback parameter

The loopback (LOOP) parameter (parameter 62), which is used for network troubleshooting, can only be changed by the NTS software.

The HELP -PAR command shows you the choices you have for parameter settings, but it does not tell you the current setting for any of the parameters. To review the current parameter settings, use the SHOW command.

You can use the HELP -PAR command as a companion to the SET and SHOW commands because both SET and SHOW refer to LTS parameters by parameter numbers and to parameter settings by number codes. HELP -PAR is a quick way to find parameters by number and to determine what the number codes mean.

SHOW COMMAND

The SHOW command displays the settings of the parameters for your LTS port.

Command Syntax:

SHOW *parameter_number:1_parameter_number:2* [-DEFAULT] [-SESSION *n*]

You can display the current settings or the default settings stored in EAROM. You can also display both the current and the default settings for as many as five specific parameters. For information about the -SESSION option, see the section Displaying Parameter Settings for a Specific Session: SHOW -SESSION later in this chapter. The HELP -PAR command can help you interpret the results of the SHOW command.

The LTS maintains two sets of parameters for each port. One set is for LTS command mode and the other is for data transfer mode. If you have changed any parameters, the two sets may differ. (For information on how parameter settings vary from one mode to the other, see the section entitled Parameters Common to the Command Mode and Session Parameter Sets, earlier in this chapter.)

Displaying the Current Settings: SHOW

To display the current settings of the parameters for your LTS port, enter SHOW without an argument or option. The LTS displays the LTS command mode settings and the settings for your current session. For example, to show the current settings for session 3, switch to that session and then enter SHOW.

```
<1>CMD: SWITCH 3
<3>CMD: SHOW
```

```
Port:    0
Session: 3
```

Parameter Number	C U R R E N T Command Mode	Data Transfer Mode	Parameter Number	C U R R E N T Command Mode	Data Transfer Mode
1		^\	52	0	0
5	0	1	53	1	0
6	5	5	54	1	0
9	0		55	^S	^S
11	14	14	56	^Q	^Q
12	0	1	57	0	
13	1		58		1
14	0		59	0	
16	^H		60	0	
17	?		61	0	
18	^L		62		0
21	0	0	63	1	1
50	8	8	64	0	0
51	1	1			

Displaying the Default Settings Stored in EAROM: SHOW –DEFAULT

To display the default settings for your port stored in EAROM, enter SHOW -DEFAULT. The LTS displays both the LTS command mode default settings and the data transfer mode default settings. In the example below, note that parameter 53 (PROTOCOL) is set to 0 (TTY) for LTS command mode and 1 (TRAN) for data transfer mode. The parameter settings stored in EAROM are the factory default settings unless you have entered different settings with ESCAPE -DEFAULT, PORT -DEFAULT, or SET -DEFAULT.

<2>CMD: <u>SHOW -DEFAULT</u>

Parameters for session: 2

Parameter Number	DEFAULT Command Mode	Data Transfer Mode	Parameter Number	DEFAULT Command Mode	Data Transfer Mode
1		^\	52	0	0
5	1	1	53	0	1
6	5	5	54	0	0
9	0		55		
11	32	32	56		
12	1	1	57	0	
13	1		58		1
14	0		59	0	
16	^H		60	0	
17	?		61	0	
18	^L		62		0
21	0	0	63	1	1
50	8	8	64	0	0
51	0	0			

Displaying the Settings of Specific Parameters: SHOW

To display the settings of as many as five specific parameters, enter SHOW followed by the numbers of the parameters you want to display. The LTS displays the current setting and the default setting stored in EAROM for both LTS command mode and data transfer mode. In the example below, SHOW is used to display the settings of XON/XOFF flowto, XON/XOFF flowfrom, protocol, and EIA flowcontrol. These are the four parameters that are common to the LTS command mode and the session parameter sets. Therefore, they can have a command mode setting that differs from the data transfer mode setting, as the following example shows.

<2>CMD: SHOW 5 12 53 54

Parameters for session: 2

Parameter Number	CURRENT Command Mode	Data Transfer Mode	DEFAULT Command Mode	Data Transfer Mode
5	0	1	1	1
12	0	1	1	1
53	1	0	0	1
54	1	0	0	0

Displaying Parameter Settings for a Specific Session: SHOW –SESSION

To display the setting of parameters for another session from your current session, enter the SHOW command with the -SESSION option. For example, to display the settings of parameters 5, 12, 53, and 54 in session 4 from session 1, enter the following command. (-SESS is an abbreviation for -SESSION.)

<1>CMD: SHOW 5 12 53 54 -SESS 4

To display the default parameters for another session that is not your current session, use the SHOW ocommand with the -SESSION option and the -DEFAULT option. For example, to display the default settings of parameters 5, 12, 53, and 54 in session 4 from session 1, enter the following command.

<1>CMD: SHOW 5 12 53 54 -SESS 4 -DEF

PORTS COMMAND

The PORTS command displays the settings of the crucial global port parameters for any of the ports on the LTS. The crucial global port parameters are baud rate, parity, bits per character, and number of stop bits. You can display the current settings of these parameters for all LTS ports or for any particular port.

Checking a Specific Port

Enter the PORTS command to check the settings of the crucial global port parameters for a specific port.

Command Syntax:

PORTS [n]

where n is the LTS port number. LTS port numbers range from 0 through 7, as shown in Figure 4-8.
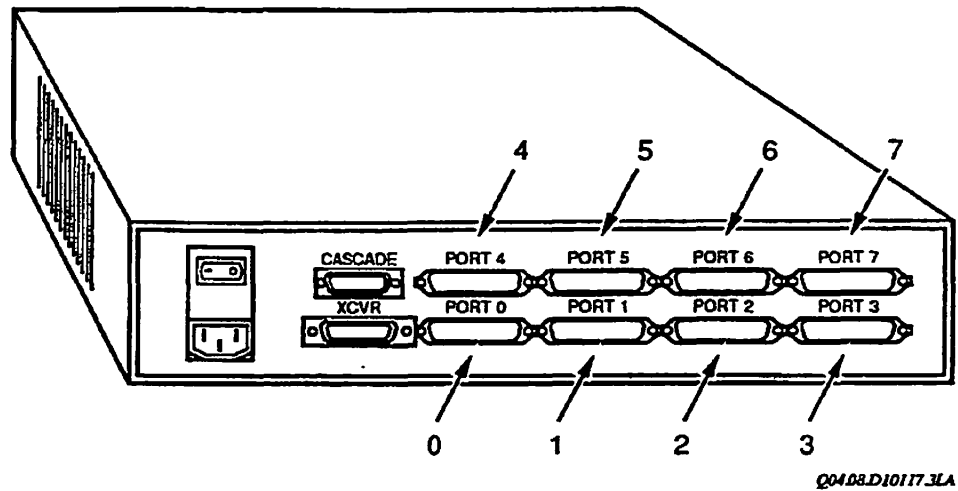
FIGURE 4-8. LTS Port Numbers

For example,

```
<1>CMD: PORTS 3
```

Port #	Baud	Parity	BPC	Sbits
3	9600	ODD	7	1

Checking All Ports on the LTS

To check the settings of the crucial port parameters for all ports on the LTS, enter PORTS without an argument. For example,

```
<1>CMD: PORTS
```

Port #	Baud	Parity	BPC	Sbits
0	9600	ODD	7	1
1	4800	NONE	8	1
2	AUTO	NONE	8	1
3	9600	NONE	8	1
4	9600	EVEN	7	1
5	9600	NONE	8	1
6	2400	NONE	8	1
7	9600	ODD	7	1

If your baud rate setting does not match the terminal's setting, see Figure 4-9. If you know which LTS port your terminal is attached to, you can fix this problem.

Terminal is transmitting data at 4800 bits per second.

LTS baud rate parameter is set at 9600.

Data

LTS

Q0409D10117.XA
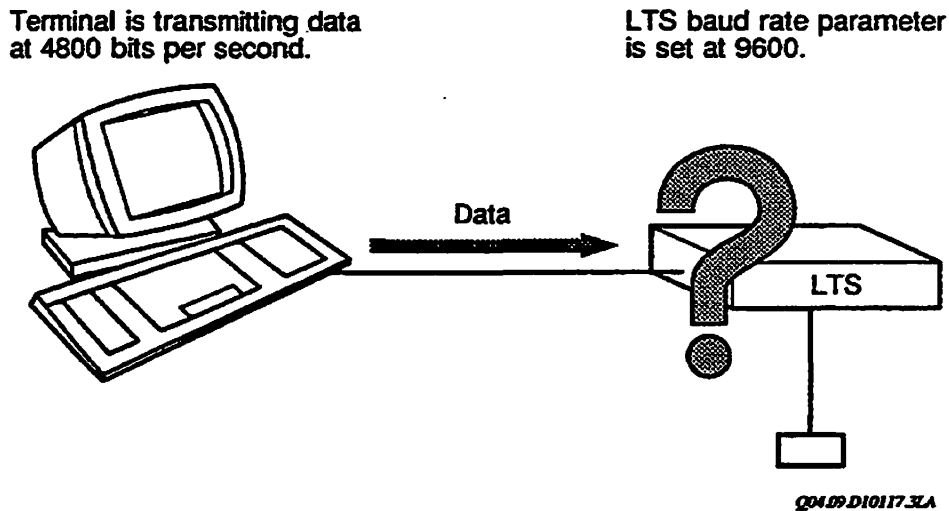
FIGURE 4-9. Terminal Baud Rate Does Not Match LTS Baud Rate Parameter: Communication Fails

Procedure When Baud Rates Do Not Match:

1. Go to another terminal attached to your LTS.

2. Make sure that terminal is in LTS command mode.

3. Issue the PORTS command at the second terminal, entering the LTS port number for your first terminal.

4. Find out your first terminal's current baud rate parameter.

5. Go back to your first terminal and use software or hardware switches to change its baud rate to match the LTS parameter. (On some terminals, you need to turn the terminal off after changing the baud rate, wait a few seconds, and then turn the terminal on again to activate the change; check the manual for your terminal.)

6. Try out an LTS command from your terminal (for example, HELP or LIST_HOSTS) to make sure communication is reestablished.

7. Use the PORT command to set the baud rate parameter to the setting you wanted in the first place.

8. Change your terminal baud rate to match the new parameter setting.

If this procedure does not correct the problem, ask your administrator for help.

DEFAULT COMMAND

The DEFAULT command activates the default parameter settings stored in EAROM for your port. The default settings are the factory default settings unless you have saved different settings with ESCAPE -DEFAULT, PORT -DEFAULT, or SET -DEFAULT. The SHOW -DEFAULT command, described earlier in this chapter, displays the settings of the default parameters in EAROM. You can activate the default settings for the current session, for all sessions, or for LTS command mode operation, as described in the following sections. The DEFAULT command is useful if you have been experimenting with parameter changes and you want to set the parameters back to a known state quickly.

If EAROM for your LTS line fails, you can still use the LTS. When you issue the DEFAULT command or when the LTS is reinitialized, the LTS checks EAROM to make sure it is good. If EAROM is not good, the LTS activates the factory default settings for all parameters. You can then make changes to the parameters, but you cannot save any changes permanently until EAROM is working again.

DEFAULT does *not* change the current settings for the global port parameters: LTS messages, baud rate, bits per character, parity treatment, parity type, number of stop bits, and DTR connection control. The factory default settings in EAROM for those parameters are activated only when the system administrator performs a front panel boot to reinitialize the LTS and reconfigures the EAROM.

Activating Default Settings for a Specific Session

To activate the default settings for a specific session, switch to that session and then enter DEFAULT without an option. The LTS activates the data transfer default settings stored in EAROM for parameters 1, 5, 12, 53, 54, and 58. In the case of parameters 5, 12, 53, and 54, the LTS uses the data transfer mode default settings, not the LTS command mode default settings. There is one set of session parameters (called the data transfer mode defaults) stored in EAROM, not a separate set for every session. The default settings are activated immediately if the session is free, or upon disconnect if it is active. In the example below, to activate the default settings for session 5, switch to that session and then enter DEFAULT.

```
<1>CMD: SWITCH 5
<5>CMD: DEFAULT
```

Activating Default Settings for All Sessions: DEFAULT –ALL

To activate the data transfer mode default settings stored in EAROM for all sessions, enter DEFAULT -ALL. The default settings for parameters 1, 5, 12, 53, 54, and 58 are activated immediately for all of the sessions, whether they are free or active. In the case of parameters 5, 12, 53, and 54, the LTS uses the data transfer mode default settings, not the LTS command mode default settings. The example below shows the use of DEFAULT -ALL:

```
<1>CMD: DEFAULT -ALL
```

Activating the Command Mode Default Settings: DEFAULT –COMMAND

To activate the LTS command mode default settings stored in EAROM, enter DEFAULT -COMMAND (or DEFAULT -CMD). The LTS activates the default settings for all of the LTS command mode parameters: 5, 9, 12, 13, 14, 16, 17, 18, 53, 54, 57, 59, 60, 61. In the case of parameters, 5, 12, 53, and 54, the LTS uses the command mode default settings, not the data transfer mode default settings. The example below shows the use of DEFAULT -COMMAND:

```
<1>CMD: DEFAULT -CMD
```

Using the Options Together: DEFAULT –COMMAND –ALL

To activate the default settings stored in EAROM for LTS command mode and all sessions, enter DEFAULT -COMMAND -ALL. The LTS immediately activates the command mode default settings and the data transfer mode default settings for all sessions. The LTS activates the default settings for any active sessions as soon as they disconnect. The following example shows the usage of DEFAULT -COMMAND -ALL:

```
<1>CMD: DEFAULT -CMD -ALL
```

SET_ASYNC COMMAND

Whenever you are in LTS command mode and are not connected to a host computer, or when you have established a connection and escaped to LTS command mode, you can use the LTS commands described in this chapter to change your LTS parameters. When you establish a connection to a LAN host and log in, you can change some LTS parameters from the PRIMOS with the PRIMOS SET_ASYNC command.

The SET_ASYNC command has options for users and other options that are available to operators and administrators only. For complete information on SET_ASYNC options for users, see the *System Administrator's Guide, Vol. II.*

Some of the SET_ASYNC options are counterparts to LTS parameters. For example, if you issue the following SET_ASYNC command,

OK <u>SET_ASYNC -LINE 1026 -SPEED 4800</u>

PRIMOS sends this information to the LTS, which changes the baud rate parameter for your line to 4800.

When you enter a SET_ASYNC command, you must include your PRIMOS line number (1026 in the example). PRIMOS line numbers for NTS users can change from one connection to the next. To find out your current PRIMOS line number during a connection, issue the STATUS ME command.

Table 4-9 lists the SET_ASYNC options available to you when you communicate with PRIMOS during data transfer mode. Listed next to each option is its counterpart among the LTS parameters. The SET_ASYNC options that do not have LTS counterparts are not listed. The default settings are indicated with asterisks.

In addition to similar parameters, some LTS commands work like some SET_ASYNC options as shown in Table 4-10.

TABLE 4-9.   SET_ASYNC Options and LTS Parameters

SET_ASYNC Option	LTS Parameter	Notes
-PROTOCOL name TTY* TRAN TT8BIT TTYUPC TTY8 TTY8HS TTYNOP ASD	53 PROTOCOL 0 TTY* 1 TRAN 2 TTY8BIT 3 TTYUPC 4 TTY8	The LTS supports fewer protocols than PRIMOS. If you select a PRIMOS protocol that the LTS does not support, you receive an error message.
-SPEED value 50 75 110 134.5 150 200 300 600 1200* 1800 2400 3600 4800 7200 9600 19200 CLOCK J1 J2 J3	11 BAUD 50 75 110 134.5 150 200 300 600. 1200 1800 2400 3600 4800 7200 9600 19200 AUTO*	SET_ASYNC speeds include CLOCK, J1, J2, and J3. These choices represent baud rates that can vary from one Prime host to another. NTS terminal users can activate any of the 16 available speeds with the LTS PORT or SET command, so you do not need to use these SET_ASYNC options for terminal lines. For information on setting line speeds for assignable lines, see Chapter 6, NTS Assigned Lines.
-STOP_BITS n 1* 2	51 SBITS 1* 2	Signals the receiving device to wait for the next character. Some devices that operate at slower speeds require two stop bits between characters.
-CHAR_LENGTH n 5 6 7 8*	50 BPC 5 6 7 8*	Sets the number of information bits per character. You can adjust the character length for non-standard terminals or devices.

Table 4-9.   SET_ASYNC Options and LTS Parameters (Continued)

SET_ASYNC Option	LTS Parameter	Notes

-PARITY *value*
None*
Odd
Even
	21 PARITY_TREATMENT
	   0 Parity disabled*
	   3 Parity enabled
	
	52 PARITY
	   0 Odd*
	   1 Even
		Note that the LTS uses two parameters for parity, while SET_ASYNC uses only one option.

-LINE_FEED* -NO_LINE_FEED	13 LF_AFTER_CR 0 13 LF_AFTER_CR 1*	The LTS default in LTS command mode is to insert a line feed after a carriage return. In data transfer mode, however, PRIMOS inserts the line feed so the LTS does not.
-RESET_XOFF	None	This option may result in data loss.
-XOFF* -NO_XOFF	12 FLOWFROM 1* 12 FLOWFROM 0	Flowfrom is XON/XOFF flow control from the terminal.
-REVERSE_XOFF -NO_REVERSE_XOFF*	5 FLOWTO 1* 5 FLOWTO 0	Flowto is XON/XOFf flow control to the terminal.

-NO_DATA_SENSE_ENABLE*
-DATA_SENSE_ENABLE
 	
-DATA_SET_SENSE
   High*
   Low
	54 FLOWCONTROL 0*
	54 FLOWCONTROL 1 or 2
	
	54 FLOWCONTROL 1
	54 FLOWCONTROL 2
		This parameter is EIA flow control. The LTS uses a single parameter for this function. PRIMOS uses two SET_ASYNC options. For SET_ASYNC, these options relate to DTR. For LTS parameter 54, the settings relate to CTS/RTS.

*Default setting

TABLE 4-10.   PRIMOS SET_ASYNC Options and Similar LTS Commands

SET_ASYNC Option	LTS Command
-DISPLAY	SHOW
Displays the SET_ASYNC options that are currently active.	Displays the current settings for LTS parameters.
-DEFAULT	DEFAULT
Sets all options to their PRIMOS default settings. These defaults *are not* all the same as the LTS defaults. Unless your terminal is running at 1200 baud, *do not* use this option because it sets the baud rate to 1200.	The LTS DEFAULT command changes parameter settings to the original defaults or, for those parameters stored in EAROM, to the EAROM settings.
-SYSTEM	None
Restores the line characteristics to the cold-start values, or the most recent values set by a SET_ASYNC command issued at the supervisor terminal.	

LTS and PRIMOS Parameters

When your terminal communicates with the LTS, the LTS relies on your line's parameter settings for accurate communication. PRIMOS needs some of the same information to communicate correctly with your terminal. For example, PRIMOS needs to know which parameter to use for your line.

As soon as you connect to a LAN host through your LTS, the LTS sends parameter information over the LAN to PRIMOS at the host. The LTS parameter settings become the active PRIMOS line characteristics, as if you had issued SET_ASYNC commands to activate the appropriate options. The same thing happens when you give the CONTINUE command to return to a connection after you escaped to LTS command mode. If you changed any parameters while you were in LTS command mode, the LTS sends the new parameter information, in this example, the baud rate to PRIMOS. Figure 4-10 shows an example.

BAUD = 2400

BAUD = 2400

Host

Q04.10.D10117.3LA
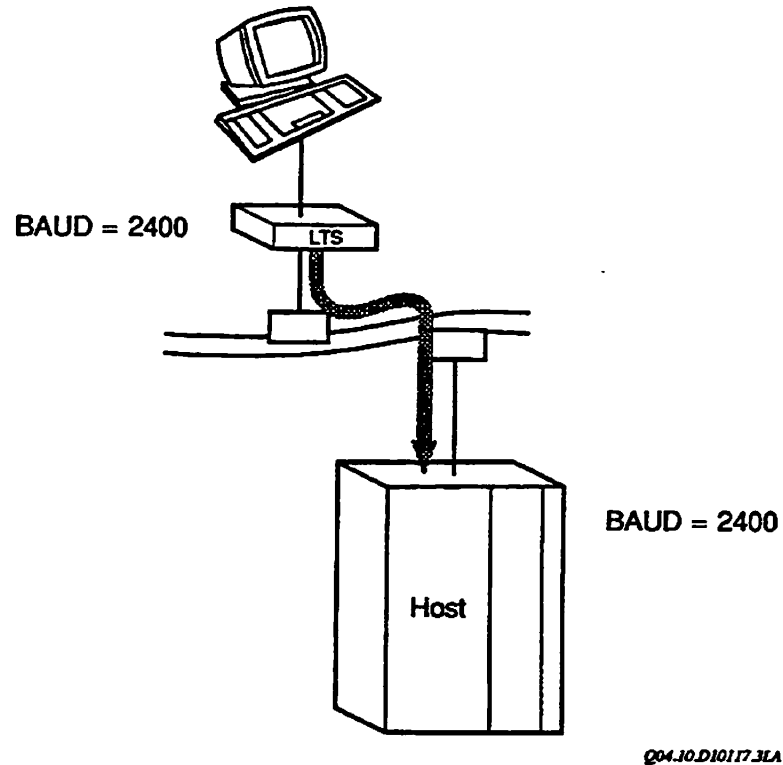
FIGURE 4-10.   When a Connection Is Established or Continued, the LTS Sends
Parameters to PRIMOS

You can, of course, change the settings later, with PRIMOS or LTS commands. The
operator or administrator can also change the settings. So can some programs. However,
the initial PRIMOS settings for your line always come directly from your LTS parameters.

You might need to regain control of your line's parameters, for example, if a program that
changed parameters terminated prematurely, before the program could change the parameters
back again. If this problem occurs, return to LTS command mode (use the escape character;
or log out; or turn your terminal off, wait 10 seconds, and then turn it on again).
Redefine any parameters that you need to change. When you continue your session with
the host or reconnect to the host, the LTS sends your choice of parameters to PRIMOS,
where they overwrite any other settings.

STATUS COMMANDS

Some LTS commands can help you determine the status of your NTS line and obtain information to troubleshoot network problems or for network configuration. Most network management information is available to the administrator from a supervisor terminal. However, some LTS information can be obtained only from a terminal attached to an LTS.

In many cases it is easier for the administrator to make a phone call and ask you for the information than to make a trip to the LTS. Although network configuration and troubleshooting are probably not your responsibilities, some of the information you obtain may be useful to the administrator.

This chapter discusses the following commands:

    STATUS
    LTS_ADDR
    BANNER
    TEST

STATUS COMMAND

The STATUS command helps you keep track of your sessions, as described in Chapter 2, Basic LTS Commands. If you enter STATUS when you have no connections established, the LTS displays No active connections. STATUS shows the status of each active session, indicates your current session with an arrow, and displays the names of the hosts to which you are connected (see the example below).

```
<3>CMD: STATUS
    Session                                              Packets
  Number  State         Host Name   Network Address   Transmitted/Received
      1   connected     TOM         08-00-2F-02-17           141/18
      2   connected     DICK        08-00-2F-02-F2         23632/1384
   ->3    not active
      4   disconnecting HARRY       08-00-2F-02-1C       5848393/25032
      5   connected     PEGGY       08-00-2F-02-16           503/487
      8   connected     MOE         08-00-2F-01-2C          9163/205
```

Each session is in one of five states:

not active   The session is free; that is, completely idle. This status is displayed only
                  if your current session is free and you have other sessions that are active.

connecting   The LTS attempted to establish a connection to a host and a response
                  from the host is pending. The session remains in this state until the host
                  accepts or rejects the connection request, or until a timer expires. No user
                  action is required.

connected   A connection is established with the host.

disconnecting   The connection is being terminated, either at your request (LOGOUT or
                  DISCONNECT command), or because of a forced logout by the host. No
                  user action is required.

disconnecting*   The connection is terminated, but there is information sent to your
                  terminal that has not been displayed yet. This state occurs when a
                  suspended session is terminated by an abnormal condition, such as a forced
                  logout, a host crash, or a broken link to the host. The information that
                  remains to be displayed is typically a message indicating the reason for
                  failure, because host output normally stops when a session is suspended.

                  The session remains in the disconnecting* state until you enter
                  DISCONNECT or CONTINUE. To free up the session and not display the
                  buffered information, enter DISCONNECT. To display the waiting
                  information, enter CONTINUE. The LTS displays the information on your
                  screen and then frees the session.

The STATUS command also displays other information that can assist the administrator in
troubleshooting, but is of little interest to you as a user.

During a connection, STATUS displays the name of the host that you are connected to and
the network address of the LHC controller the host uses for your connection. The address
is a unique identifying number assigned to each LHC at the factory. The hyphens are not
part of the address; they just make the address easier to read. The administrator sometimes
needs to know the address of an LHC. The *Operator's Guide to Prime Networks* and the
NTS Planning and Configuration Guide contain complete information about administering a
LAN network.

The STATUS command also displays the number of packets exchanged between your
terminal and the host since the connection was established. On a network, data is

transmitted and received in units known as packets. The number of packets exchanged can sometimes help the administrator to troubleshoot the network.

LTS_ADDR COMMAND

The LTS_ADDR command tells you the LAN address and the name of the LTS device that your terminal is physically attached to.

Command Syntax:

LTS_ADDR

The administrator needs to know the address of each LTS in order to configure the NTS network. If your administrator asks for the address of your LTS, use the LTS_ADDR command. The LTS displays a 12-digit hexadecimal number, which uniquely identifies the number that each LTS receives at the factory. For example,

```
<1>CMD: LTS_ADDR
Network Address      LTS Name
08-00-2F-F8-08-2B    LTS_P6
```

As in an LHC address, the hyphens in an LTS address are not really part of the address. They just make the address easier to read.

The LTS name is the name assigned by the administrator in the NTS configuration file on the host that initialized the LTS. LTS names, like host names, are easier to work with than network addresses. Terminal users do not need to know LTS names, but the information can be useful to the administrator.

If your administrator allows unconfigured LTS devices on your LAN, your LTS might not have a name. In that case, you see the message -unconfigured- in place of an LTS name.

BANNER COMMAND

The BANNER command is another command that can help the administrator.

Command Syntax:

BANNER

When the LTS receives this command, it sends your terminal the same welcome message that it displays whenever Auto Speed Detect is successful, or whenever the LTS is reinitialized. The LTS also displays the name of the LAN host that booted (downline loaded the software to) the LTS and the PRIMOS pathname of the file the host used to boot the LTS. Likewise, the LTS indicates the name of the host that last upline dumped the LTS software and the PRIMOS pathname of the host file used to receive the dump. The upline dump is used to diagnose LTS software problems. For example,

```
<1>CMD: BANNER
[LTS Rev. 23.0]
Copyright (c) 1990 Prime Computer, Inc.

Booting host:      SYSA
Load file:         <SYSTEM2>DOWN_LINE_LOAD*>LTS.DL

Upline dump host:  SYSA
Upline dump file:  UPLINE_DUMP*>LAN>LTS08_00_2F_F8_271087.1555
```

The version number in the welcome message (Rev. 23.0) tells you which version of software your LTS uses. If the version number is incompatible with the version of software in a LAN host controller you want to communicate with, network problems can result. The BANNER command can provide this important information quickly.

If the LTS has not been upline dumped since the last time it was force booted, the LTS displays the upline dump information shown below. (A force boot is a downline load of the LTS initiated by the host or by pressing certain front panel controls on the LTS.)

```
Upline dump host:  This LTS has not been upline dumped since the last force boot.
Upline dump file:  ULD information is not available.
```

If the LTS has an older PROM set (a set of memory chips) that does not support upline dumping, the LTS displays the upline dump information shown below. If you see the following message, ask your PRIME SERVICE representative to upgrade your LTS PROM set.

```
Upline dump host:  LTS PROM set out of date.
Upline dump file:  ULD information is not available.
```

TEST COMMAND

If you have problems communicating with your LTS or with a LAN host, you may be able to narrow down the possible sources of the problem with the TEST command.

Command Syntax:

TEST

When the LTS receives this command, it sends identical lines of text to your terminal until you press CR to stop the test. Each test line contains the following 80 characters plus a carriage return and linefeed.

ABCDEFGHIJKLMNOPQRSTUVWXYZ++0123456789++ABCDEFGHIJKLMNOPQRSTUVWXYZ++0123456789

If the test lines that you receive match this example, you know that your terminal and the LTS communicate correctly; any problems must be elsewhere on the network. If your test lines do not match the example, or if you do not receive any test results at all, you know that the problem is in your terminal, in the LTS, or in the cable or connectors between them.

Before you report problems to your administrator, try to use the TEST command. Let your administrator know the test results.

PRIMOS STATUS COMMANDS

Two PRIMOS commands, STATUS USERS and STATUS NTS, also provide information on NTS. You must be connected to a LAN host and logged in before you can use these commands. The commands are available to any terminal user logged into the host, not just to NTS terminal users.

STATUS USERS Command

The STATUS USERS command lists all users and active processes on a Prime host. You can tell which users are NTS users by checking the column that contains PRIMOS line numbers. PRIMOS line numbers for NTS lines start at 1024 (decimal). For example,

OK, <u>STATUS USERS</u>
ENM> status users

User	User No (In Decimal)	Line No	Devices (AL in Decimal)
SYSTEM	1	asr	<OURSYS>
BRUCE	12	10	<OURSYS>
BETTY	14	1024	<OURSYS> <HISSYS> <HERSYS>
CONNIE	16	1036	<OURSYS> <HERSYS>
BERTHA	17	1040	<OURSYS> <HERSYS>
JPJ	93	slave	<OURSYS>
JCE	97	slave	<OURSYS>
NETMAN	105	nsp	<OURSYS>
BERTHA	106	phant	<OURSYS> AL16
DST_SERVER	107	phant	<OURSYS>
YTSMAN	108	phant	<OURSYS>
FTP	109	phant	<OURSYS>
BATCH_SERVICE	110	phant	<OURSYS>
PRINTERA	111	phant	<OURSYS> AL50
PRINTERB	112	phant	<OURSYS> AL60
TP_QUM	113	phant	<OURSYS> AL62
BACKUP_SERVICE	114	phant	<OURSYS> <HISSYS>
MAILER_DAEMON	115	phant	<OURSYS> <HERSYS>
RFT_AGENT	116	phant	<OURSYS> <YURSYS>
FTX_AGENT	117	phant	<HISSYS> <OURSYS>
TCPIP_MANAGER	120	phant	<OURSYS>
NM_SERVER	121	phant	<OURSYS> (3)
NTS_SERVER	138	ncm	<OURSYS>
TIMER_PROCESS	139	kernel	<OURSYS>
BUFFER_SERVER	140	kernel	<OURSYS>
LOGOUT_SERVER	141	kernel	<OURSYS> (SYSTEM IDLE)
LOGIN_SERVER	142	LSr	<OURSYS> (3)
DSMSR	144	DSM	<OURSYS>
DSM_LOGGER	145	DSM	<OURSYS>
SYSTEM_MANAGER	146	SMSr	<OURSYS>
ISC_NETWORK_SERVER	147	ISCNsr	<OURSYS>
NAME_SERVER	148	NameSr	<OURSYS>
DSMASR	149	phant	<OURSYS>

In the example, three NTS users are logged in to the host: BETTY, CONNIE, and BERTHA. One of them, BERTHA, is also using an NTS assignable line, as indicated by AL16 in the last column. (AL stands for assignable line.) Chapter 6, NTS Assignable Lines, explains how to assign NTS lines.

The STATUS NTS Command

The STATUS NTS command tells you whether NTS has been started on the host and, if NTS has been started, the command tells you the name of the NTS configuration file on that host. For example,

```
OK, STATUS NTS

NTS is currently started
NTS config file <SYSS8>NTS*>NTS.CONFIG
```

You must start NTS before you can connect to that host from an NTS terminal or use the STATUS NTS command. Users at directly attached (local) terminals can use this command when NTS is not running. For example,

```
OK, STATUS NTS

NTS is not currently started
```

NTS ASSIGNABLE LINES

This chapter provides information on NTS assignable lines. NTS assignable lines are different from NTS user lines in that they are a class of communication lines that are used by programs or devices rather than by interactive terminal users. The commands you use for NTS assignable lines include the following PRIMOS commands:

ASSIGN ASYNC
UNASSIGN ASYNC
NTS_ASSOCIATE
NTS_LIST_ASSOCIATE
NTS_UNASSOCIATE
SET_ASYNC

For more information about these commands, see the *System Administrator's Guide, Vol II*.

NTS ASSIGNABLE LINES VERSUS NTS USER LINES

The other chapters in this guide tell you how to use an NTS user line, which is a terminal line. However, not all NTS lines connect to terminals. You can attach other asynchronous devices to an LTS, for example, printers.

Unlike a user terminal, a printer cannot initiate any NTS connection requests. Instead, connection requests are initiated from PRIMOS. Similarly, because a printer cannot define its line parameters, parameter information also comes from PRIMOS.

The system administrator can make many other types of lines assignable, for example, a line to a printer, to a magnetic tape unit, or to a card reader attached to a host. Assignable asynchronous lines can be NTS or local lines that connect printers or other devices directly to the host. The PRIMOS ASSIGN ASYNC command gives a user control over the line, whether it is an NTS or a local line.

Notes

You cannot assign an NTS line if any terminal (LTS-to-host) connections are established on it.

Likewise, when an NTS line is assigned, a terminal attached to the line cannot be used to make outbound (LTS-to-host) connections.

ASSIGN ASYNC COMMAND

Terminal users can request exclusive use of NTS printers or other assignable devices with the PRIMOS ASSIGN ASYNC command. Both NTS users connected to a host and local terminal users at terminals wired directly to the host can assign NTS assignable lines.

Note

Printers shared by many users are usually part of a host spooler subsystem. To print files on these printers, you do not need to assign the line. All you need to do is issue the PRIMOS SPOOL command. Printers to the spooler subsystem can use NTS assigned lines, but the host assigns the lines automatically.

When you issue an ASSIGN ASYNC command, PRIMOS assigns the line to you, initiates an NTS connection to the device for you, and sends parameter information defined by the SET_ASYNC command to the device's LTS. You have exclusive use of the line until you unassign it. The system administrator can release any assigned line; you can release only your own assigned lines.

Before you can assign an NTS line, it must be mapped by the system administrator with the NTS_ASSOCIATE command.

NTS users are allowed twenty seconds to complete each connection request before the ASSIGN command terminates.

Command Syntax:

ASSIGN ASYNC -LINE *n* [-TO *m*]

Options

-LINE *n*   Where *n* specifies the required *decimal* line number to be assigned, or when used with the -TO option, the first line number in a series to be assigned.

-TO *m*   Conveniently assigns a consecutive range of lines from *n* to *m*, inclusive, where *n* and *m* are *decimal* line numbers.

Examples

For example, to assign line number 1036, issue the following command:

```
ASSIGN ASYNC -LINE 1036
```

To save time when you are assigning several consecutive lines, you can issue one ASSIGN ASYNC command as in the following example:

```
ASSIGN  ASYNC -LINE 1036 -TO 1050
```

UNASSIGN ASYNC COMMAND

UNASSIGN ASYNC is a companion to the ASSIGN ASYNC command. All use of an asynchronous line is relinquished when you issue an UNASSIGN ASYNC command. Line numbers are specified in decimal. If you have assigned a range of consecutive lines, you can release them all with one command line using the -TO option.

Use the UNASSIGN command to break a permanent connection over an NTS line. NTS users are allowed twenty seconds to complete each disconnect request before the UNASSIGN command terminates.

Users can unassign only those lines that they have assigned. The operator or system administrator has the rights to unassign any line or device from the supervisor terminal, regardless of who assigned it or from which terminal it was assigned.

Command Syntax:

```
UNASSIGN ASYNC -LINE n [-TO m]
```

Options

-LINE n   Where n specifies the required *decimal* line number to be unassigned, or, when used with the -TO option, the first line number in a series to be released.

-TO m   Unassigns a consecutive range of lines from n to m, inclusive, where n and m are *decimal* line numbers.

Examples

For example, to release a range of five lines from line number 1036 to line number 1040, issue the following command:

```
UNASSIGN ASYNC -LINE 1036 -TO 1040
```

If you have assigned several lines, you may, of course, issue individual UNASSIGN ASYNC commands for each line when you are finished using it.

For example, lines 1036 to 1040 are assigned lines. Lines 1036 and 1038 are used for transmitting financial records from the host to branch offices. When the transmission is complete, these lines are released with the following command lines:

```
UNASSIGN ASYNC -LINE 1036
UNASSIGN ASYNC -LINE 1038
```

Lines 1037, 1039, and 1040 remain assigned to their processes or devices, and lines 1036 and 1038 are now available.

NTS_ASSOCIATE COMMAND

The NTS_ASSOCIATE command defines a permanent or temporary path from a physical line attached to an LTS to a logical line number in the Prime host. The system administrator must associate a line before a user can issue an ASSIGN, UNASSIGN, or interactive SET_ASYNC command for the line.

Note

The NTSDIM polls all NTS lines consecutively. Choose NTS assignable line numbers that are close to 1024 plus NTSUSR to avoid wasting system resources servicing unused lines and to improve performance.

Command Syntax:

$$\text{NTS\_ASSOCIATE} \begin{cases} \text{-LINE } \textit{number} \text{ -LTS\_NAME } \textit{name} \text{ -LTS\_LINE } n \text{ [-PERM]} \\ \text{-HELP} \end{cases}$$

Arguments

-LINE *number*	Indicates the *decimal* line number in the Prime host. Valid NTS line numbers range from 1024 through 1536. Assignable NTS line numbers usually start at 1024 plus the decimal value of NTSUSR.
-LTS_NAME *name* -LNAME	Specifies the logical name of a particular LTS. The Network Administrator gives each LTS on a LAN a unique name when it is added to the configuration with CONFIG_NTS. LTS names can be a maximum of 16 characters long and must follow the same format and rules as PRIMENET node names. You can list LTS names with the LIST_LAN_NODES command.
-LTS_LINE *n* -LLINE	Specifies the LTS line number. *n* can range from 0 through 7.

| -PERMANENT | Establishes a stable connection that is reconnected automatically if |
| -PERM | a disconnect occurs. A temporary connection cannot recover if |

-PERMANENT
-PERM   Establishes a stable connection that is reconnected automatically if
               a disconnect occurs.   A temporary connection cannot recover if
               the carrier signal is lost for three minutes; it is unassigned
               automatically.   A connection is permanent until the line is
               unassigned.   A permanent connection can be removed by reissuing
               the NTS_ASSOCIATE command without supplying this option.
               Permanent connections are recommended for spooler lines.

-HELP   Displays the command format and options.
-H

For more information on CONFIG_NTS, see the *NTS Planning and Configuration Guide.*

Examples

Making a Temporary Association: The following NTS_ASSOCIATE command issued from the supervisor terminal maps the logical PRIMOS line number 1153 to the physical line number 1 attached to the LTS SCIENCE.LAB.

```
OK, NTS_ASSOCIATE -LNAME SCIENCE.LAB -LLINE 1 -LINE 1153
[NTS_ASSOCIATE Rev. 21.0 Copyright (c) 1986, Prime Computer, Inc.]
OK,
```

Making a Permanent Association: The NTS_ASSOCIATE command can create a permanent association to an LTS line supporting a printer.   In the following example, the association between the PRIMOS line number 1154 and the printer attached to line 0 of the LTS MATH.DEPT is stable.   The link to the printer recovers from network failures automatically.

```
OK, NTS_ASSOCIATE -LNAME MATH.DEPT -LLINE 0 -LINE 1154 -PERM
[NTS_ASSOCIATE Rev. 21.0 Copyright (c) 1986, Prime Computer, Inc.]
OK,
```

It is also possible to make an existing association permanent. Reissue the NTS_ASSOCIATE command with the -PERM option and specify the PRIMOS line number as shown in the next example.

```
OK, NTS_ASSOCIATE -LNAME MATH.DEPT -LLINE 1 -LINE 1155
[NTS_ASSOCIATE Rev. 21.0 Copyright (c) 1986, Prime Computer, Inc.]  ·
OK, NTS_ASSOCIATE -LINE 1155 -PERM
[NTS_ASSOCIATE Rev. 21.0 Copyright (c) 1986, Prime Computer, Inc.]
OK,
```

NTS_LIST_ASSOCIATE COMMAND

You can ask PRIMOS for information about associated lines using the NTS_LIST_ASSOCIATE command.

Command Syntax:

$$\text{NTS\_LIST\_ASSOCIATE} \left\{ \begin{array}{l} \text{-LTS\_NAME } \textit{name} \\ \text{-LINE } \textit{number} \\ \text{-HELP} \end{array} \right\}$$

If you enter the command without any options, PRIMOS displays a list of all associated line numbers for NTS assignable lines along with their corresponding LTS names and port numbers. Permanent connections are indicated in the display by the letter P. For example,

```
OK, NTS_LIST_ASSOCIATE
[NTS_LIST_ASSOCIATE Rev.23.0. Copyright (c) 1990 Prime Computer, Inc.]

Primos              LTS
line #    LTS Name  line #

 1213     PAYROLL3  0
 1214     PAYROLL3  1
 1215     PAYROLL3  2
 1220     COPYROOM2 4
 1221 [p] LAB       7
```

* [p] denotes a permanent association.

PRIMOS line numbers used for NTS lines are decimal numbers from 1024 through 1536. Other line numbers are reserved for other types of lines, such as local terminal lines or local assignable lines. The administrator assigns a name (a maximum of 16 characters) for each LTS in the NTS configuration file. (LTS names are easier to work with than LTS addresses, which are 12-digit hexadecimal numbers.) The LTS line numbers listed are the physical port numbers from 0 through 7 on the back of each LTS.

If you want to find out what NTS line is associated with a particular PRIMOS line number, you can specify the PRIMOS line number in the command. For example,

```
OK, NTS_LIST_ASSOCIATE -LINE 1221
[NTS_LIST_ASSOCIATE Rev.23.0. Copyright (c) 1990 Prime Computer, Inc.]

Primos              LTS
line #    LTS Name  line #

 1221     LAB       7
```

PRIMOS displays the LTS name and port number associated with the PRIMOS line number that you specified.

You can request all PRIMOS line numbers associated with a particular LTS, or, if you also specify a port number, you can find out the PRIMOS line number for a specific NTS line. For example,

```
OK, NTS_LIST_ASSOCIATE -LTS_NAME Payroll3 -LTS_LINE 1
[NTS_LIST_ASSOCIATE Rev.23.0. Copyright (c) 1990 Prime Computer, Inc.]

Primos                          LTS
line #     LTS Name             line #

 1214      PAYROLL3             1
```

NTS_UNASSOCIATE COMMAND

The NTS_UNASSOCIATE command removes a permanent or temporary path from a physical line attached to an LTS to a logical line number in the Prime host. Only the system administrator can unassociate a line. If a line is currently assigned by another user, it cannot be unassociated until it is unassigned.

There are two ways to remove a connection: by specifying the *primos_line_number* or by specifying the *lts_name* and *lts_line_number*. Use the NTS_LIST_ASSOCIATE command to display a list of all currently associated lines.

Command Syntax:

$$
\text{NTS\_UNASSOCIATE} \left\{ \begin{array}{l} \text{-LINE } \textit{number} \\ \text{-LTS\_NAME } \textit{name} \quad \text{-LTS\_LINE } \textit{number} \\ \text{-HELP} \end{array} \right\}
$$

Arguments

-LINE *number*	Indicates the *decimal* line number in the Prime host. Valid NTS line numbers range from 1024 through 1536.
-LTS_NAME *name* -LNAME	Specifies the logical name of a particular LTS. You can list LTS names with the LIST_LAN_NODES command.
-LTS_LINE *number* -LLINE	Specifies the LTS line number. *number* can range from 0 through 7.
-HELP -H	Displays the command format and options.

Examples

Unassociating an LTS line: The following command line breaks the connection between the host and line 1 on the LTS MATH.DEPT.

```
OK, NTS_UNASSOCIATE -LNAME MATH.DEPT -LLINE 1
[NTS_UNASSOCIATE Rev. 21.0 Copyright (c) 1986, Prime Computer, Inc.]
OK,
```

Unassociating a PRIMOS line: The following command line releases the PRIMOS line number 1153 from any active association.

```
OK, NTS_UNASSOCIATE -LINE 1153
[NTS_UNASSOCIATE Rev. 21.0 Copyright (c) 1986, Prime Computer, Inc.]
OK,
```

SET_ASYNC COMMAND

When you assign an NTS line, PRIMOS sends configuration parameters to the LTS, which uses those parameter settings for as long as the line is assigned. For terminal lines, the original parameter settings move from the LTS to PRIMOS when a connection is established or continued; for assigned lines, parameter settings move in the opposite direction, from PRIMOS to the LTS. Figure 6-1 shows the source of parameters for both kinds of lines.
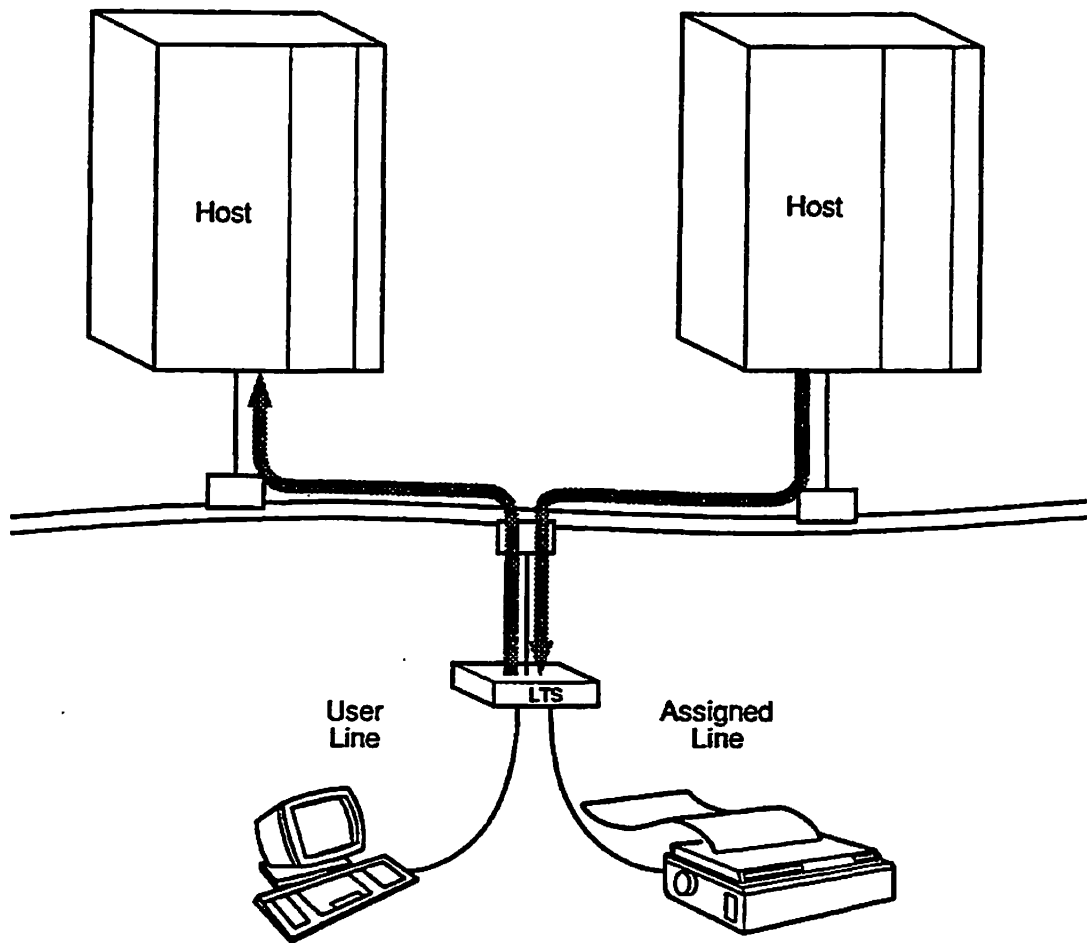
Q06.01.D10117.3LA

FIGURE 6-1. Parameter Sources for NTS User Lines and Assignable Lines

Parameter information for NTS assignable lines comes from the SET_ASYNC options for those lines. The administrator configures assignable lines in the host configuration file, but you can change the parameters if you wish. To change parameters for an assignable line, make sure that NTS has been started and then use the SET_ASYNC command before you assign the lines.

Command Syntax:

SET_ASYNC -LINE *n* [*option*]

The line number is the decimal PRIMOS line number that the administrator has associated with the NTS line you want to assign. The SET_ASYNC options that are mapped to LTS parameters are described in Chapter 4, Setting Parameters.

If you want to know the current settings for SET_ASYNC, use the -DISPLAY option. For example,

OK, SET_ASYNC -LINE 1214 -DISPLAY

PRIMOS lists the current settings for all the SET_ASYNC options for the line you specify. Because the administrator and other users can change these settings, check the current settings before you change parameters, and before you assign a line.

To set the baud rate for a line you are going to assign, use the SET_ASYNC command with the -SPEED option. For example,

OK, SET_ASYNC -LINE 1214 -SPEED 2400

After you have changed the parameters to the settings you want, use the ASSIGN ASYNC command to assign the line. PRIMOS sends the current SET_ASYNC settings to the LTS, which activates those SET_ASYNC settings. The LTS does not save any parameter information from PRIMOS in EAROM; the only way to save parameter settings in EAROM is with LTS commands from a LAN terminal.

APPENDICES

LTS COMMAND SUMMARY

This appendix summarizes all the LTS commands. For more information on LTS commands, see the following chapters:

Chapter 2, Basic LTS Commands
Chapter 4, Setting Parameters
Chapter 5, Status Commands

The commands are listed in alphabetical order, with abbreviations placed immediately below the full form, and any arguments or options indicated. A brief description of each command's function is also included.

ADMIN
Admits the server manager to administration mode from LTS command mode. Only one server manager at a time can enter administration mode.

BANNER
B
Displays the LTS banner, which shows the version number of the LTS software, the name of the host that downline loaded the LTS, and the pathname of the downline load file. It also displays information about the last upline dump of the LTS software: the name of the host that received the dump, and the pathname of the upline dump file.

CHANGE_PASSWORD
CP
Allows the server manager to change the management password and store it in non-volatile memory. Use only in administration mode.

CONNECT *hostname*
C
Establishes a connection with *hostname*. The LTS uses the current session if it is free. Otherwise, it scans for the first free session, beginning at session 1. Do not use this command in administration mode.

CONTINUE [n]
CO

Tranfers you from LTS command mode to an active but suspended session. A suspended session is one on which you established a connection and then escaped to LTS command mode or switched to another session. The LTS continues the current session unless you specify another session number with the n argument. Do not use this command in administration mode.

DEFAULT [-ALL] [-COMMAND]

When entered without an option, updates the current session's parameters with the parameter settings stored in LTS EAROM memory. The changes take effect immediately if the current session is free, or upon disconnect if it is active. The -ALL option works the same way, except that it affects all eight sessions. The -COMMAND option (abbreviated -CMD) acts upon only the LTS command mode parameters.

DISCONNECT $\left\{\begin{array}{l}\text{-ALL}\\ n\end{array}\right\}$
D

Breaks a connection with a host. DISCONNECT breaks the connection on the current session unless you indicate a different session number with the n argument. The -ALL option breaks the connections on all eight sessions. Do not use this command in administration mode.

ESCAPE $\left[\begin{array}{l}escape\_character\\ \left\{\begin{array}{l}\text{-OFF}\\ \text{-ON}\end{array}\right\}\\ \text{-ALL}\\ \text{-DEFAULT}\end{array}\right]$
ESC

Displays the escape character when entered without an option, changes the escape character to escape_character, enables (-ON), or disables (-OFF) the escape character. The -ALL option displays, changes, enables, or disables the escape character for all eight sessions, rather than just for the current session. The -DEFAULT option (abbreviated -DEF) acts on the escape character information stored in LTS EAROM memory.

HELP [-PAR]

Lists information on LTS commands. The -PAR option displays information on LTS parameters: parameter numbers, names, and valid settings.

LIST_HOSTS
LH

Displays the host computers that are active on your LAN network.

LIST_PORT_ACCESS $\left\{\begin{array}{l}\text{-ALL\_PORTS}\\ \text{PORT } n\end{array}\right\}$
LPA

Displays the security level for one or all server ports. Use only in administration mode.

LTS__ADDR

Displays the address of your LTS and its name, if it has one.

$$\text{PORT} \quad \left[\begin{Bmatrix} baud\text{-}rate;parity;bits\text{-}per\text{-}character;stop\text{-}bits \\ AUTO \end{Bmatrix} [\text{-DEFAULT}] \right]$$

Changes the four crucial global port parameter settings for LTS command mode for all sessions. When entered without an option, displays the current settings for your port's global port parameters. The -DEFAULT option (abbreviated -DEF) stores the parameter settings in LTS EAROM memory in addition to changing the LTS command mode and session settings.

PORTS [n]

Displays the settings of the four global port parameters for all of the ports on your LTS (the default), or for n, the LTS port number. The global port parameters are baud rate, parity type, bits per character, and number of stop bits.

PROMPT [new-prompt]

Changes the text portion of your prompt to new-prompt. When entered without an argument or option, reactivates the default prompt, <n>CMD:, where n is the current session number.

QUIT

Causes the port to exit from administration mode and return to LTS command mode. Use only in administration mode.

$$\text{SET } parameter\_number:parameter\_value \quad \begin{bmatrix} \text{-COMMAND} \\ \text{-ALL} \\ \text{-DEFAULT} \\ \text{-SESSION } n \end{bmatrix}$$

Changes the settings of as many as five global port parameters at once. The -COMMAND option (abbreviated -CMD) must be used to change a LTS command mode parameter. It restricts the changes to the LTS command mode parameter set in the cases where the parameters are relevant in both the command mode and the session parameter sets. The -ALL option affects all eight sessions whether free or active, rather than just the current session. The -DEFAULT option (abbreviated -DEF) changes the settings of the parameters stored in LTS EAROM memory and the current session's parameters. The -SESSION option (abbreviated -SESS) allows you to change parameters for a session that is not your current session. The options can be used together.

$$\begin{matrix} \text{SET\_PORT\_ACCESS} \\ \text{SPA} \end{matrix} \quad \begin{bmatrix} \text{-ALL\_PORTS} \\ \text{-PORT } n \\ \text{-PROTECT} \\ \text{-UNPROTECT} \end{bmatrix}$$

Allows the server manager to define the security level for any port. Use only in administration mode.

SHOW *parameter___number:1...parameter___number:5* [-DEFAULT] [-SESSION *n*]

When entered without an option or argument, displays the settings of the LTS command mode parameter set and the current session's parameter set. You can enter a maximum of five parameter numbers to display the current and default (EAROM) settings of those parameters. The -DEFAULT option (abbreviated -DEF) displays the settings of the parameters stored in LTS EAROM memory. The -SESSION option (abbreviated -SESS) displays the settings of the parameters for another session that you specify from your current session.

STATUS

ST

Displays the status of every active session, indicates the name of the host to which you are connected, the address of its LHC used for the connection, and the number of packets received from and sent to the host during the connection. Also displays the current session even if it is free and marks it with an arrow.

SWITCH [*n*]

SW

When entered without an option, switches you to the next highest session number; for example, from session 4 to session 5. The *n* argument indicates the session to switch to.

TEST

Instructs the LTS to send identical 80-character lines of test data to your terminal. To stop the test, press your carriage return key.

LTS PARAMETER SUMMARY

This appendix summarizes the LTS parameters. The three parameter sets, each listed by parameter number, are shown on the next page, followed by all of the parameter charts, listed alphabetically.

TABLE B-1.   Global Port Parameter Set

Number	Parameter Function	Name
6	LTS Messages	SRVSGNL
11	Baud Rate	BAUD
21	Parity Treatment	PARITY_TREATMENT
50	Bits per Character	BPC
51	Stop Bits	SBITS
52	Parity Type	PARITY
63	DTR Connection Control	DTR_DROP
64	Modem Control	MODEM_CONTROL

TABLE B-2.   Session Parameter Set

Number	Parameter Function	Name
1	Define Escape Character	ESC
5 *	XON/XOFF Flowto	FLOWTO
12 *	XON/XOFF Flowfrom	FLOWFROM
53 *	Protocol	PROTOCOL
54 *	EIA Flow Control	FLOWCONTROL
58	Enable Escape Character	ENTERCMD

* *Also in the command mode parameter set.*

TABLE B-3.   Command Mode Parameter Set

Number	Parameter Function	Name
5 *	XON/XOFF Flowto	FLOWTO
9	Carriage Return Padding	CR_PADDING
12 *	XON/XOFF Flowfrom	FLOWFROM
13	Linefeed After Carriage Return	LF_AFTER_CR
14	Linefeed Padding	LF_PADDING
16	Erase Character	ERASE
17	Line Erase Character	LINE_ERASE
18	Line Display Character	LINE_DISPLAY
53 *	Protocol	PROTOCOL
54 *	EIA Flow Control	FLOWCONTROL
57	Full-duplex/Half-duplex Mode	HALFDUPL
59	Horizontal Tab Padding	HT_PADDING
60	Vertical Tab Padding	VT_PADDING
61	Form Feed Padding	FF_PADDING

* *Also in the session parameter set.*

Baud Rate

Parameter name	BAUD
Parameter number	11
Default	Auto Speed Detect (32)

Choices

0 - 110	10 - 50
1 - 134.5	12 - 2400
2 - 300	13 - 4800
3 - 1200	14 - 9600
4 - 600	15 - 19200
5 - 75	30 - 3600
6 - 150	31 - 7200
7 - 1800	32 - Auto Speed Detect
8 - 200	

Parameter set	Global
LTS commands	PORT, SET
PRIMOS command	SET_ASYNC -SPEED

Bits per Character

Parameter name	BPC
Parameter number	50
Default	8
Choices	5, 6, 7, or 8
Parameter set	Global
LTS commands	PORT, SET
PRIMOS command	SET_ASYNC -CHAR_LENGTH

Carriage Return Padding

Parameter name	CR_PADDING
Parameter number	9
Default	0
Choices	0 through 255 characters
Parameter set	Command mode
LTS command	SET

DTR Connection Control

Parameter name	DTR_DROP
Parameter number	63
Default	Break the connection when DTR drops (1)
Choices	0 - Do not break the connection when DTR drops
	1 - Break the connection when DTR drops
Parameter set	Global
LTS command	SET

Define Escape Character

Parameter name	ESC
Parameter number	1
Default	[Ctrl] [\]
Choices	Any single ASCII character
Parameter set	Session
LTS commands	ESCAPE, SET

EIA Flow Control

Parameter name	FLOWCONTROL
Parameter number	54
Default	Disable EIA flow control (0)
Choices	0 - Disable EIA flow control
	1 - Enable EIA flow control on high to low CTS/RTS
	2 - Enable EIA flow control on low to high CTS/RTS
Parameter sets	Command mode and session
LTS command	SET
PRIMOS commands	SET_ASYNC -NO_DATA_SENSE_ENABLE
	SET_ASYNC -DATA_SENSE_ENABLE
	SET_ASYNC -DATA_SET_SENSE_HIGH
	SET_ASYNC -DATA_SENSE_ENABLE
	SET_ASYNC -DATA_SET_SENSE_LOW

Enable Escape Character

Parameter name	ENTERCMD
Parameter number	58
Default	Escape character enabled (1)
Choices	0 - Escape character disabled
	1 - Escape character enabled
Parameter set	Session
LTS commands	ESCAPE, SET

Erase Character

Parameter name	ERASE
Parameter number	16
Default	[Backspace]
Choices	Any single ASCII character
Parameter set	Command mode
LTS command	SET
PRIMOS Command	TERM

Form Feed Padding

Parameter name	FF_PADDING
Parameter number	61
Default	0
Choices	0 through 255 characters
Parameter set	Command mode
LTS command	SET

Full-duplex/Half-duplex Mode

Parameter name	HALFDUPL
Parameter number	57
Default	Full-duplex mode (0)
Choices	0 - Full-duplex mode
	1 - Half-duplex mode
Parameter set	Command mode
LTS command	SET

Horizontal Tab Padding

Parameter name	HT_PADDING
Parameter number	59
Default	0
Choices	0 through 255 characters
Parameter set	Command mode
LTS command	SET

Line Display Character

Parameter name	LINE_DISPLAY
Parameter number	18
Default	[Ctrl] [L]
Choices	Any single ASCII character
Parameter set	Command mode
LTS command	SET

Line Erase Character

Parameter name	LINE_ERASE
Parameter number	17
Default	[?]
Choices	Any single ASCII character
Parameter set	Yes
LTS command	SET
PRIMOS command	TERM

Linefeed After Carriage Return

Parameter name	LF_AFTER_CR
Parameter number	13
Default	Insert linefeed after carriage return (1)
Choices	0 - Do not insert linefeed after carriage return
	1 - Insert linefeed after carriage return
Parameter set	Command mode
LTS command	SET

Linefeed Padding

Parameter name	LF_PADDING
Parameter number	14
Default	0
Choices	0 through 255 characters
Parameter set	Command mode
LTS command	SET

LTS Messages

Parameter name	SERVSGNL
Parameter number	6
Default	LTS transmits all messages (5)
Choices	0 - LTS does not transmit any messages
	1 - LTS transmits all but prompt messages
	5 - LTS transmits all messages
Parameter set	Global
LTS command	SET

Modem Control

Parameter name	MODEM_CONTROL
Parameter number	64
Default	Connection disabled
Choices	0 - Connection disabled
	1 - Connection enabled
Parameter set	Global
LTS commands	PORT, SET

Parity Treatment

Parameter name	PARITY_TREATMENT
Parameter number	21
Default	Parity disabled (0)
Choices	0 - Parity disabled
	3 - Parity enabled
Parameter set	Global
LTS commands	PORT, SET
PRIMOS command	SET_ASYNC -PARITY

Parity Type

Parameter name	PARITY
Parameter number	52
Default	Odd parity (0)
Choices	0 - Odd parity
	1 - Even parity
Parameter set	Global
LTS commands	PORT, SET
PRIMOS command	SET_ASYNC -PARITY

Protocol

Parameter name	PROTOCOL
Parameter number	53
Default	TTY (0)
Choices	0 - TTY
	1 - TRAN
	2 - TT8BIT
	3 - TTYUPC
	4 - TTY8
Parameter sets	Command mode and session
LTS command	SET
PRIMOS command	SET_ASYNC -PROTOCOL

Stop Bits

Parameter name	SBITS
Parameter number	51
Default	1 stop bit
Choices	1 - 1 stop bit
	2 - 2 stop bits
Parameter set	Global
LTS commands	PORT, SET
PRIMOS command	SET_ASYNC -STOP_BITS

Vertical Tab Padding

Parameter name	VT_PADDING
Parameter number	60
Default	0
Choices	0 through 255 characters
Parameter set	Command mode
LTS command	SET

XON/XOFF Flowfrom

Parameter name	FLOWFROM
Parameter number	12
Default	Enable flow control character from the terminal (1)
Choices	0 - Disable flow control character from the terminal
	1 - Enable flow control character from the terminal
Parameter sets	Command mode and session
LTS command	SET
PRIMOS command	SET_ASYNC -XOFF
	SET_ASYNC -NO_XOFF
	SET_ASYNC -RESET_XOFF

XON/XOFF Flowto

Parameter name	FLOWTO
Parameter number	5
Default	Enable flow control character to terminal (1)
Choices	0 - Disable flow control character to terminal
	1 - Enable flow control character to terminal
Parameter sets	Command mode and session
LTS command	SET
PRIMOS command	SET_ASYNC -REVERSE_XOFF
	SET_ASYNC -NO_REVERSE_XOFF

ADMINISTRATION MODE

This appendix is designed for the user who has management privileges and is responsible for administering the LTS unit. The appendix gives an overview of administration mode, the management facility of the LTS device. It lists management commands that only the administrator can issue. The appendix also includes a section on security levels for server ports.

OVERVIEW

Administration mode is an extension of LTS command mode. It allows a privileged user called the server manager to perform management functions on the LTS device. These functions include the following tasks:

- Change existing parameter values for any port on the LTS.

- View current parameter values for any port on the LTS.

- Establish security levels for any port on the LTS.

The global port parameters and session parameters that apply to LTS command mode also apply to administration mode. However, you, the server manager, cannot issue the CONNECT, CONTINUE, or DISCONNECT commands to establish sessions while you are in administration mode.

Administration mode requires passwords to guard against unauthorized usage of the set of privileged management functions. The default password is LTS300 (case independent). You can enter administration mode, change the password, and store it in non-volatile memory. Only one server manager at a time can enter administration mode. This prevents multiple managers from making simultaneous changes.

To enter administration mode, issue the LTS command ADMIN while the port is in LTS command mode. You can enter administration mode from any port on the server regardless of its security classification. See the section Security Levels for an explanation of security levels on the LTS device.

The following example shows how you would enter administration mode with the ADMIN command from a terminal connected to a port on an LTS device. The prompt ADMIN: reminds you that the port is in administration mode. You cannot change this prompt.

```
<1>CMD: ADMIN
[LTS300 Administration Mode]
Password? LTS300

ADMIN:
```

Your terminal remains in administration mode until one of the following events occur:

1. You issue the QUIT command from administration mode.

2. You do not issue a command within two minutes.

Note

As a security feature, a two-minute timer is set when you enter administration mode. Each time you issue a command, the timer is reset. If you do not enter any commands within the two minutes, the port returns to LTS command mode, even if the timer expires when you are in the process of issuing a command.

MANAGEMENT COMMANDS

This section lists management commands that only the server manager can issue while in administration mode. These commands can be entered in either uppercase or lowercase. The command syntax shows valid abbreviations and available options.

CHANGE_PASSWORD

The CHANGE_PASSWORD command allows you to change the management password and have it stored in non-volatile memory. If you change the management password, the new password remains in effect until you explicitly change it, regardless of the number of times the LTS unit is rebooted. The maximum length of the management password is 16 characters. The password can contain the numerals 0 through 9, the letters A through Z, and the characters # & * - . / and _ , either uppercase or lowercase. The first character of the password must be between A and Z. Refer to the Error Messages section for error messages.

Command Syntax:

```
CHANGE_PASSWORD
CP
```

The following example demonstrates how to use the CHANGE_PASSWORD command to change the management password from LTS300 to SECRET and store it in non-volatile memory while in administration mode (passwords are not echoed).

```
<4>CMD: ADMIN
[LTS300 Administration Mode]
Password? LTS300

ADMIN: CP
New password: SECRET
Reenter new password for confirmation: SECRET

ADMIN:
```

If you forget the management password, you must reboot the LTS unit with the factory default values to restore the default management password. Refer to the section Default Parameters, RAM, and EAROM in Chapter 4, Setting Parameters, for information about activating the factory default values.

LIST_PORT_ACCESS

The LIST_PORT_ACCESS command displays the security level for one or all server ports. The security level is the level that is currently effective and is stored in non-volatile memory. See the Security section for more information on security levels.

Command Syntax:

```
LIST_PORT_ACCESS  ⎡-ALL_PORTS⎤
LPA               ⎣-PORT n   ⎦
```

Options

-ALL_PORTS -AP	Displays each port's security level.
-PORT n	Displays a specific port's security level.

Refer to the Error Messages section for error messages from this command.

The following examples show how to use the LIST_PORT_ACCESS command and its options to display the security level of all server ports or of only one port.

```
<2>CMD: ADMIN
[LTS300 Administration Mode]
Password? SECRET

ADMIN: LPA -AP
Port    Security Level
0       unprotected
1       unprotected
2       protected
3       protected
4       unprotected
5       protected
6       unprotected
7       unprotected

ADMIN: LPA -PORT 6
Port    Security Level
6       unprotected

ADMIN:
```

SET_PORT_ACCESS

The SET_PORT_ACCESS command allows you to define the security level for any port on the LTS device. The specified security level takes effect immediately and also is stored in non-volatile memory.

Command Syntax:

$$
\text{SET\_PORT\_ACCESS} \atop \text{SPA} \quad \begin{bmatrix} \text{-ALL\_PORTS} \\ \text{-PORT } n \\ \text{-PROTECT} \\ \text{-UNPROTECT} \end{bmatrix}
$$

Options

-ALL_PORTS   Changes each port's security level to protected or unprotected.
-AP

-PORT *n*   Changes a specific port's security level.

-PROTECT   Changes a specific port's security level to protected.
-PCT

-UNPROTECT   Changes a specific port's security level to unprotected.
-UPCT

The following example shows how to set the access of all ports except server port 5 to protected with the LIST_PORT_ACCESS and SET_PORT_ACCESS commands. First, list the security level of all ports with the LPA -ALL_PORTS command. Next, issue the SPA -AP -PCT command to protect all ports. Then set port 5 to unprotected with SPA -PORT 5 -UPCT. Finally, verify the security level of all ports with LPA -AP.

```
<2>CMD: ADMIN
[LTS300 Administration Mode]
Password? SECRET

ADMIN: LPA -ALL_PORTS
Port    Security Level
0       unprotected
1       unprotected
2       protected
3       protected
4       unprotected
5       protected
6       unprotected
7       unprotected

ADMIN: SPA -AP -PCT

ADMIN: SPA -PORT 5 -UPCT

ADMIN: LPA -AP
Port    Security Level
0       protected
1       protected
2       protected
3       protected
4       protected
5       unprotected
6       protected
7       protected

ADMIN:
```

QUIT

The QUIT command causes the port to exit from administration mode and return to LTS command mode.

Command Syntax:

    QUIT

SECURITY LEVELS

The server manager uses security levels to define the access to server ports on the LTS device. A server port is classified as either protected or unprotected (default). A protected port restricts the user's ability to change many parameters associated with a server port. An unprotected port allows access to all parameters in any parameter group.

Since many parameters affect the way a device communicates with the LTS and the network, the server manager can define certain parameter values and the security level associated with server ports. For instance, when you configure a port for modem control,

you should protect the parameters associated with that port. As a result, dialup users cannot change parameters on protected ports. If a modem connection to an unprotected port is broken, the session remains active. The next dialup user could then dial in to the same modem-controlled port and find one or more sessions active.

Use the SET_PORT_ACCESS and LIST_PORT_ACCESS commands while in administration mode to administer the security levels of ports. See the Management Commands section for examples.

Many commands, command arguments, or command options that alter parameter values are not allowed to execute on protected ports. You cannot change the following parameters for protected ports: 11, 21, 50, 51, 52, 55, 56, 62, 63, and 64. Also, you cannot use the -DEFAULT option with a command when a port is protected because protected ports cannot affect non-volatile memory.

The next two examples show the difference between HELP commands issued from a protected and an unprotected port. The displays show that you cannot use the -DEFAULT option with the ESCAPE, PORT, and SET commands from a protected port while you can use -DEFAULT with the same commands from an unprotected port. The protected port display shows that you cannot change the baud, parity, bpc, and stopbits parameter settings with the PORT command from a protected port. You can change these parameters from an unprotected port.

Example 1: Protected Port

```
ADMIN: HELP
ADMIN
BaNneR
Connect name
COntinue [n]
DEFault [-ALL] [-CoMmanD]
Disconnect [n | -ALL]
ESCape [escape_char] [-ON | -OFF] [-ALL]
Help [-PAR]
List_Hosts
Lts_Addr
PORT
PORTS
PRompt [prompt_char]
SET parameter:value... [-ALL | SESSion n] [-CoMmanD]
SHow [parameter...] [-DEFault] [-SESSion n]
STatus
SWitch [n]
TEST
```

Example 2: Unprotected Port

```
ADMIN: HELP
ADMIN
BaNneR
Connect name
COntinue [n]
DEFault [-ALL] [-CoMmanD]
Disconnect [n | -ALL]
ESCape [escape_char] [-ON | -OFF] [-ALL] [-DEFault]
Help [-PAR]
List_Hosts
Lts_Addr
PORT [baud;parity;bpc;stopbits | AUTO] [-DEFault]
PORTS
PRompt [prompt_char]
SET parameter:value... [-ALL | SESSion n] [-CoMmanD] [-DEFault]
SHow [parameter...] [-DEFault] [-SESSion n]
STatus
SWitch [n]
TEST
```

The server manager can enter administration mode from any port regardless of the port's security classification. Once in administration mode, the port's security level is unprotected, as shown in the following example. After the administration mode session is complete, when the port returns to LTS command mode, the security classification reverts to the prior state.

Example 3: Administration Mode Port

```
ADMIN: HELP
BaNneR
Change_Password
DEFault [-ALL] [-CoMmanD]
ESCape [escape_char] [-ON | -OFF] [-ALL] [-DEFault]
Help [-PAR]
List_Hosts
List_Port_Access {-All_Ports | -PORT n}
Lts_Addr
PORT [baud;parity;bpc;stopbits | AUTO] [-DEFault]
PORTS
PRompt [prompt_char]
Quit
SET parameter:value... [-ALL | SESSion n] [-CoMmanD] [-DEFault] [-PORT n]
Set_Port_Access {-All_Ports | -PORT n} {-ProteCT | -UProteCT}
SHow [parameter...] [-DEFault] [-PORT n] [-SESSion n]
STatus [-PORT n]
SWitch [n]
TEST
```

ERROR MESSAGES

Administration mode currently in use. Access denied.
Only one server manager at a time may enter administration mode.

All requests have been ignored.
You entered an invalid SET or SHOW command line.

Cannot enter -ALL_PORTS and -PORT together.
You typed both options.

Cannot enter -PROTECT and -UNPROTECT together.
You typed both options.

Cannot use -ALL and -SESSION together.
You typed both options.

Disconnecting because DTR disappeared.
The DTR signal dropped and all sessions are disconnected.

Illegal command - insufficient access rights.
You attempted to issue a privileged command from a protected port. Enter HELP to display the format for commands that you can issue from a protected port.

Inactivity timer expired!
A port was inactive in administration mode for more than 2 minutes. The port switched from administration mode to LTS command mode.

Incorrect password format.
The management password must start with a character between A and Z inclusive, be less than or equal to 16 characters/digits, and be made up of letters between A and Z, number 1 through 9, and the characters # & * - . / and __ .

Insufficient access rights to perform requested operation.
You attempted to use a restricted option at/from a protected port.

Invalid command line. Type HELP for assistance.
You specified a command line incorrectly.

Invalid password.
You used an incorrect password.

More instances of -ALL_PORTS than are supported.
You entered this option more than once.

More instances of -PORT than are supported.
You entered this option more than once.

More instances of -PROTECT than are supported.
You entered this option more than once.

More instances of -SESSION than are supported.
  You entered this option more than once.

More instances of -UNPROTECT than are supported.
  You entered this option more than once.

Parameter cannot be changed - insufficient access rights.
  You cannot change the specified parameter when the port is protected.

Passwords do not match!
  The new and confirmed password did not match during an interactive CHANGE_PASSWORD session.

Port number not specified.
  You must supply a port number that ranges from 0 through 7 with the -PORT option.

Port number out of range (0 - 7).
  You must supply a port number that ranges from 0 through 7 with the -PORT option.

Session number not specified.
  You must enter a session number that ranges from 1 through 8 with the -SESSION option.

Session number out of range (1 - 8).
  You must enter a session number that ranges from 1 through 8 with the -SESSION option.

GLOSSARY

active session

A session on which a connection to a host is established. An active session is not necessarily in data transfer mode, however; the user established the connection but not yet logged in to the host. The user can also escape to LTS command mode or switched to another session, in which case the session is said to be active but suspended.

address

On a LAN, a unique hexadecimal number assigned at the factory to each LAN Terminal Server (LTS) and LAN Host Controller (LHC).

administration mode

An extension of LTS command mode that makes it possible for a user called the server manager to perform management functions on the LTS device.

administrator

The person responsible for setting up, managing, and troubleshooting a computer system or computer network. At your site, you may have a Network Administrator (for the LAN), and one or more System Administrators (for the Prime hosts). Or one person may be responsible for the network and for the host systems.

ASCII character

A character whose bit pattern follows the American Standard Code for Information Interchange, a widely used code for data communications and data processing defined by the American National Standards Institute (ANSI).

assigned line

A PRIMOS line reserved for the exclusive use of one person. Users can assign lines to themselves with the PRIMOS ASSIGN command. The administrator decides which lines are assignable and, for NTS lines, associates a particular LTS port number with a PRIMOS line number. Assigned lines are often lines attached to printers.

associated line

A PRIMOS line number that is mapped to a particular NTS line by an administrator command.

asynchronous terminal

A computer terminal that transmits and receives data without any clocking mechanism to synchronize the receiver and sender. Instead, clocking is built into each character through start and stop bits. PT250, PST100, and PT45 terminals are asynchronous terminals.

Auto Speed Detect

On a LAN, an LTS feature that sets the baud rate for the line. When you enter a series of carriage returns at an attached terminal, the LTS determines the baud rate of the terminal. The LTS then sets the baud rate parameter for that line to match the baud rate of the terminal.

baud rate

A measure of the signaling speed of a device. The baud rate refers to the number of signaling changes per second. On a LAN, the baud rate is the number of bits per second transmitted by a device.

bit

An acronym for binary digit, a bit is the smallest unit of information that a computer recognizes. A bit can have a value of zero or one. Eight bits constitute a byte.

bits per character

The number of data bits in each character. Commonly used communications codes use 5, 6, 7, or 8 bits per character.

buffer

A temporary data storage area in a device.

byte

Eight bits of data. A character, for example, is one byte.

LTS command mode

The LTS operating mode in which a user terminal communicates only with its LTS. The terminal sends LTS commands to the LTS, which interprets and acts on those commands. (*See* data transfer mode.)

connection

On a LAN, a logical link between an LTS port and an LHC that enables communication between a terminal and a Prime host computer.

current session

The session on which communication is taking place (data transfer mode), or the session that can be initiated, continued, configured, or disconnected (LTS command mode). The number of your current session is displayed in the first part of your LTS prompt, which is <1>CMD: by default. The STATUS command also indicates which session is the current one.

Data Terminal Ready (DTR)

One of the electrical signals defined by the Electronic Industries Association (EIA) for the RS-232-C standard interface between data communication devices. On a LAN, an LTS can use the DTR signal for flow control or for connection control.

data transfer mode

The LTS operating mode in which a user terminal communicates with a Prime host through an LTS. The LTS passes all data from the terminal to the Prime host (except for the LTS escape character or the XON/XOFF characters). In the other direction, the LTS passes all data from the Prime host to the terminal. (*See* LTS command mode.)

DTR

See Data Terminal Ready.

default setting

On a LAN, the parameter setting that the LTS uses in the absence of other instructions from terminal users.

delimiter

A character that defines the boundary between units of data. For example, in the LTS PORT command, you use semicolons as delimiters between parameters.

Distributed Processing Terminal Executive (DPTX)

A Prime networking product that enables communication between Prime terminals and IBM computer systems.

DPTX

See Distributed Processing Terminal Executive.

Distributed Systems Management (DSM)

A set of software products and services that support the administration and day-to-day management of single and networked PRIMOS systems. DSM enables systems to be administered and controlled collectively from any point on the network and simplifies administrative tasks such as resource monitoring and event logging.

EAROM

See Electrically Alterable Read-only Memory.

echo

To send a received character back to its source.

EIA

See Electronic Industries Association.

Electrically Alterable Read-only Memory (EAROM)

A type of computer memory that can be modified through software and that can store information permanently (even if the unit is turned off). This type of memory is often referred to as nonvolatile memory. (*See* random access memory.)

Electronic Industries Association (EIA)

The organization that publishes the RS-232-C standard for the electrical interface between data communication devices.

EMACS

A full-screen text editor available on Prime computer systems.

even parity

A parity-checking scheme in which the total of 1-bits in a correctly transmitted character is always an even number.

File Transfer Service

A PRIMENET utility that allows users to transfer files between PRIMENET host computers.

flow control

On a LAN, the use of ASCII characters or EIA signals to stop and start the flow of data between network devices.

free session

A session on which no connection is established. (Contrast with active session.)

full-duplex mode

On a LAN, an operating mode in which characters from a computer terminal travel in two directions: to the LTS or Prime host, and from the LTS or Prime host back to the terminal.

gateway

On a PRIMENET network, a host computer that routes data between two other computer systems that are not directly connected.

half-duplex mode

On a LAN, an operating mode in which characters from a computer terminal travel in one direction only, to the LTS or Prime host. Neither the LTS nor the host echoes the characters back to the terminal.

hard-copy terminal

A computer terminal that prints characters on paper rather than displaying them on a video screen. (*See* video display terminal.)

high-order bit

The bit preceding the stop bit in an asynchronous character.

host

A 50 Series computer on a LAN network. The word *host* is used because users connect to the system and use its resources as *guests*, even though they are not directly attached.

IEEE

See Institute of Electrical and Electronics Engineers.

IEEE 802.3

A widely used standard for local area networks published by the Institute of Electrical and Electronics Engineers (IEEE). Prime LAN products comply with this standard.

Institute of Electrical and Electronics Engineers (IEEE)

A United States organization that defines and publishes standards for computer networks.

interactive device

A device that can send and receive data; interactive devices can *converse* with a host computer.

interface unit

On a LAN, a physical device that serves as the entryway to the network for host computers, terminals, and printers.

LAN

See Local Area Network.

LAN Host Controller (LHC)

A board in a Prime host computer that connects the host to the LAN cable.

LAN Terminal Server (LTS)

A small standalone unit that connects as many as eight terminals or printers to the LAN cable.

LAN

A Prime network that complies with the IEEE 802.3 standard for local area networks.

LHC

See LAN Host Controller.

Line

The transmission device that connects terminals to computers or other devices.

Local Area Network (LAN)

A geographically limited network of computers and computer equipment. A local area network can be a subnetwork within a larger network.

local terminal

A terminal attached directly to a host computer.

LTS

See LAN Terminal Server.

mark parity

A parity-checking scheme in which the parity bit in a correctly transmitted character is always one (mark).

MODEM_CONTROL

A parameter that controls modem signals between a port on an LTS device and a connected unit such as a modem or a port selector.

NETLINK

A PRIMENET command that allows local terminal users to access other PRIMENET hosts or hosts on a Packet Switched Data Network (PSDN).

network
A collection of computers and computer equipment that can communicate locally (a LAN, for example) or across a large geographic area (a PSDN, for example). Large networks can contain one or more subnetworks.

Network Terminal Service (NTS)
A Prime network product that enables communication between Prime host computers and asynchronous terminals and printers on a LAN.

NTS
See Network Terminal Service.

odd parity
A parity-checking scheme in which the number of 1-bits in a correctly transmitted character is always an odd number.

packet
A group of data and control characters transmitted over a network as a single message.

Packet Switched Data Network (PSDN)
A type of public data network that offers wide-area communications to its subscribers.

parameter
In an LTS, a piece of information that tells the LTS how to function (for example, what baud rate to use). User commands can set LTS parameters to different values.

parity bit
An extra bit in a character used to check for errors in data transmission.

port
On a LAN Terminal Server, one of the eight connectors for attaching cables from terminals or printers.

PRIMELINK
Prime communications software that enables communication between IBM PCs, IBM-compatible PCs, and 50 Series computers.

PRIMENET
Prime communications software that enables communication between host computers: between Prime hosts, or between Prime and other hosts attached to a Packet Switched Data Network.

PRIME/SNA
A Prime network product that enables communication between Prime computers and IBM systems that use IBM Systems Network Architecture (SNA).

protocol
A set of mutually understood rules for communication between devices.

PSDN

See Packet Switched Data Network.

RAM

See Random Access Memory.

Random Access Memory (RAM)

A type of computer memory that can store information only as long as the unit remains turned on. When the unit is turned off, the information is lost. This type of memory is often referred to as volatile memory. (*See* Electrically Alterable Read-only Memory.)

reinitialize

Restart.

remote file access

Access to files on a remote computer; that is, a computer other than the one to which your terminal is directly attached.

Remote Job Entry (RJE) emulation

Prime communications software that allows users to submit jobs to other systems from Prime terminals.

remote login

To log in to a remote computer, that is, a computer other than the one to which your terminal is directly attached or, on a LAN, to log in to a computer other than the one to which you have established an NTS connection.

RINGNET

A Prime ring network.

ring network

A type of local area network in which data is transmitted in a circular manner, as around a ring.

RS-232-C

A standard for the electrical interface between data communication devices. The RS-232-C standard is published by the Electronic Industries Association (EIA).

session

A connection between an LTS terminal and a host. Each LTS terminal can have as many as eight concurrent sessions to the same or different hosts. Each session can be configured individually.

space parity

A parity-checking scheme in which the parity bit in a correctly transmitted character is always a zero (space).

Spooler

On a Prime computer system, the subsystem that controls printing on printers shared by multiple users.

start bit

In asynchronous communication, the bit that indicates the start of a new character.

stop bit

In asynchronous communication, the bit (or bits) that indicates the end of a character.

supervisor terminal

On a Prime computer system, the terminal that the administrator or operator uses to start, stop, and control the system.

suspended session

A session on which a user established a connection to a host and then escaped to LTS command mode or switched to another session. The connection to the host remains open but no communication takes place.

switch box

A unit that attaches a computer terminal or other device switch from one line to another.

syntax

In computer commands, the required order of words, characters, numbers, or other symbols.

Transmission Control Protocol/Internet Protocol (TCP/IP)

Department of Defense protocols that enable communication between a 50 Series host and a workstation or system running the Transmission Control Protocol (TCP) and the Internet Protocol (IP) over a LAN.

TCP/IP

See Transmission Control Protocol/Internet Protocol.

video display terminal

A computer terminal that displays characters on a video screen rather than printing them on paper. (*See* hard-copy terminal.)

XON/XOFF

Special ASCII characters that one device can send to another to ask that device to stop transmitting data (XOFF) or to resume transmission (XON).

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