INTRODUCTION TO THE EXPLORER SYSTEM

LIST OF EFFECTIVE PAGES

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The system-defined windows shown in this manual are examples of the software as this manual goes into production. Later changes in the software may cause the windows on your system to be different from those in the manual.
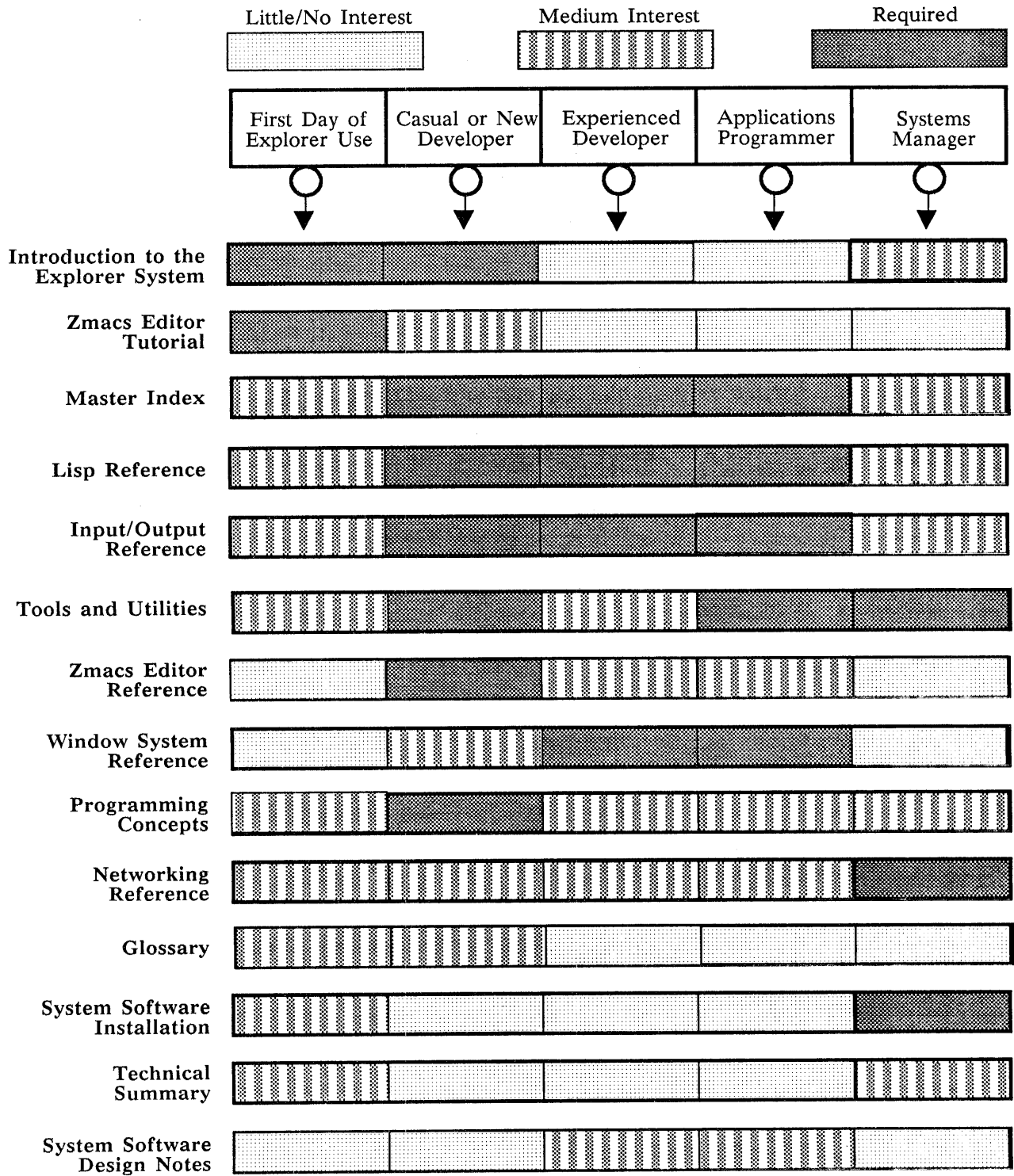
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THE EXPLORER™ SYSTEM SOFTWARE MANUALS

Little/No Interest   Medium Interest   Required

First Day of Explorer Use	Casual or New Developer	Experienced Developer	Applications Programmer	Systems Manager

Introduction to the Explorer System

Zmacs Editor Tutorial

Master Index

Lisp Reference

Input/Output Reference

Tools and Utilities

Zmacs Editor Reference

Window System Reference

Programming Concepts

Networking Reference

Glossary

System Software Installation

Technical Summary

System Software Design Notes

THE EXPLORER™ SYSTEM SOFTWARE MANUALS

THE EXPLORER™ SYSTEM HARDWARE MANUALS

143-Megabyte Disk Drive Vendor Publications	XT-1000 Service Manual, 5 1/4-inch Fixed Disk Drive, Maxtor Corporation, part number 20005 (5 1/4-inch Winchester disk drive, 112 megabytes)	2249999-0001
	ACB-5500 Winchester Disk Controller User's Manual, Adaptec, Inc., (formatter for the 5 1/4-inch Winchester disk drive)	2249933-0001
1/4-Inch Tape Drive Vendor Publications	Series 540 Cartridge Tape Drive Product Description, Cipher Data Products, Inc., Bulletin Number 01-311-0284-1K (1/4-inch tape drive)	2249997-0001
	MT01 Tape Controller Technical Manual, Emulex Corporation, part number MT0151001 (formatter for the 1/4-inch tape drive)	2243182-0001
	Viper™ Half-High Intelligent 4 1/4-Inch Streaming Cartridge Tape Drive SCSI Models 2060S and 2125S, Archive Corporation, part number 21136-001	2551106-0001
182-Megabyte Disk/Tape Enclosure MSU II Publications	Mass Storage Unit (MSU II) General Description	2537197-0001
182-Megabyte Disk Drive Vendor Publications	Control Data® WREN™ III Disk Drive OEM Manual, part number 77738216, Magnetic Peripherals, Inc., a Control Data Company	2546867-0001
515-Megabyte Mass Storage Subsystem Publications	SMD/515-Megabyte Mass Storage Subsystem General Description (includes SMD/SCSI controller and 515-megabyte disk drive enclosure)	2537244-0001
515-Megabyte Disk Drive Vendor Publications	515-Megabyte Disk Drive Documentation Master Kit (Volumes 1, 2, and 3), Control Data Corporation	2246129-0002
	Volume 1, General Description, Operation, Installation and Checkout, and Part Data	2246125-0004
	Volume 2, Theory, General Maintenance, Trouble Analysis, Electrical Checks, and Repair Information	2246125-0005
	Volume 3, Diagrams	2246125-0006
1/2-Inch Tape Drive Publications	MT3201 1/2-Inch Tape Drive General Description	2537246-0001

1/2-Inch Tape Drive Vendor Publications	Cipher CacheTape® Documentation Manual Kit (Volumes 1 and 2 With SCSI Addendum and, Logic Diagram), Cipher Data products 2246130-0001
	1/2-Inch Tape Drive Operation and Maintenance (Volume 1), Cipher Data Products 2246126-0001
	1/2-Inch Tape Drive Theory of Operation (Volume 2), Cipher Data Products 2246126-0002
	SCSI Addendum With Logic Diagram, Cipher Data Products 2246126-0003

Printer Publications	Model 810 Printer Installation and Operation Manual 2311356-9701
	Omni 800™ Electronic Data Terminals Maintenance Manual for Model 810 Printers 0994386-9701
	Model 850 RO Printer User's Manual 2219890-0001
	Model 850 RO Printer Maintenance Manual 2219896-0001
	Model 850 XL Printer User's Manual 2243250-0001
	Model 850 XL Printer Quick Reference Guide 2243249-0001
	Model 855 Printer Operator's Manual 2225911-0001
	Model 855 Printer Technical Reference Manual 2232822-0001
	Model 855 Printer Maintenance Manual 2225914-0001
	Model 860 XL Printer User's Manual 2239401-0001
	Model 860 XL Printer Maintenance Manual 2239427-0001
	Model 860 Xl Printer Quick Reference Guide 2239402-0001
	Model 860/859 Printer Technical Reference Manual 2239407-0001
	Model 865 Printer Operator's Manual 2239405-0001
	Model 865 Printer Maintenance Manual 2239428-0001
	Model 880 Printer User's Manual 2222627-0001
	Model 880 Printer Maintenance Manual 2222628-0001
	OmniLaser™ 2015 Page Printer Operator's Manual 2539178-0001
	OmniLaser 2015 Page Printer Technical Reference 2539179-0001
	OmniLaser 2015 Page Printer Maintenance Manual 2539180-0001
	OmniLaser 2108 Page Printer Operator's Manual 2546348-0001
	OmniLaser 2108 Page Printer Technical Reference 2546349-0001
	OmniLaser 2108 Page Printer Maintenance Manual 2546350-0001
	OmniLaser 2115 Page Printer Operator's Manual 2546344-0001
	OmniLaser 2115 Page Printer Technical Reference 2546345-0001
	OmniLaser 2115 Page Printer Maintenance Manual 2546346-0001

Communications Publications	990 Family Communications Systems Field Reference 2276579-9701
	EI990 Ethernet® Interface Installation and Operation 2234392-9701
	Explorer NuBus Ethernet Controller General Description 2243161-0001
	Communications Carrier Board and Options General Description 2537242-0001

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ABOUT THIS MANUAL

Introduction

The Texas Instruments Explorer system is an advanced, single-user work station that provides extensive support for development of large-scale, complex programs and for research in new technologies, including artificial intelligence. The Explorer system is also an affordable delivery vehicle for end-user applications requiring symbolic processing, high-quality graphics, and special-purpose processors. The programming environment of the Explorer system includes the following:

- High-resolution, interactive display

- High-speed symbolic processing using the Lisp language

- Integrated programming tools

- Extensive software

- Large memory capacity and sophisticated memory management

- Networking facilities

Purpose

This manual is designed to introduce the Explorer system to someone who has never used one before but who is familiar with other computer systems. By reading this manual, you learn in general how to use the Explorer system, its hardware, software, and help features, what books to read next, how to customize your system environment, and how to use the file system and make backups. Other sections include information about maintaining your disk partitions, using tapes, and using printers.

Scope

This manual assumes that you have the following prerequisites:

- Familiarity with computers and computer languages

- At least a superficial knowledge of the Lisp programming language

- Familiarity with the contents of the *Explorer Technical Summary*

- Access to an installed and working Explorer system

Contents of This Manual

This manual is organized into the following sections and appendixes, as well as an acronym list and an index.

Section 1: Getting Started — Describes the Explorer environment, introduces general terminology, and shows how to boot the system.

Section 2: Software Overview — Discusses the software components of the Explorer system and lists where to find more information about a particular utility.

Section 3: Explorer Console — Describes the Explorer monitor, keyboard, and mouse.

Section 4: Starting the System — Describes how to start the system, how to log in, and how to end a session.

Section 5: Windows and Menus — Describes the types of menus and windows and how they interact.

Section 6: Using Help Features — Describes the online help features available on the Explorer system and how to access them.

Section 7: Exploring the Lisp Environment — Describes Lisp functions and explains how to interpret and use them.

Section 8: Recovering From Errors — Describes methods of error recovery.

Section 9: Customizing Your Environment — Describes how to modify your environment to suit your needs.

Section 10: Using Files — Describes the general organization of an Explorer file system and explains how to use directories and files.

Section 11: Tape Operations — Describes the basic concepts of tape operation and how to use the Backup System window.

Section 12: Maintaining a Disk — Describes the disk partitions and how to maintain them.

Section 13: Printing Files and Screens — Describes how to print files and screens on a printer.

Appendix A: Boot Information — Lists boot error codes and fault indicators.

Appendix B: Cartridge Tape and Tape Drive — Describes the features and care of the tape cartridge and drive.

Appendix C: MT3201 Half-Inch Tape Drive — Describes the features and care of the MT3201 tape drive.

Appendix D: Model 855 Printer — Describes the controls and operation of the 855 printer.

Appendix E: Model 880 Printer — Describes the controls and operation of the 880 printer.

Appendix F: OmniLaser 2015 Page Printer — Describes the controls and operation of the OmniLaser 2015 printer.

Appendix G: Explorer System Enclosure — Describes the Explorer system enclosure.

Other Manuals
The complete publishing information for the purchased book listed in the frontispiece is as follows:

Clocksin, William F., and Christopher S. Mellish. *Programming in Prolog.* Berlin: Springer-Verlag, 1981.

Suggestions for Using This Manual
This manual is designed both as an introduction and as a reference. After you understand the basic concepts presented in the first, third, and fourth sections, you can use the remainder of the manual as a reference book by finding the section you need to help you perform a task. Each section includes paragraphs that describe the concepts needed to use the procedures within that section. In addition, Section 2, Software Overview, suggests where to find more information about particular software packages.

Notational Conventions
This manual uses certain notations to indicate the following:

■ Keystroke sequences that execute a command

■ Abbreviations indicating a mouse operation

■ How to use Lisp functions

■ Portions of Lisp code

The following paragraphs describe the notational conventions used in this manual.

Keystroke Sequences	Many of the commands used with the Explorer system are executed by a combination or sequence of keystrokes. Keys that should be pressed at the same time, or *chorded*, are listed with a hyphen connecting the name of each key. Keys that should be pressed in a particular sequence are listed with a space separating the name of each key. The following table explains the conventions used in this manual to describe keystroke sequences.

Keyboard Sequence	Interpretation
META-CTRL-D	Hold the META and CTRL keys while pressing the D key.
SYSTEM HELP	Press and release the SYSTEM key, then press and release the HELP key.
CTRL-X CTRL-F	Hold the CTRL key and press the X key, release the X key, and then press the F key. Alternately, press CTRL-X, release both keys, and press CTRL-F.
META-X Find File RETURN	Hold the META key while pressing the X key. Then, release the keys, and type FIND FILE. Finally, press the RETURN key.
TERM – SUPER-HELP	Press the TERM key and release it, press the minus key (–) and release it, then press and hold the SUPER key while pressing the HELP key.

Mouse Clicks	The mouse features three buttons that enable you to execute operations from the mouse without returning your hand to the keyboard. Pressing and releasing a button is called *clicking*. The following table lists abbreviations used online to describe clicking the mouse.

Abbreviation	Action
L	Click the left button (press the left button once and release it).
M	Click the middle button (press the middle button once and release it).
R	Click the right button (press the right button once and release it).
L2 M2 R2	Click the specified button twice quickly. Alternatively, you can press and hold the CTRL key while you click the specified button.
LHOLD MHOLD RHOLD	Click the specified button and hold it down.

Lisp Functions   You usually execute Lisp functions by typing them in a Lisp Listener or by calling them from other functions. Depending on how the function is defined, you can provide either positional arguments or keywords for a Lisp function. The following paragraphs illustrate how these arguments are listed in a functional description and give examples of using the different types of arguments to execute a Lisp function. For more information about types of arguments, see the *Explorer Lisp Reference* manual.

The following syntax lines are portions of typical function descriptions that use the two types of arguments:

sys:compare-disk-partition *from-unit from-part to-unit to-part*   Function
　　　　　　&optional *n-pages-at-a-time delay starting-hundred whole-thing-p*

The **compare-disk-partition** function compares partitions on the same machine. This function displays a notice and then prints a number for every 100 pages compared....

print-file *filename* **&key :printer-name :copies :lines :header**   Function
　　　　　　:page-heading :cpi :lpi :font :font-list :delete-after :print-wide

The **print-file** function prints *filename* on a printer using the print server.

Description:

① Package name containing the function — If the package name is not specified, the function resides in the **global** package. If you do not specify a package name and the function is not in the **global** package, the Explorer system attempts to find the function in other packages. If the system finds a function of the same name in another package, the system asks you whether to use that function. For more information about packages, see the *Explorer Lisp Reference* manual.

② Function name — In this manual, function names are printed in boldface.

③ Required argument — Required arguments are the arguments that follow the function name but precede a lambda-list keyword, such as **&optional** or **&key**, in the list of arguments. Thus, **sys:compare-disk-partition** has four required arguments; **print-file** has only one required argument. When you type a Lisp function to be evaluated, you must supply a value for each of the required arguments, in order from left to right. In this manual, arguments that are not keyword arguments or lambda-list keywords are printed in italics.

④ Lambda-list keyword — A lambda-list keyword, such as **&optional**, **&key**, or **&rest**, describes the arguments that follow it and is not typed when you

call the function. All lambda-list keywords, by convention, are preceded by an ampersand (&). In this manual, lambda-list keywords are printed in a medium typeface.

⑤ Optional argument — Optional arguments, arguments that follow the &optional keyword, do not need to be specified when you use the function. The arguments must, however, be used in the correct order. Thus, if you want to specify the third optional argument, you must also specify the first and second optional arguments. In this manual, arguments that are not keywords or lambda-list keywords are printed in italics.

⑥ Keywords — Keywords describe an optional argument. When you use a keyword to call a function, you must specify both the keyword and its value. However, you need only specify those keywords and values that you want to include; thus, if you want to specify the third keyword, you need not specify the first or second keywords. Keywords are preceded by a colon (:) when they are called, not when they are defined. In this manual, keywords are printed in boldface.

Example:

To use optional arguments, type something similar to the following:

```
(sys:compare-disk-partition 1 "LOD1" 1 "LOD3" 85. nil 700.)
```

This call to sys:compare-disk-partition compares the partition named LOD1 on disk 1 to the partition named LOD3, also on disk 1, beginning with the 700th block. Notice the following things about the function call:

■ The first four arguments are required, and they must be specified in the correct order.

■ The characters enclosed in quotation marks (") are strings. Depending on the function and the argument, whether a string is uppercase or lowercase may be significant. In this function, you can use either uppercase or lowercase letters.

■ The values specified for the *n-pages-at-a-time* and *delay* arguments are the default values as explained in the complete function description. However, you must specify the values of these arguments in the function call to be able to specify a value of the *starting-hundred* argument different from its default value.

■ The decimal point after the numbers indicate that they are decimal values.

Example:

To use keywords, type something similar to the following:

```
(print-file "C8:WEBB;MY-FILE" :printer-name "TI855-ROSEMARY"
:header nil :page-heading "Version 3")
```

This call to print-file prints the file named C8:WEBB;MY-FILE on the printer named TI855-ROSEMARY without a header page but with a heading at the top of each page. Notice the following things about the function call:

■ You need specify only one required argument.

■ The :printer-name is the first keyword specified. Its value, the string "TI855-ROSEMARY", immediately follows it. Two other pairs of keywords and values are specified.

Lisp Code   Three fonts are used in this manual to denote Lisp code:

■ System-defined words and symbols are in **boldface**. System-defined words and symbols include names of functions, variables, macros, flavors, methods, packages, and so on—any word or symbol that appears in the system source code.

■ Examples of programs and output are in a special monowidth font. System-defined words in an example are also in this font.

■ Sample names are in *italics*. Names in italics can be any value you choose to substitute. (Italics are also used for emphasis and to introduce new terms.)

For example, this sentence contains the word **setq** in boldface because **setq** is defined by the system.

Some function and method names are very long—for example, **get-ucode-version-from-comment**. Within the text, long function names may be split over two lines due to typographical constraints. When you type the function name **get-ucode-version-from-comment**, however, you should not split it or include any spaces within it.

Within each example of actual Lisp code, all symbols are shown in the monowidth font. For instance:

```
(setq x 1 y 2) => 2
(+ x y) => 3
```

The form (setq x 1 y 2) sets the variables x and y to integer values; then the form (+ x y) adds them together.

In this example of Lisp code with its explanation, setq appears in the monowidth font because it is part of a specific example.

For more detailed information about Lisp Syntax descriptions, see the *Explorer Lisp Reference* manual.
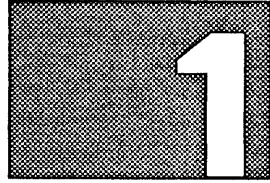
GETTING STARTED ▮1

Introduction

1.1 The Explorer system provides a Lisp environment of more than 14,000 Lisp functions. However, most programmers use few of these functions in their everyday work. Even with these few functions, the Explorer system provides a very productive environment. As you become more familiar with the system, you can easily enhance this environment for your own needs.

Before working on exercises with the Explorer system, you should become familiar with the model behind the Explorer environment, some general terminology, and initialization procedures as discussed in this section.

Models of Computing

1.2 Many computer users are familiar with one or more general conceptual models of computing environments. For example, an environment may resemble a daisy, with an operating system interface at the center and paths to various programs that run in that system along the petals. In this model, the activity always starts at the center, moves out along a petal, and returns to the center when complete. Only one activity occurs at a time, and it always completes before starting another activity.
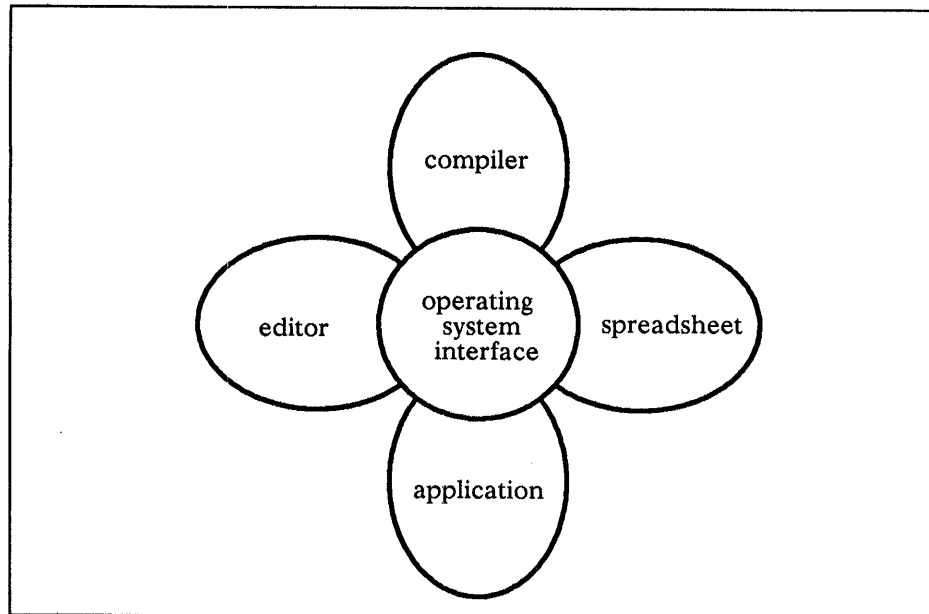
Other models allow many processes to be in an active or a waiting state simultaneously, as shown in the following graph. A process can be interrupted, allowing another process to run until it is interrupted, after which the original process runs again.

Zmacs
editor

Lisp
Listener

VT100 ™
Emulator

Inspector

window-based
debugger
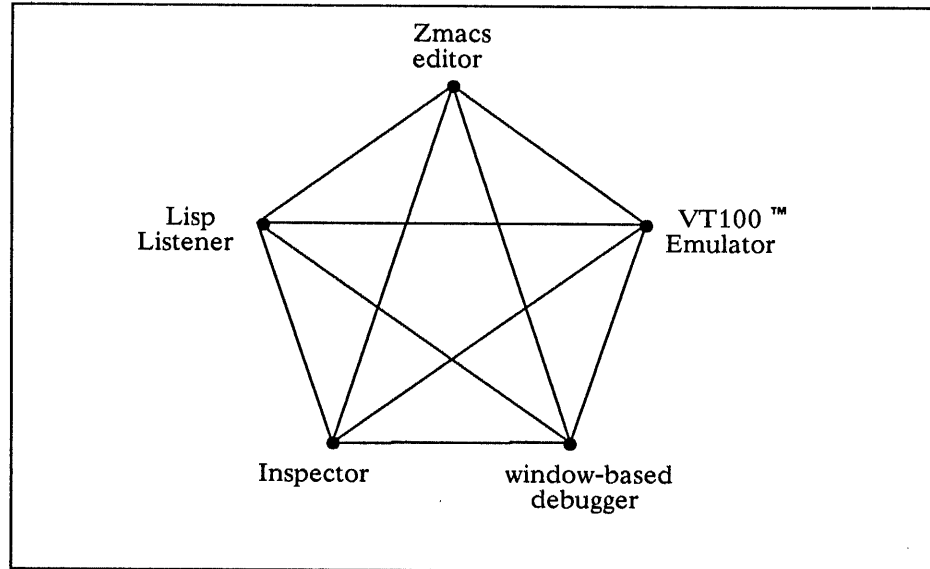
The Explorer environment closely resembles the model in this graph. There is no central location of activity. In general, you can move from any one process to any other process. In addition, the Explorer system uses a powerful window system to support its user interface to processes. Each process interacts through a window. The window system introduces yet another model of computing.

Consider the work environment at your desk. You may be working on several tasks at once. Each task is represented by a piece of paper on your desk. People organize their desks differently. Some people stack all the pieces of paper (all their work) in neat stacks. Others have a more liberal approach, often called the *messy desk* approach, where papers are overlapped and those of immediate interest are partially visible.

Similar approaches can be taken with window systems. Some window systems model the messy desk approach; others mimic the stacked paper approach. The Explorer window system accommodates both methods, but the default condition is the stacked paper approach. That is, you can have many processes in some state of activity and only one is visible (at the top of your window stack) at a time. However, you can move from the top window to any other window very easily.

There are many windows available, and each one shares the same global environment of symbols. That is, there is one active environment of variables and function definitions that can be used by all of the processes. In addition, each process can have its own set of symbols. Thus, from any particular process, you can conduct activities that affect the environment seen by all other processes. As you might guess, this can have negative and positive consequences.

In general, the Explorer system is a personal workstation that is used in a network of Explorer systems and other computers. This arrangement has numerous implications. Users in the network generally expect software to be shared among members on the network. Anything requiring file security needs to be archived on file servers that provide protection; these cannot be Lisp machines. If your Explorer system functions as a server on the network,

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shut down your machine with some care for the state of your machine. In general, Explorer users leave their machines running at all times. Since working sessions can last several days, users often log in and leave their machines running for days or weeks at a time, without shutting them down. Work in progress can be saved to a disk, but the working copies often remain in editing buffers for future reference. Much like the papers on your desk, system memory is usually filled with work most recently in progress and likely to be consulted again soon.

Terminology

1.3 The Explorer software system, which resides in the Lisp environment, is very large. Without some means of reducing the complexity of the system, its use would be extremely difficult even for the most experienced Lisp programmer. An understanding of some basic concepts will help you understand the organization and structure of the Explorer software system.

Buffer — A temporary storage area within the active system environment. For example, when you edit a file in Zmacs, the file is copied into a buffer, and you edit the copy in the buffer. Until you save the buffer to a file again, only the in-memory copy is modified.

Directory — A group of related files and subdirectories. The Explorer has a hierarchical directory system — with pathname components of indefinite length.

Error Handler — A condition handler that deals with errors. It usually gives you a set of choices when an error occurs. It always allows you the choice to abort the activity and escape from the process in error.

Host — Any computer in a network that can initiate a network operation or has a resource (such as a file system) that can be used by other computers in the network. Each host is identified by a unique name (host name) that must be specified when accessing files on that host. For example, if you want to access a file on a host named DELTA in your network, you must specify DELTA as part of the file pathname.

Package System — A facility in the Lisp environment that allows all the symbols of each separate application to be grouped into separate collections. For example, Lisp objects in the file system are grouped into a package called file-system (FS) and globally defined Lisp objects are grouped into the global (LISP) package. This package arrangement lends structure to the rather complex Explorer software system and makes it possible for two or more applications to use the same symbol name for different purposes.

Partitions (Bands) — Contiguous, discrete regions on a disk, each of which has a unique identity that describes the function of the partition. For example, a file partition contains either all or part of the file system. The file system includes directories, subdirectories, and files.

Process — A separate computation or activity consisting of a set of operations performed sequentially. The Explorer system allows a number of processes to be active concurrently. All processes run in the same virtual address space, sharing the same set of Lisp objects. However, each process has its own program counter, its own stack of function calls, and its own special-variable binding environment.

Window — A rectangular region that can be displayed on a screen. A window is associated with one process and acts as a stream, providing a place for the process to write to and read from.

Initializing Your System

1.4 Your Explorer console is composed of several physical components, as shown in Figure 1-1. The monitor, keyboard, and mouse must be on your desk. The system enclosure and mass storage devices can be in your office or another room.

Figure 1-1

Explorer Console

2286690   mouse
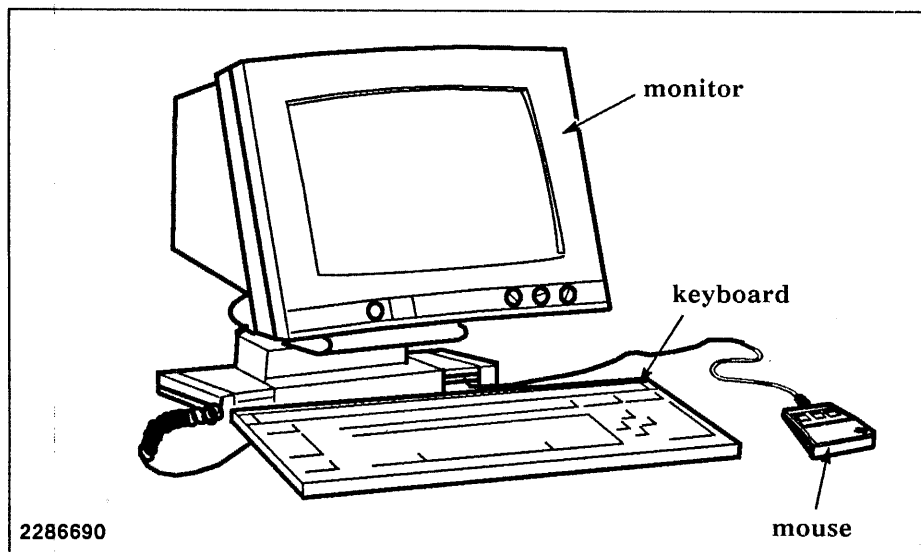
If you have just unpacked your system, you were instructed how to start up and boot the system. If you inherited a system from someone, you may not know how to do this.

In this section, you will do some work with the Explorer system to guarantee that you have a working directory in which to place files that you create, and you will be introduced to some fundamental operations.

Powering Up and Booting Your System

1.4.1 The Explorer system can remain powered up at all times.

If your system is not powered up, use the following steps to power up the system:

1. Push the power button on the back of each mass storage enclosure to the ON (in) position.

2. Push the power button on the front of the monitor to the ON position.

3. Push the power button on the front of the system enclosure. You should hear the fan start inside the enclosure.

CAUTION: Do not attempt to operate the system if the fan is not working; report the trouble to a technician.

---

4. Finally, turn on any additional equipment such as printers.

5. Let the system go through a default boot. Do nothing when you are asked a question. After several seconds the system chooses a default configuration. (If this does not happen, refer to Section 4, Starting the System.)

The Initial Lisp Listener Screen

1.4.2 As the system boots from the specified load and microload bands, the video display shows indications of what the system is doing. The parts of the display described in the paragraphs that follow are produced by the original software. Almost every item described here can be changed by modifying the Lisp environment. If your system has been customized, some or all of these items may have been changed.

Status Line

1.4.3 The status line is located at the bottom of the screen. This line contains information to help you determine the current status and condition of your system. The six components of the status line are the date and time, user name, package name, status message, run bars, and file information.

Date and Time

1.4.3.1 During cold booting, the system polls network clocks, called *time servers*. During this polling, the status message is Ask the Time. If no time servers respond, the Explorer system polls its own system clock. Because the system clock is battery-powered even when the system enclosure is turned off, you only need to set the time at initial system power-up, when the battery is replaced, or after certain extended hardware tests.

User Name

1.4.3.2 The user name appears to the right of the time. The user name is the name of the user who is currently logged in.

Package Name

1.4.3.3 To the right of the user name appears a name followed by a colon. This is the name of the current *package*.

Status Message

1.4.3.4 The status message, also called *process state*, appears to the right of the package name. Status messages include Run, Stop, Keyboard, Ask the Time, No Window Selected, and many others. During cold booting, the displayed status message is Run.

Run Bars

1.4.3.5 The run bars are thin lines that flicker in the status line to indicate that the system is currently active (busy). The run bar on the right indicates paging activity. The run bar on its left indicates processor activity. A third run bar (appearing as a dashed line), not visible during booting, appears to the extreme left during garbage collection and indicates scavenging activity.

File Information

1.4.3.6 The file information appears to the right during file transfers. This information includes the name of the file being transferred and the percentage of transfer complete. An arrow indicates input to or output from the named file.

Mouse Documentation Window

1.4.4 The mouse documentation window consists of one or two lines of information about currently available mouse operations. These lines, which appear in reverse video near the bottom of the screen, describe what happens when you press a particular mouse button. In addition, they sometimes include keystroke sequences and information about the item to which the mouse cursor is pointing.

Using the Mouse

1.4.5 The mouse is a pointing device whose motion causes a *mouse cursor* to move on the video display. The mouse cursor, typically a thin arrow, is separate from the keyboard cursor. In most utilities, the keyboard cursor keeps the same shape. The mouse cursor, however, changes shape depending on how it is used.

Mouse and Pad

1.4.6 You may have either a mouse with an optical pad or a padless mouse, depending on when your system was purchased. The association between the physical position of the mouse and the position of the mouse cursor on the display is not fixed. You can pick the mouse up and put it down on another part of the pad without affecting the mouse cursor. The mouse cursor responds to mouse movement only when the mouse is on the pad.

The placement of the optical pad is important; the wide part of the pad should be horizontal, not vertical. If the pad is properly positioned, you can move the mouse up, down, and to each side, and the mouse cursor makes a corresponding move on the video display. If the pad is improperly positioned, however, the mouse cursor moves to the sides but not up and down.

The Mouse Buttons

1.4.7 The mouse features three buttons (left, middle, and right) that enable you to execute commands from the mouse without returning your hand to the keyboard. Pressing and releasing a button is called *clicking*. The operations available at any given time are usually explained in the mouse documentation window at the bottom of the screen. The notations used in this window are as follows:

- **■** L — Click the left mouse button (press the left button once and then release it).

- **■** M — Click the middle mouse button (press the middle button once and then release it).

- **■** R — Click the right mouse button (press the right button once and then release it).

- **■** L2, M2, R2 — Quickly click the specified mouse button twice. Alternately, you can press and hold the CTRL key while you click the specified button once.

Mouse Keys on the Keyboard

1.4.7.1 For convenience, you can use the LEFT, MIDDLE, or RIGHT keys on the Explorer keyboard as mouse buttons. When the MODE LOCK key is locked, you can use the arrows of the cursor pad to move the mouse cursor.

Left-Handed Mouse

1.4.7.2 You can set the mouse as a left-handed mouse so that the button you usually press to execute a command is pressed with the index finger of the left hand instead of the index finger of the right hand. When the mouse is defined as left-handed, the instructions in the mouse documentation window

are switched as well as the actions of the buttons themselves; that is, the actions that were formerly associated with the right mouse button are now associated with the left mouse button and vice versa.

Accessing Programs

1.5 You can access programs by using a keystroke sequence that includes the SYSTEM key and a character key or by selecting the program from the System menu. To display a list of programs available on your work station and the keystroke sequences that invoke them, press SYSTEM HELP. Figure 1-2 shows a typical display of the list.

Figure 1-2

Typical SYSTEM HELP Listing

```
Press SYSTEM and one of the following characters to create the first
instance of or select the most recently used window for the corresponding
program.

Press SYSTEM CTRL and one of the following characters to create a new
window for the corresponding program.

Press RUBOUT to do nothing if you pressed SYSTEM by accident.

B     Magnetic tape - Backup\restore files and partitions with magnetic tape media.
C     Converse - send/receive messages from another Lisp Machine monitor.
E     Zmacs Editor - create or modify programs or text
F     Font editor - create new fonts or modify existing fonts.
I     Inspector - examine complex data structures.
L     Lisp Listener - evaluate Lisp forms.
M     Mail Reader - manage electronic mail messages.
P     Peek - display system activities and their current states.
T     Telnet - log in to another machine using the Telnet protocol.
V     VT100 emulator - emulate operation of a VT100 terminal.
Z     Glossary - display definitions of terms.

Press the space bar to remove this message.
```

1. Click the right mouse button once to bring up the System menu. Figure 1-3 shows the Explorer System menu.

2. Select Peek by moving the mouse cursor to that option and clicking the right mouse button once.

3. Move the mouse cursor to the Modes menu and select Processes. The mouse documentation window explains that the screen listing is a status list of processes.

4. Now move the mouse cursor to Modes menu and select Window. Again, notice the information in the mouse documentation window.

5. Move the mouse cursor to the Commands menu and select Exit. You should now be in the Lisp Listener.

Figure 1-3

Explorer System Menu

Explorer System Menu			
USER AIDS:	**PROGRAMS:**	**WINDOWS:**	**DEBUG TOOLS:**
Glossary	Backup	Arrest	Flavor Inspector
New User	Converse	Bury	Inspector
Profile	Font Editor	Change Layouts	Network
Suggestions	Hardcopy Menu	Create	Peek
	Lisp Listener	Edit Attributes	Trace
	Mail	Edit Screen	
	Namespace Editor	Kill	
	Telnet	Refresh	
	VT100 emulator	Reset	
	Zmacs Editor	Select	
		Split Screen	

New User Utility　　**1.5.1** The New User utility creates a new directory each time you invoke it. You can execute this utility only once for any specific user name. The system you are using must include a local file system where the utility can create a directory. A local file system is one contained on the disk associated with the local Explorer system. The New User utility performs the following actions:

■ Lists the name and synonyms of the machine you are using.

■ Establishes your personal user ID to identify you to other users on the network.

■ Creates a user directory in your name.

■ Creates a login initialization (init) file in your user directory. This file contains Lisp forms that are automatically executed each time you log in with your user name. These forms initialize the machine environment the way you want it.

■ Logs you in to the system under the user name you have chosen.

■ Describes how to log out of the current session and how to log in for your next session on the same machine.

To execute the New User utility, bring up the System menu by double clicking the right mouse button. Select the New User item. The system displays the initial New User screen. Pressing the RETURN key displays the next screen, and so on.

Figure 1-4 shows a typical initial screen displayed when you execute the New User utility.

Suggestions Menus　　**1.5.2** Suggestions menus consist of mouse-selectable commands that are available in most utilities. These menus are context sensitive. As you perform different operations, the Suggestions menus change to reflect currently applicable options. Each utility that uses Suggestions has its own collection of menus.

A Suggestions menu can help you do the following:

■ Find a command within the utility

■ Learn the commands associated with a particular utility

■ Learn the keystroke sequences that execute commands

When you use a Suggestions menu, the mouse documentation window provides a brief explanation of each menu item when the item is boxed. In some cases, the subtitles are mouse-selectable. They give a brief overview of a command set and how the commands are used together. Try using the Suggestions menu as follows:

1. Click the right mouse button once to bring up the System menu.

2. Click right on Suggestions to bring up the Suggestions menu. A menu of options is presented for those utilities that have suggestions. Select some of the options for practice. Turn Suggestions on for the Lisp Listener to see what happens.

Figure 1-4 Initial Screen of the New User Utility

```
Hello and welcone to ti-7.
You are using Romeo (whose list of synonyms is: NIL).

You have logged in as MARK.
If you look at the botton-left corner of the screen, you will see
the tine (3/19/87 10:43:07) and MARK (your current user-ID).

This utility perforns the following initializations for you:
    1) Establishes your personal user-ID.
    2) Creates a directory for you to use.
    3) Creates an initialization file that will be read each tine you login.

Press the ABORT key at any tine to abort this new-user utility.

Press any other key to continue.
■
```

New User Utility . . .

R: Bring up the System Menu.

Next Steps

1.6 To learn more about the Explorer system, you can start experimenting by using items from the Suggestions menus, entering Lisp forms to the Lisp Listener, examining the other utilities, and using Help. For example, you might do the following:

1. Locate the *Explorer Zmacs Editor Tutorial* manual and complete at least the first exercises. The Zmacs editor is the utility you may work with most of the time. This utility allows you to create text, create programs, compile programs, debug programs, locate existing code, and save your work.

2. Read Section 2, Software Overview, in this book. This section describes various utilities and how they are used.

3. Review the rest of this book in order to learn how to use the basic tools and available hardware.

SOFTWARE OVERVIEW
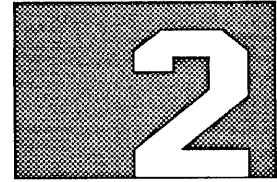
Introduction

2.1 The Explorer system features a highly productive programming environment that allows you to develop very complex programs in incremental steps. You can use any of the system software, as well as optional toolkits and utilities, as building blocks to create your software. The environment provides many tools to help you modify and enhance that software to a finished product.

This section briefly describes each part of the Explorer software and tells where to find more information about each item.

System Software

2.2 The programs described in the following paragraphs are available as part of each Explorer system. Some of these programs are not accessible from the System menu because they are not interactive programs. Each paragraph refers to other parts of this manual and/or other manuals that provide detailed information about the software.

Backup Utility

2.2.1 The system backup utility enables you to make backup copies of your files and directories and to transport data between systems that are not connected by a network. See Section 11 Tape Operations, of this manual and the *Explorer Input/Output Reference* manual.

Chaosnet

2.2.2 Chaosnet is a networking protocol that links individual systems into a network. The term *chaos* refers to the fact that there is no central control. See the *Explorer Networking Reference* manual.

Compiler

2.2.3 The LISP compiler converts Lisp functions into macrocode so that they run faster and require less memory. See the *Explorer Tools and Utilities* manual and the *Explorer Lisp Reference* manual.

Converse

2.2.4 Converse is an electronic message package that allows interactive conversations between users on different Explorer systems. See the *Explorer Tools and Utilities* manual.

Debug Tools

2.2.5 The interactive debugger enables you to examine the environment in which an error (or some other condition) is signaled and to take the necessary corrective action. Other tools include break, trace, step, and advise facilities. See the *Explorer Tools and Utilities* manual.

Font Editor

2.2.6 The Font Editor enables you to modify existing fonts or to create new fonts. (A *font* is the typeface used to display a character or symbol.) See the *Explorer Tools and Utilities* manual.

Glossary Utility

2.2.7 The Glossary utility provides online definitions of terms specific to the Explorer system and the Lisp environment. See the *Explorer Tools and Utilities* manual and Section 6, Using Help Features, of this manual.

Graphics Editor

2.2.8 The Graphics Editor enhances the basic capabilities of the window system to enable you to create, modify, and manipulate individual objects within a picture. See the *Explorer Tools and Utilities* manual.

Inspector

2.2.9 The Inspector enables you to view and modify the components of Lisp objects. See the *Explorer Tools and Utilities* manual.

Lisp Listener

2.2.10 Using the Lisp Listener, you can communicate directly with the Lisp interpreter. The Lisp Listener reads a Lisp form, evaluates it, and prints the results. When you boot an Explorer system, the Lisp Listener is the default window. See the *Explorer Tools and Utilities* manual and Section 4, Starting the System, of this manual.

Mail Utility

2.2.11 The Mail utility enables you to send, receive, and manipulate electronic mail messages. See the *Explorer Tools and Utilities* manual.

Metering System

2.2.12 The metering system monitors programs to determine the amount of time required for each part of a program. Other tools are also available to help you time your programs. See the *Explorer Tools and Utilities* manual.

New User Utility

2.2.13 The New User utility allows you to create a login initialization (init) file containing Lisp forms that are automatically executed each time you log in under your user name. See the *Explorer Tools and Utilities* manual and Section 1, Getting Started, of this manual.

Peek Utility

2.2.14 The Peek utility displays different types of system activities and their current states. These activities include processes, statistic counters, areas, windows, file system status, and network status. See the *Explorer Tools and Utilities* manual.

Print Server

2.2.15 The print server prints files or screen images on either a local printer or a network printer. See the *Explorer Input/Output Reference* manual and Section 13, Printing files and Screens, of this manual.

Profile Utility

2.2.16 The Profile utility allows you to customize your system environment. See the *Explorer Tools and Utilities* manual and Section 9, Customizing Your Environment, of this manual.

Suggestions Menus

2.2.17 The Suggestions menus list the commands available in a particular utility and/or types of things you can do in a current situation. See the *Explorer Tools and Utilities* manual and Section 6, Using Help Features, of this manual.

Telnet   **2.2.18** Telnet is a networking protocol that allows you to use its window as a terminal to another host. It sends characters typed on the local keyboard to the remote host's Telnet server. See the *Explorer Networking Reference* manual.

Universal Command Loop   **2.2.19** The Universal Command Loop (UCL) accepts various forms of user input (such as menu selection, mouse clicks, keystrokes, or typed command names) and interprets the input as requests for command execution. See the *Explorer Tools and Utilities* manual and Section 6, Using Help Features, of this manual.

VT100 Emulator   **2.2.20** The VT100 emulator is a window-based facility that allows you to use your Explorer monitor and keyboard as a VT100 terminal. When you use the VT100 emulator, all character keys, all cursor control keys, and most function keys transmit the VT100 key codes to a connected host. See the *Explorer Tools and Utilities* manual.

Zmacs Editor and Dired   **2.2.21** Zmacs is a real-time editor that provides extensive support for writing Lisp programs as well as other types of text. Dired, a directory editor embedded within Zmacs, enables you to access files and directories. See the *Explorer Zmacs Editor Reference* manual.

Color Map Editor   **2.2.22** The Color Map editor allows you to define and edit software *color maps*. With the present implementation of color hardware, you can choose from over 16 million different colors, 256 of which can be displayed at any one time. These 256 colors are associated with a particular color map. You can create and save as many color maps as desired. At any time, only one of these color maps can be loaded in the hardware, thus determining the 256 colors that can be displayed. See the *Explorer Tools and Utilities* manual.

Visidoc   **2.2.23** The Visual Interactive Documentation (Visidoc) Online Manual Viewer allows you to view documentation from online reference manuals. Visidoc retrieves online reference material and places it in a buffer where the text and graphics information can be viewed. You can also perform operations such as evaluating examples and copying text. See the *Explorer Tools and Utilities* manual.

Among the online manuals from which you can view documentation are the following:

- *Explorer Window System Reference*

- *Explorer Lisp Reference*

- *Explorer Tools and Utilities*

- *Explorer Input/Output Reference*

- *Explorer Zmacs Reference*

- *Explorer Networking Reference*

Optional Toolkits and Utilities

2.3 The following toolkits and utilities are optional software packages that can be added to an Explorer system. If your system includes one of these programs, the name of the program is displayed when you press SYSTEM HELP.

Grasper

2.3.1 Grasper is a knowledge engineering toolkit that contains object-oriented tools for describing problems, knowledge, and situations that are best represented as a network. It includes the primitives for creating nodes and spaces and provides capabilities for associating data with these elements. See the *Explorer Grasper User's Guide*.

Natural Language Menu System

2.3.2 The Natural Language Menu System (NLMenu) provides tools to build natural language interfaces to any application. The user chooses sentence elements from menus that are dynamically controlled with a grammar that corresponds to the particular application. See the *Explorer Natural Language Menu System User's Guide*.

Prolog

2.3.3 TI Prolog is a high-performance, fully compiled version of Prolog. The Prolog option includes Zmacs support for Prolog, a Prolog listener, debugging tools, and an expert system tool written in Prolog. See the *Explorer Prolog User's Guide* and *Programming in Prolog* by Clocksin and Mellish.

Relational Table Management System

2.3.4 The Relational Table Management System (RTMS) enables you to build, access, and manipulate relational database tables within the Lisp environment. See the *Explorer Relational Table Management System User's Guide*.

Network File System

2.3.5 The Network File System (NFS) is a tool used by more advanced operating systems to provide transparent file I/O to users. Refer to the *Explorer NFS User's Guide* for more information.

DECnet

2.3.6 Explorer DECnet software enables transparent file I/O between your Explorer and a DECnet environment. With this software, you can access files that reside in a DECnet environment just as you would your local files. See the *Explorer DECnet User's Guide*.

TCP/IP

2.3.7 Explorer TCP/IP is a collection of communications protocols that provide file transfer, virtual terminal, and other services. See the *Explorer TCP/IP User's Guide* for more information.

Introduction

3.1 This section describes the Explorer monitor, keyboard, and mouse. You may want to skip this section and use it as a reference. However, you should look at Table 3-1 (Types of Keys and Their Usage). The information in this table tells which keys are generally used for various types of functions.

Monitor

3.2 The Explorer console (sometimes called the *display unit*) consists of the monitor, the keyboard, and the mouse, which may have an optical pad. The monitor provides a total display area of 1024 horizontal by 808 vertical pixels. Figure 3-1 shows the Explorer console.

Figure 3-1   Explorer Console

2286690
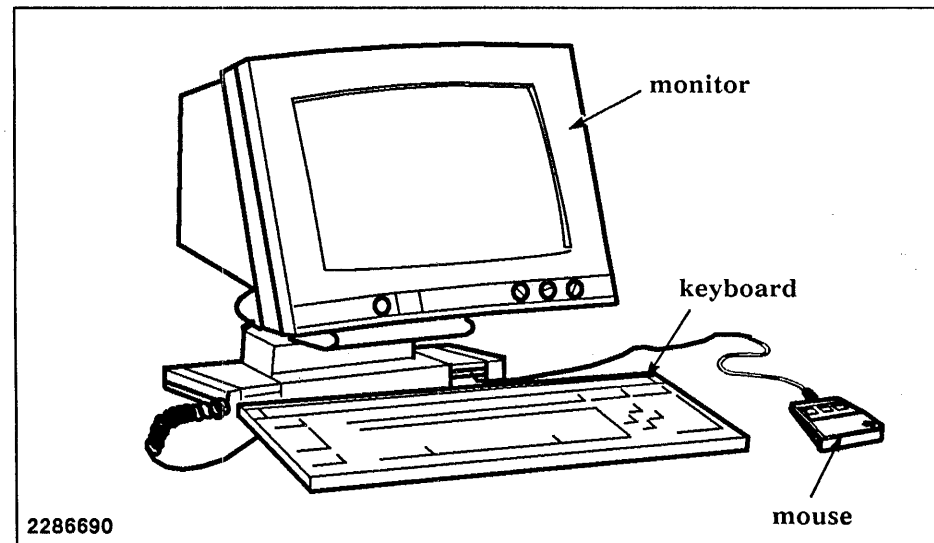
Display Features   3.2.1 The monitor display can show text in any one of several different fonts. It reproduces on the screen items that you type at the keyboard, including some special keystrokes. In addition, the monitor display features two distinctly different cursors: the keyboard cursor and the mouse cursor.

When you type a character at the keyboard, the keyboard cursor determines the character's position on the display.

The mouse cursor is normally controlled by the mouse; that is, you can use the mouse to move the mouse cursor to any point on the display at which you want to perform a mouse operation. The mouse cursor changes shape at different locations to indicate the type of operation you can currently perform.

Monitor Controls   **3.2.2**   Figure 3-2 shows the Explorer monitor controls and their locations. These controls provide the following functions:

- ON/OFF button — Turns power on or off

- Contrast control — Adjusts the contrast between black and white pixels

- Brightness control — Adjusts the brightness of pixels

- Volume control — Adjusts the volume of sound produced by the system speaker

Figure 3-2   Front View of the Monitor

ON/OFF button

volume control
brightness control
contrast control

cable to keyboard

cable to mouse

reserved for future use   reserved for future use

2287835
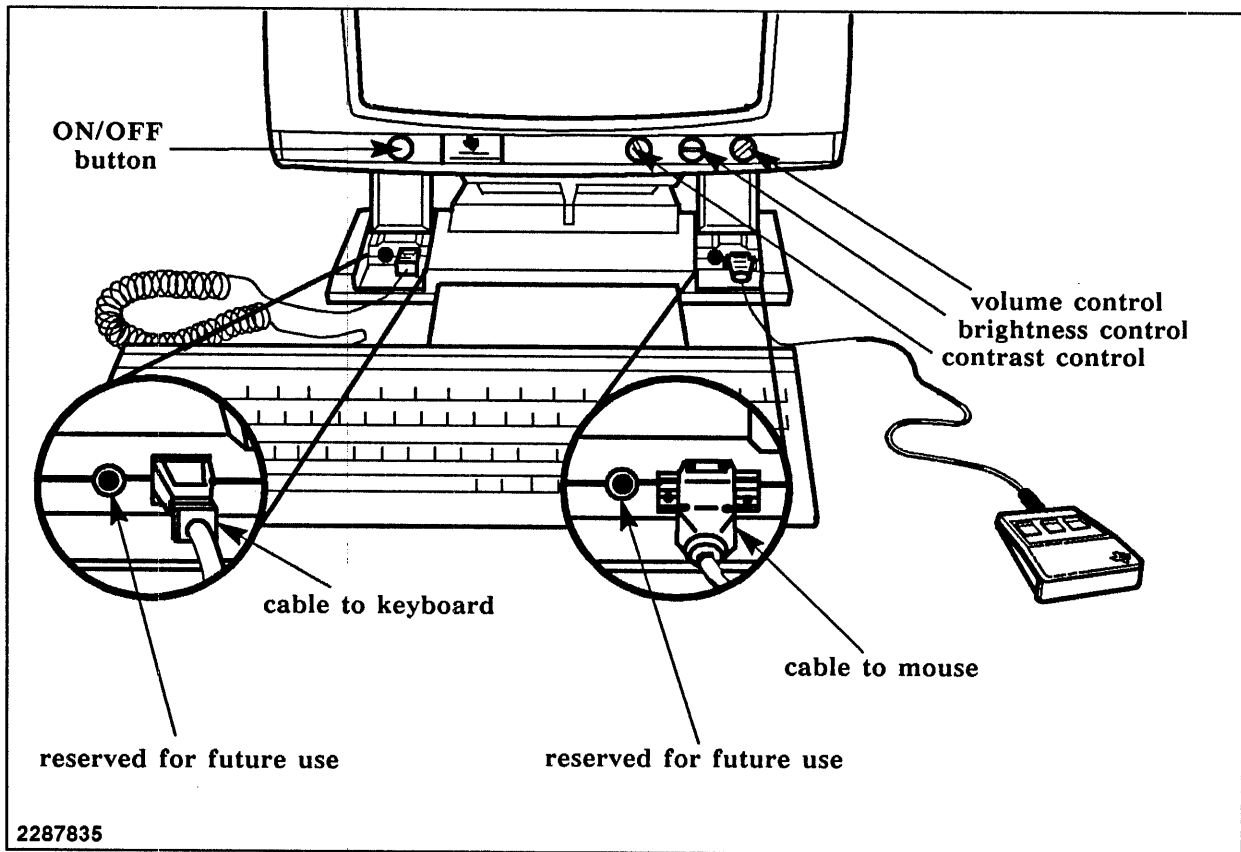
Cables and Connectors   **3.2.3**   The monitor base contains connectors for the keyboard and mouse and two additional connectors reserved for future accessories. A rear cover can be raised to gain access to the fiber-optic link and to the monitor power cord connector.

The fiber-optic link provides an interface between the monitor and the system enclosure. The permanently attached power cord provides a means of plugging the computer into a wall outlet.

Figures 3-2 and 3-3 show the monitor cables and connectors.

Figure 3-3   Rear View of the Monitor

raised
access
cover

monitor
power
cord

fiber-optic
cable
connector

2288010
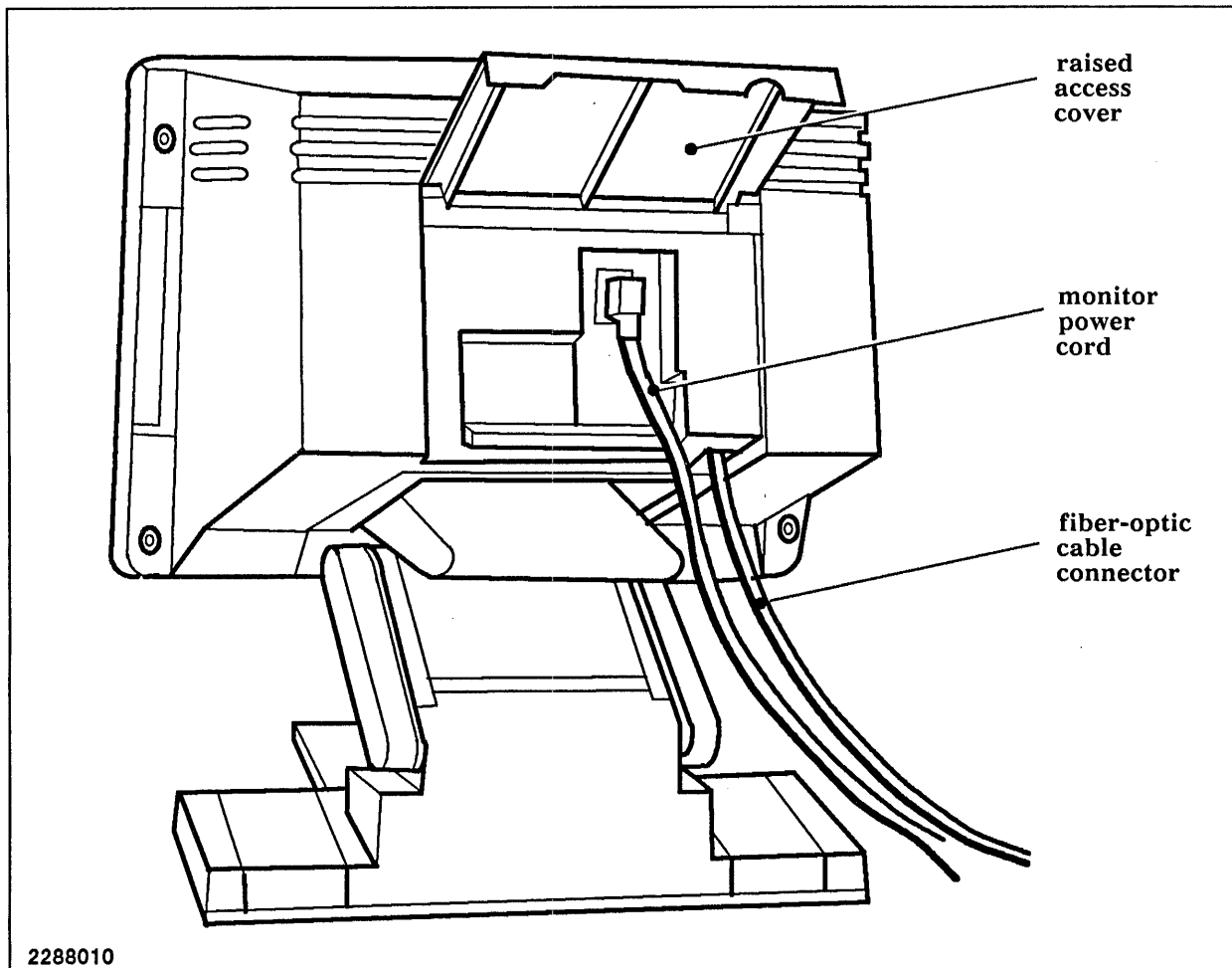
Monitor Adjustment	**3.2.4** You can adjust the position of the monitor by lifting and/or tilting it. The gas springs in the base of the monitor provide a continuous adjustment range and hold the monitor in position until it is readjusted.

Explorer Keyboard

3.3 The low-profile Explorer keyboard features 111 keys, including the standard typewriter keys, Lisp-specific keys, mouse-control keys, cursor-control keys, and a number pad. Other features include repeating keys, special key combinations for command execution, and a keystroke buffer to compensate for differences between typing speed and system reaction. The Profile utility allows you to program a keyclick to provide an audible feedback in response to the keystrokes. Figure 3-4 shows the Explorer keyboard.

Table 3-1 groups keys as they are used by programs on the Explorer system. The most common use is described for each of these keys. Refer to this table to understand the general way the Explorer system handles particular keys.

Figure 3-4 Explorer Keyboard
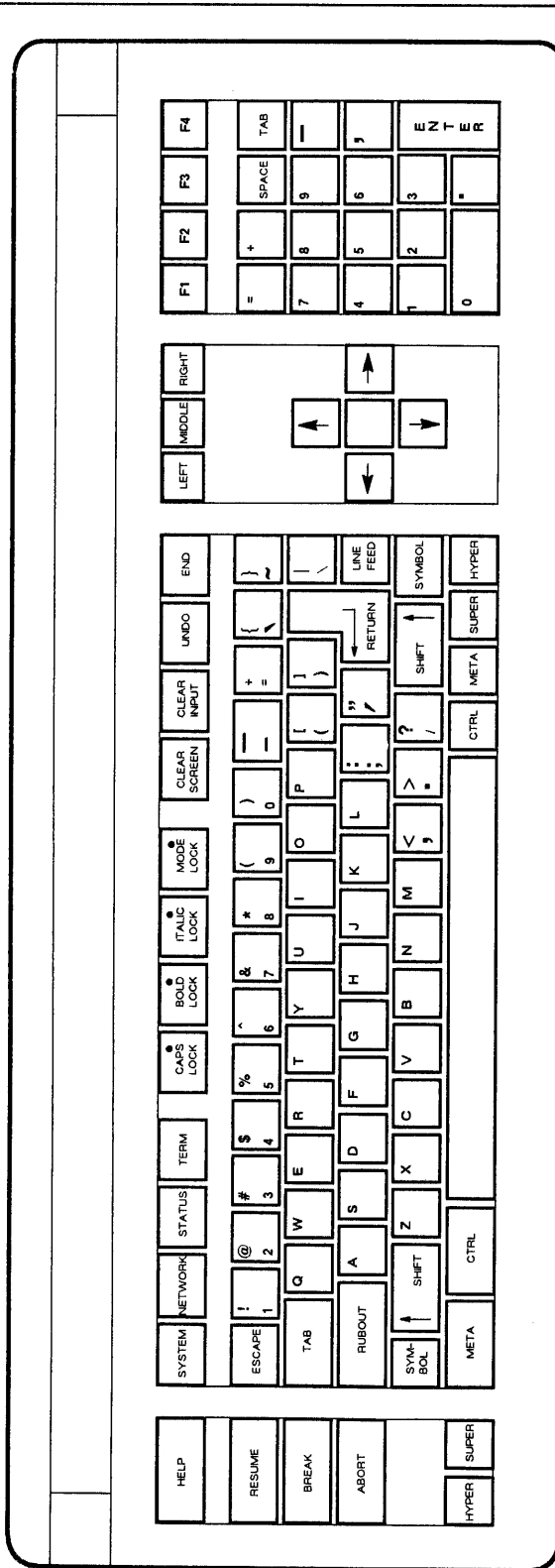
2286693

Type-Ahead Buffer   3.3.1 The Explorer system includes a type-ahead buffer. If the system cannot respond immediately to keystrokes, the buffer stores them until the system is ready or until you stop typing. The keystrokes are then displayed on the monitor, and the system performs the operations.

Repeating Keys   3.3.2 When you press and hold an alphabetic, numeric, or punctuation key, the system types the key repeatedly until you release it. If you press a key momentarily and then release it, one character is typed. With the Profile utility, you can set the length of the delay before the character begins repeating. This delay is equal in length to the delay between repetitions when you press and hold a key. The Profile utility also allows you to disable the repeating feature.

Types of Keys   3.3.3 The Explorer keyboard consists of various types of keys. These include character keys, line-positioning keys, program control keys, information and status keys, modifier keys, mode keys, user interaction keys, mouse keys, cursor keys, number keys, and programmable function keys. The following paragraphs describe the different types of keys. Figure 3-4 shows the keyboard layout.

Character Keys   3.3.3.1 Character keys are similar to keys on a standard typewriter. The Explorer keyboard, however, includes several characters that are not usually found in the standard set. These include braces ({}), brackets ([]), and an extra set of parentheses that are part of the lowercase character set.

Mouse Keys   3.3.3.2 The LEFT, MIDDLE, and RIGHT keys on the keyboard perform the same functions as the buttons on the mouse.

Cursor Keys   3.3.3.3 Each arrow key moves the cursor in the direction of the arrow. If the MODE LOCK key is enabled, the arrow keys move the mouse cursor. If the MODE LOCK key is not enabled, the arrow keys move the keyboard cursor. The blank key in the center of the arrows has no function; pressing this key causes the display to flash.

Number Pad   3.3.3.4 The keys on the number pad perform the same functions as the number and punctuation keys on the main part of the keyboard. Each number and punctuation key on the number pad produces only the character or symbol shown on its surface.

Function Keys   3.3.3.5 The function keys are used in application software. For information about programming the function keys, refer to the *Explorer Window System Reference* manual.

Other Keys   3.3.3.6 Table 3-1 lists the line-positioning keys, program control keys, information and status keys, modifier keys, mode keys, user interaction keys, and number pad keys. These keys are used in a fairly consistent way throughout the software. Browse through the table to see what functions they generally perform.

Table 3-1 Types of Keys and Their Usage

Key	Description
Line-Positioning Keys	
RUBOUT	Deletes the character preceding the current cursor position. It can be used with modifier keys to delete more than one character at a time.
TAB	Moves the cursor to the right. For example, in the Lisp mode of Zmacs, TAB moves the cursor to the next point at which the Lisp form should be indented.
RETURN	Usually acts like a carriage return key on a standard typewriter, returning the cursor to the left margin of the next line. In some software, pressing this key indicates that the current input is complete.
LINE FEED	Moves the cursor to a point on the next line (depending on the current mode of operation). For example, in the Lisp mode of the Zmacs editor, pressing LINE FEED moves the cursor to the point on the next line at which the Lisp form should be indented.
Program Control Keys	
ABORT	Stops the current program and returns control to the next higher command level. This key is often used with modifier keys to exit recursive functions.
BREAK	Stops the execution of the current process. In the Lisp Listener, the Zmacs editor, and most other places, pressing this key initiates an exit from the editor to create a Lisp Listener window where Lisp code can be evaluated.
RESUME	Restores execution after you have used the BREAK key or after execution encounters a breakpoint. This key also causes an exit from the error handler with a restoration of normal execution.

Table 3-1 Types of Keys and Their Usage (Continued)

Key	Description
Information and Status Keys	
HELP	Provides online documentation of various features.
SYSTEM	When used with a character key, invokes a program. The SYSTEM HELP keystroke sequence displays a list of characters that you can use with the SYSTEM key and a brief explanation of the program that each keystroke sequence invokes.
NETWORK	When used alone or with a character key, executes functions in network utilities such as Telnet.
STATUS	When used alone or with a modifier key, accesses the contents of the input, output, or kill histories.
TERM (Terminal)	When used with other keys, performs certain console functions such as editing windows and moving among windows.
Modifier Keys[1]	
CTRL, META HYPER, SUPER,	When used with other keys, modify the functions of the other keys. For example, in the Lisp Listener, CTRL-D deletes a character, META-D deletes a word, and the chord META-CTRL-D deletes all characters and words up to the next parenthesis. You can also use any of these modifier keys with ABORT. In other applications, META and CTRL perform opposite functions. For example, in some applications, CTRL-V causes forward scrolling, and META-V causes backward scrolling.
SHIFT	When used with a letter, number, or symbol key, causes the key to produce its uppercase version.
SYMBOL	When used with a character key, causes the character key to produce an alternate symbol. For example, pressing SYMBOL-R produces the set union symbol (∪); pressing SYMBOL-SHIFT-E produces the Greek letter epsilon (ε).

Note:

[1] Modifier keys are always used either with character keys or with other modifier keys. Each of the six different modifier keys has both a left key and a right key, which can be used interchangeably except in boot commands. All boot commands require a chord consisting of both META keys, both CTRL keys, and one additional key. This five-key chord eliminates the possibility of accidental boot operations.

Table 3-1 Types of Keys and Their Usage (Continued)

Key	Description
Mode Keys[2]	
CAPS LOCK	When locked in its ON position, causes letter keys to produce uppercase letters. The Profile utility allows you to set a variable that enables you to type a lowercase letter in CAPS LOCK mode by pressing the shift key with the letter key.
BOLD LOCK	Reserved for future use.
ITALIC LOCK	Reserved for future use.
MODE LOCK	When locked in its ON position, enables the arrow keys on the cursor pad to move the mouse cursor rather than the keyboard cursor. When the MODE LOCK key is unlocked, the arrow keys move the keyboard cursor.
User Interaction Keys	
ESCAPE	Application-defined function key.
CLEAR SCREEN	Clears some or all of the contents of a selected window. In the Lisp Listener, pressing this key clears the entire window except for any uncompleted Lisp form. If a Lisp form is incomplete when you press CLEAR SCREEN, the window is cleared, and the incomplete Lisp form is displayed at the top of the window.
CLEAR INPUT	Erases the characters that you have typed. Depending on the current program, it erases the characters on the current line or all characters typed since the last complete function, or it redisplays a window obscured by an error-handling process.
UNDO	Depending on the current program, reverses a previous action. For example, pressing the UNDO key can restore deleted text or replace a changed value.
END	Depending on the current program, terminates a command, conversation, or application.

Note:

[2] The mode keys toggle between ON and OFF. A small light on each of the mode keys indicates the condition (ON or OFF) of the key.

Table 3-1 Types of Keys and Their Usage (Continued)

Key	Description
Number Pad Keys	
ENTER	Currently not used in Lisp software.
SPACE	Performs the same function as the space bar (the long unmarked bar at the bottom of the main part of the keyboard).
TAB	Performs the same function as the TAB key on the main part of the keyboard. (See the Line-Positioning Keys at the beginning of this table.)

Connecting the Keyboard

3.3.4 A coiled cord connects the keyboard to the monitor. One end is permanently connected to the keyboard; the other end plugs into a connector at the base of the monitor, as shown in Figure 3-2.

Once connected, the keyboard should remain connected to the monitor. If you need to connect the keyboard, lift the door on the left side of the monitor base and insert the square connector firmly into the right receptacle. (This connector is designed so that you can insert it only one way.)

Adjusting
the Keyboard

3.3.5 The angle or slope of the keyboard is determined by the position of an adjustable foot on the bottom of the keyboard. To adjust the tilt of the keyboard, release the foot by pressing the buttons on the front top edge of the keyboard, as shown in Figure 3-5. For an intermediate angle, hold the buttons and move the foot to the desired position.

Figure 3-5   **Adjusting the Keyboard Angle**

release
buttons

tilt
adjustment
foot

2286699
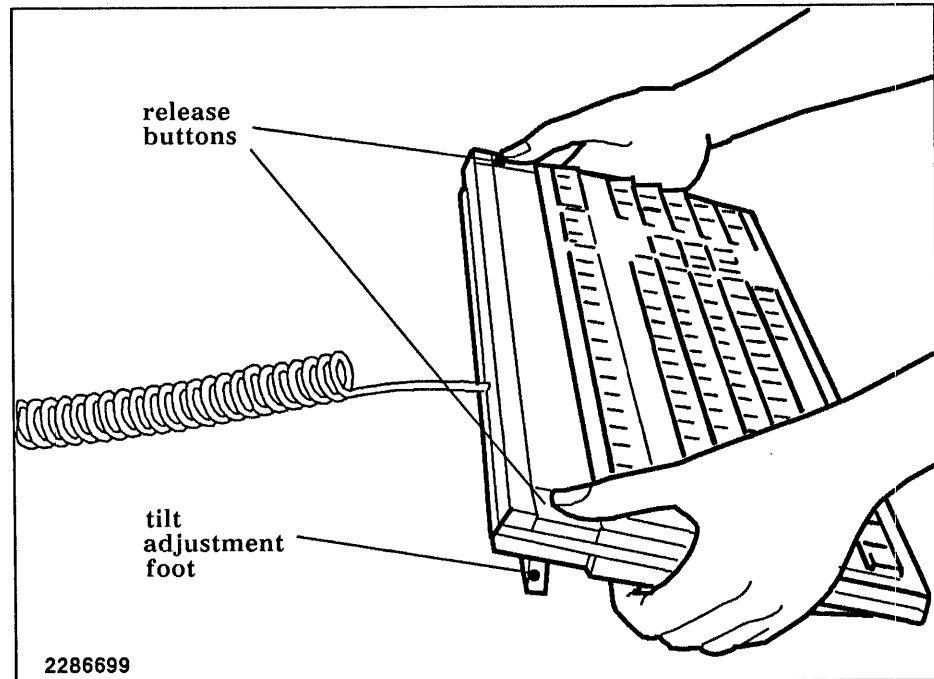
Mouse

3.4 The mouse is a pointing device whose motions are sensed and translated by the Explorer system into cursor or blinker movements on the video display.

Mouse Buttons

3.4.1 The mouse is equipped with three buttons (left, middle, and right). Any of these buttons can be quickly pressed and released to perform operations such as selecting an item in a menu or requesting more information. A line of text at the bottom of the video display usually explains the currently relevant choices. You can change the mouse from right-handedness to left-handedness by setting the Mouse Handedness variable in the Profile utility. The mouse buttons are described in Section 1, Getting Started.

Connecting the Mouse

3.4.2 A cable supplies power to the mouse and transmits information between the mouse and the monitor. One end of the cable is permanently connected to the mouse; the other end plugs into a connector at the base of the monitor, as shown in Figure 3-2.

Once connected, the mouse should remain connected to the monitor. If you need to connect the mouse to the monitor, lift the door on the right side of the monitor base and insert the connector firmly into the right receptacle. (This connector is designed so that you can insert it only one way.)
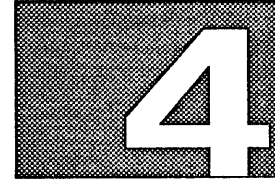
STARTING THE SYSTEM 4

Introduction

4.1 This section tells you how to start the Explorer system, how to log in, and how to end a session. If you worked through Section 1, Getting Started, you have already done some of these activities. This section gives you more detail and can be used later as a reference on boot and login procedures. As you use the system, notice that the bottom line of the screen (the status line) displays valuable information about the current status of the system. If you are not the first person to use the system since it was powered up, you may want to perform a boot operation to reinitialize it.

If you decide to investigate the system on your own, it is almost impossible to harm the system or its files. The worst that can happen is that you can lose the work you have done during the current session.

Powering Up the System

4.2 The Explorer system can remain powered up at all times.

If your system is not powered up, follow these steps to power up the system:

1. Push the power button on the back of each mass storage enclosure to the ON (in) position.

2. Push the power button on the front of the monitor to the ON position.

3. Push the power button on the front of the system enclosure. You should hear the fan start inside the enclosure.

CAUTION: Do not attempt to operate the system if the fan is not working; report the trouble to a technician.

---

4. Finally, turn on any additional equipment, such as printers.

Booting the System

4.3 Each time you power up the system, the system performs a series of operations called a *system reset*. You can also invoke a system reset by pressing META-CTRL-META-CTRL-ABORT. This keystroke sequence is also known as the *cold-boot sequence*. The list that follows shows the steps in the system reset sequence. The system does the following:

1. Performs hardware self-tests and identifies any faults detected.

2. Sounds a tone to indicate that all self-tests are complete and displays a menu. If all system boards have passed their tests, the system waits several seconds for you to choose a menu boot item; then it continues the booting process. If any system boards fail their tests, the system stops at the menu and waits for your reply.

3. Depending on the current default setting, you may see no prompt or the system may prompt you to specify the system partition (load band) and microload partition (microload band) to be loaded, and the device on which to load them.

4. Loads the microcode contained in the selected microcode band into the processor board's control memory.

5. Loads the contents of the load band into memory.

6. Boots a file partition and displays a message that describes it.

7. Performs other tasks that are defined on the initialization lists.

8. Invokes the Lisp Listener (the default program).

Suggestions for Correcting Errors During Booting

4.3.1 Errors may sometimes occur during hardware tests, initial menu, and menu boot operations. To correct these errors, try one of the following suggestions:

■ If the display freezes during any part of the boot process, the system has encountered a fatal error. Press META-CTRL-META-CTRL-ABORT to reset the system. If the problem is a temporary one, the system may boot properly.

■ If you choose an option incorrectly, press ABORT to return to the previous prompt or menu. You can also reset the system by pressing META-CTRL-META-CTRL-ABORT.

■ If you select a device that is offline or not available, the system continues to wait for the device to become ready. The system displays a Waiting message and a series of periods after the word. After you verify that the device is powered up and correctly connected, the system should work properly. If not, repeatedly press the ABORT key to return to the initial menu. If you prefer, you can reset the system by pressing META-CTRL-META-CTRL-ABORT.

■ If you select a microload band that does not work with the specified load band, the video display freezes during the boot process. Reset the system by pressing META-CTRL-META-CTRL-ABORT and make a different selection.

■ If the system displays the message ERROR: BAD MICROLOAD FORMAT, the selected microload band contains an unusable format. The system displays the initial boot options. Boot again, selecting a different microload band.

Refer to Appendix A, Boot Information, for additional information concerning boot failure messages.

Hardware Tests 4.3.2 During system testing, each board that contains a processor performs its own self-tests and presents the results to one processor that is designated as the *system test and boot master (STBM)*. The STBM prints its slot number and a message on the video display; this message indicates that the processor is beginning to test the system. After each logic board in the system enclosure is tested, the processor lists the results on the video display. Figure 4-1 shows a typical display.

Figure 4-1   **Typical Results of Hardware Self-Tests**

```
Slot 6   TESTING SYSTEM

Slot 0   passed
Slot 2   passed
Slot 3   passed
Slot 4   passed
Slot 5   passed
Slot 6   passed

D=Default load, M=Menu load, R=Retest, E=Extended tests  :
```

Initial Boot 4.3.3 After all self-tests are complete, the processor sounds a tone and
Menu displays the following initial menu:

```
D=Default load, M=Menu load, R=Retest, E=Extended tests :
```

One of the following occurs, depending on the results of the tests:

■ If all boards pass their self-tests, you can choose from the menu within 15 seconds; otherwise, the processor uses the default values for booting the system to perform the default load.

■ If any boards fail their self-tests, both the test results and the menu remain on the video display until you choose an option. Even if some of the tests are unsuccessful, you can still attempt to boot the system.

If you want to use the default load device and the default load and microcode bands to boot the system, you can press D or RETURN immediately after the menu is displayed.

After the system completes its hardware self-tests, you can specify how to continue. In general, you can either load a system, perform additional tests, or load a diagnostic operating system. To specify your choice, press one of the letters shown on the bottom line of the system self-test display (Figure 4-1) or one of the other choices described in the paragraphs that follow.

System Utility 4.3.3.1 Most of the boot choices select a system to load and run. Several
Load Choices choices (Select device, Factory, and Named options) are not listed in the system self-test menu.

Default Load Choice Press D. The system loads from the default device specified by the system nonvolatile RAM (NVRAM) and from the default partitions specified in the disk partition table of the default device. This choice is the default choice for this menu; if you press RETURN or if you do not press a valid letter within 15 seconds, this choice is automatically

executed. Refer to Appendix A, Boot Information, for more information about NVRAM utilities.

Select Device Choice Press S. The processor scans the slots in the system enclosure for possible load devices and then displays a menu of the devices. (An asterisk indicates the default choice.) After you choose a device from the menu by specifying one of the letters in the left column, the system loads from the default partitions specified on the device. The menu is similar to the following one:

```
AVAILABLE LOAD DEVICES

    A=  Slot   0  Enet   00
  *B=  Slot   2  Disk   00
    C=  Slot   2  Disk   01

Select   load   device  :
```

Menu Load Choice Press M. The processor displays a menu of the available load devices, identical to that shown for the Select Device choice. After you choose a device from the menu, the system loads a boot utility (called *menu boot*) from a partition named BOOT on that device. This boot utility displays a menu similar to the following one:

```
L=Lisp load, M=Multi-unit load, D=Diagnostic load, P=Print device label:
C=Configuration Boot
```

General Diagnostic Operating System Press G. The system asks you to choose a device from a menu, then loads the General Diagnostic Operating System (GDOS) from the specified device. Diagnostic programs that run under control of GDOS are useful for locating hardware problems that are not found by extended testing. The *Explorer Diagnostic User's Guide* provides detailed information about GDOS.

Named Options Choice Press N. The system prompts you for the names of the microcode band and the load band, in that order. You must type the names exactly as they appear in the disk label, then press RETURN; if the name appears in uppercase letters, you must type uppercase letters. If you make an error while typing, you can either press RUBOUT to correct the error or ABORT to return to the previous prompt or menu. After you supply the partition names, the system asks you to choose a device from a menu. If possible, the system loads from the specified partitions. If you specify invalid partitions, the system displays a message and the initial menu again.

Factory GDOS Press F. This puts you into FDOS, which is either a factory version of GDOS or any microcode partition that you want to name FDOS in order that the partition be easily loaded. This option is only available on Explorer II.

Testing Choices **4.3.3.2** After a system reset, you can choose from two levels of system testing by pressing the appropriate letter.

Retest Choice Press R. The system reexecutes the hardware tests and displays the results. Retesting is usually done if you suspect an intermittent problem on a logic board. After retesting, a display appears similar to that shown in Figure 4-1.

Extended Tests Choice Press E. The system performs more extensive hardware tests and displays the results. Figure 4-2 shows the messages displayed by a typical system after extended test completion. Notice that no message

Figure 4-2

Typical Messages Displayed After Extended Test Completion

```
Slot  6  TESTING  SYSTEM

Slot  0  NEC  (TIAU  00002236400-0001  *P)
    ETHERNET  BOARD  TEST
        E'net  memory      :  passed
        Initialization     :  passed
        SCB  commands      :  passed
        Diagnose           :  passed
        IA  setup          :  passed
        Configure          :  passed
        82586  int  lpbk   :  passed
        Serial  int  lpbk  :  passed
        Network presence   :  passed
passed

Slot  2  NPI  (TIAU  00002238040-0001  *L)  passed

Slot  3  MEM  (TIAU  00002243910-0003  *H)
    EXTENDED  MEMORY  TEST
        Interface  test            :  passed
        Parity test                :  passed
        Modified  addr  test       :  passed
        Pattern  test  (1-8)12345678 passed
        Chip  hit  test   :  >>ERROR
Diagnostic  TESTS  FAILED

Slot  4  MEM  (TIAU  00002236415-0001  *G)
    EXTENDED  MEMORY  TEST
        Interface  test            :  passed
        Parity  test               :  passed
        Modified  addr  test       :  passed
        Pattern  test  (1-8)12345678 passed
        Chip  hit  test            :  passed
passed

Slot  5  SIB  (TIAU  00002236645-0001  *J)
    SYSTEM  INTERFACE  TEST
        Initialization                 :  passed
        Event  generation  vectors     :  passed
        RTC  and  long  interval  timers :  passed
        Bit  map  memory  address  lines :  passed
        Graphics  operations           :  passed
        Mouse  registers               :  passed
        Local  keyboard  USART  check   :  passed
        Monitor  presence              :  passed
        Keyboard  presence             :  passed
        Mouse  loopback  circuitry     :  passed
        Voice  loopback  circuitry     :  passed
        Parallel  port  data  loopback  :  passed
        Battery  backup                :  passed
        Non-volatile  RAM              :  passed
passed

Slot  6  passed

D=Default  load,  M=Menu  load,  R=Retest,  E=Extended  tests:
```

appears for an empty slot. Extended testing, which can take up to five minutes per board, is usually done in the following cases:

■ When the system or a logic board is first installed

■ When standard power-up testing has indicated a problem

■ When you suspect that a hardware fault is causing system problems

■ Before you execute diagnostic programs

Maintenance Submenu Choice (Explorer II only) Press ! (exclamation point). This option gives you access to a submenu of testing mode controls and utilities.

■ N=Nubus — Read and write to any physical address on the Nubus.

■ S=Single — Toggle between the single and All slots choices for RETEST/EXTENDED. If the current choice is single, you are then prompted for the slot to test.

■ X=eXecute — Execute processor self-test(s). You are then prompted for the number of the self-test.

■ F=Flags — Displays current state of the test mode flags

   ■ L=Loop —Toggles loop-on-tests flag. (A value of 1 means to loop on the selected test(s).)

   ■ H=Halt —Toggles halt-on-error flag. (A value of 1 means to halt the test(s) if any error is detected.)

   ■ I=Ignore —Toggles ignore-errors flag. (A value of 1 means to loop on the selected test(s).)

Menu Boot Choices **4.3.3.3** You can press a letter to select one of the choices or press RETURN to select the default choice (Lisp load).

Lisp Load Choice Press L. The system does the following:

1. Displays a menu of available system partitions. You can press a letter to select a particular partition, RETURN to accept the default partition (the letter indicated by an asterisk), or ABORT to go to the previous menu.

2. Displays the version number of the microcode band preferred by the selected load band and a menu of microcode bands. You can select a particular band, accept the default, or return to the previous menu.

3. Attempts to load from the specified load and microcode bands. If the system cannot successfully load from the specified bands, it displays a message followed by the initial menu of options.

Multi-Unit Load Choice This option enables you to boot from a load band on one device and a microcode band on another. Press M. The system does the following:

1. Displays a menu of devices that may contain load bands. You can press a letter to select a particular device, RETURN to accept the default device (the letter indicated by an asterisk), or ABORT to return to the previous menu.

2. Displays a menu of load bands. You can select a particular band, accept the default, or return to the previous menu.

3. Displays a menu of devices that may contain microcode bands. You can select a particular band, accept the default, or return to the previous menu.

4. Displays the version of the microcode preferred by the selected load band and a menu of microcode bands. You can select a particular band, accept the default, or return to the previous menu.

5. Attempts to load from the specified load and microcode bands. If the system cannot successfully load from the specified bands, it displays a message followed by the initial menu of options.

Diagnostic Load Choice Press D. The system does the following:

1. Displays a list of devices that may contain diagnostic bands. You can press a letter to select a particular device, RETURN to accept the default device (the letter indicated by an asterisk), or ABORT to return to the previous menu.

2. Displays a menu of diagnostic bands. You can select a particular band, accept the default, or go to the previous menu.

3. Attempts to load from the specified band. If the system cannot successfully load from that band, it displays a message followed by the menu boot options.

Print Device Label Choice This option enables you to see the disk label for a specified device. Press P. The system does the following:

1. Displays a list of devices. You can press a letter to choose a particular device, RETURN to choose the default device, or ABORT to return to the previous menu.

2. Displays the volume name.

3. Displays the name and comment of each partition on the device label.

4. Displays the partition type and CPU/user type for each partition.

5. Displays the initial menu of user options.

Configuration Boot Choice This option allows you to display a menu of devices that may contain configuration partitions. Press RETURN to accept the default device. You then see a menu of configuration partitions (if they exist on that device). Press RETURN to accept the default partition.

File Systems 4.3.4 An Explorer system can include several file bands, but only one band can be booted at a given time. The system uses certain conventions to determine which file band to boot. To use a file system that spans several partitions, you must set the partition properties and create the file system.

Determining 4.3.4.1 Your Explorer system uses the following algorithm to determine
the File Band which file band to use during the boot operation:

1. Searching from the lowest through the highest unit number, the system chooses the first file partition marked as the default that is not also a diagnostic partition.

2. If the first search does not find a suitable partition, the system again searches from the lowest through the highest unit number and chooses the first file partition named FILE.

---

3. If this second search does not find a suitable partition, the system does not boot a file partition.

You can boot a different file system after the system is initialized. Refer to the *Explorer Input/Output Reference* manual.

Using Several
File Partitions

4.3.4.2 In a file system that crosses several disks, the first partition in the system contains a map of the locations of the other partitions. Each file partition in the file system should have its logical partition property set. The first partition should also have the default property set to indicate that it is the beginning of the system.

You create a file system that contains more than one partition by allocating the file partitions and then by executing the **fs:initialize-file-system** function. Refer to the *Explorer Input/Output Reference* manual.

Page Partitions

4.3.5 During the boot process, the system may find several page partitions. The system uses all partitions with the page partition attribute set as virtual memory storage. A table is created in microcode to list the available page partitions.

Setting Date and Time

4.4 If you need to supply the time, the system prompts you for the current date and time with the following message:

```
Please type the date and time:
```

If you press RETURN, the system displays the following message:

```
Do you want to specify the time or not? (Y or N)
```

If you answer N (no), the system returns nil and the boot operation continues without placing the time in the status line. If you answer Y (yes), the system displays the `Please type date and time:` message again.

If you respond to the `Please type date and time:` message by entering a date and time, the system verifies that the correct format has been used. If the format is incorrect, the system displays the following message:

```
Unrecognized date/time format, starting with token 12347982.
Please type the date and time:
```

An acceptable format is, for example, 10/05/88, 14:30:22. The system returns the following message:

```
Time is Wednesday the fifth of October, 1988; 14:30:22, OK? (Y or N)
```

If you answer N (no) in response to the question, the system again displays the `Please type the date and time:` message.

Lisp Listener

4.4.1 Each time you perform a boot operation on the standard Explorer software system, the Lisp Listener utility is automatically invoked. Above the Listener menu in the lower left corner of the large window, the words Lisp Listener 1 appear. This label indicates that the system is now active in the Lisp Listener, the interactive Lisp interpreter.

Listener Menu **4.4.1.1** The line just above the mouse documentation window is a menu of commands available in the Lisp Listener. The use of menus is discussed later in this section.

Initial Screen **4.4.1.2** At the completion of the cold boot operation, the Lisp Listener displays the *initial screen*, which lists the name of your system, the memory available in your system, and the names and version numbers of the software available on your system. Figure 4-3 shows a typical initial screen.

Figure 4-3 Typical Lisp Listener Initial Screen

```
                    Texas Instruments Explorer™




Copyright (c) 1985, 1986, 1987 Texas Instruments. All Rights Reserved.
Enter (TI-Show-Legal-Notice) for complete restricted rights notices.

File system boot sequence: unit: 1, partition: FILE

*** Successfully contacted a server (QUEBEC) for namespace TI-7

Initializing the network ...
Setting up SYS host ...
Setting "SYS" to the logical-host "SYS3"
Setting up SITE options ...

Explorer TI AUSTIN ASD Lima.
Load band LOD2 (3.0 PCHS-TRAINED-IP) loaded from disk , Microcode MCR2 (EXP1-UCODE 207).
12 MB of physical memory, 76 MB of virtual memory.
     System                     3.0+     Pathname-Support              3.1
     System                     3.2      Chaosnet                      3.3
     GC                         3.1      Zmacs                         3.1
     Window System              3.1      Namespace                     3.4
     Experimental IP            2.2      Experimental Explorer Bug System  4.4
     Microcode                  207
Last system shutdown was abnormal.  To view crash record use (si:report-last-shutdown)


Press the Help key for Explorer Help Information.
Press Mouse-Right-2 to display the System Menu.
Enter (NEW-USER) if this is your first time on an Explorer.

Enter (PRINT-HERALD T T) for full partition contents.
Please login. Enter (LOGIN your-name)

> ■




                                                                         ↖




Lisp Listener 1
            Suggestions Menus On                  System Menu                     Help
 R: Bring up the System Menu.

05/20/87 06:56:24AM           USER:   Keyboard
```

Prompt Symbol **4.4.1.3** After the initial screen is shown, the system displays a blank line and the prompt symbol (>) at the left margin. This prompt symbol, with the status message of Keyboard, indicates that the Lisp Listener is now ready to evaluate the functions you type. The blinking keyboard cursor (■) indicates where the typed characters are represented on the video display.

Lisp Top Level **4.4.1.4** Usually on the Explorer, a user interacts with the Lisp language through a top-level loop called the read-eval-print loop. This loop continuously monitors the Lisp Listener for input of Lisp expressions. When input is detected, the loop reads and evaluates the expression, then prints the result on the display.

Logging In
4.5 You can perform many operations on an Explorer system without logging in. However, to set up the system environment with your preferences and to gain access to files and printers, you must log in; that is, you must execute the **login** function.

The **login** function is a Lisp function that identifies you and provides access to the system.

login *user-name* &optional *host inhibit-init-file-p* Function

The **login** function provides access to the file system and to the Mail utility.

Arguments: *user-name* — Provides a logical address for electronic mail or messages and specifies your default directory. The *user-name* argument can be either a symbol, such as ´name or a string such as "name". If you use a symbol, the letters are changed to all lowercase or all uppercase letters, depending on certain system variables. If you use a string, the case of the letters remains the same.

host — Specifies which host's file system to use. The specified *host* becomes your default file server; all references to files that do not specify another host use files in that system. The default value is the local machine (lm). In particular, this is where your login-initialization file (login-init file) comes from. If host is specified as T, then **login** assumes that host equals lm and *inhibit-init-file-p* equals true.

inhibit-init-file-p — Specifies whether to use a login-init file. If *inhibit-init-file-p* is nil, the system attempts to find a file called LOGIN-INIT.LISP or PROFILE-LISPM.INIT saved under a directory of the same name as user-name on host. If the system cannot find a login-init file, it simply returns the Lisp Listener prompt. The default value of *inhibit-init-file-p* is nil, which means to use a login-init file if one exists.

To execute the **login** function, type the function in the Lisp Listener window that appears when you boot the system. If you have never logged in to the system before, you should use the following specific form:

```
(login ´user-name t)
```

You can specify any name as user-name. The apostrophe, or single quote (´), indicates that the characters following it should be treated as a literal value and should not be evaluated. The letter t tells the system to ignore any login-init file. This prevents the possible use of a login-init file that someone else may have created under the specified *user-name*.

As you type the **login** function, the system reacts as follows:

1. The opening parenthesis may initiate system activity.

2. If you type rapidly, the video display may not immediately repeat what you type. The characters are stored in a buffer until the machine displays them.

3. When you type the closing parenthesis, the system executes the function. The run bars flicker, and the status message changes to Run.

---

4. The system displays the specified *user-name* on the status line between the time and the package name.

5. When execution is complete, the system displays a T (the returned value of the function) and moves the cursor and the system prompt to the beginning of a new line.

Ending a Session

4.6 If your Explorer system is shared among several users, you may need to end a session by logging out when you are finished with your work. However, if you are the only user of your Explorer system, you will probably not need to log out except when you reboot or power down your machine. If you are ending a session with the Explorer system, save any editing buffers that you want to keep before you log out.

Logging Out

4.6.1 Logging out cancels your association with the machine. It does not change the environment, destroy the contents of buffers, or kill or bury windows. To log out, follow these steps:

1. Select a Lisp Listener window. If you are not in a Lisp Listener window, select one by pressing SYSTEM L or by selecting the Lisp Listener item from the System menu.

2. Type the Lisp function (logout). The Explorer system evaluates the function (logs you out); in some cases, it resets the values of variables set using an initialization list. Then the system returns the value **t**.

Powering Down

4.6.2 Because the Explorer system is often part of a network, powering down an Explorer system requires more than simply turning off the components of the system. If your Explorer station is part of a network and provides a file system or a printer for other stations on the network, you should leave your station powered up while other stations require it.

Typically, an Explorer system remains powered up at all times. A situation may arise, however, that forces you to power down the system. To ensure that all operations within the system are completed before you power down the system, follow these steps:

1. Log out as described in paragraph 4.6.1, Logging Out.

2. Wait until the run bars disappear and the status line does not report any file activity, such as the message File Serving C15 or the name of a pathname being transferred to another file system or to a printer.

3. Type the Lisp function (fs:dismount-file-system). (This function, as its name implies, makes the file system unavailable to anyone.) The system completes all output to disk and prevents anyone from writing to the file system.

4. Type the Lisp function (sys:system-shutdown). The system completes any current activity and shuts down the processor. The keyboard cursor in the selected window stops blinking.

5. Turn off the power to the monitor, the mass storage enclosures, the system enclosure, and any peripheral devices.

WINDOWS AND MENUS
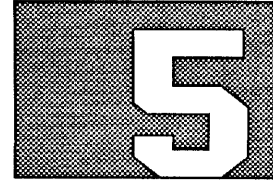
Introduction

5.1 The Explorer system uses a variety of windows and menus to present data and options. This section describes the types of menus and windows and how they interact. More information is found in the *Explorer Window System Reference* manual. The examples shown in this section assume that you have already logged in to your Explorer system.

Windows

5.2 The window system provides a hierarchical input/output interface between you and the Explorer system. Anything shown on the video display is contained within a window; any time you type something from the keyboard or press a mouse button, you are interacting with a window.

Different windows have different characteristics: they can be various sizes, occupy various positions on the video display, accept keyboard or mouse input, or display information. Some windows, such as the mouse documentation window, are displayed by system software; others are invoked by you.

The Explorer window system features several different states of activation. A window may be in one or more of the following states at any given time:

■ Visible — A visible window is one that is currently displayed on a screen. A window is fully visible if no other window covers any part of it. If another window covers part of it, the window is said to be partially visible.

■ Exposed — An exposed window is one that is enabled to accept data output from a process. An exposed window need not be visible on the display, although it may be. Several windows may be exposed at any given time.

■ Selected — A selected window is one that is fully visible and enabled to accept input from the keyboard or mouse. Only one window can be selected at any given time.

■ Active — An active window is one that is capable of being exposed.

■ Buried — A buried window is one that has been moved to the bottom of a stack of windows, thus allowing the next window in the stack to become visible. A buried window remains exposed, although it is neither visible nor selected.

■ Inactive — An inactive window is one that is neither exposed nor visible. The process of making a window inactive is called *killing* the window. When you kill a window, the resources associated with the window (such as processes and network connections) are terminated.

Parts of a Window 5.2.1 The top node of the window system hierarchy is the entire screen, which can contain one or several windows. Just as a screen can contain several windows, each window can contain several panes. A frame is a collection of panes that usually appear together and can be manipulated as a single window.

Each window or pane has several characteristics. The border shows the edges of a window. A label describing the window or pane is usually placed in the lower left corner of a window or at the top of a pane. For example, the first Lisp Listener window, the window created when you boot the system, is identified as Lisp Listener 1. The next Listener window you create is labeled Lisp Listener 2, and so on.

The text displayed in a window can be of different typefaces, or fonts, just as the text in a book can vary in size and shape. Typically, the Explorer system uses a different font for the labels of windows and for the text you type. Most processes and utilities on the Explorer system follow this convention.

Figure 5-1 shows a typical window.

Figure 5-1 Typical Window

```
TV:BORDERS-MIXIN's methods (all)

Methods defined for flavor TV:BORDERS-MIXIN.  * = special method combination type
        Type      Message                      Arglist
                  :COMPUTE-BORDER-MARGIN-AREA-MARGINS (TV::SPEC TV::LM TV::TM TV::RM TV::BM)
                  :COMPUTE-MARGINS                    (TV::LM TV::TM TV::RM TV::BM)
```
```
W:GRAPHICS-MIXIN

Flavor W:GRAPHICS-MIXIN's component flavors.

W:TRANSFORM-MIXIN
SYS:VANILLA-FLAVOR
```
```
W:WINDOW

Flavor W:WINDOW's component flavors.  ** = redundant included flavor

W:GRAPHICS-MIXIN
  W:TRANSFORM-MIXIN
TV:STREAM-MIXIN
TV:BORDERS-MIXIN
TV:LABEL-MIXIN
  TV::ESSENTIAL-LABEL-MIXIN
TV:SELECT-MIXIN
  TV:DELAY-NOTIFICATION-MIXIN** (included flavor of TV:SELECT-MIXIN)
TV:DELAY-NOTIFICATION-MIXIN
TV:MINIMUM-WINDOW
  TV:ESSENTIAL-EXPOSE
  TV:ESSENTIAL-ACTIVATE
  TV:ESSENTIAL-SET-EDGES
  TV:ESSENTIAL-MOUSE
  TV:ESSENTIAL-WINDOW
    TV:SHEET
SYS:VANILLA-FLAVOR
```
```
Help On Syntax  All Flavors    Trace      Exit      │ TV:BORDERS-MIXIN's methods (all)
Doc             Delete         Refresh    Up        │ W:GRAPHICS-MIXIN
Down            Break          Mode       Config    │ W:WINDOW
Flavor/Method: my-window
Flavor/Method: ■
```
```
Flavor Inspector 4
L: Select data to inspect, M: Help on currently displayed data, M2: Lock/Unlock inspector pane, R: Menu of operations on flavor W:WINDOW

04/16/87 02:13:24PM WEBB        USER:   Keyboard          + Lima: WEBB; IMAGE.XLD#3  0
```

Windows and the Video Display

5.2.2 The video display is divided into two separate screens, one of which is invoked by the system software and is always visible at the bottom of the screen. This system-invoked screen contains the mouse documentation window and the status line. The remainder of the display contains the main screen, which differs from one utility to another. Both screens appear simultaneously on the video display; visible windows appear in the main screen, as shown in Figure 5-2.

By using the Create or Split Screen option of the System menu, you can display several fully or partially visible windows in the main screen. However, only one fully visible window can be selected (used for input) at one time. The selected window is usually indicated by a blinking keyboard cursor.

Figure 5-2   Several Fully Visible Windows
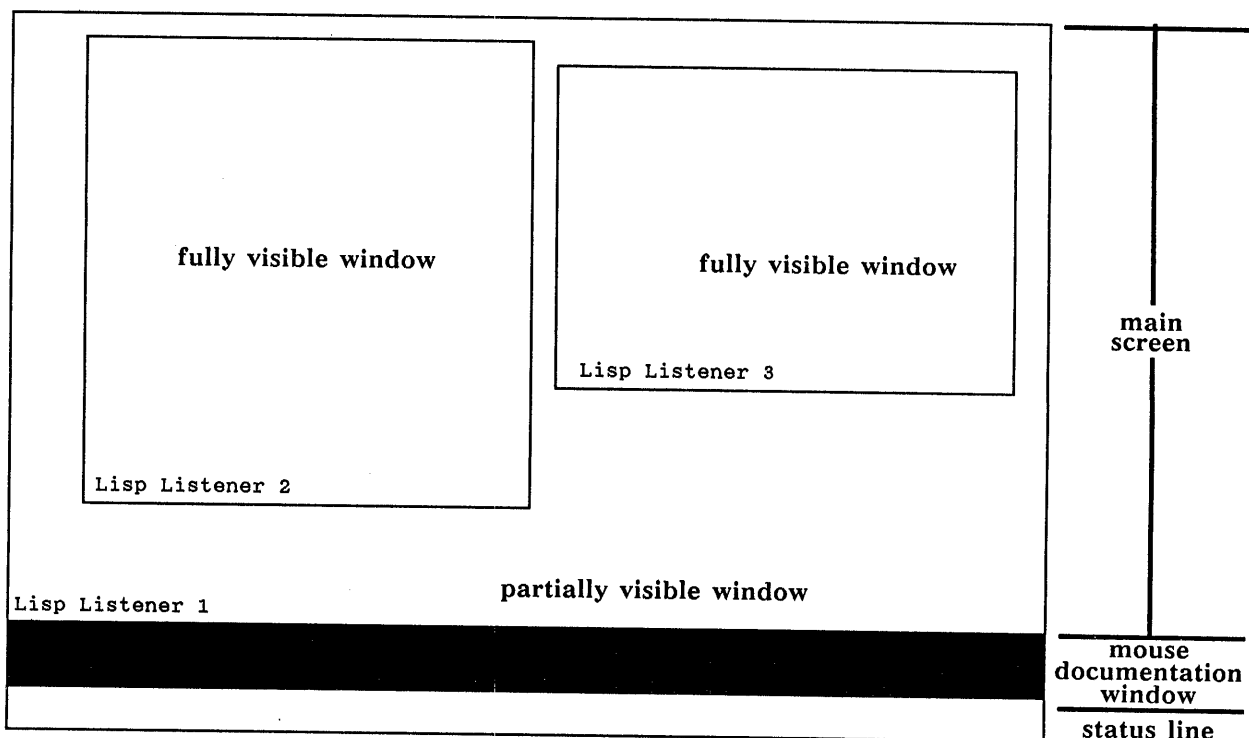
Priority of Windows

5.2.3 The Explorer system keeps track of active windows. Similar to the topmost paper in a stack of papers, the highest priority window is the one that is visible and selected. When you select a different window (for example, using the System menu to choose Peek while in the Listener window), the topmost window (labeled active 1 in Figure 5-3) is placed at the bottom of the stack, or *buried*, and the selected window is moved to the top of the stack. You can also *kill* a window and totally remove it from the stack, similar to throwing away a sheet of paper.

Figure 5-3   **Window Stack**

Figure 5-3: Window Stack — showing "selected active 1" at the top of stack, with "active 2", "active 3", "active 4", "active 5" and so on stacked below. Labels: "top of stack", "Buried windows remain part of stack; killed windows disappear." and "and so on".
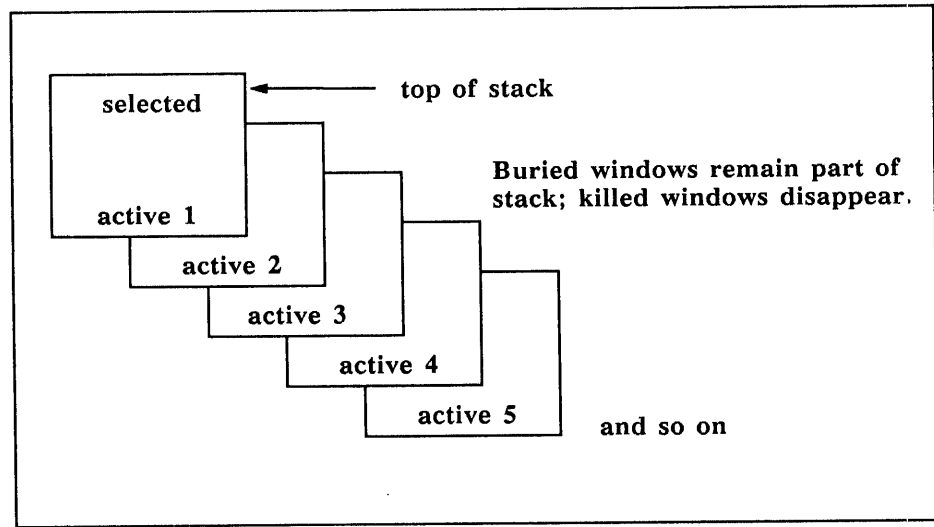
Temporary Windows

5.2.4 In addition to the active windows in the stack, the Explorer system uses temporary windows. Temporary windows overlay visible windows. When a temporary window overlays the selected window, the selected window and all other active windows are temporarily locked; that is, they are unable to accept input or output. When you remove a temporary window, the selected window is again displayed.

Temporary Menus

5.2.4.1 A temporary menu is one type of temporary window. A temporary menu remains on the screen until you select an item or otherwise cause the window to disappear. In general, the Explorer system uses two types of temporary menus:

■ Momentary menus disappear after you move the mouse cursor outside of the menu or select an item (for example, the System menu).

■ Pop-up menus require you to select an item to make them disappear. If you move the mouse cursor outside the menu, the menu remains on the screen (for example, the Network menu, which appears as a pop-up menu within the System menu).

Notification Windows

5.2.4.2 A notification window is another type of temporary window. This type of window usually appears at the top or middle of the video display to notify you of an error or an action taken by a process. The window sometimes prompts you for information needed by a process. You can remove a notification window by answering the prompt or by pressing the space bar. Figure 5-4 shows a typical notification window.

Typeout Windows

5.2.4.3 A third type of temporary window is a typeout window. Typeout windows display information usually in response to a particular command. For example, the window in the Zmacs editor that displays documentation about a command is a typeout window.

Many times, the file or other information shown in a typeout window cannot be displayed in the window at once. In this case, you can scroll through the window to examine different sections of information.

Figure 5-4 Typical Notification Window

Menu of Glossary Entries	Thumb Index	Text of Selected Glossary Entries
screen	A	*status line*
screen array	B	A line in *normal video* at the bottom of the display that
screen formatter	C	indicates the status of the *system*. From left to right the
screen manager		status line shows the date and time, your login name, the
scroll bar	D	*current package*, various *status messages*, and the *run bars*.
scrolling	E	The status line can also show *messages* from the *file server*
scrolling window		or the *print server*.
SCSI bus	F	
section		
sectionize	G	*screen*
seed	H	The topmost node of the *window system* hierarchy, which
select	I	defines an *area* of the physical display. The physical
selected window		display *area* is divided logically into two screens: the main
self-evaluating form	J	screen and the screen containing the *status line* and *mouse*
semilexicographic comparison	K	documentation *window*. A screen has no *superior windows*, and
sequence	L	*windows* in one screen cannot be extended into the other
server		screen.
set	M	
settable	N	
shadow		*window*
SHIFT key	O	A rectangular *region* that can be displayed on a *screen*. A
signaling		window ... and acts as a *stream*,
significant comm.		... to and read from.
simple array		...cific *flavor*. The
simple sequencing function	R	*window's flavor* governs how the window and *process* interact.
single-colon package qualifier	S	
small computer systems interface bus	T	

```
06:59 Spooling Default Screen print request to printer IMAGEN on Icarus.
Press the space bar to remove this message.
```

Selecting Windows

5.2.5 Windows can be selected in several different ways. You can select an item from the System menu, use the SYSTEM key to invoke a utility, or use the TERM key to select an active window. If several windows are fully visible, you can use the mouse to select one of them.

Using the System Menu

5.2.5.1 You can select a window from the System menu (Figure 5-5) by doing one of the following:

■ Select the appropriate item in either the USER AIDS or the PROGRAMS column to invoke the most recently used window of that type.

■ Select the Create item in the WINDOWS column to invoke another menu that lists the types of windows available in the system. (This item also enables you to create a window with the screen editor and to specify its size and position. Using the screen editor is described in Section 9, Customizing Your Environment.)

■ Select the Select item in the WINDOWS column to invoke another menu that lists all windows currently active in the system.

Figure 5-5   **Explorer System Menu**

Explorer System Menu

USER AIDS:	PROGRAMS:	WINDOWS:	DEBUG TOOLS:
Glossary	Backup	Arrest	Flavor Inspector
New User	Converse	Bury	Inspector
Profile	Font Editor	Change Layouts	Network
Suggestions	Hardcopy Menu	Create	Peek
	Lisp Listener	Edit Attributes	Trace
	Mail	Edit Screen	
	Namespace Editor	Kill	
	Telnet	Refresh	
	VT100 emulator	Reset	
	Zmacs Editor	Select .	
		Split Screen	

Using the
SYSTEM Key

5.2.5.2 Rather than using the mouse to select a program from the System menu, you can use the SYSTEM key to invoke a particular program by doing one of the following:

■ Press SYSTEM *x*, where *x* is the letter that invokes a particular software utility. This keystroke sequence invokes the most recently used window of that type. (To obtain a list of the character keys that can be used with the SYSTEM key, press SYSTEM HELP.)

■ Press SYSTEM CTRL-*x*, where *x* is the letter that invokes a particular software utility. In most utilities, this keystroke sequence creates a new instance of the utility and its window.

Using the
TERM Key

5.2.5.3 If you are using several different utilities, you can use the TERM S keystroke sequence to select any one of the active windows in the stack. You can move between active windows by doing one of the following:

■ Press TERM S to toggle between the currently selected window and the most recently selected window.

■ Press TERM *n* S to toggle between the currently selected window and another window; *n* is a number that indicates the position of the window in the stack (see Figure 5-3).

■ Press TERM 0 S to select a typeout window (usually in response to a message that indicates a window needs to type out information).

Using the Mouse

5.2.5.4 If several windows are visible on the screen, you can use the mouse to select one of them. To select a different visible window, move the mouse cursor into that window and click the left button. The keyboard cursor in that window begins blinking, indicating that it is now the selected window. Only one window can be selected (for input) at a given time.

Scrolling
Within a Window

5.2.6 Sometimes the system displays more information than can fit within the current window. In this case, the system allows you to scroll forward or backward in the window to display additional information.

The system default position for the scroll bar region is on the left, as shown in Figure 5-6; however, the Profile utility allows you to change it to the right. A thick black arrow at the top or bottom of the scroll bar region indicates more information above or below the window, respectively.

If you move the mouse cursor into the scroll bar region, the cursor changes to a thick double-headed arrow and a scroll bar appears (default mode) to indicate that the scrolling feature is enabled. The mouse documentation window tells you which operations are available.

To exercise the scrolling operations described here, select the Zmacs editor and either load a long file or create a buffer of data that is more than one screen long.

Figure 5-6 Scroll Bar Region

```
;;; -*- Mode:Common-Lisp; Base:10 -*-

;; The pathname in the following defvar is where the screen dump is saved.
(defparameter *output-file* "mh:webb;image.xld#")

(tv:add-terminal-key #\meta-i 'image-export)

(defun image-export ()
   (declare (special sunstrm)
            (special pix-array)
            (special invert-pix-array)
            (special sunarray))
   ;set up an output stream to the file which will contain the bit map of the screen
   (setf sunstrm (global:open *output-file* :element-type '(unsigned-byte 16)
                   :direction :output))

   ;make an array called pix-array and displace it to printer:*full-screen-array*
   (setf pix-array (make-array '(832 1024) :type 'art-1b
                    :displaced-to printer:*full-screen-array*))

   ;make an array called invert-pix-array that matches the properties of pix-array,
   ;it will contain the bit map formatted for the Interleaf.
   (setf invert-pix-array (make-array '(832 1024) :type 'art-1b))

   ;make an array called sunarray which is displaced to invert-pix-array, it is an
   ;art-16b array instead of an art-1b array so that a byte at a time can be written to
   ;the output file.
   (setf sunarray (make-array '(832 64) :type 'art-16b :displaced-to invert-pix-array))

   ;capture the current screen and put it in printer:*full-screen-array*
   (printer:zap-screen-and-wholine)

   ;this copies a reversed pattern of bits in each byte of pix-array into invert-array
   (do ((j 0 (+ 8 j)))
       ((>= j 1024))
     (bitblt tv:alu-seta 1 832 pix-array (+ j 7) 0 invert-pix-array j 0)
     (bitblt tv:alu-seta 1 832 pix-array (+ j 6) 0 invert-pix-array (+ j 1) 0)
     (bitblt tv:alu-seta 1 832 pix-array (+ j 5) 0 invert-pix-array (+ j 2) 0)
     (bitblt tv:alu-seta 1 832 pix-array (+ j 4) 0 invert-pix-array (+ j 3) 0)
     (bitblt tv:alu-seta 1 832 pix-array (+ j 3) 0 invert-pix-array (+ j 4) 0)
     (bitblt tv:alu-seta 1 832 pix-array (+ j 2) 0 invert-pix-array (+ j 5) 0)
     (bitblt tv:alu-seta 1 832 pix-array (+ j 1) 0 invert-pix-array (+ j 6) 0)
     (bitblt tv:alu-seta 1 832 pix-array j 0 invert-pix-array (+ j 7) 0))

   ;this loop simply writes a byte of sunarray to the output file
   (do ((i 0 (1+ i)))
       ((= i 861))
     (do ((j 0 (1+ j)))
         ((= j 64))
       ;when i is 832 or greater simply write out 1's to the file.
       ;this is needed because the extra bytes are required for the Interleaf
       ;to process the file correctly.
```

```
ZMACS (Common-Lisp) CAPTURE-SCREEN.LISP#> WEBB; Lima: (?) ↓
```

| L: This line to top | LH: Continuous next line | L2: Next page | M: To fraction of buffer   MH: Drag lines |
| R: Top line to here | RH: Continuous previous line | R2: Previous page. | Bump top or bottom for single line scrolling. |

```
03/19/87 10:34:33AM WEBB          USER:   Keyboard          → Lima: WEBB; IMAGE.XLD#3  0
```

Scrolling Forward **5.2.6.1** A down arrow at the bottom of the scroll bar region indicates that you can scroll forward. Scrolling forward displays information from below the window. To scroll forward, do one of the following:

■ This line to top — Click the left mouse button once. The line next to the arrow moves to the top.

■ Scroll forward continuously — Press the left mouse button and hold it down.

■ Scroll forward one page — Click the left mouse button twice.

■ Scroll forward one line — Move the cursor (the double-headed arrow) into the scroll bar region and then move it past the bottom of the region. The next line moves up. If you continue to move the cursor past the bottom of the region, lines continue to scroll.

Scrolling Backward   **5.2.6.2**   An up arrow at the top of the scroll bar region indicates that you can scroll backward. Scrolling backward displays information from above the window. To scroll backward, do one of the following:

- Top line to here — Click the right mouse button once. The top line will move next to the arrow.

- Scroll backward continuously — Press the right mouse button and hold it down.

- Scroll backward one page — Click the right mouse button twice.

- Scroll backward one line — Move the cursor (the double-headed arrow) into the scroll bar region and then move it past the top of the region. The next line moves down. If you continue to move the cursor past the top of the region, lines continue to scroll.

Moving a Number   **5.2.6.3**   The middle mouse button allows you to move a segment of lines
of Lines   at a time or to move the scroll bar within the scroll bar region. To use the middle mouse button, do one of the following:

- Drag lines — Press the middle mouse button and hold it down. Moving the mouse cursor up or down moves the text lines accordingly.

- Move a fraction of the buffer — Place the arrow in the scroll bar window. Whatever percentage of the way down you move the arrow is the percentage of the buffer that will be moved when you click the middle mouse button.

Escaping   **5.2.7**   To escape from an unwanted window, use one of the following
From Windows   methods:

- If you are in a utility window and want to invoke another utility or another window, use the System menu, the SYSTEM key, or the TERM key.

- If you are in a temporary menu, select an item such as Abort or Exit. If the menu does not include such an item, move your mouse cursor off the menu to make the menu disappear.

- If you are in a notification window, follow the directions given in the window to remove the window.

- If you are in a window that reports an error, press one of the suggested keystroke sequences. To leave the error-handling process, press ABORT; if that command does not exit the error handler, press CTRL-ABORT or META-CTRL-ABORT. Use META-CTRL-ABORT sparingly, since it can disable useful error handling (such as unwind-protect) in a process.

Printing Windows   **5.2.8**   If your Explorer system includes a printer or is part of a network that includes a print server, you can obtain a printed copy of a window. Pressing TERM Q invokes the Screen Image Print Parameters menu (Figure 5-7), which enables you to print part or all of the screen display. As you move the mouse cursor over a menu variable, the mouse documentation window describes the variable.

Figure 5-7 Screen Image Print Parameters Menu
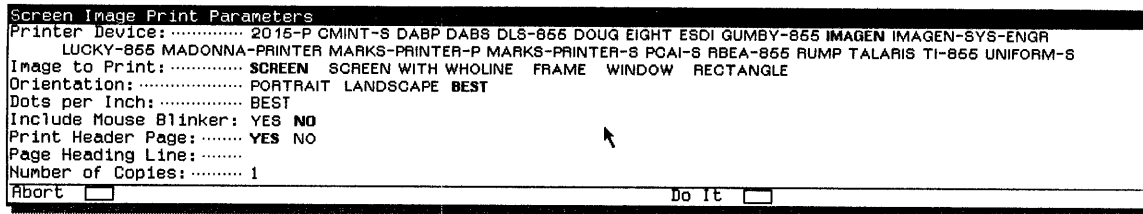
```
Screen Image Print Parameters
Printer Device: ············ 2015-P CMINT-S DABP DABS DLS-855 DOUG EIGHT ESDI GUMBY-855 IMAGEN IMAGEN-SYS-ENGR
      LUCKY-855 MADONNA-PRINTER MARKS-PRINTER-P MARKS-PRINTER-S PCAI-S RBEA-855 RUMP TALARIS TI-855 UNIFORM-S
Image to Print: ············· SCREEN  SCREEN WITH WHOLINE  FRAME  WINDOW  RECTANGLE
Orientation: ···················· PORTRAIT LANDSCAPE BEST
Dots per Inch: ················ BEST
Include Mouse Blinker: YES NO
Print Header Page: ········ YES NO                                  ➤
Page Heading Line: ········
Number of Copies: ·········· 1
Abort  ☐                                                      Do It  ☐
```

The keystroke sequences that follow allow you to print screen images without invoking the menu. These methods use the default values of the Screen Image Print Parameters menu to print an image of the screen display, including any momentary menus or other temporary windows. The keystroke sequences are discussed in paragraph 13.3.1, Keystroke Sequences for Printing Screens.

You can set the default values of menu variables with the Profile utility. These variables also define the default values for the keystroke sequences that print screen images without using the menu.

Menus

5.3 *Menus* are special-purpose, temporary windows that offer you a choice of *items* (or *options*). The mouse documentation window generally lists valid options and the meaning of menu entries.

Selecting an Item

5.3.1 Using the mouse enables you to select items from menus rather than typing a command or pressing a keystroke sequence. Within some types of menus, the mouse cursor changes from a thin arrow to a small x. When you move the mouse cursor near an item, a box encloses the item; this is often called *boxing* an item. You can then click one of the mouse buttons to perform an operation. *Selecting* an item means clicking the left button with the mouse cursor on the item. When you select an item, you usually execute a command or invoke another menu.

Types of Menus

5.3.2 The Explorer software uses several types of menus. The four main types (shown in Figure 5-8) are command menus, multiple-item menus, multiple-choice menus, and choose-variable-values menus.

Command Menus

5.3.2.1 Command menus present a series of selectable items. When you box an item and click a mouse button, the system performs the operation explained in the mouse documentation window. To see an example of a command menu, click right twice to get the System menu; now click on Peek to perform the operation of examining system status. Return to the System menu and select the Lisp Listener item.

Multiple-Item Menus

5.3.2.2 Multiple-item menus present a series of items from which you can select several items at the same time. Each selected item is displayed in reverse video. After you select all the items, you then execute the commands by selecting an item such as Do It. For an example of a multiple-item menu, choose the Profile item from the System menu. Click on the current value of ***initial minor nodes*** (which is nil). A multiple-item menu appears on the display. Experiment a little, and then press ABORT when you are finished. Press END to exit from the profile utility.

Multiple-Choice Menus   **5.3.2.3**   Multiple-choice menus present a series of items along with several boxes called *choice boxes* that indicate yes/no choices. An X in a choice box indicates yes. You can choose yes or no for a particular item by clicking within the box. The Kill or Save Buffers menu is an example of a multiple-choice menu. You can see this menu by invoking the System menu, selecting the Zmacs Editor item, and clicking right once. When you click right once on Kill or Save Buffers, the multiple choice menu appears. Click on the Abort choice in the menu margin to exit the menu.

Choose-Variable-Values   **5.3.2.4**   Choose-variable-values menus enable you to view and modify the
Menus   values of a set of variables. For example, use TERM Q to invoke the Screen Image Print Parameters menu. You can box and select Portrait, Landscape, or Best for the value of Orientation. When you select the value for Number of Copies, however, you can type any whole number as a value. After modifying the desired values, click within the box labeled Do It to execute the command.

Figure 5-8   Examples of Menu Types

command menu

multiple-item menu

multiple-choice menu

choose-variable-values menu
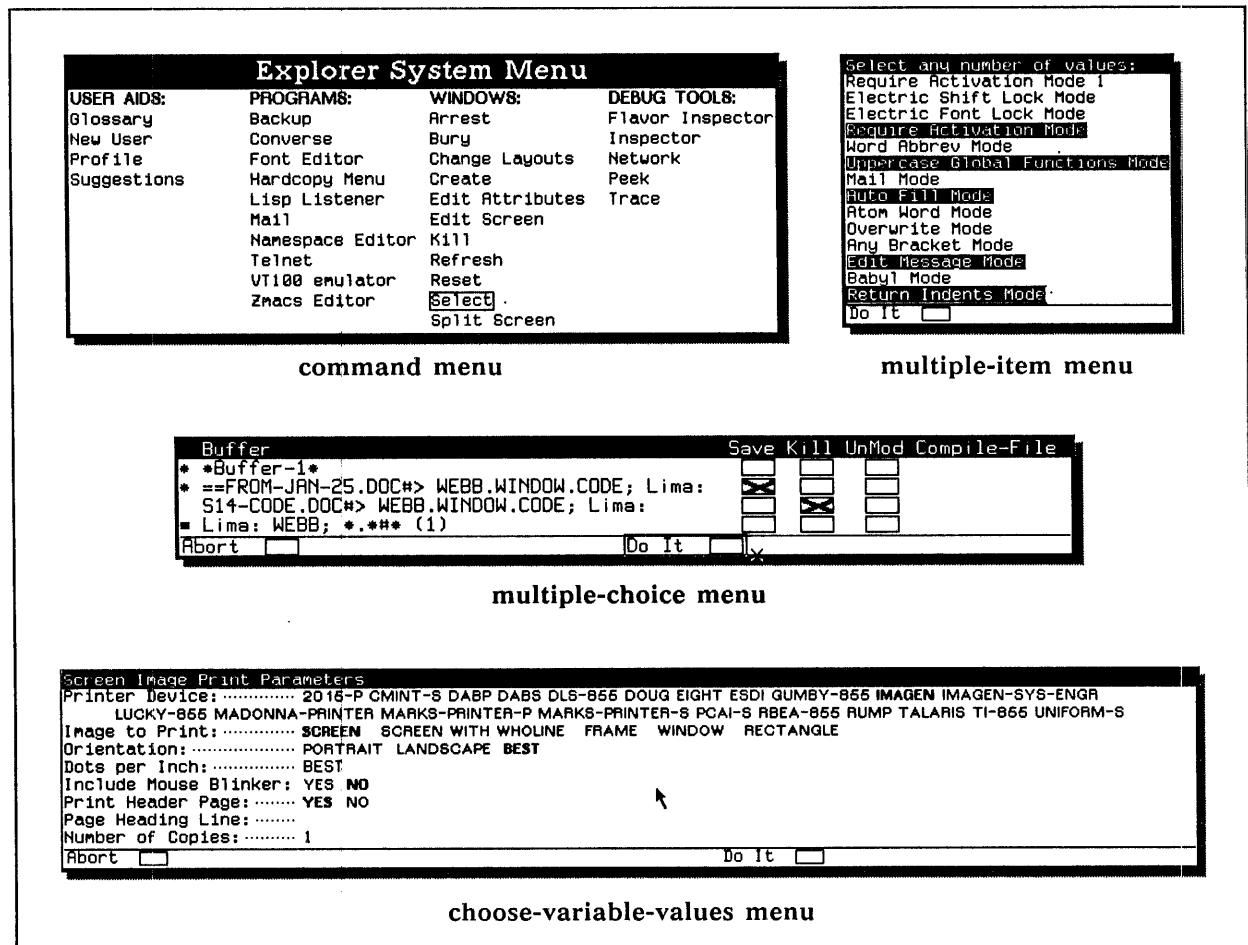
USING HELP FEATURES
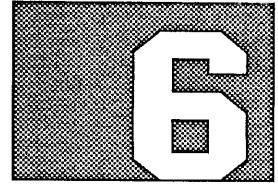
Introduction

6.1 This section provides information about various Explorer help features and explains how to use them. Specifically, this section describes the following features:

- Status line and mouse documentation window

- HELP key

- Glossary utility

- Histories

- Suggestions menus

- Universal Command Loop

- Online documentation

Status Line and Mouse Documentation Window

6.2 The status line, located at the bottom of the display, presents information about the status of the system, including the current user, the time, and a message that describes the status of the system or currently selected window. In addition, when the file system is transferring a file, the status line displays the name of the file and the percentage of the transfer completed.

The mouse documentation window displays the operations currently available with the mouse and information about mouse-selectable items.

HELP Key

6.3 The HELP key is located at the upper left corner of the keyboard. To obtain help information about the various programs and utilities in the Explorer system, you press the HELP key or a keystroke sequence including the HELP key.

The HELP key is context sensitive; that is, the type of help provided by the HELP key can vary depending on the type of operation being performed at the time the key is pressed. Pressing the key in some utilities displays a menu of mouse-selectable help options; in other utilities, it displays a list of help options that you can choose by typing a specified letter.

For example, if you press the HELP key after you have typed the opening parenthesis of a Lisp form in the Lisp Listener, the system displays general system help that suggests various alternatives. However, if you press the

HELP key while at the top level of most utilities (before typing input), the system displays a menu of the following items:

■ Explorer Overview — Describes the Explorer environment, how to move around the system, how to get started, and other available help features.

■ System Menu — Displays the System menu and allows you to select an item.

■ System Applications — Displays a list of applications available on the Explorer system.

■ Term Key Help — Displays a help screen with TERM key sequences and their functions.

■ Application Help Option — Prints a message describing the application. The name of this help option is specific to the current UCL application (for example, Lisp Listener Help).

■ Command Name Search — Allows you to search for commands that contain a specified substring.

■ Command Display — Displays a list of the currently active universal and input editor commands.

■ Command Type-in Help — Provides information about typing command names and Lisp forms.

■ Command History — Displays a list of recently entered commands.

■ Keystroke Search — Allows you to search for commands that contain a specified keystroke or keystroke sequence.

■ Customization Menu — Provides a menu of items that allow you to customize the command interface.

Some other common uses of the HELP key are as follows:

■ CTRL-HELP — Produces a list of commands available in the input editor.

■ HYPER-CTRL-HELP — In a utility that uses the UCL, produces a list of commands available in the utility.

■ TERM HELP — Produces a list of keys you can use with TERM.

■ SYSTEM HELP — Produces a list of keys you can use with the SYSTEM key to invoke a utility.

■ SYMBOL-HELP — Produces a display of keyboard mapping used to display additional characters.

Glossary Utility 6.4 The Glossary utility is an online, interactive glossary that defines terms used in the Explorer system. You can invoke the Glossary utility either from the System menu or by pressing SYSTEM Z. *This utility uses a rather large database that can require several minutes for loading the first time you invoke it.* For your convenience, all glossary definitions also appear in the *Explorer Glossary* manual.

You can use any one of the following ways to request a definition from the glossary:

■ Type a term in the Keyboard Type-In window. If the term is in the glossary, it appears at the top of the Menu of Glossary Entries, and its definition is listed in the text pane. If the term is not in the glossary, a message appears in the Keyboard Type-In window reporting this situation, and the Menu of Glossary Entries displays the term that alphabetically follows the requested term.

■ Select an entry in the Menu of Glossary Entries. This pane includes a scroll bar to help you move from entry to entry. (The mouse documentation window provides information about scrolling.) You can also select a letter from the Thumb Index to display the entries for that letter.

■ The definitions appearing in the text pane have some terms displayed in bold type. These terms are mouse-selectable terms that are also defined in the glossary. Selecting one of these terms with the mouse displays its definition at the top of the text pane.

You can also scroll within the text pane to examine definitions you requested earlier. If you request a definition more than once, the system moves the definition to the top of the text pane rather than displaying it again in the buffer. Selecting the Clear Text Display option in the Glossary Command menu clears the displayed definitions. Figure 6-1 shows the glossary screen.

Figure 6-1 Glossary Screen

```
┌─────────────────────────────┬───────────┬──────────────────────────────────────┐
│ Menu of Glossary Entries    │Thumb Index│ Text of Selected Glossary Entries     │
│            a-list           │     A     │                                       │
│       abnormal shutdown     │     B     │                                       │
│          ABORT key          │     C     │                                       │
│        access function      │     D     │                                       │
│        access operation     │     E     │                                       │
│       accessor function     │     F     │                                       │
│     activation environment  │     G     │                                       │
│        active element       │     H     │                                       │
│        active process       │     I     │                                       │
│        active window        │     J     │                                       │
│           adjust            │     K     │                                       │
│           advise            │     L     │                                       │
│        after daemon         │     M     │                                       │
│         alu function        │     N     │                                       │
│          ancestor           │     O     │                                       │
│        application          │     P     │                                       │
│          apropos            │     Q     │                                       │
│      apropos completion     │     R     │                                       │
│            area             │     S     │                                       │
│          argument           │     T     │                                       │
│ arithmetic logic unit function│   U     │                                       │
│           array             │     V     │                                       │
│        array leader         │     W     │                                       │
│           arrest            │     X     │                                       │
│         art-q array         │     Y     │                                       │
│       association list      │     Z     │                                       │
│       association pair      │           │                                       │
│            atom             │           │                                       │
│        atomic form          │           │                                       │
│       attribute list        │           │                                       │
│        autoexposure         │           │                                       │
│         autoselect          │           │                                       │
│         aux variable        │           │                                       │
│   auxiliary keyword variable│           │                                       │
│         backplane           │           │                                       │
│      backquote facility     │           │                                       │
│        backup system        │           │                                       │
├─────────────────────────────┤           │                                       │
│ Glossary Command Menu       │           │                                       │
│ Help         Clear Text Display         │                                       │
│ Exit Glossary               │           │                                       │
├─────────────────────────────┴───────────┤                                       │
│ Keyboard Typein Window                   │                                       │
│                                          │                                       │
└──────────────────────────────────────────┴──────────────────────────────────────┘
 Glossary System - Main Glossary
 L,M,R: Display glossary entries beginning with the character "S"

 05/08/87 06:20:20AM uebb      FRED:    Keyboard        → Lima: WEBB; IMAGE.XLD#1  0
```

Histories

6.5 *Histories* are buffers that store information about previously used commands. Entries in histories can be used to reduce typing, to store intermediate results, and sometimes to move text from one utility to another. The three types of histories are the input history, the output history, and the kill history. All three types are accessible from the Lisp Listener.

Input History

6.5.1 The input history stores any Lisp form that you enter in the Lisp Listener. You can save keyboard entry time by retrieving previous forms and executing them again, or by making minor modifications and executing them again. Try each of the following keystrokes with your own input history. The following keystroke sequences allow you to access input histories:

■ CTRL-C — Copies the most recent input history entry into the Lisp Listener input line.

■ CTRL-*n* CTRL-C — Copies the input history entry specified by the number *n*, with 1 denoting the most recent entry, 2 the previous entry, and so on.

■ META-C — When used immediately after CTRL-C, replaces what CTRL-C just copied with the second most recent input history entry into the Lisp Listener input line. When used immediately after CTRL-*n* CTRL-C, copies the input history entry prior to that specified by *n*. In either case, if you press META-C again without moving the keyboard cursor, the next most recent input history entry replaces the one currently displayed.

■ STATUS — Invokes a menu containing the most recent entries from the input history. You can select one of the entries in the menu to copy it into the Lisp Listener input line. For example, if you have logged in and then logged out since the last cold boot operation, you can use the following sequence to log in again:

■ Press the STATUS key to invoke the menu of the most recent commands. This menu contains your last login entry.

■ Use the mouse to select your login command from the menu. This selection copies the command into the Lisp Listener input line.

■ Press RETURN.

■ META-STATUS — Displays a numbered list of the entries from the input history. You can use the number of the entry as an argument with CTRL-*n* CTRL-C to copy a specific entry from the input history into the input line.

Figure 6-2 shows a typical input history.

Figure 6-2

Typical Input History

```
Input Ring -- make a selection
(print-disk-label)
(PRINT-HERALD )
(setq package *user-package*)
*user-package*
*package*
(setq package user)
package
(apropos 'package)
(make-system 'indexor :noconfirm)
(User:abc)
(PRINT
(chaos:reset t)
(hostat 'dsg)
(hostat 'icarus)
(chaos:reset t)
(close-all-files)
(login 'webb 'lm t)
(logout)
(login 'marty 'lm t)
(print-disk-label)
(login 'webb 'lm t)
(logout)
(make-system 'indexor :noconfirm)
(load "golf:bice.indexor; defsystem")
(load-file "golf:bice.indexor; defsystem")
(load-patches :noselective)
(make-system 'winifred :noconfirm)
(login 'webb 'lm t)
3.0 PCHS-TRAINED-IP
```

Output History 6.5.2 The HYPER-STATUS keystroke allows you to access output histories that store what the Lisp Listener returns. HYPER-STATUS invokes a menu of output history entries from which you can select an entry to copy into the Lisp Listener input line.

Kill History

6.5.3 The kill history stores any segment of text larger than a character that you mark for deletion while in Zmacs or that you delete while in the Lisp Listener. The following keystroke sequences allow you to access kill histories:

■ CTRL-Y — Copies the most recent kill history entry into the Zmacs buffer input line. This action is commonly called *yanking*.

■ CTRL-*n* CTRL-Y — Copies the kill history entry specified by the number *n*, with 1 denoting the most recent entry, 2 the previous entry, and so on.

■ META-Y — When used immediately after CTRL-Y, replaces the entry copied by CTRL-Y with the second most recent kill history entry into the Zmacs buffer input line. When used immediately after CTRL-*n* CTRL-Y, copies the kill history entry prior to that specified by *n*. In either case, if you press META-Y again without moving the keyboard cursor, the next most recent kill history entry replaces the one currently displayed.

■ META-CTRL-STATUS — In the Lisp Listener, displays a numbered list of the entries from the kill history. You can use the number of the entry as an argument with CTRL-*n* CTRL-Y to copy a specific entry from the kill history into the input line. This keystroke is not defined in Zmacs.

Suggestions Menus

6.6 Suggestions menus are menus of mouse-selectable commands that are available in most utilities. These menus are context sensitive. As you perform different operations, the Suggestions menus change to reflect currently applicable options. Each utility that uses Suggestions has its own collection of menus.

A Suggestions menu can help you do the following:

■ Find a command within the utility

■ Learn the commands associated with a particular utility

■ Learn the keystroke sequences that execute commands

When you use a Suggestions menu, the mouse documentation window provides a brief explanation of each menu item when the item is boxed. In some cases, the subtitles are mouse-selectable. They give a brief overview of a command set and how the commands are used together.

In each Suggestions menu, the top panes feature several commands, such as the following:

■ List Menus — Displays a list of menus in the lower pane

■ Help — Invokes a Help menu

■ Suggestions Menus Off — Disables the Suggestions menus

The bottom pane performs one of these two functions:

■ Lists the available menus that can be displayed in the pane. By selecting one of the items, you can display that menu.

■ Lists the commands available in that menu. By selecting one of the items, you execute the command. Other mouse operations display the keystroke sequence for the boxed command or display more information about that command.

When the system is first booted, Suggestions menus are disabled. To enable Suggestions menus, select the Suggestions item from either the permanent Lisp Listener menu or the System menu. For more details about the capabilities of Suggestions menus, including information about modifying them, see the *Explorer Tools and Utilities* manual.

Universal Command Loop

6.7 Most of the system utilities were built using the Universal Command Loop (UCL) to provide a common interface to command input, help, and mouse handling. UCL provides menus of commands from which you can select commands instead of typing command names or pressing keystroke sequences. The UCL gathers and presents online documentation of commands. The UCL also enables you to do the following:

■ Have the system complete a partially typed item, such as a command, function, or flavor name

■ Search for a specific command name or keystroke sequence

■ Use input editor commands, which enable you to edit any time you type

The *Explorer Tools and Utilities* manual provides more information on how to use the UCL.

Searches

6.7.1 The UCL and the Suggestions menus provide a quick way to find command names or keystroke sequences. If you press the HELP key in any utility built with the UCL, the system displays a basic help menu from which you can choose several mouse-selectable items that can help you find commands or keystroke sequences. You can use the Peek utility window to explore the following items:

■ Command display — Displays available commands. You can select a command and execute it, receive more information about it, or display the keystroke sequence associated with it. You can also use the HYPER-CTRL-HELP keystroke sequence to invoke the command display.

■ Command history — Lists the command name, keystroke sequence, and a short description of each command you have used. You can select a command and execute it, receive more information about it, or see the keystroke sequence associated with it. You can use this option to learn the keystroke sequence for a command executed from a menu. You can also use the HYPER-CTRL-P keystroke sequence to invoke the command history.

■ Command name search — Searches for any command containing a word you specify. You can also use the HYPER-CTRL-N keystroke sequence to invoke the command name search. When you type a substring, the

system searches for all commands containing that substring. For example, if you type ed, the command name search will list all commands with ed in them.

■ Keystroke search — Searches for the command executed by the keystroke sequence you specify. You can also use the HYPER-CTRL-K keystroke to invoke the keystroke search. When you enter a keystroke sequence, a description of that sequence is displayed.

Completions

6.7.2 In the Lisp Listener, you can use several completion options. For items such as commands, flavors, and symbols, you can press a keystroke sequence to execute any of the following types of completion:

■ Recognition — Tries to complete a word exactly as typed. Pressing ESCAPE completes the word if only one match is found or displays the possible matches in the mouse documentation window if several matches are found. Pressing CTRL-/ displays a menu containing the possible matches. Pressing the space bar completes the word with the first match found.

■ Apropos — Searches for a symbol containing, in the specified order, the letters you type. The symbol need not begin with an alphabetic character. Pressing SUPER-ESCAPE displays the possible matches in the mouse documentation window. Pressing SUPER-/ displays a menu containing the possible matches.

■ Spelling — Searches for a symbol containing letters in the specified order or in a similar order. Pressing HYPER-ESCAPE displays the possible matches in the mouse documentation window. Pressing HYPER-/ displays a menu containing the possible matches. When running a completion on a word defined as a function, you must enter the word as a function; that is, the word must be prefaced with an opening parenthesis.

For example, if you type the misspelled word (primt and press HYPER-ESCAPE (the command for spelling completion), the system changes the letters to PRINT. If you then press HYPER-/, the system displays a menu similar to that shown in Figure 6-3. As you box each item, a brief description of that function appears in the mouse documentation window. You can select one of the items and copy it into the input line.

Figure 6-3 Functions Menu

```
> (PRINT


 Select one of the following (Functions)
 PRINT
 PRINT-BITMAP
 PRINT-BITMAP-AND-WAIT
 PRINT-DISK-LABEL
 PRINT-FILE
 PRINT-FILE-AND-WAIT
 PRINT-HERALD
 PRINT-LOADED-BAND
 PRINT-LOGIN-HISTORY
 PRINT-NOTIFICATIONS
 PRINT-SENDS
 PRINT-STREAM
 PRINT-SYSTEM-MODIFICATIONS
```

```
Lisp Listener 1
      Suggestions Menus On                    System Menu                        Help
 PRINT-HERALD prints a description of all the software installed on the system
 to STREAM, in either a trimmed or verbose style.
 05/08/87 06:39:35AM webb       USER:    Menu choose        → Lima: WEBB; IMAGE.XLD#3  0
```

Miscellaneous Features

6.7.3 The Explorer system offers two miscellaneous features for use with its commands: the Redo command and numeric arguments.

Redo Command

6.7.3.1 The Redo command, executed by pressing HYPER-CTRL-R, repeats the last significant command. (Significant commands typically perform editing operations.) For example, if you have just used the Save command from the Customization menu in the Lisp Listener, you can immediately reselect it by pressing HYPER-CTRL-R.

Numeric Arguments

6.7.3.2 With some editing commands, you can use numeric arguments to repeat the commands a specific number of times. To use numeric arguments with most commands, you press CTRL-n , where n is a positive number, and then press the keystroke sequence for the command. For example, pressing CTRL-3 META-D deletes three words to the right of the cursor.

Other commands use the presence or absence of a numeric argument (regardless of the value) to indicate whether the command is to be modified in a particular way. For example, in the directory editor (Dired), D marks for deletion the file that the cursor is on, but CTRL-n D, where n is any number, marks the files to delete in the current directory.

Input Editor

6.7.4 The input editor offers many keystroke sequences to help you enter input with a minimum of effort. Pressing CTRL-HELP invokes an online list of these keystroke sequences.

The input editor commands are valid in any Lisp Listener as well as in various windows, such as Peek and the Inspector. Also, Zmacs has its own input editor that is very similar to this one. Table 6-1 shows the input editor commands and where they are valid. The arrow keys shown in the table are the keys located to the right of the alphanumeric keypad.

Table 6-1   Common Keystroke Sequences

Keystroke Sequence	Command Name	Description
Used in Input and Zmacs Editors:		
ESCAPE	Complete	When a match is found, an Auto Complete (see Space Bar) is done.
CTRL-A or SUPER-←	Beginning of Line	Moves the cursor to the left margin of the current line.
CTRL-B or ←	Backward Character	Moves the cursor one position to the left.
META-B or META-←	Backward Word	Moves the cursor to the first character of the current word unless the cursor is already on the first character of a word or between words, in which case this command moves the cursor to the first character of the previous word.
META-CTRL-B or META-CTRL-←	Backward Parenthesis	With the cursor immediately to the right of the closing parenthesis of a given set of parentheses, moves the cursor to the opening parenthesis (in other words, finds the matching parenthesis).
CTRL-D	Delete Character	Deletes the character highlighted by the cursor.
META-D	Delete Word	Deletes the word (or fragment) from the position of the cursor onward to the right.
CTRL-E or SUPER-→	End of Line	Moves the cursor to the right end of the line.

Table 6-1 Common Keystroke Sequences (Continued)

Keystroke Sequence	Command Name	Description
CTRL-F or →	Forward Character	Moves the cursor one position to the right.
META-F or META-→	Forward Word	Moves the cursor one word to the right (to the space before the next word).
META-CTRL-F or META-CTRL-→	Forward Parenthesis	With the cursor directly over the left parenthesis of a given set of parentheses, moves the cursor to the right of the closing parenthesis (in other words, finds the matching parenthesis).
CTRL-K	Kill Line	Kills input from the keyboard cursor to the end of the current line.
CTRL-N or ↓	Next Line	Moves the cursor to the next line.
CTRL-P or ↑	Previous Line	Moves the cursor to the previous line.
CTRL-Q*	Quote Character	Enables you to insert the name of a command key rather than performing the command. (For example, pressing CTRL-Q CLEAR INPUT inserts ⟨CLEAR INPUT⟩ into the input line rather than actually clearing the line.)
CTRL-T	Transpose Character	Exchanges the character highlighted by the cursor with the one to the left.
META-T	Transpose Word	Transposes words on either side of the keyboard cursor.
RUBOUT	Rubout Character	Deletes the character to the left of the cursor.
META-RUBOUT	Rubout Word	Deletes the word to the left of the cursor.
META-CTRL-RUBOUT	Rubout Parenthesis	Deletes input from the left of the cursor to the matching left parenthesis.
META-SHIFT-< or HYPER-↑	Beginning of Buffer	Moves the cursor to the beginning of the buffer or file.

* CTRL-Q works in the Zmacs text buffer, but not in the minibuffer.

Table 6-1 Common Keystroke Sequences (Continued)

Keystroke Sequence	Command Name	Description
META-SHIFT-> or HYPER-↓	End of Buffer	In Zmacs, moves the cursor to the end of the buffer. In the Input Editor, moves the cursor to the end of Zmacs and the beginning of the Lisp Expression.
CTRL-O	Open Line	Inserts a carriage return to the left of the cursor.

Used Only in the Input Editor:

Keystroke Sequence	Command Name	Description
SUPER-ESCAPE	Apropos Complete	Searches for a symbol containing, in the specified order, the letters you type. The symbol need not begin with an alphabetic character. Displays the possible matches in the mouse documentation window.
HYPER-ESCAPE	Spelling Complete	Searches for a symbol containing letters in the specified order or a similar order. Displays the possible matches in the mouse documentation window.
META-CTRL-K	Kill to Next Parenthesis	Deletes the Lisp form to the right of the cursor.
CTRL-/	List Completions	Displays a menu containing the possible matches for recognition completion.
Space Bar (used after CTRL-/)	Auto Complete	Completes the word with the first match found for recognition completion of the commands listed on the Command Display of the HELP screen for utilities that use UCL.
SUPER-/	List Apropos Completions	Displays a menu containing the possible matches for apropos completion.
HYPER-/	List Spelling Completions	Displays a menu containing the possible matches for spelling completion.
CTRL-L	Refresh Screen	Clears the selected window and reprints the current input.
HYPER-CTRL-N	Command Name Search	Bring up the menu to specify the commands to find.
HYPER-CTRL-P	Command History	Displays previous significant commands in the scroll window.

Table 6-1 Common Keystroke Sequences (Continued)

Keystroke Sequence	Command Name	Description
META-CTRL-HELP	Display Internal State	Displays the internal state of the input editor.
CTRL-S	Position at Error	Yanks the previous input that contained a typing error and positions the cursor where the typing error occurred.

Used Only in the Zmacs Editor:

Keystroke Sequence	Command Name	Description
CTRL-V	Scroll Down	Scrolls the window backward.
META-V	Scroll Up	Scrolls the window forward.
CTRL-space bar	Set Mark	Sets the start of a region beginning with the cursor.
CTRL-SHIFT-<	Mark Beginning	Marks a kill region from the position of the cursor to the beginning of the buffer.
CTRL-SHIFT->	Mark End	Marks a kill region from the position of the cursor to the end of the buffer.
CTRL-W	Kill Region	Kills a region of input marked by the user.
CTRL-SHIFT-U	Undo	Undoes small changes from a recent edit.

Online Documentation

6.8 In addition to the various help menus that you can invoke while in certain programs and utilities, the Explorer system provides several kinds of online documentation. This online documentation is designed to provide immediate help while you perform various operations.

Mouse Documentation

6.8.1 The mouse documentation window provides definitions of various mouse operations and lists the functions of the mouse buttons for any given operation at any given time.

The actual message in the documentation window at any given time depends upon which Explorer facility is in use at the time and the specific location of the mouse cursor. For example, when the mouse cursor is located in the main screen of the Lisp Listener, the mouse documentation window displays the following message:

R: Bring up the System Menu

The letter R represents a single click of the right mouse button. In this case, the message indicates that a single click of the right mouse button invokes the System menu.

If the mouse cursor is located within the System menu, the mouse documentation window displays a definition of the currently boxed menu item and lists the mouse button that invokes the item. For example, if you move the mouse cursor over the Suggestions item, a box appears around the item, and the mouse documentation window displays the following message:

`L,M,R: Turn Suggestions Menus On or Off`

If the mouse cursor is located within a Suggestions menu, the mouse documentation window displays a definition of the currently boxed menu item and lists the functions of the mouse keys. For example, if you move the mouse cursor over the Clear Screen item, a box appears around the item, and the mouse documentation window displays the following messages:

■ `L: Execute Command` — A single click of the left mouse button clears everything above the current prompt line and moves the current prompt line to the top of the main screen.

■ `M: What Keystroke Invokes Command` — A single click of the middle mouse button momentarily displays `CLEAR-SCREEN` in reverse video in the vicinity of the currently boxed item. This message indicates that pressing the CLEAR SCREEN key has the same effect as clicking the left mouse button on the Clear Screen item.

■ `R: Menu Documentation, Keystroke: Clear-screen` — This message indicates that you can obtain information about the Clear Screen command by clicking the right mouse button. It also indicates that pressing the CLEAR SCREEN key invokes the command. A single click of the right mouse button displays a typeout window that defines the function of the Clear Screen command.

Function Documentation

6.8.2 The Lisp language provides thousands of valid Lisp functions, each of which has a unique definition and a unique set of required and/or optional arguments. The Explorer system provides the following online documentation features that allow you to obtain immediate help when entering a Lisp function:

■ Mouse documentation window — When you type a function name in the Lisp Listener and then press the space bar, the mouse documentation window immediately displays the function name and a list of valid arguments for the function. For example, if you type (print then press the space bar, the mouse documentation line displays the following message:

`PRINT: (OBJECT &OPTIONAL STREAM)`

■ CTRL-SHIFT-A — The keystroke sequence CTRL-SHIFT-A provides an alternate means of obtaining the arguments of a given function. After you type a function in the Lisp Listener or editor, pressing this keystroke sequence displays a message identical to the one displayed in the mouse documentation window. For example, if you type (print and press CTRL-SHIFT-A, the following message appears on the main screen or in the minibuffer of the editor:

`> PRINT: (OBJECT &OPTIONAL STREAM)`

■ CTRL-SHIFT-D — The keystroke sequence CTRL-SHIFT-D displays the function name and its arguments followed by the function definition. For example, if you type (print and press CTRL-SHIFT-D, the following message appears on the main screen or in the minibuffer of the editor:

```
> PRINT: (OBJECT &OPTIONAL STREAM)

Print OBJECT on STREAM with quoting if needed, with a RETURN before
and a Space after.
```

If you try to enter an invalid or undefined Lisp function, the system returns a message indicating that the function is undefined. For example, if you type (sink-the-bismark and press CTRL-SHIFT-D, the following message appears on the main screen or in the minibuffer of the editor:

```
> Can't find a definition for SINK-THE-BISMARK.
```

Variable Documentation

6.8.3 Online documentation of variables is similar to function documentation except that it is valid only in the Zmacs editor. The keystroke sequence CTRL-SHIFT-V provides this documentation. The following are typical examples of the use of the variable documentation feature:

■ Variables for which online definitions are provided — When you type one of these variables in a Zmacs buffer and press CTRL-SHIFT-V, a typeout window provides a message that gives the current state of the variable and its definition. For example, if you type *package* in a Zmacs buffer and press CTRL-SHIFT-V, a message similar to the following appears in a typeout window:

```
*package* has a value and is declared special. The current package,
the default for most package operations including INTERN.
```

■ Variables for which online definitions are not provided — When you type one of these variables in a Zmacs buffer and press CTRL-SHIFT-V, a message giving the current state of the variable appears in the Zmacs minibuffer. For example, if you type mt:*current-unit* and press CTRL-SHIFT-V, a message similar to the following appears in the Zmacs minibuffer:

```
MT:*CURRENT-UNIT* has a value and is declared special by file
SYS:STREAMER-TAPE;NU-MTDEFS.#
```

■ Undeclared variables — When you type an undeclared variable in a Zmacs buffer and press CTRL-SHIFT-V, the minibuffer momentarily displays a message indicating that the term has not been declared a variable. For example, if you type still-water and press CTRL-SHIFT-V, a message similar to the following appears in the minibuffer:

```
STILL-WATER is not a declared variable.
```
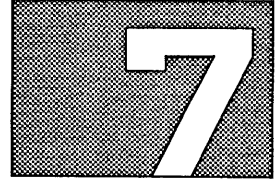
EXPLORING THE LISP ENVIRONMENT

Introduction

7.1 This section provides a brief overview of Lisp functions and explains how to interpret and use them. It introduces some functions and special forms that help you investigate the Lisp environment. This section also introduces the following Explorer features:

■ Inspector utility — Allows you to view and modify Lisp objects

■ Peek utility — Allows you to observe the current system status

■ Dribble files — Contain records of all keyboard input and all system output for a given session

■ Converse utility — Allows you to interactively send messages to or receive messages from any other network user

■ Print-notification function — Allows you to obtain a complete list of all notifications received during a given session

■ Mail system — Allows you to send messages to or receive messages from other network users and to perform other manipulations on these messages, such as replying or forwarding

■ Bug reporting system — Allows online reporting of Explorer software problems

■ Garbage collection — Enhances memory efficiency by freeing unused memory areas

Lisp Functions

7.2 All Lisp programs consist of one or more *Lisp functions* that specify procedures to be performed. Some procedures are not complete within themselves; that is, they must be given one or more pieces of information to work with. In the Lisp world, these pieces of information are called *arguments*. For example, consider the following elementary Lisp function:

```
(+ 5 2)
```

This expression consists of the procedure (+) and its arguments (5 and 2). The procedure specifies what is to be done to the arguments. That is, the procedure specifies that 5 and 2 are to be added together.

Every Lisp function is enclosed by a set of parentheses. The opening parenthesis identifies the expression as a Lisp function; the closing parenthesis signals the Lisp machine to perform the specified operation and to return the value specified by the expression. This process is called *evaluation*.

Lisp syntax governs the legal order of the elements of any Lisp expression, including those of Lisp functions. Some Lisp functions require several types of elements; some require only the procedure name.

The syntax examples that follow show three typical Lisp functions. These examples illustrate the legal order of the elements of typical Lisp functions. The six element types are described after the three examples.

```
package                 required        keyword
name                    argument          /
  /                        /             /                                    Function
fs:create-directory  pathname  &key :error :recursive
            \           function    lambda-list   keyword
                        name        keyword
```

```
        required              optional
        argument              argument
           /                     /                                           Function
login  user-name  &optional  host  inhibit-init-file-p
      \            \                    \
      function     lambda-list          optional
      name         keyword              argument
```

```
package      function     required     required     required   required
name         name         argument     argument     argument   argument
  /            /             /            /            /          /          Function
sys:receive-band from-machine  from-partition  to-unit  to-partition
            &optional subset-start  subset-n-blocks
                    \             \              \
                    lambda-list   optional       optional
                    keyword       argument       argument
```

Element Descriptions:

■ Package name — The name of the package in which the function resides. When a package name is specified, it is considered to be part of the function name.

If the package name is not specified, the function resides in the current package or the global LISP package. If you do not specify a package name and the function is not in the LISP package, the Explorer system attempts to find the function in other packages. If the system finds a function of the same name in another package, it asks you whether you want to use that function.

■ Function name — The name of the function. The function name usually indicates the type of operation specified by the function. For example, the **fs:create-directory** function creates a directory as specified by the pathname argument.

■ Required argument — Required arguments are the arguments directly following the function name; they are not preceded by a qualifying character such as &. When you type a Lisp function to be evaluated, you must supply a value for each of the required arguments. The required arguments in the previous syntax examples are *pathname, user-name, from-machine, from-partition, to-unit,* and *to-partition.*

■ Lambda-list keyword — Lambda-list keywords are words that describe the arguments that follow. That is, these words are argument separators rather than arguments. All lambda-list keywords are preceded by an ampersand (&). The lambda-list keywords in the example syntax are as follows:

    ■ &optional — Indicates that the arguments that follow are optional

    ■ &key — Indicates that the arguments that follow are keywords

■ Optional argument — Optional arguments follow the lambda-list keyword &optional. These arguments do not have to be specified when you use the function with which they are associated. However, when you do specify these options, you must specify all the options in the order in which they are listed. Thus, if you want to specify the third optional argument, you must also specify the first and second optional arguments. The optional arguments in the syntax examples are *host, inhibit-init-file-p, subset-start,* and *subset-n-blocks*.

■ Keyword — Keywords describe an optional argument. When you use a keyword to call a function, you must specify both the keyword (preceded by a colon) and its value. However, you need only specify those keywords and values that you want to include; therefore, if you want to specify the third keyword, you need not specify the first or second keywords. Also, the order in which you specify keywords is unimportant. The keywords in the syntax examples are **:error** and **:recursive**. Note that keywords are preceded by a colon (:) when they are called, not when you define them.

Useful Functions and Special Forms

7.3 The following functions and special forms provide the means to explore relationships between various Lisp forms and the workings of the Explorer system:

■ **describe**

■ **apropos** and **sub-apropos**

■ **who-calls**

■ **what-files-call**

■ **where-is**

■ **symbol-plist**

Most of these functions and special forms can be used to great advantage in conjunction with either the Inspector or Zmacs.

---

describe Function

7.3.1 The **describe** function provides information about objects such as arrays, closures, function entry frames (FEFs), symbols, lists, locatives, stack groups, packages, floating-point numbers, fixnums, bignums, complex numbers, select methods, named structures, and **defstructs**.

---

describe *x* Function

The **describe** function provides information about a Lisp object *x*. It prints the attributes of the specified object and can describe an object located within another; such recursive descriptions are indented appropriately.

For example, when you apply the **describe** function to a symbol, it shows the symbol's value, its function definition, and each of its properties. Calling the **describe** function on a floating-point number shows the number's internal representation in a way that is useful for tracking down errors, such as round-off errors. Executing **describe** on an array shows the array's type, dimension, and length, but the contents of each array element are not shown. (The Inspector shows array contents.)

After printing the attributes of an object, the **describe** function returns the object. For example, (describe 'user) returns the symbol user in the USER package; it has no value, definition, or properties.

Other functions that are useful for obtaining information about objects are the **describe-area, describe-flavor, describe-system,** and **describe-package** functions. The *Explorer Tools and Utilities* manual provides information about these functions. Try the following functions to see what they return:

```
(describe-area gloss:glossary-area)

(describe-flavor 'printer:basic-printer)

(describe-system 'bug)

(describe-package 'sys)
```

Apropos Functions

7.3.2 Apropos is a facility that searches the system for all symbols whose print names contain a specified string and prints information about the symbols found.

apropos *substring* &optional *package* Function

The **apropos** function tries to find all symbols in the entire system whose print names contain *substring* as a substring. Whenever it finds a symbol, this function prints the symbol's name; if the symbol is defined as a function and/or is bound to a value, this function tells you so and prints the names of the arguments (if any) to the function. Specifying a package name restricts the search for *substring* to *package* and any other packages to which *package* is subordinate.

sub-apropos *substring starting-list* &key :predicate :dont-printp Function

The **sub-apropos** function finds all symbols in *starting-list* whose names contain *substring* and that satisfy :predicate. If :predicate is nil, the substring is the only condition. The symbols are printed if :dont-printp is nil. In any case, a list of the symbols found is returned.

This function is most useful when applied to the value of *, after apropos has returned a long list.

The *Explorer Tools and Utilities* manual provides further information about the apropos functions. To see some examples of these functions, try the following:

```
(apropos 'edit)

(apropos-list 'edit 'sys)

(sub-apropos 'edit *)
```

---

who-calls
Function

7.3.3 The **who-calls** function searches for all the functions that call a specified object and prints one line of information for each caller it finds.

who-calls *x* &optional *package*   Function

With the **who-calls** function, *x* must be a symbol or a list of symbols. This function tries to find all the Lisp functions that call *x* as a function or macro, or use *x* as a variable or constant. (It does not find forms that use constants containing *x*, such as a list, one of whose elements is *x*; it only finds the form if *x* itself is used as a constant.) It tries to find all the functions by searching all function calls of all symbols in *package* and *package*'s descendants. The *package* argument defaults to **nil**, meaning that all packages are checked.

The editor command META-X List Callers is similar to **who-calls** and defaults to the USER package. Type (who-calls 'print-herald) to see what the function returns.

---

what-files-call
Function

7.3.4 The **what-files-call** function is similar to the **who-calls** function except that it finds all the files containing functions that call a particular object.

what-files-call *x* &optional *package*   Function

This function returns a list of the pathnames of all files containing functions that **who-calls** would have printed. This function is useful if you need to recompile and/or edit all of these files. Type the following to see what the function returns:

```
(what-files-call 'print-herald)
```

---

where-is
Function

7.3.5 The **where-is** function prints the names of all packages that contain a specified symbol.

where-is *print-name* &optional *package*   Function

The *print-name* argument specifies the object for which the specified packages are searched. If *print-name* is a string, it is converted to uppercase. Unless *package* is specified, **where-is** assumes you want to search all packages. If you specify a package for *package*, the function searches only those packages inheriting from the specified package. The **where-is** function returns a list of all the symbols it finds. Type (where-is 'print-herald) to see what the function returns.

---

symbol-plist
Function

7.3.6 The **symbol-plist** function returns the association list that represents the property list of symbols for a specified object. The *Explorer Lisp Reference* manual provides further information about the **symbol-plist** function.

The Inspector

7.4 The Inspector is a window-based utility for viewing and modifying Lisp objects. Inspecting a particular object displays the components of this object. The type of object determines exactly what is displayed. For example, the components of a list are its elements; the components of a symbol are its value binding, function definition, property list, package, and print name.

The components of displayed objects are mouse-sensitive; positioning the mouse cursor over an object causes a box to appear around that object. Once the object is boxed, you can press the proper mouse button to inspect the boxed object, modify it, or give the object as an argument to a command.

Two different types of Inspectors exist; one type has its own process, and the other does not. For this reason, you can invoke the Inspector in these three different ways:

■ Press SYSTEM I.

■ Use the mouse to select Inspect from the System menu.

■ Call the **inspect** or **inspect*** function from the Lisp Listener.

inspect &optional *x*   Function

The **inspect** function enters the Inspector, displaying the contents of *x* (if specified). This function invokes the Inspector in its own process instead of in the calling process, just as if you pressed SYSTEM I.

An Inspector invoked with **inspect** or SYSTEM I does not have access to locally bound variables.

inspect* &optional *x*   Function

The **inspect*** function enters the Inspector, displaying the contents of *x* (if specified). This function runs in the stack group of the calling process, rather than in a separate stack (as when you press SYSTEM I or use **inspect**).

This function maintains the environment. It has access to locally bound variables.

The inspection window contains the following panes:

■ An interaction pane called Inspect:

■ Three inspection panes (which are configurable to 1, 2, or 3)

■ A history pane

■ A command menu pane

Figure 7-1 shows a typical Inspector window. The *Explorer Tools and Utilities* manual provides more information about the **inspect** function and the Inspector. Examine a few items by selecting them from the Suggestions menu. For example, select **current-process** and press RETURN, then select ***standard-input*** and press RETURN.

Figure 7-1 Typical Inspector Window

```
Empty                                                                    | Inspector:
                                                                         | List Menus
                                                                         | Menu Tools
                                                                         |------------------
                                                                         |      Help
                                                                         | Lisp Expressions
#<SYS:PROCESS Inspect Frame 4 16163413>                                  |------------------
An object of flavor SYS:PROCESS.  Function is #<EQ-HASH-TABLE (Funcallable) 31056211> | Interesting Globals MENU
                                                                         | General
SYS::NAME:                    "Inspect Frame 4"                          | current-process
STACK-GROUP:                  #<DTP-STACK-GROUP "Inspect Frame 4" 3400056> | all-packages
SYS::WAIT-FUNCTION:           #<DTP-FUNCTION TRUE 27307442>              | package
SYS::WAIT-ARGUMENT-LIST:      NIL                                        | *all-flavor-names*
SYS::WHOSTATE:                "Run"                                      | *standard-input*
#<INSPECTOR-INTERACTION-PANE Inspector Interaction Pane 5 4003523 exposed> | *standard-output*
An object of flavor TV::INSPECTOR-INTERACTION-PANE.  Function is #<EQ-HASH-TABLE (Funcallable) 312224 | TV
                                                                         | w:all-the-screens
TV:SCREEN-ARRAY:              #<ART-1B-56-1024 16164132>                 | Previously Selected Wind
TV:LOCATIONS-PER-LINE:        32                                         | w:previously-selected-wi
TV:OLD-SCREEN-ARRAY:          NIL                                        | w:window-resource-names
TV:BIT-ARRAY:                 #<ART-1B-741-1024 16100000>                | w:*system-keys*
TV:NAME:                      "Inspector Interaction Pane 5"            | w:*terminal-keys*
TV:LOCK:                      NIL                                        | w:selected-window
TV:LOCK-COUNT:                0                                          | tv:selected-io-buffer
TV:SUPERIOR:                  #<INSPECT-FRAME Inspect Frame 4 4002570 exposed> | w:mouse-window
TV:INFERIORS:                 NIL                                        | w:initial-lisp-listener
TV:EXPOSED-P:                 T                                          | w:default-screen
TV:EXPOSED-INFERIORS:         NIL                                        | w:main-screen
TV:X-OFFSET:                  1                                          | w:who-line-screen
TV:Y-OFFSET:                  686                                        | w:mouse-process
TV:WIDTH:                     822                                        | tv:*SYSTEM-MENU-PROGRAMS
TV:HEIGHT:                    56                                         | SI
TV:CURSOR-X:                  2                                          | si:self-mapping-table
TV:CURSOR-Y:                  28                                         | si:patch-systems-list
TV:MORE-VPOS:                 NIL                                        | si:*systems-list*
TV:TOP-MARGIN-SIZE:           2                                          | si:active-processes
TV:BOTTOM-MARGIN-SIZE:        2                                          | si:all-processes
TV:LEFT-MARGIN-SIZE:          2                                          |
TV:RIGHT-MARGIN-SIZE:         2                                          | FS
TV:FLAGS:                     32768                                      | fs:*default-pathname-def
TV:BASELINE:                  9                                          |
TV:FONT-MAP:                  #<ART-Q-26 16055426>                       |
TV:CURRENT-FONT:              #<FONT CPTFONT 57555040>                   |
TV:BASELINE-ADJ:              0                                          |
TV:LINE-HEIGHT:               13                                        |

PlavIns Doc      Exit    Delete    #<SYS:PROCESS Inspect Frame 4 16163413>
Set=     Refresh Modify  Config    #<INSPECTOR-INTERACTION-PANE Inspector Interaction Pane 5 4003523
Mode     Print   Edit
Inspect: CURRENT-PROCESS
Inspect: *STANDARD-INPUT*
Inspect:

Inspect Frame 4
L: Execute Command, M: Command Keystroke, R: *More Documentation Available*
Default stream for input functions such as READ.
05/20/87 07:11:13AM WEBB         USER:   Keyboard
```

Peek Utility

7.5   Peek is a window-oriented utility that displays a continuously updated system status of the following mouse-selectable items:

■ Windows mode — Lists the hierarchy of windows currently displayed on the system

■ Areas mode — Displays for each area the area name, number of regions, and allocation

■ Processes mode — Displays the process name, status, priority, quantum, and idle time of each process

■ File Status mode — Lists all the hosts that have remote file connections to or from this host and shows any connections (host units) associated with those hosts

■ Servers mode — Displays a list of all the servers running on this host that are serving other hosts, including the server's contact name, host, process, and connection

■ Function histogram — Displays a continuously updated statistical sampling of which functions use the most system resources

■ Network mode — Allows you to find useful information about all network connections

■ Counters mode — Displays the statistics of all the microcode meters

■ Documentation (Help) command — Displays brief, general information about the Peek utility

■ Set Timeout command — Allows you to set the time delay between Peek utility updates

■ Host Status command — Displays the status of each host contacted since booting

■ Exit command — Returns to the process from which Peek was called

You can invoke the Peek utility by selecting it from the System menu, pressing the keystroke sequence SYSTEM P, or entering the **peek** function in the Lisp Listener. For detailed descriptions of the various Peek utility modes and commands, refer to the *Explorer Tools and Utilities* manual. Try some of the options to see what type of data is shown. Figure 7-2 shows a Peek window.

Figure 7-2 Typical Peek Window

```
Process Name                    State              Priority  Quantum    %      Idle

Flavor Inspector 2              Keyboard              0.      60/60.    0.0%    22 min
Inspect Frame 2                 Keyboard             -1.      60/60.    0.0%    27 min
Dormant FTP Connection GC       Sleep                 0.      60/60.    0.0%    28 min
Vt100 Frame 1-Typein            Keyboard              0.      60/60.    0.0%    2 hr
Vt100 Frame 1-Typeout           Never-open            0.      60/60.    0.0%    2 hr
File Server                     Chaosnet Input        0.      60/60.    0.0%    2 min
Glossary Frame 1                Keyboard             -1.      60/60.    0.0%    19 hr
Profile Frame 1                 Keyboard             -1.      60/60.    0.0%    20 hr
Print Daemon                    Queue Empty          -1.      60/60.    0.0%    20 hr
Peek Frame 1                    Run                   0.      56/60.   15.0%
Zmacs Frame 1                   Keyboard             -1.      60/60.    0.0%    18 sec
Mail Daemon                     Mailer Sleep         -5.      60/60.    0.0%    6 min
TCP Background                  Background Task      15.      60/60.    0.0%    2 sec
TFTP Server                     UDP Input            -5.      60/60.    0.0%    22 hr
IP Packet Fragment timer        Sleep               -15.      60/60.    0.0%    25 sec
ICMP Listener                   ICMP Listen          15.      60/60.    0.0%    1 min
Suggestions Frame 1             Arrest                0.      60/60.    0.0%    20 hr
Pop-Up Keystrokes               Pop Up Keystrokes     0.      10/10.    0.0%    20 hr
Hardware Monitor                Hardware Event Wait  -50.      60/60.    0.0%    22 hr
Tm-Update                       Sleep                -5.      60/60.    0.0%    1 min
GC Daemon                       GC Daemon             0.      60/60.    0.0%    22 hr
GC-PROCESS                      Stop                  0.       0/60.    0.0%    forever
Dormant FILE connection GC      Ofile gc sleep       -2.      60/60.    0.0%    17 min
NUBUS Receiver, #XF0            Wait NuEther Input    25.      60/60.    7.0%
Chaos RUT transmitter           Stop                 30.       0/60.    0.0%    forever
Chaos Background                Background Task       25.      60/60.    0.0%    7 sec
Screen Manager Background       Screen Manage         0.      60/60.    0.0%    1 min
Mouse                           MOUSE                30.      60/60.    3.0%    2 sec
Keyboard                        terminal-            30.      60/60.    0.0%
Initial Process                 Keyboard             -1.      60/60.    0.0%    1 hr
Page-Background                 Sleep              -100.      60/60.    0.0%    17 min

Clock Function List
UPDATE-FUNCTION-HISTOGRAM
BLINKER-CLOCK




Peek Processes
Modes                                                                              Commands
Windows          Processes            Servers              Counters               Documentation  Host Status
Areas            File Status          Network              Function Histogram     Set Timeout     Exit
List status of every process -- why waiting, how much run recently.
Key assignments: p
```

Mail System

7.6 The Explorer mail system allows communication between network users. The Explorer mail reader is a Zmacs-based utility that allows you to manage special files that contain mail messages. The overall design of the mail reader is based on the directory editor (Dired) and can be accessed and used in much the same way. Thus, familiarity with Zmacs and Dired should aid you in using the mail reader.

The mail reader provides commands that allow you to do the following:

■ Receive new messages

■ View, reorganize, and manipulate messages

■ Send mail to other users or groups of users

You can access the mail reader from the System menu by pressing SYSTEM M or from Zmacs by pressing META-X and typing read mail. The mail reader checks your incoming messages in all of your inboxes. Your local user community may have established one or more mail servers where you are receiving mail. Messages are sent to your login directory, by default, when someone mails messages to you as USER@HOST. To specify other sources for your inboxes, click right to bring up the Mail Operations menu and select Change Inboxes.

The following commands can be used to introduce you to the mail system and start viewing your mail:

■ G — Get new mail

■ V — View a message

■ D — Mark a message for deleting

■ M — Create a new message (press END to send, ABORT to interrupt)

■ R — Reply to a message

■ F — Forward a message

■ B — List mail buffers

■ X — Perform marked operations P and D

■ U — Unmark (undelete) the P or D from a marked message

■ CTRL-SHIFT-P — Mark a message for printing (a P is used for the mark)

Since your mail file is treated much like any other Zmacs buffer, your reading activity affects the current buffer copy only. To save your changes press CTRL-X CTRL-S, which saves the current buffer state. You can also press END to exit the mail reader, which prompts you to save your changes.

For more information on the Explorer mail system, refer to the *Explorer Tools and Utilities* manual.

Other Utilities and Functions

7.7 In addition to the utilities discussed in the preceding paragraphs, the Explorer system features several other useful utilities and functions, which are discussed in the following paragraphs.

Dribble Files

7.7.1 An Explorer dribble file records all terminal interaction performed at a session; that is, it contains a record of all keyboard input and all system output. Assuming that you have opened (and closed) a dribble file, the file might appear as follows:

```
; Reading at top level in Lisp Listener 1.
; Now using traditional syntax and semantics and base 10 in package USER.
(load "c8:imagen;defsystem")
Loading C8: IMAGEN; DEFSYSTEM.XLD#> into package USER
# FS:REMOTE-LM-PATHNAME "C8: IMAGEN; DEFSYSTEM.XLD
(make-system 'imagen)
Files to be loaded:
C8: IMAGEN; IMPRESS.XLD#>
C8: IMAGEN; IMAGENP.XLD#>
C8: IMAGEN; PARALLEL-PORT.XLD#>
Load all three of them? (S, Y, or N) Yes.
Loading C8: IMAGEN; IMPRESS.XLD#> into package IMAGEN - #2.
Loading C8: IMAGEN; IMAGENP.XLD#> into package IMAGEN - #28.
Loading C8: IMAGEN; PARALLEL-PORT.XLD#> into package IMAGEN - #1.
T
(dribble-end)
```

The Explorer system provides four Lisp functions for dribble file operations: **dribble, dribble-start, dribble-all,** and **dribble-end.** An Explorer dribble file records all terminal interaction performed at a session. The *Explorer Tools and Utilities* manual provides detailed information about the use of these functions.

Converse Utility

7.7.2 The Converse utility allows interactive communication between users in an Explorer network; that is, you can send messages to or receive messages from any other network user. The Converse message editor displays all messages that you have sent or received. Unlike the mail system, no message files are maintained for Converse.

Converse groups all messages between you and a particular user into a *conversation*. All conversations are separated by thick black lines. Within a given conversation, the name of the other party appears at the top of a chronologically ordered group of messages. When you begin communicating with someone for whom there is no existing conversation, Converse creates one.

You can enter Converse by pressing SYSTEM C, by selecting the Converse item from the System menu, or by typing the form (qsend) in the Lisp Listener. The Converse screen then displays the word To: to prompt you for a user's name. If you want to converse with a single user, specify the form *user@host* in response to the prompt.

For example, to send a message to user GEORGE at host DELTA, enter Converse and type george@delta in response to the To: prompt.

To send a message, follow these steps:

1. After entering the the user and host name in response to the To: prompt, press RETURN, and enter your message.

2. Press the END key to transmit your message. (If you decide you do not want to send the message, press ABORT.)

Converse also allows you to converse with multiple users, specified users at unknown hosts, or specified hosts without regard to user names. For more information about these options, see the *Explorer Tools and Utilities* manual.

---

print-notifications Function

7.7.3 At times you may need a list of all notifications received during the current session. For example, you might have missed notifications or inadvertently deleted them before reading them. The **print-notifications** function allows you to reprint all notifications.

Since converse messages are handled as notifications, the **print-notifications** function *normally* includes all Converse messages as well as notifications from other processors.

Bug Reporting System

7.7.4 The Explorer software system provides a template that allows the user to report a specific Explorer software problem. Customers who have access to ARPANET or any other appropriate network can use this template to submit bug reports by network mail. After you fill in the template and select the Do It item, the system creates a mail message and sends the report.

You can invoke the bug report template from Zmacs by pressing META-X, typing bug, and pressing the RETURN key. Then follow the instructions provided by the template.

Garbage Collection

7.8 *Garbage collection* (GC) is the process of examining allocated memory to discover which parts of it have become garbage so that they can be made available for reuse. On the Explorer system, garbage collection is performed by copying nongarbage (that is, everything that *can* be accessed) from allocated memory to previously unallocated memory. When the copy operation is complete, all of the previously allocated memory is declared available for reuse. This copying technique ensures that available memory does not become fragmented over time.

Scavenging is the process of scanning all virtual memory starting from a few well-known anchor points for the purpose of finding all accessible memory. Scavenging guarantees that all potentially accessible memory will be transported from old space to new space during a collection cycle even if the system does not happen to be using it at the time.

Generational Garbage

7.8.1 The more GC operations a piece of memory survives without becoming garbage, the more likely it is to be permanent data. If the system keeps the newest generation of allocated memory separate from previous generations, then during GC most garbage is found in this newest generation. The higher generation (that is, the memory that has survived a GC) has, on the average, less garbage. The generation two levels higher (that is, the one that has survived two GC operations) has still less garbage, and so on.

Therefore, GC efficiency is greatly improved if the GC is limited to only the most recent generations. A GC of all memory takes a long time, but it eventually finds all of the garbage. A GC limited to *young* memory, on the other hand, tends to find 90 percent of the garbage in 10 percent of the time because it knows the best places to look for garbage. The actual percentages, of course, depend heavily on program characteristics.

Temporal GC

7.8.2 The implementation of generational GC on the Explorer system is called *Temporal GC*, or simply TGC. TGC maintains four generations of memory numbered 0 to 3 (that is, the number represents the number of GC operations the memory contents have survived). Most garbage is located in generations 0 and 1, and memory that has reached generation 3 is virtually static.

Despite the seemingly wide variety of functions available to perform garbage collection and the number of variables available to control these functions, you basically have three sets of choices for TGC:

■ Use batch or automatic (incremental) collection.

■ Determine which generations to collect. This choice is based on how thorough you want to be and how much time you have.

■ Decide if you should use promotion. When memory in one generation survives a GC operation, should it be *promoted* to the next higher generation or left where it was?

For more information about garbage collection, see the *Explorer Lisp Reference* manual.
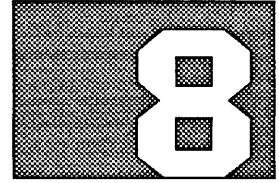
RECOVERING FROM ERRORS

Introduction

8.1 In most cases, an error on the Explorer system invokes the error-handling routine. This routine provides online suggestions for recovering from the error. Other suggestions for recovering from errors are discussed in the following paragraphs.

**General
Suggestions**

8.2 For most situations, you can use the general suggestions that follow to recover from an error. Try each of these suggestions in the order given until the situation is corrected.

1. If you notice the mistake before you complete the command, use the input editor commands to correct your mistake.

2. If the run bars are flickering, wait until all activity has stopped before you try to leave the window. Some utilities require time to load into memory.

3. If the current window does not contain information you need, you can select or create another window and bury or kill the current one.

4. You can use ABORT to leave the current level of program execution. If ABORT does not work, try META-ABORT or META-CTRL-ABORT. Use META-CTRL-ABORT sparingly, since it aborts error-handling protection (such as **unwind-protect**).

**Kinds of
Boot Operations**

8.3 If the previous suggestions do not correct the problem, try a boot sequence. The Explorer system features several types of booting:

■ If the system is completely locked up, press META-CTRL-META-CTRL-RETURN to initiate a warm boot. Warm booting restarts all processes but does not destroy the contents of virtual memory or edited buffers. If the problem is serious and warm booting is effective, immediately save any edited buffers and reboot the system. If the Zmacs editor is locked up, get to a Lisp Listener and type (zwei:save-all-files).

■ If warm booting the system does not correct the problem and you want to continue running the same load band, press META-CTRL-META-CTRL-RUBOUT to initiate a cold boot. Cold booting reloads the load band and microload band that were running when you pressed the keystroke sequence. Thus, you have a newly initialized problem-free Lisp environment, but you have lost the contents of virtual memory.

■ If you want to run a different load band, press META-CTRL-META-CTRL-M to initiate a menu boot (without the usual power-up self-test). Menu booting loads the boot microcode, which then prompts you for the device, load band, and microload band to use during boot operations. After using menu boot, you have a newly initialized Lisp environment. Virtual memory is also initialized.

■ If menu booting still does not free the system, press META-CTRL-META-CTRL-ABORT to initiate a system reset. This keystroke sequence causes the same boot sequence as cycling power on the system enclosure. In most cases, you should cold boot the system or use menu boot rather than reset the system. Resetting the system requires several additional moments to provide you with a newly initialized system.

Specific Problems 8.4 The status message (in the status line) indicates the system status. The following list shows suggested responses to information reported by status messages. Status messages include the following:

■ Arrested — The process in this window has been arrested. If you wish to restart it, select the Un-Arrest This Process item from the menu.

■ Choose — You need to select an item from the menu.

■ Cold Load Stream — You have created a condition that has placed you in a low-level error handler called the cold load stream. Use one of the suggested keystrokes to leave the error handler or explore the problem.

■ Disk Wait — The system is waiting for disk input or output.

■ Keyboard — The system is waiting for input from you at the keyboard.

■ Lock — The process in the selected window is waiting for another process to unlock. Try pressing META-CTRL-ABORT or use the Peek utility to reset the process. If necessary, press META-CTRL-META-CTRL-RETURN to execute a warm boot operation.

■ No Selected Window — No window is currently selected. This message sometimes appears briefly when the system is switching from one window to another. If the message remains for more than a few seconds, the system probably has a problem with loading a utility, or the selected window has been killed.

■ Notify — The system is waiting for another system host to acknowledge receipt of a notification.

■ Output Hold — A process needs to display to a window but cannot because, for example, the window is not exposed. You can sometimes recover from this state by determining which window is needed and selecting that window. Press TERM 0 S to locate the window needed for the display.

■ Stop — The process in the window has stopped. Press ABORT, select another utility, or execute a reset and enable operation via the Peek utility.

■ System- — You pressed the SYSTEM key and did not press another key. Either press RUBOUT to cancel, or press another key to invoke a utility.

■ Terminal- — You pressed the TERM key and did not press another key. Either press RUBOUT to cancel, or press another key to execute a command.

■ Window Lock — A problem exists in the window system. Press TERM CTRL-CLEAR INPUT. If the message still reads Window Lock, press

TERM 0 S. If this keystroke sequence does not correct the problem, invoke the System menu and select Arrest. If the problem still exists, try ABORT, CTRL-A, or META-CTRL-A. If that fails, try booting the system.

Crash Analysis

8.5 When the Explorer operating system detects an irrecoverable error, it executes a system crash to prevent further operation. A microcode routine called ILLOP (illegal operation) records information about the error condition in a crash record, then halts the machine. The crash analyzer uses the crash record information to analyze the error condition and report it to the user in a readable format. Although you may not be able to decipher information in the crash record, the data may be useful when reporting problems to your customer representative.

The crash analyzer contains a number of Lisp routines, including the following user-callable functions:

sys:report-last-shutdown &key :stream :pathname :abnormal-only   Function

This function reports the result of analyzing the crash record from the previous boot.

Arguments: **:stream** — This keyword specifies where the crash record is to be written to unless otherwise specified by the **:pathname** keyword. The default value of **:stream** is the value of ***standard-output*** (usually the screen).

:pathname — This keyword specifies the file into which the crash record is to be written. The specified file must be parsable, and it is opened in the Append mode. If the value of **:pathname** is **nil** (the default value), the crash record is written to the stream indicated by the **:stream** keyword.

:abnormal-only — This keyword specifies whether to report crash records caused by actual crashes as opposed to normal system shutdowns or boot operations. The default value of **:abnormal-only** is **nil**, which indicates that any crash record can be reported.

sys:report-all-shutdowns &key :stream :pathname :abnormal-only   Function
:unlogged-only

This function reports the results of analyzing all currently recorded crash records. With the exception of the **:unlogged-only** keyword, the arguments for this function are identical to those for the **sys:report-last-shutdown** function. If the value of **:pathname** is not **nil** and the value of **:unlogged-only** is **true**, only records that have not been previously reported are written to the log file.

The crash analysis format differs for each kind of halt operation. For system boot operations, only header information is displayed. The header information contains the following items:

■   Progress fields

■   Load information

■   Time information

■   Kind of halt

For Lisp halt operations, the header information is displayed followed by the Lisp crash code, a text description of the code, and the saved-register values. Microcode halt operations are reported in much the same way, except that the halt address and a text string describing the microcode halt are also listed. This text string is obtained from the crash analysis database on the basis of the microcode halt address.

For more information about crash records and crash analysis, refer to the *Explorer Tools and Utilities* manual.

CUSTOMIZING YOUR ENVIRONMENT
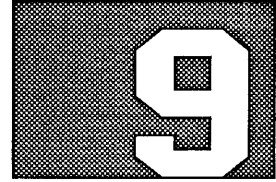
Introduction

9.1 When you first log in to your Explorer system, its responses are set to certain default values. For example, the keyclick feature is turned off, and the video mode is white characters on a black background. As you use the system, you may wish to modify its responses to suit your preferences. This section describes how to customize the Explorer environment.

Using the Profile Utility

9.2 The Profile utility provides a simple way to change the system environment. This utility provides the following capabilities:

■ Allows you to change your environment for the current session only

■ Allows you to create a login-initialization (login-init) file that sets up the same customized environment each time you log in and returns the environment to its default condition when you log out

To use the Profile utility, you must be logged in; to create a login-init file, you must have an existing login directory. If you need to create a login directory, see paragraph 4.5, Logging In.

Accessing the Profile Utility

9.2.1 To access the Profile utility, select the Profile item on the System menu. The Profile utility window that appears consists of a choose-variable-values menu labeled `Variables currently displayed`, an Actions menu, and a menu of types of variables.

When you first invoke the Profile utility, the menu displayed at the top is the Important Variables menu. The system tells you which menu is displayed by highlighting the name of the menu in reverse video in the choose-variable-values menu. The Profile utility allows you to change the values of variables and/or execute commands.

Figure 9-1 shows a typical Profile utility window.

Accessing Variables

9.2.2 Variables in the choose-variable-values menu are grouped according to the areas they affect, such as Input Variables, Display Variables, and Compiler Variables. The Important Variables group includes frequently changed variables from several other groups.

To edit a group of variables, select the name of the group in the bottom menu. The selected group is then displayed in reverse video, and the top pane of the window displays the variables that you can change.

You can edit the values of variables listed in the display just as you would edit the values in a choose-variable-values menu. An explanation of the selected variable appears in the mouse documentation window.

Figure 9-1 Typical Profile Utility Window

```
*PRINT-BASE*: ····················································· Binary  Octal  Decimal  Hexidecimal
*PRINT-LENGTH*: ··················································· NIL
*PRINT-LEVEL*: ···················································· NIL
*PRINT-STRUCTURE*: ················································ T [yes]  NIL [no]
*READ-BASE*: ······················································ Binary  Octal  Decimal  Hexidecimal
PROFILE::CLOCK-FORMAT: ············································ 24 Hour Clock  12 Hour Clock
EH:*ENTER-WINDOW-DEBUGGER*: ······································ NIL [never use it]  T [ask]  :ALWAYS [always use it]
EH:*USE-OLD-DEBUGGER*: ············································ T [yes]  NIL [no]
PROFILE::KEYCLICK-STATE: ·········································· On Off
PROFILE::LOAD-PATCHES-AT-LOGIN: ··································· T [yes]  NIL [no]
PROFILE::NUMBER-OF-MOUSE-DOCUMENTATION-LINES: 2
PROFILE::P-LISP-MODE: ············································· COMMON-LISP ZETALISP
PROFILE::SAVE-BUFFERS-AT-LOGOUT-ACTION: ······· Via Menu  Via Prompts  Don't Save Buffers
PROFILE::SCREEN-REVERSE-VIDEO-FUNCTION: ······· Black on White  White on Black
PROFILE::SUGGESTIONS-MENUS-ON?: ··················· T [yes]  NIL [no]
TV::*FLAVOR-INSPECTOR-CONFIGURATION*: ·········· THREE-PANES ONE-PANE TWO-HORIZONTAL-PANES TWO-VERTICAL-PANES
TV::*INSPECTOR-CONFIGURATION*: ···················· THREE-PANES ONE-PANE TWO-HORIZONTAL-PANES TWO-VERTICAL-PANES
TV:MORE-PROCESSING-GLOBAL-ENABLE: ·············· T [yes]  NIL [no]
ZWEI::*DEFAULT-MAJOR-MODE*: ························ COMMON-LISP ZETALISP TEXT MACSYMA MIDAS TEX ZTOP
ZWEI::*INITIAL-MINOR-MODES*: ······················ NIL
ZWEI::*REGION-MARKING-MODE*: ······················ UNDERLINE REVERSE-VIDEO
```

```
Actions
Store Options          Restore System Defaults        Restore User Defaults          Exit
  Variables currently displayed:
Important Variables    UCL Variables       Error Handling Variables   Network Variables    GC Variables
Compiler Variables     Mail Variables      Zmacs Variables            Mouse Variables      Input Variables
File System Variables  Evaluation Variables   Common Lisp Globals      Display Variables    Color System Variables
Profile Frame 1
L: move to an item and select it, R: move to an item and edit it.
Press the HELP key for command descriptions.
```

The Profile utility allows you to change the following variables from the Input Variables menu, as well as many others from other groups:

■ Continuous Repeat Delay — Sets the length of delay (in 60ths of a second) between each repeated appearance of a character while you hold a key down.

■ Initial Repeat Delay — Sets the length of delay (in 60ths of a second) between the time you press a key and the time the key begins to repeat. Setting this value to 0 disables the repeating feature.

■ Mouse Handedness — Specifies whether the mouse is for a right-handed or left-handed user.

■ Keyclick State — Enables or disables the audible key click.

■ Read Base — Specifies the base or radix of numbers you type. By default, the system assumes you type decimal numbers.

Selecting Actions 9.2.3 In addition to changing the values of variables, you can select one of the following actions from the Actions menu:

■ Store Options — Creates or updates a special login-init file in your login directory. This login-init file specifies your login environment to be the same as the current environment. When you log out, the system returns most variables to their default values.

■ Restore System Defaults — Restores system default values to all variables.

■ Restore User Defaults — Restores default values listed in the login-init file.

■ Exit — Terminates the Profile utility and returns you to the window from which it was called.

Selecting Reverse Video

9.3 You can specify reverse video (black type on a white background) on different parts of the video display in any of the following ways:

■ Entire video display — Press TERM C, select the Complement Video item in the Terminal Characteristics menu from the Lisp Listener Suggestions menu, or use the Profile utility. This is only supported on monochrome monitors.

■ Mouse documentation window — Press TERM 0 C or select an item in the Terminal Characteristics menu. This is only supported on monochrome monitors.

■ Specific window — Invoke the Attributes menu from the Edit Attributes item of the System menu for that window and select the Reverse Video item.

Specifying a Default Printer

9.4 On a network with a print server, the network configuration initially defines the default printer for files, as well as the default printer for screen images. You can specify a different default printer for your Explorer system.

Listing the Available Printers 9.4.1 Before you can specify a default printer, you must first learn which printers are available. To display a list of printers available on your network, type the following function in the Lisp Listener:

(list-printers)

The system displays a screen similar to that shown in Figure 9-2, in which the characters enclosed in quotes (strings) are the names of the printers available on your network. The listing also includes the printer type and the host of the printer.

Figure 9-2 Typical List of Available Printers

```
> (list-printers)
(("2015-p" :TYPE :TI2015 :HOST "quebec" :STREAM :PARALLEL)
 ("CANCER-888" :HOST "CANCER" :TYPE :TI888 :STREAM :SERIAL :PORT NIL :BAUD 9600 :DATA-BITS 8 :STOP-BITS 1 :PARITY NIL :XON-XOFF
   T :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("CANCER-P" :HOST "CANCER" :TYPE :TI855 :STREAM :PARALLEL :PORT NIL :BAUD NIL :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL
   :XON-XOFF T :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("cmint-s" :HOST "WRIGHT" :TYPE :TI855 :STREAM :SERIAL :PORT 1 :BAUD 4800 :DATA-BITS 8 :STOP-BITS NIL :PARITY :ODD :XON-XOFF T
   :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("DABP" :HOST "DAB" :TYPE :TI855 :STREAM :PARALLEL :PORT NIL :BAUD NIL :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL :XON-XOFF T
   :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("DABS" :HOST "DAB" :TYPE :TI855 :STREAM :SERIAL :PORT 1 :BAUD 4800 :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL :XON-XOFF T
   :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("DLS-855" :HOST "DLS" :TYPE :TI855 :STREAM :SERIAL :PORT 1 :BAUD 9600 :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL :XON-XOFF T
   :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("DOUG" :HOST "ADAMS" :TYPE :TI855 :STREAM :PARALLEL :PORT NIL :BAUD NIL :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL :XON-XOFF T
   :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("EIGHT" :HOST "C19" :TYPE :TI855 :STREAM :SERIAL :PORT 1 :BAUD 4800 :DATA-BITS 8 :STOP-BITS 1 :PARITY NIL :XON-XOFF T
   :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("ESDI" :HOST "Disk" :TYPE :TI855 :STREAM :PARALLEL :PORT NIL :BAUD NIL :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL :XON-XOFF T
   :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("Gumby-855" :HOST "Gumby" :TYPE :TI855 :STREAM :SERIAL :PORT 1 :BAUD 9600 :DATA-BITS 8 :STOP-BITS 1 :PARITY NIL :XON-XOFF T
   :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("IMAGEN" :HOST "Icarus" :TYPE :IMAGEN-PRINTER :STREAM :PARALLEL :PORT NIL :BAUD NIL :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL
   :XON-XOFF T :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("IMAGEN-SYS-ENGR" :HOST "VICTOR" :TYPE :IMAGEN-PRINTER :STREAM :PARALLEL :PORT NIL :BAUD NIL :DATA-BITS 8 :STOP-BITS NIL
   :PARITY NIL :XON-XOFF T :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("International-855" :HOST "International" :TYPE :TI855 :STREAM :PARALLEL :PORT NIL :BAUD NIL :DATA-BITS 8 :STOP-BITS NIL
   :PARITY NIL :XON-XOFF T :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("LUCKY-855" :HOST "LUCKY" :TYPE :TI855 :STREAM :PARALLEL :PORT NIL :BAUD NIL :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL
   :XON-XOFF T :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("madonna-printer" :HOST "madonna" :TYPE :TI855 :STREAM :PARALLEL :PORT NIL :BAUD NIL :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL
   :XON-XOFF T :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("MARKS-PRINTER-P" :HOST "FLEMING" :TYPE :TI855 :STREAM :PARALLEL :PORT NIL :BAUD NIL :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL
   :XON-XOFF T :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("MARKS-PRINTER-S" :HOST "FLEMING" :TYPE :TI855 :STREAM :SERIAL :PORT 1 :BAUD 2400 :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL
   :XON-XOFF T :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("PCAI-G" :HOST "PCAI" :TYPE :TI855 :STREAM :SERIAL :PORT 1 :BAUD 9600 :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL :XON-XOFF T
   :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("RBEA-855" :HOST "RBEA" :TYPE :TI855 :STREAM :PARALLEL :PORT NIL :BAUD NIL :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL :XON-XOFF
   T :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("RUMP" :HOST "R-M" :TYPE :TI855 :STREAM :PARALLEL :PORT NIL :BAUD NIL :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL :XON-XOFF T
   :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("talaris" :HOST "V4" :TYPE :TALARIS :STREAM :SERIAL :PORT 1 :BAUD 9600 :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL :XON-XOFF T
   :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("TI-855" :HOST "GRACE" :TYPE :TI855 :STREAM :PARALLEL :PORT NIL :BAUD NIL :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL :XON-XOFF T
   :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T)
 ("TI-PRINTER" :*ALIAS-OF* "2015-p")
 ("UNIFORM-S" :HOST "UNIFORM" :TYPE :TI855 :STREAM :SERIAL :PORT 1 :BAUD 9600 :DATA-BITS 8 :STOP-BITS NIL :PARITY NIL :XON-XOFF
   T :CHARACTER-PRINTER-P T :IMAGE-PRINTER-P T))
```

Changing the Default Printer

9.4.2 Information concerning default printers and printer availability is stored in the network namespace. The following functions can be used to access this information:

- **set-default-printer** — Establishes the default text printer

- **set-default-image-printer** — Establishes the default image printer

- **get-default-printer** — Returns the name of the default text printer

- **get-default-image-printer** — Returns the name of the default image printer

- **list-printers** — Returns a list of all printers in the current namespace

For further details about these functions, refer to the *Explorer Input/Output Reference* manual.
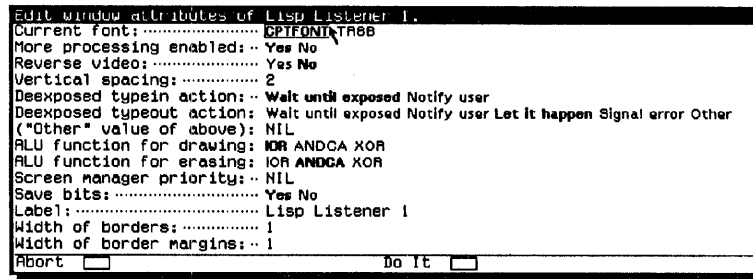
Changing Window Attributes

9.5 You can modify the attributes of a particular window by modifying the values in the Window Attributes menu. You can invoke this menu by selecting the Edit Attributes item from the System menu. Any values you change remain in effect for the current session.

Figure 9-3 shows a typical Window Attributes menu for a Zmacs window. Some of the variables in this menu are as follows:

■ Current font — Sets the font or font list used in this window; allows you to select one of the listed fonts or specify a new font

■ Reverse video — Selects regular or reverse video for the specific window only

■ Vertical spacing — Specifies the amount of space between lines of print within the window

■ Label — Specifies the window label

■ Width of borders — Specifies the width of the window's borders

■ ALU for drawing — Specifies the ALU for drawing output on the window

■ ALU for erasing — Specifies the ALU for erasing objects from the window

---

Figure 9-3　　　　　**Window Attributes Menu**


```
Edit window attributes of Lisp Listener 1.
Current font: ···················· CPTFONT·TR88
More processing enabled: ·· Yes No
Reverse video: ···················· Yes No
Vertical spacing: ················ 2
Deexposed typein action: ·· Wait until exposed Notify user
Deexposed typeout action: Wait until exposed Notify user Let it happen Signal error Other
("Other" value of above): NIL
ALU function for drawing: IOR ANDCA XOR
ALU function for erasing: IOR ANDCA XOR
Screen manager priority: ·· NIL
Save bits: ······················· Yes No
Label: ····························· Lisp Listener 1
Width of borders: ·············· 1
Width of border margins: ·· 1
Abort  □                                    Do It  □
```

If you have a color system, the following variables are also on the menu:

■ Foreground Color — Specifies the foreground color of the window

■ Background Color — Specifies the background color of the window

■ Label Color — Specifies the color of the window label

■ Label Background Color — Specifies the background color for the window label

■ Border Color — Specifies the color of the border of the window

If you click on the value of any of these variables, a menu of color names appears from which you can select a color. Also on this menu are the items Show Color Map and Enter Color Number.

■ Selecting the Show Color Map displays a map of colors from which you can select a color. (The first 24 colors in the color map are the colors that are named. You can name any of the other colors and add them to the menu, as described in the *Explorer Window System Reference* manual.)

■ Selecting the Enter Color Number allows you to enter the number for one of the colors in the color map.

Refer to the Color Map Editor section in the *Explorer Tools and Utilities* manual for more information on using the color map.

Also notice that in a color environment the default for the ALU for Drawing variable is TRANSPARENT and the default for the ALU for Erasing variable is BACKGROUND. For more information on color ALUs and adding color to your applications, refer to the *Explorer Window System Reference* manual.

Viewing Several Windows

9.6 The Explorer system allows you to display several windows at once in the main screen, either in a standard layout or in a layout you create yourself. You can also change the size and position of windows on the video display and of panes within a frame. In addition, you can save the layout and assign a keystroke sequence to invoke it during a session.

Using a Standard Layout

9.6.1 To use a standard layout, choose the Split Screen option on the System menu. When you select this option, the system displays a menu of windows you can select, as well as a few functions. Figure 9-4 shows a typical Split Screen Element menu.

Split Screen Choices

9.6.1.1 When you select an item from the Split Screen Element menu, you create a small screen that shows the position of the window relative to the video display and to other windows in the split screen (Figure 9-5). From the split screen element menu, you can make one of the following choices:

■ You can select a specifically named window, such as Peek or Telnet.

■ You can select the Existing Window option to obtain a menu of active windows. You can then select one of these windows to include in the split screen.

■ You can select the Any option to obtain a small window that prompts you for the flavor of window to include.

Figure 9-4

Typical Split Screen Element Menu
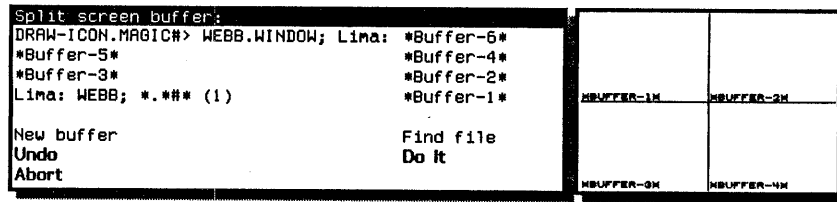
```
Split screen buffer:
DRAW-ICON.MAGIC#> WEBB.WINDOW; Lima:   *Buffer-6*
*Buffer-5*                              *Buffer-4*
*Buffer-3*                              *Buffer-2*
Lima: WEBB; *.*#* (1)                   *Buffer-1*

New buffer                              Find file
Undo                                    Do It
Abort
```

Figure 9-5　　　　　　　**Standard Layouts Created by the Split Screen Option**

Split Screen　**9.6.1.2** You can select any of the following commands in the Split Screen
Commands　menu:

- Abort — Cancels the layout and returns you to the previous window.

- Do It — Creates the specified layout.

- Frame — Invokes a menu that enables you to save a layout as a frame
  and to assign a keystroke sequence to invoke the layout. The name you
  assign to this frame appears in the Select menu invoked by the System
  menu.

- Mouse Corners — Specifies the area in which to place the split screen
  layout.

- Undo — Cancels the last window included as part of the layout.

Creating a Layout　**9.6.2** Instead of using a layout created by the Split Screen menu, you can
create your own layout by using the Create option of the System menu.

Because all windows are rectangular, the Create option enables you to specify
the size and position of a window by setting two corners. To create a window,
perform these steps:

1. Invoke the System menu and select the Create option. The system
   displays a menu of utilities.

2. Select the type of window you want to create. The menu disappears, and
   the mouse cursor becomes an upper left corner (⌐).

3. Move the corner to the position where you want the upper left corner of
   the window to be; then click the mouse as instructed in the mouse docu-
   mentation window. The upper left corner becomes stationary, and the
   mouse cursor becomes a lower right corner (⌙).

4. Move the cursor to the position where you want the lower right corner of
   the window to be; then click the mouse as instructed in the mouse docu-
   mentation window. The window appears within the rectangle defined by
   the two corners.
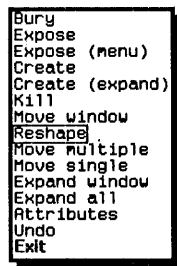
Modifying a Layout

9.6.3 The Explorer system also allows you to modify an existing layout. To change the layout of a window or pane, use the Edit Screen menu shown in Figure 9-6. When you use this menu, the system returns you to the menu after each command is completed. To leave the menu, you must select Exit. When you are modifying a layout, the contents of some windows may not appear until after you exit the Edit Screen menu.

The following commands can be used to modify a layout:

■ Move Window — Changes the position of a window without changing its size. After you select a window, a shadow replaces its borders. As you move the mouse cursor, the outline of the window moves with it.

■ Reshape — Changes the shape of a visible window. You specify the upper left and lower right corners of the new window.

■ Move Single — Moves and reshapes a single window. You specify a single border or corner of a window and move that border or corner to a new position. Other corners and borders remain fixed.

■ Move Multiple — Moves and reshapes several contiguous windows by specifying and moving one or more borders or corners of the block of windows.

Figure 9-6

Edit Screen Menu

```
Bury
Expose
Expose (menu)
Create
Create (expand)
Kill
Move window
Reshape
Move multiple
Move single
Expand window
Expand all
Attributes
Undo
Exit
```

Naming a Layout

9.6.4 For any layout you use, you can assign a name and keystroke sequence to the layout. Assigning a keystroke sequence enables you to invoke the layout by using a method similar to one for invoking a window for a particular utility. How you assign the name and keystroke sequence depends on whether you used the Split Screen Element menu or the Create option to create the layout.

Some of the steps outlined in the following paragraphs require a keystroke sequence consisting of the SYSTEM key and another character. In these cases, you should not use a keystroke (such as SYSTEM L) that already calls a utility. To list the keystroke sequences already used with the SYSTEM key, press SYSTEM HELP. (Note that uppercase and lowercase letters invoke the same item.)

Using the
Split Screen Menu

9.6.4.1 When you use the Split Screen menu to create a screen layout, you can also use the Frame command in the menu to assign a name and keystroke sequence to the layout. If you have used the Split Screen menu without the Frame command to create the layout, use the Change Layouts option described in paragraph 9.6.4.2, Using the Change Layouts Option.

To name a layout you are creating with the Split Screen menu, follow these steps:

1. After you choose the windows in the layout, select the Frame option in the Split Screen menu. The system displays a menu of two prompts.

2. Type a name for the layout and press the keystroke sequence you want to use to invoke the layout. (This keystroke sequence must begin with the SYSTEM key.) If you decide not to name the layout, you can select the Cancel item. The system retains the layout you chose but discards information about the frame.

3. Select the Do It item. The system invokes the layout you created.

For the remainder of the current session, you can invoke the layout by pressing the specified keystroke sequence or by choosing its name from the Select menu invoked from the System menu.

Using the Change Layouts Option

9.6.4.2 If you use the Create command to create a layout or if you have completed a layout with the Split Screen command, you can use the Change Layouts option of the System menu to name the layout. Follow these steps:

1. Invoke the System menu, and select the Change Layouts option. The system displays a menu that includes one or more items.

2. Select the Save This item. The system prompts you for the name of the layout.

3. Type the name for the layout. The system prompts you for the keystroke sequence you want to use to invoke the layout.

4. Press the desired keystroke sequence beginning with the SYSTEM key. The system returns to the layout.

For the remainder of the current session, you can invoke the layout by pressing the specified keystroke sequence or by choosing the name from the Change Layouts menu invoked by the System menu.

Adding Custom Macros

9.7 By using the Universal Command Loop (UCL) within the Lisp Listener, you can create and implement macros that incorporate frequently used combinations of commands or keystrokes. A *command macro* consists of a series of commands, such as Delete Character, List Completions, and so on; a *keystroke macro* consists of a series of keystrokes, such as that contained in the name of a Lisp function. In addition to the macro itself, you can specify its name, keystroke sequence, and description to be displayed with other commands when you press HYPER-CTRL-HELP. You should not use a keystroke sequence that is already being used in the system.

The procedures described in the paragraphs that follow create custom macros for the Lisp Listener. To create a keyboard macro in the Zmacs editor, see the *Explorer Zmacs Editor Reference* manual.

Searching for a Keystroke Sequence

9.7.1 To discover if a keystroke sequence is currently used in the system, follow these steps from the Lisp Listener:

1. Press HYPER-CTRL-K to search for possible current uses of the keystroke sequence. The system displays a menu that prompts you for the keystrokes.

2. Press the keystrokes for which you want to search; then select the Do It item. The system displays either the command that the keystroke executes or a message stating that the keystroke was not found. *Do not select the boot sequence because the system will reboot.*

Adding a Command Macro

9.7.2 To create a command macro from the Lisp Listener, follow these steps:

1. Press HYPER-CTRL-C to invoke the Build Command Macro command. Alternately, you can invoke this command by pressing HELP, selecting the Customization item from the Help menu, and then selecting the Build Command Macro item from the Customization menu. The system displays a menu that prompts you for three values.

2. Type the name of the command and a short description of what it does. (After you complete the command macro, this input is displayed when you press HYPER-CTRL-HELP.) Be sure to press RETURN when you complete each entry to signal to the system that you are finished.

3. Select the field that prompts you for the keystroke sequence to execute this macro. The system displays another menu that prompts you for the keystroke sequence.

4. Press the keystroke sequence that you want to execute this command macro; then select the Do It item when the keystroke is correct. As you use this menu, you can delete unwanted keystrokes by selecting the Rubout item. You can return to the previous menu by selecting the Abort item. The system displays a menu of available commands.

5. Follow the instructions in the mouse documentation window to select the commands for your macro. Each command you select is displayed in reverse video in the menu. In addition, the system lists each command you choose so that you can see the contents of the command macro.

6. After you select all the commands, select the Do It item. The video display again shows the window selected before you began creating a macro.

The command Save Commands saves all your command modifications and keystroke and command macros that are normally found in your directory. This command saves not only the modifications to the current application but also the modifications to any UCL application; that is, it saves your entire command environment in one file that can be loaded at another time.

Adding a
Keystroke Macro

9.7.3 To create a keystroke macro from the Lisp Listener, follow these steps:

1. Press HYPER-CTRL-M to invoke the Build Keystroke Macro command. Alternately, you can invoke this command by pressing HELP, selecting the Customization item from the Help menu, and then selecting the Build Keystroke Macro item from the Customization menu. The system displays a menu that prompts you for three values.

2. Type the name of the command and a short description of what it does. (After you complete the keystroke macro, this input is displayed when you press HYPER-CTRL-HELP.) Be sure to press RETURN when you complete each entry to signal the system that you are finished.

3. Select the field that prompts you for the keystroke sequence to execute this macro. The system displays another menu that prompts you for the keystroke sequence.

4. Press the keystroke sequence that you want to execute this keystroke macro; then select the Do It item when the keystroke is correct. As you use this menu, you can delete unwanted keystrokes by selecting the Rubout item. You can return to the previous menu by selecting the Abort item. The system displays a window with a request for your input.

5. Follow the instructions in the window to remove the window, and then type the keystrokes that you want to insert into the input line when you press the keystroke sequence. If you include several complete Lisp functions, press RETURN between each function.

6. When you are satisfied with the keystrokes, press HYPER-CTRL-M to complete the macro. The video display again shows the window selected before you began creating a macro.

The command Save Commands saves all your command modifications and keystroke and command macros normally in your directory. This command saves not only the modifications to the current application but also the modifications to any UCL application; that is, it saves your entire command environment in one file that can be loaded at another time.

Loading Patches　　**9.8**　A *patch file* is a file that contains upgrades and fixes for problems in a software system.

The Explorer system uses numbers to indicate the version of a software system or utility. For example, font editor version 2.3 indicates that this font editor is the second *major version* (the 2 of the 2.3) and the third *minor version* (the 3 of the 2.3). Thus, three patches have been made since version 2 of the font editor was installed. You can see the current version of each software system when you execute the **print-herald** function. If you have set Verbose mode on, it lists each system or utility name (along with its version number) installed on your system.

To make use of the latest version of the software, you must load the patch files for each system you want to update. The **load-patches** function enables you to load patches easily. For example, to load all patches to the system software, type the following Lisp function:

```
(load-patches)
```

For each subsystem with defined patches, you are then queried whether to load patches for that subsystem. To load only some of the patches, reply no to the queries about the patches you do not want loaded.

If you want to load the patches to only a single subsystem and you know the name of the subsystem, execute the function and specify the name of the subsystem. For example, you know that the name of the Zmacs editor subsystem is zmacs. To load patches to the Zmacs editor, type the following Lisp function:

```
(load-patches 'zmacs)
```

If you want to use the patches each time you boot the system, you can save the patched load band by using the **disk-save** function. See the *Explorer Input/Output Reference* manual for more information.

For information about making patches, refer to the *Explorer Lisp Reference* manual.

USING FILES　10

Introduction

10.1 This section describes the general organization of an Explorer file system and explains how to use directories and files.

File System Organization

10.2 An Explorer file system is a set of directories, subdirectories, and files contained in one or more file partitions on a disk. Most Explorer systems use local file systems. A local file system is contained on the disk associated with that Explorer system. Explorer systems can also access file systems belonging to other machines on the network (remote file systems). If your file system is serving another Explorer system, your system status line displays a message such as File Serving C8, where C8 is the name of the other machine.

The file system (Figure 10-1) is a hierarchical system of directories, subordinate directories, and files, whose top directory is called the *root directory*. The root directory contains one or more directories (no files), each of which can contain files and/or other directories, called subdirectories. Each subdirectory can contain other subdirectories and files. A directory that contains neither subdirectories nor files is an *empty directory*.

Figure 10-1 Explorer File System Organization
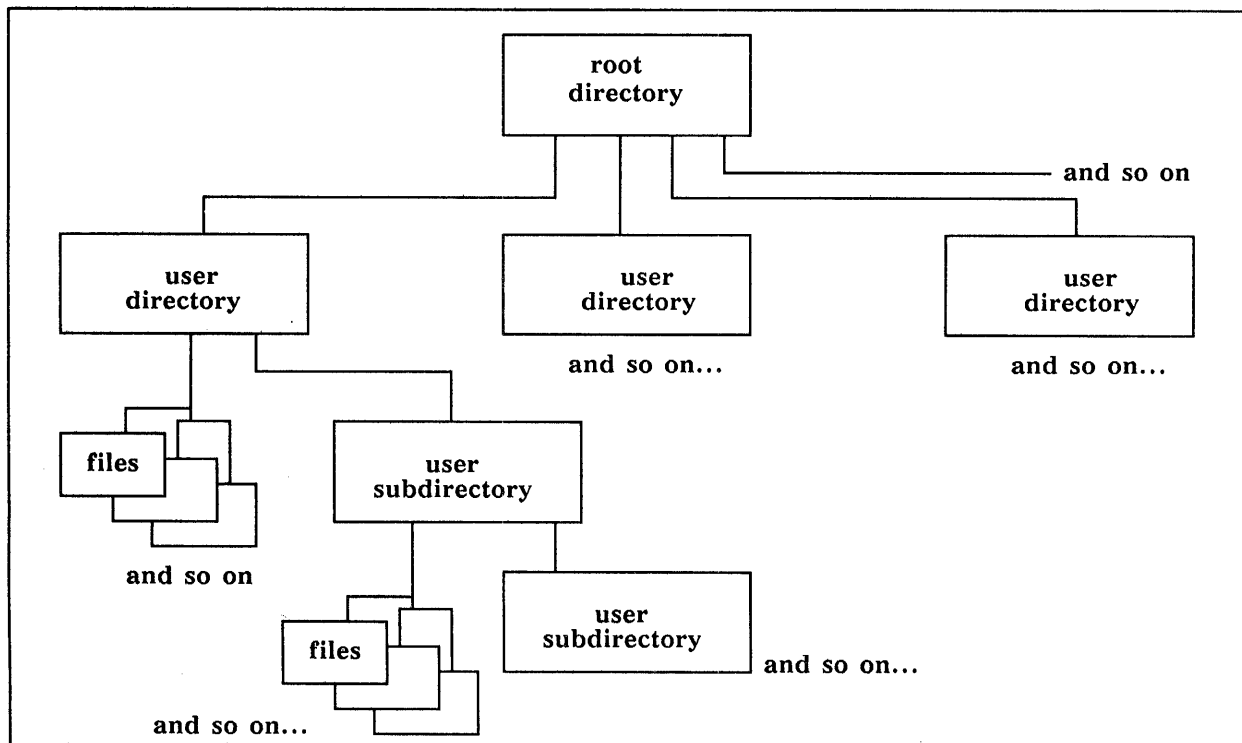
File Pathnames

10.3 A *namestring* is a string used to gain access to a file or directory. All Explorer pathnames have five components, of which all except the *name* component are delimited by a special character, as follows:

host:directory;name.type#version

A typical file pathname is:

BE-REAL:BD-EYES;WILLIAMS.LISP#3

The component names are defined as follows:

■ BE-REAL = *host* — The host component names the machine on which the file resides. The machine you are using is referred to as the local machine (LM). The host name SYS refers to the network system host. The delimiter for *host* in a namestring is a colon (:).

■ BD-EYES = *directory* — The directory component contains the name of the directory and, if needed, the subdirectories in order from the highest level through each successive level. Each subdirectory is separated from the previous by a period(.). For example, the directory name BD-EYES.SMITH.JOHN; represents the subdirectory JOHN in the sub-directory SMITH in the directory BD-EYES. The delimiter for *directory* in an Explorer namestring is a semicolon (;). In this case BD-EYES is a root (top-level) directory.

You can specify the root directory with an asterisk (*) or a tilde (~).

■ WILLIAMS = *name* — The name component is the name of a particular file. The default filename varies depending on the software application. For example, the default filename in the Zmacs editor is the file most recently copied into a buffer. There is no delimiter for *name*. A string without a delimiter is parsed as a name component.

■ LISP = *type* — If you do not specify a file type in your file pathname, the system supplies it for you. The file type is usually one of the following:

- .LISP — A Lisp source code file

- .XLD — A file containing compiled Lisp programs

- .TEXT — A general text file

■ 3 = *version* — The version number of the file is an integer preceded by a number sign (#). A positive number indicates a specific version, whereas a negative number indicates a version with respect to the newest version. For example, –1 indicates the version immediately before the newest version. Three special symbols can also be used as version numbers: #> indicates the newest version, #< indicates the oldest version, and #* indicates all versions.

Except for the host component, every pathname component can be either a string or a symbol. For example, any pathname component other than the host can be an asterisk (*). The asterisk is a symbol that calls for all values of the specified component. Thus, the following pathname calls for all files in the BD-EYES directory:

BE-REAL:BD-EYES;*.*

The Explorer system places few limits on pathnames. Follow these guidelines for specifying them:

■ Pathnames can be of any length. However, you should use short pathnames to avoid excessive keystrokes.

■ For the Explorer system, pathnames can be typed either uppercase or lowercase. Some hosts (such as UNIX®) may be case-sensitive.

■ If you use a delimiting character (a period, number sign, colon, semicolon, or space) within a component name other than as a delimiter, you must precede it with a forward slash (/).

Directory Tools

10.4 The Explorer system provides several tools and methods for working with files and directories. These methods include the commands used in the Zmacs editor and directory editor (Dired) in Zmacs, as well as the Lisp functions used in the Lisp Listener. In addition, for many tasks, you can also select a command from a Suggestions menu. Many of the methods discussed in this section make use of Suggestions.

Zmacs and Dired

10.4.1 Many of the tasks described in this paragraph and paragraph 10.5, Manipulating Directories and Files, can be invoked from the Zmacs editor. You can invoke the Zmacs editor either from the System menu or by pressing SYSTEM E. For most commands, you then press META-X, type the appropriate command, and press RETURN. The minibuffer then prompts you for any required additional information.

Dired is a facility within Zmacs that allows you to perform directory housekeeping. You can invoke Dired from the Zmacs editor by pressing the keystroke sequence CTRL-X CTRL-D or by pressing META-X, typing dired, and pressing RETURN. In either case, the minibuffer prompts for the name of the directory to edit.

You can use numeric arguments in Dired. For example, typing 20D marks the next 20 files for deletion.

Specifying Directories **10.4.1.1** To specify the root directory of the local machine, type lm:*; and press RETURN. The system then places the list of files and subdirectories in the Zmacs buffer (see Figure 10-2). To specify other directories, type the host name and the directory name, then press RETURN. For example, to specify the directory BD-EYES on host BE-REAL, type be-real:bd-eyes; then press RETURN.

Using Dired Commands **10.4.1.2** In the Dired mode, the Zmacs Suggestions menu contains a list of mouse-selectable commands. On the menu, most of the commands are preceded by a letter or a keystroke sequence. This notation indicates that you

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can execute a given command either by selecting it with the mouse or by typing the associated letter or keystroke sequence.

Some Dired commands do not cause any immediate action but mark a selected file for manipulation when you exit from Dired. For example, selection of the command D (Mark to Delete) marks the specified file at the cursor position for deletion when you request all marked files to be expunged (removed).

Figure 10-2 Typical Root Directory With Subdirectories

```
Lima: ~; *.*#*                                                          │        Zmacs:
Free=8567, Reserved=748, Used=20685 (56 pages used in ~;)               │    Find Commands
54 blocks in files listed                                              │     List Menus
■ ALVIN.DIRECTORY #1     4   DIRECTORY |  05/12/86 09:23:06     ALVIN   │       Undo
  CRASH.DIRECTORY #1     1   DIRECTORY |  03/26/87 11:01:43     RALPH   ├───────────────
  DAVE.DIRECTORY #1      0   DIRECTORY |  04/25/86 16:13:18  NEIGHBORS  │       Help
  FARR.DIRECTORY #1      2   DIRECTORY |  04/25/86 16:14:06   CHUCKLES  │  Lisp Expressions
  FONTS.DIRECTORY #1     1   DIRECTORY |  04/25/86 16:15:20    SYSTEM   │    Menu Tools
  GLOSSARY.DIRECTORY #1  1   DIRECTORY |  04/25/86 16:15:34    SYSTEM   │  Suggestions Menus Off
  HELP.DIRECTORY #1      1   DIRECTORY |  06/22/86 13:09:52     DAVE    ├───────────────
  INDEX.DIRECTORY #1     0   DIRECTORY |  05/06/87 11:09:36     WEBB    │   When Dired MENU
  JIM.DIRECTORY  #1      1   DIRECTORY |  03/31/87 12:03:16     suplee  │
  KEITH.DIRECTORY #1     1   DIRECTORY |  04/17/87 10:50:43     KEITH   │to SELECT A FILE LINE
  LAURIE.DIRECTORY #1    2   DIRECTORY |  04/25/86 16:18:17     NELSON  │I Next Undumped File
  LOAD-DISTRIBUTION-TAPE-DIR.DIRECTORY #1  1  DIRECTORY | 11/07/86 10:46:55 JIMK │N Next File with Hogs
  MAILER.DIRECTORY #1    1   DIRECTORY |  09/12/86 10:06:23     DAVE    │Cursor Movement MENU
  MANUAL-OUTLINES.DIRECTORY #1  1  DIRECTORY | 06/23/86 14:43:13  WEBB  │
  MARK.DIRECTORY #1      1   DIRECTORY |  12/12/86 10:26:57     mark    │FILE COMMANDS
  MARTY.DIRECTORY #1     2   DIRECTORY |  09/08/86 09:46:39     MARTY   │E Edit File or Directory
  MATILDA.DIRECTORY #1   1   DIRECTORY |  11/04/86 09:18:41    MATILDA  │C-E Dired + Edit too
  NAME-SERVICE.DIRECTORY #1  2  DIRECTORY |  05/16/86 16:00:46   REL3   │C Copy File
  NETWORK-SUPPORT.DIRECTORY #1  1  DIRECTORY | 12/03/86 16:33:16  LISA  │R Rename File
  ONDOC.DIRECTORY #1     4   DIRECTORY |  06/19/86 10:33:10     WEBB    │V View File [read only]
  PATCH.DIRECTORY #1     1   DIRECTORY |  11/07/86 10:47:05     JIMK    │L Load File
  PCPLUS.DIRECTORY #1    1   DIRECTORY |  11/07/86 10:47:26     JIMK    │P Print Hardcopy
  PCX.DIRECTORY #1       1   DIRECTORY |  11/07/86 10:47:36     JIMK    │= Source Compare
  PIXEL-IMAGE-MODIFICATION.DIRECTORY #1  1  DIRECTORY | 11/07/86 11:04:19 JIMK │$ Toggle Don't Reap
  PRINTER.DIRECTORY #1   1   DIRECTORY |  09/03/86 13:34:30    PRINTER  │# Toggle Don't Supercede
  PROLOG.DIRECTORY #1    1   DIRECTORY |  04/25/86 16:31:50  ACCESS-LIST│@ Toggle Don't Delete
  RALPH.DIRECTORY #1     1   DIRECTORY |  04/25/86 16:33:24     ellis   │, Show File Attributes
  SITE.DIRECTORY #1      3   DIRECTORY |  04/25/86 16:34:08    SYSTEM   │. Change File Properties
  SNA-COMM.DIRECTORY #1  1   DIRECTORY |  08/11/86 14:10:33     SIKES   │
  TEST.DIRECTORY #1      1   DIRECTORY |  04/25/86 16:42:11  ACCESS-LIST│to MARK A FILE
  UBIN.DIRECTORY #1      1   DIRECTORY |  04/25/86 16:45:27    SYSTEM   │F Mark to Edit on Exit
  UNSUPPORTED.DIRECTORY #1  1  DIRECTORY | 04/25/86 16:46:46 ACCESS-LIST│H Mark this File's Hogs
  WEBB.DIRECTORY #1      4   DIRECTORY |  04/25/86 16:47:56   ROSEMARY  │nH Mark all Files' Hogs
  XNS.DIRECTORY  #1      0   DIRECTORY |  04/25/86 16:50:11     ralph   │D Mark to Delete
                                                                       │U Unmark Current Line
                                                                       │RUBOUT Unmark Previous
                                                                       │
                                                                       │DIRECTORY COMMANDS
                                                                       │S Dired Subdirectory
                                                                       │< Dired Superior
                                                                       │A Mark to Apply Function
                                                                       │C-X C-R Revert Directory
                                                                       │Expunge [this] Directory
                                                                       │
                                                                       │to EXIT DIRED
                                                                       │X Execute and Stay
                                                                       │Q Execute and Quit
                                                                       │ABORT Quit [no execute]
ZMACS (Dired) Lima: ~; *.*#* (1)  (RO)    (END to exit)                │Listing Sort MENU

L: Move point, L2: Move to point, M: File operations menu, M2: Sorting menu, R: General Menu, R2: System Menu

05/08/87 07:18:12AM webb          USER:   Keyboard         → Lima: WEBB; IMAGE.XLD#9  0
```

Example   **10.4.1.3** To search for files in Dired that contain hogs (too many old versions), move the mouse cursor within the Dired Suggestions menu until a box appears around the command Next File with Hogs. (Observe the mouse documentation window for a description of the command.) Execute the command either by typing the letter N or by selecting the command with the mouse. Dired then starts searching forward from the cursor position for directory hogs.

If the directory contains hogs (generally files with three or more versions), the first set of hogs moves to the top of the Zmacs window with the keyboard cursor positioned by the oldest version. To continue the search, execute the command again. When no further hogs are found, the display flashes in reverse video, and the message No more hogs appears in the minibuffer.

To mark the hogs for deletion, select the command Mark This File's Hogs or Mark All Files' Hogs. Remember to check the mouse documentation window for command definitions. For more information, refer to the *Explorer Zmacs Editor Reference* manual.

Lisp Functions   10.4.2 You can invoke many of the tasks described in this section by entering Lisp functions in the Lisp Listener. The Lisp Listener evaluates these functions, causing the system to perform the indicated task. Table 10-1 lists the most commonly used functions for to accomplish these tasks. Refer to the *Explorer Input/Output Reference* manual for information about these Lisp functions.

Table 10-1

File and Directory Operations

Zmacs Commands	Lisp Functions
Create Directory	fs:create-directory
Dired	dired
View File	fs:view-file or copy-directory
Copy File, Copy Binary File, or Copy Text File	copy-file
Rename Directory or Rename File	fs:rename-file
Print File	print-file
Delete File and Expunge Directory	delete-file
Expunge Directory	delete-directory
Undelete File	undelete-file
Find File or Load	load, readfile, or fasload

Manipulating Directories and Files

10.5 The paragraphs that follow describe ways to create and manipulate directories and files. The *Explorer Input/Output Reference* manual and the *Explorer Zmacs Editor Reference* manual also provide information about manipulating directories and files.

This manual shows you how to use Zmacs and Dired to manipulate files and directories; refer to the *Explorer Input/Output Reference* manual for information about using Lisp functions for these.

NOTES:

■ When typing a pathname on your local host, you can either type the actual host name or simply type LM for local machine. Your system recognizes either form. However, when accessing files on another host in the network, you must type the actual host name. The examples in these paragraphs use the name LM for local host.

■ Although the displayed messages in these examples are typical, they may not be valid for all circumstances. For example, a given message may differ from one version of a file to another.

Creating Directories **10.5.1** You can create a directory either from the Zmacs editor or from the Lisp Listener. In addition, if you are copying existing files in Dired, you can use the Copy Files command to create a new directory for the copied files.

■ Using Zmacs — Press META-X, then type `create directory` and press RETURN.

For example, to create the directory BD-EYES on your local host, press META-X, type `create directory` and press RETURN. The Create Directory window appears at the bottom of the main screen. Type `lm:bd-eyes;` and press RETURN. The minibuffer displays one of the following messages:

■ `Directory BD-EYES; created.`

■ `Directory BD-EYES; already exists.`

Creating Files **10.5.2** After you have created a directory, you can then use Zmacs to create files within the directory.

Zmacs provides buffers for editing files. Files are stored on a disk and Zmacs does not edit these files. Any time you want to edit a file, Zmacs copies the file into a buffer in virtual memory and you work with the copy. Therefore, creating files involves editing a buffer and storing the completed buffer in a disk file.

To create a file in the Zmacs editor, press META-X, type `find file`, and press RETURN. Type the pathname (including the file type) of the new file and press RETURN. The Zmacs editor creates the file and displays the message `(New File)` in the minibuffer.

For example, to create the file WILLIAMS in the directory BD-EYES, press META-X, `find file` and press RETURN. Type `lm:bd-eyes;williams.text` and press RETURN. The Zmacs editor creates the new file, displays the message `(New File)` in the minibuffer, and places the keyboard cursor at the top of the Zmacs buffer.

Creating **10.5.2.1** To create text in your file, start typing at the keyboard cursor.
Text in a File Each time you reach the end of a line while typing your text, press RETURN to position the cursor at the beginning of the next line. Remember that you are not working in an actual file but only in a copy of the file in a Zmacs buffer. If you work with the Suggestions menu on at times and off at other times, leave enough room at the right margin for the Suggestions menu. After you have completed your text, save the file to a disk before exiting the buffer as explained in paragraph 10.5.2.2, Saving a File.

Saving a File **10.5.2.2** The Zmacs editor provides several ways to save a buffer to a disk file. The following commands are available from the Suggestions menu or by entering the indicated keystroke sequence:

■ CTRL-X CTRL-S Save File — This command writes the buffer to the currently selected (default) file specified by the mode line of the Zmacs minibuffer. Each time you save the file with this file name, you create a new version of the file (you do not overwrite a previous version). Save File does not allow you to rename a file.

For example, to save LM:BD-EYES;WILLIAMS.TEXT> to the default file, press CTRL-X CTRL-S or select the command CTRL-X CTRL-S Save File from the Suggestions menu. The minibuffer displays the following message:

```
Written: LM:BD-EYES;WILLIAMS.TEXT#1 -- XX characters.
```

This message indicates that the buffer has been written to the default file and that it contains *xx* number of characters.

■ CTRL-X CTRL-W Write File — This command allows you to write the buffer to either the default file or to another file that you specify. After you enter the command, a prompt in the minibuffer asks you to type a filename and press RETURN or to simply press RETURN to choose the default file.

For example, to save LM:BD-EYES;WILLIAMS.TEXT#> to a new file, press CTRL-X CTRL-W or select the command CTRL-X CTRL-W Write File from the Suggestions menu. The mode line reads as follows:

```
Write buffer WILLIAMS.TEXT#> BD-EYES;LM: to file (Default is
LM:BD-EYES;WILLIAMS.TEXT#> (Completion)
```

Enter the name of another file and press RETURN. The minibuffer then returns a message indicating that the buffer has been written to the specified file.

Clearing a
Zmacs Buffer
10.5.2.3 After you have saved a buffer to a disk file, the buffer remains active in the Zmacs editor until you perform a kill operation. The kill operation clears the buffer (deactivates it) but does not affect the data that you have saved to the disk file. Since this is a destructive command, you should use it only after you have saved your buffer. Although this operation is sometimes desirable, it is not absolutely necessary; you can keep a number of buffers active. To see the options for killing and saving, click right to bring up the Buffer Commands menu in Zmacs.

NOTE: The foregoing paragraphs explained how to create and save the file WILLIAMS in the directory BD-EYES. Examples in the paragraphs that follow use the file WILLIAMS as well as the files ZAVALA and SNOWDEN. You may wish to create these files in directory BD-EYES before continuing.

Viewing Directories **10.5.3** The Explorer system offers several ways to view directories and subdirectories. These include Dired, the Zmacs editor, and the Lisp Listener.

■ Using Dired — Invoke Dired by pressing CTRL-X CTRL-D. Using Dired commands, type the name of the directory you wish to view in the minibuffer. Press RETURN.

For example, to view the directory BD-EYES on your local host, first invoke Dired. Then type lm:bd-eyes; and press RETURN. The system displays the directory in the Zmacs buffer.

■ Using Zmacs Suggestions — Select the File Menu item from the Basic menu list in the Zmacs Suggestions menu. The File menu contains the following mouse-selectable commands:

■ List All Directory Names — Displays a list of all top-level directories on a specified host.

For example, to view all directories on your local host, select the List All Directory Names command. Then type lm: and press RETURN. The system displays a list of the directories in the Zmacs buffer.

■ View [any] Directory — Lists the contents of a specified directory.

For example, to view the directory BD-EYES on your local host, select the View [any] Directory command. Then type lm:bd-eyes: and press RETURN. The system displays in the Zmacs buffer a list of the files and subdirectories of directory BD-EYES.

■ View Login Directory — Lists the contents of the current user's login directory.

For example, to view your login directory, select the View Login Directory command. The system displays your directory.

■ List Files [short form] — Lists the next level under a directory (both files and subdirectories) as shown in Figure 10-3. (By using *; for the root directory, you can list all top level directories.)

For example, to view the contents of directory BD-EYES on your local host, select the List Files [short form] command. Then type lm:bd-eyes; and press RETURN. The system displays the files of the directory along with their types and versions.

Figure 10-3 Typical Directory Listing Displayed by List Files

```
Lima: *; *.*#*
ALVIN.DIRECTORY #1          CRASH.DIRECTORY #1              Zmacs:
DAVE.DIRECTORY #1           FARR.DIRECTORY #1             Find Commands
FONTS.DIRECTORY #1          GLOSSARY.DIRECTORY #1          List Menus
HELP.DIRECTORY #1           INDEX.DIRECTORY #1               Undo
JIM.DIRECTORY  #1           KEITH.DIRECTORY #1               Help
LAURIE.DIRECTORY #1         LOAD-DISTRIBUTION-TAPE-DIR.DIRECTORY #1   Lisp Expressions
MAILER.DIRECTORY #1         MANUAL-OUTLINES.DIRECTORY #1     Menu Tools
MARK.DIRECTORY #1           MARTY.DIRECTORY #1           Suggestions Menus Off
MATILDA.DIRECTORY #1        NAME-SERVICE.DIRECTORY #1     Sensitive Typeout Menu
NETWORK-SUPPORT.DIRECTORY #1   ONDOC.DIRECTORY #1        <Mouse-Sensitive Items>
PATCH.DIRECTORY #1          PCPLUS.DIRECTORY #1
PCH.DIRECTORY  #1           PIXEL-IMAGE-MODIFICATION.DIRECTORY #1   SPACE Remove Typeout
PRINTER.DIRECTORY #1        PROLOG.DIRECTORY #1
RALPH.DIRECTORY #1          SITE.DIRECTORY #1
SNA-COMM.DIRECTORY #1       TEST.DIRECTORY #1
UBIN.DIRECTORY #1           UNSUPPORTED.DIRECTORY #1
WEBB.DIRECTORY #1           XNS.DIRECTORY  #1
■
```

Viewing Files 10.5.4 Viewing files enables you to examine but not change the contents of files. To view files, you can use either Dired, the Zmacs editor, or the Lisp Listener.

■ Using Dired — Enter Dired for the directory of the file you wish to view, position the keyboard cursor on the line that lists the file, and type v. Dired loads the file into a read-only Zmacs buffer for you to examine.

For example, to view the file WILLIAMS in the directory BD-EYES, invoke Dired for the directory LM:BD-EYES. Position the keyboard cursor on the line that reads as follows:

```
WILLIAMS.TEXT...
```

Type v. The WILLIAMS file appears in the Zmacs minibuffer, and the mode line reads:

```
Viewing LM:BD-EYES;WILLIAMS.TEXT#1
```

■ Using Zmacs — Press META-X, type view file, and press RETURN. Then type the pathname of the file you wish to view and press RETURN. The selected file appears in the Zmacs buffer.

For example, to view the file ZAVALA in the directory BD-EYES, press META-X to enter the Zmacs minibuffer, type view file, and press RETURN. Then type lm:bd-eyes;zavala and press RETURN. The ZAVALA file appears in the Zmacs buffer.

Copying Directories

10.5.5 You can copy several directory levels at once. Also, you can copy all files within a single directory level by specifying the wildcard characters *.*#* for the name, type, and version. (Paragraph 10.5.6, Copying Files, provides more information on copying files.)

NOTE: Copying a directory into an existing directory can destroy the contents of the existing directory when you use the overwrite option or when the destination is a UNIX host. Therefore, it is a good idea to create a new directory when practicing the use of this function.

Copying Files

10.5.6 To copy a single file, you can use either Dired, Zmacs, or a Lisp Listener. Zmacs and the Lisp Listener also allow you to copy multiple files.

■ Using Dired — With the Dired command C, mark the file you wish to copy. Dired prompts you for the name of the new file. You can place the file into a directory that already exists or, if the directory you specify does not exist, you can create it.

Example:

To copy the file LM:CLASS;SNOWDEN.TEXT#1 into the file LM:SMITH;JOHN.TEXT#1, press CTRL-X CTRL-D to invoke Dired. Then type lm:class; and press RETURN. The directory pathname LM:CLASS;*.*#* appears in the Zmacs buffer. Mark the file SNOWDEN with C for copy. When a prompt appears in the minibuffer asking for a new file pathname, type lm:smith;john. and press RETURN. The following message appears in the minibuffer:

```
Directory not found for LM:SMITH;JOHN.TEXT#1
Create the directory? (Y or N)
```

Type y for yes. Another message appears indicating that the new directory has been created and the file has been copied into it.

■ Using Zmacs — Use the Copy File, Copy Binary File, or Copy Text File command, depending on the type of file you are copying. You can copy all the files in one directory level by using wildcard characters in your response.

Example:

To copy the file LM:CLASS;WILLIAMS.TEXT#1 into the file LM:SMITH;BOBBY.TEXT#1, press META-X, type `copy text file`, and press RETURN. A prompt appears in the minibuffer asking for the file you wish to copy. Type `lm:class;williams.text#1` and press RETURN. Another prompt appears asking for the new file pathname. Type `lm:smith;bobby.text#1` and press RETURN. The following message appears in the minibuffer:

```
Copied LM:CLASS;WILLIAMS.TEXT#1 to
LM:SMITH;BOBBY.TEXT#1
```

Renaming Directories

10.5.7 To rename a directory, enter Dired for the parent directory, position the keyboard cursor on the line that lists the directory to be renamed, and press R. Dired then prompts you for the new name of the directory. The fs:rename-file function also allows you to rename a directory.

NOTE: When renaming a directory, ensure that the new name you choose is not an existing directory name.

For example, to change the name of the directory CLASS to GOODGUYS, invoke Dired. Then type `lm:*;` and press RETURN. The Zmacs buffer displays the directory LM:~;*.*#* (the parent directory of CLASS). Mark the CLASS directory with R for rename. A prompt appears in the minibuffer asking for the new directory name. Type `lm:~;goodguys.directory#1` and press RETURN. The following message appears in the Zmacs minibuffer:

```
File renamed to LM:~;GOODGUYS.DIRECTORY#1
```

Renaming Files

10.5.8 You can use either Dired, Zmacs, or the Lisp Listener to change the name of a file.

■ Using Dired — With the Dired command R, mark the file you wish to rename. The minibuffer prompts you for the new filename.

For example, to change the filename LM:GOODGUYS;SNOWDEN to the filename LM:GOODGUYS;SMILEY, invoke Dired for the directory named LM:GOODGUYS and mark the file SNOWDEN with an R. In the minibuffer, a prompt appears asking you to enter the new filename. Type `lm:goodguys;smiley.text#1` and press RETURN. The following message appears in the minibuffer:

```
File renamed to LM:GOODGUYS;SMILEY.TEXT#1
```

■ Using Zmacs — Press META-X, type the command `rename file`, and press RETURN. You can use wildcard characters to rename several files at once.

For example, to change the filename LM:GOODGUYS;WILLIAMS to the filename LM:GOODGUYS;WHITE-HAT, press META-X, type `rename file` in the Zmacs minibuffer and press RETURN. A prompt appears in the minibuffer asking for the name of the file to be renamed. Type `lm:goodguys;williams.text#1` and press RETURN. Another prompt appears asking for the new file pathname. Type `lm:goodguys;white-hat.text#1` and press RETURN. The following message appears in the minibuffer:

```
LM:GOODGUYS;WILLIAMS.TEXT#1 renamed to
LM:GOODGUYS;WHITE-HAT.TEXT#1
```

Printing Directories

10.5.9 To print a directory, you can either use Zmacs or print the screen image of a directory listed on the video display.

■ Using Zmacs — Display the directory in a Zmacs buffer. Then press META-X, type `print buffer`, and press RETURN.

For example, to print the directory LM:GOODGUYS, display the directory in a Zmacs buffer. Then press META-X, type `print buffer` in the Zmacs minibuffer, and press RETURN. The system prints the buffer on its default printer.

■ Printing a Screen Image — To print a screen image of a directory, display the directory in a Zmacs buffer and press TERM Q.

For example, to print the directory LM:GOODGUYS; display the directory in a Zmacs buffer and press TERM Q. The system displays a menu of Print Image Screen Parameters to choose from. After you have chosen the desired parameters or have accepted the default values, select the Do It item. The system sends the screen image to the selected printer.

For further information about printing directories, see Section 13, Printing Files and Screens.

Printing Files

10.5.10 You can use either Dired, Zmacs, or the Lisp Listener to print the contents of a character file. Other types of files require different functions. Section 13, Printing Files and Screens, provides information about printing other types of files. You can specify any file or any host your machine recognizes for printing. However, the print server must also recognize that host. Otherwise, the print server receives an error.

NOTE: All methods of printing described here use your system default printer. To change the default printer or to specify another printer as your output device, see paragraph 9.4, Specifying a Default Printer.

■ Using Dired — With the Dired command P, mark the file(s) you wish to print. After you mark all desired files, press X to execute marked entries. Answer yes to the prompt Print? (Y or N). Dired sends the file or files to the default printer.

For example, to print the file LM:GOODGUYS;WHITE-HAT, use Dired to display the directory LM:GOODGUYS, mark the file WHITE-HAT with a P, and press X to execute (the marked entry). The prompt Print? (Y or N) appears. Type y for yes. Dired sends the file to the default printer.

■ Using Zmacs — Press META-X, type print file, and press RETURN. You can use wildcard characters to print several files at once.

For example, to print the file LM:GOODGUYS;PAL, press META-X, type print file, and press RETURN. A prompt appears asking for the name of the file to print. Type lm:goodguys;pal.text#1 and press RETURN. The system sends the file to the default printer.

Deleting Files   10.5.11 Deleting a file from an Explorer system does not actually remove it from the system. To remove the file from the system and free its space, you must expunge the file from its parent directory. After marking a file for deletion, you can undelete it at any time before you expunge the directory. You can use either Dired, Zmacs, or the Lisp Listener to delete a file.

Systems that do not provide the expunge operation (for example, VAX and VMS), remove the file when it is marked for deletion.

■ Using Dired — Use Dired to display the directory of the files to be deleted. With the Dired command D, mark the file(s) you wish to delete, then press press X to execute (what is marked). Dired lists the files you have marked for deletion and asks you to confirm that you wish to delete them.

For example, to delete the file LM:SMITH;BOBBY, use Dired to display the directory LM:SMITH. Mark the file BOBBY with the letter D and press X. The prompt Delete? (Y, N, or E) appears. Press E for expunge. The system deletes the file and displays the message x blocks freed. in the Zmacs minibuffer.

■ Using Zmacs — Press META-X, then type delete file, and press RETURN. You can use wildcard characters to delete several files at once.

For example, to delete the file LM:SMITH;JOHN, type META-X delete file in the Zmacs minibuffer and press RETURN. A prompt appears asking for the name of the file to be deleted. Type lm:smith;john and press RETURN. The system marks the file for deletion and displays the message LM:SMITH;JOHN.TEXT#1 deleted. Expunging the directory removes the file from the system.

Deleting Directories   10.5.12 Removing directories from the Explorer system requires two operations. First you mark a directory for deletion, and then you perform an expunge operation to actually remove the directory from the system. Only empty directories can be removed from the system. Systems that do not provide the expunge operation (for example, VAX and VMS) remove the directory when it is marked for deletion.

To mark an empty directory for deletion, use Dired to display the parent directory in a Zmacs buffer, mark the directory with a D, and press END. Dired lists the directories you have marked for deletion and asks you to confirm that you wish to delete them.

For example, to delete the directory LM:SMITH, use Dired to display the parent directory LM:~;*.*#*. Mark the directory SMITH with a D and press END. The prompt Delete? (Y,N, or E) appears. Answer E for expunge. Dired removes the directory from the system.

NOTE: You can also enter the Expunge Directory command in Zmacs to remove a directory from the system. You typically use this method only if you have used the Delete File command in Zmacs to mark a file for deletion.

Undeleting Files

10.5.13 If you accidentally mark a file for deletion, you can *undelete* the file before expunging the directory. You can use either Dired, Zmacs, or the Lisp Listener to undelete a file.

■ Using Dired — Enter Dired for the directory of the file you wish to undelete and then use either the Undelete Forward command (U) or the Reverse Undelete command (RU3OUT) as follows:

  ■ Undelete Forward — Position the keyboard cursor on the line with the file marked for deletion and press U. The D by the file is erased.

  ■ Reverse Undelete — Position the keyboard cursor on the line below the line with the file marked for deletion and press RUBOUT. The D is erased.

■ Using Zmacs — Press META-X, then type undelete file, and press RETURN. You can use wildcard characters to undelete several files at once.

Protecting Directories and Files

10.5.14 Dired offers special flag commands that can protect your directories and files from accidental deletion or replacement. To use these flag commands to protect your directories and files, use Dired to display the parent directory of the file or directory you wish to protect. Mark the file or directory with one of the following flags:

■ Don't Delete (@) — Prevents the file or directory from being deleted

■ Don't Supersede (#) — Prevents the creation of newer versions of a file

■ No Reap ($) — Prevents the deletion of excess versions of a file (for example, hogs)

After marking a file or directory with one of the special flags, you can remove the flag by positioning the cursor next to the file or directory and pressing the key again. For example, if you have protected a file from deletion by pressing @, you can remove the delete protection by pressing @ again.

Editing Files   10.5.15 You can use either Dired or Zmacs to edit files. After you edit a buffer, you must save the edited buffer to a file to retain the new information.

■ Using Dired — With Dired command E, mark the file you wish to edit. Dired loads the file into a Zmacs buffer and selects it for you to examine and modify. Remember that any time you edit a buffer, you must save it to a disk file if you want to keep it.

NOTE: The minibuffer messages described in the following examples are based on the assumption that there is only one version of each file. If a file has more than one version, the message may be different.

For example, to edit the file LM:GOODGUYS;DIPLOMAT, enter Dired for the directory LM:GOODGUYS and mark the DIPLOMAT file with the Dired command E. The buffer for the selected file appears on the screen, and the Zmacs minibuffer reads as follows:

```
ZMACS (Text) DIPLOMAT.TEXT#> GOODGUYS;LM: (1)
Type META-CTRL-L to return to DIRED
```

You can either edit the buffer or press the keystroke META-CTRL-L to return to the parent directory.

■ Using Zmacs — Press META-X, type find file, and press RETURN. If a buffer does not already exist for the file, this command creates a new buffer for the file; otherwise, it selects the specified buffer.

For example, to edit the file LM:GOODGUYS;WHITE-HAT, press META-X, type find file, and press RETURN. A prompt appears in the Zmacs minibuffer asking for the name of the file to edit. Type the pathname lm:goodguys;white-hat.text and press RETURN. The buffer for the selected file appears on the screen and the minibuffer reads as follows:

```
ZMACS (Text) WHITE-HAT.TEXT#> GOODGUYS;LM: (1)
```

Saving Edited Files   10.5.16 After you edit a file, you must save the edited buffer to keep the changes. You can use either of the following Zmacs commands to save a buffer:

■ Save File (CTRL-X CTRL-S) — Automatically saves the file to the pathname of the buffer

■ Write (CTRL-X CTRL-W) — Prompts you for the pathname to which you want the file saved

To use the Kill or Save Buffers menu to save a buffer, select the menu as instructed in the mouse documentation window, and mark each buffer to be saved in the Save choice box.

Loading Files   10.5.17 Programs are typically stored in files. Program files are of two distinct types—LISP files contain Lisp source code; XLD files contain code created by the Lisp compiler and can be loaded into your system more quickly than Lisp-type files. You can use one of the following methods to load a file:

■   Using Dired — With the Dired command L, mark the file you wish to load. The system loads the file.

■   Using Zmacs — Press META-X, type load file, and press RETURN.

Maintaining   10.6 A file band is one or more disk partitions that contain either all or a
File Bands   portion of the file system. File bands require several types of maintenance. Refer to the *Explorer Input/Output Reference* manual for more information about maintaining file bands.
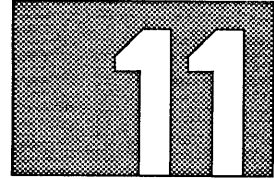
TAPE OPERATIONS

Introduction

11.1 The Explorer system supports two types of magnetic tape devices: ¼-inch streaming tape cartridge and ½-inch streaming tape. Both are supported by the system backup utilities; however, not all of the system backup utilities are supported on the ½-inch tape. The ½-inch tape cannot be used with the following tape operations: Retension, Make Bootable Tape, Restore Bootable Tape, Restore Symbolics Carry, Verify Bootable Tape, and Load Distribution Tape.

The ½-inch tape can be used with user-written applications to extract data from ½-inch tapes written by other computers; to create such an application, you need to know the exact format of the data on the tape. Two formats of ¼-inch tape are supported: Explorer ¼-inch tape is fully supported by the system backup utilities, and Symbolics carry tape is usable for carry tape operations.

This section explains the basic concepts of tape operations and describes how to use the Backup System window. Appendixes B and C provide information about using and maintaining the tape drives.

Using Tape

11.2 Although Winchester disks are reliable devices, it is usually a good idea to make backup copies of their contents. The Explorer backup system uses magnetic tape devices that allow you to create archival copies and ensure that valuable information is not lost because of system problems. The tape backup system enables you to transport data between systems that are not connected by a network and to deliver new data or software releases to established sites.

When using a tape cartridge, keep in mind the following limitations and requirements:

- You can append to tape only at the end of recorded media (EORM).

- Overwriting of data can be done only by writing from the beginning-of-tape (BOT).

- The commands that verify and restore data use the data immediately after the current read/write head position instead of searching for a pathname on the tape. Therefore, the tape must be explicitly positioned before you verify or restore data.

- You should rewind the tape before removing the cartridge from the drive. This procedure prevents damage to the recorded media during storage or transport.

Backup
System Window

11.3 The SYSTEM B keystroke invokes the Backup System window. This window consists of a Backup Command menu and a typeout pane. The typeout pane displays messages in response to commands selected from the menu. Choose-variable-values menus are displayed to request additional information when required. Figure 11-1 shows a typical backup system window.

To get online information about each command, box the command with the mouse and observe the mouse documentation window. Also, for those commands that invoke a menu, use the same method to get information about each menu item.

Figure 11-1 Typical Backup System Window

Backup System

```
PREPARE-TAPE complete.
Rewinding ... REWIND complete.
Listing contents ...
   1 Lina.ti-7: BEV; LOGIN-INIT.LISP#1                              1      380 (8)  04/23/86 10:08:59 BEV
   2 Lina.ti-7: DALLAS; FLAVOR-INSPECTOR.XFASL#6                   198   101120 (16) 02/20/86 14:01:35 [304,34
]
   3 Lina.ti-7: DAVE; A.LISP#1                                       1       33 (8)  04/04/86 12:22:45 MARK
   4 Lina.ti-7: DAVE; BABYL.TEXT#10                                  5     5075 (8)  04/22/86 09:14:44 DAVE
   5 Lina.ti-7: DAVE; C-CURVE1.LISP#2                                4     3579 (8)  03/26/86 09:03:40 LAURIE
   6 Lina.ti-7: DAVE; LOGIN-INIT.LISP#1                              1      304 (8)  03/03/86 13:45:33 New-Use
r
   7 Lina.ti-7: DAVE.SCIENCE; DINO.TEXT#14                           2     1490 (8)  03/31/86 14:39:57 DAVE
   8 Lina.ti-7: DEBUG-UTILITIES; DEFSYSTEM.LISP#23                   1     1005 (8)  06/05/85 11:00:37 SYSTEM
   9 Lina.ti-7: DEBUG-UTILITIES; INSPECT.LISP#255                   60    60922 (8)  06/05/85 11:00:40 SYSTEM
  10 Lina.ti-7: DEBUG-UTILITIES; INSPECT-SUGG.LISP#10               5     4242 (8)  06/05/85 11:00:45 SYSTEM
  11 Lina.ti-7: DEBUG-UTILITIES; PEEK.LISP#250                     34    33910 (8)  06/05/85 11:00:47 SYSTEM
  12 Lina.ti-7: DEBUG-UTILITIES; STEP.LISP#107                     20    19715 (8)  06/05/85 11:00:51 SYSTEM
  13 Lina.ti-7: DEBUG-UTILITIES; WINDOW-DEBUG.LISP#205             54    55205 (8)  06/05/85 11:00:54 SYSTEM
  14 Lina.ti-7: EH; EH.LISP#370                                   130   132414 (8)  06/05/85 14:07:40 SYSTEM
  15 Lina.ti-7: EH; EHC.LISP#256                                   69    70267 (8)  06/05/85 14:08:07 SYSTEM
  16 Lina.ti-7: EH; EHF.LISP#238                                  127   129757 (8)  06/05/85 14:08:13 SYSTEM
  17 Lina.ti-7: EH; UCL-EHC.LISP#18                                34    34477 (8)  06/05/85 14:08:23 SYSTEM
  18 Lina.ti-7: FARR; BABYL.TEXT#16                                44    44085 (8)  04/24/86 18:31:33 FARR
  19 Lina.ti-7: FARR; JUNK.LISP#1                                   1      808 (8)  04/23/86 16:18:30 FARR
  20 Lina.ti-7: FARR; OUTLINE.TEXT#3                                5     4422 (8)  04/14/86 15:06:42 WEBB
  21 Lina.ti-7: FILE; CLEAR.LISP#1                                  3     2129 (8)  06/05/85 14:09:27 SYSTEM
  22 Lina.ti-7: FILE; COPY.LISP#145                               30    30625 (8)  06/05/85 14:09:29 SYSTEM
  23 Lina.ti-7: FILE; FS.LISP#83                                   3     2683 (8)  06/05/85 14:09:36 SYSTEM
  24 Lina.ti-7: FILE; FSDEFS.LISP#195                             34    34718 (8)  06/05/85 14:09:38 SYSTEM
  25 Lina.ti-7: FILE; FSGUTS.LISP#424                             93    94328 (8)  06/05/85 14:09:42 SYSTEM
  26 Lina.ti-7: FILE; FSNAME.LISP#117                              8     8092 (8)  06/05/85 14:09:50 SYSTEM
  27 Lina.ti-7: FILE; FSSTR.LISP#3                                16    16172 (8)  06/05/85 14:09:52 SYSTEM
  28 Lina.ti-7: FILE; HOGS.LISP#3                                  1      807 (8)  06/05/85 14:09:55 SYSTEM
  29 Lina.ti-7: FILE; LMPARS.LISP#110                             21    21132 (8)  06/05/85 14:09:58 SYSTEM
  30 Lina.ti-7: FILE; LOGIN.LISP#25                                3     2900 (8)  06/05/85 14:10:01 SYSTEM
  31 Lina.ti-7: FILE; SERVER.LISP#158                             53    53394 (8)  06/05/85 14:10:04 SYSTEM
  32 Lina.ti-7: FILE; VBAT.LISP#8                                 13    13058 (8)  06/05/85 14:10:09 SYSTEM
  33 Lina.ti-7: FONT-EDITOR; COMMANDS.LISP#12                     42    42499 (8)  06/05/85 14:10:17 SYSTEM
  34 Lina.ti-7: FONT-EDITOR; DEFSYSTEM.LISP#20                     2     1811 (8)  06/05/85 14:10:21 SYSTEM
  35 Lina.ti-7: FONT-EDITOR; EDITOR.LISP#5                       183   186587 (8)  06/05/85 14:10:24 SYSTEM
  36 Lina.ti-7: FONT-EDITOR; EXTRAS.LISP#2                         6     5128 (8)  06/05/85 14:10:37 SYSTEM
  37 Lina.ti-7: FONT-EDITOR; FNTCNV.LISP#87                       75    76654 (8)  06/05/85 14:10:39 SYSTEM
  38 Lina.ti-7: FONT-EDITOR; FNTDEF.LISP#20                        4     3671 (8)  06/05/85 14:10:45 SYSTEM
  39 Lina.ti-7: FONT-EDITOR; H-BUILD-FED.LISP#251               214   218584 (8)  06/05/85 14:10:48 SYSTEM
  40 Lina.ti-7: FONT-EDITOR; H-BUILD-FED-CHANGES.LISP#271        41    41747 (8)  06/05/85 14:11:02 SYSTEM
  41 Lina.ti-7: FONT-EDITOR; INSTANCE.LISP#3                       3     2121 (8)  06/05/85 14:11:07 SYSTEM
  42 Lina.ti-7: FONTS; COURIER.XFASL#1                             3     1474 (16) 06/05/85 14:11:44 SYSTEM
  43 Lina.ti-7: FONTS; ILGREEK10.XFASL#3                           5     2148 (16) 03/11/86 14:11:22 PAM
  44 Lina.ti-7: FONTS; ILMATHA10.XFASL#1                           5     2151 (16) 02/25/86 10:51:30 WEBB
  45 Lina.ti-7: FONTS; ILMATHB10.XFASL#1                           4     1996 (16) 02/19/86 07:43:08 WEBB
  46 Lina.ti-7: FONTS; ILOLD.XFASL#1                               3     1424 (16) 03/05/86 08:24:51 KENB
  47 Lina.ti-7: FONTS; ILSYMBOLS10.XFASL#4                         5     2407 (16) 03/10/86 13:37:37 PAM
  48 Lina.ti-7: FRANCES; BUG-INIT.TEXT#1                           1       59 (8)  03/19/86 09:03:27 FRANCES
  49 Lina.ti-7: FRANCES; LOGIN-INIT.LISP#1                         1      425 (8)  03/12/86 09:48:34 FRANCES
□*MORE**
```

Backup Typeout Window

Read the rest of the entire tape, displaying all file and partition headers until the end of recorded media is encountered.

04/16/87 02:55:45PM WEBB   USER: Keyboard

Quarter Inch Tape Menu

Prepare Tape
Unload Tape
Load Tape

Erase Entire Tape
Re-Tension

Rewind
Prepare to Append
Position Past File (EOF)
Position Past Blocks

List Contents
List Directory

Backup File
Backup Directory
Backup Partition
Make Bootable Tape

Restore File
Restore Directory
Restore Partition
Restore Bootable Tape

Verify File
Verify Directory
Verify Partition
Verify Bootable Tape

Load Distribution Tape

Write EOF

Help
Exit

Basic Tape Operations

11.4 Basic tape operations include tape drive preparation and tape manipulation, such as loading, erasing, and positioning a tape. The examples in these paragraphs include Explorer display messages. These are typical messages that may change depending on the exact state of the hardware and on the software installed at a given time.

Table 11-1 lists the menu entries and corresponding Lisp functions for tape operations. See the *Explorer Input/Output Reference* manual for more information on these Lisp functions.

Table 11-1

Tape Operations

Menu Entries	Lisp Functions
Prepare Tape	mt:prepare-tape
Unload Tape	mt:unload
Retension	mt:tension
Erase Entire Tape	mt:erase
Rewind	mt:rewind
Prepare to Append	mt:space-to-append
Position Past File (EOF)	mt:space-to-eof
Position Past Blocks	mt:space-blocks
Write EOF	mt:write-eof
List Contents	mt:list-contents
Backup File	mt:backup-file
Verify File	mt:verify-file
Restore File	mt:restore-file
Backup Directory	mt:backup-directory
Verify Directory	mt:verify-directory
Restore Directory	mt:restore-directory
Backup Partition	mt:backup-partition
Verify Partition	mt:verify-partition
Restore Partition	mt:restore-partition
Load Distribution Tape	mt:load-distribution-tape

Preparing the Tape Drive

11.4.1 Before using a tape drive for tape operations, use the Prepare Tape command to set the tape system for the proper operating mode. Select this command at the following times:

■ When you use the tape drive for the first time after booting the system

■ After cycling power on the mass storage enclosure that contains the tape drive

The Prepare Tape command prepares the system for tape operations by searching for an online tape drive, assigning it as the current tape unit, and selecting the tape operating mode. When you select the Prepare Tape command, the system prompts you for the type of tape device: $\frac{1}{4}$-inch streaming tape, $\frac{1}{4}$-inch carry tape, or $\frac{1}{2}$-inch tape.

When you select the proper tape option (normally $\frac{1}{4}$ streaming), the system sets the formatter for the selected operating mode and displays a message similar to the following:

```
Tape prepared: SETUP-QUARTER-INCH-TAPE format. PREPARE-TAPE complete.
```

Unloading and Loading Tape

11.4.2 Under certain circumstances, such as when you remove a tape cartridge from the drive, you may need to place the tape drive in its offline condition. The following commands allow you to remove a tape drive from and/or restore it to its online condition:

■ Unload Tape — Rewinds the tape to the BOT and places the tape drive offline. When you select the Unload command, the system displays a message stating that the unload operation is complete.

■ Load Tape — Restores the tape drive to its online condition and rewinds the tape. When you select this command, the system displays a message stating that the load operation is complete.

If, after unloading a tape, you decide not to remove the tape cartridge from the drive, you must select the Load command to restore the drive to its online condition before performing any other tape operations.

Adjusting Tape Tension

11.4.3 The Retension command moves the tape to its physical end, then rewinds it to the BOT. This operation ensures that the tape tension is uniform throughout the reel. When you select the Retension command, the system displays a message stating that the operation is complete.

Retensioning is required any time a Media Error message occurs or when the tape cartridge has been exposed to extreme temperature conditions. This process may take several minutes depending on the length of the tape.

Erasing a Tape

11.4.4 Circumstances such as a need for data security or a change of recording format may result in a need to erase an entire tape rather than writing over existing data. Erasing a tape, which literally deletes all data from the tape, can take several minutes. When you select the Erase Entire Tape command, the system asks whether you want to delete everything on the tape.

If you type *yes* and press RETURN, the system rewinds the tape. After erasing the entire tape, the system rewinds the tape again and displays a message stating that the erase process is complete.

If you type *no* and press RETURN, the system cancels the erase operation.

Positioning a Tape

11.4.5 Before performing any tape operations, you must position the tape to the proper starting point. This point can be at the beginning of tape (BOT), at the end of a specified file or directory, or at the end of record medium (EORM). The Tape Backup Command menu provides the following tape-positioning commands:

■ Rewind — Moves the tape to the BOT position. When you select this command, the system displays a message stating that the operation is complete. (Each time you insert a tape cartridge in the drive, the tape is automatically rewound.)

■ Prepare to Append — Moves the tape forward past the EORM (the last EOF), leaving it positioned to append data to the existing media. When you select this command, the system displays a message stating that the operation is complete.

■ Position Past File (EOF) — Moves the tape forward past a specified number of EOF markers. Selection of this command invokes a menu that asks the number of EOFs to skip. Type the number you desire, press RETURN, then select the Do It item. The system displays a message stating that the operation is complete.

When using the Position Past File (EOF) command, note that tape directories have two EOFs.

CAUTION: The command described next (Position Past Blocks) can leave the tape positioned in the middle of a file or partition, causing the system to lose track of the file or partition header information. However, you can recover from this condition by using one of the other positioning commands.

■ Position Past Blocks — Moves the tape forward a specified number of blocks or to the next EOT, whichever comes first. The command has no practical application for the general user, and its use can cause the loss of recorded information. Therefore, the Position Past Blocks command is not recommended for general use.

Marking a Logical Backup

11.4.6 A single tape directory can contain files from one or more file system directories. Thus, a tape directory is sometimes called a *logical backup* to distinguish it from a file system directory. A tape directory consists of all files or partitions between the BOT and the first double EOF marker, or between any two consecutive double EOF markers.

On a backup tape, a single EOF follows each file and each partition. An extra EOF marker at the end of a group of backed-up data delimits the group, thus marking the end of a logical backup. The contents of each logical backup are listed separately by a List Contents command; a single Restore Directory command restores the entire contents of a logical backup.

A backup operation automatically writes one EOF marker at the end of each file or partition. To create a logical backup, do either of the following:

■ Execute a Write EOF command at the completion of a normal Backup command.

■ Request an EOF during execution of a Backup Directory command.

Listing the Tape Contents

11.4.7 Before using a tape for backup operations or any other write operations, you should examine it to determine its current contents. A tape can contain any combination of the following information:

■ Single files delimited by single EOF markers.

■ Directories with their files and with or without their subdirectories. Each file is delimited by a single EOF.

■ Partitions delimited by single EOF markers.

■ Logical backups delimited by double EOF markers.

The Backup Command menu provides the following commands for examining the contents of a tape:

■ List Contents — Reads the contents of the tape from the current tape position to the next double EOF and lists the file and/or partition headers. The system asks you whether to continue. If you type *y* for yes, the system continues to read to the next double EOF and again displays the Double EOF message. Thus, to list the entire tape contents, rewind the tape, select the List Contents command, and type *y* at each double EOF. If you type n in response to the Double EOF message, command execution terminates.

■ List Directory — Reads the contents of a logical backup from the current tape position to the next double EOF and lists the file and partition headers. Thus, to list an entire logical backup, use the positioning commands to position the tape at the beginning of the logical backup, then select the List Directory command.

Backup Operations

11.5 Each command in the Backup, Verify, and Restore groups invokes a menu of pathnames and options. To execute one of these commands, select the command from the Backup Command menu, enter the appropriate pathname(s), choose the desired options, and select the Do It item. The system initiates command execution and displays a message that describes the operation in progress.

Upon completion of command execution, the system displays other messages that indicate command completion and status.

After completing a backup operation, you should rewind the tape and select one of the verify commands to ensure that the operation was successful.

Backing Up a File

11.5.1 The Backup File command copies a single file from the file system to tape. You can select a file from the local host file system or any other file system on the network.

For example to back up the file BR:DOE;JANE.TEXT, perform the following steps:

1. Use the positioning commands to move the tape to the position at which you want the backup to begin (usually at the EORM).

2. Select the Backup File command to invoke the Backup File menu.

3. Type the pathname br:doe;jane.text in the pathname field, and press RETURN. You can either specify the file version number or accept the default value #> (latest version only).

4. Select the Do It item to initiate command execution. The system displays the following message:

```
Backing up file BR:DOE;JANE.TEXT#> . . .
```

After the file has been copied to the tape, the system displays the following message to indicate that the file backup has completed successfully:

```
Copied BR:DOE;JANE.TEXT#2 to BR:DOE;JANE.TEXT#2
Byte size 8, Characters T BACKUP-FILE complete.
```

If you want the file you have just backed up to be the last file in a logical backup, select the Write EOF command immediately after the system displays the BACKUP-FILE complete message. This command writes an extra EOF marker at the end of the file.

Verifying a File Backup

11.5.2 The Verify File command allows you to compare the contents of a file on tape to a file on disk. Selecting the Verify File command invokes a menu of the following items:

■ Source Pathname — The pathname of the tape file whose contents you want to verify. If the tape pathname does not match the source pathname, the file is skipped over and not verified. You can specify a full pathname or use wildcard values. However, you must specify the host name. The default pathname is the last source pathname entered.

■ Destination Pathname — The pathname of the disk file you want to compare your tape file to. You can specify a full pathname or use wildcard values. However, you must specify the host name. The default pathname is either the last destination pathname used in the Verify File command or the pathname used in a preceding backup operation.

■ Use host name from tape? Yes No — If the destination name you specified is different from the host name specified during backup (tape host name), select Yes. If a logical pathname was used when making the backup, the logical host is merged with the rest of the destination pathname. Select No if the tape host name is the same as the specified destination pathname.

As an example, perform the following steps to verify the contents of the newly backed up file BR:DOE;JANE.TEXT#2:

1. Use the positioning commands to position the tape at the beginning of the file.

2. Select the Verify File command to invoke the Verify File menu.

3. If the source pathname field contains a valid pathname for the tape file BR:DOE;JANE.TEXT#2, press RETURN.

   The following examples are valid source pathnames for the file BR:DOE;JANE.TEXT#2:

   ```
   BR:~;*.*#> or BR:~;*.*#2
   BR:DOE;*.*#> or BR:DOE;*.*#2
   BR:DOE;JANE.*#> or BR:DOE;JANE.*#>
   BR:DOEFJANE.TEXT#> or BR:DOE;JANE.TEXT#>
   ```

   If the source pathname field does not contain a valid pathname for the file, type a valid pathname and press RETURN. If the source pathname field contains an invalid host name and a valid directory name, you need type only the host name. If it contains both an invalid host name and an

invalid directory name, you must type both the host name and the directory name.

4. Type a valid pathname for BR:DOE;JANE.TEXT#2 in the destination pathname field and press RETURN. The same rules apply to this field as to the source pathname field.

5. Select Yes for the question Select host name from tape?

6. Select the Do It item to initiate command execution. The system displays a message indicating that the tape file is being verified against the file whose pathname was specified in the destination pathname field. If the verification passes, the system then displays a message similar to the following:

```
Tape:   BR:DOE;JANE.TEXT#2              Disk:   BR:DOE;JANE.TEXT#2
T  VERIFY-FILE complete.
```

If the verification fails, the system displays a message similar to the following:

```
Tape:   DOE;JANE.TEXT#2                 Disk:   BR:DOE;JANE.TEXT#2
VERIFY FAILED.
```

Restoring a File 11.5.3 The Restore File command copies a selected tape file to a specified disk file. Selection of this command invokes the Restore File menu, which is identical to the Verify File menu. The procedure is also identical to that used with the Verify command.

For example, to restore the tape file BR:DOE;JANE.TEXT#2 to a specified disk file, perform the steps outlined in paragraph 11.5.2, Verifying a File Backup. Substitute the Restore File command for the Verify File command. Selection of the Do It item initiates the Restore File command.

If you did not specify a version number in the destination pathname, the system uses the default value (the last version number entered in the destination pathname field). A default version number of #* restores the file to the same version number as that on the tape. A default version number of #> restores to the latest version of the file on disk. After the tape file has been copied to the disk file, the system displays the following message:

```
Copied BR:DOE;JANE.TEXT#2 to BR:DOE;JANE.TEXT#3
Byte size 8, Characters T RESTORE-FILE complete.
```

Backing Up
a Directory 11.5.4 The Backup Directory command copies the contents of a directory, including its subdirectories and files, from a disk file to a backup tape. Selection of the Backup Directory command invokes a menu of the following items:

■ Pathname — The pathname of the directory to be backed up. Use wildcard characters for the filename, file type, and version number.

■ Write an EOF at the end? Yes No — Select Yes to write an extra EOF at the end of the directory, thus identifying it as the end of a logical backup. If you choose No, the extra EOF is not written, and other files, directories, or partitions can be concatenated onto the directory.

■ Backup subdirectories too? Yes No — Select Yes to include the directory's subdirectories in the backup.

■ Set backed up flag? Yes No — Select Yes to mark each file as backed up after it is copied to the tape. Files not marked as backed up have an exclamation mark preceding the date in the Dired directory.

■ Since time? — Type a universal time and press RETURN. To find out the current universal time, enter the **time:get-universal-time** function in the Lisp Listener. This action limits the backup operation to files created since the specified time.

■ Only files that are not backed up (incremental)? Yes No — Select Yes to back up only files not previously backed up. The version number component in the pathname can override this component. For example, if you select Yes, but the version number in the pathname is #>, the backup operation ignores all versions other than the latest.

■ Query? Yes No — Select Yes to have the system ask whether to back up each file prior to performing the operation.

For example, to backup the directory BD-EYES on host BR, perform the following steps:

1. Use the positioning commands to move the tape to the position at which you want the backup to begin.

2. Select the Backup Directory command to invoke the Backup Directory menu.

3. Type br:bd-eyes; in the pathname field and press RETURN.

4. Select all other desired backup parameters from the menu. If you want this directory to be the last entry in the logical backup, select Yes in response to the question Write an EOF at the end?

5. Select the Do It item to execute the Backup Directory command. The system displays a message identifying the directory that is being backed up. As the backup directory operation progresses, the system displays a list of the files that have been backed up followed by a message to indicate backup completion.

Verifying a Directory Backup

11.5.5   The Verify Directory command verifies the contents of a selected tape directory against a specified disk directory. Selecting the Verify Directory command invokes a menu identical to the Verify File menu (paragraph 11.5.2, Verifying a File Backup).

For example, to verify the tape directory BD-EYES on host BR, perform the steps outlined in paragraph 11.5.2, Verifying a File Backup. Substitute the Verify Directory command for the Verify File command in step 2. When you select the Do It item, the system initiates the verify operation and displays a message identifying the directory being verified.

As the operation progresses, the system displays a list of files that have been verified followed by a message to indicate completion of the verify operation.

**Restoring
a Directory**
11.5.6 The Restore Directory command copies a selected tape directory to a specified disk directory. Selection of this command invokes a menu of the following items:

■ Source Pathname — The pathname of the tape directory you want to restore. You can specify both the host and directory names or use a wildcard character as a directory name. Tape pathnames that do not match the source pathname are skipped over and not restored. The default pathname is the last source pathname entered.

■ Destination Pathname — The pathname of the disk directory you want to restore. You can specify both the host and directory names or use a wildcard character as a directory name. The default pathname is the last destination pathname used in the Restore Directory command.

■ Query? Yes No — Select Yes to have the system ask whether or not to restore each file prior to performing the operation.

■ Create directories automatically? Yes No — Select Yes to have the system create new directories without intervention. Select No to have the system ask whether to create directories.

NOTE: The Explorer system is not generally case-sensitive. However, if you are restoring to a UNIX system, namestring capitalization is significant.

For example, to restore the directory BD-EYES on host BR to a directory on host MC, perform the following steps:

1. Use the positioning commands to position the tape to the beginning of the directory BD-EYES.

2. Select the Restore Directory command to invoke the Restore Directory menu.

3. Type br:bd-eyes; in the source pathname field and press RETURN. Type mc:bd-eyes; in the destination pathname field and press RETURN.

4. Select the other desired restore parameters from the menu.

5. Select the Do It item to execute the Restore Directory command.

**Backing Up
a Partition**
11.5.7 The Backup Partition command copies a selected disk partition to tape. Selecting the command invokes a menu of the following items:

■ Unit number — Type the number of the disk unit where the selected partition resides.

■ Partition name — Type the name of the partition you want to back up, such as DIAG, without quotes.

■ Starting offset — This choice allows you to start at the beginning or at some multiple of 100 blocks into the partition. To start at the beginning, type o.

The backup partition operation causes the system to display a message similar to the following:

```
Backing up partition DIAG on unit 0 . . .
Copying "GDOS FS 289-85"1 2 3 4 5 6 7 8 9 10 BACKUP-PARTITION complete.
```

As the backup operation progresses, the system displays a number for each 100 data blocks copied. If the tape fills before the entire partition is copied, use the following procedure to complete the backup on another tape:

1. Note the last number that appeared on the display prior to the EOF.

2. Rewind the tape and remove the cartridge from the tape drive.

3. Insert a new tape cartridge.

4. Reselect the Backup Partition command and specify the starting offset as the last number displayed. This number is stored in the tape header for later use during verify and restore operations.

Verifying a Partition Backup

11.5.8 The Verify Partition command verifies the contents of a selected tape partition against a specified disk partition. Selecting the Verify Partition command invokes a menu of the following items:

■ Unit number — Type the number of the disk unit from which the selected partition was copied.

■ Partition name — Type the name of the partition you want to verify.

The verify partition operation causes the system to display a message similar to the following:

```
Verify partition DIAG on unit 0 . . .
Comparing "GDOS FS 289-85" and "GDOS FS 289-85"1 2 3 4 5 6 7 8 9 10
VERIFY-PARTITION complete.
```

Restoring a Partition

11.5.9 The Restore Partition command copies a tape partition to a specified disk partition. Selecting this command invokes a menu identical to the Verify Partition menu.

Selecting the Do It item from the Restore Partition menu initiates the restore operation and causes the system to display a message similar to the following:

```
Restoring partition to DIAG on unit 0 . . .
Do you really want to clobber partition DIAG on unit 0 (DO)  "GDOS FS
289-85"? (Yes or No)
```

If you type yes and press RETURN, the system copies the selected tape partition to the specified disk partition and displays the following message:

```
Copying "GDOS FS 289-85"1 2 3 4 5 6 7 8 9 10 RESTORE-PARTITION complete.
```

If you type no and press RETURN, the system ignores the Restore Partition command.

Installing a Distribution Tape

11.6 A *distribution tape* includes a software option not installed on your Explorer system or patches to software you already have. The general procedure for installing a distribution tape is to load the software from tape to a file server, create an in-memory image of the option, and save the entire system image to a new load band. The details for any steps that are particular to the option being installed can be found in the product's release and installation instructions.

Loading a Distribution Tape

11.6.1 Loading a distribution tape copies the software from the tape onto the file system of the local host. The data transfer path is from tape to disk, then from disk to the system environment (virtual memory). Some distribution tape programs may require special instructions for loading. The installation notes for each option provide additional information.

To load a distribution tape, perform the following steps:

1. Insert the distribution tape into the tape drive.

2. Invoke the Backup System window by pressing SYSTEM B.

3. Select the Load Distribution Tape command. Follow the prompts to load the tape.

Installing a Program

11.6.2 After you create a newly initialized Lisp environment, you are ready to actually install the program. You can install the program immediately, or you can perform other tasks and install the program in another session. However, only install the program after a cold boot. You can also load another distribution tape before you install the program.

To install the program, perform the following steps:

1. Boot the system with the load band that is to contain the new software.

NOTE: If you are currently running the load band in which you want to install the new software, press META-CTRL-META-CTRL-RUBOUT. This keystroke sequence boots the system with the same device, load band, and microload band you used when booting. If you want to install the program under a different load band, press META-CTRL-META-CTRL-M to invoke menu boot. Select the band in which you want to install the new program.

---

2. Do not log in. Type (install-new-program) in the Lisp Listener. The system installs the new program in the load band you are currently using.

3. Save the current Lisp environment by saving a new load band. You should follow the procedure designed for your site, but procedures at all sites should include the following steps:

   a. Perform one garbage collection operation to minimize the size of the load band.

   b. Save the current environment by executing the **disk-save** function.

Bootable-Format Tape Operations

11.7 A *bootable-format tape* is a tape whose software is in the same format as that needed for booting from a disk. If the load band or microload band on your system has been destroyed, you can use a bootable-format tape to restore it. The Backup menu provides the following bootable tape commands:

■ Make Bootable-Format Tape — Allows you to create a bootable tape from one or more disk partitions. Selecting this command invokes a menu of the available disk partitions.

■ Verify Bootable-Format Tape — Allows you to verify a newly created bootable tape.

■ Restore Bootable-Format Tape — Allows you to restore one or more partitions from a bootable tape. As the operation progresses, the system lists the partitions on the tape and asks which partitions to restore. Follow the instructions in the mouse documentation window to restore the desired partitions.

For more information about bootable-format tapes, see the *Explorer System Software Installation Guide* and the *Explorer Input/Output Reference* manual.
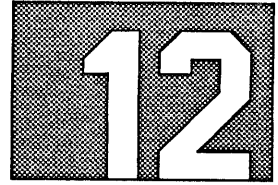
MAINTAINING A DISK

Introduction

12.1 This section provides an introduction to the process of maintaining disks and disk partitions. For more detailed information, refer to the *Explorer Input/Output Reference* manual. Specifically, this section discusses the following topics:

■ Partitions in the disk label

■ Multiple disks

■ Obtaining information about partitions

■ Transmitting bands across the network

■ Changing disk information

■ Maintaining file partitions

Lisp functions (such as the **disk-save** function) used in creating a new Lisp environment are described in the *Explorer Input/Output Reference* manual. Refer to that manual for more information on maintaining a disk.

Partitions in the Disk Label

12.2 A Winchester disk that you receive from Texas Instruments is already formatted. Each disk contains a *disk label*, which is a list of discrete regions of the disk called *partitions*. Each partition consists of one or more contiguous disk sectors called disk data *blocks*. A *band* is a logical grouping of one or more partitions.

Partition Names and Attributes

12.2.1 Each partition on a disk has a name of up to four characters and attributes that specify the partition type and processor type. In some cases, the software uses a particular name for a particular purpose. For example, a file partition named FILE is usually the default file partition. In other cases, the choice of a name is arbitrary.

The following general facts apply to all disks and partitions in an Explorer system:

■ Not all disks include all types of partitions.

■ The name, partition type, and processor type must uniquely identify a given partition.

■ On a system that includes more than one disk, partition names on one disk can be duplicated on another disk.

■ Editing the disk label allows you to establish or change the name and attribute of a partition. It does not affect the data on the disk. In addition, moving a partition does not move the data. Refer to the *Explorer Input/Output Reference* manual for information on editing a disk label.

Kinds of Partitions 12.2.2 Each disk in an Explorer system can contain several kinds of partitions. To display a list of the partitions on a given disk, enter the following function in the Lisp Listener, substituting the disk unit number for *n*:

```
(print-disk-label n)
```

The partition list can contain any of the following types of partitions. Each disk unit must have FMT, PTBL, and LABL partitions. The unit that serves as your system disk must also have BOOT and PRIM partitions. Explorer II machines do not require a PRIM partition. MCR, PAGE, and LOD partitions must be available on one or more disks.

■ FMT — The format partition contains data for disk formatting and surface analysis.

■ TZON — The test zone partition consists of six 1-kilobyte blocks that contain data patterns used in diagnostic testing.

■ BOOT — The boot partition is a special-purpose microload partition that contains the code for the menu boot process.

■ GDOS, DIAG, and EXPT — The General Diagnostic Operating System (GDOS) and diagnostic (DIAG) partitions contain diagnostic microcode and test patterns used for all system diagnostic tests other than the processor and memory. The EXPT partition contains all microcode for the Explorer processor and memory diagnostics. These two diagnostics are called standalone diagnostics because they do not run under GDOS. These partitions are needed when analyzing problems. You can delete them; however, they take up very little disk space.

■ MCR*n*, where *n* is a number — A microload partition contains the microcode that is loaded into processor memory when you boot the system. The MCR*n* name is a convention used by several internal system functions but is not necessary to boot the system. An asterisk at the beginning of the line in a **print-disk-label** listing indicates the current default microload.

■ LOD*n*, where *n* is a number — A load partition (load band) contains the initial environment that is loaded when you boot the system. Each load band requires a specific microload partition. The LOD*n* name is a convention used by several internal system functions but is not necessary to boot the system. An asterisk at the beginning of the line in a **print-disk-label** listing indicates the default load band (usually the current band) for the next time you boot the system.

■ FILE — A file partition contains all or part of the system files. The file system, which can consist of a single partition or a set of logical partitions called a file band, includes a root directory, user directories, and files. The partition name FILE is a convention used by the system to help determine which file partition on a disk is booted as the default file system. Other names can also be used. The *Explorer Input/Output Reference* manual provides information about using a set of logical partitions for a file system.

■ METR — The meter partition contains the information generated by the metering utility. This partition is usually created before doing metering work, and it is deleted afterward.

■ PAGE — The page partition is used as the address space for virtual memory. All partitions used for virtual memory have the page attribute set. By convention, most page partitions are named PAGE. Unlike other partitions, you can have more than one partition named PAGE on a single disk. Taken together, they are called the PAGE band.

■ PTBL — The partition table contains information about each partition on the disk, such as its type, length, and starting block.

■ LABL — The volume label is a two-block partition starting at block 0 on the disk. The label includes information about the disk itself. Although some disks do not explicitly list the volume label as a separate partition in the partition list, the volume label always exists.

■ SAVE — The save partition is used during execution of the **disk-save** function. The partition size must be the same as the PTBL partition size.

■ PRIM — The primitive download partition is a special-purpose microcode partition that contains the code to control the boot process. The PRIM partition references the default configuration partition during the boot process to determine which microload and load partitions should be loaded as the Lisp environment. On systems with downloadable boards or devices, PRIM also controls the downloading of these boards and devices. The primitive download partition is recognized by its name. PRIM should always be on the default disk and have the default property set.

■ CFG*n*, where *n* is a number — A configuration partition contains the information about which system partitions to load during the boot process. It may contain entries that override the default MCR and LOD bands that are marked with asterisks in the listing from **print-disk-label**.

■ LOG — This partition contains the system log.

Multiple Disks

12.3   Each Explorer system can include up to eight 5¼-inch Winchester disk drives and two 516 Mb storage module device (SMD) Winchester disk drives. An SMD disk enclosure can contain one or two drives. The 5¼-inch disk drives reside in mass storage enclosures, each of which can contain one or two drives. Thus, each Explorer system can contain up to four mass storage enclosures connected to the system in a daisy chain.

In a multiple-disk configuration, the first mass storage enclosure in the daisy chain is called the *primary* mass storage enclosure. All other enclosures are called *secondary*.

Mass Storage Enclosure Jumpers

12.3.1   Each disk in an Explorer system must have a unique unit number. When shipped from the factory, each disk is configured with a specific unit number. If you move a mass storage enclosure to a different system, you may need to reset the jumper that specifies the unit number. If your system has a 516 Mb disk, it must be configured as units 0 and 1. The following

supplements to the *Explorer Mass Storage Enclosure General Description* provide information on setting unit numbers:

■ *Winchester Disk Formatter (ADAPTEC) Supplement*

■ *Winchester Disk Drive (Maxtor) Supplement*

■ *Tape Drive (Cipher) Supplement*

■ *SMD/516-Megabyte Mass Storage Subsystem General Description*

The primary mass storage enclosure in an Explorer system includes a ground jumper to reduce noise. Secondary enclosures do not have this jumper. Thus, if you move a mass storage enclosure to a different position within the system, you must ensure that the ground jumper is either installed or removed as appropriate. The *Cable Interconnect Board (2236120-0001) Supplement to the Explorer Mass Storage Enclosure General Description* provides information on setting the ground jumper.

Host Names and Unit Numbers

12.3.2 All Explorer software accepts references to a disk in the form of a *unit-number*, which can be any integer in the range of 0 through 13. In addition, most operations that access disk partitions can use the following forms to refer to a disk:

■ A string of the form *host-name:unit-number,* such as "DELTA:3".

■ A *host-name* without a *unit-number,* such as "DELTA". The system uses the default unit number for the disk.

■ A string of up to 16 characters of the form *host-name:device-name,* such as "DELTA:D0".

■ A *device-name* without a *host-name,* such as "D0". The system uses the local machine (LM).

Obtaining Information About Partitions

12.4 Several Lisp functions provide information about partitions, disk labels, and so on. Three frequently used functions, **print-disk-label**, **print-herald**, and sys:describe-partition, are described here. Other functions are described in the *Explorer Input/Output Reference* manual.

print-disk-label &optional *unit stream*   Function

The **print-disk-label** function prints the contents of the disk label of the specified unit.

Arguments: *unit* — Specifies the unit whose label is displayed. The *unit* argument can be a unit number, a device name, a host name, a host name and unit number, or a host name and device name. If a host name is specified without a unit number, the default unit for that host is used. The default value of *unit* is the value of **sys:*default-disk-unit***.

stream — Specifies where to print the disk label. The default value of stream is the value of ***standard-output***, typically the video display.

Example: If you execute the Lisp function **print-disk-label**, the display is similar to that shown in Figure 12-1.

Figure 12-1   **Result of the print-disk-label Function**

```
lima:D0, MAX-0140, ID # = 01600201025r
LABL version 2, DISK
1024 bytes per block, 256 bytes per sector,
32 sectors per track, 15 heads,
917 cylinders, 917 sectors for defects,
System Load Defaults from CFG1 on unit 0: Microcode = MCR2 on unit 0, Load = LOD2 on unit 0
Disk Label defaults: Microcode = PRIM  Load = LOD2
Partition table PTBL, starting block 107537, length 3
Save area SAVE, starting block 3, length 1
18 partitions,  16-word descriptors:

                              Starting
   Name  Partition type       Block  Length  CPU/OS Type  Comments
 * LABL  (Volume Label)         0           2 (Generic)
                    *Note: 2 blocks free at 2
   FMT   (Format Parameters)    4           9 (Explorer)
   TZON  (Test Zone)           13         122 (Explorer)
   BOOT  (Microcode)          135          64 (Explorer)    MENUBOOT 23
 * PRIM  (Microcode)          199          64 (Explorer)    PRIM 23
 * CFG1  (Configuration band) 263          17 (Generic)
                    *Note: 3 blocks free at 280
   GDOS  (Microcode)          283         300 (Explorer)    GDOS_289-85 45
   DIAG  (File Band)          583        1024 (Explorer)    GDOS FS 289-85
   EXPT  (Microcode)         1607         150 (Explorer)    EXPT_291-85
   MCR0  (Microcode)         1757         160 (Explorer)    EXP1-UCODE 203
   MCR1  (Microcode)         1917         160 (Explorer)    CONTROL 315
 * MCR2  (Microcode)         2077         160 (Explorer)    EXP1-UCODE 207
   LOD0  (Load Band)         2237       35000 (Explorer)    30+patches/U203 4/21/87
   LOD1  (Load Band)        37237       35000 (Explorer)    REL2/Fan33(XNS/GLOSS) CTRL315
 * LOD2  (Load Band)        72237       35300 (Explorer)    3.0 PCHS-TRAINED-IP
 * PTBL  (Partition table) 107537           3 (Generic)
                    *Note: 1260 blocks free at 107540
   LOG   (System Log)      108800        1000 (Explorer)    System Log
   END   (Format Parameters) 109800         0 (Explorer)
NIL
```

print-herald &optional *stream verbose-p*   Function

The **print-herald** function lists the name of the disk and the versions of the system software for the load band currently executing.

If *stream* is specified, this function prints the list to *stream* rather than to the default, ***standard-output***.

If *verbose-p* is non-nil, then all loaded software is listed. If it is **nil**, an abbreviated listing of the software is displayed. The default is **nil**.

Example: If you execute the Lisp function (print-herald), the display is similar to that shown in Figure 12-2.

Figure 12-2   **Result of the print-herald Function**

```
Explorer TI AUSTIN ASD Lima.
Load band LOD2 (3.0 PCHS-TRAINED-IP) loaded from disk D0, Microcode MCR2 (EXP1-UCODE 207).
12 MB of physical memory, 76 MB of virtual memory.
   System                    3.0+    Disk-IO                  3.1
   Pathname-Support          3.3     File-System              3.1
   System                    3.4     Chaosnet                 3.3
   GC                        3.2     Zmacs                    3.1
   Window System             3.2     Namespace                3.4
   Printer                   3.1     Experimental IP          2.2
   Experimental Explorer Bug System  4.4   Experimental WINIFRED  1.0
   Microcode                 207
```

sys:describe-partition *partition-name* &optional *unit*   Function

The **sys:describe-partition** function displays information about the partition named *partition* on the disk specified in *unit*.

Arguments: *partition* — Specifies the name of the partition to describe.

unit — Specifies the unit that contains the partition. The *unit* argument can be a unit number, a device name, a host name, a host name and unit number, or a host name and device name. If a host name is specified without a unit number, the default unit for that host is used. The default value of *unit* is the value of **sys:*default-disk-unit***.

If *partition-name* is a LOD partition, this function displays (in addition to other information) the microcode version required by the band, the size of the data in the partition, and the highest virtual address used. The size informs you of the amount of space required to copy this partition; the highest virtual address indicates the size of the PAGE partition needed to run *partition*.

Example: If you execute the Lisp function (sys:describe-partition "LOD1"), the system displays a message similar to the following:

```
Partition LOD1 starts at 37053 and is 35000 pages long.
It is a compressed world-load.
Data-length is 26496 pages, highest virtual page number is 65984.

Goes with microcode version 304.
It is a (Load Band) of CPU type (Explorer)
NIL
```

In this example, pages refers to blocks of 1024 bytes each.

Transmitting Bands Across the Network

12.5   The Lisp functions that follow allow you to transfer bands between systems within a network. Before you use these functions, you should print the labels of both machines to verify the names of the partitions you want to transfer. Also, examine the sizes of the bands to ensure that the receiving band is as large or larger than the band being transferred.

This paragraph describes the most common functions for band transmission. Others are described in the *Explorer Input/Output Reference* manual.

sys:receive-band *from-machine from-partition to-unit to-partition*   Function
&optional *subset-start subset-n-blocks*

The **sys:receive-band** function accepts a new band from another machine. This function displays a notice on the remote machine and prints a number on the local machine for every 100 pages (blocks) transferred. If a transfer is not totally successful, you can evaluate the function again and specify *subset-start* as the last number printed on the local machine. This procedure causes the transfer to resume where it stopped.

Arguments: *from-machine* — Specifies the name of the machine sending the band. The *from-machine* argument can be a host name, a host name and unit number, or a host name and device name. If a host name is specified without a unit number, the default unit (as specified in the NVRAM) for that host is used.

from-partition — Specifies the name (as a string or symbol) of the partition being sent.

to-unit — Specifies the unit receiving the band. The *to-unit* argument can be a unit number, a device name, a host name, a host name and unit number, or a host name and device name. If a host name is specified without a unit number, the default unit for that host is used.

to-partition — Specifies the name (as a string or symbol) of the partition on the new unit.

subset-start — Specifies the offset from the beginning of the partition in hundreds of blocks. This argument is used to receive only a section of the band. The default value is **nil**, to start at block 0.

subset-n-blocks — Specifies the number of blocks to receive in hundreds of blocks. The default value is **nil**, to receive the entire partition.

Example: An Explorer user at system ECHO wants to replace load band 0 (LOD0) on the local machine with load band 2 (LOD2) from disk unit 0 (D0) on a remote machine named DELTA. The user types the following in the Lisp Listener:

```
(sys:receive-band "delta:D0" "lod2" "0" "lod0")
```

The system returns the following message:

```
Do you really want to clobber LOD0 on unit 0 ? (Yes or No)
```

The user types **yes** and presses RETURN. The system begins the operation and returns a message similar to the following:

```
Receiving partition "LOD2" on unit D0 from delta into partition
"LOD0" unit 0:
2009 blocks
```

As the operation progresses, the system displays a number after transferring each 100 data blocks, then returns **t** to indicate that the operation is complete. A message similar to the following appears on the display:

```
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
T
```

sys:transmit-band *from-partition from-unit to-machine to-partition*   Function
&optional *subset-start subset-n-blocks*

The **sys:transmit-band** function sends a new band to another machine. This function displays a notice on the remote machine and prints a number on the local machine for every 100 blocks transferred. If a transfer is not totally successful, you can evaluate the function again and specify *subset-start* as the last number printed on the local machine. This procedure causes the transfer to resume where it stopped.

Arguments: *from-partition* — Specifies the name (as a string or symbol) of the band being sent.

from-unit — Specifies the unit sending the band. The *from-unit* argument can be a unit number, a device name, a host name, a host name and unit number, or a host name and device name. If a host name is specified without a unit number, the default unit for that host is used. If a unit is specified without a host, the local machine is used.

---

to-machine — Specifies the host receiving the band. The *to-machine* argument can be a host name, a host name and unit number, or a host name and a device name. If a host name is specified without a unit number, the default unit for that host is used.

to-partition — Specifies the name (as a string or symbol) of the partition on the new host.

subset-start — Specifies the offset from the beginning of the partition in hundreds of blocks. This argument is used to transmit only a portion of the band. The default value is **nil**, to start at block 0.

subset-n-blocks — Specifies the number of blocks to transmit in hundreds of blocks. The default value is **nil**, to transmit the entire partition.

Example: As a variation on the example that you saw for sys:receive-band, you could instead use the following function call. The transmitting machine is DELTA and the receiving system is ECHO.

```
(sys:transmit-band "lod2" "d0" "echo" "lod0")
```

sys:compare-band *from-machine from-partition to-partition*   Function
&optional *to-unit subset-start subset-n-blocks*

The **sys:compare-band** function compares partitions on different machines. This function displays a notice on the remote machine and then prints a number on the local machine for every 100 blocks compared. If a comparison is incomplete, you can evaluate the function again and specify *subset-start* as the last number printed on the local machine. This procedure causes the comparison to resume where it stopped.

Arguments: *from-machine* — Specifies the host containing the band to be compared. The *from-machine* argument can be a host name, a host name and unit number, or a host name and device name. If a host name is specified without a unit number, the default unit for that host is used.

from-partition — Specifies the name (as a string or symbol) of the band to be compared.

to-partition — Specifies the name (as a string or symbol) of the band to compare to.

to-unit — Specifies the host of the band to compare to. The *to-unit* argument can be a unit number, a device name, a host name, a host name and unit number, or a host name and device name. If a host name is specified without a unit number, the default unit for that host is used.

subset-start — Specifies the offset from the beginning of the partition in hundreds of blocks. This argument is used to compare only a portion of the band. The default value is **nil**, to start at block 0.

subset-n-blocks — Specifies the number of blocks to compare in hundreds of blocks. The default value is **nil**, to compare the entire partition.

Example: An Explorer user at ECHO wants to compare load band 0 (LOD0) on the local machine's default disk unit with load band 2 (LOD2) from the default disk unit on a remote machine named DELTA. The user types the following in the Lisp Listener:

```
(sys:compare-band "delta" "lod2" "lod0")
```

The system returns a message similar to the following:

```
Comparing partition "lod0" on unit 0 with partition "lod2" on unit NIL from ECHO:
  20 blocks

Discrepancy at block 1, halfword 0: value in local-part = 000054; from-part = 000046 (octal)
Discrepancy at block 1, halfword 1: value in local-part = 015320; from-part = 000000 (octal)
Discrepancy at block 1, halfword 2: value in local-part = 015320; from-part = 000000 (octal)

Discrepancy at block 7, halfword 0: value in local-part = 000154; from-part = 000020 (octal)
Discrepancy at block 7, halfword 1: value in local-part = 015320; from-part = 000054 (octal)
Discrepancy at block 7, halfword 2: value in local-part = 079431; from-part = 040000 (octal)
```
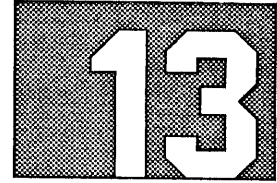
PRINTING FILES AND SCREENS

Introduction

13.1 The Explorer system provides several methods of printing hardcopies of files and screens if your system or network has a properly configured printer. This section explains how to print files and screens on a printer. Information about specific printer types and printer configurations can be found in the *Explorer Input/Output Reference* manual.

Printing From the System Menu

13.2 The System menu contains a Hardcopy item that allows you to use the mouse to print a file or a screen image. Selecting the Hardcopy item from the menu invokes another menu of the following items:

■ A file — Selecting this item invokes a menu of the following items:

  ■ Printer Device — Selects the printer device on which to print the file.

  ■ File Pathname To Print — Allows you to enter the namestring of the file you want to print. The default namestring is the namestring of the last file printed from this menu. Clicking the right mouse button allows you to edit the default namestring. Clicking the left mouse button deletes the default namestring and allows you to enter a new one.

  ■ Lines Per Page — Allows you to specify the number of lines per page. The default value is the value of the **printer:*default-lines*** variable.

  ■ Characters Per Inch — Allows you to specify the number of characters per inch. The default value is the value of the **printer:*default-cpi*** variable.

  ■ Lines Per Inch — Allows you to specify the number of lines per inch. The default value is the value of the **printer:*default-lpi*** variable.

  ■ Print Header Page — Allows you to specify whether a header page is to be printed. The default value is the value of the **printer:*default-header*** variable.

  ■ Print Page Heading — Allows you to specify whether a heading is to be printed at the top of each page. The default value is the value of the **printer:*default-page-heading*** variable.

  ■ Second Line of Page Heading — Allows you to enter a string to be printed as the second line of the page heading. This parameter is valid only if you have specified that a page heading is to be printed.

  ■ Number of Copies — Allows you to specify the number of copies to print. The default value is 1.

■ Screen image — Selecting this item invokes a menu of screen image print parameters, which are described in paragraph 13.3.

Printing
Screen Images

13.3 Pressing TERM Q invokes the Screen Image Print Parameters menu, which enables you to print part or all of a video screen. You can select and change any or all of the following print parameters:

- **Printer** — Selects the printer device on which to print the screen image.

- **Image to print** — Allows you to specify what portion of the screen you want to print by selecting one of the following options:

  - **Screen** — Prints the entire screen, except for the mouse documentation window and the status line.

  - **Screen with mouse documentation window and status line** — Prints the entire screen, including the mouse documentation window and status line.

  - **Frame** — Prints a frame on the screen. If there is more than one frame on the screen, the mouse cursor changes to a circled plus, and you are asked to select a frame.

  - **Window** — Prints an inferior window that belongs to a frame. You are asked to choose the window.

  - **Rectangle** — Prints a rectangular portion of the screen. You are asked to select with corner brackets the portion to print.

- **Orientation** — Allows you to specify whether you want the screen to be printed as a portrait or a landscape orientation. *Portrait* means to print the image in a vertical orientation. *Landscape* means to print the image on its side, in a horizontal orientation. *Best*, which is the default value, means to choose the better of landscape or portrait orientation.

- **Dots per inch** — Allows you to specify the printer resolution. *Best* is the default value.

- **Include mouse blinker** — Allows you to specify whether to include the mouse blinker in the printed image. It is usually excluded.

- **Print header page** — Allows you to specify whether to print a header page.

- **Print header line** — Allows you to specify whether to print a header line.

- **Number of copies** — Allows you to specify the number of copies to print. The default value is 1.

Keystroke
Sequences for
Printing Screens

13.3.1 The keystroke sequences that follow allow you to print screen images without invoking the menu. These methods use the default values of the Screen Image Print Parameters menu to print an image of the video display, including any momentary menus or other temporary windows. The keystroke sequences are as follows:

- **TERM Q** — Invokes a menu from which you can change the screen image print parameters or choose to print on the default printer with the default values. Selecting the Do It item causes the current main screen to be printed.

- TERM *n* Q — Identical to TERM Q except that it causes *n* copies of the main screen to be printed.

- TERM CTRL-Q — Prints the current main screen with the current default parameters. A menu does not appear.

- TERM *n* CTRL-Q — Identical to TERM CTRL-Q except that it causes *n* copies of the main screen to be printed.

- TERM META-Q — Prints the current screen including the main screen, the mouse documentation window, and the status line. A menu does not appear.

- TERM *n* META-Q — Identical to TERM META-Q except that it causes *n* copies of the main screen to be printed.

Default Variables   13.3.2 You can set the default values of menu variables with the Profile utility. These variables also define the default values for the keystroke sequences that print a screen image without using the menu. The following variables define the defaults used for the printing of screen images:

printer:*default-screen-to-print*   Variable

This variable specifies what portion of the screen to print. Valid values are **:screen, :screen-with-wholine, :window, :frame,** or **:rectangle.** The default value is **:screen.**

printer:*default-orientation*   Variable

This variable specifies the orientation that is used for the screen image. Valid values are **:portrait, :landscape,** or **:best.** The **:portrait** argument takes the image as it is on the screen. The **:landscape** argument takes the image and turns it on its side, in a horizontal orientation. The default value is **:best,** which means that the variable looks at the dimensions of the screen image and decides the best way to present it.

printer:*default-blinkerp*   Variable

This variable specifies whether to include the mouse blinker in the printed copy. If the value is **t,** the blinker is included; if the value is **nil,** it is not included. The default value is **nil.**

**Creating a
Print Request**   13.4 Calling a print function creates a file print request. The local print server also creates a file print request for each request received from a remote host. After a print request is created, it is added to a print queue. Every request created is assigned a print request number.

Print Daemon   13.4.1 A background process, called the *print daemon*, handles each print request in the printing queue. For each print request, the print daemon first determines the location of the printer that is specified by the print request.

If the printer is on a remote host, the print daemon sends the print request to the print server of the remote host. It then sends a notification to the user who made the request that the request has been spooled (sent) to the remote host. For a file print request, the pathname and all specified printer options are sent to the remote print server.

If the printer is on a local host, the print daemon creates a parallel or serial stream and an instance of the printer. The print daemon then uses the stream to begin printing the file.

You can print a file from any foreign host you can access. However, the print server must also be able to access that host.

Completion of Printing

13.4.2 When the last information has been sent to the printer, the print daemon sends a status message to the user who made the request. If an error occurred during processing, the print daemon sends an error message to the user who made the request. It then begins processing the next print request.

Examining Print Requests

13.4.3 The following variables and functions allow you to examine print requests to a host that is a print server. If your machine is the print server, you see all the print requests; if not, you see only the status of requests from your machine. When you examine a queue, the file preceded by an asterisk is currently being printed.

printer:*print-queue*   Variable

This variable contains a list of the current print requests and the assigned numbers.

show-print-queue &optional *stream*   Function

This function displays on *stream* the current status of the print requests that are in the printing queue. The default stream is the value of ***terminal-io***. The number assigned to each print request is also displayed.

cancel-print-request *request-no*   Function

This function cancels the print request specified by the number in the *request-no* argument.

Examining Requests on a Remote Host

13.4.4 The following functions allow you to cancel or show print requests on a remote host. You can issue the functions from any host on the same network with the print server.

printer:cancel-print-request-on-remote-host *host request-no*   Function

This function makes a request to cancel the printer request specified by the number in the *request-no* argument at the remote host specified by the *host* argument.

printer:show-print-queue-on-remote-host *host*   Function

This function makes a request to obtain the status of the print queue on the remote host specified by the *host* argument.

Printing Files and Streams

13.5 The Explorer system provides several functions that enable you to print files and streams. These functions make use of various variables that can be set to different values to customize the printer's output configuration. The following paragraphs describe these functions and variables.

Default Variables

13.5.1 The following variables are used to supply default values to the functions that enable the printing of files and streams.

printer:*default-lines*   Variable

This variable specifies the number of lines per page. The default value is 60.

printer:*default-cpi*   Variable

This variable specifies the number of characters per inch. The default value is 12. This variable is meaningless to the IMAGEN® printer.

printer:*default-lpi*   Variable

This variable specifies the number of lines per inch. The default value is 6. This variable is meaningless to the IMAGEN printer.

printer:*default-header*   Variable

This variable specifies whether to print a header page. Valid values are **t** and **nil**. The default value is **t**.

If the value is **t**, a header page is printed that contains the following information:

- ■ User @ host

- ■ Current date and time

- ■ File namestring

- ■ Date and time of file creation

If the value is **nil**, no header page is printed.

printer:*default-page-heading*   Variable

This variable specifies whether to print a heading on each page. Valid values are **true**, **nil**, or a string. The standard default value is **nil**.

If the value is **true**, the name of the file, current date, time, and page number are printed on the first line of each page. If the value is a string, the result is like that for **true**, except that the string is also printed on the second line. If the value is **nil**, no heading is printed.

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Functions 13.5.2 The following functions are used to enable the printing process for files and streams. The word *enable* is used because the system uses a background process known as the print daemon to do the actual printing.

print-file *pathnames* &key :printer-name :copies :lines   Function
     :header :page-heading :cpi :lpi :font :font-list :delete-after :print-wide

This function prints a file or a list of files specified by the *pathnames* argument. Before printing the file, this function makes a print request queue entry that is accessible to the print daemon. The function then returns a list of the file(s) added to the print request queue.

print-stream *input-stream* &key :printer-name :header-name :copies   Function
     :lines :header :page-heading :cpi :lpi :font :font-list :print-wide

This function prints the stream that is specified in *input-stream*. It copies the stream into a temporary file and makes a print request queue entry that is accessible to the print daemon. Zmacs commands use this function to print buffers and regions.

The options and the values you specify for them are identical to those of **print-file**, with the following exceptions:

■ A **:header-name** option allows you to specify the name of the stream or file to use on the header page.

■ A **:delete-after** option is not included.
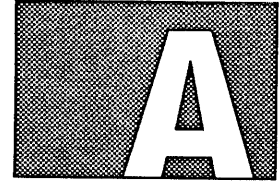
BOOT INFORMATION

Boot Error Code Descriptions

A.1   During system testing and boot operations, an Explorer system reports most errors with textual messages displayed on the video display. A typical error message is Bad Microload Format.

In some cases, however, the processor is not able to translate a specific, device-related error to an appropriate textual message. In such cases, the system returns error code messages instead.

The following acronyms are used in the descriptions of the error codes:

■   DE — Diagnostic engine. A processor-independent language used to implement device drivers and diagnostic code.

■   NUPI — NuBus peripheral interface. A board that interfaces between the NuBus and the mass storage devices through the small computer systems interface (SCSI) bus.

The boot process returns error code messages of the general form device error: *nnnnnnnn* or error: *nnnnnnnn*, where *nnnnnnnn* is a hexadecimal error number. Table A-1 lists these error codes.

Table A-1   Error Code Messages for Explorer and Explorer II

Error Code	Explanation
00000002	Load device offline or not responding. The device is probably powered down or not connected.
00000003	Load device error. The load device has experienced an unrecoverable error.
00000004	Memory board unavailable. The processor cannot find a memory board that passes all tests.
00000005	NuBus error. The processor has received a NuBus error while executing DE code in a device driver.
00000006	Command time-out. The NUPI did not complete a specified command block operation before the maximum time elapsed.
00000009	Network down. The Ethernet is disconnected or otherwise disabled.
0000000A	Invalid unit number for the load device.
0000000B	Ethernet board failed to initialize properly.

Table A-1   Error Code Messages for Explorer and Explorer II (Continued)

Error Code	Explanation
00000010	Bad DE instruction header. The processor found a board with a valid configuration ROM, but with a diagnostic offset or device driver offset pointing to DE code that has an invalid header. (For more information about the configuration ROM, refer to the *Explorer NuBus System Architecture General Description*.)
00000011	Invalid DE request. A request was made that could not be handled by a particular device, such as a boot request issued to the monitor. The contents of the NVRAM are probably invalid. To correct this error, use menu boot to specify the boot unit. After the system boots, execute the sys:setup-nvram function (described in paragraph A.3, NVRAM Functions). For more information about the NVRAM, refer to the *Explorer NuBus System Architecture General Description*.
00000012	DE instruction space problems. The processor found an invalid instruction while trying to interpret DE code contained in the ROM on a logic board. This error can occur when the processor is interpreting either a diagnostic or a device driver. The ROM on the logic board may be faulty.
00000013	DE internal data space problem. While the processor was interpreting DE code, it found either an internal data stack overflow or underflow, or a data space variable out of range. This error can occur when the processor is interpreting either a diagnostic or a device driver. The ROM may be bad or the code being executed may be faulty.
00000014	Device access error. The boot device returned bad status. Refer to the manual for the particular device for more information about the status.
00000015	Invalid volume label. The first word of block 0 did not contain the string "LABL".
00000016	Invalid volume partition table. The first word of the partition table did not contain the string "PRTN".
6*nnnnnnn*	NUPI command status. These error codes are returned by the NUPI device driver as a copy of the status field of the NUPI command block. For more information about these error codes, refer to the *Explorer NuBus Peripheral Interface General Description*.

Interpreting Fault Indicators

A.2   Although most errors are returned as either textual messages or hexadecimal error codes, in some cases the processor cannot display a message. In these cases, the processor stops, turns on its red fault indicator, and displays a hexadecimal code in its amber fault indicators. To view these fault indicators (shown in Figure A-1), open the outer front door of the system enclosure; the fault indicators are located behind the viewing slot.

CAUTION: Do not open the inner door. Safety interlocks on the door power down the enclosure when the door is opened.

Figure A-1 Fault Indicator LEDs

binary value, hexadecimal digit, error code:

on = 1
off = 0
off = 0   = 8
off = 0

on = 1
off = 0   = 9
off = 0
on = 1

= 89 = processor self-test failed

on   Large red LED, not included in calculations

2287894
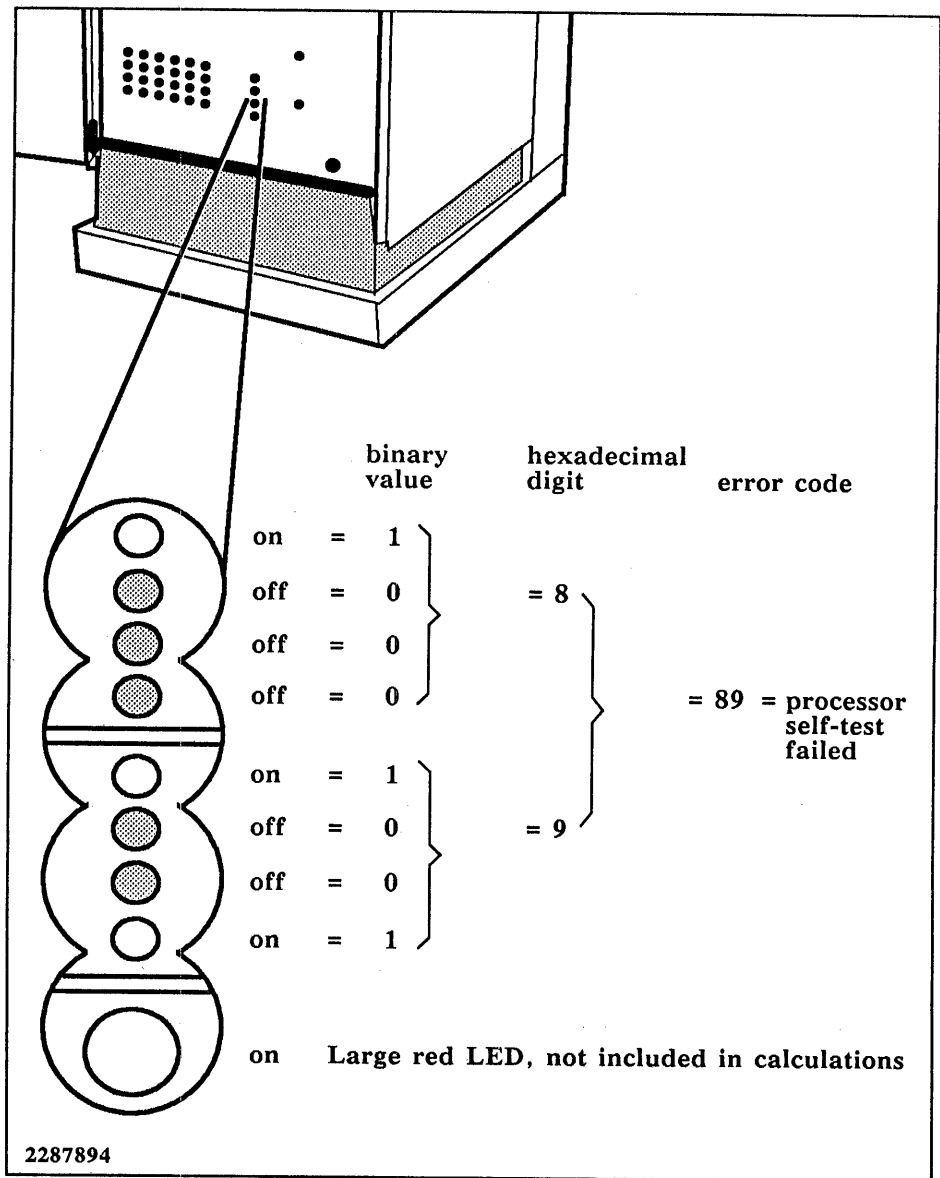
To obtain the fault code from the amber fault indicators, read the indicators as an 8-bit binary number with the top indicator as the most-significant bit and the lowest as the least-significant bit. Convert the code to a hexadecimal error code. Tables A-2 and A-3 list valid error codes for the Explorer and Explorer II systems, respectively.

Table A-2 Error Codes for Explorer

Error Code	Explanation
81	Power failure. The processor took the power failure hardware trap.
82	The processor took the control store parity error trap. This code may indicate a faulty writable control store on the processor board.
88	The processor received a NuBus error.
89	The processor failed its internal self-test.
8B	No boot device. This error occurs if the processor cannot find either a boot device or a monitor on which to display a message.
8C	Microload problems. This error occurs if the processor cannot find a monitor on which to display the message Bad Microload Format.
8D	DE problems. This error occurs if the processor cannot find a monitor on which to display device errors 10 through 13 described in Table A-1, Error Code Messages.
8E	Monitor device driver problems. The processor received a nonzero completion code on a call to the monitor device driver.
8F	Unable to initialize monitor. The monitor device driver returned a nonzero completion code as a result of a call to initialize the monitor.
90	Unable to initialize keyboard. The keyboard device driver returned a nonzero completion code as a result of a call to initialize the keyboard.

Table A-3 Error Codes for Explorer II

Error Code	Explanation
01 - 6F	The self-tests failed.
71	There are no online devices from which to download specified.
72	A bad microcode format was found during an attempted download.
73	A device error occurred during an attempted download.
74	No good system memory was found.
75	A NuBus error occurred during download from the NuBus memory to internal memories.
76	A MCR partition requires the floating point board, which is not present.
7F	The processor was unable to load code from the erasable, programmable read-only memory (EPROM).

NVRAM Functions

A.3 The nonvolatile random-access memory (NVRAM), located on the system interface board, specifies where to locate the monitor, the keyboard, and the device that contains the load and microload bands. The contents of the NVRAM must be set up when a system is installed or when its contents have been corrupted by an inadvertent NuBus write operation. Also, any of the following conditions may require that the NVRAM contents be altered:

■ The default monitor, keyboard, or load source interface board has been moved to a different slot.

■ The fault indicators display 8A, which means that no memory has been found. If the processor can find a monitor, it also displays `error: 00000004` on the video display.

■ The previous default load device has been removed.

The following functions allow you to alter the contents of NVRAM:

sys:change-nvram &key :load-unit :load-slot:monitor-unit   *Function*
        :monitor-slot :keyboard-unit :keyboard-slot

This function sets values in the NVRAM to enable the boot process to locate the monitor, the keyboard, and the mass storage device that contains the load and microload bands.

Arguments: **:load-unit** — Specifies the unit number of the mass storage device that contains the default load band. The default value is 1.

:load-slot — Specifies the slot in the system enclosure that contains the NUPI board. The default value is 2.

:monitor-unit — Specifies the monitor unit number. The default value is 0.

:monitor-slot — Specifies the slot in the system enclosure that contains the system interface board. The default value is 5.

:keyboard-unit — Specifies the keyboard unit number. The default value is 0.

:keyboard-slot — Specifies the slot in the system enclosure that contains the system interface board. The default value is 5.

sys:setup-nvram &optional *logical-unit*   *Function*

This function initializes NVRAM and sets the locations for devices to the default values defined by the **sys:change-nvram** function. Initializing NVRAM enables the boot process to locate the monitor, the keyboard, and the mass storage device that contains the load and microload bands. The *logical-unit* argument specifies the logical disk unit that contains the default load band. This value is a hexadecimal number that is the sum of the unit number and the formatter number times 8. The default value is 1.

CARTRIDGE TAPE AND TAPE DRIVE **B**

Description

B.1 The 102-by-152-millimeter (4-by-6-inch) tape cartridge conforms to ANSI specifications X3.55-1977 and X3B5.82-89 for unrecorded cartridges. Figure B-1 shows the tape cartridge and its features.

Figure B-1 The 1/4-Inch Tape Cartridge

To maintain contact between the recording media and the read/write heads, a band maintains the take-up reel at a higher tension than the supply reel. Because the tape can be run both forward and backward, a reel is unwound at a lower tension than it was wound. During continuous backup, write, and restore operations, the tension of the reels remains stable enough to provide good performance. However, if you perform a number of small data transfers or if the tape has been exposed to extreme temperatures, you should retension the tape.

The cartridge also features a slotted plug that can be set for write-protected or unprotected operation. When the arrow embossed on the plug points to SAFE, the cartridge is write-protected.

Precautions

B.2 Tape cartridges are rugged devices that eliminate many of the problems that can arise when you handle magnetic media. By observing the following precautions, you can prevent loss of data and extend the life of your equipment:

■ Rewind the tape before removing it from the drive. Rewinding places blank leader tape instead of recording media under the access door and helps to prevent contamination of the recording media.

■ Remove the tape cartridge from the drive when not in use.

■ Store tape cartridges in a dust-free location with temperature in the range of 5 to 45 degrees C (41 to 113 degrees F) and humidity in the range of 10 to 80 percent.

■ Keep tape cartridges away from magnets and magnetic fields, such as those produced by fans, typewriters, and other power supplies.

■ Avoid X-ray machines. The X-rays themselves do not hurt the tape, but most X-ray machines generate powerful magnetic fields.

■ Do not expose tape cartridges to heat, direct sunlight, or moisture.

■ Keep cartridges away from sticky, oily, or abrasive substances.

■ If a tape cartridge is stored at a temperature significantly different from that of the drive, let the tape cartridge reach room temperature before using it.

■ If you suspect a tape cartridge has been exposed to an extreme temperature, retension the tape before you read from or write to it.

Inserting a Tape Cartridge

B.3 The tape drive features a sliding tray that holds the tape cartridge. A lever rotates 90 degrees to lock the cartridge into place. To insert a cartridge (Figure B-2), follow these steps:

1. If the slide is not extended, ensure that the lever is in the horizontal position and gently pull the slide straight out.

2. Orient the cartridge with the clear plastic side up and the access door to the right; then, place it in the slide.

3. Gently push the slide holding the cartridge into the drive. When the slide is inserted, the access door on the cartridge automatically opens.

4. Rotate the lever 90 degrees counterclockwise to its vertical position. When the lever is vertical, the cartridge is seated and held in the best position for reading and writing. The drive automatically verifies that the tape is inserted correctly and rewinds it to the beginning.

Figure B-2   **Inserting a Tape Cartridge**

2286759
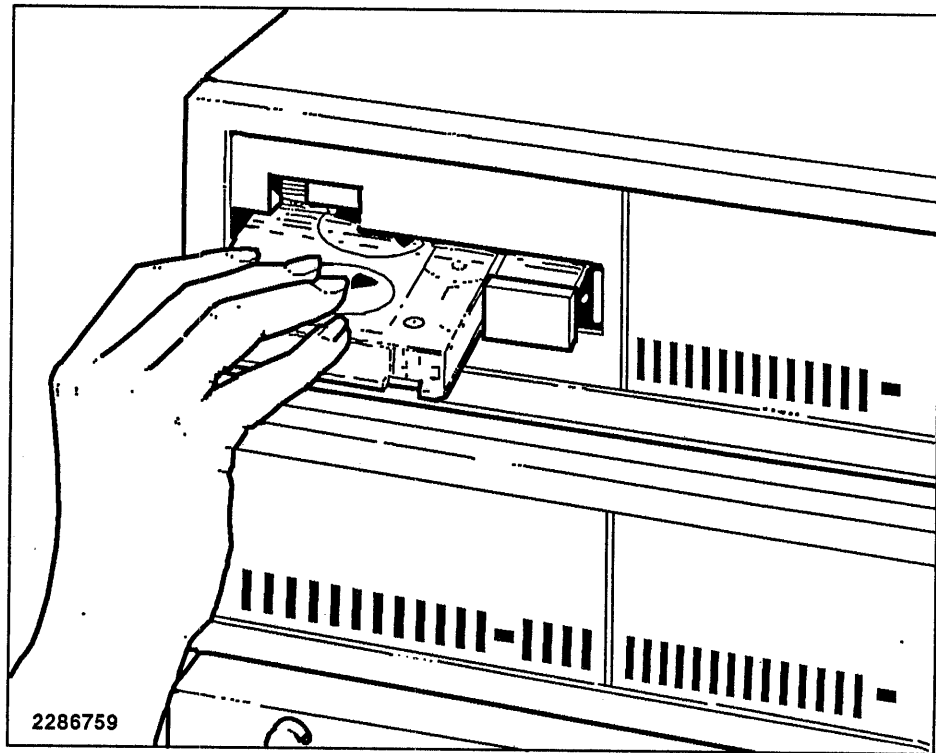
**Removing a
Tape Cartridge**

B.4 Removing a tape cartridge from the drive is basically a reversal of the steps for insertion:

1. Rewind the tape to its physical beginning. By rewinding the tape, you position a nonrecording leader under the access door. If the tape under the door becomes contaminated during storage or transport, the recording media is still intact.

2. Rotate the lever 90 degrees clockwise to its horizontal position.

3. Gently pull the slide and cartridge straight out from the drive.

4. Remove the cartridge from the slide.

5. If you are not going to immediately insert another tape cartridge, push the empty slide into the drive.

**Write Protecting
a Tape Cartridge**

B.5 You can write protect a tape cartridge by using the slotted plug. When you turn the arrow to point to the word SAFE or PROTECTED, the cartridge is write-protected. Figure B-3 shows the write-protect plug.

Figure B-3

Write-Protect Plug and Access Door
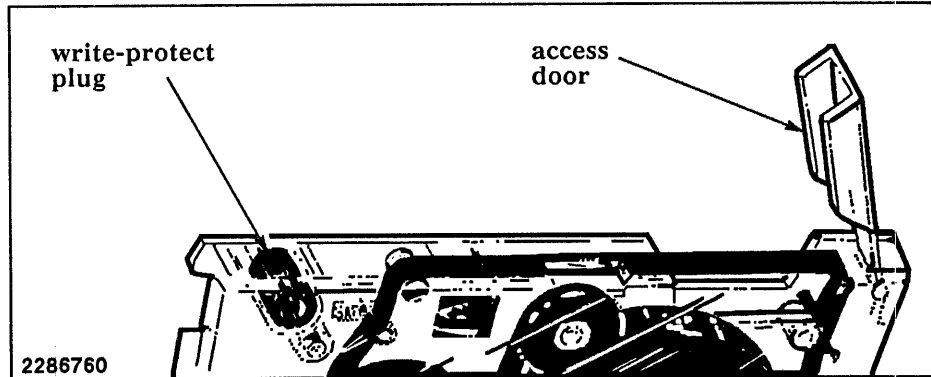
**Cleaning the
Read/Write Heads**

B.6 The read/write heads can accumulate metal oxides and dust. A large accumulation of material on the heads can cause poor performance. To ensure good performance, clean the read/write heads after every twenty hours of drive use. If you are using only new tapes, you may need to clean the heads more often to remove the accumulation of metal oxides.

Required Materials

B.6.1 To clean the read/write heads, you need a long-handled, lint-free swab moistened with one of the following:

■ Freon™ TF

■ Denatured alcohol

■ A commercial head-cleaning solvent

Cleaning the Heads

B.6.2 To clean the heads on the tape drive, follow these steps:

1. Remove the tape, if any, from the drive.

2. Rotate the lever counterclockwise to its vertical position to orient the heads forward.

3. Gently clean the mirror-polished surfaces of the read/write heads with a swab (Figure B-4).

4. Allow the heads to dry thoroughly before using the tape drive.

Freon is a trademark of E.I. du Pont de Nemours & Co., Inc.

Figure B-4   **Cleaning the Read/Write Heads**

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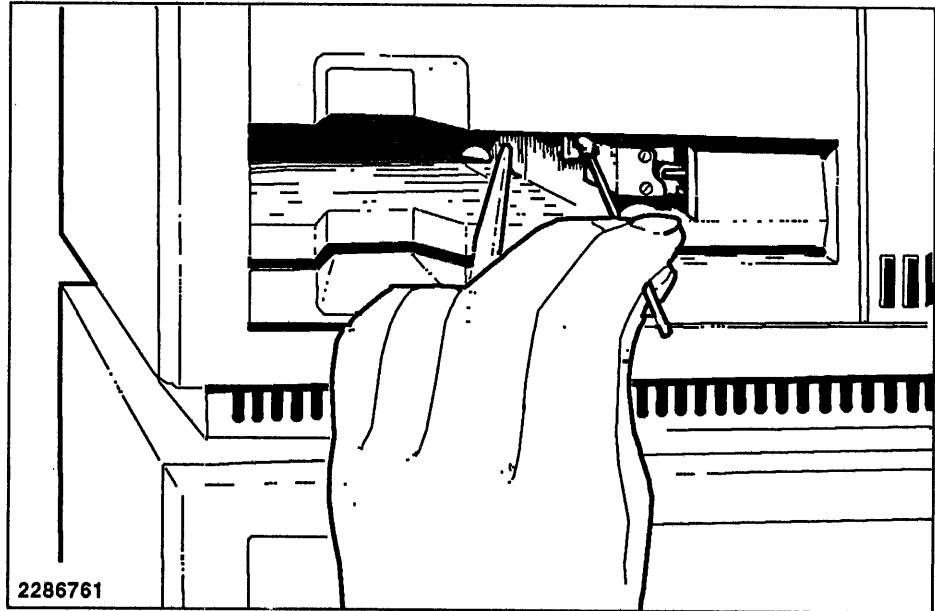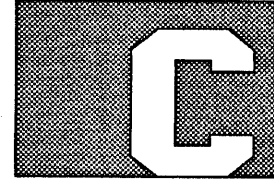
MT3201 HALF-INCH TAPE DRIVE

Introduction

C.1 The MT3201 is a ½-inch tape drive that interfaces with the Explorer system through a small computer system interface (SCSI) bus. The drive can automatically load 7-inch, 8.5-inch, or 10.5-inch tape reels. The phase-encoded (PE) tape format is compatible with the industry-standard 1600 bits-per-inch (bpi), PE tape format for ½-inch tape drives. Figure C-1 shows the MT3201 tape drive.

Figure C-1 MT3201 Tape Drive

outer enclosure cover

inner chassis assembly

outer enclosure

2287770
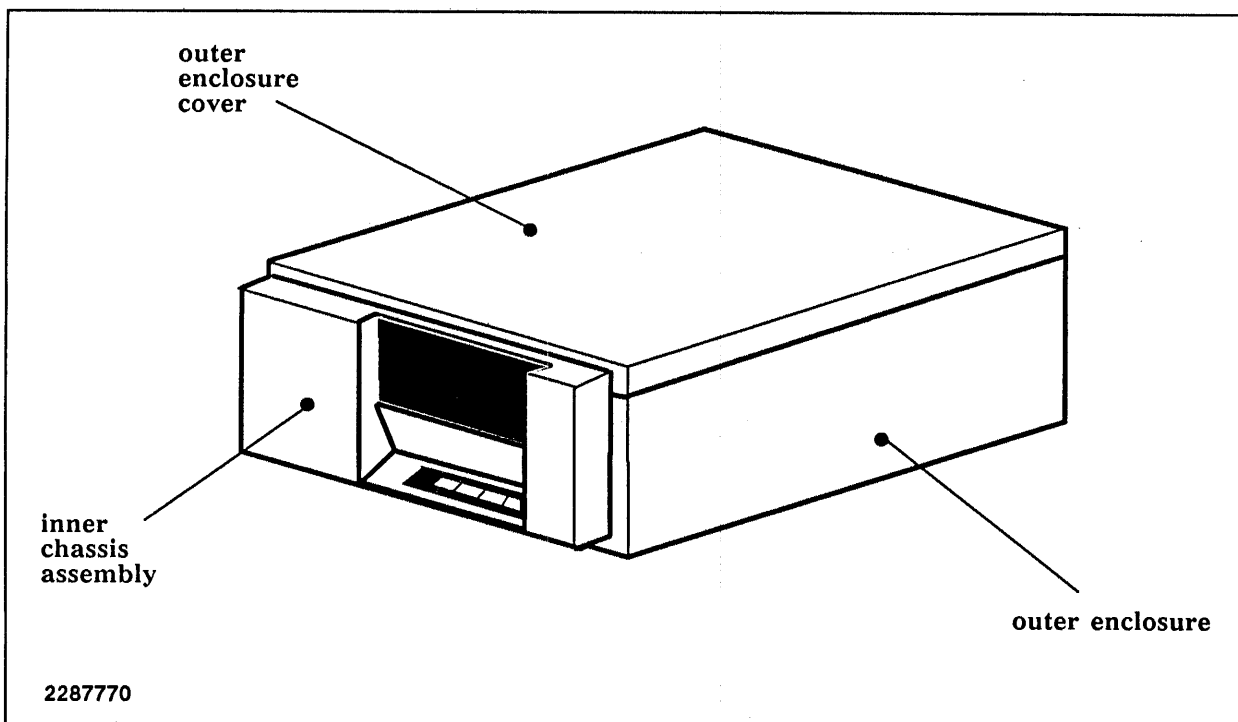
Tape drive operation is based on the use of a 64-kilobyte cache memory that serves as a buffer to temporarily store a large block of data from the host computer. This method of data transfer compensates for differences in speed between the tape drive and the computer system. It also allows the host computer to perform other operations while data is being written to tape from the cache memory. This same cache memory operation is performed when data is being transferred from tape to the host computer.

An assembly at the rear of the MT3201 enclosure contains an SCSI controller board. This board provides the interconnections and the control logic required to adapt the standard Cipher Data Products interface of the ½-inch tape drive to the SCSI bus. The control logic on the SCSI controller can operate as a target device during execution of standard tape functions and as an initiator device during execution of the COPY command to another device on the SCSI bus.

Tape Drive Preparation

C.2 To prepare the MT3201 for operation, you must set switches on the MT3201 formatter and the SCSI controller. In addition, you must install the interface cables between the tape drive and the host, and install the power cable between the drive and the ac power outlet. The *MT3201 1/2-Inch Tape Drive General Description* provides detailed information on tape drive preparation.

Operation

C.3 The MT3201 tape drive features both manual and automatic tape loading or unloading. Operation of the drive with a reel tape loaded and with the drive in the online mode is controlled by the host computer. Figure C-2 shows the MT3201 operator control panel.

Figure C-2 MT3201 Operator Control Panel
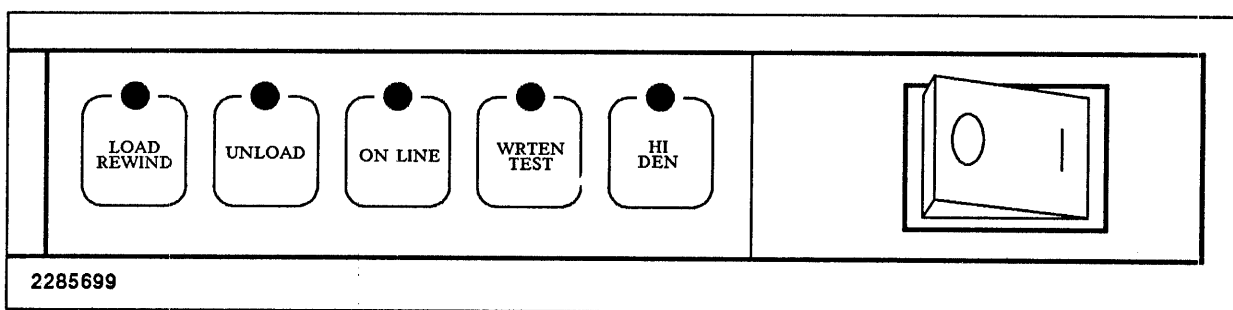
Each of the operator-accessible controls has an associated indicator that shows the current condition of the control. The operator-accessible controls and indicators are as follows:

■ Power switch — Switches line power on (1) and off (0).

■ LOAD/REWIND switch — Loads the tape to the beginning-of-tape (BOT) marker in the LOAD position. Rewinds the tape to the BOT marker in the REWIND position. (Tape rewinding requires that the drive be in the offline mode.) The indicator light is on when the BOT tab is positioned at the BOT sensor and flashes when the drive is executing a load or rewind operation.

■ UNLOAD switch — Unloads tape from any point. The UNLOAD indicator flashes during the unload sequence, then remains lit. The unload operation requires that the drive be in the offline mode.

■ ONLINE switch — Toggles the drive between the online mode and the offline mode. The indicator is on in the online mode and off in the offline mode.

■ TEST/WRTEN switch — This control functions as a switch for diagnostic testing and as an indicator only for the write-enable feature. During power-up self-test, the five control indicators collectively show self-test information. Pressing the switch after self-test completion places the unit in the diagnostic mode. (Refer to the *MT3201 1/2-Inch Tape Drive General Description* for more information on self-tests and diagnostics.) The WRTEN indicator light comes on to indicate that the tape reel has a write-enable ring installed to enable writing to the tape.

■ HI DEN switch — Toggles the drive between the high-density (3200 char-
acters per inch) and low-density (1600 characters per inch) recording
modes. The indicator lights to indicate the high-density mode. Changing
the density requires that the drive be in the offline mode.

Loading and Unloading Tape

C.4 Before loading a tape on which you want to write data, check the reel to
ensure that the write-enable ring is installed. The following paragraphs
describe automatic and manual tape loading and unloading.

Automatic Tape Loading

C.4.1 To load the tape through the front panel of the MT3201, perform the
following procedure:

1. Apply ac power to the MT3201 and verify that the UNLOAD indicator is
lit after a delay of approximately five seconds.

2. Verify that the write-enable ring, if used, is fully seated on the tape reel.

3. Ensure that the tape is completely wound onto the reel.

4. Open the front-panel door by gently pressing down on the top (center) of
the door.

5. Insert the tape reel through the MT3201 front-panel door opening with
the write-enable ring side down. Tip the edge of the reel slightly upward
to clear the supply hub. Place the tape reel completely inside the chassis.

6. Close the front panel door and verify that the tape reel does not touch
the door.

7. Press the LOAD switch. The access doors are now locked. The LOAD
indicator remains lit after the load sequence completes. Pressing the ON
LINE switch during the load sequence places the transport immediately
online when the BOT marker is sensed by the drive.

8. If an automatic load failure occurs, all the indicators except UNLOAD
and ON LINE flash. A possible correction for this problem is as follows:

    a. Remove the tape reel from the MT3201.

    b. Clean the reel with an antistatic cloth (commercially available) to
    remove any static electricity charges.

    c. Check that the end of the tape leader is properly crimped to ensure
    that the automatic load feature functions properly.

    d. Repeat steps 3 through 7 to verify proper operation of the tape. If the
    problem still exists, contact a qualified service person.

Automatic Tape Unloading

C.4.2 Perform the following procedure to unload the tape through the front-
panel door of the MT3201:

1. Press the ON LINE switch to place the drive in the offline mode. The ON
LINE indicator should be off.

2. Press the UNLOAD switch. During the unload sequence the UNLOAD
indicator flashes, and the access doors remain locked. When the unload

sequence completes, the UNLOAD indicator remains lit, and the access doors unlock.

3. Open the front-panel door and carefully lift the reel up so that it clears the supply hub. Remove the reel from the chassis.

4. Close the front-panel door.

Manual Tape Loading

C.4.3 Perform the following procedure to manually load the tape through the top cover of the MT3201:

1. Open the operator access cover of the MT3201 and place the cover support in the slot provided to keep the cover open.

2. Place the reel of tape on the supply reel hub and ensure that the reel is evenly seated on the hub.

3. Locate the manual unlock button located behind the front-panel door on the bottom left side of the tape reel opening. Press and hold this button while rotating the supply hub clockwise until the supply reel is locked in place.

4. Thread the tape along the path shown in Figure C-3. Carefully move the tachometer assembly away from the take-up reel hub. Wrap one turn of tape clockwise around the take-up reel hub, then gently replace the tachometer assembly. Turn the take-up reel hub clockwise until about five revolutions of tape are wrapped on the hub.

5. Ensure that the tape is seated correctly on the guides and is threaded properly over the head assembly; then close the operator access cover.

6. Press and hold the HI DEN switch while you press the LOAD switch; then release both switches. The tape should be placed under tension and advance forward until the BOT is positioned at the BOT sensor, at which time the LOAD indicator light comes on.

7. To check that there is at least 25 feet of tape beyond the EOT mark, press the REWIND switch to rewind the tape. The MT3201 automatically unloads the tape to the EOT position, then reloads it to the BOT position. The MT3201 is now ready for use.

Manual Tape Unloading

C.4.4 Perform the following procedure to manually unload the tape through the top cover of the MT3201:

1. Open the operator access cover of the MT3201 and place the cover support in the slot provided to keep the cover open.

2. If the MT3201 cannot complete the rewind/unload sequence when the REWIND switch is activated, manually rotate the supply reel in a counterclockwise direction until the tape is rewound.

3. Locate the manual unlock button behind the front-panel door on the bottom left side of the tape reel opening. Press and hold this button while rotating the supply reel counterclockwise until it rotates freely and can be removed from the drive.

Figure C-3 MT3201 Tape Path and Related Parts

take-up hub

tachometer roller

tape roller guide (3)

compliance arm roller guide

roller guides

roller guide

read-write head

reel hub pad

supply reel

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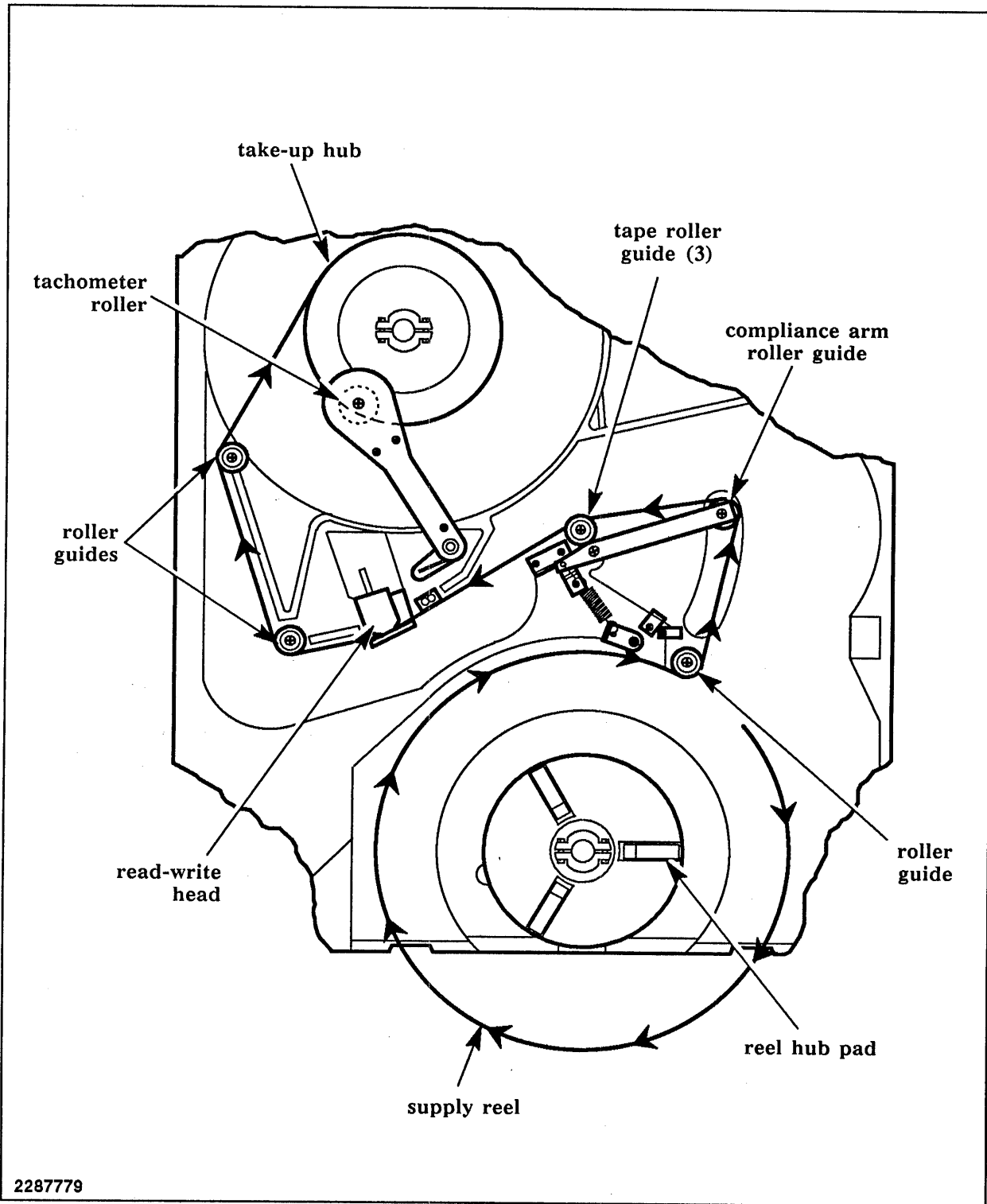
Preventive Maintenance

C.5 Preventive maintenance for the MT3201 consists of cleaning a number of items and changing the air filter. Table C-1 shows the schedule for preventive maintenance.

Table C-1

Preventive Maintenance Schedule

Maintenance Operation	Frequency (Hours)	Quantity to Maintain
Tachometer roller	8	1
Take-up reel hub	8	1
Roller guides	8	5
Reel hub pads	8	3
Read/write head	8	1
Tape cleaner	8	1
Front panel and door	as required	1
Top plate casting	as required	1
Filter	1000	1

The recommended tape-path cleaner is Freon, which is commercially available. Lint-free cloths, solvent-resistant swabs, and plastic cleaners are also available commercially.

Open the top cover of the MT3201 to access the items that require cleaning.

CAUTION: Do not apply a cleaner directly from the container to the surface to be cleaned, even though instructions on the container may suggest this method. Always apply the cleaner to a swab first, carefully removing any excess, before using the swab to clean an item.

Perform preventive maintenance on the following items as indicated.

■ Tachometer roller — Use a swab moistened with tape-path cleaner to wipe the entire roller surface. You can slowly rotate the roller by manually turning the take-up reel hub.

CAUTION: Do not allow cleaning solvent to run into the bearings of the tachometer roller or the roller guides. The solvent can break down the lubricant in the precision bearings of these items, causing the bearings to wear out prematurely.

■ Roller guides — While rotating each roller, use a swab moistened with tape-path cleaner to wipe the tape contact surface-flanges and washers.

■ Take-up reel hub — While manually rotating the hub, use a swab moistened with tape-path cleaner to wipe the tape wrapping surface.

■ Reel hub pads — Use a swab moistened with tape-path cleaner to wipe the contact surface of each pad and remove any debris around the pad.

■ Read/write head — Use a swab moistened with tape-path cleaner to wipe the entire face of the head and attached erase bar. Pay particular attention to the recessed areas.

CAUTION: Rough or abrasive materials can scratch sensitive surfaces of the heads, resulting in permanent damage. Other cleaners, such as alcohol-based types, can cause read/write errors.

■ Tape cleaner — Use a swab moistened with tape-path cleaner to wipe the entire length of each blade of the tape cleaner. Remove accumulated oxides from the recessed area between the blades.

CAUTION: Exercise care to avoid damage to the sharp edges of the tape cleaner blades.

■ Front panel and door — Use a cloth moistened with plastic cleaner to gently clean the surface of the front panel and door assembly.

■ Top plate casting — Use a cloth moistened with plastic cleaner to gently clean the surface of the top plate casting.

■ Filter — Locate and remove the filter from inside the air duct opening at the lower left corner of the front panel. Clean the filter with low-pressure compressed air or a vacuum in the opposite direction of airflow, then reinstall the filter.
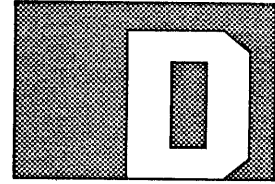
MODEL 855 PRINTER

Introduction

D.1 This appendix briefly describes the operator control panel, installation, power-up tests, and operation of the Model 855 printer. For further information see the *Model 855 Printer Operator's Manual* and the *Model 855 Printer Technical Reference Manual*.

Figure D-1 shows the Model 855 printer with its ribbon cartridge and a font module.

Figure D-1 Model 855 Printer
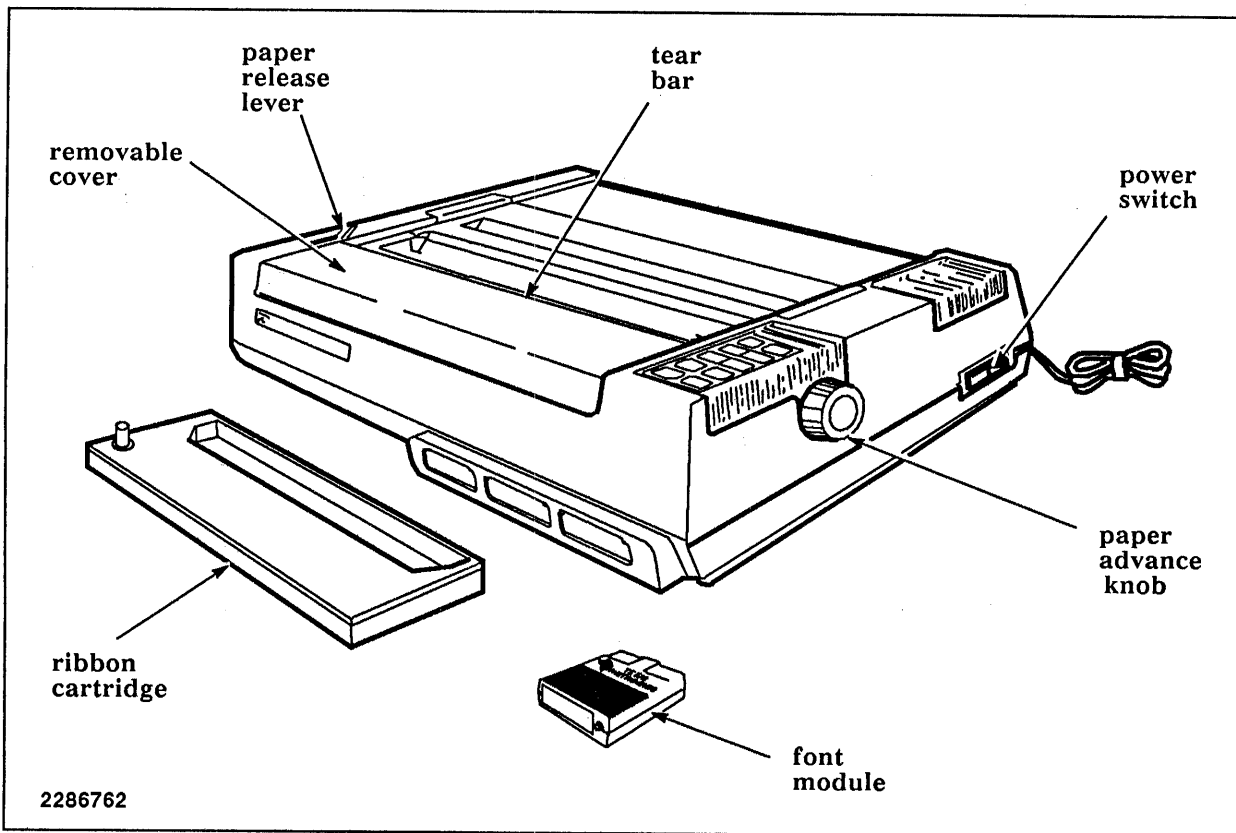
Operator Panel   **D.2**   The operator panel (Figure D-2) features touch-sensitive membrane controls for operator-controlled functions. It also includes several light-emitting diode (LED) indicator lights, a POWER indicator, and an ALERT indicator.

Figure D-2   Model 855 Printer Operator Panel

INDICATORS

ON--out of paper
    or data overflow
    flashing--failed
    power-up test

If the alert indicator flashes,
turn power switch off and
call your local service
representative.

SWITCHES

The power switch is
located on the right
side of the printer.

ON--power applied
OFF--power not applied

select font
module

change between
draft and quality
printing

select character
spacing

select line
spacing

ON--form length
being set

advance paper
one line

set form length
when offline

ON--printer ready
OFF--printer not ready
FLASHING--pause

advance paper
to preset top
of form

change between
online and
offline

POWER   ALERT

MODULE
SELECT

DRAFT

QUALITY

10   12
      15
CHAR
SPACING
COMPRESS

6   8
LINE
SPACING
DOUBLE

SET
FORM
LENGTH

LINE
FEED

ON
LINE

FORM
FEED

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The operator panel controls and indicators are as follows:

■ POWER indicator — The POWER switch, located on the right side of the printer, turns the printer on and off. Turning the printer on lights the POWER indicator and sets operating parameters to the default values.

■ ALERT indicator — The ALERT LED glows steadily when the printer is out of paper and flashes when an internal problem exists in the printer. If the ALERT LED is flashing, turn off the printer and call your customer representative.

■ MODULE SELECT switch — Pressing this switch selects one of the font modules. The Explorer operating system can override this selection. If no module is inserted in a socket, the printer uses the internal-test character set.

■ DRAFT/QUALITY switch — Pressing this switch toggles between the draft and letter quality modes. LEDs beside the words DRAFT and QUALITY on the panel indicate the selected mode.

A font module must be inserted in a socket to use the quality mode; if the quality mode is selected with no font module inserted, the printer executes line feeds but does not print.

The DRAFT/QUALITY switch cannot be used when the ALERT or the SET FORM LENGTH indicator is lit. A host computer can override the mode selected by the DRAFT/QUALITY switch.

■ CHAR SPACING switch — Pressing this switch selects the character spacing (pitch) of the printed line. An LED beside the switch indicates the selected pitch. The Explorer system controls the characters per inch (cpi) for the files it prints.

■ LINE SPACING switch — This switch selects the line spacing used. The Explorer system controls the lines per inch (lpi) for the files it prints. LEDs positioned beside the switch indicate the selected spacing.

■ FORM FEED switch — Pressing this switch advances the paper to the top of the next form. If the printer is printing when this switch is pressed, it prints the entire line, then advances to the top of the next form.

This switch cannot be used when the SET FORM LENGTH indicator is lit.

■ LINE FEED switch — This switch advances the paper one line; holding the switch down advances the paper continuously until the switch is released.

The LINE FEED switch is used with the SET FORM LENGTH switch to set the length of a form.

■ SET FORM LENGTH switch — Pressing this switch places the printer in the set form length mode; pressing the switch again takes the printer out of the set form length mode.

This form length remains in effect until the form length is reset or the printer is turned off.

■ ON LINE switch — This switch toggles the printer between its online and offline conditions; the switch also causes the printer to resume printing after the host computer has sent a pause command.

The printer is automatically in the online mode when turned on.

After the host computer sends a Pause command (to enable you to change something on the printer), pressing the ON LINE switch causes the printer to resume printing. The printer resumes printing where the printhead is positioned; if the printhead is moved while the printer is stopped, the printhead does not return to the original position by itself.

Installing a Model 855 Printer

D.3 The general steps for installing a printer include connecting the cables, setting the printer switches, and adding the printer to the list of devices on your Explorer system. The cables needed depend on the protocol you are using. The cable requirements are as follows:

■ For a parallel printer, you need cable number 2235641-000n, where n specifies the length of the cable.

■ For a serial printer, you need both cable number 2222477-0002 and cable number 2303077-0001.

These instructions apply to an Explorer system that has been previously installed and verified as working. If you are installing the Explorer system itself, you should follow the procedure listed in the *Explorer 7-Slot System Installation* guide. If the printer is new, you should follow the procedures listed in the *Model 855 Printer Operator's Manual* to install optional equipment such as a tractor feed or paper separator on your printer.

Connecting Cables

D.3.1 Use the following procedure to connect the data cable between the printer and the system enclosure and to connect the printer power cable:

1. To avoid problems with interrupted processes, power down your Explorer system.

2. If you are using a parallel printer, skip this step and continue with the next step. If you are using a serial printer, connect the two serial cables. The male and female connectors are keyed so that you can connect them only one way.

3. Connect the appropriate cable to the rear of the system enclosure (refer to Figure D-3):

    a. To connect a parallel printer, bring the printer cable into the system enclosure through the space at the bottom of the rear enclosure door. Connect the 40-pin printer cable connector to the matching 40-pin connector on the fiber-optic board (the bottom connector of the three connectors on that board).

    b. To connect an RS-232C device, bring the RS-232C cable into the system enclosure through the space at the bottom of the rear enclosure door. Connect the RS-232C cable connector to the matching 18-pin connector on the fiber-optic board (the middle connector of the three connectors on that board).

Figure D-3   System Enclosure Connectors for the Printer Cables

cable to monitor

connector for serial cable

connector for parallel cable

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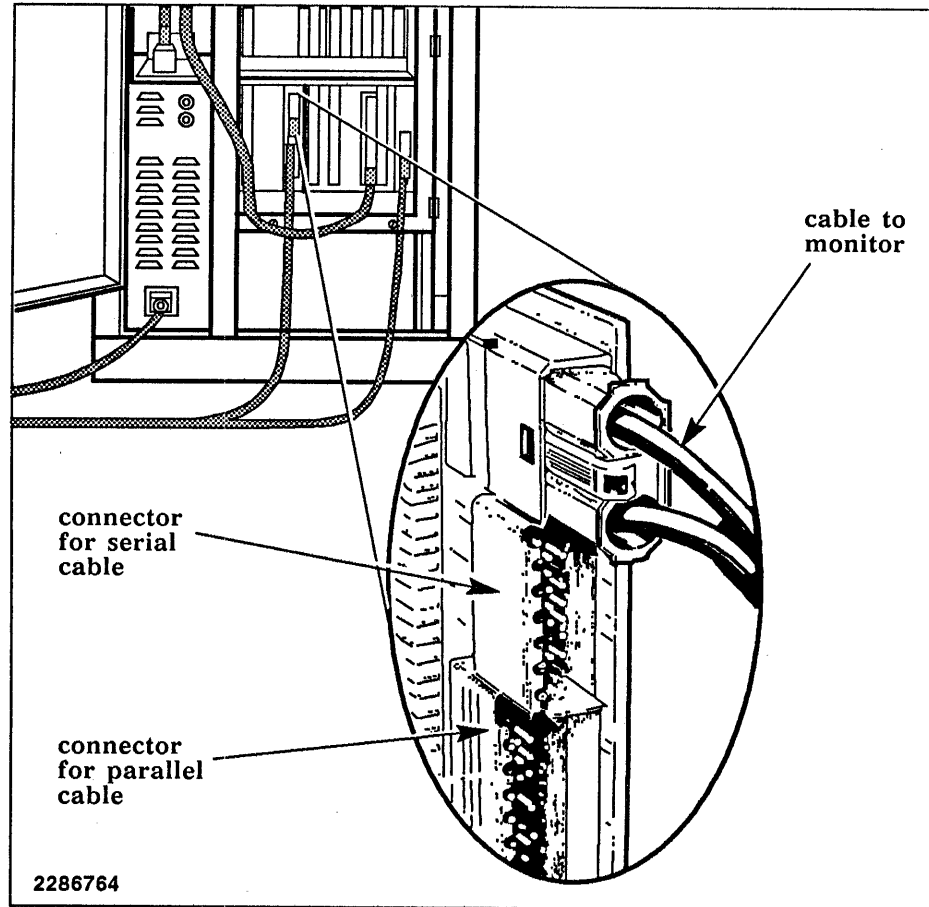
4. Connect the other end of the cable to the printer (Figure D-4).

    a. Plug the connector into the receptacle on the back of the 855 printer.

    b. Lock the connector into place by snapping the wire clips on each side of the receptacle into the slots on the connector.

5. Connect the printer to a power source.

    a. Ensure that the power switch for the printer is in the off position.

    b. Plug the power cord into a three-hole, protective ground, ac power outlet.

CAUTION: Do not turn on power yet.

Figure D-4   Rear View of the 855 Printer

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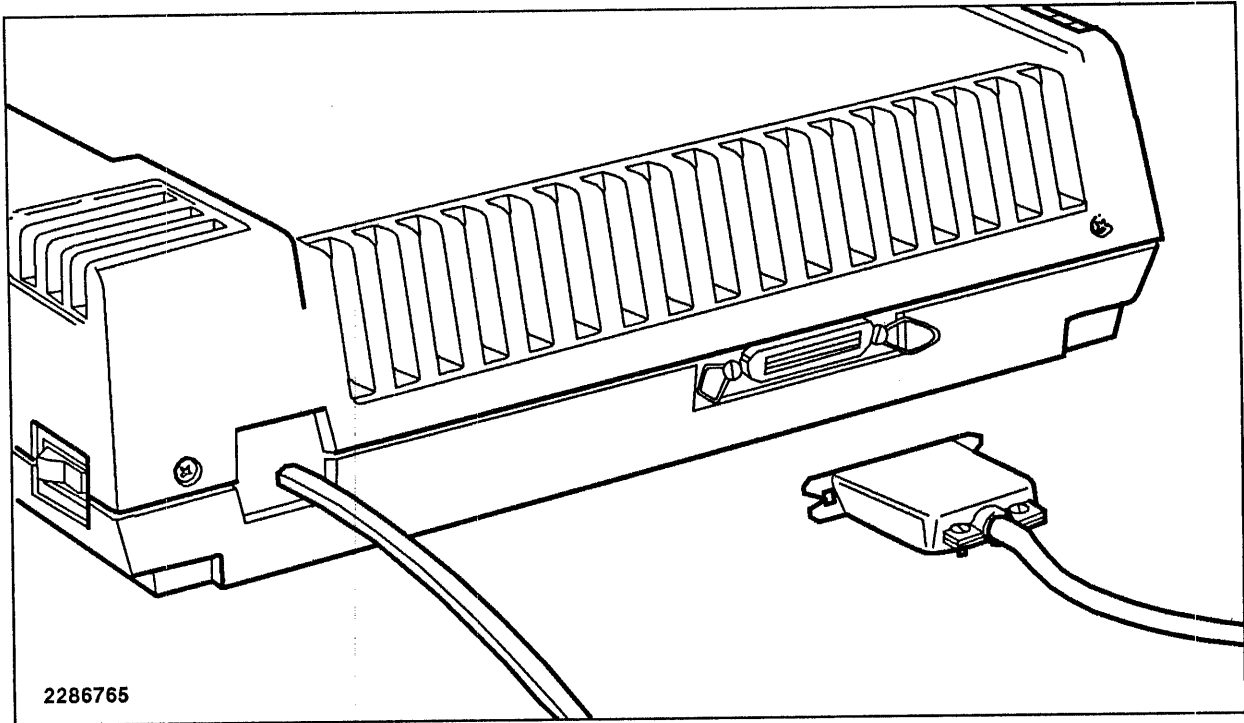
**Setting the
Internal Switches**

D.3.2 Set the internal switches on the 855 printer to the correct values for the protocol you are using. These switches are located under the front cover directly below the carriage on the printed wiring board. Figure D-5 shows the internal switches.

Parallel Protocol

D.3.2.1 To use the Model 855 printer with a parallel interface, the internal controls should be set as follows:

Control	Setting	Meaning
1	On	Eight data bits, no parity
2	On	Eight data bits, no parity
3	On	No automatic line feed or carriage return
4	Off	Data processing mode
5	On	Parallel protocol
6	On	Parallel protocol
7	On	Parallel protocol
8	On	Parallel protocol

Figure D-5 Model 855 Printer Internal Switches
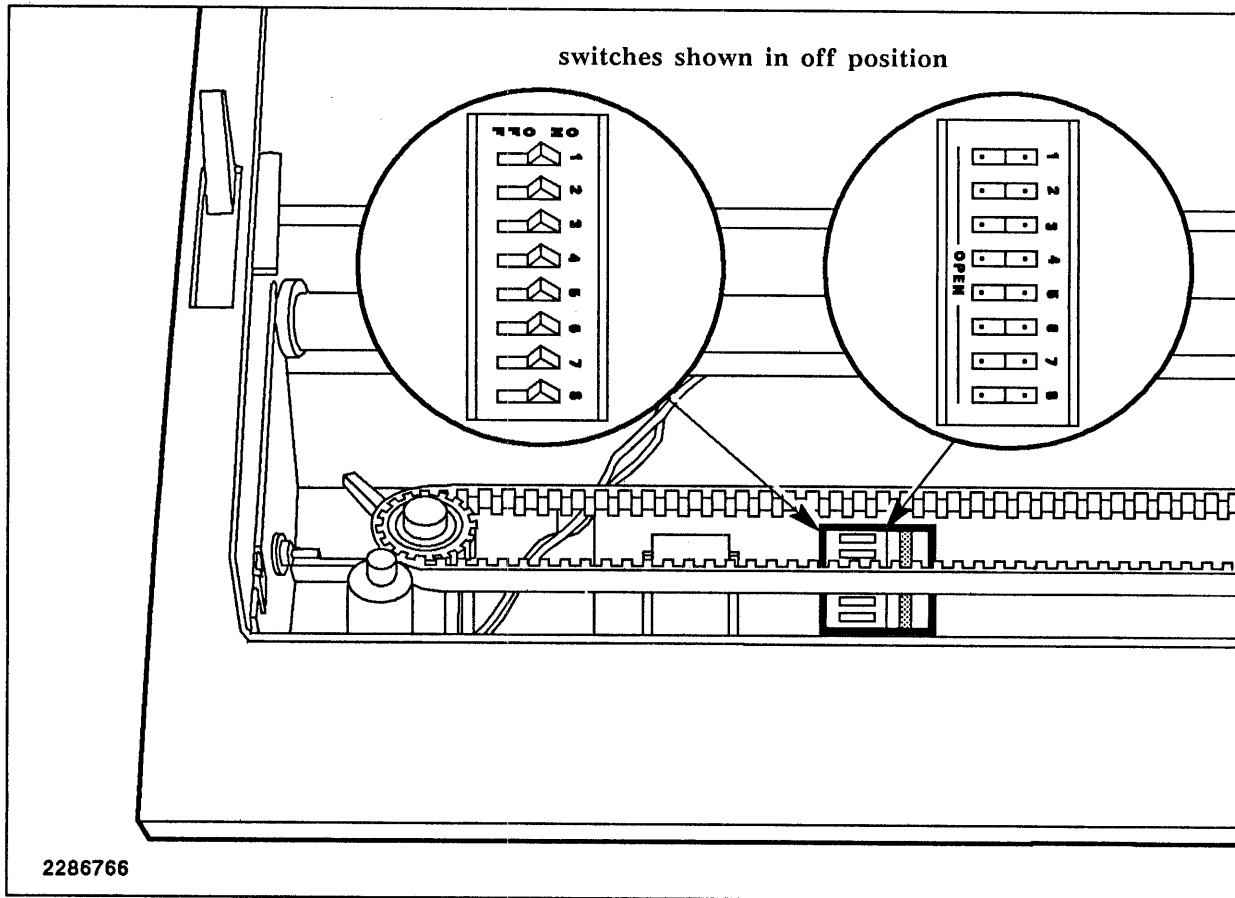
Serial Protocol   **D.3.2.2** To use the Model 855 Printer with a serial interface, the internal controls should be set as follows:

Control	Setting	Meaning
1	On	Eight data bits, no parity
2	On	Eight data bits, no parity
3	On	No automatic line feed or carriage return
4	Off	Data processing mode
5	On	4800 baud with xon/xoff protocol
6	Off	4800 baud with xon/xoff protocol
7	On	4800 baud with xon/xoff protocol
8	Off	4800 baud with xon/xoff protocol

NOTE: You can use a different baud rate with the Explorer system and your 855 printer by changing the value of the **printer:*default-baud-rate*** variable and the settings of internal switches 5 through 8. These two settings *must agree*. For information about other settings for these switches, see the *Model 855 Printer Operator's Manual*. For information about the **printer:*default-baud-rate*** variable, see the *Explorer Input/Output Reference* manual.

Adding the Printer to the Software

D.3.3 Use the following procedure to add a printer to the list of Explorer system printers on your network:

1. Power up the Explorer system and the printer.

2. Add the printer to the list of printer devices in your Explorer system.

   ■ If the printer and host are to be used as a print server, use the procedure described in the *Explorer Input/Output Reference* manual.

   ■ If the printer is to be used only as a local printer (not accessible to other systems on the network), execute the **add-printer-device** function as described in the *Explorer Input/Output Reference* manual.

Power-Up Tests

D.4 When the printer is turned on, various tests are performed automatically to verify memory and functions. The printer loads a default set of forms into memory and sets various default parameters. The Explorer system sets these parameters explicitly each time a file is printed.

Initial Settings

D.4.1 After successfully completing the self-tests and loading the default set, the printer places itself online. The POWER, DRAFT, and ON LINE LEDs light up; the ALERT and SET FORM LENGTH LEDs go out. If the ALERT LED remains lit or flashes, refer to paragraph D.2, Operator Panel.

Barberpole Test

D.4.2 You can also perform the power-up barberpole test to check the quality of the printing and to display the different kinds of print available in the different fonts.

By examining the pattern, you can see if the printing is dark enough and if all the letters are complete. You can adjust the printhead to make the print darker or lighter.

To perform the barberpole test, press and hold the MODULE SELECT switch and press the POWER switch to turn the printer on. You can display different kinds of printing by beginning the barberpole test and then pressing the DRAFT/QUALITY, MODULE SELECT, LINE SPACING, and CHAR SPACING switches on the printer. When you press each switch, the printer completes the line of type and then switches to the new type on the next line.

To stop printing the test pattern, press the ON LINE switch.

Typefaces

D.5 The 855 printer has an internal character set and three font module sockets located on the lower front of the printer. If no font module is installed, the printer uses the internal character set; otherwise, the printer uses the font of the module on which the indicator is lit or the module specified by the Explorer system. You can select the print quality from the operator control panel. You can specify the style of print by including fonts either in the attribute line of your file or in the function call that prints the file.

Print Quality   **D.5.1** The 855 printer uses either draft or letter-quality mode. The DRAFT/ QUALITY switch on the operator panel toggles the printer between these two modes, or the host computer can change the mode by sending command codes.

A font module must be inserted into a socket to use quality mode; if quality mode is selected when no font module is inserted, the printer executes line feeds but does not print. The 855 printer uses the character sets contained in font modules only when it prints files that contain text. These files can be files of types such as TEXT or LISP. Screen images and other bit-map arrays, such as files of type PICTURE, are printed using raster graphics rather than a character set. In raster graphics, the printer places dots wherever needed rather than printing lines of characters.

Print Style   **D.5.2** Each font module, although it contains only one set of characters, can print in four styles:

■ Regular printing is the standard character set for the font module.

■ Bold printing is created by the printhead overprinting characters without an offset.

■ Shadow printing is created by the printhead overprinting characters with a 1/120-inch offset. The Explorer system uses shadow printing as an italic typeface.

■ Bold shadow printing is created by the printhead overprinting shadowed characters.

The printhead must make varying numbers of passes to produce these styles in draft and quality modes. The following table lists the number of passes required for each style of printing in draft and quality modes.

Printing Style	Draft Mode	Quality Mode
Regular printing	1	2
Bold printing	2	4
Shadow printing	2	4
Bold shadow printing	4	8

Operation

D.6 The following paragraphs discuss installing a ribbon cartridge, loading paper, adjusting for form thickness, setting the form length, and installing font modules.

Installing a Ribbon Cartridge

D.6.1 Use the following procedure to install a ribbon cartridge in the 855 printer:

1. Set the power control to OFF.

2. If the power cord is connected, disconnect it.

3. Use the printhead adjustment lever (Figure D-6) to move the printhead away from the platen.

Figure D-6 Model 855 Printhead Adjustment Lever

2286772
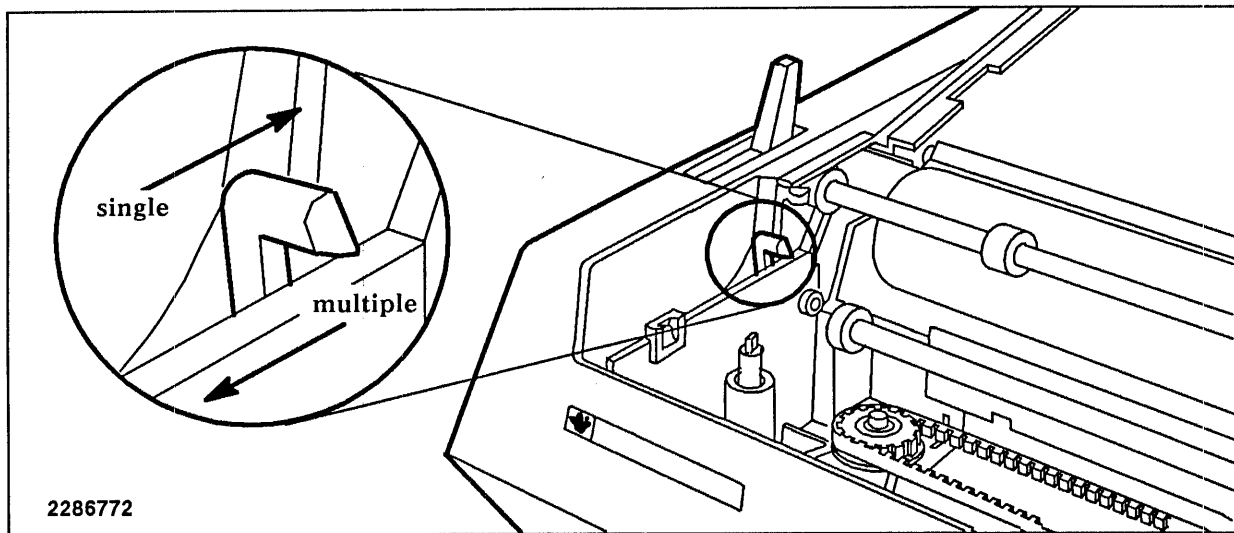
4. Grasp the carriage portion of the printhead-carriage assembly and manually slide the printhead to the center of the platen.

CAUTION: If the printer has been in use, the printhead may be quite warm.

5. Remove the ribbon cartridge if one is already installed.

6. Hold the ribbon cartridge by the ends and insert the ribbon between the printhead nose and the ribbon guides (Figure D-7).

Figure D-7 Model 855 Ribbon Guides and Printhead Nose

ribbon   printhead   ribbon
2286767   nose   guide
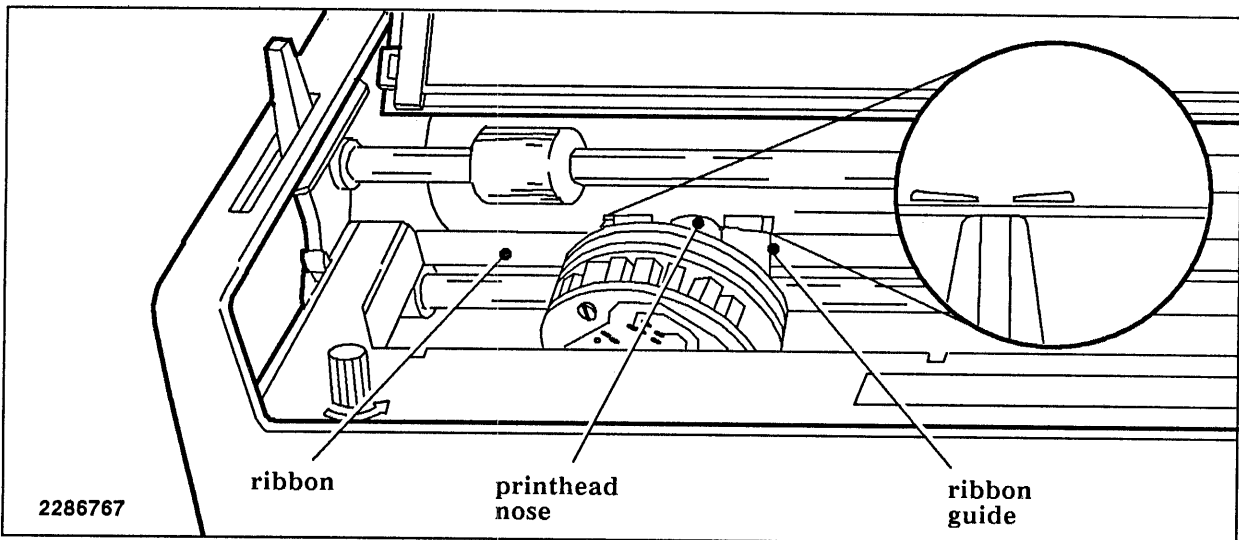
7. Tilt the ribbon cartridge backward and insert the pins on each side of the cartridge arm into the hooks on the printer frame.

8. Press the front of the cartridge down gently until it snaps into position. If you feel any resistance on the left side, turn the ribbon adjustment knob (Figure D-8) in the direction of the arrow.

Figure D-8 Model 855 Cartridge Arm and Ribbon Adjustment Knob

ribbon
cartridge
arm

ribbon
adjustment
knob

2286774
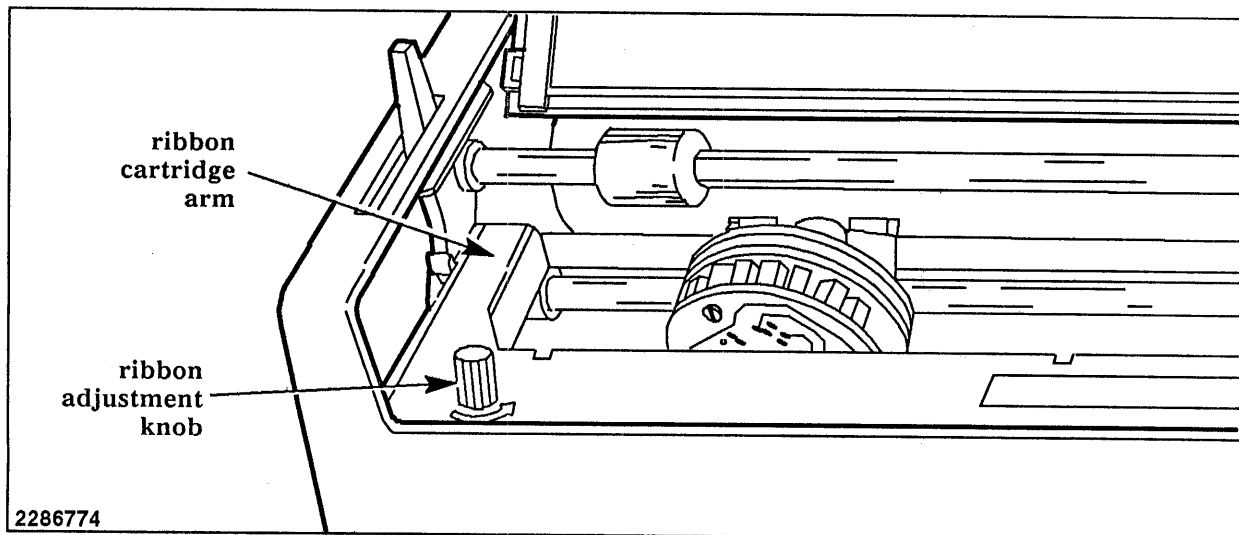
9. Slide the printhead from side to side to ensure that the ribbon is smooth across the face of the printhead.

10. Move the printhead adjustment lever to the middle notch. You may need to adjust this setting again depending on the forms you use. See paragraph D.6.3, Adjusting for Form Thickness.

11. Rotate the ribbon adjustment knob in the direction of the arrow to remove any slack from the ribbon.

12. Ensure that the ribbon moves freely.

13. Reconnect the power cord and turn the printer on.

Loading Paper **D.6.2** The 855 printer can use single-sheet, roll, or fanfold paper.

CAUTION: Do not use the printer without paper; doing so can damage the printhead and the platen.

Single-Sheet Paper **D.6.2.1** Single-sheet paper is loaded into the printer in the same manner as loading paper in a typewriter:

1. Move the paper release lever (Figure D-9) toward the front of the printer.

2. Insert and align the paper.

3. Move the paper release lever toward the rear of the printer.

4. Use the paper advance knob to position the paper.

Figure D-9 **Model 855 Paper Release Lever**
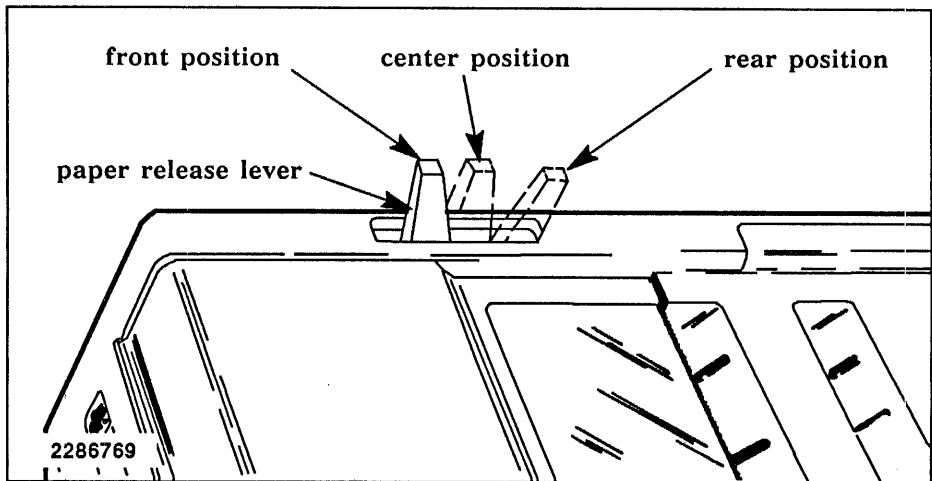
Roll Paper   **D.6.2.2** The optional paper-roll holder is required to use roll paper. The holder accepts paper rolls 76 to 254 millimeters (3 to 10 inches) wide and up to 127 millimeters (5 inches) in diameter. Figure D-10 shows the paper path for roll paper.

Figure D-10   **Path for Roll Paper**

2286770
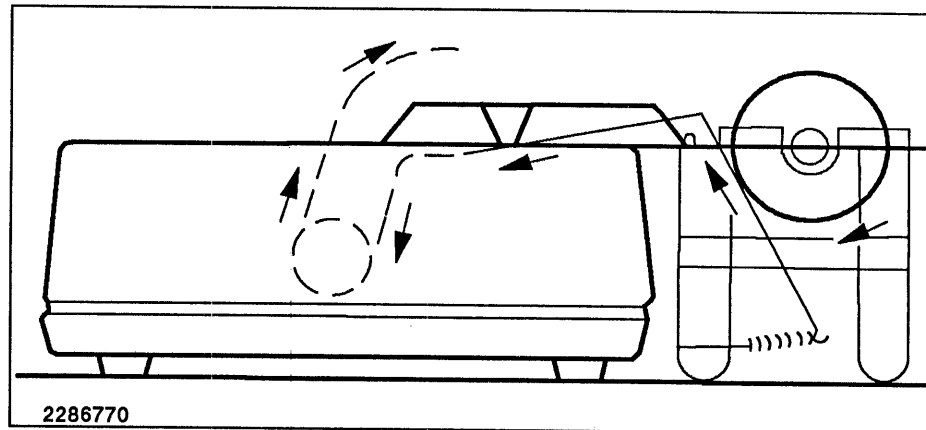
The following procedure assumes that you have already installed the paper-roll holder.

1. Remove the old paper roll if necessary.

2. Place a roll of paper on the paper rod and a keeper on each side of the roll.

3. Making sure that the free end of the paper feeds toward the printer from the bottom of the roll, place the paper rod into the two slots on the sides of the paper-roll holder.

4. Slide the paper roll to the left on the rod so that the paper contacts the paper-out switch when fed into the printer. Move the keepers to hold the paper roll in that position.

5. Feed the paper from the bottom of the roll over the top of the tension bar and between the top of the printer and the separator, as shown in Figure D-10.

6. Move the paper release lever toward the front of the printer.

7. Slide the paper under the platen until paper appears above the printhead, in front of the platen, and under the guide rollers.

8. Move the paper release lever to the rearmost position.

9. Rotate the paper advance knob until the paper clears the top opening of the printer.

10. Tear off excess paper by grasping the top of the paper at either corner and pulling the paper against the tear bar. The tear bar is the serrated edge of the window in the access door.

Fanfold Paper **D.6.2.3** The optional tractor drive assembly is required to use fanfold paper. Figure D-11 shows the paper path for fanfold paper.

Figure D-11   **Path for Fanfold Paper**

2286771
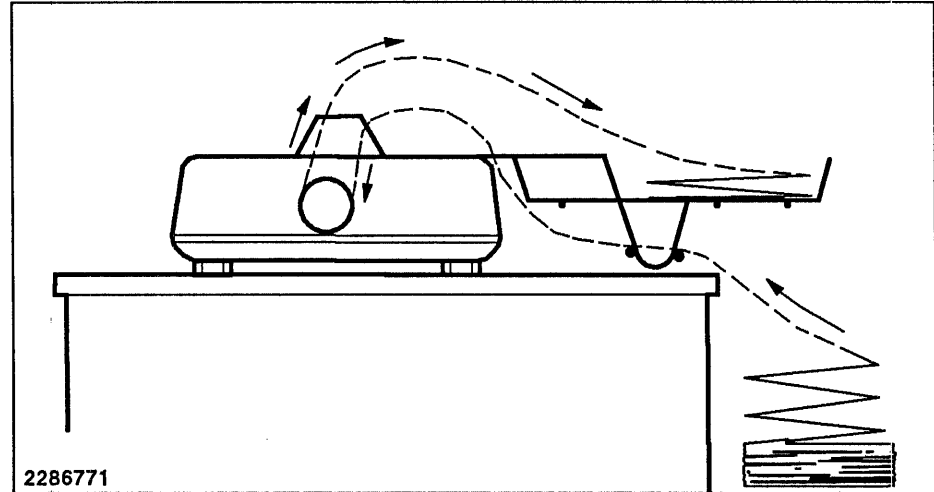
The following procedure assumes that you have already installed the tractor drive assembly and positioned the tractors for the width of paper you are using.

1. Place the box or stack of fanfold paper behind and beneath the printer so that the sheets of paper face the front of the printer.

2. Line up the box from side to side with the platen of the printer so that the paper feeds straight from the box to the tractors. Check to ensure that the cables do not interfere with the paper.

3. Move the paper release lever to the front of the printer.

4. Open the tractor covers.

5. Insert the paper under the separator if your printer is equipped with one and over the tractors as shown in Figure D-11.

6. Place the paper over the tractor drive pins and close the covers. The holes in the paper must fit on the drive pins in the tractors.

7. Feed the paper under the platen and under the paper guide roller, then out to the rear of the printer.

8. Move the paper release lever to the rear of the printer.

9. Set the paper position for the top of form.

Adjusting for Form Thickness

D.6.3 The printhead can be adjusted to accommodate forms of various thicknesses, including multicopy forms. Adjustments should be made after the forms have been installed.

CAUTION: Never adjust the printhead while it or the platen is moving. Doing so can damage the printhead.

To adjust the form thickness, move the printhead adjustment lever (see Figure D-6) toward the platen for single thicknesses and away from the platen for multiple thicknesses. If the printhead is smudging the paper or dragging against the paper, move the printhead away from the paper. If the letters are faint but the ribbon is good, move the printhead toward the platen to increase the darkness of printed letters.

Setting Top of Form

D.6.4 The setting for the top of form—the first line of print on the page—remains only as long as the printer is powered up. Each time you power up the printer, the top of form is set. To set the top of form, follow these steps:

1. Wait for all printer activity to stop; then turn off the power to the printer.

2. Using the paper advance knob, position the top of the form at the printhead.

3. Turn on the power to the printer.

Setting Form Length

D.6.5 The setting for form length remains only as long as the printer is powered up. If you are using paper that is not 279.4 millimeters (11 inches) long, you must set the forms length each time you power up the printer. To set the form length, follow these steps:

1. Press the ON LINE switch to take the printer offline; the ON LINE LED goes out.

2. Set the top of the form at the printhead using the paper advance knob.

3. Press the SET FORM LENGTH switch; the SET FORM LENGTH LED turns on.

4. Press the LINE FEED switch for each line of the form; press the switch repeatedly until the top of the next form is under the printhead.

5. Press the SET FORM LENGTH switch; the SET FORM LENGTH LED goes out.

6. Press the ON LINE switch; the ON LINE LED lights up.

Installing a Font Module

D.6.6 Figure D-12 shows a font module installed in the Model 855 printer. The printer can have three modules installed at the same time. To install a module, grasp the textured portion so that the label is facing away from the printer and insert the module into one of the empty sockets on the front of the printer. The modules can be inserted in only one way. Do not insert or remove font modules while the printer is printing.

Figure D-12 Installing Font Modules in the 855 Printer

2286773
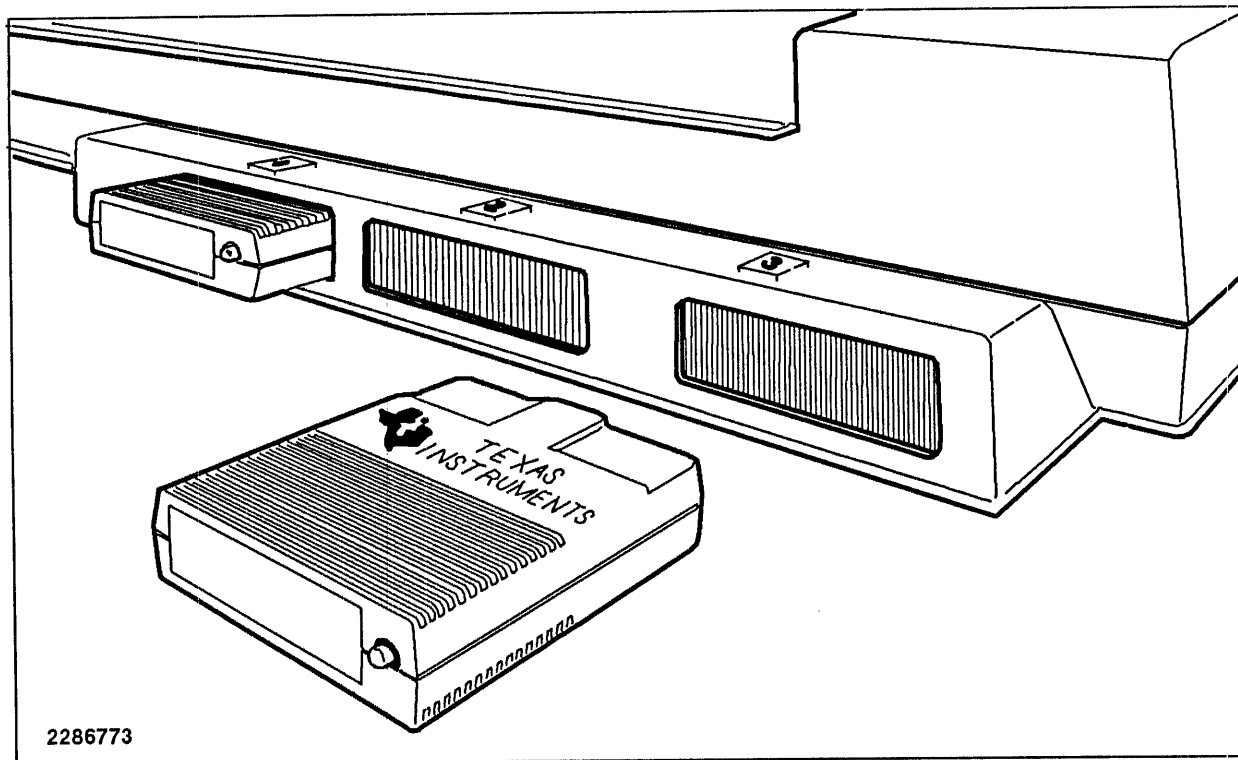
Preventive Maintenance

D.7 To maintain high print quality and to prevent carriage jams, the carriage guide and platen must be kept clean.

Cleaning the Printhead Area

D.7.1 You should clean the printhead and ribbon area whenever dust appears on the printhead tip or on the carriage-guide rod. Perform the following procedure at least once every three months or after each box of paper is used.

WARNING: Always remove the power plug from the power outlet before cleaning the printer.

1. Turn off power to the printer and remove the power plug from the power outlet.

2. Remove the ribbon cartridge.

3. Carefully vacuum the paper particles from the printhead and ribbon area. Move the carriage by hand to vacuum under the printhead.

4. If ink residues have accumulated, use a clean cloth moistened with denatured alcohol to clean the platen, the ribbon guide, and other non-porous surfaces.

5. Clean the paper-guide rollers with a clean, dry cloth. Do not use any solvents.

6. Wipe the paper particles and dust from the carriage-guide rod with a clean, dry cloth. Do not use any solvents and do not add any lubricants.

7. Replace the ribbon cartridge and the power plug.

Cleaning the Carriage-Guide Rod

D.7.2 If the carriage-guide rod is cleaned periodically, as described in the preceding paragraph, the carriage should move smoothly. If the rod is not cleaned, however, a gummy residue may build up and cause erratic carriage motion.

Never oil the carriage-guide rods; no lubricant is required. Using a lubricant could cause faulty carriage movement because of the buildup of oil and dirt.

If the carriage on your printer is moving erratically, perform the following procedure to clean it:

1. Turn off power to the printer and remove the power plug from the power outlet.

2. Remove the ribbon cartridge.

3. Using a clean cloth lightly moistened with denatured alcohol, remove the gummy residue on the carriage-guide rod.

4. Dry the rod with a clean, dry cloth before moving the carriage over the area just cleaned.

5. Replace the ribbon cartridge and the power plug.

Cleaning the Case

D.7.3 You can clean the plastic parts of the printer case with a clean cloth dampened with water and a mild detergent. Do not use an abrasive cleaner or the solvent used to clean the carriage-guide rods. Wipe with a clean, dry cloth. Avoid getting the detergent solution on the electronic or electrical circuits of the printer.

MODEL 880 PRINTER
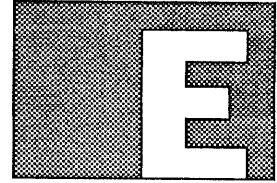
Introduction

E.1 The Texas Instruments Model 880 Printer (Figure E-1) is a versatile, high-speed, serial-matrix impact printer that provides draft font as well as enhanced font printouts. The printer is capable of printing 300 characters per second bidirectionally. It features bold, shadow, and auto-underscore printing. Other features of the 880 printer are as follows:

- Multiple character set selection (optional alternate character sets)

- 7-by-9 dot-matrix characters with true descenders for 10 and 12 characters per inch (cpi)

- 9-by-9 dot-matrix characters with true descenders for 16 $^2/_3$ cpi

- 15-by-18 dot-matrix enhanced characters for 10 and 12 cpi

- Complete configuration and format selection from menu display

- Vertical raster graphics

- Parallel and serial interface

For a more detailed description of the printer, see the *Model 880 and Model 880 DP Printers User's Manual*.

Figure E-1 Model 880 Printer

2288007
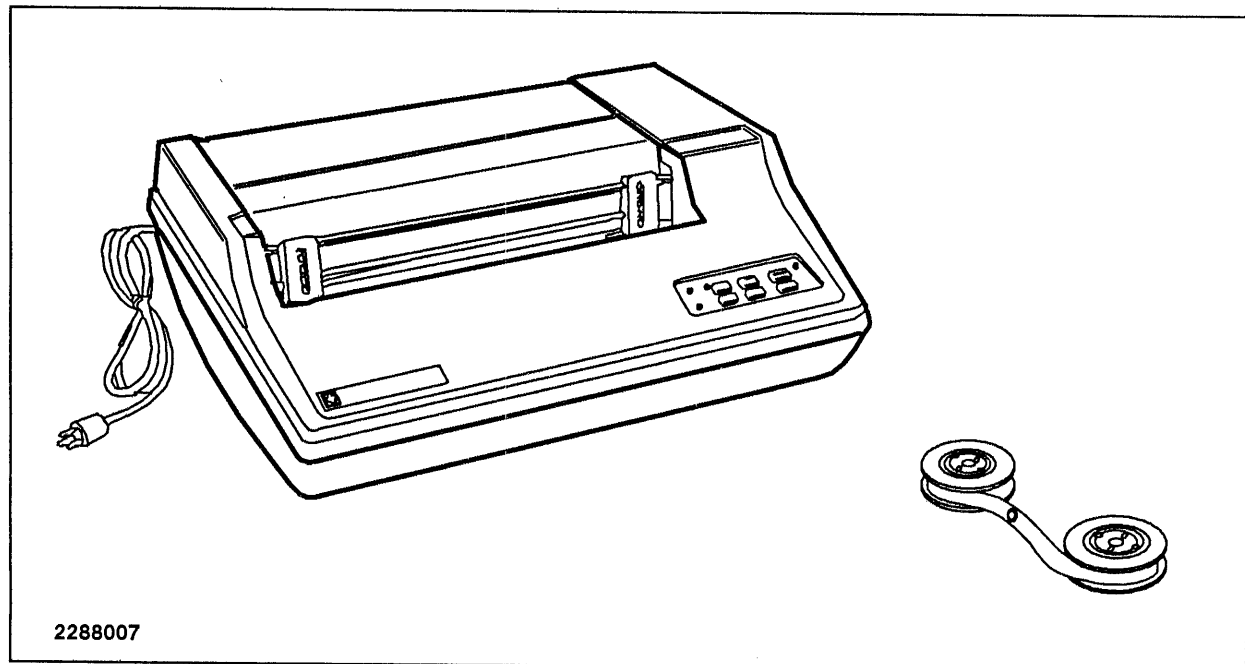
Installing the 880 Printer

E.2   In order for your 880 printer to function properly, you must first perform certain basic installation procedures prior to operating the equipment. These procedures are as follows:

■   Installing the necessary printer accessories, printer ribbon, and paper

■   Connecting the printer to the computer and connecting ac power to the printer.

■   Activating and testing the printer

■   Adjusting the printhead

CAUTION: To avoid possible damage to the printhead and platen, do not operate the printer without a ribbon and paper.

Connecting Cables

E.2.1   Use the following procedure to connect the data cables between the printer and the system enclosure and to connect the printer power cable. For the data cables, you will need a serial cable (TI part number 2235682-0001) and a parallel cable (TI part number 2235641-0002).

1.   To avoid problems with interrupted processes, power down your Explorer system.

2.   If you are using a parallel printer, skip this step and continue with the next step. If you are using a serial printer, connect the two serial cables. The male and female connectors are keyed so that you can connect them only one way.

3.   Connect the appropriate cable to the rear of the system enclosure (refer to Figure E-2):

   a.   To connect a parallel printer, bring the printer cable into the system enclosure through the space at the bottom of the rear enclosure door. Connect the 40-pin printer cable connector to the matching 40-pin connector on the fiber-optic board (the bottom connector of the three connectors on that board).

   b.   To connect the printer as a serial device, bring the serial cable into the system enclosure through the space at the bottom of the rear enclosure door. Connect the serial cable connector to the matching 18-pin connector on the fiber-optic board (the middle connector of the three connectors on that board).

4.   Connect the other end of the cable to the printer (Figure E-3).

   a.   Plug the connector into the receptacle on the back of the 880 printer.

   b.   Lock the connector into place by snapping the wire clips on each side of the receptacle into the slots on the connector.

Figure E-2   **System Enclosure Connectors for the Printer Cables**
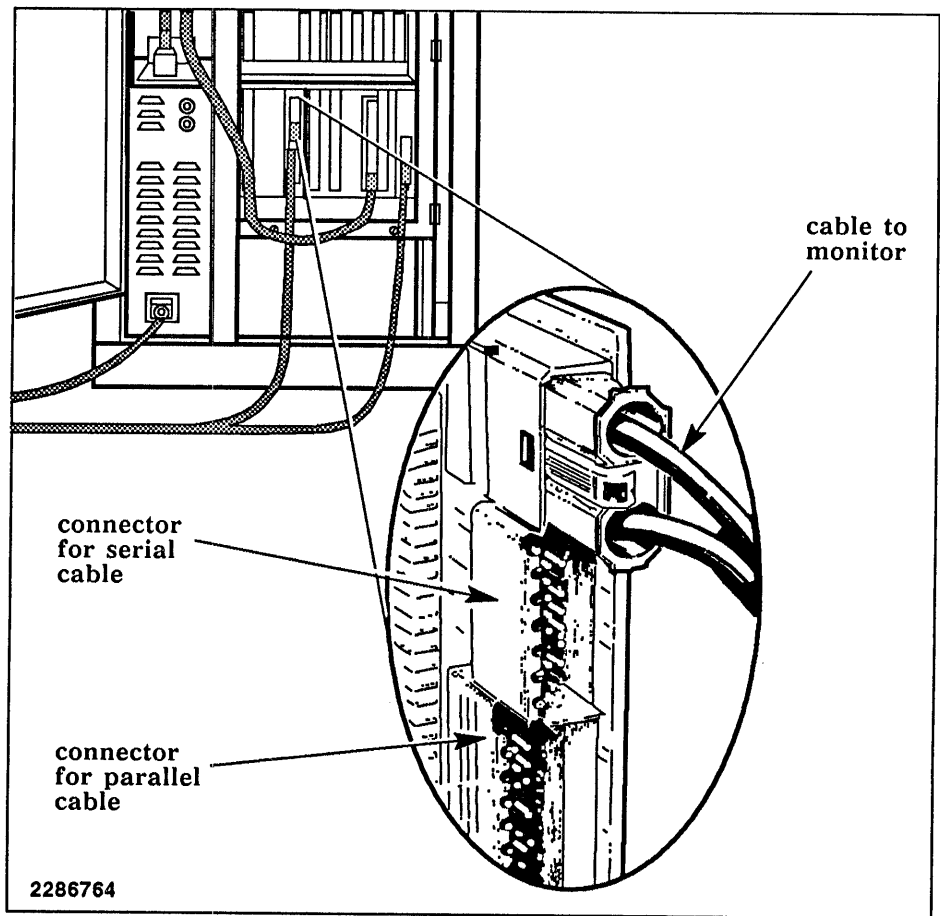
cable to
monitor

connector
for serial
cable

connector
for parallel
cable

2286764

5. Connect the printer to a power source.

    a. Ensure that the power switch for the printer is in the off position.

    b. Plug the power cord into a three-hole, protective ground, ac power outlet.

CAUTION: Do not turn on power yet.

Figure E-3   Printer Data Cable Connectors

parallel
connector
or optional
interface
connector

serial
connector

2287984
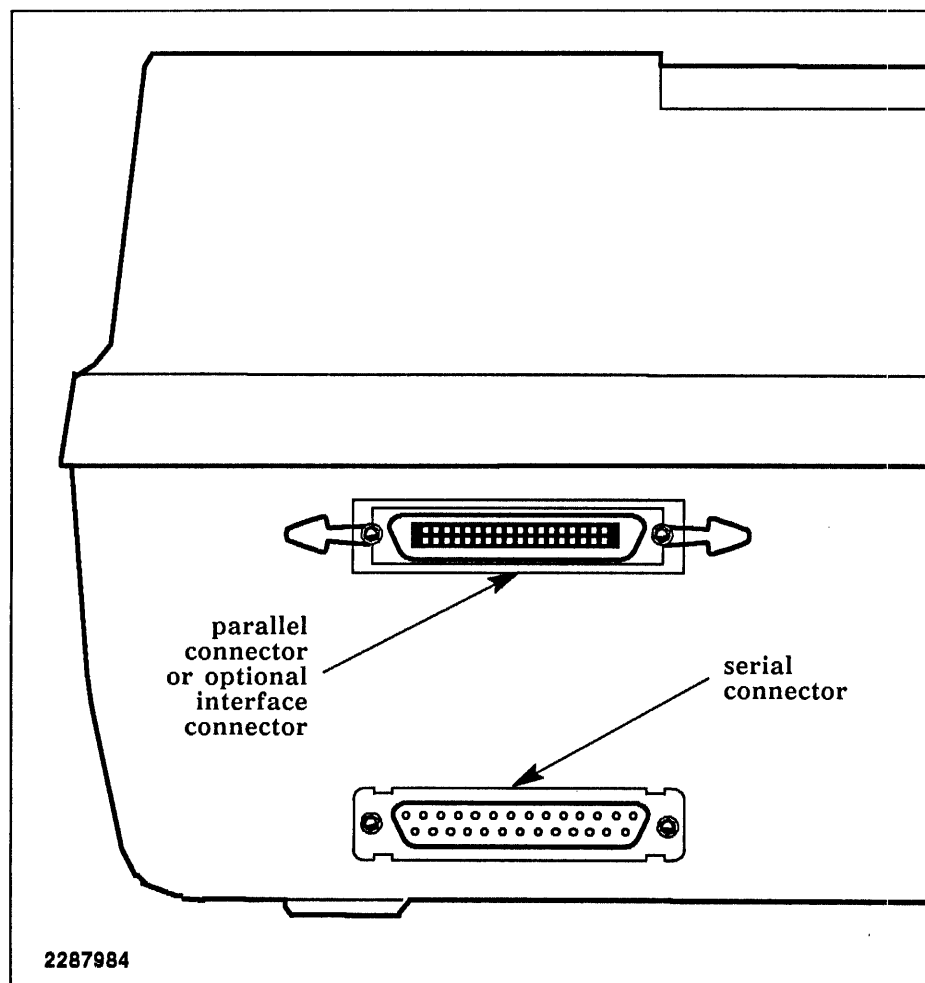
Preparing   **E.2.2** With all components accounted for, follow these steps to prepare your
the Printer 880 printer for operation:

1. Set the printer on a level surface that is able to safely support 25 kilo-
    grams (55 pounds). If the printer is placed on a metal surface, ensure
    that the surface is grounded to prevent electrical interference.

**CAUTION: Do not obstruct the air intake vent on the right side of the
printer, shown in Figure E-4. Poor ventilation can cause damage to the
printer from heat buildup.**

2. If you have the optional printer stand, fasten the printer to the stand
    according to the assembly instructions provided with the stand.

Figure E-4 Model 880 Printer Dimensions

2288008
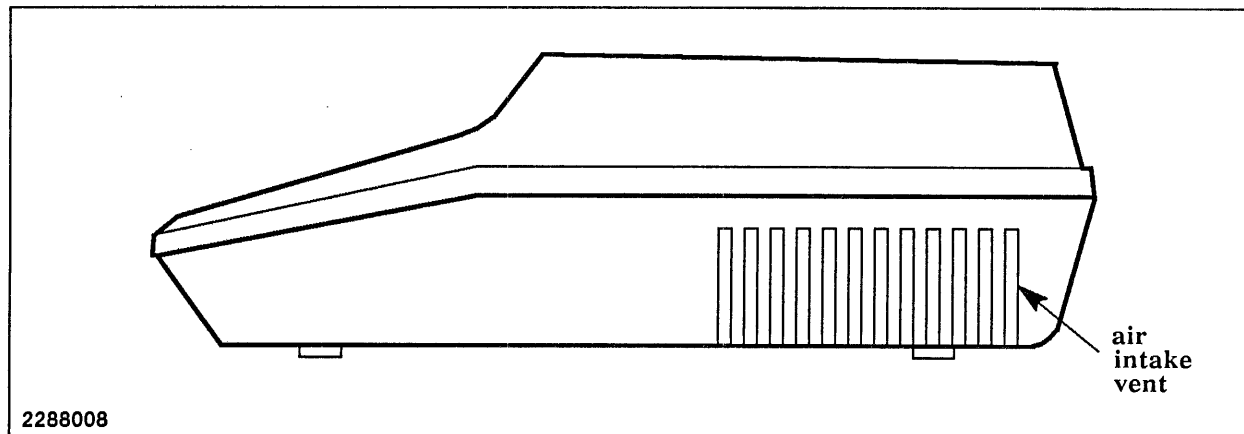
3. If you have an optional stand-mounted paper basket, mount the basket on the printer stand according to the assembly instructions provided with the paper basket kit.

4. Open the printhead door (Figure E-5) and remove the cardboard shipping material from the printhead.

Figure E-5   **Opening the Printhead Door**

2287995
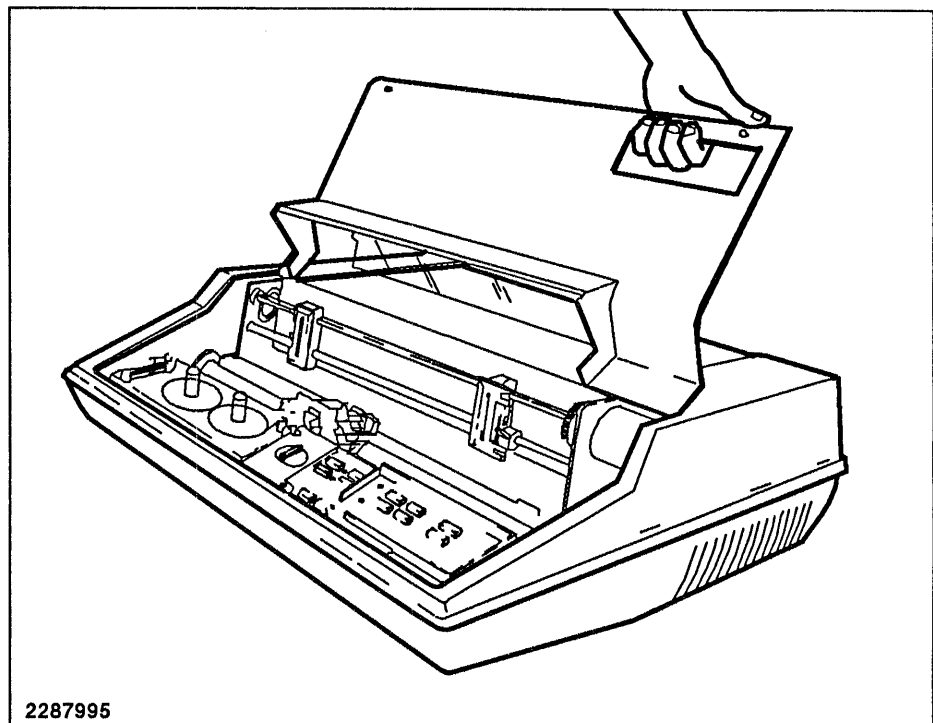
5. Slide the printhead from side to side to verify that the printhead and connected wire rope move freely.

6. Close the printhead door.

Installing the Paper Basket

E.2.3 If you choose not to install the paper basket accessory, you must provide another suitable method (such as the optional stand-mounted paper basket) for holding the printer output. For correct printer operation, any other paper-holding device must be connected to printer ground to prevent electrostatic discharge.

Figure E-6 shows how to install the paper basket. Fasten the basket to the printer by compressing the basket and inserting the pivot pins into the holes on the rear of the printer.

Figure E-6

Installing the Paper Basket

2287996
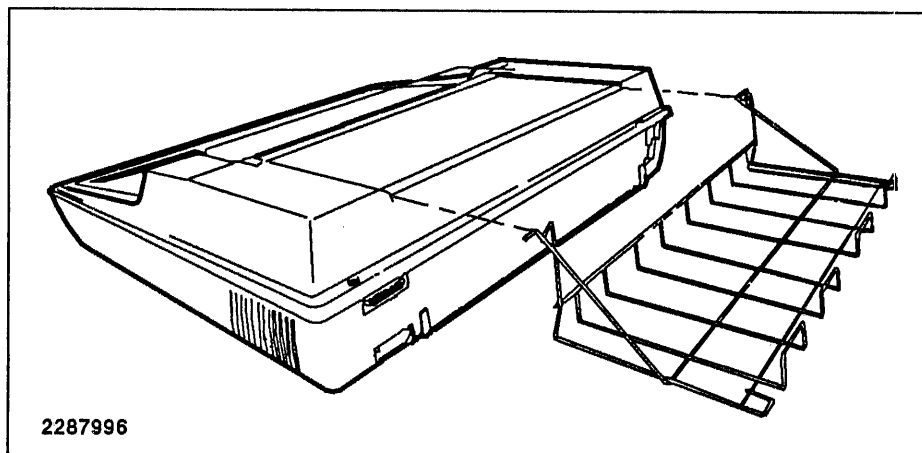
Installing the Ribbon

E.2.4 The printer ribbon (TI part number 224601) is designed especially for printers such as the model 880. Use of a ribbon that does not meet the same specifications can cause excessive printhead wear. To install the ribbon, follow these steps:

1. Set the power switch to the OFF position. The power switch is located at the left rear of the printer.

2. Open the printhead door.

3. Make a note of the position of the printhead adjustment lever (Figure E-7). Then move the lever away from the platen by pushing the lever slightly to the right and rotating it toward the front of the printer.

4. Lift the old ribbon spools off the hubs and remove the ribbon from the ribbon path (Figure E-8).

5. Thread the new ribbon through the ribbon path as shown in Figure E-8. The empty spool of the new ribbon should be placed on the left spool hub. Verify that the ribbon rides on the ribbon guides and inside the left end plate.

NOTE: Make sure that the ribbon-reversing eyelet is between the left ribbon-reversing arm and the left spool, as shown in Figure E-8; otherwise, the ribbon will not reverse.

6. Rotate the hubs to pull the ribbon tight.

7. Rotate the printhead adjustment lever to its original position. If necessary, adjust the printhead.

Figure E-7   **Printhead Adjustment Lever**

toward

away

2287942

Figure E-8   Ribbon Path

left end plate

ribbon path

printhead

printhead adjustment lever

ribbon guides

eyelet

ribbon-reversing arm (left)

ribbon-reversing arm (right)

takeup-spool

spool hubs

supply spool

2287959
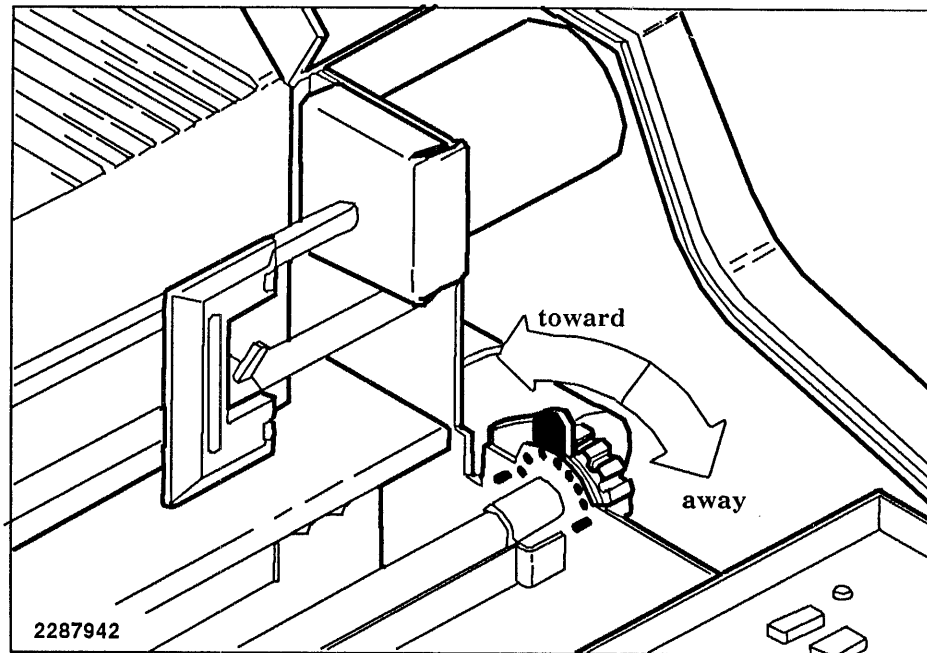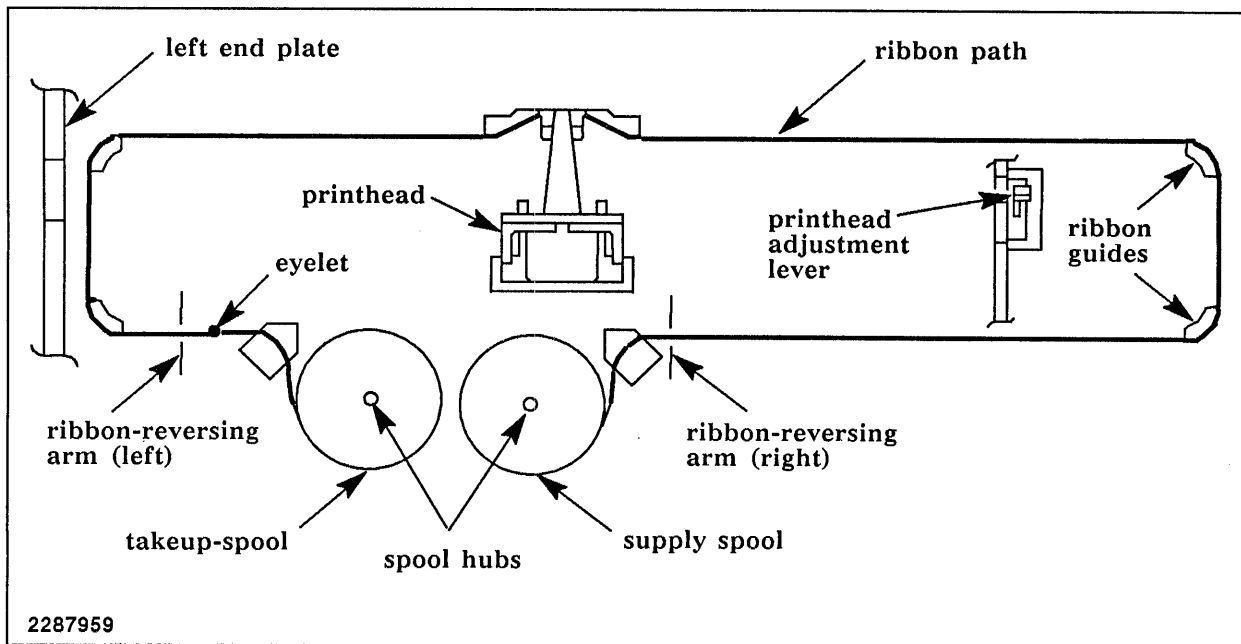
Loading Printer Paper

E.2.5 The 880 printer has a bottom and a rear paper path, either of which can be used for single-thickness forms. The bottom path is recommended for multiple-thickness forms. To load paper in the printer, follow these steps:

1. Open the printhead door.

2. The left tractor must be to the left of the paper-out switch (Figure E-9). If not, loosen the locking lever (Figure E-10) and slide the left tractor to the left so that when the paper is installed, the paper covers the paper-out switch. Tighten the locking lever.

3. Open the left and right tractor covers.

4. Use the printhead adjustment lever to move the printhead away from the platen.

5. To load paper through the rear paper path, follow these steps:

   a. Place the paper supply in back of the printer.

   b. Insert the paper, with the side to be printed facing down, into the paper path at the rear of the printer until the paper appears at the platen. Align the paper so that it does not rub against the sides of the paper path.

   c. Go to step 7.

6. To load paper through the bottom paper path, follow these steps:

   a. Place the paper supply under the table or stand.

   b. Insert the paper, with the side to be printed facing forward, into the bottom paper path until the paper appears at the platen. Align the paper so that it does not rub against the sides of the table slot or the sides of the paper path.

7. Loosen the locking lever on the right tractor and adjust the tractor to accept the paper width.

8. Place the paper in both tractors with the paper holes on the tractor pins. Be sure to place left and right holes on corresponding pins.

9. Close the tractor covers and adjust the right tractor to pull the paper tight across the platen, then tighten the locking lever.

10. Check the alignment of the paper supply with the paper path. The paper must not touch either side of the path.

11. Rotate the printhead adjustment lever to its original position. If necessary, adjust the printhead.

Figure E-9 Loading Printer Paper

tractors

printhead
door

printhead
adjustment
lever

rear

platen

printhead

front

rear path

bottom path

paper-out
switch

2287901
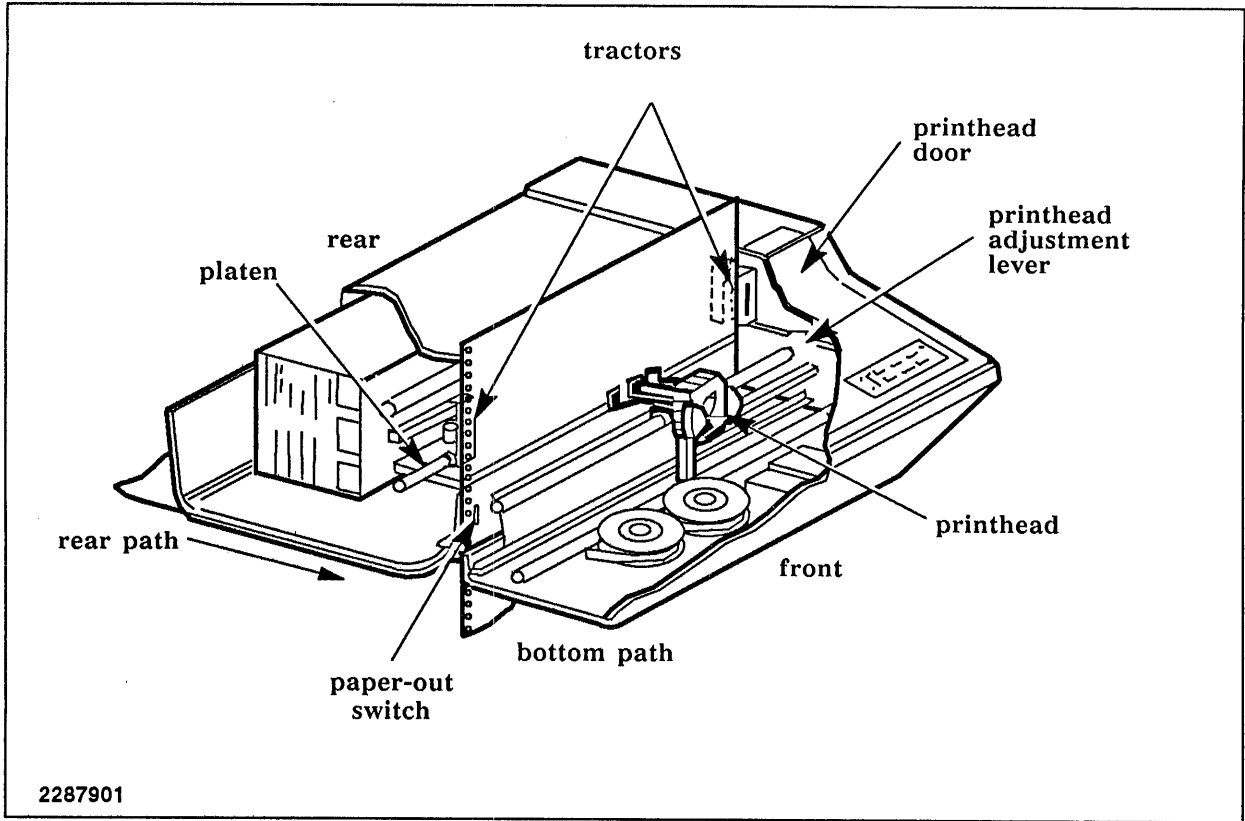
Figure E-10   Left and Right Paper Tractors

left locking lever
rotated up in the
locked position

right locking lever
rotated forward in
the movable position

left tractor cover
in open position

right tractor cover
in closed position

2287906
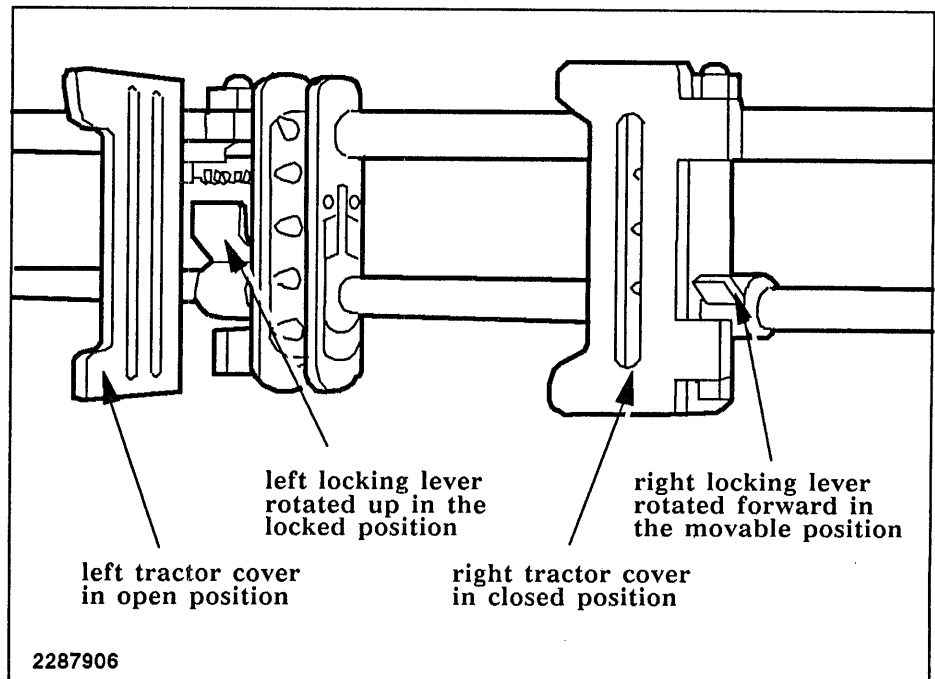
Connecting the Power Cord

E.2.6 The 880 printer power cord is a detachable, three-wire power cord with a female connector on one end and a three-prong male connector on the other end for plugging the cord into an ac outlet. To connect the printer power cord, follow these steps:

CAUTION: Refer to the identification label on the rear of the printer for correct voltage levels. Using an incorrect voltage level can damage the printer.

1. Set the power switch to the OFF position.

2. Connect the power cable to the printer by firmly pushing the female connector into the receptacle at the rear of the printer.

3. Connect the other end of the cable to a properly grounded three-wire receptacle.

WARNING: The printer must be connected to a three-wire ac receptacle with a properly connected earth ground. If an extension cable is needed, it must be a three-wire cable that includes an earth-ground connection. Failure to provide an earth ground can cause faulty printer operation, possible damage to the printer, and possible electrical shock hazard to the operator.

CAUTION: Before activating a new printer, allow at least 15 minutes after unpacking the printer for it to adapt to ambient temperature and humidity conditions.

Activating
the Printer

E.2.7 When the power switch is placed in the ON position, the printer performs an automatic self-test that requires about 30 seconds. The following events should occur during the self-test:

1. All indicator lights (except Command) on the operator control panel should be on.

2. The indicator lights should turn off in the following order:

   a. ON LINE

   b. PAPER OUT

   c. TEST

   d. MENU

   e. ERROR

3. The carriage should move to the right bumper, then to the left bumper.

4. The printer should emit a short, audible tone.

5. The POWER and NORMAL indicators should remain on. If you have not loaded paper, the PAPER OUT indicator should flash. The ON LINE indicator should turn on to indicate that the printer is properly configured and powered up.

Failure of the printer to produce any of the required results during the self-test indicates a printer problem. For problem analysis procedures, refer to the *Model 880 and Model 880 DP Printers User's Manual.*

Adjusting
the Printhead

E.2.8 The printhead must be adjusted to the thickness of the paper used. For the initial adjustment and to make corrections for different paper thicknesses, follow these steps:

1. After loading paper, move the printhead toward the platen by pushing the printhead adjustment lever (Figure E-7) slightly to the right and rotating it toward the rear of the printer. Allow the printhead to barely touch the paper.

2. Print a barberpole test. Ink smears on the paper indicate that the printhead is probably too close to the paper. Incomplete characters or no characters on the paper probably indicate that the printhead is too far from the paper.

3. Continue adjusting the printhead and printing barberpole tests until the print appears sharp and dark.

NOTE: Adjusting the printhead cannot compensate for a worn-out ribbon. If the characters are too light, replace the ribbon.

Barberpole Test   **E.2.9**   Before printing the barberpole test, the printer must be offline. If the ON LINE indicator is on, press the ON LINE button once to set the printer offline. To print a barberpole test, sequentially press the following buttons: NORMAL, COMMAND, TEST, and CHANGE. To stop the test, press either the ACCEPT key or the NORMAL key.

Connecting   **E.2.10**   The 880 printer can operate in either parallel or serial data transfer
the Data Cable   modes. The parallel mode requires a parallel printer cable (TI part number 2223106-0001); the serial mode requires a serial printer cable (TI part number 2230504-0001). The parallel interface connector is fastened by wire clips on the printer. The serial interface connector has screw fasteners.

Use the following procedure to install your data cable:

1.   Set the printer power switch to the OFF position.

2.   Insert the data cable into the appropriate connector at the rear of the printer.

3.   Tighten the screws on each side of the connector or press the wire clips in place, as appropriate.

4.   Connect the other end of the cable to the appropriate connector on the system interface board in the Explorer system enclosure. Refer to Appendix D for detailed instructions for connecting the data cable to the Explorer system.

5.   Return the power switch to the ON position and check the ON LINE indicator to ensure that the printer is online and ready to operate.

After you have connected your printer to the system, the printer is ready to accept output from the computer. The control panel allows you to select various printer features, such as one of four operating modes. Refer to the *Model 880 and Model 880 DP Printers User's Manual* for detailed information about control panel operation.

To connect your computer to the network, refer to the *Explorer Input/Output Reference* manual for details.

Adding the Printer   **E.2.11**   Use the following procedure to add a printer to the list of Explorer
to the Software   system printers on your network:

1.   Power up the Explorer system and the printer.

2.   Add the printer to the list of printer devices in your Explorer system.

   ▪   If the printer and host are to be used as a print server, use the procedure described in the *Explorer Input/Output Reference* manual.

   ▪   If the printer is to be used only as a local printer (not accessible to other systems on the network), execute the **add-printer-device** function as described in the *Explorer Input/Output Reference* manual.

OMNILASER 2015, 2108, AND 2115 PAGE PRINTERS
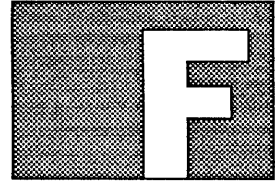
Introduction

F.1 This appendix provides information needed to install and operate the Texas Instruments OmniLaser 2015, 2108, and 2115 Page Printers.

The Texas Instruments OmniLaser 2015 Page Printer can use either a Centronics parallel interface or an RS-232-C serial interface to communicate with the host computer.

The OmniLaser 2108/2115 can connect to a host computer by using either a Centronics parallel interface or an RS-232-C serial interface. The printer is preset for an RS-232-C serial interface.

Installing the 2015/2108/2115 Printers

F.2 After moving the printer to its final work surface, prepare it for operation by performing the following procedure:

- Installing the paper trays

- Loading the toner cartridge

- Installing the Organic Photo Conductor (OPC) cartridge

- Connecting the printer data cable

- Connecting the printer power cord

Paper Tray Installation

F.2.1 The Model 2015/2115 laser printers can accommodate two paper trays as shown in Figure F-1. The Model 2108 has only one paper tray. Install the paper tray for the 2108 as follows:

1. Place some paper in the paper tray.

2. Insert the paper tray into the body of the printer. Rest the end of the tray on the lower lip, raise the outside end up slightly, and slide the tray into the printer until the tray drops down into a level and locked position.

Follow the same procedure to install the paper trays for the 2015/2115 printers. If you have paper trays for different paper sizes, install the tray for the most commonly used size in the upper slot.

Figure F-1   **Paper Tray Installation**

upper paper tray

lower paper tray

2288012
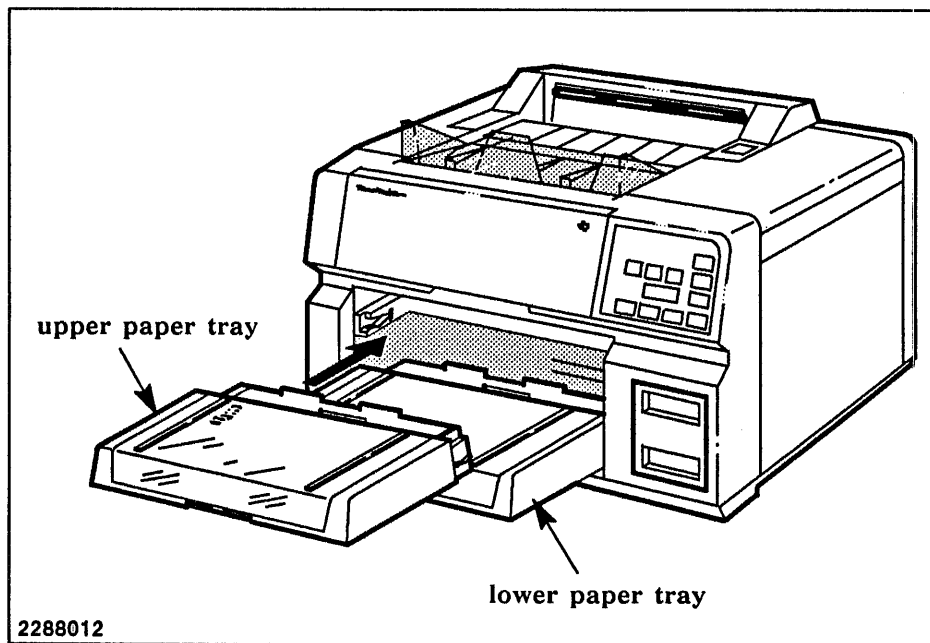
Loading a Toner Cartridge

F.2.2 The toner cartridge fits in the development unit above the upper paper tray. Use the following procedure to load a toner cartridge:

1. Remove one of the toner cartridges from its package.

2. Gently shake the toner cartridge until the toner moves freely inside the cartridge (about 15 seconds).

3. Pull out the development unit (Figure F-2) until it is even with the upper paper tray, and rest the unit on the paper tray.

Figure F-2   **Toner Cartridge Installation**

toner cartridge holder

2288013
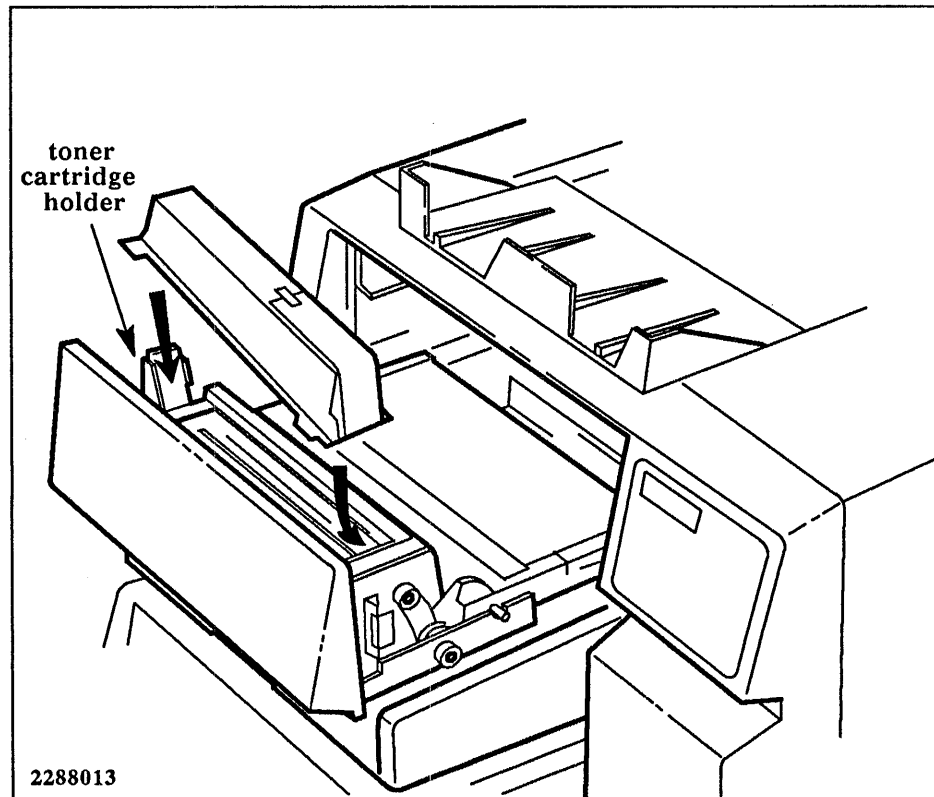
4. Take out the present toner cartridge.

5. Turn the new toner cartridge so that the seal faces toward the right. Align the two projections on the cartridge with the notches on the toner cartridge holder.

6. Push down on the cartridge until it is fully seated in its holder.

7. Refer to Figure F-3 and use the following steps to remove the cartridge seal:

   a. Remove the exposed end of the cartridge seal.

   b. While holding the cartridge in place with one hand, gently pull the seal toward the right until a green tab becomes visible.

   c. Pull the seal by the green tab until the entire seal is removed.

   d. If you are working on a 2015 printer, leave the development unit open for installing the OPC cartridge. Skip the remaining steps and continue with paragraph F.2.3.

      If you are working on a 2108/2115 printer, tap the top of the toner cartridge to dislodge any remaining toner. Then continue with step 8.

8. After allowing a few seconds for the toner to settle into the hopper, remove the empty toner cartridge by pressing the toner cartridge holder and lifting up on the toner cartridge. Discard the empty toner cartridge.

   You need to load two cartridges of toner to fill the hopper of the 2115.

9. Repeat steps 1 through 7 with the second toner cartridge. Leave the second cartridge in place after loading. Also, leave the development unit open for installing the OPC cartridge.

Figure F-3   **Removing the Cartridge Seal**

2288014 1/3
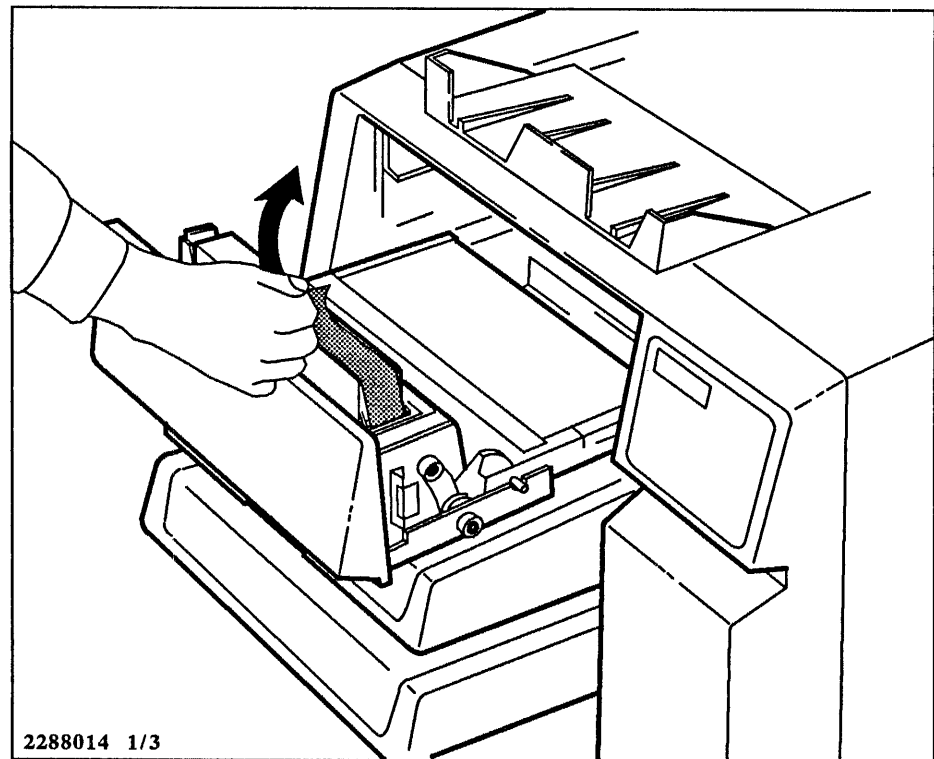
Figure F-3   **Removing the Cartridge Seal (Continued)**

2288014 2/3

2288014 3/3
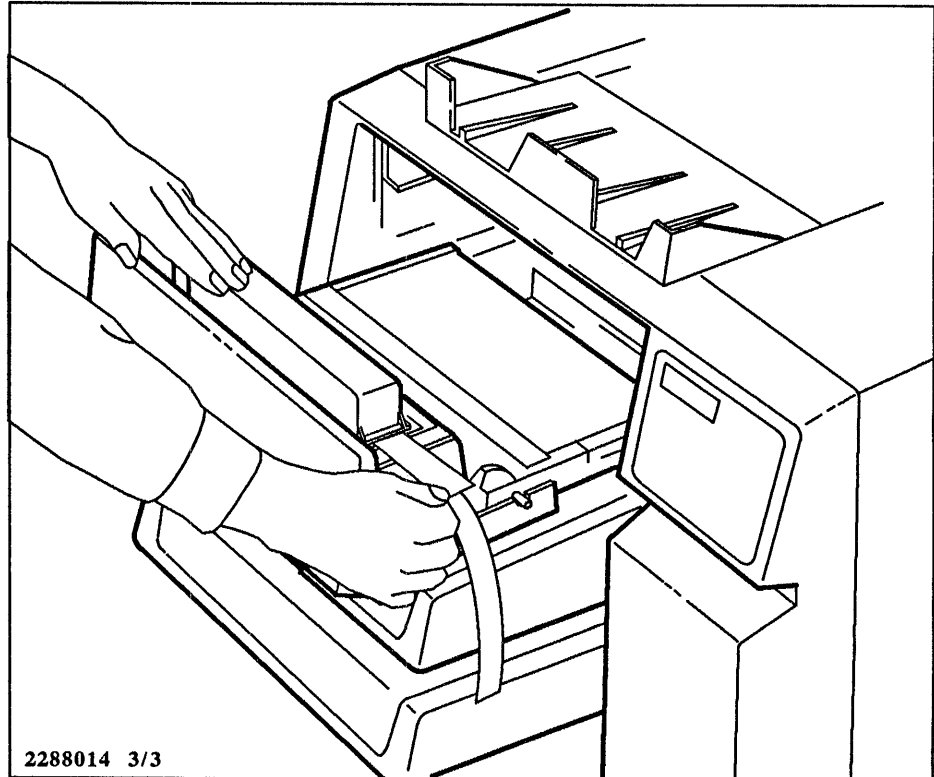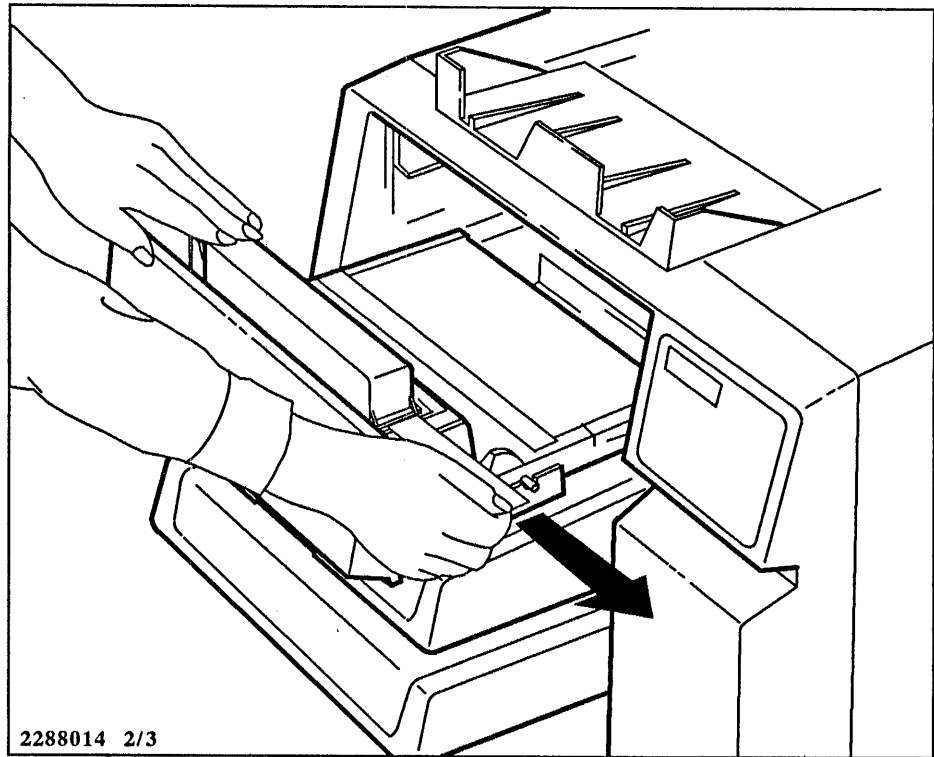
Installing an OPC Cartridge

F.2.3 The OPC cartridge fits in the development unit behind the toner cartridge. Use the following procedure to load an OPC cartridge:

1. Remove the OPC cartridge container from the vinyl bag. Place the container on a table so that the word UP is showing.

CAUTION: Do not touch the surface of the OPC belt within the cartridge. If oil from the skin touches the belt, smudges on the printed pages may result. Also, exposing the OPC cartridge to light for more than five minutes can reduce its expected life.

---

2. Open the OPC cartridge container.

3. Remove the two green spacers from the rear shaft of the OPC cartridge. Remove the protective sheet from the front of the cartridge.

4. Refer to Figure F-4. Grasp the OPC cartridge by the green marks on each side of the cartridge. Insert the cartridge into the development unit behind the toner cartridge so that the front shaft of the OPC cartridge rests in the corresponding notches in the development unit.

5. Return the development unit to its normal operating position.

Figure F-4   **OPC Cartridge Installation**

2288013
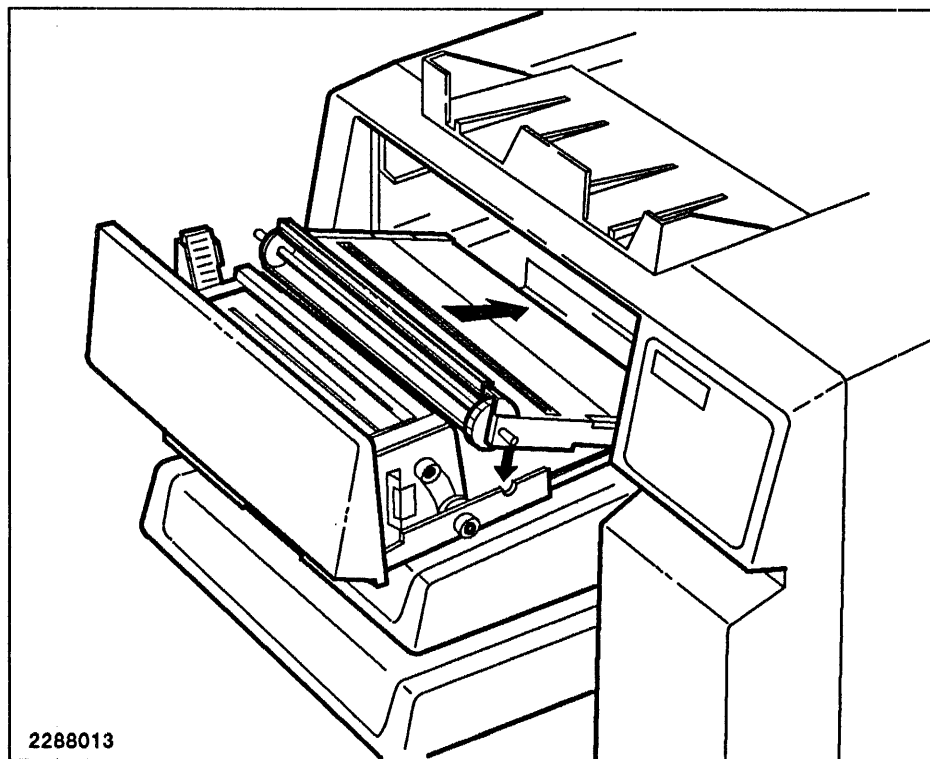
Connecting the
Data Cables

F.2.4 The 2015/2108/2115 printers can be connected to the computer with ▉ either a parallel or serial data cable. The procedure that follows is for connecting either data cable:

NOTE: The data cables are not standard components of the printer. They must be purchased separately or provided by the host system. The TI part number for a serial cable is 2235682-0001; for a parallel cable it is ▉ 2235641-0002.

---

1. Refer to Figure F-5. Bring the cable into the Explorer system enclosure through the space underneath the connector rear door. Connect the cable to the appropriate connector on the fiber-optic board.

2. Connect the other end of the cable to the appropriate data receptacle on the rear of the printer.

3. Hook the wire clips on the parallel data receptacle into the slots on the cable connector to hold the connector securely in the receptacle.

   Instead of clips, the serial cable has two small screws that must be inserted to hold the cable securely to the printer. ▉

Connecting the
Printer Power Cord

F.2.5 The 2015/2108/2115 printers use a removable power cable with a ▉ three-wire male connector on one end and a three-wire female connector on the other end. Use the procedure that follows to connect the printer power cord.

CAUTION: To prevent damage to your printer, be sure to select the proper operating voltage.

---

1. Ensure that the voltage from the electrical outlet is the same as that shown on the label on the rear of the printer.

2. Ensure that the power ON/OFF switch in its OFF (0) position.

3. Plug the female end of the power cord into the receptacle at the rear of the printer.

4. Plug the other end of the power cord directly into a three-wire, protective-ground, ac power outlet. If you need an extension cord, use only a cord with a three-prong connector.

WARNING: Failure to provide adequate grounding can cause faulty operation, damage to the printer, and/or electrical hazard to the operator.

▊ Figure F-5   Location of the Explorer Data Connectors

cable to monitor

connector for serial cable

connector for parallel cable

2286764
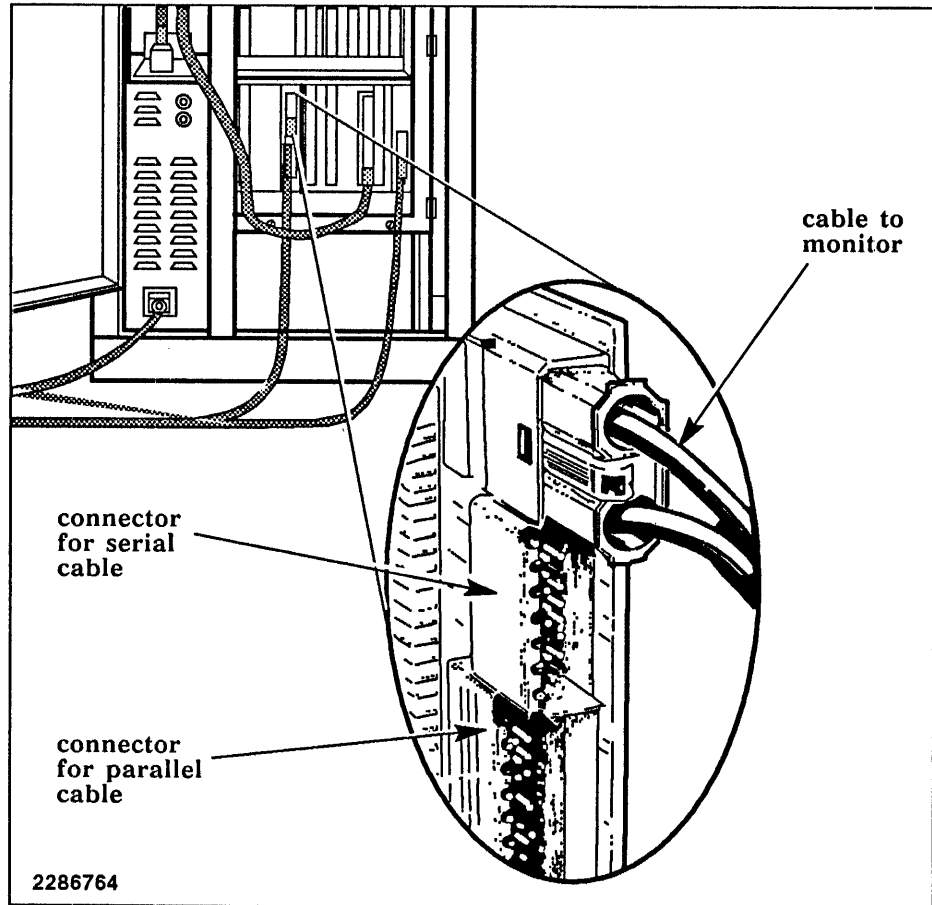
Operator Controls for the 2015

F.3 The 2015 printer operator control panel contains most of the operator-accessible controls and indicators. Figure F-6 shows the operator control panel. Table F-1 lists and defines the various controls and indicators. For more information about the controls and indicators, refer to the *OmniLaser 2015 Operator's Manual*.

Figure F-6   OmniLaser 2015 Operator Control Panel

2288020
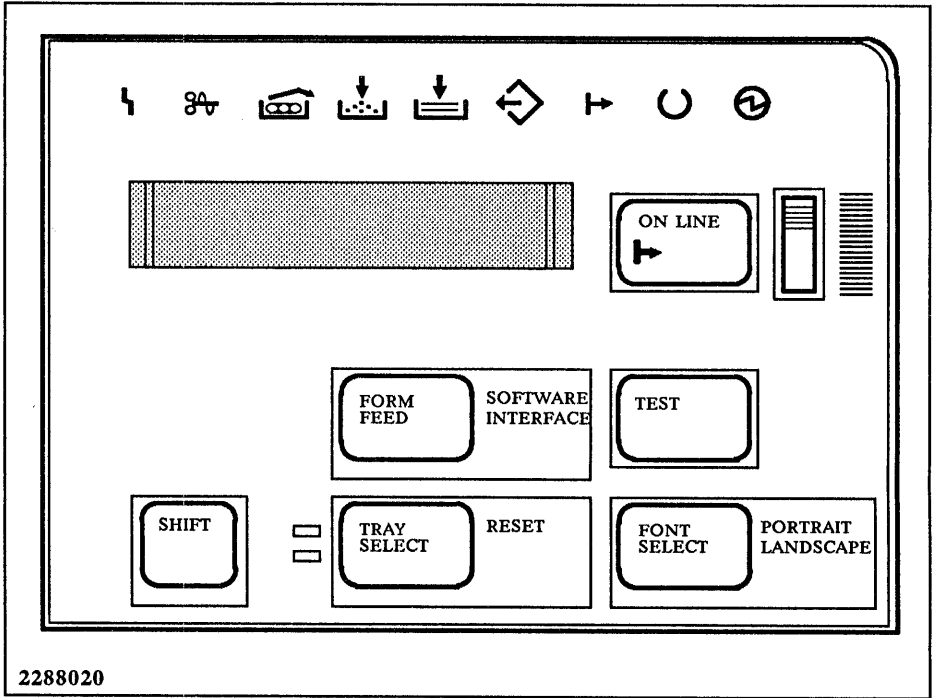
Table F-1 OmniLaser 2015 Controls and Indicators
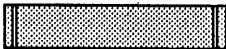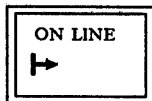
Control/Indicator	Description
	Liquid crystal display (LCD) — Provides detailed information about the printer.
	LCD brightness control — Determines the brightness or darkness of the LCD. You can adjust the control as follows: ■ Slide the control up to make the characters darker. ■ Slide the control down to make the characters lighter.
	ON LINE switch — Allows you to place the printer either online or offline. When the printer is online, the online indicator (▶) lights and the LCD displays **READY**. When the printer is offline, the online indicator is off and the LCD displays **OFF LINE**.

Table F-1 OmniLaser 2015 Controls and Indicators (Continued)
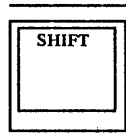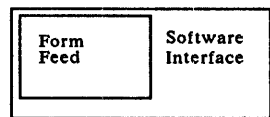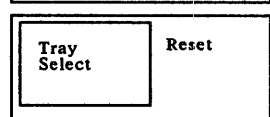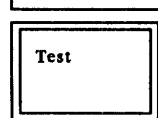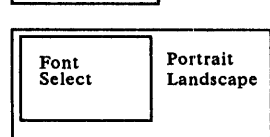
Control/Indicator	Description
SHIFT	SHIFT switch — Selects an alternate function for the Form Feed, Tray Select, or Font Select switch. To select the alternate function, you press the Shift switch and the switch whose alternate function you want to select. The alternate functions are as follows:

- Reset. To select the reset function, press the Shift switch while holding the Tray Select switch. The reset function resets all error conditions and returns the printer to its default settings. For example, if the printer stops printing because of a software error, select the reset function (after correcting the error) to resume printing.

- Software interface. To select the software interface function, press the Shift switch while holding the Form Feed switch. This function selects the software interface and interprets printer commands. The first time you select the function, the LCD displays the name of the current software interface; the next time you select it, the LCD displays the name of the next available software interface, and so on.

- Portrait/Landscape. To select the portrait/landscape function, press the Shift switch while holding the Font Select switch. This function toggles the printer between the portrait mode (vertical page) and the landscape mode (horizontal page). The LCD displays the selected mode.

Control/Indicator	Description
Form Feed / Software Interface	Form Feed switch — Prints all data from the print buffer and ejects the page.
Tray Select / Reset	Tray Select switch — Select the paper tray from which to take paper.
Test	Test switch — Tests the printer and prints a summary of the current printer configuration.
Font Select / Portrait Landscape	Font Select switch — Selects the printing font. The first time you press the switch, the LCD displays the name of the current font; the next time you press it, the LCD displays the name of the next available font, and so on.
	Tray Select indicators — Indicate the currently selected tray (bottom or top).

Table F-1 OmniLaser 2015 Controls and Indicators (Continued)

Control/Indicator	Description

Each of the following is lit on the top row of indicators only when the relevant condition occurs:

⌐	Error indicator — Indicates a printer error other than those indicated by other specific error indicators.
8√	Paper jam indicator — Indicates that a paper misfeed has occurred.
▭	OPC cartridge indicator — Indicates that the OPC cartridge needs changing.
↓	Toner indicator — Indicates that the printer is almost out of toner.
↓	Paper out indicator — Indicates that the selected tray is out of paper.
◇	Print buffer indicator — Indicates that the print buffer contains unprinted data. The indicator blinks while data is being received.
⊢	Online indicator — Indicates that the printer is online and can receive data.
○	Ready indicator — Indicates that the printer is warmed up and ready to print.
⊕	Power indicator — Indicates that the printer is plugged in and turned on.

Operator Controls for the 2108/2115

F.4   The 2108/2115 printer operator control panel (Figure F-7) allows you to control and monitor printer operations and to select features. The control panel contains a liquid crystal display (LCD) and 11 touch switches. The LCD shows printer status, options available, and error messages. The touch switches are described in Table F-2. For more information about the switches, refer to the *OmniLaser 2115 Operator's Manual*.

Figure F-7   **OmniLaser 2108/2115 Operator Control Panel**
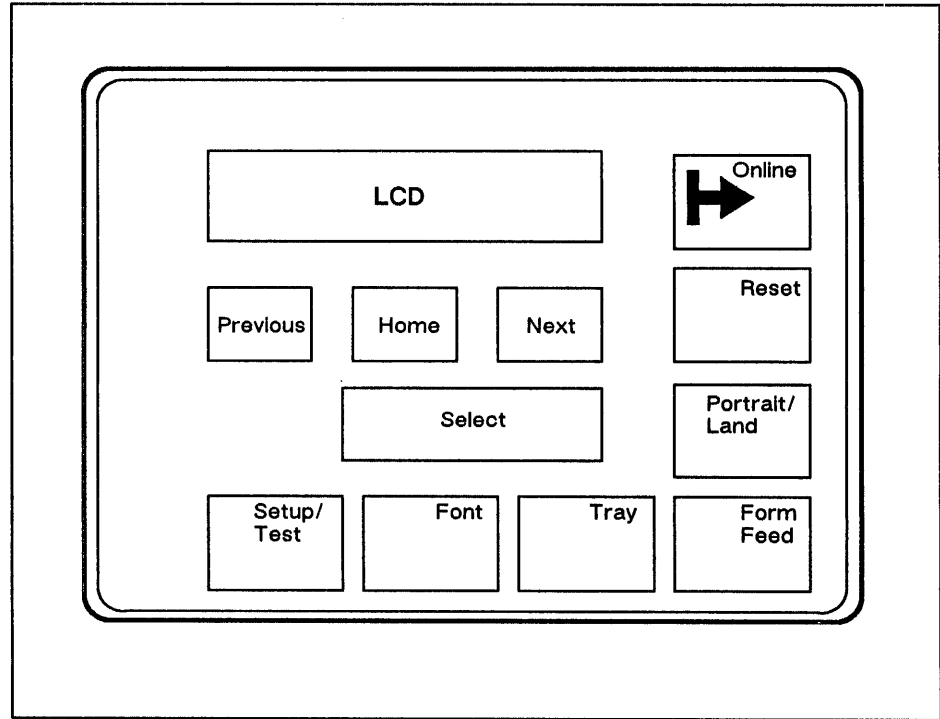
Table F-2   OmniLaser 2108/2115 Switches

Switch	Description
Printer Option Switches:	
Online	Selects whether the printer is online or offline. The printer must be online to receive data and to print. The printer usually must be offline when you are pressing the switches to select printer features.
Font*	Selects the typeface for printing if you have selected the TI 855 or the Diablo 630 software interface.
Tray*	Selects the tray that feeds the paper.
Reset	Stops the work currently being printed.
Portrait/Land*	Changes between portrait mode (normal printing) and landscape mode (printing down the length of the paper).
Form Feed	Prints any data remaining in the printer and ejects the page.
Setup/Test*	Accesses the setup/test mode to allow you to test the printer or select the hardware interface, software interface, or miscellaneous parameters. The interfaces and parameters are usually determined when the printer is installed, so you probably will not use this switch often. Chapter 1 of the *OmniLaser 2108/2115 Technical Reference Manual* contains instructions for setting up and testing the printer.
Access Switches:	
Previous	Displays different options on the LCD, starting with the last-used option and moving backward through the list of available options.
Next	Displays different options on the LCD, moving forward through the list of available options.
Home	Displays the general, higher level category of options you were selecting.
Select	Moves to another selection level or selects the item currently displayed on the LCD.

NOTE:

* Pressing the Font, Tray, Portrait/Land, or Setup/Test switch enables you to choose from more than one option. The access switches are used after you press the Font, Tray, Portrait/Land, or Setup/Test switches to view the options offered.

Printer Testing

F.5 After you have connected the printer to the host computer and the power receptacle, you can test the printer to ensure that it is functioning properly. To test the 2015, refer to the instructions in the *OmniLaser 2015 Operator's Manual*. To test the 2108/2115, refer to the *OmniLaser 2108/2115 Technical Reference Manual*.
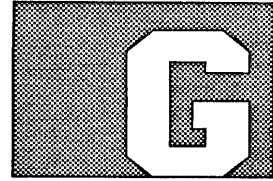
EXPLORER SYSTEM ENCLOSURE

Introduction

G.1 The system enclosure contains the system processor, memory boards, additional logic boards, power supplies, and a backplane that interfaces the logic boards with printed circuit adapters and cables. The Explorer system enclosure has an outer and an inner door in the front and a single door in the back. These doors enable a technician to gain access to the boards and connectors.

NOTE: Safety interlocks remove power when either the back door or the inner front door is opened.

Figure G-1 shows the system enclosure with the outer front door open.

Figure G-1

Front View of the System Enclosure

ON/OFF button

inner (chassis) access door

processor fault indicator

outer door (shown open)

slots to view fault indicator LEDs

2286701
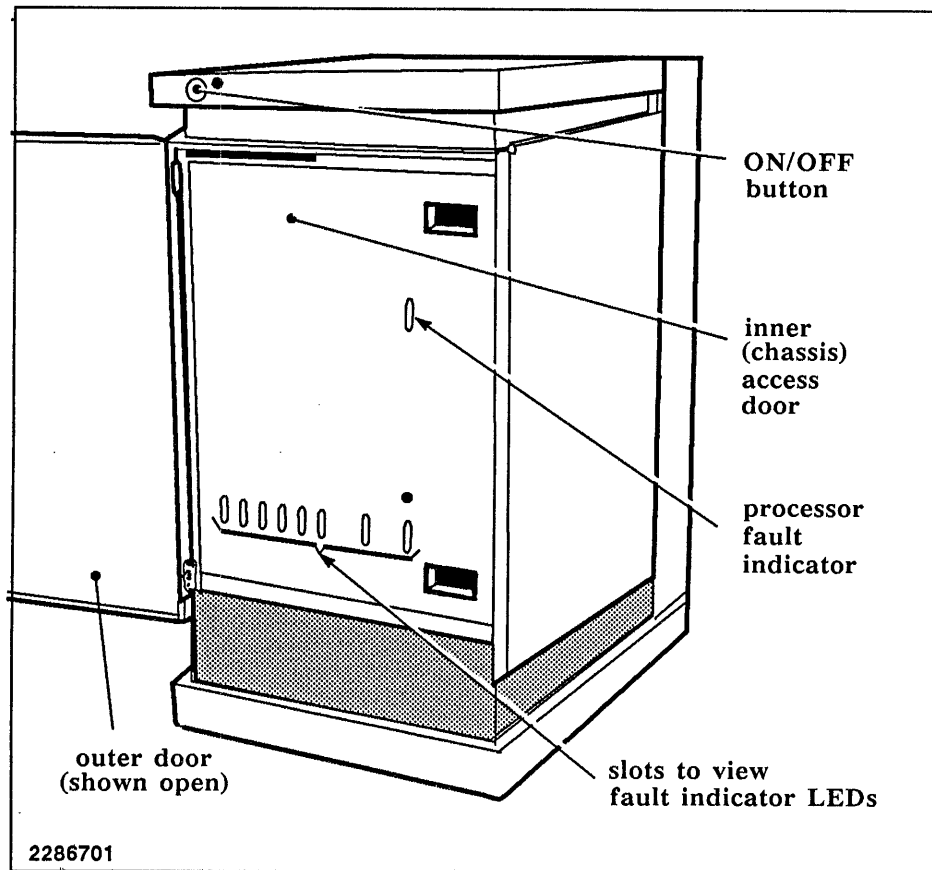
ON/OFF Button   G.1.1 When the system enclosure doors are closed, the only visible control is the power ON/OFF button on the front of the system enclosure. If the enclosure has convenience receptacles that are being used, the ON/OFF button also controls power to the devices plugged into the convenience receptacles.

Logic Boards   G.1.2 The system enclosure contains both standard and optional logic boards. These boards can include the following:

■ Explorer Lisp processor — Contains a microprogrammed processor that is specially designed for high-speed symbolic processing.

■ Conventional processor — Contains a 68020 microprocessor for the TI System V portion of the LX option.

■ Memory boards — Provide a large main memory for high performance in a demand-paged environment.

■ System interface board — Provides an interface to peripherals, graphics control logic, parallel and serial ports, and system resources.

■ Mass storage controller — Provides an interface for mass storage devices.

■ Ethernet controller board — Provides Ethernet networking capabilities.

■ Other options — Provide special-purpose processors or interfaces.

Fault Indicators   G.1.3 When the outer door is open, you can see the fault indicator lights for the logic boards through slots in the inner front door of the enclosure. Each board has at least one of these lights. When the system enclosure is initially powered up, all red fault indicator lights are on; then, as each board passes its self-test, the light goes out. Some boards contain additional amber fault indicator lights used by technicians to pinpoint problems with the boards or with subsystems related to the boards.

A quick reference label on the outer surface of the inner door provides further information about fault indicator lights.

Cables and Connectors   G.1.4 To gain access to system cables and connectors, open the back door of the system enclosure. Figures G-2 and G-3 show rear views of two different system enclosures with the back doors open. Although safety interlocks are designed to remove power, you should never connect or disconnect any cable while the power is on. For more information about installing the Explorer system, see the *Explorer 7-Slot System Installation* manual.

In addition to the connectors, the motor power supply with its power cable can be accessed through the back door of the system enclosure.

Power Cable   G.1.4.1 The power cable that supplies power to the system enclosure plugs into a standard three-hole, earth-grounded wall outlet. If convenience receptacles are available on your machine, the system enclosure can, in turn, supply power for up to two additional devices through them. Because of the power requirements, you should have only one machine per circuit breaker.

For other precautions about power to the system, see the *Explorer 7-Slot System Installation* manual.

Backplane and Peripheral Cables

G.1.4.2 The logic boards plug into the backplane from the front of the enclosure; peripheral cable adapters (PCAs) plug into the backplane from the back of the enclosure. Using a backplane enables a technician to change logic boards without disturbing the PCAs or cables and to change cables or PCAs without disturbing logic boards.

Figure G-2   **Rear View of the Explorer System Enclosure**

top access door through which cable is routed

convenience receptacles

backplane

power cable

back door

2286702
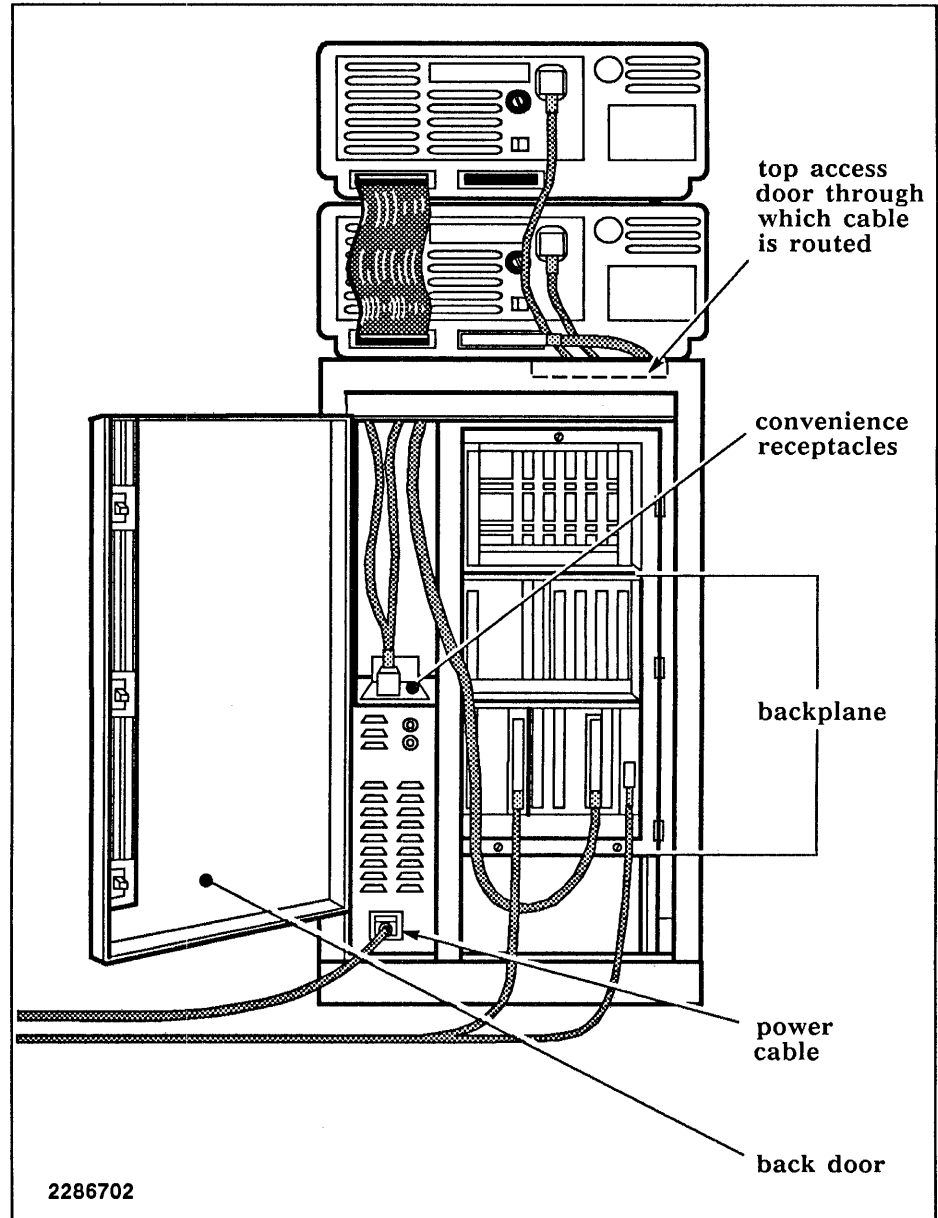
Figure G-3 Rear View of the Explorer II System Enclosure

(cable cover removed)

primary mass storage unit

SCSI terminator

SCSI cable

power cable

cable access panel

cable trough

7-slot system enclosure

auxiliary processor option board

back door

PCA board backplane connector P32

fiber-optic board backplane connector P35

circuit breaker

2287891
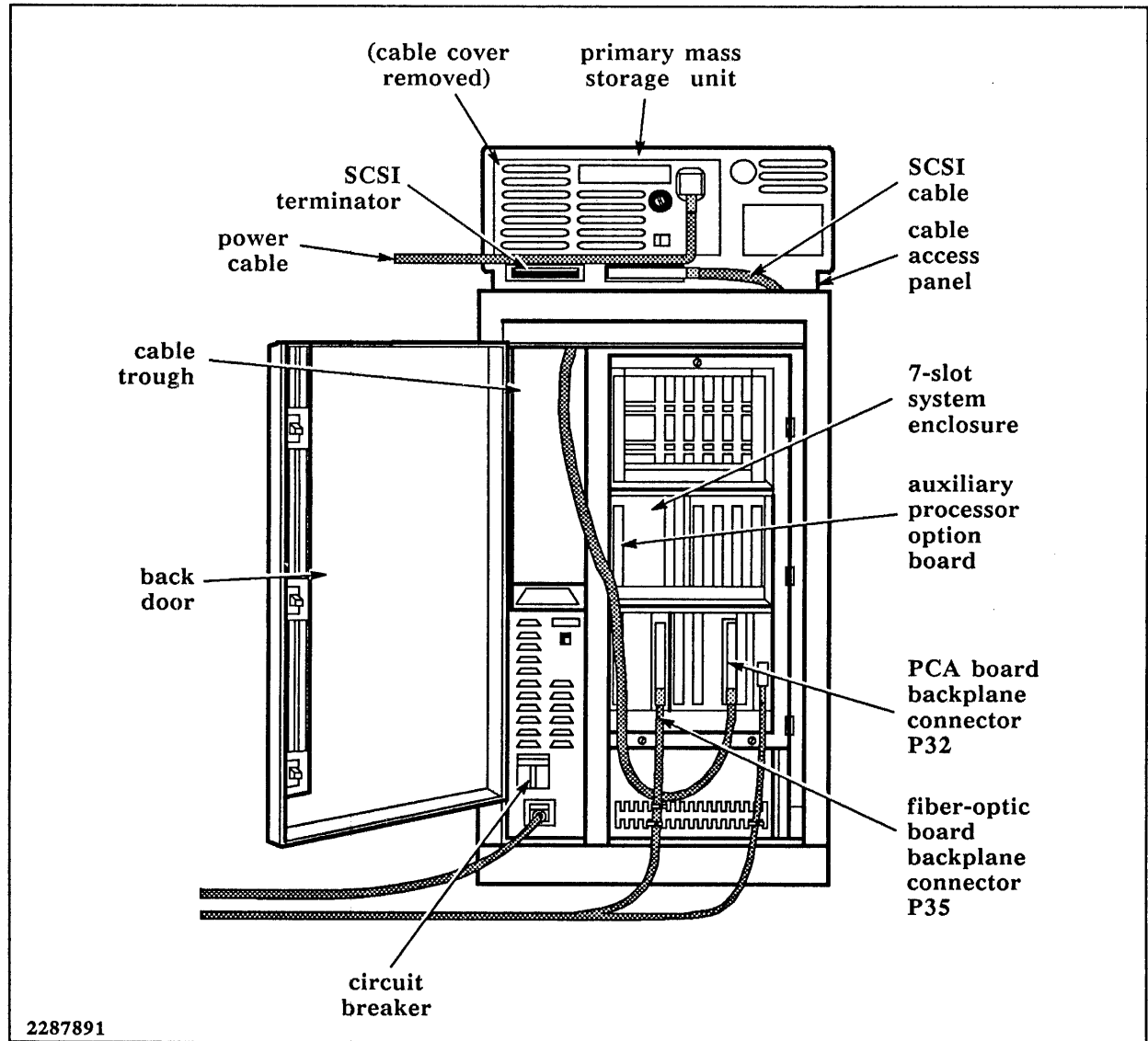
INDEX

Alphabetization Scheme

The alphabetization scheme used in this index ignores package names and nonalphabetic symbol prefixes for the purposes of sorting. For example, the **rpc:*callrpc-retrys*** variable is sorted under the entries for the letter C rather than under the letter R.

Hyphens are sorted after spaces. Consequently, the multiple menus entry precedes the multiple-choice facility entry.

Underscore characters are sorted after hyphens. Consequently, the **xdr-io** macro precedes the **xdr_destroy** macro.

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Introduction To The Explorer System

Do you use other TI manuals? If so, which one(s)?

_____   _____

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Clarity	____	____	____	____
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Overall design	____	____	____	____
Size	____	____	____	____
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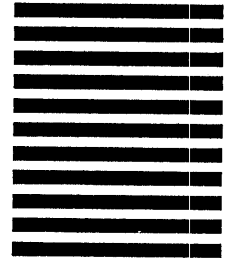
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