HP 9000 Series 200/300 Computers

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Application Execution Environment User's Manual

Application Execution Environment
User's Manual
for HP 9000 Series 200/300 Computers

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Printing History

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Chapter 1: Introduction

Introduction 1

What is AXE?

AXE, the Application Execution Environment, is a small HP-UX[1] operating system. AXE includes all parts of HP-UX necessary to execute commands to create and manage files and to run programs. AXE provides an easy-to-use interface program called PAM (Personal Application Manager) so you can run your applications, store and move files, and execute commands.

Your system has an ▆▆▆▆▆▆▆▆ editor, th▆▆▆editor, for you to create text files and modify your text files (optionally loaded means the editor is not automatically loaded into the system during installation; you will have to specifically request the editor to be loaded). If you purchased enough memory ▆▆▆▆▆▆▆▆▆▆ your system can use HP Windows/9000. Windows (described in Chapter 7) lets you graphically organize your computer operations in a way similar to organizing papers on a desk.

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[1] HP-UX is an enhanced version of UNIX (TM), a trademark of AT&T Bell Laboratories. Detailed HP-UX documentation comes with an upgrade to AXE: the Programming Environment; see Chapter 8, "More Detailed Uses of AXE."

What's In This Manual

This manual is broken into ten chapters and some appendices. The following topics are covered in this manual:

- Chapter 2, Installing AXE: how to install AXE, what to do after you install AXE

- Chapter 3, Getting Started: using the keyboard, logging in, changing your password

- Chapter 4, PAM: a friendly way to use the system to run your applications

- Chapter 5, Helpful Tips on Managing Your Files

- Chapter 6, The vi editor: an editor letting you enter, modify and store text

- Chapter 7, HP Windows/9000: a new way to organize tasks and run applications programs

- Chapter 8, More Detailed Uses of AXE: what are shells, and how to access the on-line command and file descriptions

- Chapter 9, Caring For Your AXE System: monitoring and backing up files, checking the file system

- Chapter 10, The AXE System Administration[2]: administration tools for the AXE system, booting AXE, shutting down AXE

- Appendices: lists of system commands, vi commands, window commands, AXE file sets, and swap space.

Some of the chapters include a summary at the beginning of the chapter. This summary can help you in several ways. If you are already familiar with the material in the chapter, you can refresh your memory by reading over the summary. If you have never seen the material in the chapter, you can use the summary as a quick reference after you have read the material.

---

[2] A **system administrator** is the person in charge of setting up the computer system: installing and configuring the system.

What Parts Should I Read?

The following table shows the chapters you should read depending on your needs.

Table 1-1. Necessary Chapters

Uses	Chapters									
	1	2	3	4	5	6	7	8	9	10
Upkeep of your system	X	X	X					X	X	X
Running applications	X		X	X			X			
General Use	X		X	X	X	X	X	X		

Conventions

As you read through this manual, you will see different print used in the text. The following list describes the use of the different print to make reading easier:

bold　　　　　　　Bold type is used for the first definition of a term and for emphasis.

italics　　　　　　　Italicized type is used for quoting, generic input statements such as *file_name*, and emphasis. When you see something like: `copy` *file_name*, the *file_name* refers to a name of a file name you have to type, for example `file1` (see computer type).

`computer`　　　　　　Computer type is used for anything that is typed on the screen. If you see something like: Type `cd`, you are to actually type `cd`. If you see something like: Type `cd` *folder_name*, you are to only type `cd` and then you substitute a real file name for *folder_name*. Computer type also represents screen output.

[User]　　　　　　　Words or letters contained in boxes, for example: [Return], [f1], or [k] refer to keys on the keyboard.

Open　　　　　　　This type of boldface typing refers to function keys of an application. You will find a detailed description of this convention in the chapter, "Using the System: PAM."

Color　　　　　　　When you see **Color** text, this means you are to perform the action that is colored (it can be a description of an action, or something that you type). You will see **Color** in the sections of chapters which describe interaction with the computer.

Assumptions

This manual makes some assumptions: you wish to use AXE for applications oriented tasks, and you do not plan to write programs. You are not expected to be an HP-UX expert. AXE is a helpful tool to make your job easier.

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Installing AXE

<div align="right"><h1>2</h1></div>

You received your AXE system on several flexible discs or on one cartridge tape. Installing AXE involves inserting the discs or tape and loading the contents onto your hard disc. After installation, the hard disc contains the information needed to boot AXE when you turn power on to your computer. This chapter provides a step-by-step procedure for installing the AXE Operating System on HP 9000 Series 300 computers, Models 310 and 320.

You must read and fill out the checklist items before installing AXE. This will save you time on installation, and may prevent you from needing to re-install AXE. Each item on the checklist tells you where to look for the information needed to fill out the checklist item.

Installation Overview

For your convenience, here is an overview of the major steps involved in the software installation of the AXE Operating System. You should already have your hardware installed, using the guidelines in *Peripheral Installation Guide*.

1. Fill out the pre-installation checklist on the following page.

2. Load the first of the installation flexible discs, or the installation tape.

3. Follow and respond to the installation utility menus

4. Make the necessary changes to your AXE system using the *reconfig* program.

5. Store your installation tape or flexible discs in a safe place

6. Follow the guidelines in the "After Installing AXE" section

Pre-Installation Checklist

Fill out this checklist before you begin the installation procedure. Information from this checklist will be needed during installation.

File Sets and Partitions

File sets and partitions are explained in Appendix D. You must install the filesets from the "SYS_CORE" partition. Other filesets are optional. Go through the list of filesets in Appendix D and decide what optional filesets you wish to load.

The required filesets are already filled in.

Partition:	SYS_CORE	Partition:	_____
Filesets:	98515	Filesets:	_____
	ACORE		_____
	ACORE2		_____
	ACORE3		_____
	ACORE4		_____
	ACORE5		_____
Partition:	_____	Partition:	_____
Filesets:	_____	Filesets:	_____
	_____		_____
	_____		_____
	_____		_____
	_____		_____
	_____		_____

Swap Space Required

Swap space is an area that will be created on your hard disc (destination disc) when your file system is created (during the installation process). You must determine your swap space requirements now; if you require more than the default amount of swap space, and don't request it during the installation process, you will need to re-install AXE. Swap space is discussed in Appendix E.

TOTAL SWAP SPACE REQUIRED (in Kbytes) _____

Hardware information

Does your system have a 98620B DMA card? _____

Will your destination (root) disc be connected to an HP 98625A/B high-speed
    HP-IB interface card? _____

Will you be installing from cartridge tape or from flexible disc? _____

Will you be installing from an integrated device? i.e., is the flexible disc or cartridge tape drive part of the hard disc drive? _____

If you are NOT installing from an integrated device, you must fill in the following address information for your destination (root) disc. If you set up your drives using the guidelines in the *Peripheral Installation Guide*, you can fill in the information from your worksheet:

    Select Code _____
    Bus Address _____
    Unit Number _____
    Volume Number _____

Major Number: Always 0

Before Installing AXE

You should already have your computer, hard disc drive, installation tape/flexible disc drive, and all interface and memory cards installed and tested. Follow the guidelines in the *Peripheral Installation Guide* to install your hardware if you have not already done so.

Your Destination Disc

The hard disc drive you will install AXE onto is called the **destination disc** in this chapter. If you have information on your destination disc that you do not want destroyed, you must save the information now. The installation process will overwrite everything on your destination disc.

If you have never used this disc, you do not need to worry about this caution.

Description of a System Console

The **system console** is a keyboard and monitor (or terminal) given a unique status by AXE and associated with the special (device) file */dev/console*. All boot ROM error messages, AXE system error messages, and certain system status messages are sent to the system console. Under certain conditions (for example, the single-user state), the system console provides the only mechanism for communicating with AXE.

The boot ROM and the AXE operating system assign the system console function according to a prioritized search sequence. AXE's search for a system console terminates as soon as one of the following conditions is met:

- A built-in serial interface, HP 98626A, HP 98628A[1], HP 98642A, or HP 98644A RS-232C serial interface is present with the "remote bit"[2] set. If more than one serial interface card with its "remote bit" set is present, the one with the lowest select code is used. In the case of the HP 98642A (4-channel multiplexer), port 1 is used.

- An "internal" bit-mapped display is present. This is true if a Model 310 built-in video output, HP 98542A, HP 98543A, HP 98544A or HP 98545A board is present. It is also true if an HP 98700H display station with its display interface card (HP 98287A) configured for "internal" control space is present. Note that if the HP 98700H display station's display interface card (HP 98287A) is configured for "external" control, it is never chosen ("external" bit-mapped displays have a specific select code address and "internal" bit-mapped displays **do not**).

- An HP 98546A compatibility video interface is present.

- A built-in serial interface, HP 98626A, HP 98628A, HP 98642A, or HP 98644A RS-232C serial interface is present without the "remote bit" set. If more than one is present, the one with the lowest select code is used. In the case of the HP 98642A (4-channel multiplexer), port 1 is used. The boot ROM **does not** recognize the serial interface card as console when this condition is met; however, AXE does.

If none of the above conditions are met, no system console exists. While boot ROM tolerates this, AXE will not.

---

[1] The HP 98628A Datacomm Interface Card with its "remote bit" set is not supported as a remote console by the Revision A boot ROM; however, it is supported as the system console by the AXE operating system. Therefore, when an HP 98628A card is used and has its "remote bit" set, the boot ROM sends messages to the next console found, but AXE sends its messages to the ITE (terminal) associated with the HP 98628A card.

[2] On the HP 98626A Serial Interface board the remote bit is set by cutting a jumper as described in the installation manual supplied with your computer. On the HP 98628A, HP 98642A and HP 98646A interface cards the remote bit is set by setting a switch on the board as described in each board's installation manual.

Additional Considerations

This section contains information on bit settings for the HP 98626A RS-232C Serial Interface Card's Line Control Switch Pack.

The boot ROM requires that the Line Control Switch Pack settings on the HP 98626A RS-232C Serial Interface card be set to the same setting as your remote terminal. AXE resets these values to system defaults on log in. These values are as follows:

Stop Bits	should be set to 1.
BaudRate	should be set to 9600 bps.
Parity/DataBits	should be set to 0's/7.
Enq/Ack	should be set to NO.
Pace (Handshake)	should be set to XON/XOFF.

To make the above settings on your HP 98626A Serial Interface card, set your cards Line Control Switch Pack (U-2) switches as follows:

bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7
1	1	0	0	1	0	1	0

Additional settings for Handshake Type bits 6 and 7 of the Line Control Switch Pack are:

Bit 6	Bit 7	Handshake Type
0	0	ENQ/ACK
1	0	XON/XOFF
0	1	NO HANDSHAKE
1	1	NO HANDSHAKE

Note that the other switch settings for the Line Control Switch Pack on the HP 98626A card are defined in the installation manual supplied with that card.

Installing AXE from Flexible Disc

NOTE

The whole installation process can take anywhere from one to three hours depending upon the size of the disk being initialized and the number of products you decide to load.

---

1. Turn your computer off.

2. Turn on the hard disc drive and the drive you will use for the installation.

3. Insert the first installation flexible disc.

   Find the discs from the SYS_CORE partition (the discs with no label color (grey discs)).

   Locate the write-protect mechanism; see Figure 2-1 to locate the write-protect mechanism. For the installation process to be successful, your system **must** be able to write to the media. The write protect mechanism is located on the back of the disc. Move the protect mechanism away from the label end of the disc, as shown in Figure 2-1.

   Hold the flexible disc with the label up and towards you (the write protect mechanism will be underneath the disc) and insert the first installation disc into the left side of the disc drive and push until it clicks into place.

Write—Protect Mechanism
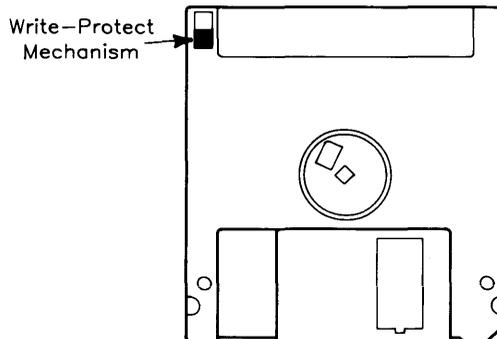
Figure 2-1. Flexible Disc Write Protect Mechanism

4. After the busy light on your flexible disc drive shuts off, turn on your computer and system console display.

NOTE

If you have any bootable system currently on your hard disc, you will need to enter the boot ROM's attended mode by holding down the space bar after you turn your computer on (see discussion below).

If you are installing AXE to a disc with a bootable system on it, you need to immediately hold the space bar down during the boot ROM power-up sequence, and continue holding it down until the word "keyboard" appears on the left side of your screen. This stops the boot ROM from automatically booting an operating system if one exists on your hard disc.

You will see a series of messages on your console **similar** to those shown in Figure 2-2.

```
Copyright 1985,                        :HP9122REM, 704, 0, 0
Hewlett-Packard Company.                 1H   SYSHPUX
All Rights Reserved.                     1B   SYSBCKUP


BOOTROM REV.A
Bit Mapped Display
MC68020 Processor
MC68881 Coprocessor
Keyboard
HP-IB
HP98644 at 9
HP98625 at 14
2096992 Bytes







SEARCHING FOR A SYSTEM (RETURN To Pause)
RESET To   Power-Up
```

Figure 2-2. First Installation Messages

5. Choose the correct operating system.

On the right side of your screen, you will see one or more HP product numbers, followed by a list of operating systems found on the disc drive associated with the product number. Choose the AXE operating system (SYSHPUX) corresponding to the product number of the drive that contains the installation disc. In the example shown in Figure 2-2, using an HP9122 disc drive for installation, type ⌐1⌐ ⌐H⌐ ⌐Return⌐.

It will take a couple of minutes for the installation program to be loaded. Follow the installation utility menus as instructed in the following steps.

The message

    Booting /hp-ux

appears on the screen and the system starts loading the AXE operating system off the flexible disc. The AXE operating system now displays messages pertaining to the system configuration, how much memory is left, and the system copyrights.

The AXE operating system loads some more information, then the copyright information will disappear and a new menu will appear (shown in Figure 2-3) to ask you whether you wish to begin or exit the installation procedure.

```
**********************************************************
        HP-UX INSTALLATION UTILITY -- MAIN MENU
**********************************************************




     Choice          Description
       b              BEGIN installation process
       e              EXIT installation process



  Please enter choice (b or e), hit [Return] >>
```

Figure 2-3. Main Installation Menu

6. Begin the installation process.

NOTE

The installation procedure will destroy all the files on the destination hard disc, if any exist.

- If this is the first time your are installing AXE on this hard disc, or you are sure you don't want files that currently exist on the disc, enter ⬚ b ⬚ Return . A screen similar to that shown in Figue 2-4 will appear. Continue with step 7.

- If you have files on your destination disc (i.e. your destination disc has information on it) and need to save any files, type ⬚ e ⬚ Return to exit the installation process. If you wish to save any of the files currently on your disc, exit the installation procedure and reboot your old system, and back up any files you want to save.

```
****************************************************
      HP-UX INSTALLATION UTILITY -- DEVICE MENU
****************************************************


Source Device                    Destination Device


Major number      4              Major Number      0
Select code       14             Select code       14
Bus address       0              Bus address       0
Unit number       1              Unit number       0
Volume number     0              Volume number     0


Choice            Description

[Return]          CONTINUE installation process
   e              EXIT installation process
   d              change DESTINATION device


Please enter choice (e or d), hit [Return] >>
```

Figure 2-4. Device Menu

7. Verify the destination device.

The screen you now see (similar to Figure 2-4) shows you the source address (installation drive) and default destination address (root disc drive). The major numbers for both the source and destination devices will be correct.

The source address will be correct, but you must check the destination address (select code, bus address, unit number, and volume number). If your source device (installation drive) and destination device (root disc drive) are integrated (both housed in the same box, product numbers HP9153A or HP9133D/H/L), these values will be correct. If your source and destination devices are not integrated, you will need to change the destination device address. **You should have the adddress written on your pre-installation checklist.**

You may perform any of the following tasks now:

- If you wish to continue with the installation process, using the device parameters as shown, press ⌷Return⌷ (be careful not to press in several returns). The message

    Checking values...

  will be displayed.

  Go to step 8.

- If you wish to exit the installation process, type ⌷e⌷ and ⌷Return⌷.

- If you need to change the address for the destination device, type ⌷d⌷ and ⌷Return⌷. You will be prompted for the select code, bus address, unit number, and volume number. These are discussed in your *Peripheral Installation Guide*, and should be written on your pre-installation checklist.

  To change a value, type in the new value followed by ⌷Return⌷; if you just hit ⌷Return⌷ the old value will be retained.

  When you are finished changing the values, the message Making device file will be displayed on the screen.

  You will be returned to the screen shown in Figure 2-4. To continue the installation process, hit ⌷Return⌷.

8. After you hit ⌈Return⌉ (from step 7 above), the message

>   **Checking values**...

will be displayed. *Install* will verify that the information you gave is correct if you have only one hard disc connected. If you have more than one hard disc, you must verify these numbers yourself.

The system will check your destination device, and depending on what kind of device you have, you may or may not get the following message(s): aaaaa

```
Will your root disc be on a 98625A/B (disc HP-IB interface card)? [y/n] >>
Does your system have a 98620B (DMA) card? [y/n] >>
```

You should be able to answer these questions from the pre-installation checklist. When you have answered these questions, the installation will continue.

The disc parameters menu (Figure 2-5) will appear on your console.

9. Verify the values displayed on the disc parameters menu.

You normally should not change these numbers. However, some applications may require non-default hard disc parameters.

Swap space is the most common parameter to change. If your applications require more than the default amount of swap space, it is important that you change swap space now. **If you do not have enough swap space, you may need to re-install AXE later.** You should have your swap space requirements filled out on the pre-installation checklist. If you change the swap space, the system will configure the swap space to be an appropriate value close to the number you request. Parameters other than swap space should be changed **only** if your application requires it, or if you fully understand the impact they can have on your system.

```
**************************************************
 HP-UX INSTALLATION UTILITY -- DISC PARAMETERS MENU
**************************************************

 Swap Size:        10192     Interleave Factor:        1
 Block Size:        8192      Free Space Threshold:    10
 Fragment Size:     1024      Rpms of the disc:      3600
                             Density- bytes / inode: 2048


 Choice               Description

 [Return]             CONTINUE installation process
     e                EXIT installation process
     b                change disc BLOCK size
     d                change DENSITY (bytes per inode)
     f                change disc FRAGMENT size
     i                change disc INTERLEAVE factor
     r                change disc RPMS
     s                change disc SWAP size
     t                change disc free space THRESHOLD size


 Use the values shown above unless you need to change them for tuning.
 Enter choice followed by [Return] or hit [Return] to continue >>
```

Figure 2-5. Disc Parameters Menu

NOTE

Copy the values from your screen to Figure 2-5. You need several of these values to properly manage your system once it is installed.

If you do not need to change any of the hard disc parameters, type [Return] to continue.

If you need to change any of the values, type the letter corresponding to the choice and [Return]. Type the new value followed by a [Return] to enter the new value. This will display a new message at the bottom of the screen:

```
    Please enter choice (e,b,d,f,i,r,s, or t), hit Return] >>
```

If you need to change any other parameters, enter the appropriate choice.

NOTE

If you change the swap space, the system will configure the swap space to be an appropriate value close to the number you request.

When you have changed the necessary parameters, go to step 10.

10. Press [Return] to continue with the installation.

You should now see a menu similar to the menu shown in Figure 2-6. This menu is shown so you can verify the correct address for the destination device. If the information is correct, go to step 11. If any information is incorrect, enter [e] and [Return] to exit the installation procedure. To restart the procedure, turn off your computer and continue with step 4.

```
*****************************************************
       HP-UX INSTALLATION UTILITY -- INSTALL MENU
*****************************************************


                      DESTINATION DEVICE


             Major  Number                0
             Select Code                  14
             Bus    Address               0
             Unit   Number                0
             Volume Number                0



    Choice          Description


       b            BEGIN Initialization and Installation
       e            EXIT Installation Process



      Please enter choice (b or e), hit [Return] >>
```

Figure 2-6. Installation Device Menu

11. Press ⬚b and ⬚Return to begin the initialization of the destination disc and the installation of HP-UX.

The following message and prompt will appear at the bottom of your screen:

```
WARNING !! Proceeding will DESTROY the contents of unit xxx, volume xxx
of the Destination Device. Do you want to proceed? [y/n] >>
```

CAUTION

Do not switch off power to the computer or hard disc drive during disc initialization. Terminating the initialization process in this fashion may seriously corrupt the disc medium.

The **only** way to install AXE is to type in ⬚y and ⬚Return. **If you think that any of the parameters you entered on previous menus are wrong, or if you do not wish to erase any information on the destination disc,** type ⬚n and ⬚Return. Answering n will exit the installation procedure.

If you entered ⬚y, disc initialization begins. The menu, as shown in Figure 2-7, informs you the destination disc is being initialized (/dev/hd and /dev/rhd reference your destination disc). The source drive will also be accessed during the initialization process. The media initialization process sets up your hard disc for normal use.

Disc initialization can take from four minutes to fifty minutes depending on the size of your disc. See Table 2-1 at the end of this chapter for approximate initialization times. In addition to initializing the disc, the installation process will create a file system and load important files to the hard disc. **The total time before you must interact with the installation process again is between 30 minutes and 3 hours.**

NOTE

See Table 2-1 at the end of this chapter for approximate initialization times.

After media initialization, the set of installation tools needed to complete the installation process is copied onto the root disc. You will see a trace of the files being copied, similar to the display shown in Figure 2-7.

If you decide to abort the installation process, type [e] and [Return].

```
**************************************************
   HP-UX INSTALLATION UTILITY -- EXECUTION TRACE
**************************************************


Initializing:  /dev/rhd
This will take between fifteen minutes and three hours

Making file system on device:  /dev/hd
Mounting device:  /dev/hd
Making directory:  /dev
Making device file: /dev/console
Making device file: /dev/mem
Making device file: /dev/kmem
Making device file: /dev/null
Making device file: /dev/swap
Making device file: /dev/tty
Making directory:  /etc
Making directory:  /disc
Making directory:  /usr
Making directory:  /usr/bin
Copying file: /hp-ux
Copying file: /etc/copyinit
Copying file: /etc/sbtab
```

Figure 2-7. Installation Trace #1

After the trace shown in Figure 2-7, the trace will disappear, and the following two lines will appear:

```
Copying file: /etc/mkfs
Copying file: /etc/mediainit
```

AXE then automatically reboots (this takes about 2 minutes), then prompts you for new media:

```
Please insert media "2" from partition: "SYS_CORE"
when BUSY light remains off, hit [Return] >>
```

Disc 2 must not be write-protected. Insert the second flexible disc from SYS_CORE. You will see message:

```
...verifying...
```

If you loaded the wrong flexible disc, you will be prompted to load the correct disc.

The installation process will now load files from the second disc; you will see the execution trace similar to Figure 2-8.

```
***************************************************
    HP-UX INSTALLATION UTILITY -- EXECUTION TRACE
***************************************************


Mounting device: /dev/src
Making directory: /bin
Making directory: /usr
Making directory: /usr/bin
Making directory: /etc
Making directory: /tmp
Making directory: /etc/filesets
Copying file: /disc/bin/cpio
Copying file: /disc/bin/mkdir
Copying file: /disc/bin/sh
Copying file: /disc/bin/pwd
Copying file: /disc/usr/bin/lifcp
Copying file: /disc/usr/bin/tcio
Copying file: /disc/etc/init2
Copying file: /disc/etc/update
Copying file: /disc/etc/sysrm
```

Figure 2-8. Installation Trace #2

After loading the tools, the screen will clear, and the following menu will appear on your screen:

```
**************************************************
   HP-UX INSTALLATION UTILITY -- EXECUTION TRACE
**************************************************

setting up device files...
reading contents file...
```

The program then loads all the required files and their file sets and displays a screen similar to the screen shown in Figure 2-9. The "XXXXXXX" refers to the fileset number or fileset name.

install will prompt you to insert the rest of the core (required) discs. As you are prompted to insert discs, put the discs in the flexible disc drive. For each disc, the installation procedure will wait until you insert the disc, and will verify that you have inserted the correct flexible disc before continuing.

Each time you insert a disc, wait for 5 to 10 minutes while the files are copied from the flexible disc to the hard (destination) disc (a screen similar to Figure 2-9). These discs contain files needed for AXE.

```
****************************************************
    HP-UX INSTALLATION UTILITY -- EXECUTION TRACE
****************************************************


Loading files from "XXXXXXX"
      .
      .
      .
Loading: etc/init
      .
      .
      .
```

Figure 2-9. Execution Trace #3

NOTE

You now have the core (required) files loaded on your system.

---

12. Exit the installation process or load more filesets.

If you wish to have only the core AXE system loaded, hit ⎡e⎤ and ⎡Return⎤ to exit the installation procedure.

If you wish to install optional filesets or products, hit ⎡d⎤ and ⎡Return⎤. You will see the following line added to Figure 2-10:

    Please insert disc

Decide which disc contains the filesets you want to load (from your pre-installation checklist or by looking in Appendix D). Insert the disc containing the filesets. You will now see the menu in Figure 2-11.

```
        **********************************************************
            HP-UX INSTALLATION UTILITY -- FILESET   MENU
        **********************************************************

        Choice          Description


        e               EXIT install process
        d               DISPLAY installation options for a new fileset

        Please enter choice (letter or number), hit [Return] >>
```

Figure 2-10. Fileset Menu #1

The menu shown in Figure 2-11 shows the filesets you can load from the disc you have chosen. You can now choose to load all the filesets on the disc, the individual filesets you want, or exit.

```
****************************************************************
       HP-UX INSTALLATION UTILITY -- FILESET   MENU
****************************************************************

Choice          Description


e               EXIT install process
d               DISPLAY installation options for a new fileset
a               Process ALL filesets listed below


1               fileset_1
2               fileset_2
3               fileset_3
4               fileset_4

Please enter choice (letter or number), hit [Return] >>
```

Figure 2-11. Fileset Menu

NOTE

The time it takes to complete this process varies; it takes about 15 minutes per flexible disc to copy optional partitions and filesets to your hard disc.

- If you wish to install all the filesets on this menu, press ⌐a⌐ and ⌐Return⌐.
- If you wish to install only certain filesets, enter the fileset number and hit ⌐Return⌐. You will be returned to this menu when the fileset is loaded.

- If you choose to "DISPLAY installation options", press ⬛ d ⬛ and ⬛ Return ⬛.

  You will get a message: `insert media from a new partition`. Choose any flexible disc of the color of partition you wish to install, and press ⬛ Return ⬛. The installation procedure will read the table of contents, and return you to a menu similar to the menu in Figure 2-11.

- If you wish to exit this menu, press ⬛ e ⬛ and ⬛ Return ⬛.

  If this is the first time you see this menu, and you decide to exit without loading anything, you will have only the core (required) files loaded on the system.

13. After you finish installing both the mandatory operating system (end of Step 11) and the optional pieces you want (end of step 12) your screen will clear and the screen shown in Figure 2-12 will appear:

```
****************************************************
    HP-UX INSTALLATION UTILITY -- EXECUTION TRACE
****************************************************




unloading media...
When Busy light remains off, hit [Return] >>

cleaning up ...
```

Figure 2-12. Screen for Exiting Fileset Menu

The program will unload the media for you. Press ⬛ Return ⬛ when the light on the flexible disc drive remains off, and remove the media. **Remember to store all installation media in a safe place.**

14. The system will reboot.

   If your file system closed cleanly, a message indicating this appears. Otherwise, the *fsck(1M)* program runs automatically and cleans up your file system. This also causes the system to reboot. This situation usually arises when the *shutdown(1M)* command was not used to shut down the system (*shutdown* is discussed in Chapter 10, "Shutting Down the System"), or when power failure occurs. See "Checking Your File System" in Chapter 9 for a brief discussion of *fsck*.

15. The program, *reconfig*, will start up. You should go through some of the reconfig items now, especially the "Security" item. For a description of *reconfig*, read the subsection, "Reconfiguring Your System" in "After Installing AXE" in this chapter.

   If you wish to exit *reconfig*, press the **Exit** softkey.

16. Follow the steps in the next section, "After Installing AXE".

Installing AXE from Cartridge Tape

NOTE

The whole installation process can take anywhere from one to three hours depending upon the size of the disk being initialized and the number of products you decide to load.

---

1. Turn your computer off before you insert the tape.

2. Turn on the hard disc drive and the drive you will use for the installation.

3. Insert the installation tape.

   Locate the write-protect mechanism; see Figure 2-13 to locate the write-protect mechanism. For the installation process to be successful, your system **must** be able to write to the media.

   The mechanism is on the top, rear, left-hand corner of the cartridge tape and is labelled "SAFE". The arrow on the protect screw should point away from the word SAFE. If it does not, use a coin or screwdriver to turn the protect screw such that the arrow points away from the word SAFE.

   Hold the tape with the SAFE label in the rear left hand corner and insert it into the tape drive door and push until it clicks into place. The BUSY indicator should now be lit. The tape drive will begin a cartridge tape conditioning sequence that takes approximately two minutes.
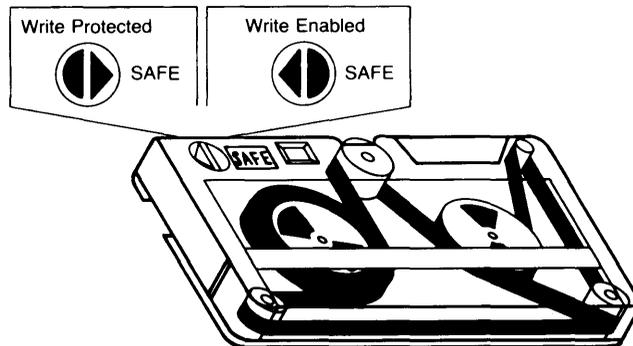
Figure 2-13. Tape Write Protect Mechanism

4. After the busy light on your tape drive shuts off, turn on your computer and system console display.

NOTE

If you have a bootable system currently on your hard disc, you will need to enter the boot ROM's attended mode by holding down the space bar after you turn your computer on (see discussion below).

If you have a bootable system currently on your disc, you need to immediately hold the space bar down during the boot ROM power-up sequence, and continue holding it down until the word "keyboard" appears on the left side of your screen. This stops the boot ROM from automatically booting an operating system if one exists on your hard disc.

You will see a series of messages on your console **similar** to those shown in Figure 2-14.

```
Copyright 1985,                          :HP9144TAPE, 704, 0, 0
Hewlett-Packard Company.                   1H  SYSHPUX
All Rights Reserved.                       1B  SYSBCKUP


BOOTROM REV.A
Bit Mapped Display
MC68020 Processor
MC68881 Coprocessor
Keyboard
HP-IB
HP98644 at 9
HP98625 at 14
2096992 Bytes




SEARCHING FOR A SYSTEM (RETURN To Pause)
RESET To  Power-Up
```

Figure 2-14. First Installation Messages

5. Choose the correct operating system.

On the right side of your screen, you will see one or more HP product numbers, followed by a list of operating systems found on the tape drive associated with the product number. Choose the AXE operating system (SYSHPUX) corresponding to the product number of the tape drive that contains the installation media. In the example shown in Figure 2-14, using an HP9144 tape drive for installation, type ⌐1⌐ ⌐H⌐ ⌐Return⌐.

It will take a couple of minutes for the installation program to be loaded. Follow the installation utility menus as instructed in the following steps.

The message

```
Booting /hp-ux
```

appears on the screen and the system starts loading the AXE operating system off the installation tape. The AXE operating system now displays messages pertaining to the system configuration, how much memory is left, and the system copyrights.

The AXE operating system loads some more information, then the copyright information will disappear and a new menu will appear (shown in Figure 2-15) to ask you whether you wish to begin or end the installation procedure.

```
*********************************************************
        HP-UX INSTALLATION UTILITY -- MAIN MENU
*********************************************************



        Choice          Description

          b             BEGIN installation process
          e             EXIT installation process


  Please enter choice (b or e), hit [Return] >>
```

Figure 2-15. Main Installation Menu

6. Begin the installation process.

NOTE

The installation procedure will destroy all the files on a currently installed disc.

- If this is the first time your are installing AXE on this hard disc, or if you are sure you want to overwrite the contents of the hard disc, enter b Return. A screen similar to that shown in Figue 2-16 will appear. Continue with step 7.

- If you have files on your destination disc and need to save the files, type e Return to exit the installation process. If you wish to save any of the files currently on your hard disc, exit the installation procedure and reboot your old system, and back up any files you want to save.

```
    ****************************************************
          HP-UX INSTALLATION UTILITY -- DEVICE MENU
    ****************************************************


    Source Device                    Destination Device

    Major number      4              Major Number        0
    Select code       14             Select code         14
    Bus address       0              Bus address         0
    Unit number       1              Unit number         0
    Volume number     0              Volume number       0


    Choice          Description

    [Return]        CONTINUE installation process
       e            EXIT installation process
       d            change DESTINATION device


    Please enter choice (e or d), hit [Return] >>
```

Figure 2-16. Device Menu

7. Verify the destination device.

The screen you now see (similar to Figure 2-16) shows you the source address (installation drive) and default destination address (root disc drive). The major numbers will be correct for both the source and destination.

The source address will be correct, but you must check the destination address (select code, bus address, unit number, and volume number). If your source device (installation drive) and destination device (root disc drive) are integrated (both housed in the same box, product number HP 7908, HP 7911, HP 7912, HP 7914, HP 7942 or HP 7946), these values will be correct. If your source and destination devices are not integrated, you will need to change the destination device address. **You should have the adddress written on your pre-installation checklist.**

You may perform any of the following tasks now:

- If you wish to continue with the installation process, using the device parameters as shown, press [Return] (be careful not to press in several returns). The message

     Checking values...

  will be displayed.

  Go to step 8.

- If you wish to exit the installation process, type [e] and [Return].

- If you need to change the address for the destination device, type [d] and [Return]. You will be prompted for the select code, bus address, unit number, and volume number. These are discussed in your *Peripheral Installation Guide*, and should be written on your pre-installation checklist.

  To change a value, type in the new value followed by [Return]; otherwise the old value will be retained.

  When you are finished changing the values, the message `Making device file` will be displayed on the screen.

  You will be returned to the screen shown in Figure 2-16. To continue the installation process, press [Return].

8. After you press ⌈Return⌉ (from step 7 above), the message

    `Checking values...`

    `will be displayed`. *Install* will verify that the information you gave is correct if you have only one hard disc connected. If you have more than one hard disc, you must verify these numbers yourself.

    The system will check your destination device, and depending on what kind of device you have, you may or may not get the following message(s):

    `Will your root disc be on a 98625A/B (disc HP-IB interface card)? [y/n] >>`
    `Does your system have a 98620B (DMA) card? [y/n] >>`

    You should be able to answer these questions from the pre-installation checklist. When you have answered these questions, the installation will continue.

    The disc parameters menu (Figure 2-17) will appear on your console.

9. Verify the disc parameters.

    You normally should not change these numbers. However, some applications may require non-default disc parameters.

    Swap space is the most common parameter to change. If your applications require more than the default amount of swap space, it is important that you change swap space now. **If you do not have enough swap space, you may need to re-install AXE later.** You should have your swap space requirements filled out on the pre-installation checklist. If you change the swap space, the system will adjust the value to the closest swap space value appropriate for the file system. Parameters other than swap space should be changed **only** if your application requires it, or if you fully understand the impact it can have on your system.

```
    ****************************************************
     HP-UX INSTALLATION UTILITY -- DISC PARAMETERS MENU
    ****************************************************

     Swap Size:        10192    Interleave Factor:        1
     Block Size:        8192    Free Space Threshold:    10
     Fragment Size:     1024    Rpms of the disc:      3600
                                Density- bytes / inode: 2048



     Choice              Description


     [Return]            CONTINUE installation process
        e                EXIT installation process
        b                change disc BLOCK size
        d                change DENSITY (bytes per inode)
        f                change disc FRAGMENT size
        i                change disc INTERLEAVE factor
        r                change disc RPMS
        s                change disc SWAP size
        t                change disc free space THRESHOLD size

 Use the values shown above unless you need to change them for tuning.
 Enter choice followed by [Return] or hit [Return] to continue >>
```

Figure 2-17. Disc Parameters Menu

NOTE

Copy the values from your screen to Figure 2-5. You need several of these values to properly manage your system once it is installed.

If you do not wish to change any of the disc parameters, type [Return] to continue.

If you need to change the any of the values, type the letter corresponding to the choice and [Return]. Type the new value followed by a [Return] to enter the new value. This will display a new message at the bottom of the screen:

```
   Please enter choice (e,b,d,f,i,r,s, or t), hit Return] >>
```

If you need to change any other parameters, enter the appropriate choice.

NOTE

If you change the swap space, the system will adjust the value to the closest swap space value appropriate for the file system.

When you have changed the necessary parameters, go to step 10.

10. Press [Return] to continue with the installation.

You should now see a menu similar to the menu shown in Figure 2-18. This menu is shown so you can verify the correct address for the destination device. If the information is correct, go to step 11. If any information is incorrect, enter [e] and [Return] to exit the installation procedure. To restart the installation process, turn your computer off and continue with step 4.

```
*****************************************************
        HP-UX INSTALLATION UTILITY -- INSTALL MENU
*****************************************************


                    DESTINATION DEVICE


            Major  Number              0
            Select Code               14
            Bus    Address            0
            Unit   Number             0
            Volume Number             0



    Choice         Description


        b          BEGIN Initialization and Installation
        e          EXIT Installation Process



    Please enter choice (b or e), hit [Return] >>
```

Figure 2-18. Installation Device Menu

11. Press ⎡b⎤ and ⎡Return⎤ to begin the initialization of the destination disc and the installation of HP-UX.

    The following message and prompt will appear at the bottom of your screen:

    ```
    WARNING !! Proceeding will DESTROY the contents of unit xxx, volume xxx
    of the Destination Device. Do you want to proceed? [y/n] >>
    ```

CAUTION

Do not switch off power to the computer or hard disc drive during disc initialization. Terminating the initialization process in this fashion may seriously corrupt the disc medium.

The **only** way to install AXE is to type in ⎡y⎤ and ⎡Return⎤. **If you think that any of the parameters you entered on previous menus are wrong, or if you do not wish to erase any information on the destination disc**, type ⎡n⎤ and ⎡Return⎤. Answering n will exit the installation procedure.

If you entered ⎡y⎤, disc initialization begins. The menu, as shown in Figure 2-19, informs you the destination disc is being initialized (/dev/hd and /dev/rhd both refer to your destination disc). The source drive will also be accessed during the initialization process. The media initialization process sets up your hard disc for normal use.

This process can take from four minutes to fifty minutes depending on the size of your disc. See Table 2-1 at the end of this chapter for approximate initialization times. In addition to initializing your hard disc, the installation process creates a file system and copies some important files from your installation tape to your hard disc. **The total time before you will need to interact with the installation process again will be between 30 minutes and 3 hours.**

NOTE

See Table 2-1 at the end of this chapter for approximate initialization times.

You will see a trace of the files being copied, similar to the display shown in Figure 2-19.

```
**************************************************
   HP-UX INSTALLATION UTILITY -- EXECUTION TRACE
**************************************************


Initializing:  /dev/rhd
This will take between fifteen minutes and three hours

Making file system on device:  /dev/hd
Mounting device:   /dev/hd
Making directory:  /dev
Making device file: /dev/console
Making device file: /dev/mem
Making device file: /dev/kmem
Making device file: /dev/null
Making device file: /dev/swap
Making device file: /dev/tty
Making directory:  /etc
Making directory:  /disc
Making directory:  /usr
Making directory:  /usr/bin
Copying file: /hp-ux
Copying file: /etc/copyinit
Copying file: /etc/sbtab
```

Figure 2-19. Installation Trace #1

After the trace shown in Figure 2-19, the trace will disappear, and the following two lines will appear:

```
Copying file: /etc/mkfs
Copying file: /etc/mediainit
```

AXE then automatically reboots (this takes about 2 minutes), loads more files; you will see the execution trace similar to Figure 2-20.

```
*****************************************************
    HP-UX INSTALLATION UTILITY -- EXECUTION TRACE
*****************************************************


Mounting device: /dev/src
Making directory: /bin
Making directory: /usr
Making directory: /usr/bin
Making directory: /etc
Making directory: /tmp
Making directory: /etc/filesets
Copying file: /disc/bin/cpio
Copying file: /disc/bin/mkdir
Copying file: /disc/bin/sh
Copying file: /disc/bin/pwd
Copying file: /disc/usr/bin/lifcp
Copying file: /disc/usr/bin/tcio
Copying file: /disc/etc/init2
Copying file: /disc/etc/update
Copying file: /disc/etc/sysrm
```

Figure 2-20. Installation Trace #2

After loading the tools, the screen will clear, and the following menu will appear on your screen:

```
****************************************************
    HP-UX INSTALLATION UTILITY -- EXECUTION TRACE
****************************************************


    setting up device files...
    reading contents file...
```

The program then loads all the required files and their file sets and displays a screen similar to the screen shown in Figure 2-21. The "XXXXXXX" refers to the fileset number or fileset name.

It will take from 30 minutes to one hour to load the mandatory file system.

```
****************************************************
      HP-UX INSTALLATION UTILITY -- EXECUTION TRACE
****************************************************



Loading files from "XXXXXXX"
    .
    .
    .
Loading: etc/init
    .
    .
    .
```

Figure 2-21. Execution Trace #3

NOTE

You now have the core system installed.

---

12. Load optional filesets or products.

    You will now see the menu shown in Figure 2-22. From this menu, either exit (if you want only the core system) or choose which optional partition(s) you want to load.

```
    ********************************************************
           HP-UX INSTALLATION UTILITY -- PARTITION MENU
    ********************************************************

    Choice          Description


    e               EXIT install process
    d               DISPLAY installation options for a new partition
    a               Process ALL partitions listed below


    1               MISC_UTILS
    2               SYS_TOOLS
    3               PROG_LANGS
    4               TEXT

    Please enter choice (letter or number), hit [Return] >>
```

Figure 2-22. Partition Menu

The options are:

- If you wish to load all partitions and filesets hit `a` and `Return`. After everything has been loaded, you will return to the menu shown in Figure 2-22, with only the e and d choices (described below).

- If you wish to load individual partitions, enter the partition number and hit `Return`. You will see a fileset menu similar to the menu in Figure 2-23. Go to step 13.

- If you wish to install another product, such as LAN, press `d` and `Return`.

   You will be prompted to insert the tape you wish to load. Insert the tape, and after the busy light remains off, press `Return`. You will now see a fileset menu similar to the menu in Figure 2-23. Go to step 13.

- If you wish to exit this menu, hit `e` and `Return`. You will see the screen shown in Figure 2-24. If this was the first time you saw the partition menu, you will have only the core (required) files loaded on the system.

13. Select your filesets.

   You can now choose to load all the filesets onto the hard disc, the individual filesets you want, or exit.

```
***********************************************************
      HP-UX INSTALLATION UTILITY -- FILESET  MENU
***********************************************************

Choice          Description


e               EXIT install process
d               DISPLAY installation options for a new fileset
a               Process ALL filesets listed below


1               partition_1
2               partition_2
3               partition_3
4               partition_4

Please enter choice (letter or number), hit [Return] >>
```

Figure 2-23. Fileset Menu

The time it takes to complete this process varies depending on whether you load one or all of the products.

- If you wish to install all the filesets on this menu, hit ⌑a⌑ and ⌑Return⌑.

- If you wish to install only certain filesets, enter the fileset number and hit ⌑Return⌑. You will be returned to this menu when the fileset is loaded.

- If you choose to "DISPLAY installation options", hit ⌑d⌑ and ⌑Return⌑. You will be returned to the menu in Figure 2-22. Continue with step 12.

- If you wish to exit this menu, hit ⌑e⌑ and ⌑Return⌑.

14. After you finish installing the mandatory operating system (step 11) and the optional pieces you want (steps 12 and 13) your screen will clear and the screen shown in Figure 2-24 will appear:

```
*****************************************************
    HP-UX INSTALLATION UTILITY -- EXECUTION TRACE
*****************************************************


unloading media...
When Busy light remains off, hit [Return] >>

cleaning up ...
```

Figure 2-24. Screen for Exiting Fileset or Partition Menu

The program will unload the tape for you. Hit [Return] when the light on the source drive remains off, and remove the tape. **Remember to store the installation tape in a safe place.**

15. The system will reboot.

   If your file system closed cleanly, a message indicating this appears. Otherwise, the *fsck(1M)* program runs automatically and cleans up your file system. This may cause your system to reboot. *fsck* is usually run when the *shutdown(1M)* command was not used to shut down the system (see "Shutting Down the System" in Chapter 10 for a discussion of *shutdown*), or when power failure occurs. See Chapter 9, "Checking Your File System" for a brief discussion of *fsck*.

16. The program, *reconfig*, will start up. You should go through some of the reconfig items now, especially the "Modify System Security" item. For a description of *reconfig*, read the subsection, "Reconfiguring Your System" in "After Installing AXE" in this chapter.

If you wish to exit *reconfig*, press the **Exit** softkey.

17. Follow the steps in the next section, "After Installing AXE".

After Installing AXE

NOTE

Now that your system is installed, you have the ability to modify and customize the system as described in the next section. If you have purchased software support services from Hewlett-Packard, you can make only limited changes to certain files without voiding your agreement. Consult your support plan or an HP System Engineer regarding intended changes.

Now that your AXE system has been installed, you should look through your documentation and perform the following tasks to protect your system:

1. reconfigure your system,

2. create a recovery system,

3. backup your system,

4. look through the documentation.

NOTE

Each time you wish to power down your system you must follow the procedures in Chapter 10, "Shutting Down your System". If you do not follow these procedures, you may corrupt your file system.

Reconfiguring Your System

After the installation program is finished, the program called *reconfig* will automatically begin. To choose an item from the *reconfig* screen, use the **Return** key until you highlight the item you wish, then press the **Select** softkey.

The *reconfig* program lets you upgrade and customize your system easily. The program lets you:

- add a new user,

  See the section called "Adding and Removing Users" in Chapter 10.

- delete a user,

  See the section called "Adding and Removing Users" in Chapter 10.

- add remote terminal support,

  See the section called "Adding a Remote Terminal" in Chapter 10.

- configure the line printer,

  See the section called "Setting Up and Removing a Printer" in Chapter 10.

- create a new AXE operating system (add optional drivers to the AXE kernel),

  You will see this menu item only if you loaded the ACONFIG fileset. See the section called "Creating a New Operating System" in Chapter 10.

- modify system security.

  See the description below.

Modify System Security

A secure system forces people to login to your computer. With security on, no one will be able to simply turn on the power to access or change your information.

To select this form, hit the [Return] key until the item "Modify System Security" is highlighted, then press the **Select** softkey.

Your AXE system is sent with security disabled, so you will see the following screen:

```
Please indicate below whether you wish to have full system
security enabled (i.e., users must login) or disabled:


                    >disabled
```

If you wish to enable system security, hit the **Next** softkey and the box will change to read:

```
>enabled
```

Press the **Done** softkey to cause the operating system to change: pressing **Main Menu** will return you to the main menu without implementing the security change.

When you exit the *reconfig* program, your system will change **run levels** and give you a login prompt. The four default logins are described below.

If you have System Security Enabled
If you request a secure system, the only way to gain access to AXE is to complete a login request; the system must know who you are before it will let you execute any programs.

A secure system has four default logins:

- "window"— when you log in you will get the *pam* shell inside a window.

    You must have windows installed before you log in as "window".

- "nowindow"— when you log in you will get the *pam* shell with no window.

- "root"— when you log in you will get the *Bourne shell* with no window.

    Be careful when you log in as "root". The "root" user is privileged. This allows the "root" user to execute critical system comands not accessible by other users, possibly leading to inadvertent damage to the AXE system.

- "guest"— when you log in you will get a *restricted* shell with no window.

    The "guest" login should be used by people who should not have access to the whole AXE system. Anyone using AXE regularly should have their own login.

On a newly installed system, none of the four default logins have passwords. If you want to completely secure your system, you must assign a password to "root", "window", and "nowindow". **Your system is not secure unless root has a password**. You don't need to assign a password to "guest" since its login shell is restricted. Follow the guidelines in Chapter 3, the section "How To Change Your Password", to assign passwords to these three logins.

NOTE

As shipped to you, the "root" user has no password. **You must give the "root" user a password to secure your system**.

If you have System Security Disabled

No security means the system does not need to identify you before you have access. When you turn on your computer, you will be in the *pam* shell with windows (if you have installed Windows/9000) or without windows (if you have not installed Windows/9000).

If you do not have a secure system, then each time you need to perform privileged commands (commands associated with the system administration duties in Chapters 9 and 10), you must become the "root" user by typing in:

    `su root` [Return]

See Chapter 10, "Becoming the Root User" for more information.

An Unattended System Console

One other protection item deserves mention: depending on the perceived need for security at your installation, use discretion about leaving a system console unattended while logged in as the **root** user (if you chose security in *reconfig*) as this defeats the password protection. The **root** user is privileged, and can execute **any** AXE command — a situation possibly hazardous to the integrity of your system.

Creating a Recovery System

A recovery system will allow you to boot up if your root disc is corrupted.

NOTE

It is very important that you create a recovery system. In case your root disc is corrupted, a recovery system may prevent you from having to re-install AXE, an possibly losing all the files you have created.

For information on creating a recovery system, read the section, "Creating a Recovery System", in Chapter 10.

Backing Up Your System

After you customize your system by adding new users, adding remote terminals and printers, and deciding on system security, you should make a backup of the entire system. System backup is explained in Chapter 9, "Backing Up and Restoring the File System".

Look through the Documentation

If you have never worked with the AXE (or the HP-UX) operating system, you will need to read Chapter 3, "Getting Started", in this manual before continuing.

NOTE

While you are learning to edit files, **do not** edit existing files. You could damage your system by editing existing files accidentally. Instead, create new files to modify and manipulate. See Chapter 6 for details on how to create new files.

This manual contains all the information on AXE most users will need. If this manual is not thorough enough, you should buy the *Series 300 System Administrator Manual*, available from Hewlett-Packard.

Each application program you purchase to run on your AXE system will come with its own manual, and each piece of hardware you purchase will come with its own manual. The *Peripheral Installation Guide* describes how to set up hardware purchased from Hewlett-Packard.

Installation Information

Table 2-1. Approximate Disc Initialization Times

DISC	SIZE	INITIALIZATION TIME
HP 7907A	20.5 fixed	9 minutes
HP 7908P	16.6 Mbytes	9 minutes
HP 7911P	28.1 Mbytes	4 minutes
HP 7912P/R	65.6 Mbytes	10 minutes
HP 7914P/R	132.1 Mbytes	14 minutes
HP7933H/7935H	404.5 Mbytes	49 minutes
HP 7941/7942A	24 Mbytes	7 minutes
HP 7945A/7946A	55.5 Mbytes	15 minutes
HP 9133D/9134D	16 Mbytes	19 minutes
HP 9133H/9134H	20 Mbytes	26 minutes
HP 9133L/9134L	44 Mbytes	48 minutes
HP 9153A/9154A	10 Mbytes	7 minutes

Notes

AXE User's Guide .

Table of Contents

3

Getting Started 3

Before you learn how to use AXE and run applications, you need to know some basics. This chapter will show you how to use the keyboard, login to AXE, and change your password (if you have a *secure* system).

Becoming Familiar With The Keyboard

The keyboard is used for entering and editing text. An application program may give you additional capabilities or redefine some operations. Be sure to check the application's documentation for any differences to standard keyboard configuration.

Entering Text

Most of the keys on the *itf*[1] keyboard are like those on a standard typewriter keyboard. You can type uppercase letters, lowercase letters, numbers, and symbols. Be sure to distinguish between the letter "l" and the number "1," and between the letter "O" and the number "0."
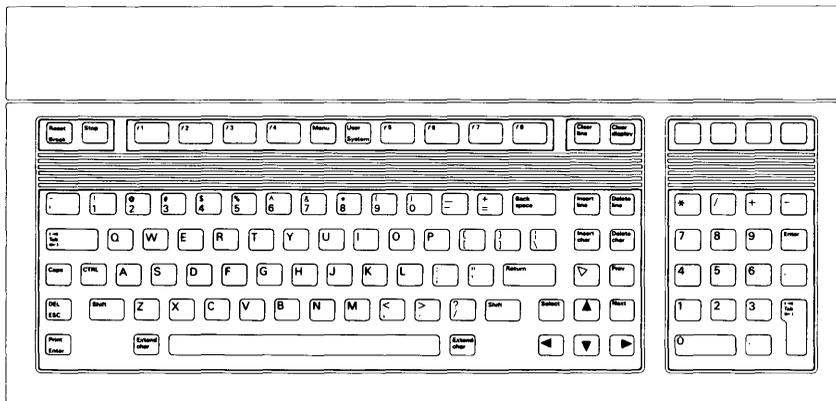
Figure 3-1. The ITF Keyboard

---

[1] Integrated Terminal Family.

The Numeric Keypad

On the right of the keyboard is the numeric keypad with digits 0 through 9, decimal, comma, enter key, and arithmetic symbols. If you are accustomed to an adding machine or calculator, the numeric keypad lets you enter numbers quickly and accurately. The effect is identical to using the corresponding keys on the main keyboard.
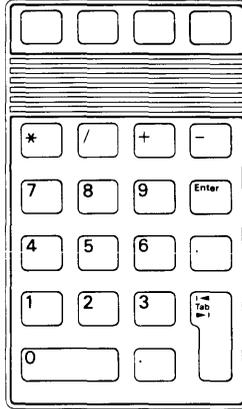
Figure 3-2. The Numeric Keypad

Special Typing Keys

The following keys are also similar to typewriter keys. They modify the character keys or move the cursor[2].

Key	Operation
Shift	Modifies the letter keys to produce uppercase letters; modifies other keys to produce the symbol (or command) on the upper half of the key.
Caps	Reverses lowercase and uppercase letters on the letter keys. Pressing Caps once causes the letter keys to produce uppercase letters without Shift, and to produce lowercase letters with Shift. Pressing Caps a second time returns the Shift key operation to normal.
Tab	Moves the cursor to the next tab stop.
Shift Tab	Moves the cursor to the previous tab stop.
Return	Terminates a line of text and moves the cursor to the left end of the next line.
Back space	Moves the cursor left one column and writes a space.
CTRL	Used in combination with other keys to produce special characters (discussed in "Using the System: PAM" chapter, "Prerequisites" section).
ESC	Used in combination with other letters to send escape sequences to the computer. Also used for termination of certain "vi editor" commands.
Break	Sends an interrupt signal to the computer.

The keys not mentioned in the above table are keys used in various applications and will be discussed in those application descriptions.

---

[2] The cursor is a visual position indicator which moves with characters entered on the keyboard or with cursor movement keys.

The following keys are used for line editing functions. When you enter a command or type text, you can use these keys to modify any typing mistakes. Note the keys will be different in applications such as the vi editor (Chapter 6).

Editing Operations

Key	Operation
►	Moves the cursor right.
◄	Moves the cursor left.
▲	Moves the cursor up.
▼	Moves the cursor down.
▶	Moves the cursor to the upper-left corner of the entire text.
Shift ▶	Moves the cursor to the lower-left corner of the entire text.
Insert line	Inserts a blank line above the cursor position. The cursor is moved to the blank line.
Delete line	Erases the current line.
Insert char	This key is used to insert a character or text. Press the Insert char and enter text to be inserted. Then press the Insert char key again to end the insert mode.
Delete char	Deletes the current character.
Clear line	Clears the current line from the cursor to the end of the line.
Clear display	Clears the screen from the cursor and down.
Prev	Moves the text information down one page.
Next	Moves the text information up one page.

Logging On To The Computer

Depending on whether your AXE system was configured with a secure or non-secure system (see Chapter 2, "After Installing AXE"), you may or may not have to go through the login procedure. If your system is configured to be a non-secure system, then you do not have to login, and you do not need to read the rest of this chapter. Your screen (after boot up) will display the PAM screen (see "Using the System: PAM," Chapter 4). If you have a secure system, you will need to go through the login procedure.

Chapter 2, "After Installing AXE," lists several user names with which you can login: `window`[2], `nowindow, root, guest`. These user names can be used if you have not followed the "Adding and Removing Users" section in Chapter 10. Refer to Chapter 2 for instructions on which user name to use.

How To Login

If you have a secure system, you will see something like the following on the screen:

`login`:

The steps for login are as follows:

1. Type your user name, and press ⌈Return⌋.
   The *user name* was set up in "Adding and Removing Users," Chapter 10. You will next be prompted to enter your password (if you required a password when you set up your user account):

   `Password`:

2. Type your password, and press ⌈Return⌋.
   If you are logging in as *root* as installed, you will not have a password; you need to get one as soon as possible. When you type the password, you will not see the characters you type on the screen (for security reasons).

   If the system accepts your login identifier and password, you may see some system messages, and then you will see the PAM screen (described in Chapter 4). If you do not see the PAM screen, your system configuration has been changed when you configured the system and you will see a system prompt. See "Running PAM" in Chapter 4 to bring up the PAM screen.

---

[2] If you have not configured your system for Windows, you should not use this user name for login. If you do, one of two things can happen: if you loaded the Window commands from the AWINDOW file set, the screen will flash and you will be prompted again for login; otherwise you will receive a message like "`/usr/lib/wm cannot be found`."

If your login identifier and password are not correctly typed, the system will give you a message like the following:

```
Login incorrect
login:
```

and prompt you again for login. You have to type your login identifier and password without making any mistakes.

How to Log Out

To log off a secure system, press:

CTRL d

(press the CTRL key and hold it down, then press the d key; similar to using the Shift key for capital letters). You will be logged off the secure system, and the screen will prompt for another login.

How To Change Your Password

Once you have successfully completed the login phase, you will see the PAM screen (unless you configured your system to show a system prompt; in this case, you can follow the same instructions below and ignore the references to PAM). You will be performing your operations in PAM; so it would be helpful to read the "Using the System: PAM" chapter before trying any operations. However, it is important to change your password to something only you know about, and you can follow the steps in this section to change your password without knowing about PAM.

Anything you type will appear in the second line from the top of the PAM screen (the *command line*). The responses from the computer will appear in the first line (*message line*). All passwords must be at least 7 characters of your choosing, containing at least one numeric or special character[3]. To change your password, do the following:

1. Type: `passwd`
   and press `Return`

You will be prompted by the following:

> `Changing password for` *your_user_name*
> `Old password:`

where *your_user_name* is your user name used in login.

2. Type the password currently used.
   You will not see the characters typed.

The system now prompts you for your new password:

> `New password:`

3. Type your new password, and press `Return`.
   The password must contain at least two alphabetic characters, one numeric, and seven characters long. You won't see the characters typed.

The system now wishes to double-check your password and prompts you with:

> `Re-enter new password:`

4. Type the new password again, and press `Return`.

---

3 Special characters: ! " # $ % & ' ( ) * + - . / : ; < > = ? @ [ ] \ ^ _ ' { } `

Something Went Wrong

If your new password does not have at least one numeric character (or it has less than two alphabetic characters), you will see the following error message:

```
The password must contain at least two alphabetic characters and
at least one numeric or special character.
New password:
```

You need to think of a password with the above constraints (sometimes just adding a number to the end of a password is sufficient).

If you don't type the same new password when asked: `Re-enter new password:`, then you may receive a message like:

```
They don't match; try again.
New password:
```

You now need to go through the sequence of typing the new password and confirming, until the new password and the re-entered password are exactly the same. Then be sure not to forget your password! If you do, you will have to login as *root* and enter:

passwd *user_name* `Return`

where *user_name* is the user name with the forgotten password. You will be prompted to enter a new password (and to verify it). The new password will be valid for the user name to login.

If you forget the *root* password, you will need to see Chapter 10, "Creating a Recovery System."

If you had trouble with PAM, then you should read the "Using the System: PAM" chapter before trying to change the password again.

Table of Contents

<div style="text-align: right; font-size: 2em; font-weight: bold">4</div>

Summary of PAM Operations

Working in a Folder

Operation	Action
Open a Folder	1. highlight folder 2. press: **Open**
Close a Folder	1. press: **Close**
Run an Application	1. highlight file 2. press: **Start**
View a File	1. highlight file 2. press: **View**
Reread a Folder	1. press: **Reread**
Print a File	1. highlight file 2. type: lp 3. press space bar 4. press: **Echo** 5. press: Return

Working with Folders and Files

Create a Folder	1. type: **makefolder** *file_name* Return
Rename a Folder or File	1. highlight file 2. press: **Rename** 3. type *file_name* 4. press: Return
Moving a Folder or File	1. highlight file 2. press: **Move** 3. type *destination* 4. press: Return
Copying Files	1. highlight file 2. press: **Copy** 3. type *new_file_name* 4. press: Return
Delete a Folder or File	1. highlight file 2. press: **Delete** 3. press: Return

Special Cases

Running PAM (when it is not automatically run)	1. type: **pam** Return
Leaving PAM (in secure system)	1. press: CTRL d

Summary Continued: PAM in Detail

Operation	Description	Example
Quoting	Keep PAM from processing special characters in a command.	`echo ''# < >''` The special characters # < > are not processed.

Pattern Matching	Can be used to search for files.
	   * matches any string
	   ? matches single character
	   [] matches any string in []
		`lp oct*`
		Matches files like: `oct1 oct2`
		`october` and `october7`
		`lp [ab]*`
		Matches `abc` and `bbc`

Redirecting Input/Output	Send output to file.
	Receive input from a file.
	   < read standard input
	   > write standard output to a file
	   >> append standard output to a file
	   ˆ write error output to a file
	   ˜ append error output to a file
	   # use window for standard input, output, and error output.
		`progA > fileB`
		Run `progA`; write output to `fileB`.

Pipes	Run programs in sequence.	`progA	progB` Use output from `progA` as input to `progB`.
Sequential Processing	Run programs in order.	`progA; progB;` Run `progA`. When it is finished then run `progB`.
Non-sequential Processing	Process files at the same time.	`progA& progB&` Run `progA` and `progB` at the same time.
Script Files	A file containing commands to be executed together.	1. Edit file to list commands in order on separate lines 2. Use `chmod` command to make the file executable. 3. Run the file as a program.

Summary Continued: PAM in Detail

Operation	Description	Example
chmod Command	Make a file executable.	**chmod 777 script_file_name** Make the file **script_file_name** executable, readable, and writable by anyone.
Autost File	Automatically run the **Autost** file when PAM starts if **Autost** exists in home folder.	Just like a script file.
source Command	Read and execute the commands in a script file and retain the effects of the commands.	**source file_name** Where **file_name** is a script file.
Environment File	A file (**.environ**) containing environment variables.	**HOME** – Homefolder **PATH** – Search path for programs script files and commands. **TERM** – Terminal type. **TZ** – Time zone. **ACTION** – Executes the program when an associated data file is entered as a command. **SCRSHELL** – Identifies the shell used when PAM runs a script file.
Networking	Set up a link with a remote system (if your system is set up for networking).	**netunam** *pathname (string)* *pathname* –remote system pathname *(string)* –login identifier **netunam** *pathname* (with no parameters) Disconnects connection to remote system.

Using the System: PAM

<div align="right">

4

</div>

Introducing PAM

PAM, the Personal Applications Manager, is a program that gives you a friendly way to start applications programs or operate on files without having to know much about HP-UX, the computer's operating system[1]. PAM works as an interpreter between you and the HP-UX operating system. Therefore, PAM lets you easily access the advantages of HP-UX without having to know all of the HP-UX commands.

The following topics are discussed in this chapter:

- prerequisites for PAM

- the PAM screen

- PAM's operations: operations in the *folder* to help you in using your applications programs, creating and using your own *folders* and *files*.

- detailed uses for PAM

- using PAM with your networking system (if you have one)

- messages that PAM generates

---

[1] AXE is a subset of HP-UX. For more details see "More Detailed Uses of AXE," Chapter 8.

Two Versions of PAM

There are two versions of PAM providing support for different systems. The **non-Windows** version supports standard terminals (or displays). The **Windows** version supports the high resolution displays running HP Windows/9000 (see Chapter 7). PAM starts the correct version for your system. For example, if your system is configured for Windows, the PAM window will be shown on your screen when you login (or boot up).

FOLDER AREA

COMMAND AREA

```
┌──── console ─────────────────────────────────────────────┐
│ Personal Applications Manager                          ↑ │
│ --------------------------------------------------------- │
│ Open Folder:  /                                          │
│                                                          │
│   Programs:   hp-ux                                      │
│                                                          │
│   Data Files: core      fa.h.asc    junk     popup    temp │
│                                                          │
│   Folders:    bin       dev         etc       lib    lost+found │
│               system     tmp         update.disc users   usr │
│                                                          │
│                                                          │
│                                                        ↓ │
│ ←─────────────────────────────────────────────────────→ │
└──────────────────────────────────────────────────────────┘
```

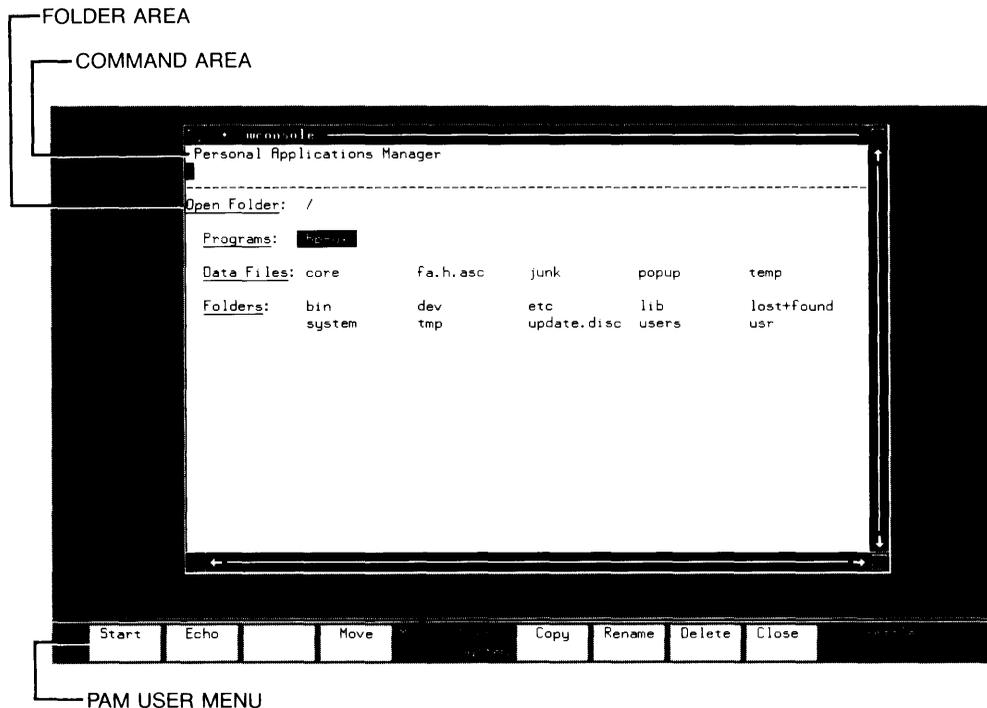| Start | Echo | | Move | | | Copy | Rename | Delete | Close | |

PAM USER MENU

Figure 4-1. The PAM screen shown in Windows version.

Some Prerequisites for PAM

Before you begin using the operations PAM has to offer, you need to know about function keys on the keyboard. This section discusses function key and *control* key use, and how to use PAM's *User menu*.

What are Function Keys?

A function key is a key on the keyboard performing an operation when pressed, unlike the "normal" keys which type a character on the screen. The purpose of a function key is to make your job easier. Instead of typing in a command and pressing $\boxed{\text{Return}}$, you simply press a function key; the computer does the rest.

How To Use Function Keys

Throughout this chapter, you will see many references to function keys. These function keys are primarily located on the upper row of keys on your keyboard; see Figure 4-2. The function keys are labeled $\boxed{\text{f1}}$, $\boxed{\text{f2}}$, $\boxed{\text{f3}}$, $\boxed{\text{f4}}$, $\boxed{\text{f5}}$, $\boxed{\text{f6}}$, $\boxed{\text{f7}}$, $\boxed{\text{f8}}$. Other function keys on the keyboard are $\boxed{\text{Stop}}$, $\boxed{\text{Menu}}$, and so forth. To use a function key, you only need to press the function key, and an associated function will be executed.
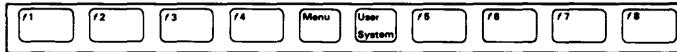

Figure 4-2. The Function Keys

When you begin using PAM, you will use the "PAM User Menu," which is shown at the bottom of Figure 4-1. This menu is present when you are using PAM. The boxes in the menu correspond with the function keys on the keyboard. For example in Figure 4-1, the first box is labeled **Start**. The first box corresponds with the first function key, $\boxed{\text{f1}}$. The second box, **Echo** corresponds with the second function key, $\boxed{\text{f2}}$, and so forth. You can note there are eight boxes in the PAM User Menu, and these boxes correspond to the eight numbered function keys in order.

How This Chapter Represents Function Keys

When you see something like "Press the **Start** function key," or, "Press **Start**," you are being asked to press the corresponding function key, in this case: $\boxed{\text{f1}}$.

The "Control" Key

Another important key is the "Control" key. This chapter uses the control key frequently, and it is important you know how to use the key. The "Control" key is represented by [CTRL]. In every case, you will see the control key followed by a letter or another key, for example: [CTRL][L]. In order to use the control key, you use the following procedure:

1. Press [CTRL] and hold the key down.

2. Then press the following key (for example, [L]). Both keys are pressed at the same time (the same as using the [Shift] key for capital letters).

The PAM User Menu

The PAM User Menu (see Figure 4-1 or 4-3) allows you to perform frequently used file operations with a single keystroke. To execute a command, press the corresponding function key. The PAM User Menu is summarized in Table 4-1.

Table 4-1. PAM User Menu and Function Key Summary

Function Key	Menu Label	Description
[f1] [2]	**Open**	Opens the highlighted folder.
	View	Displays the highlighted data file.
	Start	Executes the highlighted program.
	Reread	Updates the open folder information. (The open folder name must be highlighted.)
[f2]	**Echo**	Copies the highlighted file name to the command line.
[f3]	**>Folder**	Indicates arrow keys move file indicator. (Non-Windows version only)
	>Command	Indicates arrow keys move cursor. (Non-Windows version only)
[f4]	**Move**	Used to move the highlighted file.
[f5]	**Copy**	Used to copy the highlighted file.
[f6]	**Rename**	Used to rename the highlighted file.
[f7]	**Delete**	Used to delete the highlighted file.
[f8]	**Close**	Closes the open folder.

Function Keys on the Keyboard

Function Key	Menu Label	Description
[Menu]	**Menu**	Turns on and off the User Menu.
[Shift]-[System]	**User**	Displays the User Menu.
[System]	**System**	Displays a System Menu.

---

[2] The menu label and function of [f1] changes with the type of file being accessed.

Looking at the PAM Screen

The non-Windows version of the PAM screen shown in Figure 4-3 looks basically like the PAM Window in Figure 4-1. It consists of two main areas: the Command area and the Folder area. The Command area exists for entering commands and receiving messages. The Folder area contains all of your files and folders.
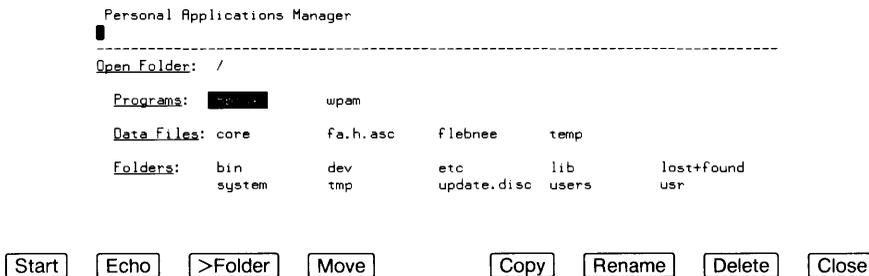
```
Personal Applications Manager
█
--------------------------------------------------------------------------------
Open Folder:   /

    Programs:  ▮▮▮▮       wpam

    Data Files: core      fa.h.asc     flebnee      temp

    Folders:    bin        dev          etc          lib          lost+found
                system     tmp          update.disc  users        usr
```

[Start]   [Echo]   [>Folder]   [Move]   [Copy]   [Rename]   [Delete]   [Close]

Figure 4-3. The PAM Screen (non-Windows version)

The PAM Screen Areas

As mentioned above, the Command area is used for entering commands and receiving messages. This area will be discussed later. The other area is the Folder area consists of three main sections: the Program listing, the Data file listing, and the Folder listing[3]. The Program listing shows all programs you can use, and the Data file listing shows all the data files you can use. The Folder listing shows all the folders you can enter from this folder (details on folders are described in the next section).

---

[3] There is also a "Devices" listing if /dev is the open folder.

What is a Folder?

A **folder** is PAM's name for a *directory* and contains files which can be programs, data files, or other folders (i.e. the contents of the Folder area). It's not necessary to have only one folder containing all your files (program or data); you can create several folders to store files, and organize the folders in an efficient way.

PAM's folders are organized in a *folder within a folder* method. There is a *root* folder (known as /) which contains (directly or indirectly) all the other folders. Within each folder can be more folders (see Figure 4-4).
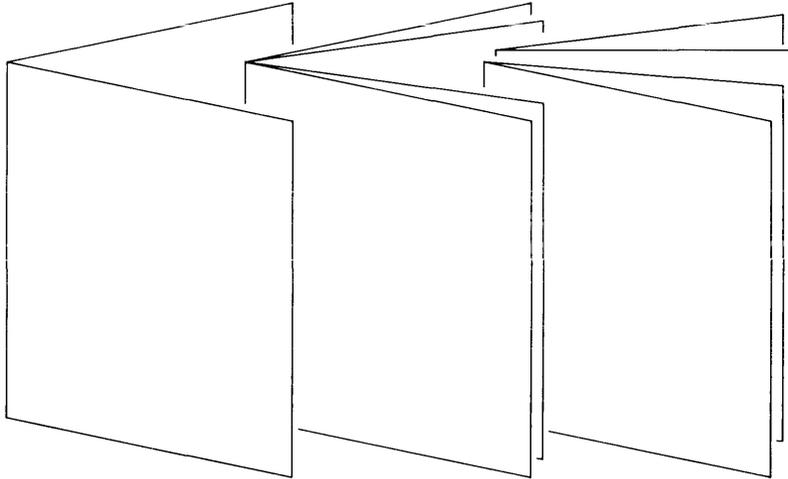
Figure 4-4. Folders within folders.

When you wish to get to a particular folder you must follow a *path*, going from one folder to another. This **path** consists of folder names separated by slashes (/), the leftmost folder enclosing the next folder, and so on. Therefore, each folder has a **path name**, for example `/users/hpux/demo/files` (where the first slash represents the root folder, and successive folders are `users`, `hpux`, `demo`, and `files` folders). As you create a folder, you will need to remember the path to get to that folder. You can get to a folder either by opening enclosing folders (as you enter each folder you look for the next folder in the path and open it; see "Opening a Folder") or by entering the full path name and directly opening the folder (see "Using the PAM Command Line").

In organizing your folders, Figure 4-5 may be a helpful pictorial reference. The top (or root) folder contains the next level folders (and so forth).
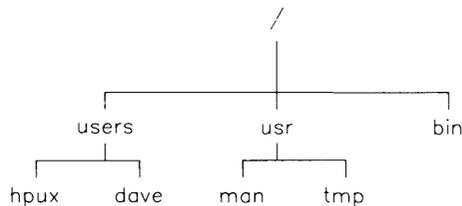
```
                        /
          ┌─────────────┼─────────────┐
        users          usr           bin
      ┌───┴───┐     ┌───┴───┐
    hpux    dave   man     tmp
```

Figure 4-5. Tree structure of folders.

The path name of the `hpux` folder on the lower left is: `/users/hpux`.

Folders Vs. Files

It is important to differentiate between folders and files. A folder is like a paper folder you use for organizing papers. The papers in the folder are files. Files contain information, either data or an executable program. So, when you see the word *file* used in this chapter, think of it as one of the names contained in the Folder area (either in the Program listing or Data file listing).

The Folder Area

The PAM screen contains a Folder area (see Figure 4-6) you can use for running programs, looking at the contents of a data file, or looking at other folders. If the folder contains more information than can be displayed at once in the folder area, PAM shows the statement **(More Files)** at the bottom of the folder area. To see the files not shown, press ⌑Next⌑, or if you are using the Windows version of PAM, move the pointer to **(More files)** and press the select button (you will need to read the Windows chapter to understand this terminology). Similarly, you can press ⌑Prev⌑ to see the previously displayed files. There is no limit to the number of files in a folder area.

```
-------------------------------------------------------------------------------
Open Folder:  /

  Programs:   ▓▓ ▓▓ ▓        wpam

  Data Files: core           fa.h.asc      flebnee       temp

  Folders:    bin            dev           etc           lib       lost+found
              system         tmp           update.disc   users     usr
```

Figure 4-6. The Folder Area

The File Indicator

The **file indicator** is a highlighted area which can be moved from item to item (see Figure 4-6). When the file indicator highlights an item, all applicable function keys and commands will operate on this item. For example, if you move the file indicator to highlight a file and press a function key, the function activated by the function key operates on the highlighted file. You may wonder why you use a *file indicator* to select a folder (because of the name). The *file indicator* is a generic name and is used to **select** rather than just to **indicate** a file *or* folder.

The terms "indicated file" and "highlighted file" are used interchangeably.

Moving the File Indicator in PAM

Certain keys perform special functions when PAM is active. For example, the ⌑Tab⌑ key moves the file indicator across a row of file names. The special PAM keys are summarized in the Table 4-2; all other keys keep their respective functions.

Table 4-2. Special PAM Key Summary

Key	Description
▲	Moves the file indicator up a column of file names.
▼	Moves the file indicator down a column of file names.
►	Moves the file indicator across a row of file names.
◄	Moves the file indicator back along a row of file names.
▼	Moves the file indicator to the first file in the open folder.
Shift ▼	Moves the file indicator to the last file in the open folder.
Tab	Moves the file indicator across a row of file names.
Shift Tab	Moves the file indicator back along a row of file names.
Next	Displays the next screen of file names.
Prev	Displays the previous screen of file names.
Return	Executes the command in the command line. If the command line is empty, then pressing Return is the same as pressing f1.
CTRL l	(letter "l") Rereads the disc and updates the open folder information.
CTRL d	Terminates PAM (see "Leaving PAM").

When the file indicator is on the top row of files in the folder area, and it is moved with the ▲ key, it will wrap to the bottom row of files in the **previous** column. If the file indicator is on the first column of the top row, then the file indicator moves to the bottom file of the last column when the ▲ key is used. The file indicator behaves similarly when on the bottom rows; it wraps to the top row of the **next column**.

Using The Mouse To Move The File Indicator
If you are using the Windows version of PAM, you can use the Mouse to move the file indicator instead of using the keyboard (reference "A New Way of Organizing Tasks: HP Windows/9000," Chapter 7).

To move the file indicator, move the *pointer* (reference "The Pointer" in the Windows chapter) with the Mouse until the pointer is over a file name. Figure 4-7 shows an example file `chcolor`. Press the select button (the left button on the Mouse), and the file indicator will move to highlight the file name you selected. Figure 4-8 shows the file indicator selecting the file.
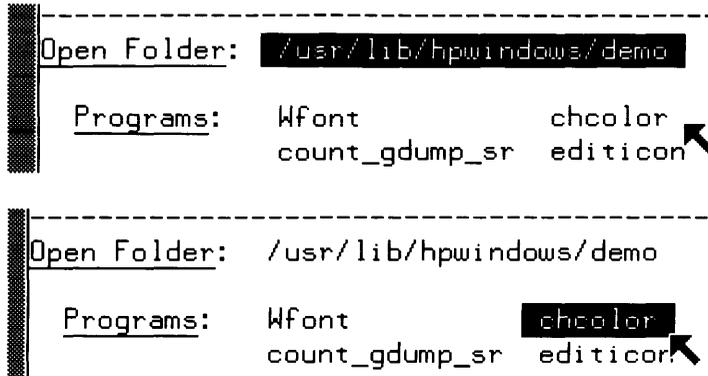
```
┌──────────────────────────────────────────
│Open Folder:  /usr/lib/hpwindows/demo
│
│   Programs:   Wfont          chcolor
│               count_gdump_sr  editicon
│
│
┌──────────────────────────────────────────
│Open Folder:  /usr/lib/hpwindows/demo
│
│   Programs:   Wfont          chcolor
│               count_gdump_sr  editicon
```

Figure 4-7, 4-8. Moving the File Indicator.

You can also use the select button to perform the same as the ⌗f1⌗ function key. For example, to open a folder you move the pointer to a folder name. Pressing the select button moves the file indicator to the folder name. Pressing the select button again will open the folder. (Opening a folder will be discussed in detail later).

PAM's Command Area

PAM's command area is the portion of the screen where you issue commands and receive messages (see Figure 4-9). The command area contains two lines. The first line is the message line and the second line is the command line.

```
Personal Applications Manager
▮
------------------------------------------------------------------------------
```

Figure 4-9. The Command Area

PAM uses the message line to display informational messages. These are simple messages indicating a problem exists. In some cases, the message contains suggestions about how to fix a problem or complete a task. For example, PAM prompts you when you copy a file. Through the message line, PAM tells you how to specify the destination of the *copy* command. A complete list of PAM messages and their meanings is shown in the "PAM Messages" section at the end of this chapter.

The Command Line

The command line allows you to enter commands directly from the keyboard. You can specify operations that involve files in folders other than the open folder and enter commands which require parameters.

What are Parameters?

A parameter is an item of information transferred to a program. For example, you could have a program which requires you to enter the date along with the command to run the program. You would need to "run the program and pass the date to the program." In the command line you would type the program name (given the program is executable) and the **parameter** (for example, the *date* parameter). When you see the word *parameter* mentioned in this chapter, it is referring to the item of information that follows a program name or command (for a program that requires a parameter).

Using the PAM Command Line

Entering commands into the command line allows you to perform operations not on the PAM User menu. A list of system commands is in Appendix A. You can also specify operations that involve files not displayed in the open folder.

To execute commands from the command line, type the command, and press ⌷Return⌷. When ⌷Return⌷ is pressed, the command in the command line is executed (if the command line is empty, then pressing ⌷Return⌷ is the same as pressing ⌷f1⌷). If you enter a command containing an error, an error message is displayed.

Editing The Command Line

The keystrokes in Table 4-3 can be used to correct errors in the command line. After correcting an error, you press ⟨Return⟩.

Table 4-3. Command Line Editing Keys

Keystroke	Function
⟨Shift⟩⟨◄⟩	Windows version only: moves the cursor one character position to the left.
⟨Shift⟩⟨►⟩	Windows version only: moves the cursor to the right one character position.
⟨◄⟩	Non-Windows version only: moves the cursor one character position to the left.
⟨►⟩	Non-Windows version only: moves the cursor to the right one character position.
⟨Shift⟩⟨▲⟩	Displays the previous command in command memory.
⟨Shift⟩⟨▼⟩	Displays the next command in command memory.
⟨Back space⟩	Moves the cursor one space to the left. The Windows version erases the current cursor character. The Non-Windows version does not erase the current cursor character.
⟨Clear line⟩	Clears all characters from the current cursor character to the right end of the line.
⟨Clear display⟩	Clears the command line and all lines following in command memory.
⟨Delete line⟩	Clears the command line.
⟨Delete char⟩	Deletes the current cursor character.
⟨Insert char⟩	Turns insert character mode on or off.

In the non-Windows version of PAM, the function key ⟨f3⟩ is used to switch the arrow key meaning. When ⟨f3⟩ shows the label >**Folder**, the arrow keys move the file indicator. When the label is >**Command**, the arrow keys move the cursor in the command line. To change settings for the arrow keys, simply press ⟨f3⟩ until you see the correct label.

The last 20 lines entered in the command line are kept in a portion of memory called **command memory**. Previous command lines can be displayed by pressing ⌈Shift⌉ along with the vertical arrow keys. For example, pressing ⌈Shift⌉⌈▲⌋ displays the previous command line. You can execute these previously entered commands by moving the command memory by one line, making any necessary modifications, and pressing ⌈Return⌋.

When using the command line, you can use a single period (.) to represent the path name of the open folder. Two adjacent periods (..) indicate the folder in which the open folder resides (the enclosing folder). For example, if you wish to execute a program in the enclosing folder, you can type ../*program_name* and press ⌈Return⌋ (where *program_name* is the name of the program in the **enclosing** folder). An alternative would be to close the current folder. The enclosing folder would become the open folder, and you can look for the program name in the folder area.

The command line can be used for executing commands that use parameters. Some commands require parameters, while other commands have optional parameters. The syntax shown for each command represents the different ways you can execute it. If the syntax shows no parameters, then parameters for the command are optional. Parameters **must** be separated with one or more spaces.

Many commands allow you to repeat either the first or second parameter several times to perform multiple operations. For example, the *copy* command allows you to enter the first parameter several times to identify the files you want to copy to the folder specified by the second parameter. To copy three files (`prodA prodB` and `prodC`) to the folder **/usr/execfiles**, you would type:

```
copy prodA prodB prodC /usr/execfiles
```

and press ⌈Return⌋.

The Echo Function Key

Pressing the **Echo** function key copies the highlighted file or folder name to the command line. You will find this a helpful tool when you execute commands in PAM. To save typing file names, you can move the file indicator to a desired file and press **Echo** . The file name is copied to the command line. You can then enter any necessary parameters and press ⌈Return⌋ to execute the command.

Using The System

In the following sections you will learn how to use PAM. In most applications, you can use a similar method of selecting files or folders for operations (for example, running a program or opening a folder). PAM has a simple way to select files using the file indicator. You can move the file indicator to a file using the arrow keys (or the Mouse in the Windows version). When the file name is highlighted, it means the file is selected. So, you only have to press the appropriate function key to perform a desired task (or press **Echo** to copy the file name to the command line).

Using the Non-Windows Version of PAM

When you execute programs or commands in PAM that require screen output, PAM will clear the screen and display the information. When you are through with a command (or when you quit a function) and wish to return to the PAM screen, you will be prompted by PAM, on the bottom line of the screen, to:

```
Press [Return] to continue
```

Press ⌐Return⌐ and the PAM screen will automatically appear on the screen.

Using the Windows Version of PAM

When you use the Windows version of PAM, you need to know the following information:

- First be familiar with HP Windows/9000 (see Chapter 7).

- When you run a program, use an editor, or other function that requires output to the screen, PAM creates an icon briefly for the function window. The icon then changes to a window when output is displayed on the screen. Both the brief icon and the window have the same name as the command or function. For example, when you use the vi editor, the name of the icon and window is vi. The window is created for the sole purpose of the function you executed. After the function ends, the window remains on the screen. The "echo" and "view" commands do not start with an icon.

  The function window will be removed from the screen when you run another function (PAM removes the window when a window for the next command or function is created). If you want the window to remain on the screen, you can use the "Save" option to save the window (see "The Save Option," in Chapter 7). So for most circumstances, you can leave the window on the screen, select the PAM window to continue operations, then any new functions that create windows will automatically remove the old function window.

- When a window is created to show output from a function as mentioned above, the PAM User Menu is taken off the screen; a new user menu is displayed if the function requires a user menu. When you select the PAM window after completing the function, the PAM User Menu will re-appear. Each window has its own user menu.

- You can use the Mouse (or other Windows device) to perform tasks easier than using the keyboard arrows. As mentioned earlier, you can use the Mouse to move the file indicator. When you have a folder with more information than will fit in a window, you will see **(More Files)** displayed at the bottom of the window. You can use the Mouse to select this field by moving the pointer to **(More Files)** and pressing the select button.

- At any time, you can use the pop-up menu to create a new window. This window will **not** be a PAM window (unless you specifically enter the `pam` command in that window; see "Running PAM"). When you select a non-PAM window, the PAM User Menu disappears.

- If you change the size of the PAM window, PAM will modify its display to fit the constraints of the window size. Generally, this means making the window smaller. PAM displays as much as it can, then displays **(More Files)**.

Working in a Folder

Opening a Folder

The names of folders accessible from the open folder are listed in the Folder area of the PAM screen; see Figure 4-6.

1. Move the file indicator to highlight a desired folder.
   (If there are more folders than PAM can show on the screen, press $\boxed{\text{Next}}$ and $\boxed{\text{Prev}}$ to see the next and previous pages of folder contents.)

2. Press: **Open**.
   PAM opens the folder and updates the screen contents.

Alternative Ways to Open a Folder

- If you are using the Windows version of PAM, move the pointer with the Mouse to the desired folder and press the select button. The folder name is highlighted. Press the select button again (or **Open** or $\boxed{\text{Return}}$) to open the selected folder.

- Move the file indicator to a desired folder name and press the **Echo** function key; the folder name is copied to the command line. Press $\boxed{\text{Return}}$ to open the folder.

- To open your home folder, type: **cd** on the command line. If you press $\boxed{\text{Return}}$, your *home folder* is opened (your **home** folder is defined in the **.environ** file to be discussed later); if there is no home folder defined, the root (/) folder is opened.

- To open any folder in your system, type: *folder_name* on the command line (where *folder_name* is the name of a folder), and press $\boxed{\text{Return}}$. If *folder_name* is listed in the open folder, *folder_name* is opened. *Folder_name* can also be a path name to a folder not listed in the open folder. An example folder name in this case could be: **/usr/lib/hpwindows/demo** where the first slash (/) represents the root folder, and each sub-folder is separated by a slash.

Closing a Folder

Press the **Close** function key.
The open folder is closed and displays its outer folder (the folder that contains it) as the open folder.

If the open folder is the root folder (/), then the root folder is redisplayed (it cannot be closed since it has no enclosing folder).

Alternate Way to Close a Folder

- Pressing **Close** is equivalent to entering `close` in the command line and pressing ⎡Return⎤.

How to Run a Program

Programs available in the open folder are shown in the Program listing of the folder area; see Figure 4-3.

1. Move the file indicator to a desired file (highlighting the file name).

2. Press ⎡Return⎤ (with the command line empty) or press the **Start** function key. (The **Start** function key label appears when a program file is highlighted.)

Alternative Ways to Run a Program

- If you are using the Windows version of PAM, move the pointer (with the mouse or the ⎡CTRL⎤ and arrow keys)[4] to the program and press the select button (or ⎡Select⎤ on the keyboard) to move the file indicator to that file. Press the select button again to start the program.

- Type the file name into the command line and press ⎡Return⎤. You can also use the **Echo** function key to copy the highlighted file name into the command line and then press ⎡Return⎤.

---

[4] See Chapter 7, sections "The Pointer" and "Using the Mouse".

Looking at the Contents of a File

The *view* command should be used to display data files, text files, or script files (see "What Is a Script File?"). Program files (that are not script files) and other files that do not contain text should **not** be displayed with *view*. If the file accessed does not contain readable text, the data may be interpreted as control characters and other non-displayable characters. The **View** function key can be used to display the contents of any file (unless it is read protected; see "The chmod Command").

1. Move the file indicator to highlight the file you wish to view.

2. Press: **View**.
   If you are using the Windows version, PAM will create a window and display the contents of the file you highlighted one page at a time. Otherwise the screen will clear and the file will be shown.

3. To see the next page, press: **More**, which now appears in the user menu. The space bar has the same function as **More** when viewing a file.

4. To return to the open folder and stop viewing a file, press: **Quit**.
   If you are using the Windows version, PAM destroys the *view* window; in the non-Windows version, the PAM screen is immediately redisplayed after pressing **Quit**.

Alternative Ways to Use the View Command

- Type: `view` *file_name*
  in the command line, where *file_name* is the name of the file you wish to view; press ⌈Return⌋. You can specify a path name to a file not in the open folder, or you can use the **Echo** function key to copy the file name from the open folder.

- Type the name of the file in the command line (or use **Echo**), and ⌈Return⌋.

- Move the file indicator to a data file, and press ⌈Return⌋ (the command line **must** be empty).

- Use a pointer device (a Mouse, for example) to move the pointer to a file you wish to view. Press the select button to highlight the file name. Press the select button again to view the file.

Rereading a Folder

Generally, the PAM information is updated to show all files and folders whenever a change is made. Sometimes you may run a program to create a file and the PAM information does not get updated. The **Reread** function key can be used to update and show any changes. **Reread** is displayed on the PAM User Menu **only when the open folder is highlighted**. You can execute this command whenever you are unsure if an operation has caused a change to the contents of the open folder.

Press: **Reread**

Alternate Way to Reread a Folder

- Type: `reread` in the command line and press Return.

- Type: CTRL-i
  (The letter "l")

How to Print a File

To send a file to the *default* printer (as designated by the system administrator):

1. Move the file indicator to a desired file (highlighting the file name).

2. Type: `lp`
   followed by a space.

3. Press: **Echo**
   The name of the file you want printed is copied to the command line.

4. Press: Return

Go to the printer and get your copy of the file.

Alternative Way to Print a File

- Type: `lp` *file_name* Return, where *file_name* is the name of the file you want printed (*file_name* can have a path name).

Using Other Printers

If you have more printers to use, you may wish to use a printer other than the default printer. The system administrator can find a listing of these printers in the */usr/spool/lp/member* folder. It is helpful to make a list of the printers.

Once you know the names of the printers from the */usr/spool/lp/member* folder, you can use the following command:

    lp -d*printer_name* [Return]

where *printer_name* is the name of the printer listed in the */usr/spool/lp/member* folder. You can also type in lp -d, then move the file indicator to the file you want printed, and press **Echo**. (Do not put a space between -d and the *printer_name*).

Something Went Wrong

If you received an error message when you tried to print a file, you may have to see "Setting Up Your System to Print Files," Chapter 10. If the computer does not have any information on the printers, it cannot use the printers.

Working with Folders and Files

Creating a Folder

1. Type: `makefolder` *folder_name*
   on the command line, where *folder_name* is the name of the folder you wish to create.

2. Press: ⌈Return⌉
   to create the new folder. The folder is empty and ready for you to use.

Alternative Ways to Create a Folder

- If *folder_name* is a path name, the folder will be created in the folder specified by the path name. All folder names along the path must already exist. Only the final folder name will be created. If the folder is a simple name (without slashes) the new folder is created in the open folder.

Duplicate folder, or file, names are not allowed in the same folder. Folder names are limited to 14 characters and should not include any special characters (such as * [ ] < > - & ; | and control characters). If you have any special characters in the file name, you must use the file indicator to select the file; the command line will interpret the special characters. You can create more than one folder with the `makefolder` command by separating the folder names with a space.

Creating Files

There is no specific command to create a file. When output is redirected with the > or ^ symbols (the details of these symbols are discussed later in "Redirecting Input an Output") to a file that does not exist, the system determines that the file does not exist and creates it. Many application programs also create files automatically.

Files for storing text are normally created with a text editor, such as *vi*. An editor has its own commands allowing you to create files, and perform editing functions such as adding or removing text. To find more about editors, see the "vi Editor" chapter.

Files you create with an editor appear as data files in the PAM screen. These files can be moved to other folders, copied, and deleted.

If you wish to create a simple data file in a non-Windows version of PAM, there is a quick way to do this without entering the editors (you must, however, use the editors to change any information in this file). Type in the command line:

```
cat > file_name
```

where *file_name* is the name of a new file. Press ⌐Return¬, and the screen will clear; you can begin typing your data (including carriage returns). To stop entering the data into *file_name*, press ⌐CTRL¬⌐d¬. You will be prompted to press ⌐Return¬ to continue. Pressing ⌐Return¬ will bring back the PAM screen.

For the Windows version of PAM, use the same command. An icon will appear. You must, however, change the icon to a window (and select it) in order to type into the *cat* window; see Chapter 7, "Icon Operations." Type in the text, then ⌐CTRL¬⌐d¬ as above to end the *cat* command.

Renaming a Folder or File

The **Rename** function key can be used to change the name of a file or folder.

1. Move the file indicator to highlight the file or folder you wish to rename.

2. Press: **Rename**
   The message line will prompt you to enter the new name:
   ```
   Now complete the rename with 'to file_name'.
   to
   ```

3. Type the new file or folder name and press ⌐Return¬.

Alternatives For Renaming a Folder or File

The file or folder to be renamed is the first parameter in the `rename` command. If a second parameter is included, it is used as the new name. Otherwise, you are prompted to enter the new name. If the file or folder to be renamed is not in the open folder, then a path name can be used to identify it. The new name entered should include a similar path name.

- Type: `rename` *filename*
  in the command line and press ⌐Return¬, where *filename* is the name of a file. You will be prompted as above to type in the new file or folder name. Type in the new name and ⌐Return¬.

- Type: `rename` *file_name1 file_name2*
  into the command line and press ⌐Return¬. *file_name1* is the name of the old file or folder; *file_name2* is the new name of the file or folder.

Moving a Folder or File

NOTE

Using an existing file as the second or last parameter of a move command causes its contents to be overwritten (if write permission exists on the file) with the file being moved.

The **Move** function key can be used to move a file stored in one folder to another folder. **Move** can also be used to rename a folder or file.

1. Move the file indicator to the file or folder you wish to move.
   The file name should be highlighted.

2. Press the **Move** function key.

3. The command line prompts you to type the destination file or folder name. Type the destination file name (be sure to include any necessary path names).

4. Press: [Return]
   to complete the move function. The file or folder is now moved to its destination.

Alternative Ways to Move a Folder or File

- Type the full command on the command line:
     move *filename destination_filename*
  where *filename* is the name of the file or folder to be moved, and *destination_filename* is the name of the destination file or folder. Press [Return].

It is necessary to use a path name for the file name or the folder name if the file or folder is not stored in the open folder. If you specify two file names, the command moves the first file to the second file (full path names for the files can be used).

Copying Files

1. Move the file indicator to the file you wish to copy. The name will be highlighted.

2. Press the **Copy** function key to copy the file.
   The message line will prompt you to enter the name of the file to copy:
   Now complete the copy with 'to *file name*'.
     to

3. Type the name of the file which will be the copy.

4. Press Return to complete the copy.

Alternative Ways to Copy a File

- You can type the entire copy command into the command line and press Return. The following commands show the different way the copy command can be used:

   copy *file_name1 file_name2*
   copy*file_name folder_name*
   copy*file_name1 file_name2 file_name3 ... folder_name*

If you enter one parameter with the copy command, the copy operation is started and you are prompted to complete the operation with the to command.

When two file names are used as parameters, the second file name is the destination file; it will contain the copy. A path name can be used to specify the file is to be copied to a different folder. If the destination file already exists in the specified folder, then the copy operation overwrites the file with the new name (unless the destination file is write protected).

If the last parameter in the copy command is a folder, then the specified files are copied to it. The copies have the same names as the original files. The last parameter specifies the folder in which the copies of the files are placed.

Deleting a Folder or File

The file you delete can be a folder or file in the open folder. You use a path name if you need to delete files or folders contained in other folders. You can delete several files or folders on the same command line by separating the file names by a blank.

Be careful when using the *delete* command. It can be used to delete any file or folder in the file system, with the following exceptions:

- Files or folders stored on a disc that is write-protected.

- Files or folders that do not have write permission (see "The chmod Command" in "What is a Script?" section).

- Files or folders whose outer folder does not have write permission.

- Files or folders that are currently being accessed or viewed (with the *view* command).

- The open folder.

- Folders that are not empty. All files or folders stored in a folder must be deleted before the folder itself can be deleted.

- The outermost folder.

NOTE

Do not attempt to delete files or folders created for use by the system (for example, **/dev**). It may be possible to delete files and folders that are necessary to the functioning of the computer. In general, you have to be *superuser* (an HP-UX mode for access to many operations not available to the general user) in order to do any great damage.

---

1. Move the file indicator to the file or folder you wish to delete. The file or folder name should be highlighted.

2. Press: **Delete**.

3. `delete filename` will appear on the command line to make sure you wish to delete the file or folder. To delete the file or folder, press Return. If you do not wish to delete the file or folder, then use Back space to erase the `delete` command from the command line.

   a. If you wish to delete more files, move the file indicator to another file or folder, and press **Echo** to copy the file name to the command line. Be sure to not press **Delete** again or PAM will write `delete filename` on the same command line. If this happens, PAM will look for a file named "`delete`" and write an error message when it can't find the file.

Alternative Ways to Delete a Folder or File

- Type: `delete` *filename*
  where *filename* is the file or folder name you wish to delete. Press Return to delete the folder or file.

If a folder appears empty in the PAM screen, but a message is displayed telling you that it is not empty (when you try to delete it), it probably contains a hidden file or hidden folder (a file that has a name beginning with "."). The folder cannot be deleted until all the files and folders it contains are deleted (with the exception of the "." and ".." files created by the system); the user does not need to delete the "." and ".." files created by the system from a folder in order to delete the folder. To list the complete contents of any folder and obtain the names of any files or folders that are hidden, type:

`ls -a` Return

in the command line. After deleting these files or folders, the folder they were stored in can be deleted.

Special Cases

Running PAM

The AXE default configuration is such that PAM will appear on your screen automatically. This configuration can be changed to not bring up PAM automatically. If this is the case, you will probably see a system prompt (usually a $). If you see the system prompt, you need to execute this command to enter PAM:

   pam [Return]

This will bring up a PAM screen.

Leaving PAM

If you have an AXE secure system (i.e. you had to login to the system), you will need to log out or leave PAM when you are finished with a session. To leave PAM, type:

   [CTRL]-[d]

Either command will log you off automatically. There may be the case where you entered PAM from another configuration (as mentioned above). If this is the case, you will see the system prompt again.

If you have a non-secure system (PAM appears automatically after boot-up), then typing [CTRL]-[d] will clear the screen, stop all programs you have running on PAM, and start a new PAM screen. If you have a program running on PAM, it would be a good idea to **not** press [CTRL]-[d] unless you are sure you wish to stop **all** processes.

There are also operator interfaces other than PAM (see "Other Shells," in Chapter 8). To access these shells from a PAM based configuration, you will execute a command which creates the operator interface out of PAM. This means if you are in a PAM window, a new window will be created in which you can execute commands in another operator interface. When you wish to leave the other operator interface, you would press [CTRL]-[D] and you would be back in PAM.

The operator interfaces available (if you have prior knowledge of these *shells*) are "C" shell, Bourne shell, and Restricted Bourne shell. The commands you need to execute are:

"C" Shell	/bin/csh (the SYS_TOOLS file set must be loaded first)
Bourne Shell	/bin/sh
Restricted Bourne Shell	/bin/rsh

Learning PAM in Greater Detail

Command Line Quoting

To prevent PAM from processing various special characters (characters such as # and > which have a special meaning to PAM), you can enclose those characters in quotation marks. PAM recognizes the following quotation marks: " (double quote) and ' (single quote).

When a group of one or more characters are enclosed within a set of either single- or double-quote marks, PAM does not interpret them as special characters. You can also use \ (backslash) to quote a **single** character. The character immediately following the backslash is not interpreted by PAM as a special character.

Examples

These examples use the echo command. If the special characters were not enclosed in quotes, PAM would think you were trying to *redirect* (see "Redirecting Input and Output") the output of the echo command. Either two double-quote marks or two single-quote marks can be used. But you can not use a single- or a double-quote mark together.

```
echo "some special characters: # < >"
echo 'some more special characters:  & ; '
echo here is a special character \;
```

Quotes can also be quoted, but they must be enclosed within a pair of different quote marks. That is, one or more single quotes can be enclosed within a pair of double quotes, and one or more double quotes can be enclosed within a pair of single quotes. For example:

```
echo 'here are some double quotes " " '
echo "here are some single quotes ' ' "
```

Command Line Pattern Matching

When a command is entered from the command line, each command word (a parameter, for example) is scanned for the characters *, ?, and [. If one of these characters appears, then the word is regarded as a *pattern*. The word is replaced with alphabetically sorted file names that match the pattern. If no file name is found to match the pattern, the word is left unchanged. Here are some examples:

- If you know of a program that begins with the letters *oct* but you can't remember the rest of the file name, you can type oct* in the command line. PAM reads the word oct* and sees the * character. PAM then scans the list of files looking for any files which begin with oct. The following file names match the oct* pattern: october oct1 oct23 or oct28.1985.
  If a pattern is used to specify a command (for example, if you forgot the entire command), PAM will only match **one** name. If there is more than one match for a command, you will see an error message.

- You could organize your files like oct1, oct2, oct3 (and so forth). If you wanted to print these files, you could use a print command (for example, lp) in the following way: lp oct?.
  PAM would recognize ? as a pattern character, and send all files beginning with oct and ending in any single character.

The Table 4-4 describes the command line pattern matching:

Table 4-4. Command Line Pattern Matching

*	Matches any string, including the null string.
?	Matches any single character.
[...]	Matches any one of the enclosed characters. A pair of characters separated by - matches any character exactly between the pair, including those characters. If you place a ! inside the left bracket, PAM will **not** match the characters in the brackets (in other words it will match every pattern **except** the pattern in the brackets).

Redirecting Input and Output

Redirecting input and output is a convenient way of selecting what files or devices a program uses. The output of a program normally displayed on the screen can be sent to the active printer or to a file. Redirection does not affect the functioning of the program because the destination of output from the program is changed at the **system** level.

Redirecting input is not used as frequently as redirecting output because the keyboard is usually the default input (that is, input to a program is typed by you). A file containing data can be used for input to a program. To let PAM know where the input comes from, or where the output should go, you include special symbols in the command line to indicate the input or output redirection.

Every program that is run has three data *paths* associated with it: standard input, standard output, and error output. Programs use these data paths to interact with you. For example, if you are using the window version of PAM, standard output and error output are directed to the window in which a program is run. If this window is the selected window, the keyboard can be used for the standard input of the program.

The symbols for redirecting input and output allow you to change a specific data path of a program while leaving its other data paths unchanged. For example, you can specify a different device for standard output. Normally, the output would be sent to the screen. You can redirect the standard output, for example, to a file if you wish to store the output.

An alternative for redirecting input and output when using Windows is designating a window for program execution. This window is then used for the standard input, standard output, and error output of the program. A window, with a name you provide, is created by PAM when a symbol is included in the command line that identifies the window name to use for the program. Note that while PAM always creates a window for a program or command, this example would create a window with the name you provide.

How to Redirect Input and Output

Symbols to redirect the input or output of a program or to specify a window for it to run in are entered in the command line when the program is started. When ⌜Return⌝ is pressed, the program begins executing with the data paths specified by the redirection symbols. To specify redirection of input or output for a program, each file or window name is preceded by a redirection symbol, for example:

    programA < file_name
    programB > file_name
    programC # window_name

Spaces between the redirection symbols and the files or window names are optional. The symbol identifies the name that follows it as a file for input or output or the name of a window. The redirection symbols are listed in Table 4-5:

Table 4-5. Redirection Symbols

Symbol	Function	Example
<	Read **standard input** from an existing file.	`program1 <input.data`
>	Write **standard output** to a file.	`program2 >output.data`
>>	Append **standard output** to an existing file.	`sample.prog >>output.data`
^	Write **error output** to a file.	`ABC ^error.listing`
^^	Append **error output** to an existing file.	`pgm.tst ^^error_log`
#	Use the specified **window** for **standard input, standard output, and error output.**	`newprog #test`

NOTE

Information in files or windows will be lost when certain redirection symbols are used. If output from a program is directed to an existing file with the > or ^ symbols, the file will be emptied and overwritten when the program starts.

Be careful not to use the same file for standard input and standard output or for standard input and error output. When input and output operations access the same file, the results are unpredictable.

If a file you specify with a redirection symbol is not in the open folder, you should use a path name to identify it. The following actions are taken when the system does not locate files named with the redirection symbols:

- If a file specified for input with the < symbol is not located, an error message is displayed.

- If a file specified for output with the > or ^ symbols is not located, it is created and used for program output.

- If a file specified for appending output to with the >> or ^^ symbols is not located, it is created and used for program output.

Examples

The following examples show how the data paths of programs, commands, or utilities can be modified with the redirection symbols.

```
prog1 ^errlist
```

Runs the program *prog1* and sends errors to the file *errlist*.

```
CHItest <data1
```

Runs the program *CHItest* using the file *data1* as input.

```
ABC >data1 ^err1
```

Runs the program *ABC* using the file *data1* for standard output. The file *err1* is used for error output.

```
date >>syslog
```

Adds the current time and date to the end of the file *syslog*.

```
newprog #test
```

Runs the program *newprog* in a window named *test*.

```
view doc1 #manual
```

Displays the file *doc1* in a window named *manual*.

What is a Pipe?

```
program_a  |  program_b
```

Two or more programs can be connected so the output of one program is used as the input of another program. The data path that joins the programs is called a **pipe**. In the above example, the output from *program_a* is *piped* as input to *program_b*. Pipes allow you to redirect program input and output without the use of temporary files.

When programs are connected with pipes, the operating system coordinates the input and output between the programs. The pipes only transfer data in one direction, from the standard output of one program to the standard input of another program.

How to Connect Programs With Pipes

The vertical bar (|) is the "pipe" symbol. Parameters for the program are listed after the program name, as usual, but before the | symbol. Spacing between the program names and vertical bars is optional. The syntax used for connecting programs with pipes is as follows:

program_a | *program_b* | *program_c...*

Pipes operate on or transform data by separate programs in stages. For example, *program_a* could have input that you type from the keyboard. This data would be passed by the first pipe to *program_b* where it would be checked for validity, and processed. The processed data could then be passed by the second pipe to *program_c* for formatting into a report, and so on.

The redirection symbols described in the "Redirecting Input and Output" section can be used for programs connected with pipes. However, only the data paths not connected with pipes can be changed. If you specify a change to a data path being used with a pipe, then an error occurs. The following changes are permitted:

- The standard input of the first program using a pipe can be redirected with the < symbol.

- The standard output of the last program using a pipe can be redirected by using the > symbol or appended to an existing file with the >> symbol.

- The error output for any program using a pipe can be redirected with the ^ symbol or appended to an existing file with ^^.

Examples

The following commands show how programs can be connected with pipes and how additional changes can be made to data paths with redirection symbols. These pipes are typed into the command line. When the command is complete, you press [Return].

```
test_prog1 | /usr/output_prog
```

Takes the standard output from *test_prog1* and uses it as standard input to */usr/output_prog*.

```
program.A <data.A ^errors.A | program.B ^errors.B
```

Connects the programs *program.A* and *program.B* with a pipe and makes additional changes to the standard input and error output paths. For *program.A*, the file **data.A** is used as standard input and **errors.A** is used for error output. The file **errors.B** is used for error output from *program.B*.

```
get_it | check_it | process_it | format_it > store_file
```

Runs four programs connected with pipes and puts the output of the fourth program in *store_file*.

Sequential Processing

When a program begins, it normally starts executing immediately. New programs can be run whether or not the last program has finished executing (*multitasking*, see "Multitasking" in Chapter 7). In some cases, it is useful to prevent additional programs from being started until a specific program has completed. This is called **sequential processing**, or processing files in order. When a program is run with sequential processing, additional programs or commands cannot be entered in PAM until the specific program has finished executing. Sequential processing can be specified for any file or command, although it is normally used only for programs.

How to Process Files Sequentially

Sequential processing can be used for commands you enter in the command line. Placing a semicolon (;) after the last character in a command tells PAM to process this command before going to the next command. For example, to run the program *backup1* with sequential processing, use the following command:

```
backup1 ;
```

If parameters are required by the program, they are entered as usual. The semicolon is placed after the last parameter or redirection symbol, for example:

```
test_program 4 5 >test_output ;
```

While a program is running as a sequential process, there is no PAM response to keyboard activity until after the program has completed. You then receive output only in the command line after the program completes executing.

Programs already in progress when a program with sequential processing is executed continue to run as usual. While a program is running as a sequential process, you have the option of waiting for the program to finish or if you are using the window version of PAM, using applications already running in other windows (by selecting the other windows).

Several programs can be run sequentially using the following syntax:

`programA; programB; programC; ...`

After the first program is run and completed, the second program begins. After that program ends, the next program begins, and so on. Using Windows, all programs run sequentially this way are executed in the **same** window. The window has the name of the first program.

Examples
The following commands specify sequential processing for programs.

`cleanup_prog ;`

> Runs the program *cleanup_prog* as a sequential process.

`/usr/otherapps/backup1 #test_window ;`

> Runs the program *backup1* (in the `/usr/otherapps` folder) as a sequential process in a window called *test_window* (for the window version of PAM).

`text_formatter execfiles/papers/Book1 ;`

> Runs the program *text_formatter* as a sequential process. The data file *execfiles/papers/Book1* is a parameter for this program.

`test1_diag ; test2_diag;`

> Runs the program *test1_diag*, waits for it to finish, and then runs *test2_diag*.

Nonsequential Processing

Programs can be run nonsequentially (that is, each program runs without waiting for the previous program to complete). Following the program name with **&** specifies nonsequential processing. For example:

```
program1& program2& program3& ...
```

For the Windows version of PAM, the **&** is optional (that is, the default processing of programs is nonsequential) to run a single program nonsequentially. For the non-Windows version, sequential processing is the default (adding ';'). Therefore, if you are in the non-Windows version of PAM and you want to run several programs at the same time, you need to use the **&** nonsequential syntax.

NOTE

For the non-Windows version of PAM: if the output is **not** redirected, running a program non-sequentially may cause PAM display problems. You could get output from several programs on the screen at the same time. Also, you need to be aware that you cannot use the keyboard as the default input because there may be several programs asking for input at the same time. In this case it is wise to redirect input to programs from data files.

What is a Script File?

As you become familiar with PAM, you will be entering commands in the command line frequently. There may be times when you need to use the same sequence of commands over and over. It would be nice to just have one command to do this and save you so much typing. A **script** file is a file containing commands you frequently use. By placing the commands in a script file, you can execute the commands with one command.

Script files contain commands and can be executed like a program. By creating a script file, you can design commands for your own needs. When the name of the script file is entered in the PAM command line, the commands in the file are executed as if you entered each one individually. Any command that can be entered in the command line can be placed in a script file. You can even use the names of other script files in a script file to act as subprograms or "subscripts."

Depending on the commands you include in a script file, command output may or may not be displayed when you execute it. Output from PAM commands, such as *move* or *copy* (except error messages), is suppressed when the commands are executed from a script file. Output from programs is displayed as if you had executed them from the command line.

How to Create a Script File

Script files are first written as data files with a text editor such as `vi` (see the "`vi` Editor," Chapter 6). **Before** a data file can be executed as a script file, its *execute permission* must be changed so it is identified as a program file. In other words, PAM will view the script file and not execute it unless PAM is told the script is executable. The `chmod` ("**ch**ange **mod**e") command can be used to change file permissions. This command is described later.

With script files, sequential processing is the default for all commands. For example, the command on the second line of the script file is not started until the command on the first line is finished executing. Multiple commands can be run simultaneously from a script file by entering the ampersand (**&**) character after each command that is not to be processed sequentially (see "Nonsequential Processing"). Placing an ampersand after a command specifies that PAM does not need to wait for it to finish executing before executing the next command in the script file. Using an ampersand after a command in a script file is equivalent to placing an ampersand after the same command when it is entered in the command line.

Parameters needed for commands in a script file are entered in the command line when the script file is executed. For example, to execute a script file called **print_it** that requires one file named **1st** as a parameter, the command would be the following:

```
print_it 1st
```

Let us assume for this example that the file **print_it** has the following contents:

```
copy $1 /users/dave
lp /users/dave/$1
delete /users/dave/$1
```

In the **print_it** script file, **1st** is assigned to the variable **$1**. This file is first copied to the file **1st** in the /users/dave folder. Then the file **/users/dave/1st** is printed on the active printer using the *lp* command. Finally, **1st** is deleted from the /users/dave folder. Because sequential processing is the default in script files, the *lp* command is not executed until the file is copied to the /users/dave folder and the file is not deleted until printing is complete.

The parameters for script files are called *positional* because they are assigned to variables in the script file in the order they are entered in the command line. The parameter values you enter are passed to the variables $1, $2, and so on up to $9, in the script file. Multiple parameters must be separated by one or more spaces. The first parameter is assigned to the variable $1, the second parameter is assigned to $2, and so on. The null string is assigned to variables for parameters you do not enter. Using the variable $0, the name of the script file can be used within the script.

When all variables are referenced at once, or over nine variables are needed in a script file, the variable $* can be used. All the parameters entered in the command line are passed to the variable $* as a long character string. This variable is useful when a different interpretation of parameters, such as one long character string, is necessary for the commands in a script file.

Example
Here is an example of the contents of a script file called date_print:

```
date > $1
cat $2 >> $1
lp $1
delete $1
```

After entering these commands in a script file (using an editor), you must use the chmod command (described next) to make the file executable. Then you enter a single command like:

```
date_print outfile memofile
```

The script file date_print would use outfile as **$1** and memofile as **$2**. First, the date command output is placed in **$1** (outfile) using the redirection symbol. Then **$2** (memofile) is appended to **$1**. The resulting file (**$1**) contains the date and contents of memofile. This file is then printed, and finally deleted.

The chmod Command
The chmod command has two syntax formats. Both are described in this section; you may choose the syntax you find easiest to use.

The first syntax for the chmod command is as follows:

chmod *nnn script_file_name*

where *nnn* are three integers (0 through 7) which describe file permissions, and *script_file_name* is the name of the script file you wish to execute. The command can be entered into the command line. You will not get any messages after pressing ⏎ Return, but the status of the file will be changed to allow you to execute the script.

In a multi-user environment, you have the possibility of other people using your files. The chmod command can also allow you to protect your files, along with allowing you to execute the files. The *nnn* specified in the above command syntax refers to three permissions you can allow for any file: owner (you), group, and public. Each integer of the *nnn* is either a 0, 1, 2, 3, 4, 5, 6, or 7. To figure out which of these numbers should be used for each permission, make a form like Figure 4-10, and follow the instructions given below the form.

chmod

		Owner (you)	Group	Public
read	(add 4)			
write	(add 2)			
execute	(add 1)			
	total			
		first number	second number	third number

Figure 4-10. Chmod Permission Form

Instructions:

For each permission (owner, group, and public) decide if you wish to allow reading, writing, and/or execution of the file. If you wish to allow reading the file, place a 4 under the permission heading. For writing, place a 2 under the heading, and so on. Then sum the numbers vertically to get a total for each permission. The three digit number you have left is the chmod number to enter in the command line (replacing the *nnn* in the above syntax).

Examples

```
chmod 777 file_a
```

Allow all users to read, write and execute *file_a*.

```
chmod 500 file_b
```

Allow only the owner (you) to read and execute the file. Remember in order to execute a file, you have to be able to read it first.

```
chmod 644 file_c
```

file_c could be a data file. Therefore, you allow the file to be read and written by you but only read by others.

Chmod Symbolic Syntax

The second syntax that chmod uses is:

chmod *nnn* *filename*

where *nnn* is replaced by:

user	u	+	r
group	g	-	w
other	o	=	x

Using the symbolic syntax may be easier to understand than the above numeric syntax for the chmod command. The symbols r, w, and xrepresent **read, write,** and **execute** permissions, respectively. The u, g, and ocharacters represent user, group, or other to whom permissions will be granted or taken away.

Using the + symbol with one (and only one) permission (r, w, or x) adds the permission for the specified user (u), group (g), or other (o), all of them (if neither u, g, nor o is specified).

Using the - symbol with one permission takes away (erase) one file permission.

Using the = symbol sets the file permission to only the one permission you specify.

Examples

chmod u-x file1

> This command removes the execute permission from the user (it does not affect the other groups).

chmod g+w file2

> This command adds the write permission to file2 for the group (you and a group specified by the system administrator).

chmod o=r file3

> This command sets file3 to be read only by other users.

chmod +r file4

> This command adds read permissions for user, group **and** other.

chmod =rwx file5

> this command sets read, write, and execute permissions for user, group, **and** other for *file5*.

Listing the File Permissions

To find out are the file permissions for a particular file or files in a folder, use the following command:

    ll [Return]

This will give you a listing of files in the folder (except for *hidden files*). To list a single file type the following command:

    ll *file_name* [Return]

where *file_name* is the file you want listed. An example listing shows what to look for:

    -rwxrwxrwx 1 davek   axe   347 Nov 15 09:29 myfile

The first column of information gives you the file permissions. These are shown in the following diagram:

```
-rwxrwxrwx
|| | |
|| | last three are for public
||  second three are for your group
| first three are for you only
indicates a folder if it shows "d"
```

Each set of three corresponds to the *read*, *write*, *execute* permissions. If there is a "-" in the permission position, then the file does not have that permission. When you use the chmod command to change permissions, you can verify permissions by executing the ll command.

Using an Autost File

An **Autost** ("*auto-start*") file is used to perform desired operations at the beginning of a PAM session. **Autost** files are often used to start an application running so that no initial choices need to be made. The file must be named **Autost**, and the following actions are taken by PAM:

- If the **Autost** file is a data file, it is displayed.

- If it is a program or a script file, it is executed.

PAM will accept command input after the processing of the Autost file has completed. If the system does not locate an **Autost** file, the PAM screen is displayed.

Any file can be used as an `Autost` file by using the *rename* (or *move*) command to change its name to `Autost`. Names such as `autost` or `AUTOST` **should not** be used because the system differentiates between lowercase an uppercase letters. Unless the file name is `Autost`, the file will not be accessed when you enter PAM.

If you are using the Windows version of PAM, a window named `Autost` is created and the output is displayed in this window. If a command that needs input is executed in the `Autost` file, you can type in the window if the window is **selected**. The Autost window will be destroyed (if it is no longer in use) when PAM creates another command window.

Direct Execution of Script Files

A script file can be run in two ways:

- Normally, without direct execution, a script file when run will execute commands such as `cd`, `getenv`, and `netunam` (see "Networking and PAM") within the script but **will not change the open folder, environment, or network status**. For example, if a script is run with a `cd` command, the folder is changed during the script execution. When the script is finished, the open folder **in effect prior to** the script execution once again becomes the open folder.

- If a script is run with *direct execution*, the commands `cd`, `getenv`, and `netunam` when run in the script, **will change the open folder, environment, or network status**, and the changes will remain in effect after the script execution completes. The `Autost` file (if it is a script file) is run with direct execution. Therefore, when you start PAM and the `Autost` file is automatically run, the commands to set the open folder and environment stay in effect when the script is finished.

To directly execute scripts, you type the following command in the command line:

`source` *script_name* [Return]

where *script_name* is the name of the script. Cases in which you might use this command are, for example:

- executing a script file containing the `cd` command.

- executing a script file with the `getenv` command (described in the next section).

- executing a script with the `netunam` command that establishes a connection with a remote system (see "Networking and PAM") if you have networking capabilities.

PAM's Environment File

Environment files provide information to the system for defining the *active environment* in PAM. The **active environment** may include a search path for locating files, a home folder that can be easily accessed, and other information about the computer for application programs. These variables provide information about your system and the files and folders it contains. When PAM is run, a file named .environ is used to set up the *active* environment.

NOTE

The .environ file is an ordinary data file. It can be changed with a text editor. The most common reason for changing the default environment is to reassign the PATH variable (order of folders PAM searches to find a program) and the TZ (time zone) variable.

The uses of the active environment include the following:

- PAM uses the environment as a source of information when conducting searches. When the name of a program is entered as a command, the PATH variable provides a list of folders to search. The open folder must be in the PATH in order to be searched (specified as ".").

- Utilities can determine information about the system environment by reading variables in the environment. The *time_of_day* utility, for example, accesses the variable TZ to determine in what time zone the computer is.

- Commands can use information in the environment as a supplementary source of information. The *cd* command uses the *HOME* variable to determine what folder to open when it is executed without a parameter, for example.

- Application programs utilize the environment to obtain information about how various features are implemented on the computer.

An editor is normally used for making changes to the **.environ** file. Changes can be made to the assignment strings of existing variables. Or, different variables can be added to the file as required by your applications. The following form is used for all variable assignments:

variable=string

In addition,

- The end-of-line indicator (usually the carriage return character) should be used to terminate the variable assignment. For example, TERM= sets the terminal type to the null string.

- Colons are used to separate parts of a variable assignment. With the PATH variable, colons separate the folder names. Do not put spaces in a variable assignment unless they are part of the assignment.

Changing the .environ file does not cause a change to be made in the active environment until PAM is re-started. The *getenv* command allows you to change the environment during a session without terminating the session (see "Selecting the Environment with getenv"). These variables can be included in the .environ file:

- The HOME variable sets the home folder. Executing the *cd* command without a folder name causes this folder to be displayed.

- The PATH variable sets the search path for programs and script files. When a program name is entered in the command line, the folders included in the search path are searched in order until the specified file is found. If this variable is not specified, the open folder is searched instead.

- The TERM variable provides the terminal type. This can be accessed by application programs to determine whether level 0 or level 1 features are implemented, for example.

- The TZ variable provides the time zone information. This can be changed so that the time_of_day utility displays the correct time zone.

- The ACTION variable specifies a program to execute when a data file name is entered as a command.

- The SCRSHELL variable is used to identify the *shell* (or command interpreter) to be used when PAM runs certain script files[5].

---

[5] For more details about *shells*, see "More Detailed Uses of AXE," Chapter 8.

Setting the Home Folder

The home folder is the folder accessed by executing the **cd** command without a parameter. It is convenient to set a folder you frequently access as the home folder. If the folder currently being used as the home folder is not the one you use most often, then the HOME variable in the **.environ** file can be changed to another folder. The folder name assigned to the HOME variable should be an absolute path name.

    HOME=*folder_name*

An example of setting the home folder is changing it from **/usr** to a folder called **/usr/execfiles**. The folder you specify must already exist. To change the home folder, access the **.environ** file with a text editor and change the HOME variable to the following:

    HOME=/usr/execfiles

Although the value of the HOME variable has been changed, the home folder used by PAM will be **/usr** until the active environment is set when you re-start PAM or it is changed with the *getenv* command.

Setting the Search Path

The search path is a list of folders that is searched for programs in a specific order. When a program name is entered in the command line, PAM checks the folders included in the search path for the specified file. The order of folders in the search path determines the efficiency of the search, and when duplicate file names exist, it determines which file is accessed.

The system searches for files starting with the leftmost folder in the search path. If a file is not found, the next folder is searched. When a match is found, the search ceases, and the file is accessed. If no match is found, a error message is displayed.

NOTE

PAM uses search paths only for program file names. Files used as command parameters are not located with the search path.

The path names of the folders in the search path are separated with colons, as follows:

PATH=*folder1:folder2:folder3 ...*

The order that folders are searched when a command is entered in the command line is shown in the following illustration. If the PATH environment variable is not defined, only the open folder is searched. If the search is unsuccessful after searching the last folder in the search path, then an error message is displayed.

Sample Search Path

PATH=.:/usr/execfiles:/bin:/tmp:/

> The current (.) folder is searched first.
> The **/usr/execfiles** folder is searched second.
> The **/bin** folder is searched third.
> The **/tmp** folder is searched fourth.
> The root (/) folder is searched last.

If the root folder is frequently used for storing programs and files, the ordering of the folders in the search path can be changed to improve search efficiency. The following assignment changes the sample search path so that the root folder, represented with /, is searched first instead of last:

PATH=/:.:/usr/execfiles:/bin:/tmp:

Another change that can be made to a search path is adding another folder to it. If a folder named **/usr/solutions** is used for storing frequently executed programs, then it can be included in the search path. This would allow programs stored in **/usr/solutions** to be executed from any open folder without specifying a path name. Note that many application programs do not use the PATH variable and can only locate files outside of the open folder when a path name is used. The following variable assignment adds the **/usr/solutions** folder to the sample search path:

PATH=.:/usr/execfiles:/bin:/tmp:/:/usr/solutions

If a folder is specified for the PATH variable that is not currently included in the file system, then it is ignored. An error message is displayed only when programs entered in the command line cannot be located.

Setting the Action

The computer takes certain default actions when files are selected depending on file type. The variable ACTION can be added to the **.environ** file to change the action taken when data files are selected (remember a `getenv .environ` command or a re-start of PAM needs to be done to have the new ACTION variable in the active environment). If the ACTION variable is not present, data files are displayed when they are accessed. When the variable ACTION is included in the environment and is set equal to a program name, then selecting a data file causes the program to begin executing.

NOTE

If you change the default action for accessing data files by including the ACTION variable in your **.environ** file, the `view` command can still be used to display data files.

Assigning a program to the ACTION variable enables application programs to be automatically executed whenever the name of a data file is entered in the command line. The name of the data file selected is passed to the program as the first parameter so entering the name of a data file then becomes equivalent to entering the program name followed by the data file name in the command line. A program is identified as the default action as follows:

ACTION=*program_name*

To specify that the program *reports* be executed, for example, add the following line to the **.environ** file:

ACTION=reports

If a simple name is used to identify the program, then the folder it is stored in should be included in the search path. When you type a data file on the command line and press Return, PAM will use this data file as input to reports.

Setting the SCRSHELL Variable

The SCRSHELL environment variable is used to identify the *shell*[6] to be used by PAM in running scripts. If the name specified by SCRSHELL does **not** contain a "/", then PAM searches for the shell using the PATH variable. The SCRSHELL variable is examined whenever a script is run. If SCRSHELL is undefined or the specified shell does not exist, then the script is processed by PAM.

In other words, if PAM does not find the shell, PAM will try to process the script instead of letting a shell process the script. An example would be: If you try execute wmstart (Windows) from PAM without a SCRSHELL set to /bin/sh, PAM will try to run wmstart. Since PAM cannot do this alone, you would receive error messages from PAM. However, if you set SCRSHELL=/bin/sh, PAM will let this shell run wmstart, and you will not receive any error messages.

Selecting Alternate Environments with *getenv*

NOTE

The most common reason for changing the default environment is to reassign the PATH variable (order of folders PAM searches to find a program) and the TZ (time zone) variable.

The active environment set when you start PAM can be changed by selecting another environment file with the *getenv* command. The *getenv* command replaces the active environment with the contents of the specified file. You specify the environment file for *getenv* to access by entering it as a parameter as follows:

    getenv *file_name*

For example, if you put environment commands in a file called sysenv, you would change the active environment to the settings specified using:

    getenv sysenv

The *getenv* command is convenient for changing the environment after editing the **.environ** file, and without restarting PAM. The environment can be changed by executing *getenv* from a script file, but the changes apply only to the commands executed from the script file (unless the script file is directly executed; see "Direct Execution of Script Files").

---

[6] For more details on *shells*, see "More Detailed Uses of AXE," Chapter 8.

Networking and PAM

PAM allows network access for the HP 9000 series 300 and 500 computers. If your system has networking capabilities, you can use the following command:

> `netunam` *pathname* (*string*)

pathname is a special network file path. If you provide PAM with a simple name (with out necessary prefixes), PAM will automatically place `/net/` in front of the path.

(*string*) is the login string (login identifier) required by the remote system with which you are networking. The parentheses ( ) indicate that *string* is optional. The (*string*) is of the form:

> *user* : *password*

where *user* is your login identifier for the remote system, and *password* is the password for the remote system. If you enter the login string as simply *user*: then you are prompted by PAM to enter the password (you will not see the characters typed; this is a good method to preserve security). If you do not need a password for the remote system, then type *user* without the colon (:).

If you enter only `netunam` without the *user:password* parameter, then the `netunam` command **disconnects** the existing link to the remote system.

If you try to access a folder in a remote system (that you are not yet connected to), PAM will try to establish a connection and prompt you for login and password if necessary.

Network special files are regarded by PAM as folders corresponding to the root folders of the remote systems. Opening a network special file is the same as opening the root of the associated remote system.

Networking Errors

'netunam path_name string' is the proper form of the command.

Improper syntax was used in entering a **netunam** command.

Invalid path name for network special file.

The first parameter of the **netunam** command was not a network special file (even with /net/ preceding the simple path).

The remote system is not connected to the network.

A connection was attempted, and it was determined the remote system was not connected to the network.

The specified login is invalid.

The login you used was not accepted by the remote system.

Error doing netunam: error=*ERROR*.

A networking error occurred that is not interpreted by PAM (e.g. NE_INTERNAL). A list of the error numbers are listed in the error messages appendix in the "Network Services/9000 LAN User's Guide" (the manual accompanying LAN).

Cannot disconnect from the remote system when connection is in use.

The open folder is on the remote system when you tried to disconnect the link (using the **netunam** command with only the *pathname* parameter).

Networking Messages

Opening a remote folder on '*system*'; Please enter a login.

This message is shown when you attempt to open a folder on a remote system that has not been connected to the local system by a previous **netunam** command. You are prompted to enter a login with an optional password.

Please enter a password.

If a password is not provided when a login string is entered, PAM prompts you with this message to enter a password.

Establishing connection...

This message is shown while a **netunam** command is being executed (there is a delay while a connection is established).

PAM Messages

Listed below are messages that can appear in the top line of the PAM screen. Following each message are an explanation and, for error messages, some hints about solving the problem. Where the listing below shows *file name* or *folder name*, the actual message shows the name of the actual file or folder.

Sorry, no more memory.

    A script is nested too deeply. Modify the script file.

name **cannot be found.**

    PAM doesn't understand the command you typed in. If *name* is a PAM command, such as *makefolder* or *rename*, check the spelling. If *name* is a simple file name, make sure it's listed in the open folder, make sure the folder containing *name* appears in the path variable in the environment.

Cannot create *file name.*

    1. There may not be enough room on the disc for a new file.
    2. A new file cannot be created due to permissions set for the file system (for example, "copy a /" tries to write file a into the root directory, which is not available to non-root users).

file name **exists and cannot be overwritten.**

    Make sure that you have write permission to the destination file or folder. Use the HP-UX *chmod* command to change the permission.

Cannot delete *name.*

    Make sure that you have write permission to the destination file or folder. Use the HP-UX *chmod* command to change the permission.

Cannot delete the open folder.

    Press **Close** (f8). The next outer folder becomes the open folder, and the folder you want to delete is listed among the contents of the outer folder. You can then delete the folder.

folder name **is not empty so it cannot be deleted.**

    Move or delete all files in the folder. You can then delete the folder.

`Cannot copy` *folder name*.

> You must create a new folder and copy the files in the original folder to the new folder.

`Cannot move a folder between discs`.

> You must create a new folder on the destination disc and move the files in the original folder to the new folder.

`Cannot move a folder into itself`.

> You can't introduce circularity into the file system—for example, you can't move **Folder1** into **Folder2** if **Folder1** contains **Folder2**. First move **Folder2** so it is no longer contained in **Folder1**, and then move **Folder1** into **Folder2**.

`Cannot read` *name*.

> You don't have read permission for the file or folder. Use the HP-UX command *chmod* to change the permission.

`Cannot write in folder` *name*.

> You don't have write permission for the folder. Use the HP-UX command *chmod* to change the permission.

`Cannot rename` *folder name*.

> You can't rename or move a folder specified by . or .., or specified by a name ending in /.

`Cannot open` *folder name*.

> You don't have execute permission for the folder. Use the HP-UX command *chmod* to change the permission.

`Specify file to copy, move, or rename before specifying 'to'`.

> You gave a *to* command before specifying the action to perform.

`Now complete the copy with 'to file name'`.
`Now complete the move with 'to file name'`.
`Now complete the rename with 'to file name'`.

> After you give a one-parameter *copy*, *move*, or *rename* command, this message prompts you to supply the second parameter.

Error while reading *file name*.

Check that the disc is working properly. This rare error may require system administrator attention or possibly indicate the need for service on a hard disc.

Error while writing *file name*.

Check that the disc is working properly. This rare error may require system administrator attention or possibly indicate the need for service on a hard disc.

Command missing in command line.

You specified I/O redirection or a command terminator without a corresponding command. Supply the command.

Missing name after '>'
Missing name after '<'
Missing name after '^'
Missing name after '#'

The name that should follow the symbol is missing. Supply the name.

The standard input is ambiguous in the command.
The standard output is ambiguous in the command.
The standard error is ambiguous in the command.

The standard input, output, or error is specified more than once in the command.

The application window is ambiguous in the command.

A window is specified more than once in the command. Only one window can be specified for all commands in a single command line.

Window name cannot contain a '/'.

Windows must have simple names.

Too many command parameters.

The specified pattern matches so many file names the resulting command uses up command memory. Perform the command with fewer parameters.

Too many commands in the command line. Limit is 10.

Edit the command line and try again.

Too many parameters. Use 'cd folder'.

The *cd* command takes only one argument.

Cannot find folder's location.

Check that you correctly typed the name of the destination folder.

Unmatched quote character '
Unmatched quote character "

Supply the matching single or double quote character.

The *name* command does not accept parameters.

You specified a parameter for a command that doesn't take parameters.

Please wait ...

A *copy*, *move* or *rename* is in progress.

Done with copy.
Done with move.
Done with rename.

The command is completed.

Use the [Next] and [Prev] keys to see more files.

The folder contains more files than can be displayed at once in the PAM window.

Too many characters in script command line.
Limit is 160.

The number of characters is determined *after* parameter substitution.

Cannot make a unique window name.

When there is an existing window with the same name as a new program, PAM appends "!" to the name for the new window. This error occurs if PAM can't append "!" without exceeding the limit for the length of a window name.

'name' could not be matched

No file name matches 'name' pattern.

'command filename' is the proper form of the command.

You gave the wrong number of parameters. Check the command's syntax.

'name' `is a device`

> You tried to specify a device as a command.

'name' `is a pipe`

> You tried to specify a pipe as a command.

'name' `is matched more than once; one match is required`.

> The command requires one file name, but the indicated pattern matches more than one file name.

'name' `is not a folder`

> You must specify a folder as the parameter for the `cd` command.

'name' `is not a window`.

> The name is not an existing window (for the Windows version of PAM).

'filename' `is not a runnable script`.

> The file either is not a script file or does not have execute permission. Use the `chmod` command to change the permission (see section on `chmod`).

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Helpful Tips for Managing Your Files

5

Introduction

This chapter describes ways you can organize your information. When you read Chapter 4, "Using the System: PAM," you learned **how** to move within the system and create folders and files. Now you can use this knowledge and make an efficient file system.

First, let us define files and folders again for you, then go into the helpful ways to manage your files.

What is a File?

A file is a collection of information stored on a disc (an external memory) or on the computer's internal memory. Each file has a unique name consisting of 1 to 14 characters. You can use any character of the alphabet or any numeral in a file name. You may also use the underscore (_), the minus (-), and the period (.). You should avoid using other characters (i.e. special characters such as characters PAM recognizes for certain purposes such as < > * |, or control characters). The details of creating a file can be found in Chapter 4, and in "The vi Editor," Chapter 6.

Typical file names can look like:

```
Junelist
Memo--12
Sept.Account
test
Test
TEST
.hidden
```

PAM distinguishes between uppercase and lowercase letters. This means `test`, `Test`, and `TEST` are three separate file names. If the file has a period (.) as the first character, the file is a *hidden file*. **Hidden** files are not listed in the folder area of the PAM screen. However, you can still access a hidden file by typing in the complete file name (including the period). If you wish to see a listing of all files including the hidden files, type:

```
ls -a  Return
```

in the command line and a complete listing will be displayed.

The Types of Files

There are four kinds of files in the file system[1]. **Program** files perform specific tasks. Typical program files include word processors, spreadsheets, and programs to calculate numbers. Information created or needed by these files are stored in **data** files. Data files include spreadsheet and document files created by an application program. A third "file" is the **folder**, which organizes files. A fourth file is the **device** file. Device files provide access to internal and external physical devices connected to the computer (discussed later in this chapter).

What is a Folder?

A folder is a collection of files. You can use folders to help organize your files by grouping them together. The file system is arranged as a *hierarchy* of folders. The top level of the system is called the **root** folder (identified by a /). A typical file system might look like this:
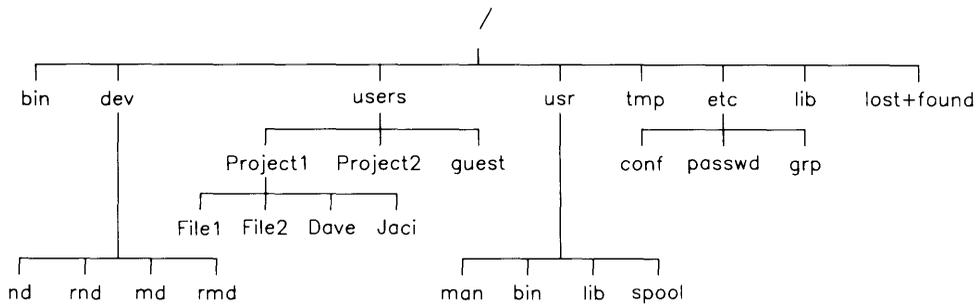
Figure 5-1. An Example File System

---

[1] In HP-UX, of which AXE is a subset (see Chapter 8), program and data files are both called "regular files"; folders are called "directories" or "directory files."

How The File System Is Structured

Folders are powerful because they can contain other folders as well as files. This leads to a hierarchy of folders: you can store a file in a folder that is stored in another folder, which you can store in another folder, and so on. As you saw in Figure 5-1, the structure looks like a family tree (an upside-down tree).

When you enter folders, you are following the "tree" in Figure 5-1 down. For example, to find a file in the *Project1* folder, you begin at the *root folder* (/) and open folder *users*. Next, you would open folder *myfolder*. Finally, you would open folder *Project1*, and look in that file listing.

How to Organize Your Files

You can organize your files in folders in such a way to collect related files in the same folder. One good example is the use of folders that contain files or other folders related to a particular project. Figure 5-2 shows an example of how to organize your files.
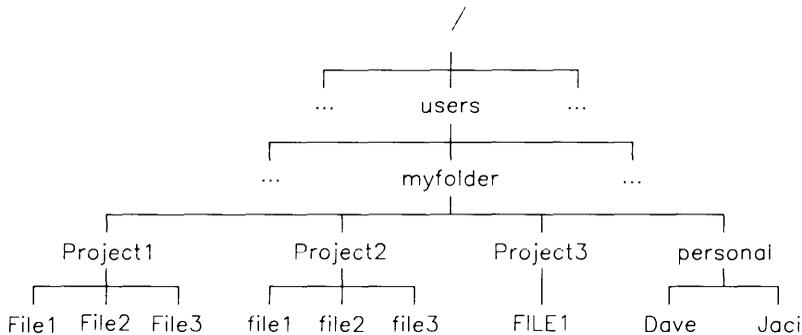
Figure 5-2. Organizing Your Files

By placing files into certain folders, you save time searching unrelated folders for your files. Also, while in the same folder, you can have direct access to all of your related files without having to switch to another folder.

Ways to Keep Track of Your Files

The PAM screen shows the contents of one folder at a time. That is, PAM shows only the file names and folder names in the *next level* of the tree. The table below is a helpful way to keep track of which folders you have and which files are contained in the folder. List all folders under the "Open Folder" heading. Then list the contents of each folder (what appears in the open folder area) under the "Contents of the Folder" heading. For example, the listing for Figure 5-2 is:

Open Folder	Contents of the Folder
/	..., users, ...
users	..., myfolder, ...
myfolder	Project1, Project2, Project3, Personal
Project1	File1, File2, File3
Project2	file1, file2, file3
Project3	FILE1
Personal	Dave, Jaci

Figure 5-3. Keeping Track of Your Files

How to Find a File

Finding a file involves finding its folder, and this involves moving around in the file structure. PAM puts you in a *Home*[1] folder when you login. This Home folder can be considered your outermost folder for files that are specifically yours. You can then move *down* the tree of folders you create, opening folder after folder, until you find the file you want. For example, if you want to find the file *File1* in Figure 5-2, and your Home folder happened to be /, you would need to move from the root folder (/) to *users*, from *users* to *myfolder*, from *myfolder* to *Project1*, and you would see *File1* in the open folder of *Project1*.

You can also use the cd command (described in Chapter 4, "Using the System: PAM") to go directly to a folder, if you know the complete *path name*. For example,

```
cd /users/myfolder/Project1
```

will open the **Project1** folder from any other folder. You can then find *File1* in the open folder.

---

[1] When you login to a security system, you can find out your working folder by executing the **pwd** command. If you set a Home folder in your Autost file for PAM, whatever file you define as Home folder will be your working folder when you login (or boot up to a non-secure system).

Each folder is identified by its path name. The folder's path name defines a path from the root folder to that folder. With our example,

users is **/users**
myfolder is **/users/myfolder**
Project1 is **/users/myfolder/Project1**

Files also have path names. A file's path name consists of its folder's name followed by a / then the file name. For example:

File1 is **/users/myfolder/Project1/File1**

To determine the path name, you can either trace the path name from the root folder to the file on the tree diagram as shown in Figure 5-4:
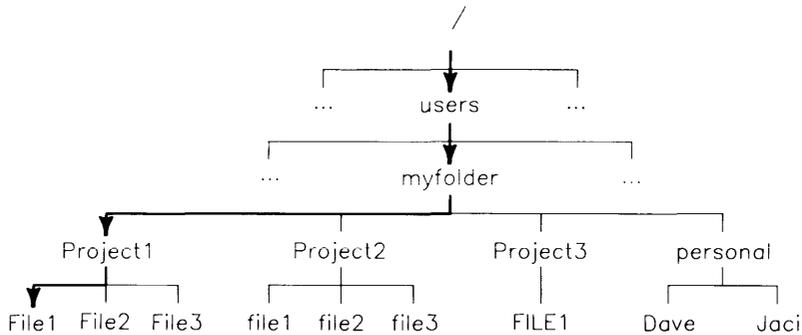
Figure 5-4. Tracing the Path to a File

or trace the path on the table for keeping track of your files:

Open Folder	Contents of the Folder
/	..., users, ...
users	..., myfolder, ...
myfolder	Project1, Project2, Project3, Personal
Project1 ⟶	File1, File2, File3
Project2	file1, file2, file3
Project3	FILE1
Personal	Dave, Jaci

Figure 5-5. Tracing the Path to a File

Backing Up Your Files

When you use files as data for applications, you must preserve the data. You can loose an entire file of text or data by making a very simple mistake (like deleting the wrong file). Therefore it is a good idea to make backup copies of your files.

Ideally, you would want to make copies of your files in two separate, physical locations. If this option is not available to you (such as using two different discs for storage) because you do not have access to such discs or do not have the knowledge required to use the discs, then you can make copies of your files in two different areas of your file system structure.

One good suggestion is to create a folder whose specific purpose is to store back up files. You could name such a folder "BKUP" or "backup." Then you would copy files using the **Copy** function key from the present folder to the new folder (see Chapter 4). You will need to know the path name of the backup folder to correctly copy the file to the new folder.

NOTE

Single file backup is **in addition** to backing up the file system, **not in place of** backing up the file system. See Chapter 9, "Backing Up and Restoring the File System," for details on backing up the file system.

Purging Unused Files

As your file system grows, you will begin to see files you no longer have any use for. These files, if you determine they **will not be used** again, should be deleted from the system. They take up space on the storage devices, and clutter your folders. So, you should occationally go through your files and determine which files are no longer needed. Then you can use PAM to delete these files.

Other File Information

File Security

Every file has three *permissions* (three each for the owner (you), your group, and the public) determining which operations can be performed with the file: read permission, write permission, and execute permission. You have the ability through the chmod command, described in Chapter 4, "The chmod Command" section, to change the permissions for a file. This can be useful if there are other people who have access to your system. If you do not protect your files, anyone can change or delete them.

Device Files

Physical devices are accessed through device files. Each device, such as a printer or disc, is associated with an internal or external device. Operations access a device by accessing the corresponding device file. All device files are contained in the /dev folder.

When you run programs, commands, and utilities, the system automatically accesses certain devices and device files. These default device files correspond to built-in (internal) devices. Peripheral devices, such as a printer, are accessed with device files that you create when you set up the peripheral device.

Archiving Seldom Used Files

If you need to keep some files, but rarely use them, you should archive the files. To archive a file, copy it to an off-line storage (a flexible disc or cartridge tape) and then remove the file from your file system.

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6

VI REFERENCE CARD

Entering and Leaving VI

vi *filename* [Return]	Enter **vi**, editing *filename*
ZZ	**Save** and quit **vi**.
:w [Return]	Save the file, but do **not** leave **vi**.
:q! [Return]	Quit **vi** **without** saving.

Basic Cursor Movement

[h]	Move the cursor left.
[j]	Move the cursor down.
[k]	Move the cursor up.
[l]	Move the cursor right.

More Cursor Movement

[w]	Move to the beginning of the next word.
[W]	Move to the beginning of the next word, skipping punctuation.
[b]	Move to the beginning of the previous word.
[B]	Move to the beginning of the previous word, skipping punctuation.
[e]	Move to the end of the next word.
[E]	Move to the end of the next word, skipping punctuation.
[S]	Move to the end of the current line.
[0] (zero)	Move to the beginning of the current line.
[(]	Move to the beginning of the previous sentence.
[)]	Move to the end of the next sentence.
[{]	Move to the beginning of the previous paragraph.
[}]	Move to the end of the next paragraph.
n [G]	Move to line number *n* (a number you type).

Text Input

[i]	Insert text **before** the cursor.
[a]	Insert text **after** the cursor.
[o] (letter)	Insert on the line **below** the cursor.
[O] (letter)	Insert on the line **above** the cursor.

Deleting Text

[x]	Delete the character on the cursor.
dd	Delete the current line.
*n***dd**	Delete the next *n* lines including the current line.

Replacing Text

r*character*	Replace the current character with *character*.
R*text* [ESC]	Replace the characters starting with the current character with *text*.
s*text* [ESC]	Substitute *text* for the current character.
:1,$s/*string***/***stringA***/g** [Return]	Search the entire text for *string* and replace it with *stringA*.

Finding Text

/*string* [Return]	Search **forward** for *string*.
?*string* [Return]	Search **backwards** for *string*.
n	Repeat last search.
N	Repeat last search in opposite direction.

Additional Commands

Y	*Yank* a copy of the current line.
n Y	*Yank* a copy of the *n* lines starting at the current line.
p	Place *yanked* lines **after** the current line.
P	Place *yanked* **before** the current line.
u	*Undo* last command.
U	Return the current line to previous state.
.	Repeat the previous command.
J	Join the current and the following lines together.
CTRL G	Update the message line.
CTRL L	Redraw the screen.
:**set nu** Return	Number the lines in the file.
:**set nonumber** Return	Turn off the numbering of lines.

Creating Text Files: The vi Editor

6

What is vi?

This chapter describes the vi (pronounced "vee eye") editor. The vi editor is a screen-oriented text editor which allows you to input, save, and update text information. Because vi is a screen oriented editor, you can scroll through a text file at leisure, and therefore view the text file as whole (unlike *line* editors which only allow you to view or move through a file one line at a time).

In order to use the vi editor, you must have loaded the ACMD file set. If you did not load the vi editor during installation, and you wish to use vi, see the section "I Can't Get vi" at the end of this chapter.

This chapter will teach you the basics of vi. You will learn vi commands to input, save, and modify text. vi has a number of commands; this chapter presents those commands which allow you to use vi effectively without having to know all of the detailed vi commands. A list of vi commands is in Appendix B.

NOTE

It is important that you do not press any other keys than the ones described in this chapter while in vi. There are many commands in vi, not all of which are described in this chapter. Therefore, to avoid any frustration: don't touch anything you do not know about. If you happen to see a colon (:) at the bottom of the screen and you receive error messages which do not make any sense, you may have gotten into another editor via the vi editor. To leave this mode you need to either press the ESC key or type :q! to exit the editor and start again. If your screen changes or does something other than described, press CTRL-l (the letter "L"). This command will redraw the screen.

Conventions

This chapter uses several conventions to describe commands you will use. When you see a command typed in `computer font`, it means you type in the command word for word. For example,

    `vi sample_file` `Return`

means you type

    `vi sample_file` and then press `Return`.

When you see a letter or word enclosed in a box, you are to press the letter or function key on the keyboard corresponding with box. For example,

    `i`

means you press the letter "i."

When you see italics, you are to substitute an appropriate word (or file name, for example). These italicized words usually follow a command or letter. For example,

    /*string* `Return`

means you type "/" and then a string. For example, if your *string* was `food`, then you would type `/food` `Return`.

Letters typed in computer font are always the exact letters you are to type. Any italicized letters or words are to be substituted with letters or words you generate.

The vi Modes

There are two modes to which you need to focus your attention: the *command* mode, and the *text input* mode. The **command** mode is seen when you first enter `vi`, and allows you to move about freely in the text. The **text input** mode is activated when you wish to input text. In this mode, you can type in text; however, you have limited mobility, unlike the command mode.

Before we go into any great detail of `vi` concepts, let us go through a short tutorial so you can become familiar with `vi`.

A Short Tutorial

It is assumed you have already become familiar with the preceeding chapters. From those chapters you learned how to login, use PAM, and have some familiarity with files. This chapter will assume you are **not** entering vi from Windows. The commands are the same for vi in all cases, only the details of screen format (ie. a window for vi) are different. With that aside, let us begin our tutorial.

1. First, be sure you have logged in, are in PAM, and vi is loaded in the system.

2. Type: vi `sample_file`
   in the PAM command line.

3. Press: [Return]
   The screen will clear, and you will see the vi command mode which looks like the following (note a flashing cursor at the top left of the screen):

   ```
   ~
   ~
   ~
   ~
   ~

   "sample_file" [New file]
   ```

IMPORTANT

If you receive an error message instead (like: vi: `execution permission denied`) then you need to read the "I Can't Get vi" section at the end of this chapter.

---

4. Press: [i]
   (**Lowercase I; do not press** [Return]). This command means "insert before the cursor." The screen does not change, so only press [i] once.

5. Now you are in the text input mode. Type the following sample text and be sure to include all mistakes (we will correct them later). If you type a mistake which is not in the text, use the [Back space] key to move back over the mistake, and type the correct text.

```
There once was a file named Sampl_file,
Who resided on AXE for a while,
Mistakes wer in he,
Correct them did we,
With vi, the edditor with style.
```

6. Press: [ESC]

([ESC] is the *escape* key, which terminates the text input mode, and returns you to the command mode. However, you won't see much change in the screen. The [ESC] key is used often in vi; it is the **only** way to get out of the text insert mode. If you get lost, typing [ESC] will get you out of the text insert mode. If you are already out of the text insert mode, pressing [ESC] will only cause your terminal to *beep*.)

7. Type: ZZ

Be sure these are both **capital letters**, and **do not press** [Return]. This command saves the *sample_file* file, and you will exit vi. You will be prompted from PAM to **Press return to continue**.... Press [Return] and the PAM screen will appear.

Now, let's reenter vi and correct our mistakes.

8. Type: vi **sample_file**

This command is the same as before, except now vi looks and finds the *sample_file* you just created.

9. Press: [Return]

The screen should clear, and you will see something like the following:

```
There once was a file named Sampl_file,
Who resided on AXE for a while,
Mistakes wer in he,
Correct them did we,
With vi, the edditor with style.
~
~
~
"sample_file" 5 lines, 146 characters
```

If the last line on the screen reads a little differently, don't worry. You probably pressed one extra [Return].

Our first task is to correct "Sampl_file" in the first line.

10. Press: ☐ l ☐

    (lowercase L) several times to move the cursor until the cursor flashes under the "_" in "Sampl_file" (the first row of text). If you pass the "_," press the ☐ h ☐ key to move the cursor left.

11. Press: ☐ i ☐

    (Lowercase I, as we did before to *insert* text).

12. Type: e

    To correctly spell Sample_file.

13. Press: ☐ ESC ☐

    To terminate the input.

Now, let's correct "wer" in the third line.

14. Press: ☐ j ☐

    (Lowercase J) two times to move the cursor to the third line. If you pass the line, press the ☐ k ☐ key to move the cursor up.

15. Press: ☐ h ☐

    (Lowercase H) several times until the cursor flashes under the "r" in "wer".

16. Press: ☐ a ☐

    (Lowercase A). This key is for *appending*, inputting text *after* the cursor (note before, when we used ☐ i ☐ for insert, the text was inserted *before* the cursor).

17. Type: e

    to correctly spell "were."

18. Press: ☐ ESC ☐

    To terminate the append mode (the same as terminating the input mode).

Our last task is to correct "edditor" in the last line.

19. Press: ☐ j ☐

    (Lowercase J) two times; the cursor should be on the last row of text.

20. Press: ☐ l ☐

    (lowercase L) several times to move the cursor under one of the "d's" in "edditor." If you pass the "d's," press ☐ h ☐ to move the cursor left.

21. Once you are under one of the "d"'s in "edditor," then
        Press: ☐ x ☐

    (Lowercase X). This key deletes one character, and you should now have a correct spelling of "editor." If you make any mistakes, such as deleting more than one character, then press ☐ U ☐ (capital U). This command restores the line to its original state before you made any deletions. Then you can try deleting the "d" again.

Your screen should now look something like:

```
There once was a file named Sample_file,
Who resided on AXE for a while,
Mistakes were in he,
Correct them did we,
With vi, the editor with style.
~
~
~

"sample_file" 5 lines, 151 characters
```

22. Type: ZZ
    (**both in capital letters; do not press** Return) to leave vi and save your corrections. You should be prompted again by PAM to `Press return to continue`.... Press Return and you will see the PAM screen.

Congratulations! You have now finished a basic vi session, and you know how to enter vi, input text, make some minor corrections, exit and save the text in a file. Let's review what you just did:

`vi sample_file` Return	"enter vi and create `sample_file`"
i	"insert text"
ESC	"quit inserting"
ZZ	"leave vi and save the file"
`vi sample_file` Return	"enter vi using already created `sample_file`"
l	"move cursor right"
j	"move cursor down"
k	"move cursor up"
h	"move cursor left"
a	"append after the cursor"
ESC	"quit the append mode"
x	"delete a character"

The next part of this chapter goes into a little more detail on vi commands. Once you have read this chapter, you can use the enclosed vi Reference Card for quick reference while using vi.

Using vi

Entering vi

Before you begin, you need to check if `vi` is loaded into the system. One easy way to do this is to execute the command described below in the "Action" sub-section. If you receive an error message something like:

```
vi: execute permission denied
```

then either `vi` is not loaded or your search path (places where the system looks for commands and files) needs to be changed. If you have received an error message, then you need to read the section, "I Can't Get vi," at the end of this chapter.

Action

To enter `vi`, you must specify a file name for `vi` to either create or find. If you are creating a text file, then use the `vi` command with your new file name. If you are editing an existing file, use the `vi` command with the existing file name.

The syntax for the `vi` command is:

```
vi file_name
```

in the PAM command line, where *file_name* is either a new file name or existing file name you type following `vi`. After you type the command, press: Return .

The Command Mode

When you enter `vi` after typing the `vi` command, you see `vi`'s **visual command mode**. In the command mode, you can type the commands to enter the *text input* mode, move the cursor around the screen, look at more lines of text, and leave `vi`.

Understanding which mode you are in is important. Using the wrong commands when you are in a particular mode can cause unpredictable results. For example, if you are in the text input mode, you cannot use the cursor movement keys (you may be typing the letter instead of moving the cursor). Part of the confusion is because you do not receive any feedback from `vi`. One helpful suggestion is, when you are not sure what mode you are in, press the ESC key. This should put you in the command mode. You might press the ESC key again to make sure; if you hear a beep, you are in the command mode.

Moving Around

The following table gives you a list of the commands to use for moving the cursor while in the command mode. To use these commands, press the key (letter). You may have to press the key several times in some cases because the command may only move the cursor one character or line. If you do not like pressing the key over and over to move the cursor in the text, try pressing the key and holding it down. The cursor will move rapidly. When you reach your destination, release the key, and the cursor will stop.

IMPORTANT

Please pay attention to the case of the letters. vi **will** distinguish between lower case and upper case.

Table 6-1. Moving the Cursor: Basics

Command	Action
h	Moves the cursor left.
j	Moves the cursor down.
k	Moves the cursor up.
l	Moves the cursor right.

More Movement Commands

In addition to the above basic movement commands are those in the following table.

Table 6-2. More Movement Commands

Word Oriented

Command	Action
w	Move the cursor to the beginning of the next word.
W	Move the cursor to the beginning of the next word, skipping punctuation.
b	Move the cursor to the beginning of the previous word.
B	Move the cursor to the beginning of the previous word, skipping punctuation.
e	Move the cursor to the end of the next word.
E	Move the cursor to the end of the next word, skipping punctuation.

Line Oriented

Command	Action
$	Move the cursor to the end of the current line.
0 (zero)	Move the cursor to the beginning of the current line.

Block Oriented

Command	Action
(	Move the cursor to the beginning of the previous sentence.
)	Move the cursor to the end of the next sentence.
{	Move the cursor to the beginning of the previous paragraph.
}	Move the cursor to the end of the next paragraph.
n G	Move the cursor to line number n (a number you type).
G	Move the cursor to the end of the file.

The Text Input Mode

When you are in the **text input** mode, you will notice the tilde (˜) on the left side of the screen disappear when you begin typing on that line. Also, if the line is longer than what the screen shows, the line of text will *wrap* around to the next line on the screen.

NOTE

If you type a line greater than 511 characters, `vi` will print an error message: `line too long`. To continue, **you have to type:** `vi` **and press** ⟨Return⟩. Your long line will be lost, so you need to make any appropriate changes.

Inserting Text

When you insert text, you are entering the text input mode. There are several commands to insert text in different ways. The following table shows the commands to insert text. As with all of `vi` commands, pay attention to the case of the letters.

Table 6-3. Inserting Text

Command	Action
⟨i⟩	Insert text **before** the cursor.
⟨a⟩	Insert text **after** the cursor.
⟨o⟩	(Lowercase letter "O"). Enter the text input mode on the line **below** the cursor.
⟨O⟩	(Uppercase letter "O"). Enter the text input mode on the line **above** the cursor.

When you wish to stop inserting text, press: ⟨ESC⟩. You will return to the command mode.

Deleting Text

When modifying text, you may wish to delete some text. The commands in Table 6-4 delete either a specific character, or several characters.

Table 6-4. Deleting Text

Command	Action
☐x☐	Delete the character on the cursor.
dd	Delete the current line.
*n*dd	Delete the next *n* lines (the number of lines you wish to delete including the current line).

Modifying Text

This section describes the commands you need to modify or update a file. You execute these commands while in the command mode. First, you locate the error or change to be made; then you use one of the modifying commands.

This method differs from the previous idea of editing. Before, you were able to locate the error, delete it, then insert the correct text. Now, you can use a *replace* or *substitute* command and correct errors in a one step method. The following table describes how to use the modifying commands:

Table 6-5. Commands to Modify Text

Command	Action
r*character*	Type **r** followed by a single character (symbolized here as *character*). This command *replaces* the next character after the cursor with the *character* you type following **r**.
R*text* ⎡ESC⎤	Type **R** followed by some text (it can include spaces). When you are through typing the *text*, press ⎡ESC⎤ to execute the command. This command *replaces* the characters following the cursor (character for character) with the *text* you type.
s*text* ⎡ESC⎤	Type **s** followed by some text (it can include spaces). When you are through typing the *text*, press ⎡ESC⎤ to execute the command. This command *substitutes* the entire *text* you typed for the character (the single character) following the cursor.
:1,$s/*string*/*stringA*/g ⎡Return⎤	To change all occurrences of *string* to *stringA*, first type :1,$s/ then type the string to be changed. Next, type a / followed by the string you want in place of the previous string. End the command with a /g and press ⎡Return⎤. For example: :1,$s/snort/sort/g ⎡Return⎤ will change all occurrences of *snort* to *sort*.

Searching For Text

When you have a file with many lines of text, you may find it difficult to search through the text by using the movement commands and searching visually for an error or modification to be made. If you know the error, or wish to look for a particular word (or *string*), you can use `vi`'s searching commands.

Table 6-6. Searching Commands

Command	Action
/*string* [Return]	First, type /. Then type the *string* for which you wish to search. Finally, execute the command by pressing [Return] (you can also press [ESC] with the same results). For example: **/editor** [Return] will search forward through the file for the string *editor*.
?*string* [Return]	First, type ?. Then type the *string* for which you wish to search. Finally, execute the command by pressing [Return] (you can also press [ESC] with the same results). This command searches **backwards** through the file for *string*. For example: **?Sampl_file** [Return] will search backwards through the file for *Sampl_file*.
n	After you have executed a search command (/*string* for example), and you wish to search for the same *string*, type: **n**. This will search for the **next** occurrence of the *string* (**down** in the text) in the previously executed search command.
N	After you have executed a search command (/*string* for example), and you wish to search for the same *string*, type: **n**. This will search for the **next** occurrence of the *string* (**up** in the text) in the previously executed search command.

Leaving vi and Saving Text

After you have inputted text, you will probably want to save the text. When you are in vi, the text you type and modifications made do not change the original file until you specifically say so. You therefore have several ways of saving the text, or, leaving vi without saving any changes (the original file remains intact).

It is a good idea to save the file you are working on periodically. This way you will insure your changes are saved in case, for example, the system goes down.

The following table shows the commands to save and/or leave vi.

Table 6-7. Saving Text

Command	Action
ZZ	Quit vi and **save** the changes made in the original file.
:w [Return]	Update the file, but do **not** leave vi.
:q! [Return]	Quit vi **without changing** the original file.

When you leave vi you will be prompted by PAM to

    Press [Return] to continue...

Press [Return] and you will see the PAM screen again.

Additional Commands

The commands described in this section are additional vi commands which give you some helpful editing features.

Table 6-8. Additional Commands

Command	Action
Y	This command "picks up" (or *yanks*) a copy of the current line. You will not *see* any change in the screen. This command is used in conjunction with the P or p command (described below). For more information see these commands.
n Y	This command "picks up" (or *yanks*) a copy of the n lines following the current line (n is a number you type). This command is also used in conjunction with the P or p commands. See these command for more information.
p	This command is used after you use the Y or n Y command. You first use the Y or n Y command to "pick up" a copy of a line or lines. Then you use the cursor movement keys and move to another location in the file. When you press p, a copy of the line or lines you *yanked* is placed **after** the current line. This command sequence is helpful when you wish to move or copy parts of the text to another location in the file. This command can also be used with lines deleted with the **dd** command.
P	This command is used after you use the Y or n Y command. You first use the Y or n Y command to "pick up" a copy of a line or lines. Then you use the cursor movement keys and move to another location in the file. When you press P, a copy of the line or lines you *yanked* is placed **before** the current line. This command sequence is helpful when you wish to move or copy parts of the text to another location in the file. This command can also be used with lines deleted with the **dd** command.
u	You can use this command when you have made a mistake in the editor. This command will *undo* the last command you made. For example, if you made a replacement and you decided you did not need the replacement, you could press u, and the replacement will change back to the way it was before you executed the command. Pressing u again will "undo the undo," or *reverse* the command. You will be put back to the original mistake.
U	If you are editing an entire line, and decide you do not want any of the corrections made, then press U and the entire line will return to the way it was before you started editing the line even if you used more than one command to change the line.

Table 6-8. Additional Commands (Continued)

Command	Action
$\boxed{.}$	The $\boxed{.}$ (*dot*) command is used to repeat the previous command. This is especially useful when you need to delete, replace, or search for a string.
$\boxed{J}$	This command joins two lines together. It also provides you with the appropriate spacing when the lines are joined: one space for words, two spaces after a ".".
$\boxed{CTRL}$-$\boxed{G}$	By pressing $\boxed{CTRL}$ and holding it down, then pressing $\boxed{G}$, you update the message line at the bottom of the screen. It will tell you if the file has been modified since you entered **vi**, and what line you are presently on. Both upper- and lowercase G's can be used in this command.
$\boxed{CTRL}$-$\boxed{L}$	This command will clear and redraw the screen. This command is helpful if you are in **vi** and receive a message from another user. The screen will be changed, but the text will not be changed. To see the original text, use this command.
:set nu $\boxed{Return}$	This command will automatically number the lines in the file. You will type the command on the bottom line of the screen.
:set nonumber $\boxed{Return}$	This command will "turn off" the numbering of lines in the file. You will type the command on the bottom line of the screen.

More Information About vi

To find more about **vi**, you can look at Appendix B. This appendix lists all of the available **vi** commands with a short description.

Windows and vi

If you are using Windows, the **vi** commands and procedures are the same as not using Windows. The only difference is that **vi** is contained in the window from where you entered **vi**.

If you are using the Windows version of PAM, there are some procedures you need to know. You enter the **vi** command in the command line and press $\boxed{Return}$. PAM then creates a brief *icon*, then restores the icon to a window named *vi*. You are then in the command mode of **vi** and proceed as normal.

When you leave **vi**, the window **does not** disappear but rather stays selected. You cannot use this window for anything except a reference. Therefore, to continue you need to either: destroy the window, and the PAM window will become selected, or select the PAM window, leaving the **vi** window on the screen as a reference.

I Can't Get vi

If you are having trouble entering vi you will have to check a few things. There are two possibilities why you are having trouble getting vi: the search path doesn't find vi, or vi is not loaded into the system. To find out which of these is the case, do the following:

1. Type: `ls /usr/bin/vi` [Return]
   into the command line.

If you receive a response like:

`/usr/bin/vi`

then vi **is** loaded into the system and there is something wrong with your search path. If this is the case, then go to your system administrator and ask to have /usr/bin included in your *search path*. If you are the system administrator, see the "Using the System: PAM" chapter, "PAM's Environment File" and read about how to include /usr/bin in the search path for PAM.

If you receive a response like:

`/usr/bin/vi not found`

then you need to load vi in to the system. This is a system administrator task, so you need to see the person responsible for system administration. If you are the system administrator, then go to Chapter 11, "Updating the AXE System" section. You will need to select ACMD as one of the file sets.

Table of Contents

7

WINDOWS QUICK REFERENCE CARD

CONTROLLING THE WINDOWS

- Move pointer to control box.
- Press select button (left button on mouse and puck; press down on stylus).

POINTER SHAPES

| · | - when outside of all windows.

$+$ - when in a function zone.

↖ - when in the user area or pop-up menu.

WINDOW OPERATIONS

WINDOW NAME   BORDER

CHANGE A WINDOW TO AN ICON
- With pointer over ICON box; press select button. ICON appears (see right).

MOVE A WINDOW
- With pointer over MOVE box, press select button.
- Move dotted rectangle with pointer device to desired location; press select button.

wconsole

SCROLL UP

SYSTEM PROMPT

USER AREA

SELECTION INDICATOR
Lines in border indicate this window is selected; you can use the keyboard to type in this window.

$

POINTER

CURSOR

SCROLL DOWN

PAUSING WINDOW OUTPUT
- With pointer over PAUSE box; press select button. Output is paused.

SCROLL LEFT   SCROLL RIGHT

CHANGING THE SIZE OF A WINDOW
- With pointer over the SIZE box; press select button.
- Move dotted rectangle with pointer device to desired size; press select button.

RESTORING WINDOW OUTPUT
- With pointer over PAUSE box; press select button again.

SCROLLING WINDOW INFORMATION
- With pointer over a SCROLL ARROW; press select button.
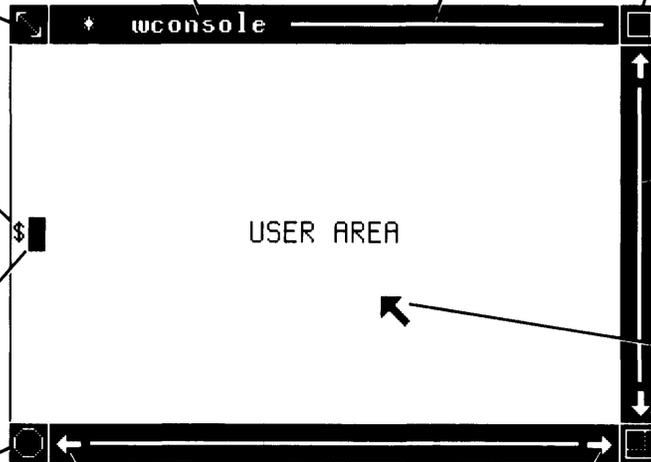
USING THE POP-UP MENU
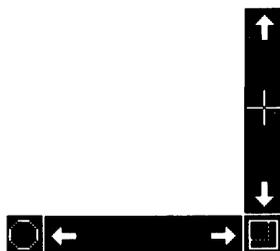
BRINGING UP A POP-UP MENU

- Move pointer to area in border outside of any boxes; press select button.
- To bring up a pop-up menu for the selected window, move pointer to a clear area of the screen; press select button.

THE POP-UP MENU

WINDOW/ICON NAME

SELECT A WINDOW/ICON (see below)

Faded items are inaccessible

PUT A WINDOW ON THE BOTTOM OF THE STACK

BRING A WINDOW TO THE TOP OF THE STACK

Highlighted items will be activated if select button is pressed.

MOVE A WINDOW/ICON TO ANOTHER SCREEN LOCATION

wconsole
Select
Top
Bottom
Move
Size
Icon
Save
Destroy
Exit WS
Repaint
Create Window

CHANGE THE SIZE OF A WINDOW

CHANGE A WINDOW TO AN ICON

SAVE THIS WINDOW

KILL ALL PROCESSES AND REMOVE A WINDOW FROM THE SCREEN

LEAVE THE WINDOW SYSTEM, KILL ALL WINDOW PROCESSES

REDRAW THE SCREEN

CREATE ANOTHER WINDOW

SELECT A WINDOW

A selected window allows you to type in that
window and access the window's operating system.

Indicates this window is selected.
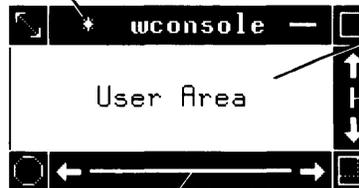
● Move pointer to user area;
press select button. Window
is brought to top of stack.

● Move pointer to border of any
window and use pop-up menu to
select the window. The window
stays in its location.

● Press SHIFT SELECT to shuffle
windows: bringing window an bottom
of stack to the top, and selecting it.

```
wconsole

User Area
```

Lines in border indicate
this window is selected.

ICON OPERATIONS

MOVE AN ICON

● With pointer over Icon MOVE
box; press select button.
● Move dotted rectangle to desired
location; press select button.

```
window1
```

RESTORE AN ICON TO A WINDOW

● With pointer over RESTORE
box; press select button.
Window re-appears.

ICON NAME

A New Way of Organizing Tasks
HP Windows/9000

7
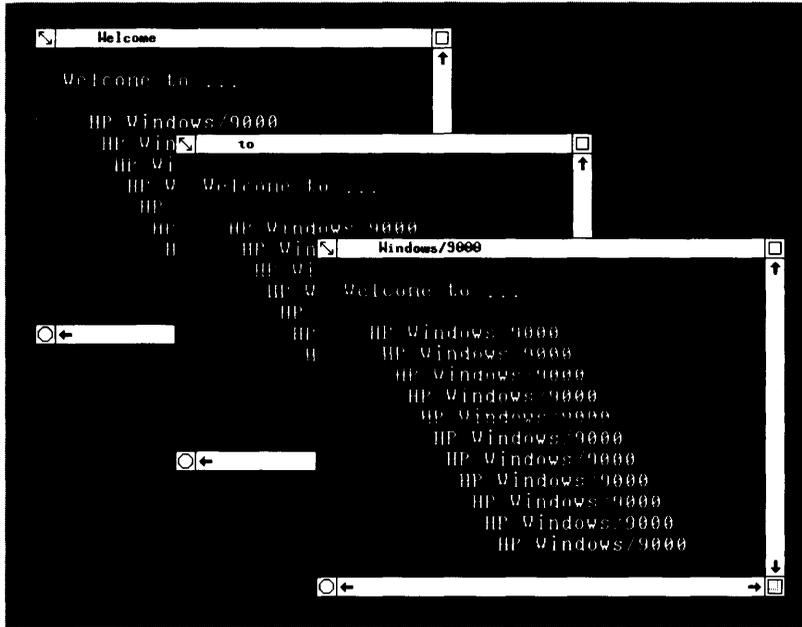
Who Can Use Windows

If you purchased the necessary memory to run HP Windows/9000 (recommended 2 megabytes) you will have configured your system during installation to run Windows; this means you loaded the AWINDOWS and ASTARBAS file sets. The default configuration (if you did not specifically request your own configuration) runs Windows automatically after you turn on the system and login (if you have a secure system). Therefore, your screen, in the default configuration, would show the Windows screen with a PAM window (for details on PAM, see Chapter 4).

Overview of Windows

Most of us are familiar with the picture of a desk scattered with papers. Some papers may be memos, others reference materials, and others current projects. As you place these papers on the desk, the most current are placed on top of others. During the course of the work day, papers are shuffled, bringing some on the bottom of the stack to the top. You may even work on several papers at the same time, performing several tasks.
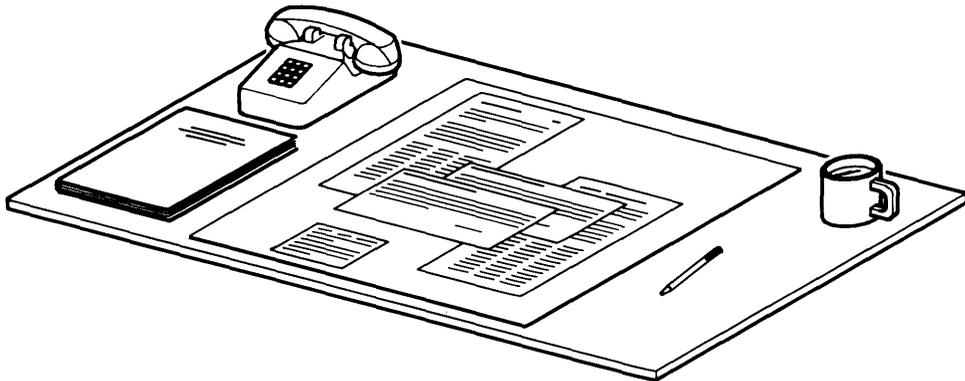
In the computer realm, a **terminal** performs a task. A terminal can be thought of as a single screen on which you execute tasks. The **window** concept takes a different approach, providing you with a visual method of performing multiple tasks. Like the papers in our desk top analogy, you can better monitor the progress of tasks by using windows .

Windows

You probably noticed the name HP Windows/9000 and may have wondered what papers on a desk have to do with windows (aside from throwing the papers out of windows). A **window** can be thought of as a piece of paper in our analogy of the desk top. Windows produces a graphic representation of a *window* and allows you to graphically place windows on the screen in the same manner you would place papers on a desk (see Figure 7-1).
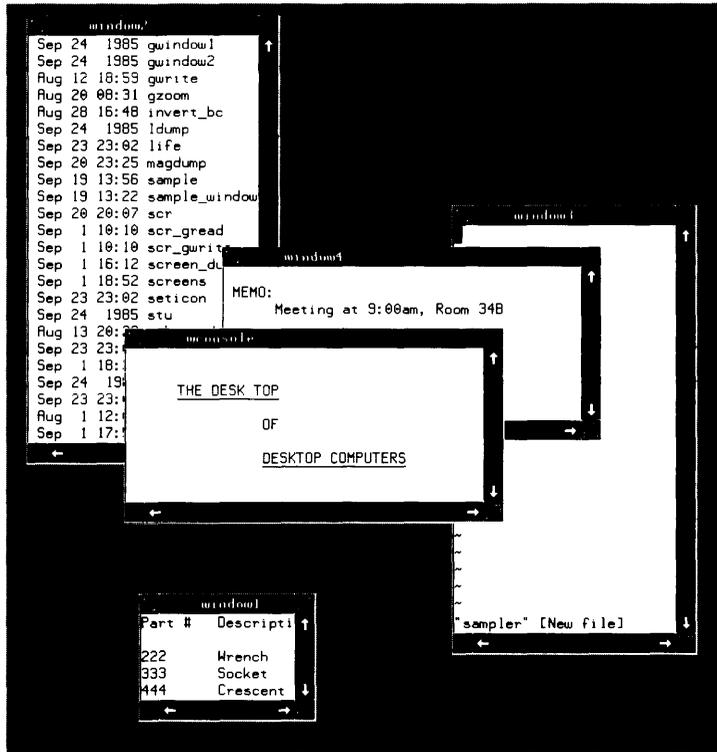
Figure 7-1. An example of window placement

Looking at Figure 7-1, you see how windows can be organized like papers on a desk top, but what specifically is a window? A window can be thought of as a terminal in which you perform a task. You can execute commands and run programs in each window. You interact with the computer within the borders of the window, and the window can be thought of as a complete unit. It is like having several terminals on the same screen.

Multitasking

By organizing the papers on your desk, you can work on several tasks at once, maybe using one as a current task and another as a reference. Performing several tasks at once on a computer is called **multitasking**. Multitasking with one terminal, you must run **background** processes (processes that are running but you cannot visually monitor). Windows allows you to display more than one task on the screen so you can monitor each task at the same time; each task executing in its own window and capable of interacting with other windows.

Why Use Windows?

As mentioned above, Windows provides a break from the traditional user/computer interface. Traditionally, you would interact with a single terminal, entering commands to perform one task at a time at that terminal. When multitasking is used without windows, you must specify foreground and background processes and may *see* only one task at a time (the **foreground** task). Using windows, you are can visually separate tasks on the computer screen and observe output. The confusion of running multiple tasks from one terminal is reduced.

Another advantage of Windows is the ability to organize your tasks in the same manner you do with paper. The graphic representation helps you remember a task that has been put aside for the moment. You can move windows around the screen, change their size, stack them like sheets of paper, and many other helpful organizing operations.

Types of Windows

Two types of windows are supported by Windows: *terminal* and *graphics* windows. A **terminal** window performs as a normal display which allows you to generate information. Applications programs using graphics execute in **graphics** windows. This chapter is primarily concerned with terminal windows.

Detailed Windows Commands

You can enter commands from the keyboard. These commands are included with the system if you wish to learn and use Windows in greater detail. A list of these commands is available in Appendix C.

Important Concepts

Before we discuss specific operations, let us first cover some essential concepts of windows.

Window Details

Looking at a window (see Figure 7-2), you can see two main areas: the *border* area, and the *user* area.

MOVE BOX   WINDOW NAME   BORDER AREA   ICON BOX

PAUSE BOX   SCROLL ARROW   SIZE BOX

USER AREA

POINTER
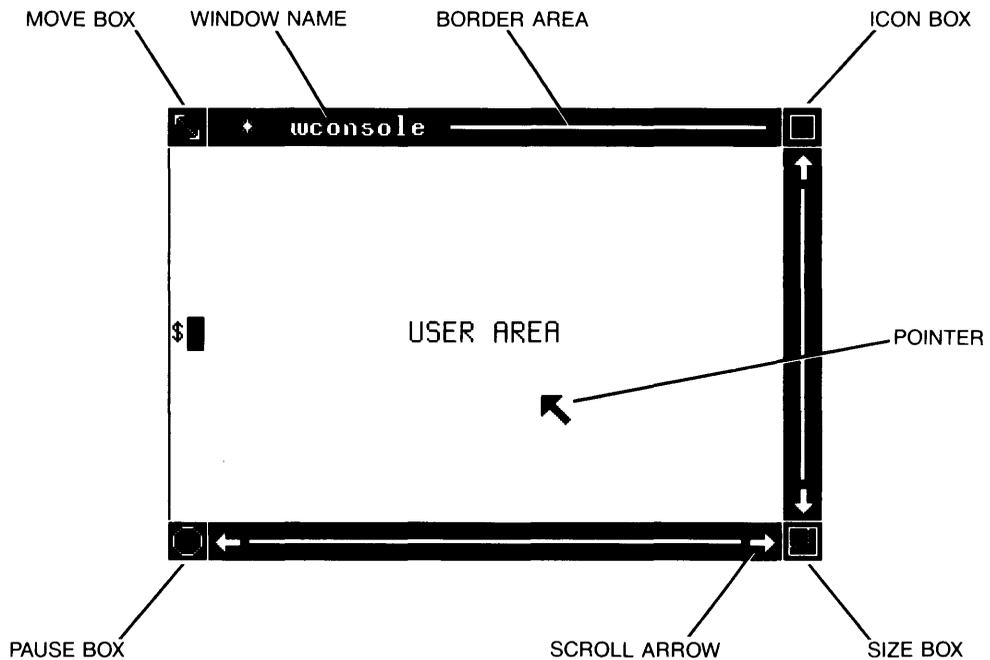
Figure 7-2. Window areas

The **user** area is reserved for information that you type on the keyboard. The **border** area extends around the user area (with a thin left border). Within the border are the window's name, symbols representing the status of the window, and areas that allow you to control the window and its relation to other windows. The operations that let you control window organization (**control boxes**) are covered in the "Window Operations" section and on the "Quick Guide to HP Windows/9000" card.

In the upper border (to the left) you see the name of the window, in our case *uconsole*. The asterisk (*) in front of the window name, and the presence of a line extending through the middle of the entire border indicates that this window is the *selected* window.

The area on the screen outside of any window or *icon* (see "Icon Operations") is called the **clear area**.

Selected Window

Windows allows you to go from one window to the next and perform operations. The keyboard is associated with one window at a time, therefore it is important to know which window is currently being used. A **selected** window responds to the keyboard. You can tell which window is selected by looking for an asterisk in front of the window name and a line in the border (see Figure 7-2). Windows without a line in the border or the asterisk in front of the window name will not respond to the keyboard until that window is selected.

The Stack

As you accumulate more than one window on the display screen, they may become overlapped. When windows are piled in this manner, they are in a **stack**. Even when the windows are not specifically overlapped, the computer orders the windows in such a way that when you *shuffle* windows (see "Shuffling Windows"), the selected window moves through the computer defined stack.

The Pointer

When the window system is running, there is a *pointer* that you can move about the screen by using a device such as a keyboard, a *Mouse*, or a *graphics tablet* (these devices will be described in more detail later). The **pointer** indicates the current screen location. The pointer is **not** the same as a *cursor*. A **cursor** is present on a terminal and thus on a terminal window (see Figure 7-2). You can have the operating system running in a window and thus have a cursor in that window. Remember that the cursor is confined to a window, and the pointer is not.

As the pointer moves on the screen, it changes shape for different areas.

POINTER SHAPE OUTSIDE OF WINDOWS

POINTER SHAPE IN FUNCTION ZONE

POINTER SHAPE IN USER AREA OR POP-UP MENU
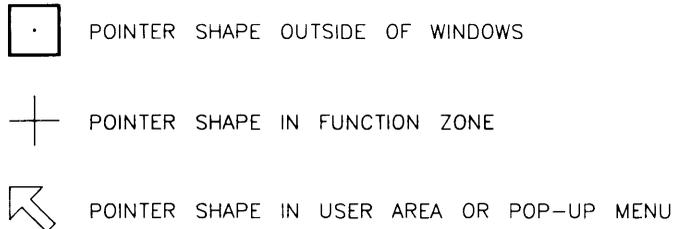
Figure 7-3. Pointer shapes

Moving the Pointer

The window system accepts instructions from various devices. While it is possible to use a keyboard to interact with Windows, a graphic input device (such as a Mouse or graphics tablet) is much more effective. These devices allow fast and easy interaction with the window system.

The Mouse

The Mouse is a convenient device to use with Windows (see Figure 7-4). It is logically connected to the pointer. To use the Mouse, place the palm of your hand over the hump on the Mouse, resting your fingers on the two buttons near the connector cord. By moving the Mouse on a table, you control the movement of the pointer. The pointer responds to every physical movement of the Mouse on the table.
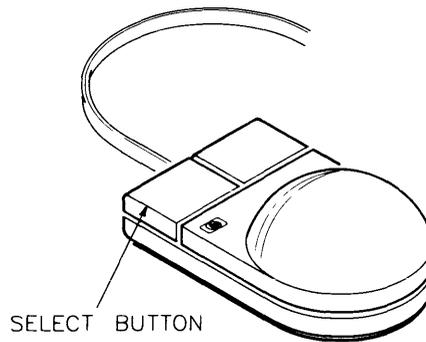
SELECT BUTTON

Figure 7-4. The Mouse

Using the Mouse

The pointer can be moved to any location on the screen by moving the Mouse over a flat surface, such as a desk top. The left button on the Mouse (as you face the cord, see Figure 7-4) is the "select button." The other button on the Mouse is not used by Windows.

You can perform various window operations by moving the pointer to appropriate locations inside the window border (see window operation descriptions) or to select items from a "pop-up" menu. For example, the box in the upper left corner of the border on a window represents the *move* operation. By moving the pointer to that area and pressing the select button, the *move* operation is activated. You can *select* a window in a similar manner (see window operation descriptions).

Graphics Tablet

The graphics tablet is also used as an interactive device for the windows system. You can use a **puck** (flat device with selection buttons) or a **stylus** (pen device) with the graphics tablet; see Figures 7-5 and 7-6. The graphics stylus or puck moves the pointer on the screen, as does the Mouse. The Mouse is moved on a table, and the pointer moves when the Mouse is moved. The stylus and puck are moved on a graphics tablet. The tablet area corresponds to the screen area; so when you pick up the stylus or puck and move it to another area of the tablet, the pointer moves to a corresponding location on the screen. Picking the Mouse off the table and moving it to another area would not move the pointer; the pointer only moves when the Mouse moves.
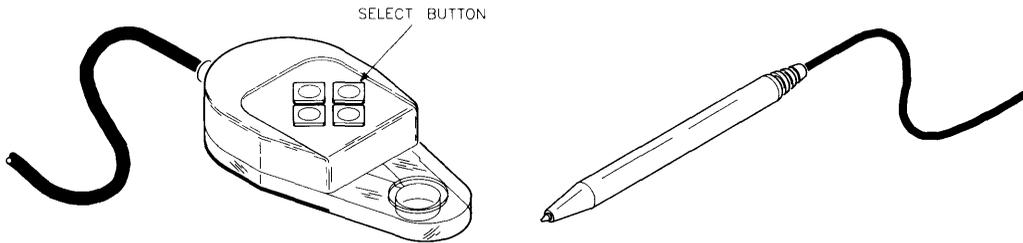
Figures 7-5, 7-6. The Puck Switch and the Graphics Stylus

You hold the puck with the cord facing you (opposite to the mouse). The "select button" on the puck is the leftmost button facing the cross-hairs, and the same as pressing down on the stylus.

Keyboard

If you have neither the Mouse nor the graphics tablet, you can still take advantage of Windows. Using the keyboard you can move the pointer and perform the same operations as with the Mouse. The next section describes the keyboard commands for Windows.

Keyboard Commands

The following commands are used to move the pointer and select operations in Windows. If two keys are shown, you must press the first key and hold it down, then press the second key. Hold the keys down to keep the pointer moving. Releasing the keys stops the pointer movement.

NOTE

If you fail to press the [CTRL] key along with the arrow keys, the pointer will not move. Instead, the cursor within the selected window will move.

Table 7-1. Keyboard Commands

Key	Operation
[CTRL]-[◄]	Moves the pointer left.
[CTRL]-[►]	Moves the pointer right.
[CTRL]-[▲]	Moves the pointer up.
[CTRL]-[▼]	Moves the pointer down.
[Select]	Selects the choice indicated by the pointer.
[Shift]-[Select]	Shuffle selection of windows on the display screen.
[Reset]	Stops execution of a process.
[Stop]	Pauses window output (switches between pausing output and resuming output).
[Menu] or [System] or [Shift]-[User]	Turns the system menu on or off.

The Pop-Up Menu

Most operations in the window system can be performed by moving the pointer and pressing the select button. However, you may not always be able to access the correct part of a window. For example, if a window is covered by another window, you need another way to operate on the covered window. Also, you need other commands such as "create a window" or "exit the system." To solve these problems, use the **pop-up** menu.

To activate the window system's *pop-up* menu (see Figure 7-7) move the pointer outside any window (not a part of any window) or to the border of a window, and press the select button. Make sure the pointer does not cover any of the control boxes. If the pointer is in a clear area (outside of any window), the pop-up menu is displayed for the selected window (items will operate on the selected window). If the pointer is in the border of a window (not necessarily the selected window), the pop-up menu will operate on that window.
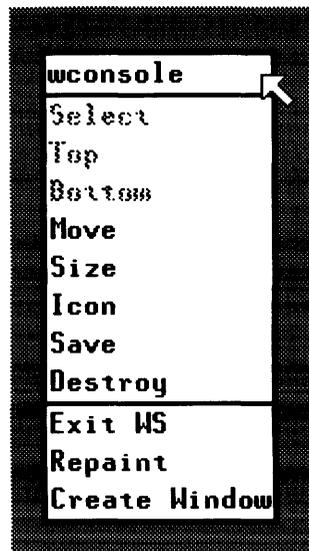
Figure 7-7. A pop-up menu

Using the Pop-Up Menu

Once the pop-up menu is activated, you will see the menu and a new pointer shape (see Figure 7-7). The menu contains a list of items available to you. To select the item, move the pointer to the item. It will highlight the area around the item (see Figure 7-8). Pressing the select button will activate the highlighted item.

Figure 7-8. Selecting an item in a pop-up menu

You can only access items that highlight as the pointer passes over that item.

To leave the pop-up menu, you can do one of the following:

- Move the pointer in a quick motion out of the menu area.

- Press any button other than the select button

- Move the pointer to the pop-up menu title or item that does not highlight and press the select button.

You will hear a beep to indicate leaving the pop-up menu.

Windows and Applications

If you purchase an application which uses Windows, you need to know the difference between *Window Smart* and *Window Dumb* applications. A **Window Smart** program will automatically use Windows (in other words you only have to start the program and it will start Windows). A **Window Dumb** application does not know how to start Windows. You must be in Windows, create a window and then run the application in the created window.

Window Operations

This section describes window operations. The descriptions avoid specific references to devices (such as graphics tablet or keyboard) by using statements like "moving the pointer." Therefore you will be able to learn the operations by observing action on the screen.

IMPORTANT

You should have read at least the "Important Concepts" section in the beginning of this chapter before continuing with the operation descriptions.

Creating a New Window

When a new window is created, it appears in its largest form. You can change the size with the Size option to suit your needs. The new window becomes the selected window (note the border lines and the asterisk before the window name).

Action

1. Bring up a pop-up menu (see "The Pop-Up Menu").

2. Highlight **Create Window**.

3. Press the select button to activate the Create Window operation.

4. After a short time, a new window will appear on the screen.

Things That Can Go Wrong

If you are having trouble staying in the pop-up menu, try to use slower motions. If you select the wrong item in the pop-up menu (such as Repaint) you will have to bring up the menu again.

Destroying a Window or Icon

The window or icon is removed from the screen and is not retrievable. Make sure you really wish to destroy a window or an icon before you execute this item. All processes in the destroyed window (or icon) are killed. If you destroy the selected window, the window on the top of the stack (if there are windows stacked on top of each other) becomes the selected window.

Action

1. Bring up a pop-up menu from the desired window (see "The Pop-Up Menu"). Check the name at the top of the pop-up menu with the name of the window you want destroyed. If the names are not the same, you have selected the wrong window; exit the pop-up menu and try again.

2. Highlight **Destroy**.

3. Press the select button to activate the Destroy item. The window will disappear from the screen.

Things That Can Go Wrong

If you destroy a window you wish to keep, you cannot retrieve the window. Therefore, be careful when selecting the correct pop-up menu. Remember at any time in a pop-up menu, you can leave the menu by moving the pointer in a quick motion out of the menu area or by pressing a button other than the select button.

If you accidentally destroy all windows on the screen, you will be able to access a *System Menu* pop-up menu. This menu has only three items that are available: Exit WS, Repaint, and Create Window. Therefore you can either leave the system (see Exit operation description), or create a new window (see Create Window operation description). You will not, however, be able to retrieve the destroyed windows.

Moving a Window

The window can be moved anywhere on the screen and can be moved partially off the screen.

Action

1. Move the pointer to the upper left box in a window border. The pointer changes to cross-hairs. Make sure the pointer is in the box with the double slanting arrow (see Figure 7-9).
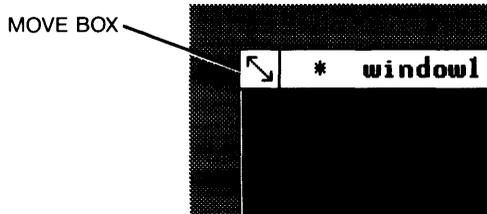
MOVE BOX

Figure 7-9. Move box

2. Press the select button to activate the Move operation.

3. A dotted rectangle will appear, surrounding the user area. Move the pointer device to move the dotted rectangle.
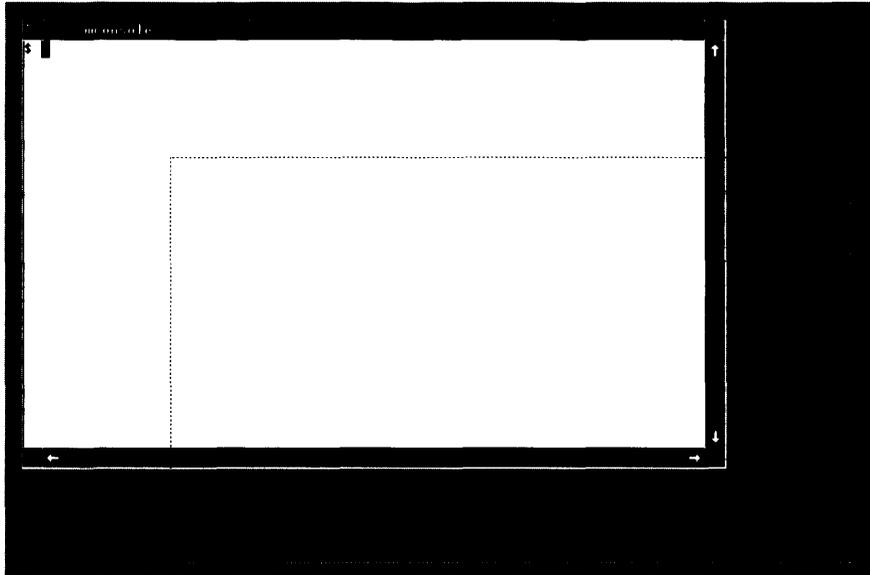
Figure 7-10. The Move Rectangle

4. Move the dotted rectangle to a desired location on the screen. Press the select button when you have reached the location. The window will move to the new area. Note the dotted rectangle represents the user area, and you should compensate for the border (if you get close to the screen edge).

If the Move box (the box with the double arrow) is unavailable, you may wish to use the pop-up menu for the Move operation. Reference the section on pop-up menus earlier in this chapter and follow these steps:

1. Bring up a pop-up menu for the desired window (see "The Pop-Up Menu").

2. Highlight **Move** .

3. Press the select button and follow steps 2 through 4, of the previous Action section.

Things That Can Go Wrong

If you experience some trouble during this operation, the pointer is probably centered in the wrong area. If you are trying to select the Move box (the double arrow) and get no response, you are probably outside of the box. Look at the shape of the pointer; it should be in the shape of a cross. Also make sure that you are not in the area of the border with the window name.

If you are having trouble staying in the pop-up menu, try to use slower motions. Recall that to leave the pop-up menu, you move the pointer with a quick motion outside of the menu area. If you select the wrong item in the pop-up menu (such as Size) try to **not** move the pointer, and press the **select** button to leave that command mode.

Changing the Size of a Window

You can change the size of a window by enlarging or shrinking the window to suit your needs. The largest a window can be is the size it was when you created the window. There is also a minimum size for a window. You can find these sizes by experimenting with this operation.

Windows allows you to change the size of a window from its size when created to a smaller size if desired. What happens if you have information filling a larger window, and you decide to shrink the size of the window? The information is not lost. The information remains the same size (pictorially), only the viewing area gets smaller. You will see later that it is possible to scroll the information in the viewing area of a terminal window up, down, left, and right to view the information in this smaller window (scroll arrows).

Action

1. Move the pointer to the box in the lower right corner of the border (see Figure 7-11).
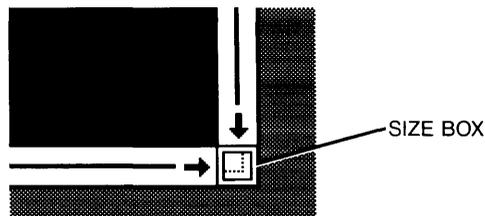
Figure 7-11. Size box

2. Press the select button to activate the **Size** operation. As in the Move operation, a dotted rectangle appears around the user area of the chosen window. If the window is partially off screen, the allowable range is only the user area **on** the screen (the dotted rectangle does not disappear off the screen).
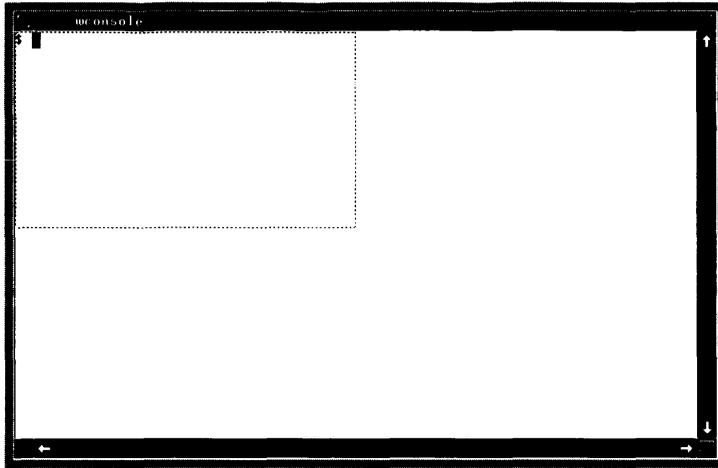
Figure 7-12. The Size Rectangle

3. Move the pointer device to change the shape of the dotted rectangle. Moving up and down will cause the rectangle to shorten and lengthen in height; moving left and right causes the rectangle to shrink and expand in width.

4. When you have a desired window size, press the select button. The window will change size.

If you wish to use the pop-up menu:

1. Bring up a pop-up menu for the desired window (see "The Pop-Up Menu").

2. Highlight **Size**.

3. Press the select button to execute the Size operation.

4. Follow steps 3 & 4, of the previous Action section.

Things That Can Go Wrong

If you experience some trouble during this operation, the pointer is probably centered in the wrong area. If you are trying to select the Size area (in Figure 7-11) and get no response, you are probably outside of the area. Look at the shape of the pointer; it should be in the shape of a cross.

If you are having trouble staying in the pop-up menu, try to use slower motions. If you select the wrong item in the pop-up menu (such as Move) try to **not** move the pointer. Just press the **select** button to leave that command mode.

Selecting Windows

If you have windows overlapping, you may wish to select a window that is not on top. There are several options: bring it to the top and make it the selected window, select it in its current location or *shuffle* windows.

By selecting a window, you can interact with that window; see "Selected Window" section.

NOTE

It is possible to select an icon. In this case the icon name is preceeded by an asterisk. Anything typed while the icon is selected cannot be seen unless the icon is restored to its original window size.

Actions
Selecting a Window and Bringing it to the Top

If you have windows that are overlapping and you select a window underneath another window or windows, this method of selection automatically brings the entire window to the top of the stack of windows.

1. To select a new window, move the pointer to the user area of the window you wish to be selected (look at the borders to make sure it is not selected; they should not have a line).

2. Press the select button. The window becomes the selected window and moves to the top of the stack.

Selecting a Window in Place

If you wish to select a window under another window or windows, this method keeps the selected window in place.

1. Bring up a pop-up menu for the desired window (see "The Pop-Up Menu").

2. Highlight **Select**.

3. Press the select button to activate the **Select** operation. The window is now the selected window (note the lines in the border).

Shuffling Windows
Shuffling windows brings the window on the bottom of the stack to the top and selects that window.

1. Press ⌐Shift⌐⌐Select⌐ on the keyboard. The window on the bottom of the stack becomes the selected window.

Things That Can Go Wrong
If you do not position the pointer in the user area when selecting a window, you may activate the wrong operation or a pop-up menu. Remember that the pointer is in the shape of an arrow while in the user area.

You may inadvertently select the wrong window. In this case move the pointer to the correct window and press the select button.

If you do everything correctly and nothing happens, you may have selected a window which is already selected. If you use a pop-up menu, make sure the Select item is highlighted. If your pointer is over the window name, nothing will happen. If the Select item is faded, you have chosen a window already selected.

Bringing a Window to the Top of the Stack
This operation can be used when you have several overlapping windows. You can go to the window you wish to be on top (selected **or** not) and use the pop-up menu to bring the window to the top of the stack.

Action

1. Bring up a pop-up menu for the desired window (see "The Pop-Up Menu").

2. Highlight **Top**.

3. Press the select button. The window will move to the top of the stack.

Note the window need not be selected to move it to the top.

Things That Can Go Wrong
If you accidentally select a pop-up menu for the wrong window, leave the menu by quickly moving the pointer out of the menu. If **Top** does not highlight as you pass the pointer over the item, it means you have selected a window which is not under another window.

Putting a Window on the Bottom of the Stack

This operation is useful when you have several overlapping windows. Use the pop-up menu to take a window to the bottom of the stack.

Action

1. Bring up a pop-up menu for the desired window (see "The Pop-Up Menu").

2. Highlight **Bottom**.

3. Press the select button. The window will move to the bottom of the stack.

Note the window need not be selected to move it to the bottom.

Things That Can Go Wrong

If you accidentally select a pop-up menu for the wrong menu, then leave the menu by quickly moving the pointer out of the area. If **Bottom** does not highlight as you pass the pointer over it, there is no window under the selected window.

Icon Operations

In Windows, an **icon** is a small representation of a window. As an analogy, let us return to our desk top. If your desk is getting full of papers, but all papers are important, you may wish to fold some up and place them in the corner of the desk. You therefore eliminate some of the clutter and make room for the more vital papers (yet you still have a visual reminder of the folded paper).

You can do something like folding papers in Windows: change the window into an *icon* and place it out of the way. Figure 7-13 shows a typical terminal icon. Figure 7-14 shows a picture of a typical graphics icon. When you use this operation, you clear the window off the screen, and the icon is placed out of your way. It is still there as a visual reference so you do not forget it is an important window.

Figures 7-13, 7-14. Terminal icon and Graphics icon

The icon location and window location are independent of each other.

Action

Creating the Icon

1. Move the pointer to the upper right corner box (see Figure 7-15).
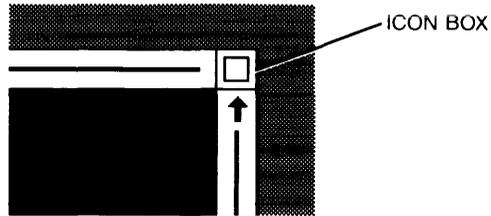
ICON BOX

Figure 7-15. Icon box

2. Press the select button to activate the Icon operation. The window will disappear from the screen, and an icon (Figure 7-13) will appear on the lower left portion of the screen. The icon will display the name of the window. If the icon covers part of another window, it will not interfere with the performance of that window.

If you wish to use the pop-up menu, follow these steps:

1. Bring up a pop-up menu for the desired window (see "The Pop-Up Menu").

2. Highlight **Icon**.

3. Press the select button to activate the Icon operation.

Moving the Icon

1. Move the pointer to the lower left corner of the icon. Here you see a small box containing a double arrow (the same as in the Move operation). Center the pointer over this area. The pointer will change to cross hairs.

2. Press the select button. A small dotted rectangle will appear around the icon.

3. Move the pointer device and move the rectangle to a desired location.

4. Press the select button. The icon moves to the new location.

Restoring a Window From an Icon

1. Move the pointer to the lower right corner of the icon to the area containing the filled square (see Figure 7-15).

2. Press the select button. The original window is restored.

Moving and Restoring a Window From an Icon

The pop-up menu contains items to move and restore the window to its normal size and location. To use the icon's pop-up menu, follow these steps:

1. Make sure that the pointer is covering some portion of the icon other than the control boxes.

2. Press the select button to bring up the icon pop-up menu. Compare the name of the pop-up menu with the name of the icon. Make sure these names are the same.

3. If you wish to move the icon, highlight **Move**. If you wish to restore the icon to the normal window size, highlight **Normal**.

4. Press the select button. If you selected the Move operation, move the dotted rectangle to a desired location and press the select button.

Things That Can Go Wrong

If you experience some trouble during this operation, the pointer is probably centered in the wrong area. If you are trying to select the restore area and get a pop-up menu, you need to be accurate with the pointer. Always compare the name of the pop-up menu with the icon name. If the names differ, leave the pop-up menu and try again.

If you are having trouble staying in the pop-up menu, try to use slower motions. If you select the wrong item in the pop-up menu (such as Size) try to **not** move the pointer. Just press the **select** button to leave that command mode. **Be careful not to accidentally execute the Destroy item.** This will erase the window or icon, and you will have to create another window.

Repainting the Screen

At some point you may be running an program that prints outside of or over a window. The Repaint operation redraws the screen and restores the original window format. This operation does not guarantee to fix all damage done to either type of window. Graphics windows, for example, may only repaint the borders.

Action

1. Bring up a pop-up menu (see "The Pop-Up Menu").

2. Highlight **Repaint**.

3. Press the select button to execute the Repaint item. The screen will be repainted.

Things That Can Go Wrong

You may try the Repaint item and notice that nothing changed. You probably have nothing to repaint. If you do not change the screen format (over the windows, for example), repaint duplicates the window format (since it is already in correct format).

Pausing Window Output

This operation allows you to halt and restart output in a terminal window. For example you may have window output (resulting from a command or program) which is scrolling too fast to read. You can stop the scrolling with this operation and restart it when ready.

Action

1. Move the pointer to the lower left corner of the desired window (see Figure 7-16).
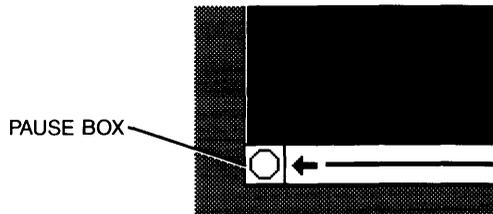
PAUSE BOX

Figure 7-16. Pause box

2. When you wish to pause the window output, press the select button. Note the area in the shape of a stop sign is highlighted. This tells you that the Pause operation is activated.

3. To restart the output, press the select button again. The area in the shape of a stop sign will return to its original form.

Using the Keyboard

1. Press ⬚Stop to pause window output.

2. To restart output, press ⬚Stop again.

Things That Can Go Wrong

If you experience some trouble during this operation, the pointer is probably centered in the wrong area. If you are trying to select the Pause box and get no response, you are probably outside of the box. Look at the shape of the pointer; it should be in the shape of a cross. Also make sure that you are not in the user area.

Scrolling Information in a Window

This operation allows you to scroll the information in the user area of a window. You can scroll up, down, right, and left. This operation is especially useful for small windows. You can visualize the process by thinking of a window moving over a large area of information. Figure 7-17 shows an analogy of scrolling information.
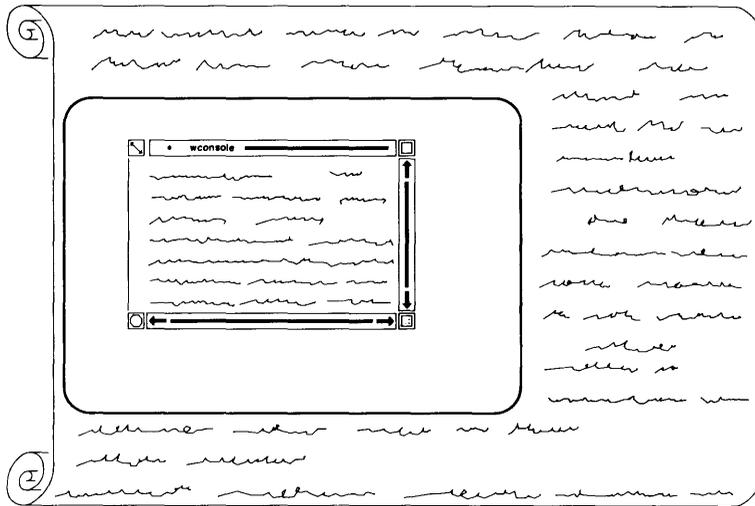
Figure 7-17. Scrolling Analogy

Inside the right and lower border of a window you will see small arrows near the control boxes (see Figure 7-18). The scroll arrows scroll the screen in the indicated directions.
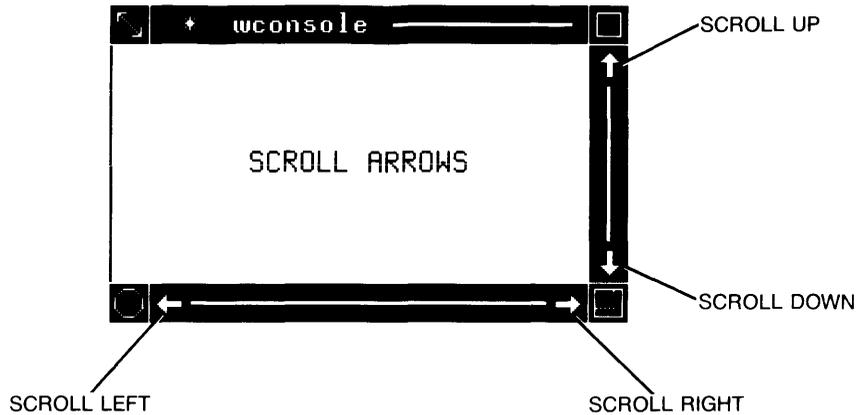
Figure 7-18. Scroll Arrows

Action

1. Move the pointer to cover a scroll arrow in the border (see Figure 7-18).

2. Press the select button. The information is scrolled by one character. If you wish to scroll rapidly, press ⌈Select⌉ and hold it down.

Things That Can Go Wrong

If the information does not move, it could be due to not having the pointer correctly over a scroll arrow. Also, the information will not scroll if it has reached the limit of two screens vertically, or the margins (left or right).

If a pop-up menu appears, your pointer is not correctly over a scroll arrow.

The Save Option

You have the option to *save* or not *save* a window.

If you have an application running in one or several windows there are two options that can occur when the application has stopped: the windows created can either stay on the screen or they can be automatically destroyed. Using the *save* option keeps the windows on the screen when all processes of that application are terminated.

You can have windows which are not saved. By doing this you can destroy the window automatically by stopping all processes. In most cases the windows you create will perform as terminals. By pressing CTRL d you terminate all processes (from a shell or system prompt). If the window is not saved, pressing CTRL d will stop all processes, and destroy the window. The window will not be destroyed after command is processed (for example, listing the current directory), only when all processes are stopped (the operating system or shell, and PAM are considered processes).

When you create windows using the pop-up menu, you create windows which are **not** saved. To change this you should use the **Save** item in the pop-up menu for this particular window. Therefore, if you create windows using the pop-up window, your only option is to *turn on* the save option. The entry in the pop-up menu for this window will now be inaccessible. Once you have *saved* a window, it stays *saved*.

Action

1. If you wish to turn on the *Save* option in the selected window, bring up a pop-up menu in the clear area (see "The Pop-Up Menu"). If you wish to turn on the *Save* option in a window which is not selected, bring up a pop-up menu for the desired window.

2. Highlight **Save**.

3. Press the select button to turn on the **Save** item. This window is now saved.

Things That Can Go Wrong

If you choose to use the Save option, you must be aware that turning on the save option is permanent for that window. Make sure you do not highlight another item when you press the select button in the pop-up menu.

If the save item is not highlighted when you move the pointer over the item area, the save option is already turned on for this window.

Special Cases

If your system is configured as a secure system (you have to login before you begin operations) you may not automatically see the Windows version of PAM when you login. If this is the case, your system may be configured for using a different *shell* (see "More Details of AXE," Chapter 8).

If you are in a shell other than PAM, you can run Windows (providing you system is configured for Windows) by following these commands (the reference to system prompt is the shell prompt the computer uses to notify you that it is ready for another process.

Entering Windows

To start Windows, be sure you see a system prompt (usually $). Enter the following command (in lower case):

wmstart Return

A window named *wconsole* will appear. From this window, you can begin operations in Windows.
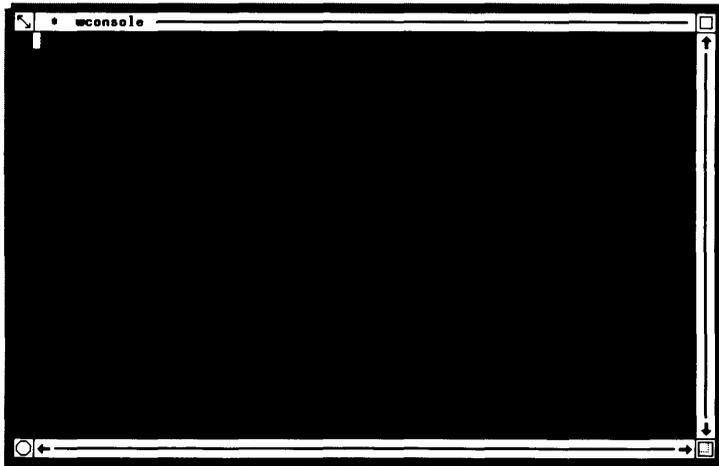
Figure 7-19. The wconsole Window

Leaving Windows

This operation will leave Windows, clear the screen, and provide you with a system prompt. All processes will be killed, so make sure you are ready to leave Windows before you proceed with this operation. (If your system is configured to run PAM in Windows, this command will only clear the screen and a new PAM window will be created.)

Action

1. Bring up a pop-up menu (see "The Pop-Up Menu").

2. Highlight **Exit WS**.

3. Press the select button to execute the **Exit WS** item. A small pop-up menu will appear asking you if you wish to leave the system (see Figure 7-20).
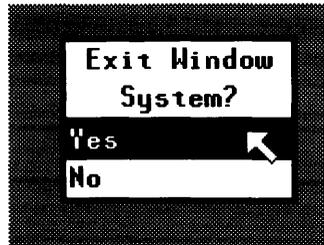
Figure 7-20. Exit system menu

4. Move the pointer to **Yes**. The area around **Yes** will be highlighted.

5. Press the select button to leave Windows.

Things That Can Go Wrong

If you **accidentally** activate the Exit WS item from a pop-up menu, you can easily cancel the action with one of two methods. First you can choose **No** and return to Windows. Second, you could move the pointer with a quick motion out of the small pop-up menu area and return to Windows.

If you have trouble staying in the pop-up menu, try slower movements of the pointer.

Table of Contents

8

More Details of AXE   **8**

The AXE you see and interact with on the screen is only part of a whole. The preceeding chapters showed you how to use AXE; this chapter will describe AXE in greater detail, on a conceptual level.

The AXE Structure

Before we discuss the AXE structure, let us divert for a moment and talk about the way humans react when interpreting the phrase, "Hand me the book." On one level, we hear the phrase, "Hand me the book." Our brain, through channels connected to the hearing process (given they function), interprets the phrase. Messages are then sent to the arm and hand to pick up the book and hand it to the person requesting it.

Looking at a computer system, you can see similar levels of interaction. When you type in the keyboard, you are opening a channel to the computer like the ears hearing the phrase, "Hand me the book." On one level, the computer interprets the keyboard interaction and sends messages to another level, similar to the brain sending messages to the arm and hands. On the lowest level, the hardware, the task is completed whether it is handing a book or performing a computer function.

AXE has several levels of interaction: the *shell*, the *file system* or *utilities*, and the *kernel*. These levels are shown in Figure 8-1, where the arrows between the levels represent interaction.
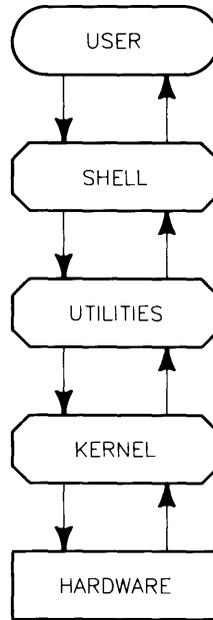
Figure 8-1. The AXE Structure

The top level represents the user (you) interacting via the keyboard or some other interactive device. The bottom level represents the actual hardware of the system. The levels in-between are described in the sections below.

The Kernel

Starting from bottom up, you can see the *kernel* directly interacting with the hardware. The **kernel** is the level which manages the resources of the computer system. It keeps track of and interacts with all the devices such as discs, printers, communication, and memory.

Utilities

The next level from the kernel is the *utility* or *file system* level. AXE has many utilities, all stored in files. These files contain the instructions that tell the kernel what to do. An example of a utility is a sorting function. When a file is to be sorted, the utility instructs the kernel how to sort the file. The kernel then instructs the hardware to physically perform the sort. The utility level contains all of the files the system uses.

The Shell

The top level of AXE is the *shell*. The **shell** is a command interpreter. It receives information from you (when you type commands, for example) and works as a supervisor, translating your requests into actions through the utility and kernel levels. The shell is what you see on the screen. The AXE default configuration (if you do not change the system when configuring or reconfiguring the system) is the PAM shell. PAM is described in detail in Chapter 4, "Using the System: PAM." There are several other kinds of shells available to you which will be described in the sections below.

Other Shells

AXE has several shells available for your use other than the PAM shell (the shell present if you do not specifically say otherwise when configuring the system). These are the "C" shell (/bin/csh, located in the SYS_TOOLS file set), Bourne shell (/bin/sh), and the Restricted Bourne shell (/bin/rsh). A shell allows you to execute HP-UX commands (a list of commands available to you is in Appendix A). These commands can be used, but due to their detailed nature, they will not be discussed in this manual.

The use of detailed HP-UX commands are catered to the needs of a programmer. Information about the shells and detailed commands are present in the "Programming Environment" package which can run "on top of" AXE (an addition to the system; see the next section, "Building on AXE").

Building on AXE

AXE is only a subset of a large system available to you. HP-UX gives you flexibility with how much detail you need for your particular application. AXE offers a basic system for users who need only basic commands to run applications. The user who wishes to write programs would need more than AXE. Figure 8-2 shows a diagram with the available additions that can be made to AXE.
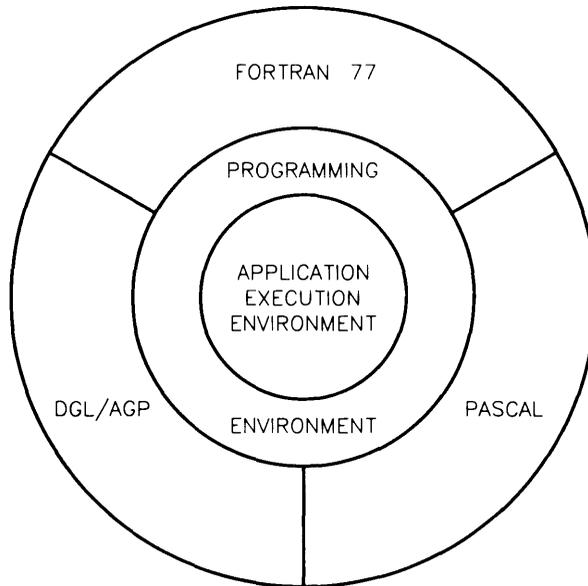
Figure 8-2. HP-UX Structure

The AXE is at the innermost level, providing PAM, administration tools, the `vi` editor, Windows, and other utilities. The next level is the *Programming Environment* (PE). This level includes UNIX[1] operating utilities and libraries, communications packages, a "C" language compiler, programming control of Windows, and other enhancements to AXE. The outermost level shows additional languages that can be placed on the system: FORTRAN 77, Pascal, and DGL/AGP, a set of graphics tools to enable advanced graphics.

---

[1] UNIX (TM) is a trademark of AT&T Bell Laboratories, Inc.

Where To Get More Information

There are several books on the market that give detailed information about UNIX. HP-UX is an enhanced version of UNIX, so the information gained by these books is applicable to your system. Also, if you upgrade your system to include the Programming Environment, you will receive detailed documentation about shells, commands, and other HP-UX information.

Notes

System Administrator's Guide for AXE

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9

Caring for Your AXE System   9

You have invested time and money into your AXE operating system. You must take care of your system so it continues to perform correctly. This chapter provides guidelines and procedures to care for your AXE system.

Periodic Checks

It is very important that you follow the suggested procedures for taking care of your AXE system. If you do not follow the suggested procedures, you could lose files, corrupt your file system, or run out of disc space.

After you install your AXE system:

- create a recovery system,

- create a password for the user, "root" (if you have a secure system),

- backup your system after you have installed and customized your system.

Each time you shutdown the system:

- use procedures in "Shutting Down the System" in Chapter 10.

Each time your file system space is low:

- Follow procedures in "Managing Disc Space"

Each time you reformat your disc (such as changing swap space or creating a new file system) or re-install AXE:

- do an archival backup using the procedures in "Backing Up and Restoring the File System" in this chapter, then,

- create a new recovery system following the procedures in "Creating a Recovery System" in Chapter 10.

Daily:

- incremental or archival backup (see "Backing Up and Restoring the File System" in this chapter),

- check logging files using the procedures in "Managing Disc Space" in this chapter,

Weekly:

- perform an archival backup (follow procedures in "Backing Up and Restoring Your File System" in this chapter),

- check logging files using the procedures in "Managing Disc Space" in this chapter.

Monthly:

- check logging files using the procedures in "Managing Disc Space" in this chapter,

- save a permanent copy of an archival backup.

Important Files

Do not delete the device files listed in Table 9-1. Deleting these required files will cause severe problems because your AXE system needs these files to operate properly.

Table 9-1 Default Device Files

Device File	c/b	Major	Minor	Device Description
/dev/console	c	0	0x000000	System message port
/dev/syscon	c	0	0x000000	System console (linked to console)
/dev/systty	c	0	0x000000	System tty (linked to console)
/dev/tty	c	2	0x000000	Process group control terminal
/dev/null	c	3	0x000002	Null file ("bit bucket")
/dev/mem	c	3	0x000000	Physical memory image
/dev/kmem	c	3	0x000001	Kernel virtual memory image
/dev/swap	c	8	0x000000	Swap device
/dev/root	b	0xffffff	0xffffff	Root psuedo device file

If you inadvertently remove any of the files in Table 9-1 use the information in the table to create a new file, using the following command:

    mknod *device_file c/b major minor*

Another important file is your AXE operating system, */hp-ux*.

If you have HP Windows/9000 running, do not remove the following files in the */dev* folder:

```
crt     crt9837     crt98700     hil*     locator     screen     pty*
```

In general, do not remove files from the following folders: */bin* and */usr/bin*.

Backing up and Restoring the File System

The backup process lets you recover lost data if there is a hardware failure, a system **crash**, or if you accidentally remove or corrupt a file. Backups can be made on cartridge tape, flexible disc, or 9-track tape. Recovery procedures are also detailed in this section.

To minimize the chance of loss, backups should be stored at a different location from the main file system. "Data safes", specially designed air-tight, water-proof containers for mass storage media, are available from many computer accessory manufacturers. If a file or the entire file system is lost or destroyed, you can recover by restoring the latest version of your system backup.

Backup Strategies and Trade-offs

The method, frequency and extent of the backup operation depends on how much you use your system and how much data you feel you can afford to lose. Complete backups (as compared with partial ones) take significant time and the media costs involved can be high.

Daily Archive Backups

One backup strategy is to make complete backups of the file system on a daily basis. A complete backup is often called an **archive backup**. Restoring the file system from a full archive backup consists of restoring the most recent backup tape or flexible disc. While relatively expensive in terms of media, system resources and the time required to make full daily backups, the time and effort spent recovering the system is minimal.

Incremental Backups

An **incremental backup** contains only files that have changed since the last archival backup. Incremental backups almost always require less time and less backup media than archive backups.

Mixing Archive and Incremental Backups

The ability to use both archive and incremental backups leads to a useful backup strategy that is cost-effective and time-efficient without sacrificing the integrity of the file system. This method involves making archive (complete) backups of the file system once per week and supplementing this with daily incremental backups.

Suppose, for example, that you make a complete backup of the file system on Monday and make incremental backups on Tuesday and Wednesday. Each incremental backup contains only those files that have changed since Monday. Further assume that, on Thursday, the file system is destroyed. The file system may be reconstructed by first restoring Monday's archival backup of the file system and then restoring the files from Wednesday's incremental backup. Note that the file system is now restored to the end of Wednesday's incremental backup. All work not on a backup has been lost.

There are two backup scripts provided with your system, *backup* and *backupf*. Use *backupf* if your backup will be on flexible disc. Use *backup* if your backup will be on cartridge tape or 9-track tape. If you use 9-track tape, you must modify the *backup* script. The backup scripts (*backupf* or *backup*) can be used to do either a full or an incremental backup. You can customize these scripts, as explained later in this chapter.

Hewlett-Packard recommends the following backup schedule:

- full archival backup weekly or biweekly
- store the backup at least 2 weeks (see Figure 9-1)
- daily incremental backup
- take an archive backup and store it in a permanent archive monthly.

File System Backup Queue

age of backup   extra

| 1 day old | 2 day old | 3 day old | 4 day old | 5 day old | 6 day old | 7 day old | 8 day old | 9 day old | 10 day old | |

place in queue ⟵   ⟵ backup system
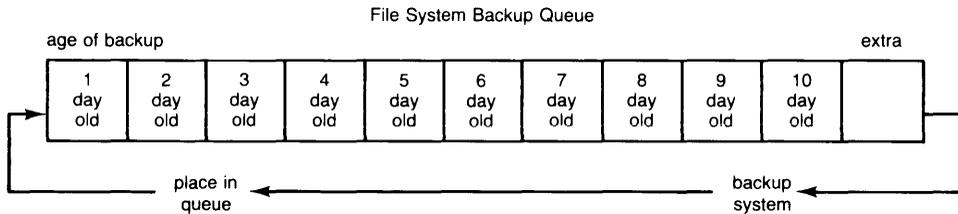
Figure 9-1. File System Backup Queue

You should continue making/using incremental backups until:

- one or two weeks have passed since the last archive backup (if you are maintaining an archival schedule).
- the size of the backups becomes unwieldy (for example, larger than one tape).
- you feel it is necessary to create a new archive backup for any reason.

Backing Up the System

The file system can be backed up onto the following media:

- cartridge tape,
- flexible disc,
- magnetic tape.

You can either:

- perform a regular system backup using either the *backup* command or the *backupf* command, or
- backup selected files using the *cpio* or *tar* commands to copy selected files to a backup volume.

The following sections describe how to use the correct backup script for your backup media.

Backing up Onto Flexible Disc

Use the backup script, *backupf*, to backup your file system onto flexible discs.

To prepare to backup, answer the following question:

- Is character special file associated with your flexible disc drive called */dev/rfd*?

  If not, you must edit */etc/backupf* to assign the correct device file to the `outdev` variable or use the procedures in "Setting Up Mass Storage Devices" in Chapter 10 to create the character special device file called */dev/rfd*.

1. Login as the super-user `root`. See the section "Becoming the Root User" in Chapter 10. If you are not the super-user you will have problems copying files that you do not own or have permission to access.

2. Execute the shutdown command by typing:

   `shutdown 0` [Return]

   For more information on the shutdown procedure, see the section "Shutting Down the System" in Chapter 10.

3. Insert the flexible disc.

4. Perform the backup.

The *backupf* script will write (log) information to the file */etc/backuplog*: the start and finish times of the backup, the number of blocks copied, and any error messages that may have occurred during the backup. Information and messages written to this log file are appended onto the end of the file.

If the *backupf* command runs out of room on the flexible disc, it prompts you to insert a new medium.

- **If you are doing an archival backup**, do the following steps:

    a. Change to the root directory by typing:
        cd / [Return]

    b. Type:
        /etc/backupf -archive [Return]

    c. Check the file system by typing in:
        fsck -p *[filesystem_name]* [Return]

       For more information on *fsck* see "Checking Your File System" in this chapter.

NOTE

Do not run *fsck -p* without reading the "Checking Your File System" section in this chapter.

- **If you are performing an incremental backup**, do the following:

    a. Change to the root directory by typing:
        cd / [Return]

    b. Type:
        /etc/backupf [Return]

- **If you are backing up selected files,** do the following:

  a. Go to the folder containing the files:
     cd *folder_name* [Return]

  b. Assuming your flexible disc drive is associated with the device file */dev/rfd* (if not, replace "rfd" with the correct character special device file name), use the *cpio* command as follows :
     - to back up all files and folders from the current folder, type in:
       find . -print | cpio -ocBx > /dev/rfd [Return]
     - to back up all files in your current folder, type in:
       ls | cpio -ocBx > /dev/rfd [Return]
     - to back up selected files in your current folder and folders, type in:
       ls *file-name dir-name/file* | cpio -ocBx > /dev/rfd [Return]

The file names should be separated by blank spaces. If your files are in different folders, you can specify relative path names for your file names.

5. When the backup has finished, remove the flexible disc.

6. Label the flexible disc with the date and the type of backup (archive or incremental) and store it in a secure place.

7. Examine the information and messages sent to the file, */etc/backuplog* to determine if any errors occurred during the backup process.

Backing up Onto Cartridge Tape

Use the backup script, *backup*, to backup your file system onto cartridge tape.

To prepare to backup, answer the following questions:

- Is character special file associated with your cartridge tape drive called */dev/rct?*

  If not, you must edit */etc/backup* to assign the correct device file to the outdev variable or use the procedures in "Setting Up Mass Storage Devices" in Chapter 10 to create the character special device file called */dev/rct.*

1. Login as the super-user root. See the section "Becoming the Root User" in Chapter 10. If you are not the super-user you will have problems copying files that you do not own or have permission to access.

2. Execute the shutdown command by typing:

   shutdown 0 [Return]

   For more information on the shutdown procedure, see the section "Shutting Down the System" in Chapter 10.

3. Insert the cartridge tape.

4. Perform the backup.

   The *backup* script will write (log) information to the file */etc/backuplog*: the start and finish times of the backup, the number of blocks copied, and any error messages that may have occurred during the backup. Information and messages written to this log file are appended onto the end of the file.

   If the *backup* command runs out of room on the cartridge tape, it prompts you to insert a new tape.

   - **If you are doing an archival backup**, do the following steps:

      a.   Change to the root folder by typing:
           cd / [Return]

      b.   Type:
           /etc/backup -archive [Return]

      c.   Check the file system by typing in:
           fsck -p *[filesystem_name]* [Return]

           For more information on *fsck* see "Checking Your File System" in this chapter.

NOTE

Do not run *fsck -p* without reading the "Checking Your File System" section in this chapter.

- **If you are performing an incremental backup**, do the following:

   a. Change to the root folder by typing:
       cd / [Return]

   b. Type:
       /etc/backup [Return]

- **If you are backing up selected files**, do the following:

   a. Go to the folder containing the files:
       cd *folder_name* [Return]

   b. Assuming your cartridge tape drive is associated with the device file */dev/rct* (if not, replace "rct" with the correct character special device file name), use the *cpio* command as follows:
       - to back up all files and subfolders from the current folder, type in:
           find . -print |cpio -ocx |tcio -o /dev/rct [Return]
       - to back up all files in your current folder, type in:
           ls |cpio -ocx |tcio -o /dev/rct [Return]
       - to back up selected files in your current folder and folders, type
           ls *file_name dir_name/file_name* |cpio -ocx |tcio -o /dev/rct

The file names should be separated by blank spaces. If your files are in different folders, you can specify relative path names for your file names.

5. When the backup has finished, remove the cartridge tape. Be certain that the cartridge tape is logically "unloaded" **before physically removing it from the tape drive**; see the "Special Considerations" material later in this section.

6. Label the cartridge tape with the date and the type of backup (archive or incremental) and store it in a secure place.

7. Examine the information and messages sent to the file, */etc/backuplog* to determine if any errors occurred during the backup process.

Backing up Onto Magnetic Tape

Use the backup script, *backup*, to backup your file system onto magnetic tape.

To prepare to backup, you must edit the */etc/backup* script and replace these lines:

```
cpio -ocx                    |
tcio -o $outdev
```

with this line:

```
cpio -ocBx > /dev/rmtxx
```

where */dev/rmtxx* is the special character device file associated with your magnetic tape drive.

1. Login as the super-user **root**. See the section "Becoming the Root User" in Chapter 10. If you are not the super-user you will have problems copying files that you do not own or have permission to access.

2. Execute the shutdown command by typing:

   shutdown 0 ⌧Return⌧

   For more information on the shutdown procedure, see the section "Shutting Down the System" in Chapter 10.

3. Insert the magnetic tape.

4. Perform the backup.

   The *backup* script will write (log) information to the file */etc/backuplog*: the start and finish times of the backup, the number of blocks copied, and any error messages that may have occurred during the backup. Information and messages written to this log file are appended onto the end of the file.

   If the *backup* command runs out of room on the magnetic tape, it prompts you to insert a new tape.

   - **If you are doing an archival backup**, do the following steps:

     a. Change to the root folder by typing:
        cd / ⌧Return⌧

     b. Type:
        /etc/backup -archive ⌧Return⌧

c. Check the file system by typing in:

     fsck -p *[filesystem_name]* ⌐Return⌐

For more information on *fsck* see "Checking Your File System" in this chapter.

NOTE

Do not run *fsck -p* without reading the "Checking Your File System" section in this chapter.

- **If you are performing an incremental backup**, do the following:

  a. Change to the root folder by typing:

       cd / ⌐Return⌐

  b. Type:

       /etc/backup ⌐Return⌐

- **If you are backing up selected files**, do the following:

  a. Go to the folder containing the files:

       cd *folder_name* ⌐Return⌐

  b. Assuming your magnetic tape drive is associated with the device file */dev/rmt* (if not, replace "rmt" with the correct character special device file name), use the *cpio* command as follows:

    - to back up all files and subfolders from the current folder, type in:

           find . -print | cpio -ocBx > /dev/rmt ⌐Return⌐

    - to back up all files in your current folder, type in:

           ls cpio |-ocBx > /dev/rmt ⌐Return⌐

    - to back up selected files in your current folder and subfolders, type in:

           ls *file_name dir_name/file_name* **| cpio -ocBx > /dev/rmt** ⌐Return⌐

The file names should be separated by blank spaces. If your files are in different folders, you can specify relative path names for your file names.

5. When the backup has finished, remove the magnetic tape.

6. Label the magnetic tape with the date and the type of backup (archive or incremental) and store it in a secure place.

7. Examine the information and messages sent to the file, */etc/backuplog* to determine if any errors occurred during the backup process.

Restoring the System

If you need to restore the system due to major problems, and the system is still functioning, log in as the super-user **root** and run the *shutdown* and *fsck* commands as referenced in steps 2 and 3 under the heading "A Standard Backup Procedure" above. In many cases, the *fsck* command can repair even serious problems in the file system. Often, lost files will show up in the */lost+found* folder after running *fsck*.

If you did not need to use *fsck* to repair the system, or after *fsck* has repaired the system, follow the procedures below. You can use these procedures to recover one or more specific files from a backup, also.

Before restoring a backup, you must know how the backup was made. If you used cartridge tape, you used both *cpio* and *tcio*. If you used flexible disc or 9-track, you used only *cpio*.

To restore the file system:

1. Log in as the super-user, **root**, if you need to restore the entire file system. Follow the procedure in "Becoming the Root User" in Chapter 10. If you will restore only specific files, you must be either the file's owner or root.

2. Write protect the tape or flexible disc your backup is stored on.

3. Place the backup medium in the mass storage device. If you are using a cartridge tape as the backup medium, **wait for the cartridge tape drive's conditioning sequence to complete** before continuing with this process. If you wish to restore only a single file, from a multiple-cartridge tape backup, insert the correct tape and answer "y" to the resynch prompt.

4. Once the medium is ready, enter one of the following command forms. You must reside in the correct parent folder before restoring files. The correct parent folder is the same as the folder you were in when you created the backup. If you are restoring from an archive or incremental backup, you must be in the root (/) directory. If you are restoring files from a selected file backup, you must be in the directory where you performed the backup. Select the appropriate form of the command based on the information supplied above.

For flexible disc or magnetic tape, type in:

```
cpio -iBcdmuvx [patterns]  < special_file  Return
```

For cartridge tape, type in:

```
tcio -i  special_file  |cpio -icdmuvx [patterns]  Return
```

Note that *special_file* is the name of the character special file associated with the backup device (usually */dev/rfd, /dev/rmt*, or */dev/rct*). *[patterns]* is an optional parameter used to specify which files to recover. If you wish to recover all the files, do not specify a pattern. If you wish to recover specific files, list them (separated by a blank space) where you see *[patterns]*.

If Disaster Strikes

If the entire file system is destroyed or if the system is in such poor shape that the *cpio* command will not function properly, then one of two options is available.

NOTE

If your file system is destroyed, you should take the time to understand the circumstances which caused the problem so you can prevent having to repeat this procedure.

Option one

If you have set up a recovery system after your initial installation (using the procedures described in "Creating a Recovery System") you can boot your system and rebuild your file system from your backups. The recovery system is a functional AXE system on cartridge tape or flexible disc.

Option two

If you have not created a recovery system, your system must be re-installed from the original distribution medium. Follow the instructions in Chapter 2, "Installing AXE", and reinstall the system.

NOTE

If you have updated your system since you first installed AXE, contact your local Hewlett-Packard Sales Office to obtain a current installation tape or set of flexible discs. Otherwise you will have to do one (or more) updates before you even begin restoring files.

Once you have re-installed the original system and it is operating properly, use the forms of the *cpio* and *tcio* commands given above to copy (restore) the most recent archive and incremental backup(s) from the backup device to the system's root device.

Special Considerations

One of the characteristics of incremental backups is that they depend heavily on the system clock. Both the current time and date as well as the time and date associated with the file being used as a reference point for the backup (such as */etc/archivedate*) have to be reasonably accurate to insure useful incremental backups. Always check, and if necessary reset, the clock (using the *date* command) if the system has been powered down for any reason or if a check of the clock shows any appreciable amount of inaccuracy.

Dealing with Backup Media

If the end of the medium is reached during the backup process, a message is sent to the standard error file (usually the system console) by the *tcio* and *cpio* commands. For example:

```
tcio: to continue, type new device name when ready, return implies
same device
```

When this occurs, change the backup medium and type:

special_file_name [Return]

where *special_file_name* is the special (device) file name associated with the backup device (for example, if you are using flexible disc, the special (device) file is probably */dev/rfd*). The backup process will then continue.

Checking Your File System

You can use a program called *fsck* to check the integrity of your file system. This program is automatically run at bootup if the system detects an improper shutdown, so you normally will not need to run *fsck* yourself.

The *fsck* command takes a few minutes to execute—the actual time depends on the size of your disc, the amount of disc space you have used, and the model of computer you have purchased. For example, an HP 7933 hard disc can take about 20 minutes to check.

To use *fsck*, use the following procedure:

1. Login as the super-user `root`. See "Becoming the Root User" in Chapter 10.

2. Shutdown your system by typing:

   `shutdown 0` [Return]

3. Check the file system by typing:

   `fsck` *[options] [file_system_name]* [Return]

   The options for *fsck* are *-p*, *-y*, and *-n*. The preen (*-p*), yes (*-y*), and no (*-n*) options are described below. If you do not specify any options, *fsck* will run in interactive mode and will prompt you for directions if it finds any errors. The information necessary to make decisions on file system errors is beyond the scope of this manual so do not use the interactive mode.

   If you wish to check all the file systems associated with the devices listed in */etc/checklist* (see "Adding to the checklist File"), you do not need to specify the *file_system_name*. If you wish to check only certain file systems, or wish to check a file system not listed in */etc/checklist*, you must specify the character special file name (for non-root file systems) associated with the file system or the block special file name (for the root file system).

NOTE

When checking the root file system, you must use the **block** special file name associated with the root file system. When checking non-root file systems, you must use the **character** special file name associated with the file system.

---

4. Reboot the system by typing in:

`reboot -n` Return

This will bring you back to the normal operating mode, with all the system processes running.

NOTE

If you are prompted to reboot from *fsck -n* or *fsck -y*, or get a return status other than 0 from *fsck -p*, **you *must* immediately reboot continuing to use the system**.

If you are running *fsck* with the *-n* or *-y* option, the program will prompt you to reboot if necessary. If you are running *fsck* with the *-p* option, you will not be prompted to reboot, but must check the return status to determine if you need to reboot. See the section on "preen option" for more details on when to reboot.

preen option

Using *fsck* with the preen option (*-p*) safely fixes many file system errors. This option is used at bootup if a file system check is necessary, and is the option you should use if you suspect problems with the file system.

preen Option at Bootup

At bootup, if AXE determines your system was not shut down correctly, AXE will automatically run *fsck -p*. You will see a message on your screen indicating a file system check is running. While *fsck* is executing, unless you have errors, all you get on your screen is information on available disc space. If *fsck* finds errors, it will either fix them or inform you that it was unable to fix the errors.

If *fsck* finds errors it cannot fix, you will be prompted to run the *fsck* program interactively (with no options). If this happens, call the National HP Response Center (if you have purchased support services) or your local HP Sales Office (if you have not purchased support services). To make intelligent responses to errors in the interactive mode you must have a thorough understanding of the file system, which is beyond the scope of this manual.

At bootup, if certain errors are fixed, the system will automatically reboot after a short pause.

Using the preen Option Manually

If you feel you might have a corrupt file system, you should execute the file system check program manually, first with the *-n* option (see the section "yes or no Option"). If *fsck -n* finds errors, you should rerun *fsck* with the preen option by typing in:

   fsck -p *[file_system_name]* [Return]

While *fsck* is executing (with the preen option), unless you have errors, all you get on your screen is information on available disc space. If *fsck -p* finds errors, it will either fix them or inform you that it was unable to fix the errors. If *fsck -p* was unable to fix errors, call the National HP Response Center (if you have purchased support services) or your local HP Sales Office (if you have not purchased support services).

If *fsck* needed to correct information on the root file system, you **must** reboot the system. If you are running *fsck -p* manually, you must check the exit status to determine if you need to reboot by typing in:

   echo $? [Return]

If AXE returns any number other than "0", you need to reboot.

yes or no option

If you run *fsck* manually (with the *-n* or *-y* option), you will see output similar to that shown in Figure 9-1 (if *-y* option, you will not see the "(NO WRITE)" on the first line).

```
** /dev/root (NO WRITE)
** Last Mounted on /
** Root file system
** Phase 1 - Check Blocks and Sizes
** Phase 2 - Check Pathnames
** Phase 3 - Check Connectivity
** Phase 4 - Check Reference Counts
** Phase 5 - Check CCyl groups
686 files, 3755 used, 5924 free (12 frags, 739 blocks)
```

Figure 9-1. fsck sample output

If you get errors during the five phases using the *-y* option, *fsck* will make changes to the file system. This **might** remove some files.

If certain errors occur on the root file system, the *fsck* output will be followed by the prompt:

```
***** REBOOT HP-UX *****
```

If this message appears, you **must** reboot the system immediately by typing:

```
reboot -n Return
```

If you get errors using the -n option, *fsck* will report the errors, but will not make any changes. You should then re-run *fsck* with the preen option.

A thorough explanation of possible errors is beyond the scope of this manual.

For More Information

If you wish to run the *fsck* program interactively, you must have a thorough understanding of the file system on your Series 300 AXE computer. The Series 300 *System Administrator Manual*, Chapter 3, gives a description of the file system on the Series 300, and Appendix A gives a more detailed description of the *fsck* program.

Managing Disc Space

AXE requires the file system to have a certain amount of free disc space. If there is not enough free disc space, you will get the message:

    no free space

When you get the above message, you must delete files before you can continue using the system. If you are the super-user root, you may continue to use the system, but you still must free disc space if you wish your system to operate properly.

It is best if you avoid this situation by doing the following on a regular basis:

- remove any unwanted files,

- remove any unneeded filesets using the procedures in "Removing File Sets" in Chapter 10,

  For example, if you have the manual pages from AMANUAL loaded, but never use them, remove the AMANUAL fileset.

- archive little-used files on flexible discs or cartridge tape, then remove the file from your file system,

- check, and clear, all logging files (logging files are described below),

- make sure each user on the system removes or archives all unnecessary files.

Determining Available Disc Space

To determine the available disc space, you can run the file system checking program, *fsck*. To interpret the file system size information, you must know your system's fragment size and the free space threshold. The fragment size and the free space threshold numbers were reported to you during AXE installation. **If you did not copy these numbers down, you cannot use this method to determine available file system space.**

For example, if you want to determine the available disc space on your root disc, and your root disc is associated with */dev/root*, you would type in:

    /etc/fsck -n /dev/root

You will see the output shown in Figure 9-1 (in the section "Checking Your File System"), which ends with a line similar to:

```
686 files, 3755 used, 5924 free (12 frags, 739 blocks)
```

The amount of free disc space you have (total) is 5924 × fragment_size. If your fragment size is 1024 bytes, then you have 5924 × 1024 = 6 066 176 bytes of free space. A percentage (free space threshold) of this space is reserved. If the free space threshold is 10%, then of the 6 066 176 bytes, 5 359 558 is available to the non-super-user.

Using the find Command

To identify disc usage problems, use the *find* command. Find is a complicated command, but certain fields are useful for locating trouble-files. You must be the super-user (root) to have access to, and find, all the files in your system. The format of the *find* command useful for identifying disc usage problems is (each part is described below):

```
find path_name_list -user uname -size n -atime n -mtime n -ctime n
```

path_name_list	tells *find* where you want to begin searching (for example, the root folder /),
-user uname	tells *find* to print the names of any files owned by the user's login name *uname*.
-size n	tells *find* to print the names of any files whos size is larger than *n* blocks. A block is 512 bytes.
-atime n	tells *find* to print the names of any files that have been accessed in *n* days.
-mtime n	tells *find* to print the names of any files that have been modified in *n* days.
-ctime n	tells *find* to print the names of any files that have been changed in *n* days.

When you execute *find*, the output will come to your screen. If you wish to save the output, redirect it into a file (redirection is discussed in Chapter 4).

Example 1

The following command puts the names of files neither written nor accessed in the last 90 days in the file `aging_files`:

```
find / -mtime +90 -atime +90 -print > aging_files
```

Example 2

The following command puts the names of large files (over 1 Mbyte) in the file `big_files`:

```
find / -size +2000 -print > big_files
```

Logging Files

Logging files are files created and written to by certain AXE commands to monitor system use and for general house-keeping. If logging files are not periodically checked and cleared, they continue to grow.

Here are some logging files:

- */etc/utmp* (binary) - current login status.

- */etc/wtmp* (binary) - history of logins, logouts and date changes.

- */usr/adm/sulog* (ASCII) - history of use of the *su* command.

These files are useful for keeping track of what goes on in your system. However, they can get very large. To keep logging files from using too much disc space, you should:

- edit the ASCII files weekly and delete unused information,

- occasionally clean the binary files by copying them to backup files, then deleting the files when you are sure you will not need them.

- If you are sure you will never use these logging files, link them to */dev/null* by executing the command:

```
ln logging_file /dev/null
```

Table of Contents

10

AXE System Administration 10

There are many tasks you need to perform to properly take care of your AXE system. This chapter tells you how to perform the following tasks:

- Adding and Removing Users
- Adding to the Checklist File
- Becoming the Root User
- Booting AXE
- Creating a New File System
- Creating a New Operating System
- Creating a Recovery System
- Initializing Media
- Mounting and Unmounting File Systems
- Reconfiguring Swap Space and System Parameters in AXE
- Removing Optional Products and Filesets
- Setting the System Clock
- Setting Up and Removing A Printer
- Setting Up and Removing A Remote Terminal
- Setting Up a Plotter or Digitizer
- Setting Up Mass Storage Media
- Shutting Down The System
- Updating AXE

NOTE

If you execute a command, but get the error:

command: `file not found`

you may need to load the command using the procedures in "Updating AXE".

Adding and Removing Users

Adding A New User

Even on a single-user system, you probably need several logins. You might want a different login for each person that accesses the computer, or for each task you want to do.

To add a new user, perform the following steps:

1. Login as the super-user, root. See "Becoming the Root User" in this chapter for details.

2. Enter the command:
   reconfig ⌷Return⌷
   The main menu of *reconfig* will appear on your screen.

3. Using the ⌷Tab⌷ key, move the cursor to the **Add a new user** menu item and press the **Select** softkey.

   The form to create a new user will appear on your screen.

4. Fill in the following fields.

   USER NAME
   This is the name your system uses to identify the user. This name will be used both to log in to the system, and will be the name of the HOME folder for the new user. The USER NAME must be limited to 8 characters, and usually represents the persons name or function. Your login might be your initials, first name, or last name. If you want a separate login for using an application such as ALIS, you might call it **alis**.

   GROUP NAME
   The name of the group the new user will belong to. A list of existing groups is displayed on the form. You can choose one of the existing groups, or you can type in a new group name. If you use a new group name, *reconfig* will create the new group by adding it to the file */etc/group*. If you hit ⌷Return⌷ without typing a group name, you select the default (displayed) group name. You can assign only one group to the user.

   DEFAULT SHELL
   The shell is a program that provides an interface between the user and the operating system. The user enters commands and accomplishes work through the shell. Four shells are provided from Hewlett-Packard, but you may use your own program or application.

The four shells supplied by Hewlett-Packard are:

```
/bin/sh        (Bourne shell)
/bin/csh       (C shell)
/bin/rsh       (Restricted Bourne shell)
/bin/pam       (Personal Applications Manager)
```

You must specify the shell as a full path name, that is, it must begin with '/'. The shell cannot be a folder name or a device name; it must be an executable file. If you hit ⟨Return⟩ without typing the shell name, you select the displayed (default) shell. This manual describes only the PAM shell. You should choose the PAM shell unless you know one of the other shells.

WINDOWS AT LOGIN?:
requires a yes or no answer.

YES   the window system will automatically be started when the user has finished his login. The user's shell will appear in a window. You must make sure your operating system is configured for windows. See the section called "Creating a New Operating System" and make sure the windows filesets are loaded.

NO   The user's shell will appear on the screen, but not in a window.

PASSWORD?
Using a password is one method of securing your computer system, and the data it contains.

YES   A new user will be forced to enter a password the first time he logs in.

NO   The user is not prompted for a password. Anyone who knows the user's login name will be able to enter the computer system.

5. When you are sure each field contains the correct information, press the **DONE** softkey to exit the form.

The *reconfig* program now performs the following tasks:

- updates the */etc/passwd* file with information about the new user.

- updates the */etc/group* file with the new user name, and a new group name if you created a new group.

- creates the HOME folder in */users*. The HOME folder will have the same name as the USER NAME.

- puts an environment file into the new user's HOME folder.

- checks that you have limited the user's name to 8 characters,

- checks that you have not duplicated a user's name.

The main menu of *reconfig* will appear on your screen.

6. Set up a terminal for the user if necessary.

   If the new user will use an existing remote terminal, or will use the console, this step should be skipped.

   If the new user will have a separate terminal, you must now go to the entry in *reconfig* for **Add remote terminal support**. See the section called "Adding a Remote Terminal" for information on setting up a terminal.

7. Press the **Exit** softkey to return to your shell.

Example:

If you want to add the following user:

- Name is Ryan Asp

- Member of group AXE

- Needs HP Windows/9000

- Wants PAM for a shell

- Needs a password (since you have a secure system)

you should perform the following steps:

1. Type `reconfig` Return.

2. Press the Tab key until the "Add a new user" option is high-lighted.

3. Press the **Select** softkey; the "Add user" form will appear on your screen.

4. Enter the USER NAME (for example, `ryan`).

5. Press the Tab key to go to the GROUP NAME field. Press the **Clear Line** key (on your keyboard) to clear the field, then type `AXE`.

6. Press the Tab key to go to the DEFAULT SHELL field. Press the "Clear Line" key (on your keyboard) to clear the field, then type `/bin/pam`.

7. Press the Tab key to go to the WINDOWS AT LOGIN? field. Press the **Next** softkey once to display the "Yes" option.

8. Press the ⌈Tab⌉ key to go to the PASSWORD? field. Press the **Next** softkey once to display the "Yes" option.

9. Press the **Done** softkey to exit the form.

Removing a User

1. Login as the super-user root. See "Becoming the Root User" in this chapter for details.

2. Enter the command:

    `reconfig` ⌈Return⌉

    The main menu of *reconfig* will appear on your screen.

3. Use the ⌈Tab⌉ key to move the cursor to the `Delete a user` menu item and press the **select** softkey.

    A form to delete a user will appear on your screen.

4. Fill in the fields:

    USER NAME
    The login name for the user you wish to remove from the system.

    DELETE USER'S FILES
    Select "yes" or "no".

    YES   This deletes the user's files and the user's HOME folder. If the user has files you, or anyone on the system, need, you should make a copy of these files *before* executing this command. These files will be removed.

    NO   This leaves the user's files on the system. The password file will not have a name to associate with the user's id number, so the files will appear as being owned by a number, rather than a user. These files should be re-assigned to another user by using the *chown* command. The format for the *chown* command is as follows, where *f_name* is the file or folder name and *u_name* is the new owner's user name:

    `chown` *u_name* *f_name* ⌈Return⌉

    The next time you add a user, the new user will get the user id from the deleted user. If you have not changed the ownership of the deleted user's files, the new user will automatically inherit the files. Unless you want this to happen, re-assign the files before adding a new user.

5. When you are sure each field contains the correct information, press the **Done** softkey to exit the form.

   This will remove the user from the */etc/passwd* and */etc/group* files, and, if you answered *yes* to the second field, it will delete all the user's files and the user's HOME folder.

   The main menu for *reconfig* will appear on your screen.

6. Press the **Exit** softkey to return to the shell.

Adding to the Checklist File

NOTE

If you do not understand the terminology used in this section, refer to "Reconfiguring Swap Space and System Parameters" and "Mounting and Unmounting File Systems" in Chapter 10 and "Checking Your File System" in Chapter 9.

The */etc/checklist* file contains a list of file systems and swap devices. The following AXE programs use the checklist file for information:

- During bootup, or if you execute the *mount -a* command all **file systems** (type "rw" and "ro") in */etc/checklist* will automatically be mounted,

- during bootup (if you add **swapon -a** to */etc/rc*), or if you execute *swapon -a*, all **swap devices** (type "sw") in */etc/checklist* will be enabled,

- if you execute *fsck* without a list of filesystems, all filesystems in */etc/checklist* will be checked.

The format of an entry in */etc/checklist* is:

```
dev_name   mnt_dev   mount_fld   type   order   0   comment
```

Where:

dev_name   The device name used by *fsck* and *swapon*. If the file system is the root file system, */dev_name* must be the **block special device file name** associated with the root file system (usually */dev/root*). If the file system is a non-root file system, *dev_name* must be the **character special device file name** associated with the file system (for example, */dev/rhd* rather than */dev/hd*). If the file system is marked as a swap device, this must be the **block special device file name**.

mnt_dev   The **block special device file name** used by *mount* and *swapon*.

mount_fld   The folder where *mnt_dev* is to be mounted.

type   The possible values for type are:
            rw read/write permission for the file system
            ro read-only permission for the file system
            sw swap device
            xx ignore this entry

order   *fsck* will check the file systems in the order you specify. The root file system (*/dev/root*) should always be "1". Any file system labeled "2" will be checked after the root file system. File systems labeled "3" will be checked after the file systems labeled "2". You will probably only use "1" and "2".

0   This field always has a value of "0".

comment   This field is preceeded by a "#". You can put any comment in this field.

For example, the entries in Table 10-1 will allow your system to automatically (at bootup):

- *fsck* both the */dev/root* and the */dev/rhd* file systems (*fsck* ignores all "sw" and "xx" entries),

- mount */dev/hd* on the directory */hd2* with read/write permission (using the *mount -a* command automatically executed at bootup),

- turn on swapping (if you added the command */etc/swapon -a* to the */etc/rc* file).

Also, the *shutdown* command executes *umount -a*, and *fsck*, when run manually, reads the list of file systems from */etc/checklist* if you do not provide a list of filesystems in the command line.

If you are temporarily removing a disc from the system, you should invalidate the entries for that disc by changing the disc's type to "xx".

Table 10-1: Example /etc/checklist Entries

```
/dev/root      /dev/root      /       rw   1   0   #root
/dev/rhd       /dev/hd        /hd2    rw   2   0   #7945
/dev/hd        /dev/hd        /hd2    sw   2   0   #7945 swap
```

Note that root is assumed to be a swap device, so you don't need a separate swap entry for the root file system. For all other file systems, if they are also swap devices, you must have both a file system entry (if you wish it to automatically be mounted) and a swap entry (if you wish it to be automatically enabled for swapping).

Becoming the Root User

You need to be logged in with the USER NAME root to perform most AXE system administrative tasks.

If you have a non-secure system, the only way to become root is to type in:

    su root ⌈Return⌉

If you have a secure system, you can use the above method, or you can log in as root. When you receive the login prompt, enter the word root:

    login: root ⌈Return⌉

then supply the password.

Booting AXE

Your Series 300 computer has a program, called the boot ROM, which is executed automatically when you turn on your computer. The boot ROM performs some hardware testing, assigns a system console, and loads an operating system. Once the operating system is loaded, the boot ROM passes control to the operating system.

To boot your system:

1. Turn power on to all your connected peripherals.

2. Turn power on to your computer and to your system console.

   A description of the system console is given at the beginning of Chapter 2. A description of the displays you will see is in the "Boot ROM Displays" subsection.

3. Select an operating system.

   a. If you are using the unattended mode, do nothing (see the subsection "Unattended Mode").

   b. If you need to use the Boot ROM's attended mode, press the space bar (see the subsection "Attended Mode").

4. Log in when you receive the prompt.

If the wrong AXE or HP-UX operating system was loaded, use the procedures in Chapter 10, the section "Shutting Down Your System", to shutdown and reboot your system, entering the boot ROM's attended mode. If an operating system other than AXE or HP-UX was loaded, cycle power (turn the computer off, then back on) and enter the boot ROM's attended mode.

You can set the correct time and date (using the *date* command) by typing an entry of the form:

```
date MMddhhmm{yy} Return
```

MM is a two digit integer representing the month. For example, 03 represents March.

dd is a two digit integer representing the day of the month. For example, 02 represents the second day of the month.

hh is a two digit integer specifying the current hour in terms of a twenty-four hour clock. For example, 03 specifies 3:00 am and 14 specifies 2:00 pm.

mm is a two digit integer specifying the number of minutes past the stated hour. For example, 04 specifies four minutes past the hour.

{yy} is an **optional** two digit integer specifying the last two digits of the current year; this parameter may be omitted if the year is already correct. For example, 86 specifies 1986 as the current year.

Boot ROM Displays

The following shows a typical display of the boot ROM's operation. **The displays vary depending on the version of the boot ROM.**

```
Copyright 1985,                        :HP7946, 1400, 0, 0
Hewlett-Packard Company.               1H SYSHPUX
All Rights Reserved.                   1D SYSDEBUG
                                       1B SYSBCKUP
BOOTROM Rev. A
Bit Mapped Display
MC68010 Processor
Keyboard
HP-IB
HP98620B
HP98644 at 9
HP98625 at 14
2096978 Bytes




SEARCHING FOR A SYSTEM (RETURN To Pause)
RESET To Power-Up
```

Once the SEARCHING FOR A SYSTEM message appears on the system console, the screen will clear and a series of messages appear, including the following information:

```
Console information
Processor information
Interface cards
real mem  =
buffer information
root device information
swap device information
avail mem =
unlockable mem =
file system checking information
copyright information
```

If, when you shutdown your system, you did not follow the procedures in "Shutting Down the System", AXE will execute *fsck*, a program to check and, if necessary repair, your file system. For more information on *fsck*, read Chapter 9, the section "Checking Your File System".

On the media where your bootable system resides (hard disc or recovery system) there is a boot area. The boot area has a file, called */hp-ux*, that is your operating system. SYSHPUX points to */hp-ux*. If you have modified your operating system, SYSBCKUP points to the previous version of */hp-ux*. The old operating system is now called */SYSBCKUP*.

NOTE

If you depend on the boot ROM's search sequence to boot a default system, make sure the mass storage device containing the operating system has completed its power-up cycle and is ready for use before powering up the computer. The order in which the operating systems are found depends on both the search sequence, and on the availability of the mass storage devices.

The Boot ROM's Search Sequence

The boot ROM has two modes of selecting an operating system: attended and unattended. In attended mode, you can select the operating system to boot from all the operating systems found on the mass storage devices. In unattended mode, the boot ROM automatically boots the first operating system in its search sequence.

Unattended Mode

You should use the unattended mode of booting if you have only one bootable operating system on line, or if you know the operating system you wish to boot is the first operating system the boot ROM will find.

The boot ROM searches a prioritized list of devices. The first system found on one of these devices will be booted. If no system is found, the list will be searched again until a system is found. This means that discs not found at power-up can be found after their initialization is complete.

To boot the operating system:

- make sure the desired operating system is the first system found, following the prioritized list below,

- make sure the device holding the operating system is fully powered up before you turn on your computer.

The search sequence that the boot ROM uses to find an operating system follows these priorities:

1. Internal mini-floppy, Unit 0 (i.e., Drive 0).

2. External discs at Select Codes 0 thru 31, Bus Address 0, Unit 0, Volume 0.

3. Shared Resource Manager at Select Code 21, Volume 8.

4. Bubble Memory at Select Code 30.

5. EPROM on Unit 0.

6. ROM board (for ROM=based operating systems).

7. Internal mini-floppy, Units 1 thru N.

8. Other external discs at Select Codes 0 thru 31, Bus Addresses 0 thru 7, Units 0 thru 15, Volumes 0 thru 7 (not Bus Address 0, Unit 0, Volume 0).

9. Other Shared Resource Managers at Select Codes 0 thru 31 (not Select Code 21, Volume 8).

10. Bubble Memory on Select Code 0 thru 29.

11. Other EPROMs.

According to the above priorities, external devices are searched in order of select code; a system at select code 4 would be found before a system at select code 5. Also, multiple units at the same select code and bus address are searched before moving to the next ascending select code or bus address. Thus, the AXE system on the root mass storage device at select code 14, bus address 0, unit 0, is found and loaded before any of the AXE "utilities" systems at select code 14, bus address 0, unit 1.

To summarize, the search levels for AXE devices, in ascending order are:

1. device class (internal discs, external discs)

2. select code

3. bus address (also called device address)

4. unit number

5. volume number

Attended Mode

If you do not want to default to the first operating system found by the boot ROM, you must enter the attended mode of selection.

You enter attended mode by typing a space, $\boxed{\text{Return}}$, or any letter or number, during the time before a default system is found, but after the keyboard has been initialized. The character used to enter attended mode is used as part of the string to select the operating system. The best way to enter the attended mode is to hold down the space bar until the word "Keyboard" appears in the installed interfaces list on the left side of the screen.

When attended mode is activated, the boot ROM displays a boot selection menu. This menu lists all accessible operating systems as the boot ROM finds them. The operating systems will be displayed by their name, listed under a mass storage device name and address. For example, if you have both an AXE kernel and an AXE backup kernel on an HP7946 at select code 14, bus address 0, unit 0, the following will appear on the menu:

```
:HP7946, 1400, 0, 0
   1H SYSHPUX
   1B SYSBCKUP
```

You select an AXE operating system by typing the 1 to 3 digit string associated with the desired system. For AXE this will usually be a "1H". The characters typed are printed in the lower right corner of the display.

After Booting

After your system is booted, AXE starts system processes that perform the following checks:

- check to see if your system was properly shutdown,

  If not, it calls the *fsck* program to check your file system and possibly make some repairs (see "Checking Your File System" in Chapter 9).

- if you have a "secure" system, processes that interact with remote terminals, called *getty*s, start,

- set the default PATH environmental variable,

- set the timezone (TZ) variable,

- set the date (an interactive process)

- initialize the system console,

- start the printer spooler process if you set up the spooler (see "Setting Up a Printer" in this chapter),

- start LAN (if you have installed LAN),

- mount all file systems in */etc/checklist*.

Creating a New File System

If you run out of space on your root file system, you can either remove enough files to gain space or you can create another file system. The following are the steps you should follow to create a file system.

1. Connect the mass storage device on which the file system will exist to your AXE system. See the "Setting Up Mass Storage Media" section in this chapter and the installation manuals supplied with your Series 300 computer and/or the mass storage device for hardware installation details.

2. Create both a character special and a block special device file for the mass storage medium. Use the instructions in the "Setting up Mass Storage Devices" section of this chapter.

3. Once the mass storage device is properly installed and turned on, run the media initialization utility *mediainit*. This utility initializes the medium on which the file system will reside. If the medium has been initialized before, you may skip this step. Read "Initializing Media" in this chapter.

4. Determine if you have any special file system requriements. Generally, the only file system parameter you may need to change is the swap space (discussed below).

   The command to create a file system (*newfs*) will create a file system with certain defaults (unless you otherwise specify). These defaults are taken from a file called */etc/disktab*. Most attributes of the file system should be used as the default value.

   Read Appendix E to determine how much swap space you need. Determine the default swap space size from */etc/disktab*. If you determine you need more than the default swap space, use the -s option of *newfs* to create a smaller filesystem (and therefore a larger swap space). All other default values should be unchanged unless the manual for your application instructs you to change them.

5. Create the file system on the initialized disc (you must be logged in as the super-user root).

   If you wish to create a file system using all default values, type in:

   newfs *device_file disc-type* [Return]

   where *device_file* is the character special device file associated with the disc drive where the file system will reside, and *disc-type* is the name for the disc in the text file */etc/disktab*.

If you wish to create a file system with a larger swap space, type in a command of the following form, where *fs_size* is the total size of the disc, less the amount of swap space (see "Reconfiguring Swap Space and System Parameters", section "Swap Space" in this chapter for an example of using *newfs* with a size you supply):

    newfs *device_file* -s *fs_size disc_type*

6. Next, mount the new file system. This is described in the section "Mounting and Unmounting File Systems".

7. If the newly created file system is intended as a permanent addition, you may wish to modify */etc/checklist* so the new file system will be checked and mounted when the system is booted. Add the new file system to */etc/checklist* by inserting the name of the character special device file name associated with the file system. (Refer to "Adding to the Checklist File")

Creating a New Operating System

The heart of your operating system is called the *kernel*. The kernel is made up of optional *drivers* and other resource management software. A driver is simply a section of the kernel. Some drivers are required in the kernel, others are optional, and are needed only when you install certain peripherals or subsystems. The required drivers will be in every version of the operating system you create. You can create an operating system that is big or small depending on which optional drivers you include in your kernel. A small kernel will give you better performance than a large kernel.

NOTE

Add ONLY the operating system drivers you need. Each optional driver requires main memory space.

The optional drivers you can choose from are shown in Table 10-2.

Table 10-2: Optional Kernel Drivers

Driver Name	Used For
cs80	most mass storage devices (always included in the operating system if you use *reconfig*).
amigo	Amigo Mass Storage Devices
ciper	Ciper Printers
printer	Non-ciper Printers
hpib	Plotters
tape	9-Track Tape Drives
stape	9-Track Streaming Tape Drives
98624	Internal Disc Controller
98625	Hi-speed HPIB Disc Controller
98628	Datacomm Card
98642	4 channel MUX Card
98626	RS-232 CARD
gpio	GPIO Card
ieee802 or ethernet	Local Area Network (LAN)
srm	Shared Resource Management (SRM)
rje	Remote Job Execution (RJE)
ptymas and ptyslv	Windows

To determine which kernel driver you need, look up the part number of your peripheral in the section at the end of this chapter, "Setting Up Peripheral Devices: General Information".

You have three choices when you create an operating system, or kernel, from the *reconfig* program. Each choice is described in detail in the following sections. You can create:

- the minimum operating system,
- the maximum operating system,
- a customized operating system.

Creating a Minimum Operating System

If you have not changed your operating system since you installed AXE, you will have the minimal operating system. The minimal operating system contains the drivers shown in Table 10-3.

Table 10-3: Drivers in Minimum Operating System

Driver name	Use
cs80	Most mass storage devices (always included in the operating system if you create the operating system with *reconfig*).
ptymas	Windows
pytslv	HP Windows/9000
98624	HP 98624 HP-IB Card
printer	Non-ciper Printers
hpib	Plotters
98625	HP 98624 Hi-speed HP-IB Disc Controller
98626	HP 98626 RS-232 Card
98642	HP 98642 4 channel MUX Card

To create the minimal operating system, perform the following steps:

1. Login as the super-user root. See "Becoming the Root User" in this chapter for details.

2. Enter the command:

   reconfig [Return]

   The main menu of *reconfig* will appear on your screen.

3. Using the ⌞Tab⌟ key, move the cursor to the `Create a minimally loaded operating system` menu item and press the **select** softkey. You will see the following message on your screen:

   `Please wait while the new operating system is created (this may take several minutes)...`

   This will not overwrite your current operating system until you specifically request it (see step 4 for instructions). The new operating system is in a file called */etc/conf/hp-ux.new*.

   You will see the main menu for *reconfig* on your screen.

   NOTE

   New drivers cannot be accessed until you reboot. Step 4 explains how to automatically reboot.

   ---

4. You should now see an additional item in the main menu of *reconfig*. This item is called *reboot*.

   - If you select the reboot option, the old kernel will be overwritten[1], and your new kernel will contain the minimal operating system listed above. AXE will now reboot.

   - If you do not want to reboot, press the **Exit** softkey. You will be asked again if you wish to reboot. Using the **next** softkey, select "no", then press the **done** softkey to exit. You will be given instructions on how to reboot AXE later. You will now be returned to your shell.

Creating the Maximum Operating System

The maximum operating system is made of all the drivers listed at the beginning of this section. With the maximum operating system, you may need extra memory in your computer. If you create an operating system that is too big, some of your larger applications may run slower. You can use the previous version of your operating system by typing in:

   `exec reboot -f SYSBCKUP` ⌞Return⌟

or by rebooting AXE in the attended mode (see "Booting AXE").

---

[1] The old kernel is actually moved to /SYSBCKUP. This way, if your new kernel doesn't work, you can reboot with your old kernel using the attended mode of the boot ROM.

To create the maximum operating system, perform the following steps:

1. Login as the super-user root. See "Becoming the Root User" in this chapter for details.

2. Enter the command:

   `reconfig` Return
   The main menu of *reconfig* will appear on your screen.

3. Using the Tab key, move the cursor to the `Create a maximally loaded operating system` menu item and press the **select** softkey. You will see the following message on your screen:

   `Please wait while the new operating system is created (this may take several minutes)...`

   This will not overwrite your current operating system until you specifically request it (see step 4 for instructions). The new operating system is in a file called */etc/conf/hp-ux.new*.

   You will see the main menu for *reconfig* on your screen.

NOTE

New drivers cannot be accessed until you reboot.

---

4. You should now see an additional item in the main menu of *reconfig*. This item is called *reboot*.

   - If you select the reboot option, the old kernel will be overwritten[1], and your new kernel will contain the maximum operating system (an operating system that contains all the drivers AXE supports). AXE will now reboot.

   - If you do not want to reboot, press the **Exit** softkey. You will be asked again if you wish to reboot. Using the **next** softkey, select "no", then press the **done** softkey to exit. You will be given instructions on how to reboot AXE later. You will now be returned to your shell.

---

[1] The old kernel is actually moved to /SYSBCKUP. This way, if your new kernel doesn't work, you can reboot with your old kernel using the attended mode of the boot ROM.

Creating a Custom Operating System

A custom operating system contains only the parts (drivers) you choose to include.

1. Decide what parts of the operating system you need to include by following the instructions at the beginning of this section.

2. Login as the super-user root. See "Becoming the Root User" in this chapter for details.

3. Enter the command:
   `reconfig` [Return]
   The main menu of *reconfig* will appear on your screen.

4. Using the **Tab** key, move the cursor to the `Create a custom operating system` menu item and press the **Select** softkey.

   The custom operating system creation will now begin. You will see a series of forms, each asking if you need a specific driver. If you need that driver, choose the **YES** answer to that form. You will see a form for each type of driver listed at the beginning of this section.

   After all the forms have appeared, *reconfig* will create your new operating system. You will see the following message on your screen:

   `Please wait while the new operating system is created (this may take several minutes)...`

   This will not overwrite your current operating system until you specifically request it (see step 5 for instructions). The new operating system is in a file called */etc/conf/hp-ux.new*.

   You will see the main menu for *reconfig* on your screen.

NOTE

New drivers cannot be accessed until you reboot. Step 5 explains how to automatically reboot.

---

5. You should now see an additional item in the main menu of *reconfig*. This item is called *reboot*.

   - If you select the reboot option, the old kernel will be overwritten[1], and your new kernel will support each of the items you chose in the previous screens. AXE will now reboot.

---

[1] The old kernel is actually moved to /SYSBCKUP. This way, if your new kernel doesn't work, you can reboot with your old kernel using the attended mode of the boot ROM.

- If you do not want to reboot, press the **Exit** softkey. You will be asked again if you wish to reboot. Using the **next** softkey, select "no", then press the **done** softkey to exit. You will be given instructions on how to reboot AXE later. You will now be returned to your shell.

Creating a Recovery System

Once your system has been installed, the first thing you should do is make a recovery system. If you can't boot from your root disc, you can use your recovery system to boot and repair your file system. You may be unable to boot because your root disc is too corrupt, or because you forgot your root password.

A recovery system is built using a command, */etc/mkrs. mkrs* will build a small AXE system with a minimal kernel so you can boot.

The recovery system is easy to build, and is valuable if you ever need it. You can build your recovery system on either cartridge tape or on two 3½ inch double-sided, double-density micro discs. The cartridge tape can hold more files, but is *much* slower for both creating and using the recovery system.

NOTE

If you change the swap space of your system, you MUST create a new recovery system. If you fail to create a new recovery system, the old one may overwrite and destroy your root file system.

The recovery system has a boot area so you can boot using just the recovery system. The recovery system also has a small file system, containing the following files and directories:

hp-ux   A minimal kernel.

/bin   Directory containing a small subset of AXE commands. The actual commands vary depending on your recovery media. Use the *ls* command to list the exact files you have on your recovery system.

/dev   The */dev* directory contains the device files necessary for using the recovery system (block and character special files for the root disc and the recovery drive). The device files are created automatically.

/disc   A directory that can be used to mount a file system.

/etc   */etc* contains the tools necessary to fix your root file system: *sbtab, fsck, mknod, mount*, and *umount*. It also contains small *inittab, init, profile*, and *rc* files, which are necessary for booting.

/tmp

To create the recovery system:

1. Log in as the superuser, root.

   You will be accessing privileged commands, so you must have super-user privileges. See "Becoming the Root User" in this chapter for details on logging in as root.

2. Create the device files in */dev* for the device you wish to create the recovery system on.

   See "Setting Up Mass Storage Media" for procedures on how to create device files. You must have both character and block mode device files for the root disc and for the tape or flexible disc drive used for the recovery system.

3. Create the recovery system by using the *mkrs* command. If *mkrs* doesn't exist on your system (you receive a message mkrs: not found), follow the guidelines in "Updating AXE" to install the "ACONFIG" file set (MISC_UTILS partition —green labels). *update* will automatically load all file sets dependent on ACONFIG.

   mkrs has the following form:

   ```
   mkrs [-f rsdev] [-r rootdev] [-t type] [-v]
   ```

   rsdev is name of the **block mode device file** for the device on which you are creating your recovery system. *rsdev* must be the same block special device file name you created in step 2. If your device files are named *ct* and *rct*, you don't need to specify this option; *ct* is the default. Do not use the full path name (e.g. use *md*, not */dev/md*).

   rootdev is assumed to be *hd* by default. If your root device files are not named *hd* and *rhd*, you must use the *-r* option. Do not use the full path name (e.g. use *root*, not */dev/root*).

   type can be either *ct* (cartridge tape) or *md* (micro disc). The default is ct.

   For example, if your root file system is associated with the device file, */dev/hd*, and you will be creating your recovery system on the flexible disc drive associated with the device file */dev/md*, you would type in:

   ```
   mkrs -f md -t md  Return
   ```

If you are creating your recovery system on micro discs, you will need two discs. You will be prompted to insert the second disc when *mkrs* is finished with the first disc.

The *mkrs* process takes about 30 minutes on a micro disc and about 1 hour on a cartridge tape.

5. Boot the recovery system to check it out. For this step, you will need to shut down the system. You probably want to test-boot the recovery system during off hours. Follow the steps 1 - 3 under "Booting the Recovery System".

6. Put the recovery system in a safe place and LOCK IT!

   When you boot using the recovery system, you come up as super-user, root. This is potentially a serious security problem. It is up to you, to keep this recovery system safe (so you can use it if needed) and out of sight (so unauthorized people do not have access to it).

Booting the Recovery System

To use your recovery system, you will need to boot, then use the recovery tools to gain access to your root disc. Follow these steps to boot your system.

1. **Power up all system swap devices** (generally just your root file system's hard disc) and the recovery system device. Your recovery system uses the swap space on your system, so these devices must be powered up.

2. Turn on your computer and (immediately) hold down the space bar to access the attended mode of the Boot ROM. A list of operating systems will come on your screen.

3. Find the system labelled "SYSHPUX" listed under the device you have your recovery system on. Enter its number on the command line. For example, if you have your recovery system on a 9122D flexible disc drive, you might see (on the right side of the display):

```
9146; 1400, 0, 0
   1H SYSHPUX
   1B SYSBCKUP
9122; 0700, 0, 0
   2H SYSHPUX
```

You would select ⬚2⬚H⬚.

As the recovery system is booting, you may see lines such as:

```
prod# ...... ignored
```

Don't worry about these messages. Your recovery system is a minimal subset of the kernel, and doesn't have (or need) the device drivers the full HP-UX system has.

The booting process takes only 2 or 3 minutes from the micro disc, and about 10 minutes from the cartridge tape.

When it's done, you will see the words:

```
Welcome to the HPUX Recovery System
```

You are now in the recovery system.

Using the Recovery System

Once you have booted your recovery system and you see the shell prompt on your display, you can use the following steps to try to recover your root file system. The procedure outlined here:

- assumes you cannot boot your regular system; you suspected a problem and used the recovery system to boot,

- uses the term "root device" for the device that is root under normal circumstances (disc drive associated with your root file system),

- assumes your root device is called */dev/hd* (block special file) and */dev/rhd* (character special file),

- assumes your recovery device is on flexible disc and is called */dev/fd* (block special file) and */dev/rfd* (character special file).

NOTE

Use "ls -l /dev" to determine what device files are actually present on the recovery system,

---

1. If you think your root device is corrupted, then run *fsck* (see "Checking Your File System" in this chapter) on the **character** special file associated with your root device (e.g. */dev/rhd*). The file */etc/sbtab* on the recovery system should identify the location of duplicate superblock (it will be an empty file if */etc/sbtab* did not exist on your root file system when the recovery system was made). For example, if one of the locations is block 16, then use `fsck -b 16 /dev/rhd`.

   If you think the boot area on your root device has been corrupted, then copy the boot area from the recovery system to the root device as follows:

   ```
   dd if=/dev/rfd of=/dev/rhd count=1 bs=8k
   ```

If the fsck appears to solve the problem then do a *sync*, wait for the busy light on the tape or floppy drive to remain off, halt the system, and reboot from your hard disc. If the reboot fails then come up on the recovery system again and go on with step 2. If the boot succeeds but other problems still exist on the disc (such as missing or corrupted files) then go to step 3.

2. Once you have run *fsck* and have recieved no errors, mount the root device using:

    ```
    mount /dev/hd /disc Return
    ```

The strategy at this point is to get the root volume back to the point where the system can be booted from it. The critical files are listed below. If any of these files are suspect on the root volume then take the indicated actions to fix the file.

/bin/sh   copy the version of this file on the recovery system to the root volume, then remove and relink /bin/rsh. The commands are:

```
cp /bin/sh /disc/bin/sh
rm /disc/bin/rsh
ln /disc/bin/sh /disc/bin/rsh
```

/etc/init   copy the version of this file on the recovery system to the root volume.

```
cp /etc/init /disc/etc/init
```

/etc/inittab   if inittab is corrupted, *init* might fail. To work around this problem, save the *inittab* file (you may want to go edit it later), then create a single line *inittab*. Do this as follows:

```
mv /disc/etc/inittab /disc/etc/inittab.save
echo "is:s:initdefault:" > /disc/etc/inittab
```

Be very careful to type the second line exactly as shown (including the quotes).

etc/ioctl.syscon   If you have changed the device used as the console then it is possible that */etc/ioctl.syscon* is incorrect, or it may have otherwise become corrupted. Work around this problem by removing the file (the next time the system is booted a correct file will automatically be created):

```
rm /disc/etc/ioctl.syscon
```

/dev/console   This file (which is also linked to */dev/syscon* and */dev/systty*) could be corrupted or the file might not match the console, resulting in the system not being bootable. Use the following to compare these files on the recovery system and the root device.

```
ls -l /dev /disc/dev
```

If the files on the root volume do not match those on the recovery system, then correct the problem by doing the following:

```
# remove the 3 files, console, syscon, and systty
rm /disc/dev/console /disc/dev/syscon /disc/dev/systty

# use the appropriate parameters to make /dev/console match
# the  /dev/console file on the recovery media (using mknod).
# Note that you cannot copy (using cp) device files.

# link the files
ln /disc/dev/console /disc/dev/syscon
ln /disc/dev/console /disc/dev/systty
```

/hp-ux   If the kernel file got corrupted there are two possibilities:

- If there is a backup kernel file on the root volume that is not corrupted then use it to reboot from the hard disc. Once you have rebooted you can either create a new kernel (using *config*) or copy the backup kernel to */hp-ux*. A common name for a backup kernel is */SYSBCKUP*.

- If there is no usable backup kernel then you need to copy */hp-ux.min* from the recovery system to the root device. If your recovery system is on cartridge tape, */hp-ux.min* will be on your one recovery tape. If your recovery system is on flexible disc, */hp-ux.min* will be on your second recovery disc. To use the second recovery disc to boot from, do the following:

- umount /dev/hd ⌐Return⌐

- *sync* and wait for the busy light on the floppy drive to remain off.

- Turn off your computer, remove flexible disc #1, insert flexible disc #2, power on your computer, hold the space bar down, and once given the choice, choose to boot from the flexible disc.

- The kernel on flexible disc #2 was built so that it uses the root volume as root (and not the flexible disc).

- `mkdir /disc`
  `mount /dev/fd /disc`
  `cp /disc/hp-ux.min /hp-ux`
  `umount /dev/fd`

- Go to step 5.

3. If you have not already done so, unmount your root disc (umount **/dev/hd**)

4. You should now be able to boot from the root volume. Do a *sync* (while still running on the recovery media), wait for the busy light on the tape or flexible disc drive to remain off, halt the system and reboot.

5. If you have rebooted from the root volume, you can now fix other possible problems as described below.

- if /etc/inittab was corrupted you can now edit the version that was saved to fix it. Once edited, move it back to /etc/inittab. Until you have tested your newly edited *inittab*, you should make the default state s, i.e., like the initdefault line shown above, which causes the system to come up in single user state when booted. You can switch to other states using *init x*, where x=1,2,..., 6.

- if you lost other system files you should *update* your system. *update* requires that at least the following commands be available. The flexible disc containing the command is also listed. All of these commands can be gotten from the #1 tape.

```
/etc/mkfs              SYS_CORE (gray) #1
/usr/bin/mediainit     SYS_CORE (gray) #1 (found as /mediainit)
/bin/sh                SYS_CORE (gray) #2
/bin/mkdir             SYS_CORE (gray) #2
/bin/pwd               SYS_CORE (gray) #2
/bin/cpio              SYS_CORE (gray) #2
/usr/bin/lifcp         SYS_CORE (gray) #2
/usr/bin/tcio          SYS_CORE (gray) #2
/etc/update            SYS_CORE (gray) #2
/etc/sysrm             SYS_CORE (gray) #2
```

If any of these are missing, they can be gotten from your install tape/flexible disc by mounting the tape/flexible disc and copying the missing command(s) to the root device.

Initializing Media

A command, *mediainit*, must be used on your flexible discs, cartridge tape, and hard discs before you can put files on them. *mediainit* prepares the disc or tape for error-free operation.

NOTE

Do not initialize a mounted file system.

---

1. Install (set up and connect) the disc or tape drive if you have not already done so. Follow the guidelines in the *Peripheral Installation Guide*.

2. Create a character device file for the tape or disc drive if you have not already done so. Follow the guidelines in the section "Setting Up Mass Storage Media" in this chapter.

3. Initialize the media by typing in the *mediainit* command using the character special device file's *pathname* (e.g. */dev/rfd* rather than */dev/fd* for flexible disc).

   `mediainit` *[options] pathname* `Return`

   The choice of the interleave factor can have a substantial impact on disc performance (both hard disc and flexible disc). The interleave factor should be 2 for flexible disc. For hard disc, use the interleave factor recommended in the *Peripheral Installation Guide*, listed under the HP part number of your disc drive.

NOTE

If you add new hard disc to your system, you may need to reinitialize the new hard disc before you can use it. If you change your system configuration (such as moving the system disc from the built-in HP-IB to the HP 98625A interface, or adding DMA) it **may** be necessary to reinitialize the disc. Check with your local HP sales office.

Here are examples of two common uses of mediainit:

- If you are initializing a cartridge tape (associated with the character special device file */dev/rct*), type in:

   `mediainit /dev/rct`

- If you are initializing a flexible disc (associated with the character special device file */dev/rfd*), you must specify an interleave factor of 2. Type in:

    ```
    mediainit -i 2 /dev/rfd
    ```

Remember, it is usually necessary to initialize media only once.

Mounting and Unmounting File Systems

When AXE is installed, only one file system (the root file system) exists. You may create, modify, and delete files from this system. At installation, the AXE file system exists on this single disc. It is possible to have other file systems on **different** discs; any other mass storage device supported by Series 300 AXE can be used as an additional file system. To accomplish this, the additional file system(s) is attached to the root file system. The process of attaching additional and functionally independent file systems to the root file system is called **mounting** and is achieved with the *mount* command. The process of removing file systems from the root file system is called **unmounting** and is achieved with the *umount* command.

To Mount a File System

1. Create special device files for the disc drive. You must have both character special and block special device files in */dev* (see the section "Setting Up Mass Storage Media" in this chapter).

2. Create the file system if you haven't already done so (see the instructions in the section "Creating a New File System" in this chapter).

3. Power up the disc drive. If the file system is on removable medium (such as flexible disc), insert the media in the mass storage device now. Do not remove the flexible disc until the file system is unmounted.

4. Create a new directory, under /, to mount the file system by typing:

    ```
    mkdir mount_directory Return
    ```

    This needs to be done only once. Make sure the directory is empty.

5. Mount the file system on the block special device file (for example, */dev/ct* rather than */dev/rct*) by typing:

    ```
    /etc/mount /dev/filesystem_name /mount_directory Return
    ```

To Unmount a File System

Use the following procedure to unmount a file system.

1. Make sure that all files on the file system are closed; no one may be accessing any file on the file system. Attempting to unmount a file system that has open files (including your current working directory) causes the *umount* command to fail without unmounting the file system.

2. Enter the following:

    /etc/umount /dev/*filesystem_name* `Return`

    where *filesystem_name* is the name of the block special (device) file of the device associated with the mounted file system.

3. When the shell prompt (#) is again displayed on your screen, it indicates that the file system is unmounted. If the file system is on a removable medium (such as a flexible disc), the medium can now be removed safely.

Mounting/Unmounting File Systems using /etc/checklist

You can mount and unmount all file systems listed in */etc/checklist* with one command. The */etc/checklist* file must contain the device file associated with the file system, and the full path name where each file system will be mounted. See "Adding to the checklist File" in this chapter.

If you wish to mount all file systems in */etc/checklist*, enter the following:

    mount -a `Return`

If you wish to unmount all file systems in */etc/checklist*, enter the following:

    umount -a `Return`

Example

The diagrams that follow show the directory structure before and after mounting. The new file system will be mounted in the directory called /direct. The new file system is on a flexible disc.

Figure 10-1 shows the /direct folder on the root file system. It also shows the file system hierarchy on the as-yet-unmounted flexible disc.
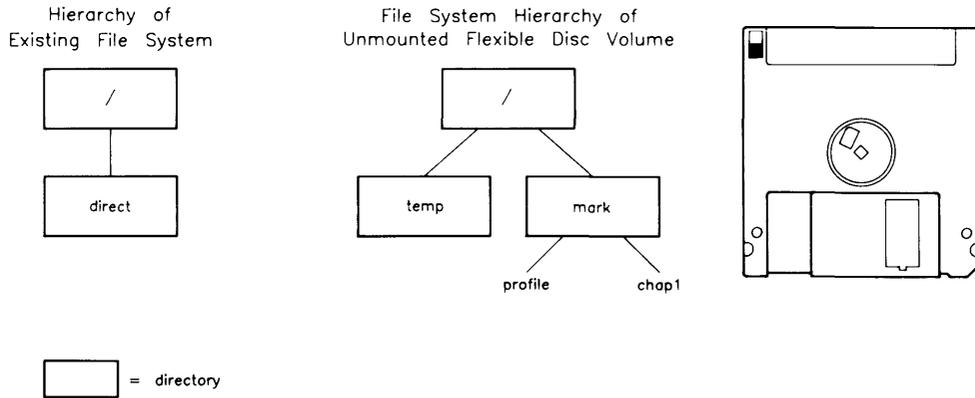
Figure 10-1. File System before Mounting

Figure 10-2 shows the file system hierarchy once the file system is mounted on the /direct folder, using the command:

```
/etc/mount /dev/md /direct  [Return]
```

The file newfile was added to the new file system after it was mounted.

Hierarchy of
Mounted File System
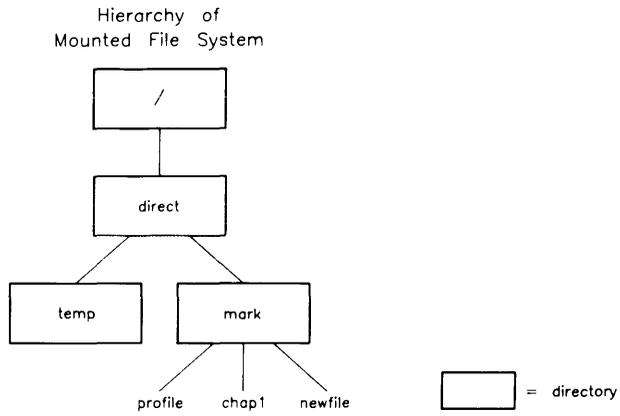
Figure 10-2. File System After Mounting

Figure 10-3 shows the */direct* folder on the root file system after the new file system is unmounted, using the command:

`/etc/umount /dev/md` [Return]

Hierarchy of
Existing File System

File System of
Unmounted Flexible Disc Volume
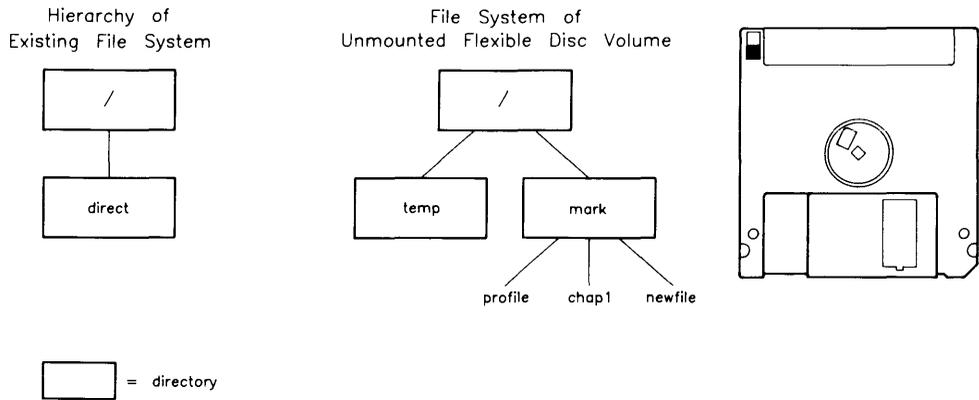
Figure 10-3. File System After Unmounting

Special Considerations

You can't unmount a file system that has open files. The following situations are the most frequent cause of open files on a file system:

- having your current working folder on a file system causes an open file on the file system.

  Change to a folder on another file system, such as the root file system.

- if a file has been accessed and the sticky bit is set in the file's protection mode; the file is always open.

  To turn off the sticky bit, type:

      chmod u-t *file_name* Return

Reconfiguring Swap Space and System Parameters

Series 300 AXE allows you to configure, or customize, various attributes of your system. You may require more swap space than the default amount of space. Perhaps you don't want the full kernel taking space in main memory. Or maybe, for a special application, you need to change selected system parameters to make the application more efficient. The *config* command allows you to customize your system to meet these requirements.

NOTE

Do not confuse the command, *config* (discussed here), and the command *reconfig*, discussed in Chapter 2, the section "After Installing AXE".

When configuring only your AXE operating system (kernel), you can use either *config* or *reconfig*. However, if you system requires a second swap device, or requires that you change system parameters, you must use the *config* command.

To create a new operating system kernel using *reconfig*, read the section "Creating a New Operating System" in this chapter. The rest of this section will discuss how to use the *config* command to create a new kernel, use additional swap space, and change system parameters.

What Can Be Configured

Each time you configure your system, you create a new kernel. Any kernel drivers not specifically listed in the *dfile* (described later) will be removed from the kernel.

Using Config

Programs and files used for configuring your system are:

- /etc/config,

- /etc/master,

- /etc/conf/libraries— object code,

- /etc/conf/h— .h files,

- /etc/conf/machine — .h files,

- /etc/conf/dfile.[min,full,full.lan,support] — sample configuration files.

- /etc/conf/dfile— the configuration file created with reconfig. This file reflects the drivers currently installed (unless you have created a new operating system using config, and used a different dfile).

NOTE

You must not use config in the root folder (/) or you will overwrite your kernel.

To use config, follow these steps:

1. Log in as the superuser, root.

2. Follow the procedures in this chapter, the section "Updating AXE", to add the ACONFIG fileset to your system.

3. Shutdown the system. This will bring your system into single-user mode, and will make your system inactive. Follow the procedure in "Shutting Down the System" in this chapter.

4. Execute fsck using the procedures in "Checking Your File System" in Chapter 9.

5. cd to some directory other than / (for example, /etc/config). This process creates your new kernel, so **you must be in a directory other than the root directory or you will overwrite the current kernel**.

6. Create or edit the dfile (description file). The dfile is a user-provided description of the system configuration. You can either create your own dfile, use the dfile created with reconfig (/etc/conf/dfile), or use one of the sample dfiles sent with your system. See the samples in /etc/conf: dfile.full, dfile.full.lan, dfile.min, dfile.support). These dfiles are described in the "Device Drivers and I/O Cards" section.

7. Execute *config* on your dfile to create both a C program and a makefile. See *config(1M)* for available options.

```
/etc/config dfile Return
```

Executing *config* creates *conf.c* and *config.mk*. *conf.c* is a C program that contains external references to the kernel driver code. Satisfying these external references will bring code from the system libraries into the kernel. *config.mk* is a makefile that will automatically compile *conf.c* and link a new kernel (hp-ux).

Check to see that you have these files by typing `ls`. You should see your dfile, *conf.c*, and *config.mk*.

8. Create the new hp-ux kernel in the current directory by executing:

```
make -f config.mk Return
```

config.mk will list all code brought into the kernel, for example:

```
/etc/conf/libmin.a
    cs80.o
    mux.o
    muxs.o
    ⋮
/etc/conf/libdevelop.a
    amigo.o
    ciper.o
    ⋮
```

Executing *conf.mk* creates a file, *hp-ux*, in your current directory.

9. Backup the existing kernel by typing in:

```
cp /hp-ux /SYSBCKUP Return
```

If the newly configured kernel won't boot, use the bootrom's *attended mode* to access the backup kernel. To use the attended mode, press the space bar during bootup. This halts the automatic boot mechanism and allows you to choose the system to load. You should select "B" (backup) option instead of the "H" (HP-UX) option. For example, select "1B" instead of "1H".

10. Move the new kernel to the / directory.

```
cp ./hp-ux /hp-ux
```

11. Reboot

    `exec reboot` $\boxed{\text{Return}}$

12. If you added a second swap disc (described under "Creating Swap Space" later in this section), enable the second disc by executing:

    `swapon` *second_swapdevice* $\boxed{\text{Return}}$

    where *second_swapdevice* is a block special file. Add this entry to */etc/rc* for automatically enabling the second disc when you boot.

13. Once you are sure your new operating system works, remove the ACONFIG fileset by following the procedures in the section "Removing Optional Products and Filesets" in this chapter.

Parts to Configure

You can configure kernel device drivers and I/O cards, swap space, and system parameters. Each is described below.

NOTE

Remember that you MUST have all the AXE kernel device drivers you need included in your *dfile* each time you use *config*, along with swap device information and/or system parameter information if you need them.

Device Drivers and I/O Cards

You MUST configure all the kernel device drivers you need each time you execute *config*. If you do not include all the kernel device drivers you need, you will be unable to communicate with the peripherals associated with those drivers. Peripherals are the hardware associated with the files in */dev*.

This area of customization enables you to configure hardware drivers, cards in the backplane, and software drivers (pseudo drivers). Pseudo drivers don't talk to any hardware device. LAN and Windows/9000 drivers are examples of pseudo drivers.

Four sample script files came with your system to show how different device drivers and I/O cards can be combined to form different kernels. The sample files can be found in */etc/conf*. The files are:

- *dfile.full*—this file will configure an AXE system with all the drivers supported in this release, minus LAN,

- *dfile.full.lan*—*dfile.full* plus the LAN driver.

- *dfile.support*—this file reflects the set of drivers and I/O cards available in releases prior to 5.0.

- *dfile.min*—this file contains one possible minimal (but still useful) system configuration.

In addition to the sample files, the dfile you created, or the dfile created by *reconfig* (*/etc/conf/dfile*), will be in this directory.

In determining the device drivers for the hardware you have, you can consult the "alias" portion of the */etc/master* file. If you wish to determine the device drivers from the */etc/master* file using alias, do the following:

1. make a list of the model numbers of all your peripheral devices, I/O cards, and software (LAN, Windows/9000, etc.).

2. look up the part number in the */etc/master* file and add the corresponding driver name to your dfile. For example, if you have a 7945 disc, look up 7945 in the file. You will see the following entry:

    7945   cs80

You would add "cs80" to your dfile.

NOTE

Remember that, in addition to configuring your kernel with the device drivers you need, you must create special (device) files. See the sections in this chapter specific to setting up peripherals for information on creating device files.

Swap Space

Swap space is an area on your disc (or discs) reserved for the virtual memory system. Swap space must be large enough to hold a process image of all the processes that are running. To determine the amount of swap space you need, read Appendix E.

If you do not have enough swap space, AXE will not execute your program. AXE will kill your process and send you the message:

    Sorry, pid pidnum was message.

Pidnum is the id number of the process that was killed. *Message* is one of 7 possible messages, describing when and why the process was killed.

Creating Swap Space

You can specify swap devices (the secondary storage devices holding swap space) by adding a line to your *dfile* that looks like:

    swap devname address swplo [nswap]

devname	Swap device's driver name (e.g. cs80).
	If you don't know the driver name, look up the product number in the */etc/master* file's alias table.
address	Minor device number in hexadecimal, without the preceeding 0x.
	This is the same minor device number you set up when you created the special (device) file for the disc drive that will contain the swap space.
swplo	Swap area's location in decimal.
	If (swplo = -1), then the swap space is put on the disc, after the file system. If (swplo = 0), then allocate the entire disc to the swap space— don't reserve any area before the swap area. If (swplo >= 1), then reserve *swplo* space at the beginning of the disc, leaving (disc-size - swplo) for the swap area.
nswap	Size of swap area in number of 1 Kbyte units.

NOTE

Remember that you MUST have all the AXE kernel device drivers you
need included in your *dfile*, along with any swap device lines.

Swap space can be on the same disc as your file system, on a separate disc, or both (see figure
10-4). If you need more than the default swap space, use the swap configuration in either 10-4-c
or 10-4-d. An explanation of each configuration follows.

NOTE

If you rebuild your root file system, you must have another bootable
system (i.e. another root disc). This procedure is described later.
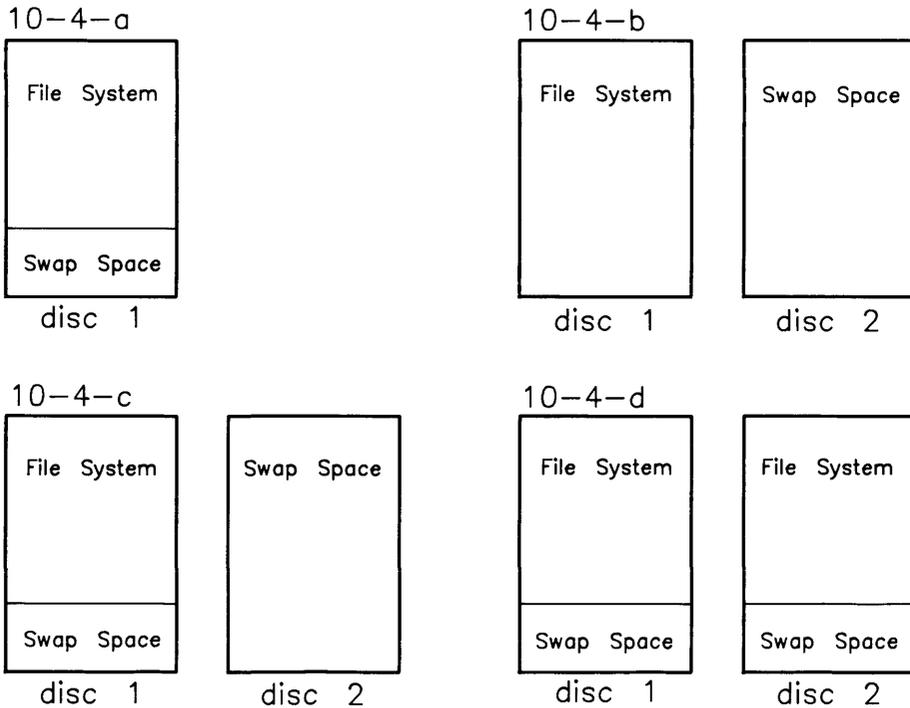
Figure 10-4. Swap Space

Possible configurations for swap space are:

- 10-4-a shows the default configuration.

  Use *newfs* to create your file system (see "Creating File Systems" in this chapter)

- 10-4-b shows one disc (probably the root disc) with no default swap area after the file system, and a second disc dedicated to swapping. You must remake your file system, using the entire disc for the file system, then put the following line in your dfile[1]:

  ```
  swap cs80 E0100 0 /* disc 2 */
  ```

- 10-4-c shows one disc (probably the root disc) with a file system with the default swap space, and a second disc dedicated to swapping. The entry in your dfile for figure 10-4-c would look like[1]:

  ```
  swap cs80 E0000 -1 /* disc 1 */
  swap cs80 E0100  0 /* disc 2 */
  ```

- 10-4-d shows two file system discs, each with the default swap space.

  On each disc, a file system was created using *newfs*. The entries in your dfile would look like[1]:

  ```
  swap cs80 E0000 -1 /* disc 1 */
  swap cs80 E0100 -1 /* disc 2 */
  ```

NOTE

If you increase the size of the swap space on your file system disc without re-making the file system, you may loose parts of your file system and the system will probably crash.

How to Remake Your File System, decreasing the file system size.

Decreasing your file system's size increases your swap size. This option would look similar to Figure 10-4-a, but the swap space would be larger—less file system space.

---

[1] All the examples assume disc 1 is at select code 14, bus address 0, and disc 2 is at select code 14, bus address 1.

To rebuild your filesystem, you can either use another root disc or re-install your system. To rebuild your filesystem using another root disc, follow these steps:

1. Determine how big you wish your swap space to be using the guidelines in Appendix E.

2. From your required swap size, determine the size your file system should be.

$$\text{file\_system\_size} = \frac{\text{disc size - swap size in bytes}}{\text{DEV\_BSIZE}}$$

DEV_BSIZE is the size of blocks and is defined in */usr/include/sys/param.h*.

For example, if DEV_BSIZE = 1024 bytes, and you need 20 971 520 bytes of swap space on your HP 7945 disc, you would need 36 352 blocks for your file system:

$$\text{file\_system\_size} = \frac{58\,195\,968 - 20\,971\,520}{1024} = 36\,352 \text{ blocks}$$

3. Create another root file system on hard disc using the *file_system_size* you determined in step 2.

In this example, you would make your file system on the disc associated with **/dev/rhd2** using the command line:

   newfs -s 36352 /dev/rhd2 hp7945 [Return]

See "Creating A New File System" in this chapter for specific details on the file system creation procedure.

4. Copy your existing file system onto the new root disc.

If you choose to re-install AXE, you must perform the following steps:

1. Determine how big you wish your swap space to be using the guidelines in Appendix E.

2. Backup the entire file system using the procedures in Chapter 9, the section "Backing Up and Restoring AXE".

3. Re-install AXE, this time specifying the larger swap size in the "Disc Parameters Menu". See Chapter 2 for instructions on how to install AXE.

4. Restore your files from the backup created in step 2.

Enabling Swap Space

The kernel will automatically turn on the first swap device specified. If you want to use the other swap devices you have configured, you must use the *swapon* command after you boot the new kernel. For examples 10-4-c and 10-4-d, if the second disc corresponded to the device file */dev/hd2*, and had a minor number of 0x0e0100, the second device could be enabled by typing "**swapon /dev/hd2**". The swap device can be enabled automatically at bootup by adding "**swapon /dev/hd2**" to */etc/rc*. Once you have enabled a device for swapping, it can not be disabled without halting the system. See "Adding to the checklist File" in this chapter for information on automatically enabling swap devices at bootup.

Changing System Parameters

If the application you purchased requires you to change AXE operating system parameters, you must put a line of the following form in your dfile:

```
parameter_name parameter_value
```

where *parameter_name* is the name of the system parameter you need to change, and *parameter_value* is the new value required by your application.

Removing Optional Products or Filesets

If you are no longer using a fileset, you should remove it so you have more space on your file system. The program *sysrm* performs the opposite of *update*; it removes optional file sets.

1. Determine which file sets you wish to remove.

   A list of AXE file sets is given in Appendix D. Appendix D does not list the file sets for optional products, such as LAN. The folder, */etc/filesets*, contains a complete list of file sets you have installed on your system using either the update or the install procedures.

2. Become the root user.

3. Shut down the system by typing in:

   shutdown 0 [Return]

4. Type in the following command, where *fileset* is the name or number of the fileset to be removed (determined in step 1):

   /etc/sysrm *fileset* [Return]

   You must execute *sysrm* once for each fileset you wish removed. The file set(s) you typed in will no longer be available. You can load them back into the system, if needed, by using the update procedure (see "Updating AXE").

5. Return your system to normal operating mode by typing in:

   reboot [Return]

Setting the System Clock

You must make sure the system clock always has the correct time and date because a number of commands use the clock to accomplish their tasks.

Occasionally, the system clock needs to be set or reset. There is no need to reset the system clock on your Series 300 if you have powered down—it has a battery which keeps the clock current.

Only the super-user can change the system clock. To set the current time and date:

1. Login as the super-user, root.

2. Insure that the time zone environment variable TZ is set properly by typing in:

   echo $TZ [Return]

   Typically, TZ's value is set with a variable declaration (as shown below) in the file */etc/profile*. As shipped to you, the system is set up to run in the Mountain Time Zone. To change the time zone to your time zone, modify the */etc/profile* file to contain two entries of the form:

   TZ=XXXHYYY
   export TZ

   where XXX and YYY are three letter representations of the standard and daylight time zones for your area and H represents the difference between current local time and Greenwich Mean Time, in hours. The export TZ line will remain the same regardless of the time zone. For example, in Denver, Colorado you would enter the following:

   TZ=MST7MDT
   export TZ

   where MST stands for Mountain Standard Time and MDT stands for Mountain Daylight Time. Here are some other examples:

   - For St. Clair Shores, Michigan: TZ=EST5EDT

   - For Norman, Oklahoma: TZ=CST6CDT

   - For Corvallis, Oregon: TZ=PST8PDT

   - For Hawaii: TZ=HST10 since Hawaii has no Daylight Savings Time.

3. Now that the time zone is set, you can set the correct time and date (using the *date* command) by typing an entry of the form:

    `date MMddhhmm{yy}` [Return]

    MM is a two digit integer representing the month. For example, 03 represents March.

    dd is a two digit integer representing the day of the month. For example, 02 represents the second day of the month.

    hh is a two digit integer specifying the current hour in terms of a twenty-four hour clock. For example, 03 specifies 3:00 am and 14 specifies 2:00 pm.

    mm is a two digit integer specifying the number of minutes past the stated hour. For example, 04 specifies four minutes past the hour.

    {yy} is an **optional** two digit integer specifying the last two digits of the current year; this parameter may be omitted if the year is already correct. For example, 85 specifies 1985 as the current year.

When *date* is executed it echoes the time and date on your screen.

Special Considerations

As mentioned in the "Backing Up and Restoring the File System" section in Chapter 9, the process of making incremental backups depends heavily on the correctness of the date. This is because incremental backups are always made in relation to a dated file.

Setting Up and Removing A Printer

Setting Up a Printer

When you set up a printer, you can print files, or redirect output, to the printer using the *lp* command.

NOTE

In addition to completing the steps here, you may need to reconfigure your kernel. The kernel must be configured with the correct driver before the printer can work.

---

1. Configure the AXE operating system so it supports this printer.

   This step can be done before or after you have set up your printer. Check the file */etc/conf/dfile* to see if the driver is already installed. If not you must add a driver (see "Creating a New Operating System") for both the printer type and for the RS232 or HP-IB printer interface.

2. Enter the command:
   reconfig [Return]
   The main menu for *reconfig* will appear on your screen.

3. Using the [Tab] key, move the cursor to the Configure the line printer menu item and press the **Select** softkey.

   The form for configuring your line printer will appear on your screen.

4. Fill in each field of the form.

   PRINTER NAME
   This is the name you will use to access the printer. This name can be any unique combination of up to 14 characters and numbers; however, a name describing the printer is normally chosen. For example, if you are adding an HP 2225A Thinkjet printer to your system, any of the following names would be appropriate:

           thinkjet   thinkjet1   hp2225a   lp1

If you called the printer thinkjet1, and you wish to send a file called *bowling_scores* to the printer, type:

```
lp -dthinkjet1 bowling_scores Return
```

MODEL NAME

Choose one of the models listed below the form. Each printer model listed has a corresponding description file in the */usr/spool/lp/model* directory. The *lp* program uses these descriptions to access the special features of the printer. If your printer does not fit into any of these models, use the *dumb* model.

SELECT CODE

Each I/O card installed in your system has a unique address associated with it, which is referred to as its select code. The select code is a number from 0 through 31. If you have used the *Peripheral Installation Guide* to set up your printer, you will have the correct select code on your worksheet.

If you have not used the *Peripheral Installation Guide* to set up your printer, you may have to remove the card and check the select code switches on it.

WARNING

DO NOT remove the card while your computer is turned on.

PRINTER INTERFACE

This field allows you to indicate which type of interface the printer supports. The two choices are HP-IB and RS-232. This information is needed to guarantee that AXE properly communicates with the printer. If you are unsure which interface the printer supports, refer to the manual supplied with the printer.

SUB-ADDRESS

The sub-address is a number from 0 through 31. The sub-address depends on the type of printer, RS232 or HP-IB. Use Table 10-4 to help determine what the sub-address number is:

Table 10-4. Printer Sub-Addresses

Printer Interface	SubAddress
HP-IB	HP-IB address assigned to the printer. Look at the switch settings or refer to your the Peripheral Installation Guide.
RS232 with single channel (HP 98626 or HP 98644 card)	0 See the note on RS232 printers.
RS232 with 4-channel MUX (HP 98642 card)	channel number on the card (refer to the Peripheral Installation Guide) See the note on RS232 printers.

DEFAULT SYSTEM PRINTER

The **default system printer** is used if you do not specify a particular destination printer in the *lp* command. The default system printer is the printer associated with the device file */dev/lp*. For example, the following command will print the file, *bowling_scores*, on the default system printer:

```
lp bowling_scores  [Return]
```

However, the following command will print the file, *bowling_scores*, on a thinkjet printer:

```
lp -dthinkjet1 bowling_scores  [Return]
```

You do not need to have a default system printer, but if you don't, then you must specify a destination printer each time you print a file. The system supports only one default printer at a time. Each time a new one is set, the old one is replaced.

5. Press the **Done** softkey to exit the form.

The *reconfig* program now performs the following functions:

- creates a file in the */dev* folder,

    For example, if you named your printer *thinkjet1*, the following file will be created:

    ```
    /dev/thinkjet1.
    ```

- checks to see that each field is within the limits,

- does NOT check to see that the select code/address/etc are correct,

  If the numbers you supplied are within the range, *reconfig* assumes you supplied the correct information.

- checks for a duplicate device file name,

  If you already had a file in the */dev* folder with the name you supplied in "PRINTER NAME", you will need to supply a new name.

- adds the new printer name to the line printer spooler mechanism so AXE knows you now have a printer.

  You will now see the main menu on your screen.

6. Press the **Exit** softkey to return to your shell.

A NOTE ON ADDING RS232 PRINTERS

When an RS232 printer, using the *dumb* printer model, is added to the system, the operating system will, by default, talk to that printer at 300 baud. For many people, this speed is inadequate. To increase the baud rate, you must become the superuser and edit the file */etc/rc* to add a line similar to the following (you can find the exact lines you need in the *Peripheral Installation Guide*):

```
nohup sleep 2000000000 < /dev/PRINTER&
stty 9600 -ienqak ixon -parenb opost onlcr tab3 < /dev/PRINTER
```

where *PRINTER* is the printer name you specified in the form. If you wish to run at a speed other than 9600 baud, then replace the 9600 with the desired baud rate.

Removing A Printer

If you remove a printer from your system, you need to perform the following steps to stop the lp scheduler:

1. Shutdown the lp scheduler by typing in:

    /usr/lib/lpshut [Return]

2. Remove the printer name from the scheduler by typing in:

    /usr/lib/lpadmin -x*printer_name* [Return]

    where *printer_name* is the name you called the printer when you set it up.

3. Restart the lp scheduler (if you still need it) by typing in:

    /usr/lib/lpsched [Return]

If space is a problem, and this was the only printer of it's type on your system, you can remove the kernel driver by creating a new operating system.

Other Useful Printer Commands

If your printer gets disabled, for example if it runs out of paper, you can re-enable it by typing in:

    enable *printer_name* [Return]

where *printer_name* is the name you called the printer when you set it up.

If you need to check on your printers, i.e., verify that they are enabled, type in:

    lpstat -t [Return]

Setting Up and Removing A Remote Terminal

Remote terminal support allows you to login from a terminal other than your system console. If you will be using only the system console, or are running a single-user system, do not add remote terminal support. The system will try to access the terminal and waste processor time.

NOTE

You can login from a remote terminal **only** if you have a multi-user system.

Setting Up a Remote Terminal

NOTE

Remote terminals can be accessed only in a "secure" system. If you set up your system for "no security", you can use only your system console.

To add support for a new port, follow these steps:

1. Follow the guidelines in the *Peripheral Installation Guide* to install the RS232 or MUX interface card (HP 98626, HP 98642, or HP 98628) that you will connect your remote terminal to.

2. Configure your AXE operating system to support the interface card you installed.

   This step can be done before or after you have set up your remote terminal. Check the file */etc/conf/dfile* to see if the driver is already installed. If not you must add a driver (see "Creating a New Operating System") for the RS232 or MUX interface card.

3. Enter the command:
   reconfig [Return]

   The main menu of *reconfig* will appear on your screen.

4. Using the [Tab] key, move the cursor to the **Add remote terminal support** field and press the **Select** softkey.

   The form for adding a remote terminal will appear on your screen.

5. Fill out each field of the form:

SELECT CODE

Each I/O card installed in your system has a unique address associated with it, called a select code. If you installed your interface card using the guidelines in the *Peripheral Installation Guide*, you will have the select code on your worksheet.

If you did not use the *Peripheral Installation Guide* when installing your interface card, you need to remove the card and check the select code switches on it.

WARNING

DO NOT remove the card while your computer is turned on. If you do, you can damage your hardware.

PORT ADDRESS

If you are adding remote terminal support to a single channel RS-232 card (98626 or 98644) port, you must set this field to 0 (zero). If the port is a 4 channel MUX card (98642), you should set this field to the port number (0 - 3) to which terminal support is being added. The card's product number is shown on the faceplate of the card.

SPEED

Choose the default speed (or baud rate) at which this port should operate. There are 5 choices: 300, 1200, 2400, 4800, and 9600.

Terminals that are directly connected to this port should probably be set to 9600 baud. If you are using a modem, the setting will depend on the modem.

PORT USAGE

It is important that you set this field to correctly reflect how the port will be used. There are 3 choices:

Direct connect   If the terminal is directly connected to your interface card (you will not use a modem), select this option.

US modem   If you will use a modem, and are in the United States or Canada, select this option. This setting will allow you to dial into your system.

CCITT modem   If you will use a modem, and are not in the United States or Canada, select this option. This setting will allow you to dial into your system.

6. When you are sure each field contains the correct information, press the **DONE** softkey to exit the form.

The *reconfig* program will perform the following tasks:

- create a file in the */dev* folder with the correct port number (the port number is the xx at the end of the file name) and correct address. A direct connect terminal will have a file that looks like: */dev/ttydxx*. A dial-in terminal will have a file that looks like: */dev/ttyxx*.

- add an entry for the device file in the */etc/inittab* file.

Each time AXE enters the "secure" mode, a process, called a *getty*, will be started for this terminal.

The main menu of *reconfig* will appear on your screen.

7. Press the **Exit** softkey.

If you haven't reconfigured your kernel to include the new interface card, you will receive a message on your screen similar to:

```
Unable to access ttyxx
```

Install the kernel driver using the guidelines in "Creating a New Operating System" in this chapter.

Removing A Remote Terminal

If you remove a remote terminal from your system, you must clean up your system by performing the following steps:

1. Find the system's name for the terminal.

If you have been receiving messages on your screen that are similar to:

```
Unable to access ttyxx
```

then the system's name for the terminal is the *ttyxx* name.

If you have not recieved the message, you must determine the name of the remote terminal by the following method:

a. type `cd /dev` [Return].

b. type `ls -l tty*` [Return]

You will see lines of the form:

```
crw--w--w-  1 jaci    axe    1 0xScPaOT date   /dev/ttyPa
```

The field `0xScPaOT` stands for the following:

0x   Indicates this number is in base 16

Sc   Select code - refer to the *Peripheral Installation Guide*

Pa   Port address - always 0 if your terminal was connected to an HP 98626 or HP 98642 interface card, and is 00, 01, 02, or 03 if the terminal was connected to an HP 98642 interface card.

0T   If you are in the United States or Canada,
        00 means dial-in modem
        01 means dial-out modem
      If you are not in the United States or Canada,
        02 means dial-in modem
        03 means dial-out modem
        04 means direct-connect

2. Edit the file */etc/inittab.*

You must have the *vi* editor on your system. See the instructions in "Updating AXE" if you don't have *vi.*

Delete the line that has a field with the words: `:respawn:/etc/getty ttyxx`, where *ttyxx* is the port you identified in step 1.

3. Update */etc/inittab* knowledge of the terminal by typing:

```
telinit q [Return]
```

Setting Up Mass Storage Media

When you set up a flexible disc drive, cartridge tape drive, or hard disc drive, you must create special files, called device files, in the /dev folder. The instructions for creating these special files are given in this section.

1. Login as the super-user **root**. See the section "Becoming the Root User" in this chapter for details.

2. Shutdown your system with the desired grace period (in seconds) by typing in:

    shutdown -h *grace_period* [Return]

    and wait for the "halted" message on your console. The section "Shutting Down the System" in this chapter explains the shutdown procedure.

3. Turn the power to your computer off.

4. Using the guidelines covered in the *Peripheral Installation Guide* and the installation manual supplied with the peripheral device, determine the best place (in terms of HP-IB Bus Addresses, shared sets of I/O resources, expected usage, etc.) to locate your disc or tape drive.

5. Connect the disc or tape drive. If it requires an interface card, set the appropriate switches on the card and install the card in the computer. **Never install an interface card while the computer is powered up**. Then set any required switches on the disc or tape drive and connect it to the computer (or interface card). If you ever change the switch settings on an HP-IB device, be sure to cycle power the device before attempting to address it.

6. Turn power on to your computer.

7. Create the special device file for your peripheral.

    Using the information from step 4, create the device file by typing in a line with the following form:

    /etc/mknod **/dev/***device_file_name c/b major_num 0xScBaUV* [Return]

    device_file_name   The *device_file_name* should follow the AXE naming conventions: Distinguish the name of a character device from a block device by prefacing the character device name with "r". See Table 10-5 for examples.

Table 10-5. Mass Storage Device Naming Conventions

Device File Name	Character/Block Mode	Type of Mass Storage Device
/dev/hd	block	Hard disc
/dev/rhd	character	Hard disc
/dev/fd	block	Flexible disc
/dev/rfd	character	Flexible disc
/dev/ct	block	Cartridge tape
/dev/rct	character	Cartridge tape
/dev/mt	block	Magnetic tape
/dev/rmt	character	Magnetic tape
/dev/hd9134	block	HP 9134 disc drive
/dev/rhd9134	character	HP 9134 disc drive

Several programs assume the AXE naming conventions. For example, *backup* assumes the character-mode cartridge tape associated with */dev/rct*, and *backupf* assumes the character-mode flexible disc drive associated with */dev/rfd*.

c/b   Use **c** if you are creating a character special device file and **b** if your are creating a block special device file.

Each hard disc drive, flexible disc drive, and cartridge tape drive must have both a **character special** and a **block special** device file.

major_num   For most mass storage devices, the *maj_num* will be 0 for the block special device files and 4 for the character special device files. Look up the product number of your mass storage device in the section, "Setting Up Peripheral Devices: General Information" at the end of this chapter.

0xScBaUV   The addressing (also called *minor number*) consists of a select code (Sc), HP-IB address (Ba), unit number (U), and volume number (V). The 0x tells AXE that this number is a hexadecimal number. You can find these numbers from the worksheet you filled out while installing the mass storage device. For each possible HP-IB address where hard discs may be located, there can be several minor numbers. For example, if you have an HP7946A disc/tape drive, the disc drive has a unit number of 0 and the tape drive has a unit number of 1.

select code = 7, HP-IB address = 0
disc drive minor number = 0x070000
cartridge tape minor number = 0x070010

For *hd/ct* combination drives with a single controller, the *ct* will be unit 1. If you ordered a dual controller option for a *hd/ct* drive, such as the hp 7114TC, the unit number for both devices is 0, but the bus addresses for the two controllers must be set to different values.

If you have an integrated CS80 hard disc and flexible disc drive, at Select code 7, bus address 0, your mknod command lines would be:

```
mknod /dev/hd  b 0 0x070000
mknod /dev/rhd c 4 0x070000
mknod /dev/md  b 0 0x070010
mknod /dev/rmd c 4 0x070010
```

You can replace the supplied device names with an appropriate name that contains the model number of your hard disc.

8. Change the permissions on the new device file.

If you have set up a new hard disc, you should type (for both block and character files):

    chmod   600 /dev/*device_file_name* ⌐Return⌐

For flexible disc drives and cartridge tape drives, you should type: (for both block and character files)

    chmod   666 /dev/*device_file_name* ⌐Return⌐

9. Make sure your kernel contains the correct drivers (kernel code) to use the peripherals. See "Creating a New Operating System" in this chapter for a description on how to add drivers to AXE. If you created the maximum kernel you will have all the drivers installed. Check the */etc/conf/dfile* file for the list of installed drivers.

Magnetic Tape Unit and Volume Numbers

The unit and volume number fields of the minor number have special meaning when creating special files for the HP 7970E, HP 7971A, HP 7974A or HP 7978A/B magnetic tape drives. The single hexadecimal unit number represents a four bit binary value. Setting and clearing the bits of this binary value affects the manner in which the tape drive operates, as indicated in Table 10-6 (bits 6 and 7 select the tape density, while bits 4 and 5 represent the unit number, and "x"s represent "don't care"):

Table 10-6. Tape Density and Unit Number Bit Settings

hex value	7	6	5	4	Selects
8	1	0	x	x	Density = 6250 bpi (HP 7978 only)
4	0	1	x	x	Density = 1600 bpi (All mag tapes)
0	0	0	x	x	Density = 800 bpi (HP 7974, opt 800 only)
0	x	x	0	0	Select Unit 0
1	x	x	0	1	Select Unit 1, etc.

The volume number field of the minor number also has special meaning when creating special files for magnetic tape drives. The single hexadecimal volume number represents a four bit binary value. Setting and clearing the bits of this binary value affects the manner in which the tape drive operates, as indicated in Table 10-7.

Table 10-7. Magnetic Tape Operation Bit Settings

Bit Order	When Clear (0)	When Set (1)
3	Industry Standard mode	HP-UX 2.0 compatibility mode
2	Immediate report on (ignored by HP 7970/7971)	Immediate report off
1	AT&T style compatibility mode	Berkeley style compatibility mode
0	Rewind on close	No rewind on close.

Example minor numbers for your tape drive are given in the *Peripheral Installation Guide.*

Setting Up Plotters and Digitizers

If you are installing an interface card, you MUST perform all the steps given here. If you are connecting your plotter or digitizer to an existing interface card, you can skip steps 2, 3, and 6.

1. Login as the super-user **root**. See the section "Becoming the Root User" in this chapter.

2. Shutdown your system with the desired grace period by typing in:

   shutdown -h *grace-period* [Return]

   and wait for the "halted" message on your console.

3. Turn the power to your computer off.

4. Using the guidelines covered in the *Peripheral Installation Guide* and the installation manual supplied with the peripheral device, determine the best place (in terms of HP-IB Bus Addresses, shared sets of I/O resources, expected usage, etc.) to locate the peripheral.

5. Connect the plotter or digitizer. If it requires an interface card, set the appropriate switches on the card and install the card in the computer. **Never install an interface card while the computer is powered up**. Then set any required switches on the device and connect it to the computer (or interface card). If you ever change the switch settings on an HP-IB device, be sure to cycle power on the device before attempting to address it.

6. Turn power on to your computer.

7. Create the character special device file for your peripheral.

   Using the select code, bus address, unit number, and volume number from step 4, create the device file by typing in a line with the following form:

   /etc/mknod /dev/*device_file_name* **c 21** *0xScBaUV* [Return]

device_file_name	Make the character special device file name meaningful, such as **plotter** or the devices model number.
c	Use **c** to create a character special device file.
21	The major number is always 21 for plotters and digitizers.
0xScBaUV	The addressing (also called *minor number*) consists of a select code (Sc), HP-IB address (Ba), unit number (U), and volume number (V). The 0x tells AXE that this is a hexadecimal number. You can find these numbers from the worksheet you filled out while installing the mass storage device. For each possible HP-IB address where hard discs may be located, there can be several minor numbers.

8. Change the permissions on the new file by typing:

    chmod 666 /dev/*device_file_name* `Return`

9. Make sure your kernel contains the *hpib* kernel driver. See "Creating a New Operating System" for a description on how to add drivers to AXE. If you created the maximum kernel you will have all the drivers installed. Check the */etc/conf/dfile* file for the list of installed drivers.

Shutting Down the System

Improperly powering down the computer (or an "on-line" mass storage device) can cause the file system to become corrupt. *shutdown(1M)* terminates, in an orderly and cautious manner, all processes currently running on the system. This allows you to power down the system hardware without adversely affecting the file system.

The *shutdown(1M)* command — among other things — kills all unnecessary processes, forces the contents of the file system's I/O buffers to be written to the disc (with the *sync(1)* command), and takes the system into the single-user state. It will also optionally halt or reboot the system.

To shutdown the system from a normal operating mode, perform the following steps.

1. Login as the super-user `root`. See "Becoming the Root User" in this chapter for more information on how to become the super-user.

2. Move to the root directory of the file system by entering the command:

    cd / [Return]

3. Execute the shutdown command.

    The *shutdown* command allows you to specify a *grace_period*, which is the number of seconds you want *shutdown* to wait before terminating all processes. You can also use the *-r* option to automatically reboot the system after reaching run-level "s", or the *-h* option to halt the system.

    The *shutdown* command looks like (see the examples below):

    /etc/shutdown *[-r|-h] grace_period* [Return]

    If *grace_period* is non-zero, *shutdown* prompts to see whether you wish to send the standard broadcast message or enter your own message. If you elect to send your own broadcast message, type the message on the terminal. When you are finished typing the message, press [Return]. Then hold the [CTRL] key depressed as you press [D] to signify the end of the message.

    If *grace_period* is omitted, then after waiting the specified amount of time, *shutdown* asks if you want to continue. When *shutdown* completes its task, it displays a message telling you to halt the system when you are ready.

4. If you have halted the system (*shutdown -h*) you may now power down the system if you wish. If you wish to bring the system back up, go to step 5.

If you have not halted the system, and you wish to power down the system, you have two alternatives:

a. If you ran *shutdown* without the *-h* option, you are now in run-level s, and can halt the system by typing in:

    reboot -h ⌷Return⌷

b. If you have not yet run the *shutdown* program, you are still in the normal operating run-level, and can halt the system by typing in:

    shutdown -h ⌷Return⌷

5. If you do not wish to power down the system, and now need to resume normal operating run-level, you should type in:

    reboot ⌷Return⌷

For example:

• To activate a newly configured kernel, you should shutdown the system with no grace period, and automatically reboot:

    shutdown -r 0 ⌷Return⌷

• If you wish to install an interface card, halt the system by typing:

    shutdown -h 0 ⌷Return⌷

Wait for the "halted" message, then turn the power off to the computer.

• If you wish to backup your system, you should change to run-level "s" by typing:

    shutdown 0 ⌷Return⌷

After running backup, bring the system back up with all the daemons running by typing:

    reboot ⌷Return⌷

NOTE

Do not execute *shutdown* -r from run-level "s". You must reboot using the *reboot* command.

- If you wish to halt the system from run-level "s" with no daemons or programs running, type:

    `reboot -h` `Return`

Updating AXE

This section describes the steps necessary to update your AXE system, as well as how to install optional products such as the SRM access utilities (Shared Resource Manager), LAN (Local Area Network) and optional partitions of your operating system. Since the process of updating or installing optional products could involve changes to the AXE kernel, you should carefully follow the preparatory steps below before proceeding. Note that the procedure is exactly the same for updating and for optional product installation.

An overview of the entire update procedure is:

1. prepare the system for an update,

2. locate the product (optional product, operating system update, or optional partition),

3. load the update tools if you are updating your operating system,

4. perform the update,

5. exit the update program,

6. Check for additional information in the *Installation Notes* or in the file called `/etc/newconfig/Update_info`.

Each of these 6 steps is discribed in the following subsections.

Preparing to Update

To make sure can recover your system in case anything goes wrong during the update, perform the following steps:

1. Stop all unnecessary processes by typing:

   shutdown *grace_period* ⎡Return⎤

   where *grace_period* is the number of seconds you wish to wait.

2. Back up your file system

   If you make a mistake while updating your system, you should be able to recover all of your data **if you have adequately backed up your system**. See the *Backing up and Restoring the File System* section of Chapter 9.

3. Do an fsck

   Following the guidelines in "Checking Your File System" in Chapter 9, do a file system check using the *fsck* command.

   If the *fsck* showed no problems with your file system, and your system is in single-user mode, you are ready to begin the update and optional product installation process.

4. Find /dev Major and Minor Numbers

   You need to know the major and minor numbers of the drive used to read the update media, and for the hard disc being updated as well. **Be sure you know the correct values of these numbers before you continue**. You can obtain this information by typing:

   ll /dev/*source* **/dev/***dest* ⎡Return⎤

   where *source* is the cartridge tape drive or flexible disc drive your update will be loaded from, and *dest* is the hard disc you will be updating (probably your root disc). Make sure you write these values down, because the */etc/update* program uses screen menus—you won't be able to "scroll" back to find these numbers.

Locate and Write-protect the Product

You will be performing the update either with cartridge tape or with flexible discs.

If your update is on cartridge tape, locate the write-protect mechanism (labeled "SAFE") on the top, rear, left-hand corner of the cartridge tape. **The arrow on the protect screw should point toward the word SAFE.** If it does not, use a coin or screwdriver to turn the protect screw such that the arrow points toward the word SAFE. Place this tape in the CS/80 data cartridge drive connected to your system with the SAFE label in the rear left hand corner. Only the BUSY and PROTECTED indicators should now be lit. The drive will begin a cartridge tape conditioning sequence that takes approximately two minutes. **Do not proceed until the busy light remains off.**

If your update is on flexible discs, locate the write-protect mechanism on the label end, and the back side of the disc. Slide the write protect shutter toward the label end of the disc, so you uncover the write protect hole. Holding the flexible disc with the label up and toward you, insert the disc into your disc drive.

Load the Update Tools

The update tools need to be loaded ONLY if you are updating your operating system with a new set of media. If you are adding an optional partition or loading an optional product, you do not need to load the update tools. If you are not updating your operating system, go to the section called "Perform the Update".

If you are updating your operating system, type in:

```
lifcp -a /dev/source:GETTOOLS /tmp/gettools  Return
chmod 700 /tmp/gettools  Return
/tmp/gettools /dev/source  Return
rm /tmp/gettools  Return
```

where the device **/dev/**source is the special device file name assigned to the same cartridge tape or flexible disc drive you just inserted the update media in. Executing /tmp/gettools causes any new tools related to the update process to be extracted from the media and put into your current file system. This could take from one to several minutes to complete.

Perform the Update

NOTE

Before you perform the update, you must have completed the preper-atory steps to ensure your system is ready. You must have copied the major and minor numbers of the cartridge tape drive or flexible disc drive the update will be on, and the major and minor numbers of the disc you will be performing the update to (usually your root disc).

If you have a non-HP terminal, you **MUST** execute the update program with a -*m* option. This will turn off all the menus in the update program. You will be prompted for the appropriate choices, rather than see the menu, on your screen.

1. Type in:

   `/etc/update` ⌐Return⌐

   Your system will reboot to remove any remaining processes. You will see your normal boot messages, and then the screen should clear and the menu shown in Figure 10-5 will appear. This is the main update utility menu. All update procedures are treated as sub-tasks from this menu.

```
*******************************************************************
                   HP-UX UPDATE UTILITY -- MAIN MENU
*******************************************************************
                            Select Choice


Source device is:       /dev/update.src   Major: -1  Minor: ffffffff
Destination device is: /dev/update.dest  Major: -1  Minor: ffffffff

DISPLAY options for a new partition
EXIT update
CHANGE source device
CHANGE destination device
```

Figure 10-5. Main Utility Menu

Note the four softkeys at the bottom of your screen:

- **NEXT** will move the highlight to the next item in each menu.

- **PREVIOUS** will move the highlight to the previous item in each menu (the item listed above the current item).

- **SELECT** will execute the currently highlighted option.

- **QUIT** will exit the *update* program at any time.

Both the source and destination device have the major number listed as -1 and the minor number as ffffffff. This prevents you from accidentally accessing the wrong device. Since these are impossible values, you must enter the correct major and minor numbers, which you should have written down earlier.

2. CHANGE the source device.

By using the **NEXT** and **PREVIOUS** softkeys, choose the "CHANGE source device" option on the main menu and press **SELECT**. You will see the top half of the menu shown in Figure 10-6.

```
**************************************************************
               HP-UX UPDATE UTILITY -- CHANGE DEVICE MENU
**************************************************************


Current source device address is:  Major: -1  Minor: ffffffff

                        NEW Major Number?  4
                        NEW Select Code?   7
                        NEW Bus Address?   4
                        NEW Unit Number?   0
                        NEW Volume Number? 0
```

Figure 10-6. Change Device Menu

As you are prompted for each item, enter the source device's major number, select code, bus address, unit and volume numbers in **decimal format**. You have these numbers written down in hexidecimal format. In our example the major number was 4, and the minor number was 0x070400 in hexidecimal format (do not type in any leading zeros for these values). The minor number has the format:

    0xScBaUV

where 0x indicates the number is in base 16, Sc is the select code, Ba is the bus address, U is the unit number, and V is the volume.

Once you have entered the volume number, the main menu will appear. Notice that the new source device values are now shown. Check that the values shown on the menu match those you have written down. It is possible that you could make a mistake while converting from hexadecimal to decimal format.

3. CHANGE the destination device.

Use the **NEXT** and **PREVIOUS** softkeys to choose the "CHANGE destination device" option on the menu and press **SELECT**. You should now see a screen very similar to the menu shown in Figure 10-6, only you will be changing the destination device rather than the source device.

In exactly the same manner as you just changed the source device, enter the new destination device major and minor numbers, which you have written down. We will use major number 0 and minor number 0x0e0500 in our example.

Once you have entered the new volume number, the update program will attempt to *mount* the device you have listed at that address. If it is the root device (which is the normal case), the following prompt will appear near the bottom of the console:

```
Cannot mount the destination device.
Is this the ROOT device?  ('y'or'n') >>
```

Because the method of updating the root disc versus another hard disc is different, you must tell the program that you are indeed updating the root volume by typing $\boxed{\text{y}}$. Otherwise, you should enter an $\boxed{\text{n}}$.

Once you have entered the correct addresses for the source and destination devices, you see these values reflected in the main menu, similar to our example menu in Figure 10-7. If either of these values are, wrong, you can go back to change either the source or the destination device. **Do not continue if you are unsure of these values!** Use the **QUIT** softkey if you are not sure of these device addresses, and go back to step 1 to begin again.

```
*********************************************************************
               HP-UX UPDATE UTILITY -- MAIN MENU
*********************************************************************
                         Select Choice


Source device is:      /dev/update.src   Major:  4  Minor: 70400
Destination device is: /dev/update.dest  Major:  0  Minor: e0500

DISPLAY options for a new partition
EXIT update
CHANGE source device
CHANGE destination device
```

Figure 10-7. Main Menu After Changing Devices

4. Choose the "DISPLAY" option.

Using the **NEXT** and **PREVIOUS** keys, choose the "DISPLAY options for a new partition" menu item and press **SELECT**. The *update* procedure will now read the update tape or flexible disc to get a list of available options, which takes a couple of minutes. You should see the screen shown in Figure 10-8.

```
****************************************************
         HP-UX UPDATE UTILITY -- READING FILE MENU
****************************************************
                      reading


Please insert media for a new partition.
When the busy light goes off, press [Return]
```
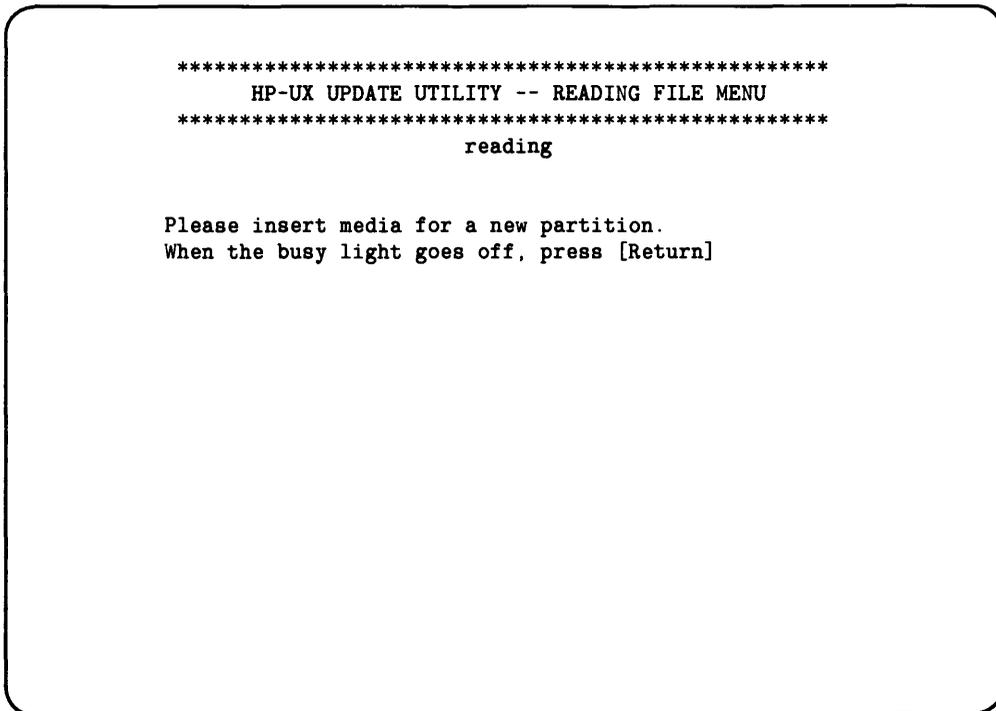
Figure 10-8. Reading File Menu

Press ⌐Return⌐. The *update* procedure will read the tape or flexible disc, and a new main menu will appear.

If you are performing the update from cartridge tape, perform steps 5 and 6, then go to step 8. If you are performing the update from flexible discs, skip steps 5 and 6, go to step 7.

5. If you are updating from flexible disc, go to step 7.

The new menu is similar to the menu shown in Figure 10-9.

```
******************************************************************
                    HP-UX UPDATE UTILITY -- MAIN MENU
******************************************************************
                            Select Choice



    Load "98515A" partition
    Load "SYS_CORE" partition

    Process ALL partitions
    DISPLAY options for a new partition
    EXIT update
    CHANGE source device
    CHANGE destination device
```

Figure 10-9. Partition Menu for Update on Cartridge Tape

- If you wish to process all the partitions, use the **NEXT** and **PREVIOUS** softkeys to move to the "Process ALL partitions" menu item, and press the **SELECT** softkey. The update program will automatically load all partitions and file sets. You will be prompted when to change media, and will be returned to the menu in Figure 10-7 when everything is loaded. It takes approximately 1 hour to process all filesets on one tape.

You can then EXIT the update program.

- If you wish to "load" a partition, use the **NEXT** and **PREVIOUS** softkeys to move to the "Load xxxxxx partition" menu item, and press the **SELECT** softkey.

  Go to Step 6.

- If you wish to display the options for a new partition, use the **NEXT** and **PREVIOUS** softkeys to move to the "DISPLAY options for a new partition" menu item, and press the **SELECT** softkey.

  The *update* procedure will now read the update tape to get a list of available options, which takes a couple of minutes. You should see the screen shown in Figure 10-9.

- If you wish to exit the update procedure, use the **NEXT** and **PREVIOUS** softkeys to move to the "EXIT update" menu item, and press the **SELECT** softkey.

6. This step is performed if you chose to "Load" a partition from cartridge tape (see step 5). If you are updating from flexible disc, go to step 7.

   You will see a menu similar to that in Figure 10-10. On the new menu, notice a partition name on the upper left segment of the screen, and the list of product "file sets".

```
     Partition:  "SYSCORE"              Media Number:  "1"
     ***********************************************************
               HP-UX UPDATE UTILITY -- FILE SET MENU
     ***********************************************************
                          select choice



     Load "ACORE" fileset
     Load "ACORE2" fileset


     Process ALL file sets
     Use the [Quit] softkey to exit the menu
```

Figure 10-10. File Set Menu for Updates on Cartridge Tape

At this point you have several options:

- If you wish to load all the file sets at one time, use the softkeys to select the `Process ALL file sets` option. This procedure could take 20 to 60 minutes to load depending upon the processor and peripherals being used, and the partition being loaded. When finished, you will be returned to the fileset menu (Figure 10-10).

  Press the **QUIT** softkey to exit. You will then return to the partition menu (Figure 10-9).

- If you wish to load just the core system (basically the update for AXE itself), use the softkeys to select the option similar to `Load "ACORE" file set`. Note that in each "Load xxxxxx" option, the xxxxxx is the product number or name for that fileset.

- If you wish to load the core system and certain optional products, select the options you want. You will select one loading option at a time. Each time, that fileset will be loaded, along with all dependencies, and you will return to the fileset menu. When you have loaded all the filesets you wish, press the **QUIT** softkey to exit. You will be returned to the partition menu (Figure 10-9).

- If you wish to exit the fileset menu, press the **QUIT** softkey to return to the partition menu, Figure 10-9.

The *update* program will immediately load this file set if it has never done so previously, but if it has, the *update* program will inform you that the product exists on your system and asks you if you want it removed. [y] will remove the old fileset, and re-load the new one. Answering [n] will prevent this file set from being loaded.

NOTE

When loading the AXE operating system or SYS_CORE partition you should answer [y] for each piece queried.

When the selected option is complete, the main menu (shown in Figure 10-9) will be re-displayed, but with one or more of the "load" options removed. Those options corresponding to the partitions you have completely loaded will not be displayed.

7. Perform this step if you are updating from flexible discs.

   You will see a menu similar to that in Figure 10-11. On the new menu, notice a partition name on the upper left segment of the screen, and the list of product "file sets".

```
Partition:  "SYSCORE"              Media Number:  "1"
***********************************************************
              HP-UX UPDATE UTILITY -- MAIN MENU
***********************************************************
                       select choice


Load "98515A" file set
Load "ACORE" file set

Process ALL file sets
DISPLAY options for a new partition
EXIT update
CHANGE source device
CHANGE destination device
```

Figure 10-11. File Set Menu for Updates on Flexible Disc

At this point you have several options:

- If you wish to load all the file sets at one time, use the softkeys to select the `Process ALL file sets` option. This procedure could take 20 to 60 minutes to load depending upon the processor and peripherals being used.

- If you wish to load just the core system (basically the update for AXE itself), use the softkeys to select the option similar to `Load "98515A" file set`. Note that in each "Load xxxxxx" option, the xxxxxx is the product number or name for that file set.

- If you wish to load the core system and certain optional products, select the options you want.

  You will select one loading option at a time. Each time, that fileset will be loaded, and you will return to the fileset menu. When you have loaded all the filesets you wish, press the **QUIT** softkey to exit. You will be returned to the main menu (Figure 10-11).

- If you wish to load more operating system partition, select the "DISPLAY options for a new partition" menu item. You will go back to the menu shown in Figure 10-7. Continue with step 4.

- If you wish to abort the entire update procedure, select the "EXIT update" menu item.

The *update* program will immediately load this file set if it has never done so previously, but if it has, the *update* program will inform you that the product exists on your system and asks you if you want it removed. ⎡ y ⎤ will remove the old file set, and re-load the new one. Answering ⎡ n ⎤ will prevent this file set from being loaded.

NOTE

When loading the AXE operating system or the ACORE fileset, you should answer ⎡ y ⎤ for each piece queried.

When the selected option is complete, the main menu (similar to the menu shown in Figure 10-11) will be re-displayed, but with one or more of the "load" options removed. Those options corresponding to the file sets you have already loaded will not be displayed. If you decided to load all the file sets, there will be no "load" options displayed.

8. Leave the update program.

If you have loaded all the partitions you want in this session, select the **EXIT** **update** option on the main menu. The program will inform you that it is unloading the media, which will take a few minutes. The system will reboot.

NOTE

Do not cycle power during the reboot.

The reboot of your system may appear to take longer than normal. This is because the first time you reboot after doing an update, scripts execute which customize your system for the updated products you installed.

9. Check for additional information.

Following this reboot process, you should log in and check to see if you have files in **/etc/newconfig/Update_info**. Also look for any other update files in the */etc/newconfig* folder or in the */tmp/update.log* file. Follow instructions in these files, and instructions in the *Installation Notes*, if supplied. The file called README contains useful information about your updated system.

Setting Up Peripheral Devices:
General Information

This section shows the necessary **kernel driver** and **major number** for your peripheral's product number. Use the *reconfig* program to add kernel drivers to your operating system (refer to "Creating a New Operating System" in this chapter). If you create the maximal operating system, you will have access to all the kernel drivers listed below. For each peripheral, you also need to set up a **device file**. The device file should be created in the */dev* directory using the instructions in the "Setting Up" section for your peripheral.

In the tables in this section, N/A means "Not Applicable". If you are using some products (for example the Mouse) you do not need to configure a kernel driver since the driver is automatically included in every kernel. Only mass storage devices require a block-mode major number, so for all other products, that item is not applicable.

If you don't know what interface your peripheral device is connected to, or can't decide which interface to connect it to, read the information for your peripheral in the *Peripheral Installation Guide*.

Hard Disc Drives, Cartridge Tape Drives, and Flexible Disc Drives

Table 10-8 shows the kernel driver and major device number for hard disc drives, cartridge tape drives, and flexible disc drives. Most of these devices are called **CS/80 devices**, which stands for Command Set 80, or **SS/80 devices**, which stands for SubSet 80. CS80 and SS80 are the only devices that are supported for booting the operating system. Hewlett-Packard also has **Amigo** drives.

In addition to the *cs80* or *amigo* kernel driver as shown in Table 10-8, you must have the kernel driver of the HP-IB interface the mass storage drive is connected to. If your drive is connected to the internal HP-IB you need the kernel driver *98624*. If your drive is connected to the high-speed HP-IB you need the kernel driver *98625*. Some of the *amigo* drives can only be used with the *98624* kernel driver. The hard disc your AXE system is on (a *cs80* disc) should be connected to the high-speed HP-IB disc interface if you have it.

Table 10-8: Kernel Drivers and Major Device Numbers for Hard Disc Drives, Cartridge Tape Drives, and Flexible Disc Drives

Product Number	Kernel Driver	Block-mode Major Number	Char-mode Major Number
HP 7907	cs80	0	4
HP 7908	cs80	0	4
HP 7911	cs80	0	4
HP 7912	cs80	0	4
HP 7914	cs80	0	4
HP 7933	cs80	0	4
HP 7935	cs80	0	4
HP 7936	cs80	0	4
HP 7937	cs80	0	4
HP 7941	cs80	0	4
HP 7942	cs80	0	4
HP 7945	cs80	0	4
HP 7946	cs80	0	4
HP 7947A	cs80	0	4
HP 7949A	cs80	0	4
HP 7960A	cs80	0	4
HP 9122	cs80	0	4
HP 9123D	cs80	0	4
HP 9125	cs80	0	4
HP 9133D/H/L	cs80	0	4
HP 9134D/H/L	cs80	0	4
HP 9142	cs80	0	4
HP 9144	cs80	0	4
HP 9154	cs80	0	4
HP 82901	amigo	2	11
HP 82902	amigo	2	11
HP 9121	amigo	2	11
HP 9133A/B/V/XV	amigo	2	11
HP 9134A/B/XV	amigo	2	11
HP 9135	amigo	2	11
HP 9138A	amigo	2	11
HP 9895	amigo	2	11

9-Track Tape Drives

In addition to the *tape* or *stape* kernel driver as shown in Table 10-9, you must include the kernel driver for the HP-IB you have the tape drive connected to. The tape drives using the *tape* kernel driver require the *98624* kernel driver. The tape drives using the *stape* kernel driver require either the *98624* or the *98625* kernel driver.

Table 10-9: Kernel Drivers and Major Device Numbers for 9-Track Tape Drives

Product Number	Device Driver	Block-mode Major Number	Char-mode Major Number
HP 7970	tape	N/A	5
HP 7971	tape	N/A	5
HP 7974	stape	N/A	9
HP 7978	stape	N/A	9

Terminals

The kernel driver needed by your terminal is the kernel driver for the interface card the terminal is connected to. The interface card kernel drivers to choose from are: *98628*, *98642*, or *98626*. For example: if your terminal is connected to a HP 98642 Mux Card, you need kernel driver *98642*.

Table 10-10: Kernel Drivers and Major Device Numbers for Terminals

Product Number	Device Driver	Block-mode Major Number	Char-mode Major Number
All Terminals	98628/98642/98626	N/A	1

Printers

In addition to the *printer* or *ciper* kernel driver as shown in Table 10-11, you need the kernel driver of the interface card the printer is connected to. If your printer is connected to an HP-IB card, you must have the *98624* kernel driver. If your printer is connected to and RS-232 card, you must have the *98626*, *98628*, or *98642* kernel driver.

You should use the *reconfig* program to set up your printers (refer to "Setting Up and Removing A Printer" in this chapter). The *reconfig* program will create the correct device file. However, you must make sure the correct kernel driver exists in your system.

Printers that are connected to an HP-IB card and are using graphics mode should use the character-mode major number of 21 and need the *hpib* kernel driver.

Table 10-11: Kernel Drivers and Major Device Numbers for Printers

Product Number	Device Driver	Block-mode Major Number	Char-mode Major Number
HP 2225	printer	N/A	7
HP 2245	printer	N/A	7
HP 2601	printer	N/A	7
HP 2602A	printer	N/A	7
HP 2631	printer	N/A	7
HP 2671A/G	printer	N/A	7
HP 2673	printer	N/A	7
HP 2686	printer	N/A	7
HP 2932	printer	N/A	7
HP 2933	printer	N/A	7
HP 2934	printer	N/A	7
HP 82905	printer	N/A	7
HP 82906	printer	N/A	7
HP 9876	printer	N/A	7
HP 2563	ciper	N/A	26
HP 2565	ciper	N/A	26
HP 2566	ciper	N/A	26
HP 2567	ciper	N/A	26
HP 2608S	ciper	N/A	26

Plotters and Digitizers

In addition to the *hpib* kernel driver shown in Table 10-12, you must include the *98624* kernel driver for the HP 98624 HP-IB your plotter or digitizer is connected to.

Table 10-12: Kernel Drivers and Major Device Numbers for Plotters and Digitizers

Product Number	Kernel Driver	Block-mode Major Number	Char-mode Major Number
All Plotters and Digitizers	hpib	N/A	21

Data Communications

The LAN kernel drivers are not included in your AXE system. You have these drivers ONLY if you have purchased (and installed) LAN.

Table 10-13: Kernel Drivers and Major Device Numbers for Data Communications

Product Number	Kernel Driver	Block-mode Major Number	Char-mode Major Number
LAN	ieee802	N/A	18
LAN	ethernet	N/A	19
SRM	srm	N/A	13
RJE	rje	N/A	15

Miscellaneous

HP-HIL devices include the HP Touch Bezel, Bar Code Reader, Keyboards, Mouse, and Control Knobs.

Table 10-14: Kernel Drivers and Major Device Numbers for Miscellaneous Devices

Product Number	Kernel Driver	Block-mode Major Number	Char-mode Major Number
HP 98622	gpio	N/A	22
HP Windows/9000	pytmas/ptyslv	N/A	N/A
HP-HIL devices	N/A	N/A	23/24/25

Appendices

System Commands

A

This appendix lists the system commands. These are commands entered on the keyboard and are intended for the user who wishes to use AXE in detail.

To get a more detailed description of some of the commands and options, use the *man* command (if the AMANUAL file set is loaded), type:

    man *command_name* [Return]

where *command_name* is one of the commands in the following list.

accept	clri	hp
asa	cmp	init
awk	config	intro
backup	cp	ipcr
backupf	cpio	ipcs
banner	csh	killall
basename	cut	lif
bfs	date	lifcp
bif	dd	lifinit
bifchgrp	devnm	lifls
bifchmod	dirname	lifrename
bifchown	disable	lifr
bifcp	du	line
biffind	echo	ln
biffsck	ed	login
bifls	edit	lp
bifmkdir	enable	lpadmin
bifmkfs	ex	lpmove
bifrm	expr	lpsched
bifrmdir	false	lpshut
brc	find	lpstat
cancel	fold	ls
cat	fsck	man
cd	fsclean	mediainit
chgrp	getty	mkdev
chmod	grep	mkdir
chown	help	mkfs
chroot	hostname	

mknod	rmdir	tee
more	rsh	touch
mount	sed	tr
mv	setmnt	true
mvdir	sh	tset
newfs	shutdown	umask
nice	sleep	umount
pam	sort	uname
passwd	stty	vedit
pr	su	vi
ps	swapon	view
pwd	sync	wc
reboot	syncer	what
reconfig	tabs	whereis
red	tail	which
reject	tar	who
rm	tcio	whoami

List of vi Commands

<div style="text-align: right">

B

</div>

This appendix contains commands for the **optionally loaded** ACMD file set (ACMD file set must be loaded for vi to work). The symbol ^ is used to represent CTRL. When you see something like ^p, it is the same as CTRL p.

Command(s)	Description
Entering vi	
vi *filename*	Enter vi; *filename* is the name of the file you wish to create or edit.
Moving The Cursor	
k or ^p	Move cursor up.
j, ^j, or ^n	Move cursor down.
h, ^h, or Back space	Move cursor left.
l or **Space**	Move cursor right.
w or W	Move cursor to next word.
b or B	Move cursor to previous word.
e or E	Move cursor to end of next word.
0	Move cursor to first column in current line.
n:	Move cursor to column *n* of current line.
^ *(hat)*	Move cursor to first character in current line.
$	Move cursor to last character in current line.
+ or Return	Move cursor to first character in next line.
-	Move cursor to first character in previous line.
G	Move cursor to last line in file.
*n*G	Move cursor to line *n* in file.
(	Move cursor to previous sentence.
)	Move cursor to end of next sentence.
{	Move cursor to previous paragraph.
}	Move cursor to end of next paragraph.

Section Positioning

Mark a section by placing a { in the first section.

[[	Move cursor to beginning of previous section.
]]	Move cursor to end of next section.

Cursor Placement on Screen and Adjusting the Screen

H	Move cursor to top line of screen.
nH	Move cursor to line n from top of screen.
M	Mve cursor to middle of screen.
L	Move cursor to bottom line of screen.
nL	Move cursor to line n from bottom of screen.
^e	Move screen up one line.
^y	Move screen down one line.
^u	Move screen up 1/2 page.
^d	Move screen down 1/2 page.
^b	Move screen up one page.
^f	Move screen down one page.
^l	Redraw screen.
z [Return]	Make current line top line on screen.
nz [Return]	Make line n top line in screen.
z. [Return]	Make current line middle line in screen.
nz. [Return]	Make line n middle line in screen.
z- [Return]	Make current line bottom line in screen.
nz- [Return]	Make line n bottom line in screen.

Placing Marks in the Text

m(a-z)	Mark current position with name (a-z).
'(a-z)	Move cursor to position with name (a-z).
''	Move cursor to where you were before the last / ? or G command.

Searching

%	Move cursor to beginning of balancing (), [], or {}.
f*character*	Move cursor forward in current line to *character*.
F*character*	Move cursor backward in current line to *character*.
t*character*	Move cursor forward in current line to character before *character*.
T*character*	Move cursor backward in current line to character after *character*.
/*string* Return	Find *string*.
?*string* Return	Find in reverse, *string*.
:se ic Return	Ignore case when searching.
:se noic Return	Pay attention to case when searching.

Using Regular Expressions in Searching

:se magic Return	Turn on regular expressions.
:se nomagic Return	Turn off regular expressions.

Include these special characters in search string:

^	At beginning of string, match beginning of line.
$	At end of string, match end of line.
.	Match any character.
\<	Match beginning of word.
\>	Match end of word.
[*string*]	Match any single character in *string*.
[^*string*]	Matches any character not in *string*.
[*x-y*]	Match any character between *x* and *y*.
*	Match any number of the preceeding pattern.

Inserting Text

a*text* ‾ESC‾	Insert *text* after cursor.
A*text* ‾ESC‾	Insert *text* after end of current line.
i*text* ‾ESC‾	Insert *text* before cursor.
I*text* ‾ESC‾	Insert *text* before beginning of current line.
o*text* ‾ESC‾	Insert a new line of *text* after current line.
O*text* ‾ESC‾	Insert a new line of *text* before the current line.

Deleting Text

^h or ‾Back space‾	While typing text, delete previous character.
^w	While typing text, delete previous word.
x	Delete current character.
*n*x	Delete next *n* characters, beginning with current.
X	Delete previous character.
*n*X	Delete previous *n* characters.
dw	Delete next word.
db	Delete previous word.
dd	Delete current line.
*n*dd	Delete next *n* lines, including current.
D	Delete rest of current line.
d*cursor command*	Delete text from current position to *cursor command* position.

Copying Text

yy or Y	*Yank* current line; see *Placing Text*.
*n*Y	*Yank* next *n* lines.
y*cursor command*	*Yank* from current position to *cursor command* position.

Placing Text

p	Place *yanked* text after cursor.
P	Place *yanked* text before cursor.

Changing Text

r*character*	Replace next character with *character*.
R*text* ESC	Replace next characters with *text*.
s*text* ESC	Substitute *text* for next character.
cw*text* ESC	Change next word to *text*.
cc*text* ESC	Change current line to *text*.
C*text* ESC	Change rest of current line to *text*.
c*cursor command**text* ESC	Change text from current position to *cursor command* position to *text*.

Joining Text

J	Join next line to end of current line.
*n*J	Join next *n* lines together.

Indenting Text

^d	While typing text, back up over supplied indentation.
0^d	While typing text, delete all supplied indentation.
^i or Tab	While typing text, insert one shift width.
:se ai Return	Turn on auto-indentation.
:se noai Return	Turn off auto-indentation.
:se sw=*n* Return	Set the shift width to *n* characters.
<<	Shift one line left by one shift width.
n<<	Shift *n* lines left by one shift width.
>>	Shift one line right by one shift width.
n>>	Shift *n* lines right by one shift width.

< or > can be used with almost any cursor command to shift multiple lines left or right.

Saving and Leaving vi

ZZ or :wq [Return] or :x [Return]   Save file and leave vi.

:w [Return]   Save file and do not leave vi.

:w *name* [Return]   Save file to *name* and do not leave vi.

:q [Return]   Leave vi.

:q! [Return]   Leave vi without saving any changes.

:r *filename* [Return]   Read *filename* into current file after current line.

Other Commands

u   Undo last command.

U   Restore current line to previous state.

n   Repeat last multi-character search command.

N   Repeat, in reverse direction, last multi-character search command.

;   Repeat last single-character search command.

,   Repeat, in reverse direction, last single-character search command.

.   Repeat last command which changed the file.

^g   Display status line.

^v*character*   While typing text, insert *character* in the text without interpreting it (eg. a command character).

Window Commands

C

This appendix lists the commands available for accessing HP Windows/9000 from the keyboard. Windows is an optional enhancement to your system. You will have had to order the correct memory requirements to run Windows on your system.

These are commands entered on the keyboard and are intended for the user who wishes to use Windows in detail by changing window default values.

For an overview of HP Windows/9000, and the commands it recognizes, type:

    man windows [Return]

To get a more detailed description of the commands and options, use the *man*[1] command, type:

    man *command_name* [Return]

where *command_name* is one of the commands described in the following table.

Window Command Descriptions

Command Name	Description
wborder	Lets you change border style, colors, and/or label.
wcreate	Create a window without a shell and set up the environment.
wdestroy	Destroys a window.
wdisp	Lets you change one or more window position in the display stack, their concealment, and/or their representation (normal or icon).
wfont	Load and activate fonts.
wlist	List status of window or fonts.
wmove	Move one or more windows or their icons.
wmready	Reports whether the window manager is running.
wmstart	Bring up the window system.
wmstop	Leave the window system and kill all processes.
wselect	Select a window.
wsh	Create a new window, and set up reasonable environments.
wsize	Change the size of the specified window.

---

[1] The **man** command is only available if you have the **AMANUAL** file set loaded.

Notes

Partitions and File Sets D

Your set of AXE micro discs (or a single tape) demonstrates the concept of *partitions*. AXE is broken into **partitions** or parts and stored on micro discs (or on one tape). Each disc represents a subset or subsets of the whole AXE system. Each partition is composed of file sets. File sets are the smallest unit in installation. You can choose the file sets you want loaded onto the system. However, the file sets which make up the SYS_CORE partition are automatically loaded on your AXE system by the installation (see "Mandatory vs. Non-mandatory File Sets" below). After these file sets are loaded, you can load other file sets depending on your needs.

By separating AXE into file sets, you can install only those file sets of AXE you will use (and save time and disc space). For example, if you do not plan to use a part of AXE (such as a text editor) you have the option of not loading the file set containing it on the system.

Except for guarding against the possibility of trying to install partitions or file sets which will not fit on your hard disc, not much planning is required. In the installation procedure you have a great deal of flexibility in what you want on (or off) the system. This flexibility also means you have to make several key decisions when installing.

How Partitions and File Sets Work

You can think of partitions, file sets, and files as "building blocks" of the AXE system. The smallest unit of information in this scheme is a **file**. Groups of related files are grouped into **file sets**. File sets, in turn, are grouped into **partitions**. Finally, the partitions — taken as a whole — comprise the AXE system. As noted above, when you receive AXE, the system will be partitioned into color coded discs (if you received AXE in a set of micro discs). Each of the color-coded partitions represents a grouping of file sets; each file set represents a grouping of files. The following diagram illustrates the relationship between the AXE system, partitions, file sets, and files.

| AXE
PARTITIONS | FILE SETS
IN SYS_TOOLS
PARTITION | FILES
IN ACMD
FILE SET |
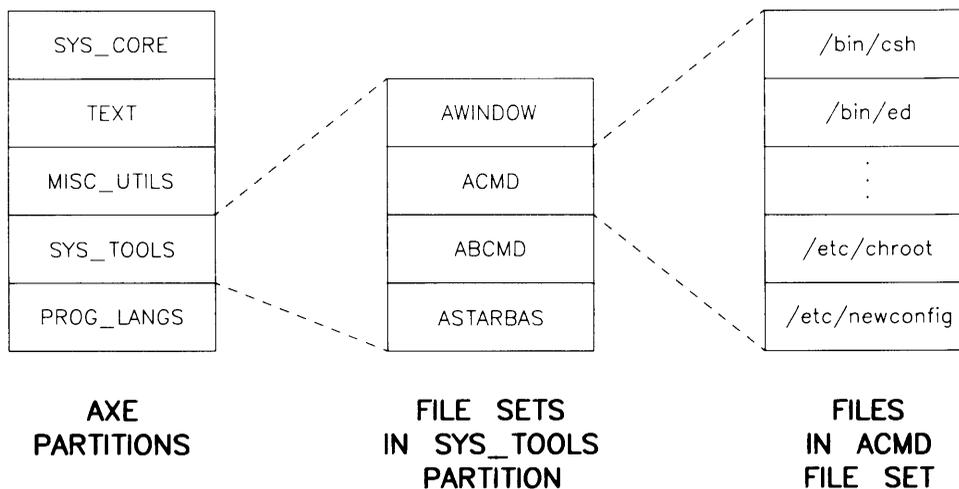
Figure D-1. AXE partitions, file sets and files.

Dependent File Sets

In some cases, one file set will depend on other file sets being present in the system. If such a **dependency** exists, the file set must be loaded along with (either before or after) the file set in question. When trying to load a file set that has a dependency, the computer informs you of the dependency. If necessary, the computer prompts you to insert a different disc to load from; it specifies which disc or tape to use. If more than one dependency exists, the computer may prompt for yet another disc to load from.

File sets are never split among discs although a given file set may have dependencies on other discs.

Mandatory vs. Non-mandatory Partitions

Only one partition **must** be installed for your AXE system to function: SYS_CORE. This partition contains the ACORE file sets which in turn contain essential facilities and commands used by other file sets. All the other partitions contain optional file sets. The SYS_CORE partition is **mandatory** for the operation of AXE and will be automatically loaded by the installation procedure. It is on the micro discs which have no colored labels. You can run AXE with only this single partition loaded.

All the other partitions are considered "non-mandatory"; they need not be installed for the proper operation of AXE. However, for most needs we recommend you install the SYS_TOOLS partition as well if you have enough disc space. This partition contains fundamental tools for file management, file manipulation, process control, peripheral support, and HP Windows/9000. The SYS_TOOLS partition is on the micro discs with the red labels.

Besides these two partitions, loading all other partitions and file sets depends on your intended use of the system. This factor must be weighed against your other needs for available storage space on your hard disc (or RAM, Random Access Memory, in the case of HP Windows/9000).

Which File Sets Do I Want?

After reading about what a file set is, you need to determine which file sets you feel you want on the system. All of the file sets are listed in this appendix with a short description. As you read through the list, you may wish to mark the file sets you feel you want on the system. Then, during installation, you can refer to this list for the file sets you want installed.

Recovering Lost Files

Most of the commands in the AXE system are contained in the file sets documented in this appendix. If any of these commands are removed or somehow destroyed, you can use *update* to re-load the file set containing the commands. In order to run update, you need to recover certain essential files. You can mount the installation media (tape or discs 1 and 2) and recover these files:

```
Micro disc 1:
etc/mkfs
mediainit

Micro disc 2:
bin/cpio
bin/mkdir
bin/sh
bin/pwd
usr/bin/lifcp
usr/bin/tcio
etc/update
etc/sysrm
```

NOTE

These files are not included in any one file set. Therefore, you cannot use update to recover them. The files are essential for update to be able to run. So, if these files get destroyed, you **must** recover them before you can run update.

Recovering Files

If you installed from a cartridge tape:

1. Make sure the tape is writable.

2. Insert tape in drive; wait for the drive light to remain off.

3. Mount the tape to an empty folder using:

   ```
   mount /dev/ct /disc
   ```

   where /dev/ct is a block device.

4. Perform the following copies depending on the file you are recovering:

NOTE

You can copy any or all of these files if needed.

```
cp /disc/etc/mkfs /etc
cp /disc/mediainit /usr/bin
cp /disc/bin/cpio /bin
cp /disc/bin/mkdir /bin
cp /disc/bin/sh /bin
cp /disc/bin/pwd /bin
cp /disc/usr/bin/lifcp /usr/bin
cp /disc/urs/bin/tcio /usr/bin
cp /disc/etc/update /etc
cp /disc/etc/sysrm /etc
```

5. Type: `sync`

6. Type: `umount /dev/ct`

If you installed from micro discs:

1. Make sure the first two micro discs are writable.

2. Insert micro disc 1 (with the grey label); wait for the drive light to remain off.

3. Mount the micro disc to an empty folder:

    ```
    mount /dev/fd /disc
    ```

    where **/dev/fd** must be a block device.

4. Enter the commands:

    ```
    cp /disc/etc/mkfs /etc
    cp /disc/mediainit /usr/bin
    ```

5. Unmount the first micro disc:

    ```
    umount /dev/fd
    ```

6. Insert micro disc 2 (grey label) into drive; wait for the drive light to remain off.

7. Mount the micro disc to an empty folder:

   ```
   mount /dev/fd /disc
   ```
   where **/dev/fd** must be a block device.

8. Enter any or all of the following commands:

   ```
   cp /disc/bin/cpio /bin
   cp /disc/bin/mkdir /bin
   cp /disc/bin/pwd /bin
   cp /disc/etc/update /etc
   cp /disc/etc/sysrm /etc
   cp /disc/usr/bin/lifcp /usr/bin
   cp /disc/usr/bin/tcio /usr/bin
   ```

9. Unmount the second micro disc: `umount /dev/fd`

Partitions and Their File Sets

The file set list is broken into sections, each representing a partition of the system. Within each section will be sub-sections which describe each file set, and list the files associated with the file set.

During installation, the following files are stored. These are not present in a specific file set. They are loaded automatically.

```
bin/mkdir
bin/pwd
bin/sh
bin/cpio
usr/bin/mediainit
usr/bin/tcio
usr/bin/lifcp
etc/mkfs
```

PARTITION: SYS_CORE

This partition is contained on the grey labeled micro discs. There are 6 micro discs to the SYS_CORE partition. These micro discs are mandatory for AXE installation and minimal operation (the file sets in this partition are loaded automatically). The first two micro discs are used for the installation procedure.

FILE SET: 98515A
Description: Mandatory file set.

```
hp-ux
etc/conf/dfile
system/98515A/customize
```

FILE SET: ACORE
Description: Mandatory file set.

```
bin/basename
bin/date
bin/expr
bin/line
bin/ls
bin/mv
bin/passwd
bin/rm
bin/rmdir
bin/sed
bin/stty
bin/sync
bin/who
etc/conf/.amigo.help
etc/conf/.ciper.help
```

```
etc/conf/.del_user.help
etc/conf/.exit.help
etc/conf/.exit2.help
etc/conf/.int.help
etc/conf/.intro.help
etc/conf/.lp.help
etc/conf/.ncip.help
etc/conf/.os_opt.help
etc/conf/.plotter.help
etc/conf/.printer.help
etc/conf/.prod.help
etc/conf/.security.help
etc/conf/.stape.help
etc/conf/.tape.help
etc/conf/.term.help
etc/conf/.user.help
etc/init
etc/initconfig
usr/lib/mv_dir
```

FILE SET: ACORE2
Description: Mandatory file set.

```
bin/backupf
```

```
bin/cat
bin/dd
bin/dirname
bin/echo
bin/find
bin/grep
bin/ipcrm
bin/ipcs
bin/kill
bin/login
bin/ps
bin/sleep
bin/su
etc/boot
etc/devnm
etc/fsck
etc/fsclean
etc/getanswer
etc/getty
etc/killall
etc/link
etc/mknod
etc/mount
etc/mvdir
etc/newconfig/.profile
etc/newconfig/README
etc/newconfig/Update_info
etc/newconfig/backup
etc/newconfig/bcheckrc
etc/newconfig/brc
etc/newconfig/checklist
etc/newconfig/disktab
etc/newconfig/gettydefs
etc/newconfig/group
etc/newconfig/inittab
etc/newconfig/motd
etc/newconfig/multi_user
etc/newconfig/passwd
etc/newconfig/profile
etc/newconfig/pstatus
etc/newconfig/qstatus
etc/newconfig/rc
etc/newconfig/single_user
etc/newconfig/ttytype
etc/newfs
etc/reboot
etc/reconfig
etc/setmnt
etc/shutdown
etc/syncer
etc/umount
etc/unlink
etc/wall
```

FILE SET: ACORE3
Description: Mandatory file set.

```
bin/chgrp
bin/chmod
bin/chown
bin/touch
bin/uname
bin/wc
etc/swapon
usr/bin/banner
usr/bin/cut
usr/bin/hostname
usr/bin/tset
usr/lib/hp2686a
usr/lib/hp2934a
usr/lib/terminfo
usr/lib/terminfo/1/100
usr/lib/terminfo/1/110
usr/lib/terminfo/1/150
usr/lib/terminfo/1/1520
usr/lib/terminfo/1/1521
usr/lib/terminfo/1/1620
usr/lib/terminfo/1/1620-m8
usr/lib/terminfo/1/1640
usr/lib/terminfo/1/1640-m8
usr/lib/terminfo/1/1700
usr/lib/terminfo/1/1line
usr/lib/terminfo/1/1linepty
usr/lib/terminfo/2/2382
usr/lib/terminfo/2/2392
usr/lib/terminfo/2/2393
usr/lib/terminfo/2/2394
usr/lib/terminfo/2/2397
usr/lib/terminfo/2/2500
usr/lib/terminfo/2/2621
usr/lib/terminfo/2/2621-48
usr/lib/terminfo/2/2621-ba
usr/lib/terminfo/2/2621-fl
usr/lib/terminfo/2/2621-nl
usr/lib/terminfo/2/2621-nt
usr/lib/terminfo/2/2621-pb
usr/lib/terminfo/2/2621-wl
usr/lib/terminfo/2/2621A
usr/lib/terminfo/2/2621P
usr/lib/terminfo/2/2621a
usr/lib/terminfo/2/2621k45
usr/lib/terminfo/2/2621nl
usr/lib/terminfo/2/2621nt
usr/lib/terminfo/2/2621p
usr/lib/terminfo/2/2621wl
usr/lib/terminfo/2/2622
usr/lib/terminfo/2/2622a
usr/lib/terminfo/2/2622p
usr/lib/terminfo/2/2623
usr/lib/terminfo/2/2623a
```

```
usr/lib/terminfo/2/2623p          usr/lib/terminfo/4/4023
usr/lib/terminfo/2/2624           usr/lib/terminfo/4/4024
usr/lib/terminfo/2/2624a          usr/lib/terminfo/4/4025
usr/lib/terminfo/2/2624p          usr/lib/terminfo/4/4025-17
usr/lib/terminfo/2/2625           usr/lib/terminfo/4/4025-17ws
usr/lib/terminfo/2/2626           usr/lib/terminfo/4/4025cu
usr/lib/terminfo/2/2626-12        usr/lib/terminfo/4/4025ex
usr/lib/terminfo/2/2626-12-s      usr/lib/terminfo/4/4027
usr/lib/terminfo/2/2626-12x40     usr/lib/terminfo/4/4027-17
usr/lib/terminfo/2/2626-ns        usr/lib/terminfo/4/4027-17ws
usr/lib/terminfo/2/2626-s         usr/lib/terminfo/4/4027cu
usr/lib/terminfo/2/2626-x40       usr/lib/terminfo/4/4027ex
usr/lib/terminfo/2/2626A          usr/lib/terminfo/4/4080
usr/lib/terminfo/2/2626P          usr/lib/terminfo/4/4112
usr/lib/terminfo/2/2626a          usr/lib/terminfo/4/4112-5
usr/lib/terminfo/2/2626p          usr/lib/terminfo/4/4112-d
usr/lib/terminfo/2/2627           usr/lib/terminfo/4/4112-nd
usr/lib/terminfo/2/2627a          usr/lib/terminfo/4/4113
usr/lib/terminfo/2/2627p          usr/lib/terminfo/4/4114
usr/lib/terminfo/2/2628           usr/lib/terminfo/4/42
usr/lib/terminfo/2/262x           usr/lib/terminfo/4/42-nl
usr/lib/terminfo/2/2640           usr/lib/terminfo/4/43
usr/lib/terminfo/2/2640a          usr/lib/terminfo/4/4424
usr/lib/terminfo/2/2640b          usr/lib/terminfo/4/4424-2
usr/lib/terminfo/2/2644           usr/lib/terminfo/4/4424-el-2
usr/lib/terminfo/2/2645           usr/lib/terminfo/4/45
usr/lib/terminfo/2/2647           usr/lib/terminfo/4/450
usr/lib/terminfo/2/2647F          usr/lib/terminfo/5/5520
usr/lib/terminfo/2/2648           usr/lib/terminfo/7/735
usr/lib/terminfo/2/2648A          usr/lib/terminfo/7/743
usr/lib/terminfo/2/2648a          usr/lib/terminfo/7/745
usr/lib/terminfo/2/2703           usr/lib/terminfo/8/8001
usr/lib/terminfo/2/2709           usr/lib/terminfo/8/8510
usr/lib/terminfo/3/300            usr/lib/terminfo/9/9020
usr/lib/terminfo/3/300s           usr/lib/terminfo/9/912
usr/lib/terminfo/3/3045           usr/lib/terminfo/9/912-2p
usr/lib/terminfo/3/31             usr/lib/terminfo/9/9122p
usr/lib/terminfo/3/3101           usr/lib/terminfo/9/912b
usr/lib/terminfo/3/33             usr/lib/terminfo/9/912c
usr/lib/terminfo/3/333            usr/lib/terminfo/9/912cc
usr/lib/terminfo/3/35             usr/lib/terminfo/9/920
usr/lib/terminfo/3/36             usr/lib/terminfo/9/920-2p
usr/lib/terminfo/3/37             usr/lib/terminfo/9/9202p
usr/lib/terminfo/3/380            usr/lib/terminfo/9/920b
usr/lib/terminfo/3/382            usr/lib/terminfo/9/920c
usr/lib/terminfo/3/3a             usr/lib/terminfo/9/925
usr/lib/terminfo/3/3a+            usr/lib/terminfo/9/950
usr/lib/terminfo/4/40             usr/lib/terminfo/9/950-2p
usr/lib/terminfo/4/400            usr/lib/terminfo/9/950-4p
usr/lib/terminfo/4/4012           usr/lib/terminfo/9/950-rv
usr/lib/terminfo/4/4013           usr/lib/terminfo/9/950-rv-2p
usr/lib/terminfo/4/4014           usr/lib/terminfo/9/950-rv-4p
usr/lib/terminfo/4/4014-sm        usr/lib/terminfo/9/9502p
usr/lib/terminfo/4/4015           usr/lib/terminfo/9/9504p
usr/lib/terminfo/4/4015-sm        usr/lib/terminfo/9/950rv
```

```
usr/lib/terminfo/9/950rv2p          usr/lib/terminfo/a/aaa-s
usr/lib/terminfo/9/950rv4p          usr/lib/terminfo/a/aaa-s-rv
usr/lib/terminfo/9/9816te           usr/lib/terminfo/a/aaa-unk
usr/lib/terminfo/9/9816teb          usr/lib/terminfo/a/aaa18
usr/lib/terminfo/9/9826             usr/lib/terminfo/a/aaa20
usr/lib/terminfo/9/9826ite          usr/lib/terminfo/a/aaa22
usr/lib/terminfo/9/9835             usr/lib/terminfo/a/aaa24
usr/lib/terminfo/9/9836             usr/lib/terminfo/a/aaa26
usr/lib/terminfo/9/9836ite          usr/lib/terminfo/a/aaa28
usr/lib/terminfo/9/9836te           usr/lib/terminfo/a/aaa29
usr/lib/terminfo/9/9836teb          usr/lib/terminfo/a/aaa30
usr/lib/terminfo/9/9837             usr/lib/terminfo/a/aaa36
usr/lib/terminfo/9/9837ite          usr/lib/terminfo/a/aaa40
usr/lib/terminfo/9/9845             usr/lib/terminfo/a/aaa48
usr/lib/terminfo/9/98700            usr/lib/terminfo/a/aaa59
usr/lib/terminfo/a/a980             usr/lib/terminfo/a/aaa60
usr/lib/terminfo/a/aa               usr/lib/terminfo/a/aaadb
usr/lib/terminfo/a/aaa              usr/lib/terminfo/a/act4
usr/lib/terminfo/a/aaa-18           usr/lib/terminfo/a/act5
usr/lib/terminfo/a/aaa-18-rv        usr/lib/terminfo/a/act5s
usr/lib/terminfo/a/aaa-20           usr/lib/terminfo/a/addrinfo
usr/lib/terminfo/a/aaa-22           usr/lib/terminfo/a/adm1
usr/lib/terminfo/a/aaa-24           usr/lib/terminfo/a/adm1a
usr/lib/terminfo/a/aaa-24-rv        usr/lib/terminfo/a/adm2
usr/lib/terminfo/a/aaa-26           usr/lib/terminfo/a/adm21
usr/lib/terminfo/a/aaa-28           usr/lib/terminfo/a/adm3
usr/lib/terminfo/a/aaa-29           usr/lib/terminfo/a/adm31
usr/lib/terminfo/a/aaa-29-ctxt      usr/lib/terminfo/a/adm36
usr/lib/terminfo/a/aaa-29-np        usr/lib/terminfo/a/adm3a
usr/lib/terminfo/a/aaa-29-rv        usr/lib/terminfo/a/adm3a+
usr/lib/terminfo/a/aaa-29-rv-ctxt   usr/lib/terminfo/a/adm3aplus
usr/lib/terminfo/a/aaa-30           usr/lib/terminfo/a/adm42
usr/lib/terminfo/a/aaa-30-ctxt      usr/lib/terminfo/a/adm42-nl
usr/lib/terminfo/a/aaa-30-rv        usr/lib/terminfo/a/adm5
usr/lib/terminfo/a/aaa-30-rv-ctxt   usr/lib/terminfo/a/aed
usr/lib/terminfo/a/aaa-30-s         usr/lib/terminfo/a/aed512
usr/lib/terminfo/a/aaa-30-s-ctxt    usr/lib/terminfo/a/agile
usr/lib/terminfo/a/aaa-30-s-rv      usr/lib/terminfo/a/agiles
usr/lib/terminfo/a/aaa-30-s-rv-ct   usr/lib/terminfo/a/aj
usr/lib/terminfo/a/aaa-36           usr/lib/terminfo/a/aj830
usr/lib/terminfo/a/aaa-36-rv        usr/lib/terminfo/a/aj832
usr/lib/terminfo/a/aaa-40           usr/lib/terminfo/a/alto
usr/lib/terminfo/a/aaa-40-rv        usr/lib/terminfo/a/altoh19
usr/lib/terminfo/a/aaa-48           usr/lib/terminfo/a/altoheath
usr/lib/terminfo/a/aaa-48-rv        usr/lib/terminfo/a/ambas
usr/lib/terminfo/a/aaa-59           usr/lib/terminfo/a/ambassador
usr/lib/terminfo/a/aaa-60           usr/lib/terminfo/a/ampex
usr/lib/terminfo/a/aaa-60-rv        usr/lib/terminfo/a/annarbor
usr/lib/terminfo/a/aaa-60-s         usr/lib/terminfo/a/ansi
usr/lib/terminfo/a/aaa-60-s-rv      usr/lib/terminfo/a/apple
usr/lib/terminfo/a/aaa-ctxt         usr/lib/terminfo/a/arpanet
usr/lib/terminfo/a/aaa-db           usr/lib/terminfo/b/bantam
usr/lib/terminfo/a/aaa-rv           usr/lib/terminfo/b/bc
usr/lib/terminfo/a/aaa-rv-ctxt      usr/lib/terminfo/b/beacon
usr/lib/terminfo/a/aaa-rv-unk       usr/lib/terminfo/b/beehiveIIIm
```

```
usr/lib/terminfo/b/bg            usr/lib/terminfo/c/ca22851
usr/lib/terminfo/b/bg-ni         usr/lib/terminfo/c/carlock
usr/lib/terminfo/b/bg-nv         usr/lib/terminfo/c/cb-unix
usr/lib/terminfo/b/bg-rv         usr/lib/terminfo/c/cbblit
usr/lib/terminfo/b/bg1.25        usr/lib/terminfo/c/cbunix
usr/lib/terminfo/b/bg1.25-nv     usr/lib/terminfo/c/cdc
usr/lib/terminfo/b/bg1.25-rv     usr/lib/terminfo/c/cdc456
usr/lib/terminfo/b/bg2.0         usr/lib/terminfo/c/cdc456tst
usr/lib/terminfo/b/bg2.0-nv      usr/lib/terminfo/c/cdi
usr/lib/terminfo/b/bg2.0-rv      usr/lib/terminfo/c/cdi1203
usr/lib/terminfo/b/bh3m          usr/lib/terminfo/c/cg7900
usr/lib/terminfo/b/bitgraph      usr/lib/terminfo/c/chromatics
usr/lib/terminfo/b/bitgraph-ni   usr/lib/terminfo/c/ci8510
usr/lib/terminfo/b/bitgraph-nv   usr/lib/terminfo/c/citoh
usr/lib/terminfo/b/bitgraph-rv   usr/lib/terminfo/c/citoh-6lpi
usr/lib/terminfo/b/blit          usr/lib/terminfo/c/citoh-8lpi
usr/lib/terminfo/b/blit-pb       usr/lib/terminfo/c/citoh-comp
usr/lib/terminfo/b/blitlayer     usr/lib/terminfo/c/citoh-elite
usr/lib/terminfo/b/bussiplexer   usr/lib/terminfo/c/citoh-pica
usr/lib/terminfo/c/c100          usr/lib/terminfo/c/citoh-prop
usr/lib/terminfo/c/c100-1p       usr/lib/terminfo/c/citoh-ps
usr/lib/terminfo/c/c100-4p       usr/lib/terminfo/c/compucolor2
usr/lib/terminfo/c/c100-rv       usr/lib/terminfo/c/compucolorii
usr/lib/terminfo/c/c100-rv-4p    usr/lib/terminfo/c/concept
usr/lib/terminfo/c/c100-rv-4p-na usr/lib/terminfo/c/concept100
usr/lib/terminfo/c/c100-rv-4p-pp usr/lib/terminfo/c/concept100-rv
usr/lib/terminfo/c/c100-rv-na    usr/lib/terminfo/c/concept100-rv-
usr/lib/terminfo/c/c100-rv-pp    usr/lib/terminfo/c/concept108-4p
usr/lib/terminfo/c/c1004p        usr/lib/terminfo/c/concept108-8p
usr/lib/terminfo/c/c100rv        usr/lib/terminfo/c/concept108-na-
usr/lib/terminfo/c/c100rv4p      usr/lib/terminfo/c/concept108-rv-
usr/lib/terminfo/c/c100rv4pna    usr/lib/terminfo/c/concept108-w-8
usr/lib/terminfo/c/c100rv4ppp    usr/lib/terminfo/c/ct82
usr/lib/terminfo/c/c100rvna      usr/lib/terminfo/c/ct8500
usr/lib/terminfo/c/c100rvpp      usr/lib/terminfo/d/d100
usr/lib/terminfo/c/c100rvs       usr/lib/terminfo/d/d132
usr/lib/terminfo/c/c100s         usr/lib/terminfo/d/d200
usr/lib/terminfo/c/c104          usr/lib/terminfo/d/d80
usr/lib/terminfo/c/c108          usr/lib/terminfo/d/d800
usr/lib/terminfo/c/c108-4        usr/lib/terminfo/d/datagraphix
usr/lib/terminfo/c/c108-4p       usr/lib/terminfo/d/datamedia2500
usr/lib/terminfo/c/c108-8        usr/lib/terminfo/d/datapoint
usr/lib/terminfo/c/c108-8p       usr/lib/terminfo/d/dataspeed40
usr/lib/terminfo/c/c108-8p-na    usr/lib/terminfo/d/dd5000
usr/lib/terminfo/c/c108-8p-rv-na usr/lib/terminfo/d/debug
usr/lib/terminfo/c/c108-na       usr/lib/terminfo/d/decwriter
usr/lib/terminfo/c/c108-na-8p    usr/lib/terminfo/d/delta
usr/lib/terminfo/c/c108-rv       usr/lib/terminfo/d/dg
usr/lib/terminfo/c/c108-rv-4p    usr/lib/terminfo/d/dg6053
usr/lib/terminfo/c/c108-rv-8p    usr/lib/terminfo/d/diablo
usr/lib/terminfo/c/c108-rv-na    usr/lib/terminfo/d/dialogue
usr/lib/terminfo/c/c108-rv-na-8p usr/lib/terminfo/d/dialogue80
usr/lib/terminfo/c/c108-w        usr/lib/terminfo/d/dialup
usr/lib/terminfo/c/c108-w-8p     usr/lib/terminfo/d/digilog
usr/lib/terminfo/c/ca            usr/lib/terminfo/d/direct
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usr/lib/terminfo/d/direct800              usr/lib/terminfo/h/h1500
usr/lib/terminfo/d/dm1520                 usr/lib/terminfo/h/h1510
usr/lib/terminfo/d/dm1521                 usr/lib/terminfo/h/h1520
usr/lib/terminfo/d/dm2500                 usr/lib/terminfo/h/h1552
usr/lib/terminfo/d/dm3025                 usr/lib/terminfo/h/h1552-rv
usr/lib/terminfo/d/dm3045                 usr/lib/terminfo/h/h19
usr/lib/terminfo/d/dm80                   usr/lib/terminfo/h/h19-a
usr/lib/terminfo/d/dm80-w                 usr/lib/terminfo/h/h19-b
usr/lib/terminfo/d/dmdt80                 usr/lib/terminfo/h/h19-bs
usr/lib/terminfo/d/dmdt80-w               usr/lib/terminfo/h/h19-pb
usr/lib/terminfo/d/dp3                    usr/lib/terminfo/h/h19-smul
usr/lib/terminfo/d/dp3360                 usr/lib/terminfo/h/h19-u
usr/lib/terminfo/d/ds40                   usr/lib/terminfo/h/h19A
usr/lib/terminfo/d/ds40-2                 usr/lib/terminfo/h/h19a
usr/lib/terminfo/d/dt80                   usr/lib/terminfo/h/h19b
usr/lib/terminfo/d/dt80-w                 usr/lib/terminfo/h/h19bs
usr/lib/terminfo/d/dtc                    usr/lib/terminfo/h/h19u
usr/lib/terminfo/d/dtc300s                usr/lib/terminfo/h/h2000
usr/lib/terminfo/d/dtc382                 usr/lib/terminfo/h/h89
usr/lib/terminfo/d/dumb                   usr/lib/terminfo/h/heath
usr/lib/terminfo/d/dw                     usr/lib/terminfo/h/heath-19
usr/lib/terminfo/d/dw1                    usr/lib/terminfo/h/heath-ansi
usr/lib/terminfo/d/dw2                    usr/lib/terminfo/h/heathkit
usr/lib/terminfo/d/dw3                    usr/lib/terminfo/h/heathkit-a
usr/lib/terminfo/d/dw4                    usr/lib/terminfo/h/hp
usr/lib/terminfo/e/env230                 usr/lib/terminfo/h/hp110
usr/lib/terminfo/e/envision230            usr/lib/terminfo/h/hp150
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usr/lib/terminfo/e/ep4000                 usr/lib/terminfo/h/hp2382a
usr/lib/terminfo/e/ep4080                 usr/lib/terminfo/h/hp2392
usr/lib/terminfo/e/ep48                   usr/lib/terminfo/h/hp2392a
usr/lib/terminfo/e/esprit                 usr/lib/terminfo/h/hp2393
usr/lib/terminfo/e/ethernet               usr/lib/terminfo/h/hp2393a
usr/lib/terminfo/e/ex3000                 usr/lib/terminfo/h/hp2394
usr/lib/terminfo/e/exidy                  usr/lib/terminfo/h/hp2394a
usr/lib/terminfo/e/exidy2500              usr/lib/terminfo/h/hp2397
usr/lib/terminfo/f/f100                   usr/lib/terminfo/h/hp2397a
usr/lib/terminfo/f/f100-rv                usr/lib/terminfo/h/hp2621
usr/lib/terminfo/f/f1720                  usr/lib/terminfo/h/hp2621-ba
usr/lib/terminfo/f/f1720a                 usr/lib/terminfo/h/hp2621-fl
usr/lib/terminfo/f/falco                  usr/lib/terminfo/h/hp2621-nl
usr/lib/terminfo/f/falco-p                usr/lib/terminfo/h/hp2621-nt
usr/lib/terminfo/f/fixterm                usr/lib/terminfo/h/hp2621-pb
usr/lib/terminfo/f/fox                    usr/lib/terminfo/h/hp2621-wl
usr/lib/terminfo/f/freedom                usr/lib/terminfo/h/hp2621a
usr/lib/terminfo/f/freedom-rv             usr/lib/terminfo/h/hp2621k45
usr/lib/terminfo/f/freedom100             usr/lib/terminfo/h/hp2621nl
usr/lib/terminfo/g/gigi                   usr/lib/terminfo/h/hp2621nt
usr/lib/terminfo/g/gsi                    usr/lib/terminfo/h/hp2621p
usr/lib/terminfo/g/gt100                  usr/lib/terminfo/h/hp2621wl
usr/lib/terminfo/g/gt100a                 usr/lib/terminfo/h/hp2622
usr/lib/terminfo/g/gt40                   usr/lib/terminfo/h/hp2622a
usr/lib/terminfo/g/gt42                   usr/lib/terminfo/h/hp2622p
usr/lib/terminfo/h/h1000                  usr/lib/terminfo/h/hp2623
usr/lib/terminfo/h/h1420                  usr/lib/terminfo/h/hp2623a
```

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usr/lib/terminfo/h/hp2623p          usr/lib/terminfo/j
usr/lib/terminfo/h/hp2624           usr/lib/terminfo/j/jerq
usr/lib/terminfo/h/hp2624a          usr/lib/terminfo/k/k45
usr/lib/terminfo/h/hp2624p          usr/lib/terminfo/k/klc
usr/lib/terminfo/h/hp2625           usr/lib/terminfo/k/ktm
usr/lib/terminfo/h/hp2626           usr/lib/terminfo/l/la120
usr/lib/terminfo/h/hp2626a          usr/lib/terminfo/l/layer
usr/lib/terminfo/h/hp2626p          usr/lib/terminfo/l/lp
usr/lib/terminfo/h/hp2627           usr/lib/terminfo/l/lpr
usr/lib/terminfo/h/hp2627a          usr/lib/terminfo/m/mdl110
usr/lib/terminfo/h/hp2627p          usr/lib/terminfo/m/megatek
usr/lib/terminfo/h/hp2628           usr/lib/terminfo/m/microb
usr/lib/terminfo/h/hp2640a          usr/lib/terminfo/m/microbee
usr/lib/terminfo/h/hp2640b          usr/lib/terminfo/m/microkit
usr/lib/terminfo/h/hp2644           usr/lib/terminfo/m/microterm
usr/lib/terminfo/h/hp2645           usr/lib/terminfo/m/microterm5
usr/lib/terminfo/h/hp2648           usr/lib/terminfo/m/mime
usr/lib/terminfo/h/hp2648a          usr/lib/terminfo/m/mime-3a
usr/lib/terminfo/h/hp2703           usr/lib/terminfo/m/mime-3ax
usr/lib/terminfo/h/hp2709           usr/lib/terminfo/m/mime-adm3a
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usr/lib/terminfo/h/hp45             usr/lib/terminfo/m/mime-fb
usr/lib/terminfo/h/hp9020           usr/lib/terminfo/m/mime-hb
usr/lib/terminfo/h/hp9816te         usr/lib/terminfo/m/mime1
usr/lib/terminfo/h/hp9816teb        usr/lib/terminfo/m/mime2
usr/lib/terminfo/h/hp9826           usr/lib/terminfo/m/mime2a
usr/lib/terminfo/h/hp9835           usr/lib/terminfo/m/mime2a-s
usr/lib/terminfo/h/hp9836           usr/lib/terminfo/m/mime2a-v
usr/lib/terminfo/h/hp9836te         usr/lib/terminfo/m/mime2as
usr/lib/terminfo/h/hp9836teb        usr/lib/terminfo/m/mime2av
usr/lib/terminfo/h/hp9837           usr/lib/terminfo/m/mimefb
usr/lib/terminfo/h/hp9845           usr/lib/terminfo/m/mimehb
usr/lib/terminfo/h/hp98700          usr/lib/terminfo/m/mimei
usr/lib/terminfo/h/hpex             usr/lib/terminfo/m/mimeii
usr/lib/terminfo/h/hpsub            usr/lib/terminfo/m/minansi
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usr/lib/terminfo/i/i3101            usr/lib/terminfo/m/mransi
usr/lib/terminfo/i/i400             usr/lib/terminfo/m/mw2
usr/lib/terminfo/i/ibm              usr/lib/terminfo/n/nec
usr/lib/terminfo/i/ibm3101          usr/lib/terminfo/n/netronics
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usr/lib/terminfo/i/intertec         usr/lib/terminfo/n/netx
usr/lib/terminfo/i/intertube        usr/lib/terminfo/n/nomad
usr/lib/terminfo/i/intertube2       usr/lib/terminfo/n/nuc
usr/lib/terminfo/i/intext           usr/lib/terminfo/n/nucterm
usr/lib/terminfo/i/intext2          usr/lib/terminfo/o/o31
usr/lib/terminfo/i/intextii         usr/lib/terminfo/o/oadm31
usr/lib/terminfo/i/ips              usr/lib/terminfo/o/obitgraph
usr/lib/terminfo/i/iq120            usr/lib/terminfo/o/obitgraph-nv
usr/lib/terminfo/i/iq140            usr/lib/terminfo/o/obitgraph-rv
usr/lib/terminfo/i/isc              usr/lib/terminfo/o/oblit
usr/lib/terminfo/i/isc8001          usr/lib/terminfo/o/oc100
usr/lib/terminfo/i/it               usr/lib/terminfo/o/oconcept
usr/lib/terminfo/i/it2              usr/lib/terminfo/o/ojerq
usr/lib/terminfo/i/ite              usr/lib/terminfo/o/omron
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usr/lib/terminfo/o/ovi300          usr/lib/terminfo/t/t1061
usr/lib/terminfo/o/owl             usr/lib/terminfo/t/t1061f
usr/lib/terminfo/p/patch           usr/lib/terminfo/t/t16
usr/lib/terminfo/p/patchboard      usr/lib/terminfo/t/t3700
usr/lib/terminfo/p/pbox            usr/lib/terminfo/t/t3800
usr/lib/terminfo/p/pc              usr/lib/terminfo/t/t500
usr/lib/terminfo/p/pe550           usr/lib/terminfo/t/tab
usr/lib/terminfo/p/plasma          usr/lib/terminfo/t/tab132
usr/lib/terminfo/p/plugboard       usr/lib/terminfo/t/tab132-rv
usr/lib/terminfo/p/print           usr/lib/terminfo/t/tab132-w
usr/lib/terminfo/p/printer         usr/lib/terminfo/t/tab132-w-rv
usr/lib/terminfo/p/printerbox      usr/lib/terminfo/t/tec
usr/lib/terminfo/p/printing        usr/lib/terminfo/t/tec400
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usr/lib/terminfo/p/pty             usr/lib/terminfo/t/tek
usr/lib/terminfo/q/qume            usr/lib/terminfo/t/tek4012
usr/lib/terminfo/q/qume5           usr/lib/terminfo/t/tek4013
usr/lib/terminfo/r/ramtek          usr/lib/terminfo/t/tek4014
usr/lib/terminfo/r/rayterm         usr/lib/terminfo/t/tek4014-sm
usr/lib/terminfo/r/reach           usr/lib/terminfo/t/tek4015
usr/lib/terminfo/r/regent          usr/lib/terminfo/t/tek4015-sm
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usr/lib/terminfo/r/regent20        usr/lib/terminfo/t/tek4024
usr/lib/terminfo/r/regent200       usr/lib/terminfo/t/tek4025
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usr/lib/terminfo/r/regent60        usr/lib/terminfo/t/televideo950
usr/lib/terminfo/r/regent60-na     usr/lib/terminfo/t/terak
usr/lib/terminfo/s/s1500           usr/lib/terminfo/t/terminet
usr/lib/terminfo/s/sb1             usr/lib/terminfo/t/terminet1200
usr/lib/terminfo/s/sb2             usr/lib/terminfo/t/terminet300
usr/lib/terminfo/s/sb3             usr/lib/terminfo/t/tex
usr/lib/terminfo/s/sbg             usr/lib/terminfo/t/ti
usr/lib/terminfo/s/sbi             usr/lib/terminfo/t/ti700
usr/lib/terminfo/s/screwpoint      usr/lib/terminfo/t/ti733
usr/lib/terminfo/s/sexidy          usr/lib/terminfo/t/ti735
usr/lib/terminfo/s/smarterm        usr/lib/terminfo/t/ti745
usr/lib/terminfo/s/smarterm-s      usr/lib/terminfo/t/ti800
usr/lib/terminfo/s/smartvid        usr/lib/terminfo/t/tn1200
usr/lib/terminfo/s/sol             usr/lib/terminfo/t/tn300
usr/lib/terminfo/s/sol1            usr/lib/terminfo/t/trs-80
usr/lib/terminfo/s/sol2            usr/lib/terminfo/t/trs80
usr/lib/terminfo/s/soroc           usr/lib/terminfo/t/ts-1
usr/lib/terminfo/s/spinwriter      usr/lib/terminfo/t/ts1
usr/lib/terminfo/s/sun             usr/lib/terminfo/t/tty
usr/lib/terminfo/s/sun1            usr/lib/terminfo/t/tty33
usr/lib/terminfo/s/superbee        usr/lib/terminfo/t/tty37
usr/lib/terminfo/s/superbrain      usr/lib/terminfo/t/tty40
usr/lib/terminfo/s/switch          usr/lib/terminfo/t/tty43
usr/lib/terminfo/s/swtp            usr/lib/terminfo/t/tty4424
usr/lib/terminfo/s/synertek        usr/lib/terminfo/t/tty4424-2
usr/lib/terminfo/s/system1         usr/lib/terminfo/t/tty4424-el-2
usr/lib/terminfo/t/t10             usr/lib/terminfo/t/ttywilliams
```

```
usr/lib/terminfo/t/tvi
usr/lib/terminfo/t/tvi-2p
usr/lib/terminfo/t/tvi2p
usr/lib/terminfo/t/tvi912
usr/lib/terminfo/t/tvi912-2p
usr/lib/terminfo/t/tvi9122p
usr/lib/terminfo/t/tvi912b
usr/lib/terminfo/t/tvi912c
usr/lib/terminfo/t/tvi912cc
usr/lib/terminfo/t/tvi912cup@
usr/lib/terminfo/t/tvi920
usr/lib/terminfo/t/tvi920-2p
usr/lib/terminfo/t/tvi9202p
usr/lib/terminfo/t/tvi920b
usr/lib/terminfo/t/tvi920c
usr/lib/terminfo/t/tvi925
usr/lib/terminfo/t/tvi950
usr/lib/terminfo/t/tvi950-2p
usr/lib/terminfo/t/tvi950-4p
usr/lib/terminfo/t/tvi950-ap
usr/lib/terminfo/t/tvi950-b
usr/lib/terminfo/t/tvi950-ns
usr/lib/terminfo/t/tvi950-rv
usr/lib/terminfo/t/tvi950-rv-2p
usr/lib/terminfo/t/tvi950-rv-4p
usr/lib/terminfo/t/tvi9502p
usr/lib/terminfo/t/tvi9504p
usr/lib/terminfo/t/tvi950b
usr/lib/terminfo/t/tvi950ns
usr/lib/terminfo/t/tvi950rv
usr/lib/terminfo/t/tvi950rv2p
usr/lib/terminfo/t/tvi950rv4p
usr/lib/terminfo/u/ubell
usr/lib/terminfo/u/ubellchar
usr/lib/terminfo/u/unitrm18
usr/lib/terminfo/u/unknown
usr/lib/terminfo/v/vc103
usr/lib/terminfo/v/vc203
usr/lib/terminfo/v/vc303
usr/lib/terminfo/v/vc303-a
usr/lib/terminfo/v/vc403a
usr/lib/terminfo/v/vc404
usr/lib/terminfo/v/vc404-na
usr/lib/terminfo/v/vc404-s
usr/lib/terminfo/v/vc404-s-na
usr/lib/terminfo/v/vc415
usr/lib/terminfo/v/vi200
usr/lib/terminfo/v/vi200-f
usr/lib/terminfo/v/vi200-ic
usr/lib/terminfo/v/vi200-rv
usr/lib/terminfo/v/vi200-rv-ic
usr/lib/terminfo/v/vi300
usr/lib/terminfo/v/vi300-aw
usr/lib/terminfo/v/vi300-rv
usr/lib/terminfo/v/vi300-ss
```

```
usr/lib/terminfo/v/vi550
usr/lib/terminfo/v/viewpoint
usr/lib/terminfo/v/virtual
usr/lib/terminfo/v/visual
usr/lib/terminfo/v/vitty
usr/lib/terminfo/v/vk100
usr/lib/terminfo/v/vt100
usr/lib/terminfo/v/vt100-am
usr/lib/terminfo/v/vt100-bot-s
usr/lib/terminfo/v/vt100-nam
usr/lib/terminfo/v/vt100-nam-w
usr/lib/terminfo/v/vt100-nav
usr/lib/terminfo/v/vt100-nav-w
usr/lib/terminfo/v/vt100-np
usr/lib/terminfo/v/vt100-s
usr/lib/terminfo/v/vt100-s-bot
usr/lib/terminfo/v/vt100-s-top
usr/lib/terminfo/v/vt100-top-s
usr/lib/terminfo/v/vt100-w
usr/lib/terminfo/v/vt100-w-am
usr/lib/terminfo/v/vt100-w-nam
usr/lib/terminfo/v/vt100-w-nav
usr/lib/terminfo/v/vt100am
usr/lib/terminfo/v/vt100nam
usr/lib/terminfo/v/vt100s
usr/lib/terminfo/v/vt100w
usr/lib/terminfo/v/vt125
usr/lib/terminfo/v/vt132
usr/lib/terminfo/v/vt50
usr/lib/terminfo/v/vt50h
usr/lib/terminfo/v/vt52
usr/lib/terminfo/w/wy100
usr/lib/terminfo/x/x1700
usr/lib/terminfo/x/x1720
usr/lib/terminfo/x/x1750
usr/lib/terminfo/x/xitex
usr/lib/terminfo/x/xl83
usr/lib/terminfo/y/ya
usr/lib/terminfo/z/z19
usr/lib/terminfo/z/z30
usr/lib/terminfo/z/zen30
usr/lib/terminfo/z/zenith
```

FILE SET: ACORE4
Description: Mandatory file set.

```
etc/newconfig/d.profile
usr/bin/asa
usr/bin/awk
usr/bin/cancel
usr/bin/disable
usr/bin/enable
usr/bin/lp
usr/bin/lpr
usr/bin/lpstat
```

```
usr/bin/more                            usr/spool/lp/interface
usr/bin/tabs                            usr/spool/lp/member
usr/bin/tar                             usr/spool/lp/request
usr/bin/what                            usr/spool/lp/model
usr/lib/accept                          usr/spool/lp/model/dumb
usr/lib/expreserve                      usr/spool/lp/model/hp2225a
usr/lib/lpadmin                         usr/spool/lp/model/hp2631g
usr/lib/lpfx                            usr/spool/lp/model/hp2686a
usr/lib/lpmove                          usr/spool/lp/model/hp2934a
usr/lib/lpsched                         usr/preserve
usr/lib/lpshut                          usr/tmp
usr/lib/more.help                       lib
usr/lib/nls                             lost+found
usr/lib/nls/n-computer                  tmp
usr/lib/reject                          users/guest
usr/lib/tabset/xerox1720                system/ACORE4/customize
usr/lib/tabset/vt100
usr/lib/tabset/teleray
usr/lib/tabset/stdcrt
usr/lib/tabset/std                      FILE SET: ACORE5
usr/lib/tabset/diablo                   Description: Mandatory file set.
usr/lib/tabset/beehive
usr/lib/tabset/9837                     bin/pam
usr/lib/tabset/9836                     system/ACORE5/customize
usr/lib/tabset/9826                     system/ACORE5/revlist
usr/lib/tabset/3101                     users/nowindow/Autost
usr/spool/lp/class                      users/nowindow/.environ
                                        usr/lib/nls/n-computer
                                        usr/lib/nls/n-computer/pam.cat
```

PARTITION: SYS_TOOLS

This partition resides on the 4 red labeled micro discs. This partition contains editors and useful programs.

FILE SET: ACMD
Description: This file set resides on micro disc 1 and contains the vi editor (shown as bin/ed) and helpful programs such as help and sort. If you plan to do text editing with the vi editor described in Chapter 6, you should load this file set.

```
bin/cmp                 bin/uname
bin/clri                bin/wc
bin/csh                 etc/chroot
bin/du                  etc/newconfig/csh.login
bin/ed                  etc/newconfig/d.Autost
bin/false               etc/newconfig/d.environ
bin/nice                etc/newconfig/d.exrc
bin/pr                  etc/newconfig/mkdev
bin/sort                system/ACMD/customize
bin/tail                usr/bin/bfs
bin/tee                 usr/bin/ex
bin/touch               usr/bin/fold
bin/true                usr/bin/help
                        usr/lib/builtins/@
                        usr/lib/builtins/alias
                        usr/lib/builtins/alloc
                        usr/lib/builtins/case
                        usr/lib/builtins/cd
                        usr/lib/builtins/chdir
                        usr/lib/builtins/dirs
                        usr/lib/builtins/eval
```

```
usr/lib/builtins/exec
usr/lib/builtins/foreach
usr/lib/builtins/glob
usr/lib/builtins/hashstat
usr/lib/builtins/history
usr/lib/builtins/if
usr/lib/builtins/jobs
usr/lib/builtins/kill
usr/lib/builtins/login
usr/lib/builtins/logout
usr/lib/builtins/newgrp
usr/lib/builtins/nice
usr/lib/builtins/nohup
usr/lib/builtins/notify
usr/lib/builtins/onintr
usr/lib/builtins/popd
usr/lib/builtins/pushd
usr/lib/builtins/rehash
usr/lib/builtins/set
usr/lib/builtins/setenv
usr/lib/builtins/source
usr/lib/builtins/stop
usr/lib/builtins/switch
usr/lib/builtins/time
usr/lib/builtins/umask
usr/lib/builtins/unalias
usr/lib/builtins/unhash
usr/lib/builtins/unset
usr/lib/builtins/unsetenv
usr/lib/builtins/wait
usr/lib/builtins/while
usr/lib/exrecover
usr/lib/help
usr/lib/help/default
usr/lib/help/he
```

FILE SET: ABCMD

Description: This file set on micro disc 2 contains lif and bif utilities. The lif utilities allow you to see what is on tapes or micro discs, and provides an interface between HP 9000 Series 200 or 500 computers and your computer. The bif utilities are used to transfer data or script files in a specific format from the Series 200 or 500 systems to your new system.

```
usr/bin/bifchgrp
usr/bin/bifchmod
usr/bin/bifchown
usr/bin/bifcp
usr/bin/biffind
usr/bin/biffsck
usr/bin/bifls
```

```
usr/bin/bifmkdir
usr/bin/bifmkfs
usr/bin/bifrm
usr/bin/bifrmdir
usr/bin/hp
usr/bin/lifinit
usr/bin/lifls
usr/bin/lifrename
usr/bin/lifrm
usr/bin/man
usr/bin/tr
usr/bin/whereis
usr/bin/whoami
system/ABCMD
system/ABCMD/customize
```

FILE SET: AWINDOW

Description: This file set on micro disc 3 contains the utilities necessary for you to run HP Windows/9000. You will need to load this file set along with the ASTARBAS file set (a dependency) to run Windows on your system (the computer will prompt you to insert the 4th disc when you need to).

```
system/AWINDOW/customize
system/AWINDOW/revlist
users/window/.wmsh
usr/bin/wborder
usr/bin/wmstart
usr/lib/raster/12x20
usr/lib/raster/12x20/cour.OU
usr/lib/raster/12x20/cour.b.OU
usr/lib/raster/18x30
usr/lib/raster/18x30/math.OM
usr/lib/raster/18x30/pica.8U
usr/lib/raster/6x8
usr/lib/raster/6x8/lp.8U
usr/lib/raster/6x8/lp.b.8I
usr/lib/raster/6x8/math.8M
usr/lib/raster/7x10
usr/lib/raster/7x10/lp.8U
usr/lib/raster/8x16
usr/lib/raster/8x16/kana.8K
usr/lib/raster/8x16/linedraw.OL
usr/lib/raster/8x16/lp.8U
usr/lib/raster/8x16/lp.b.8U
usr/lib/raster/8x16/lp.i.8U
usr/lib/raster/8x16/math.OM
usr/lib/raster/L6x15
usr/lib/raster/L6x15/lp.8U
usr/lib/wm
usr/man/cat1/wborder.1
usr/man/cat1/wcreate.1
```

```
usr/man/cat1/wdestroy.1
usr/man/cat1/wdisp.1
usr/man/cat1/wfont.1
usr/man/cat1/windows.1
usr/man/cat1/wlist.1
usr/man/cat1/wmove.1
usr/man/cat1/wmready.1
usr/man/cat1/wmstart.1
usr/man/cat1/wmstop.1
usr/man/cat1/wselect.1
usr/man/cat1/wsh.1
usr/man/cat1/wsize.1
```

FILE SET: ASTARBAS
Description: This file set on micro disc 4 is a dependency for the AWINDOW file set.

```
usr/lib/starbase/hp98710
usr/lib/starbase/hp98710/te_data
usr/lib/starbase/hp98710/te_mcode
usr/lib/starbase/defaults
usr/lib/starbase/char_sets
usr/lib/starbase/sb_daemon_1.1
```

```
usr/lib/starbase/stroke
usr/lib/starbase/stroke/markers
usr/lib/starbase/stroke/usascii
usr/lib/starbase/stroke/usascii/1
usr/lib/starbase/stroke/usascii/2
usr/lib/starbase/stroke/katakana
usr/lib/starbase/stroke/katakana/1
usr/lib/starbase/stroke/katakana/2
usr/lib/starbase/stroke/jisascii
usr/lib/starbase/stroke/jisascii/1
usr/lib/starbase/stroke/jisascii/2
usr/lib/starbase/stroke/hproman
usr/lib/starbase/stroke/hproman/1
usr/lib/starbase/stroke/hproman/2
usr/lib/starbase/stroke/font_info
usr/lib/starbase/stroke/font_info/1
usr/lib/starbase/stroke/font_info/2
usr/lib/starbase/errors
usr/lib/starbase/errors/american
usr/lib/starbase/errors/american/sb.errors
usr/lib/starbase/errors/n-computer
usr/lib/starbase/errors/n-computer/sb.errors
system/ASTARBAS/customize
system/ASTARBAS/revlist
```

PARTITION: PROG_LANGS

This partition is contained on the blue labeled micro disc. Both file sets contained in this partition are used for configuring your operating system and making a recovery system.

FILE SET: AC
```
bin/cc
lib/c2
lib/ccom
lib/cpp
lib/libc.a
```

FILE SET: APROG
```
bin/ar
bin/as
bin/ld
bin/make
bin/strip
```

PARTITION: MISC_UTILS

This partition is contained on the 2 green labeled micro discs. The two file sets in this partition are used for reconfiguring the operating system and for making a recovery system.

FILE SET: ACONFIG
```
etc/master
etc/mkrs
etc/mkrs.devs
etc/mkrs.swap
etc/config
etc/conf/h/buf.h
etc/conf/h/callout.h
etc/conf/h/cmap.h
etc/conf/h/conf.h
```

```
etc/conf/h/dir.h
etc/conf/h/dmap.h
etc/conf/h/errno.h
etc/conf/h/ino.h
etc/conf/h/inode.h
etc/conf/h/ioctl.h
etc/conf/h/ipc.h
etc/conf/h/kernel.h
etc/conf/h/magic.h
etc/conf/h/map.h
```

etc/conf/h/msg.h
etc/conf/h/opt.h
etc/conf/h/param.h
etc/conf/h/privgrp.h
etc/conf/h/proc.h
etc/conf/h/pty.h
etc/conf/h/ptyio.h
etc/conf/h/resource.h
etc/conf/h/sem.h
etc/conf/h/shm.h
etc/conf/h/signal.h
etc/conf/h/space.h
etc/conf/h/sysmacros.h
etc/conf/h/systm.h
etc/conf/h/text.h
etc/conf/h/time.h
etc/conf/h/tty.h
etc/conf/h/types.h
etc/conf/h/user.h
etc/conf/libdil_srm.a

etc/conf/libdreq.a
etc/conf/liblan.a
etc/conf/libmin.a
etc/conf/machine/a.out.h
etc/conf/machine/param.h
etc/conf/machine/pcb.h
etc/conf/machine/pte.h
etc/conf/machine/timeout.h

FILE SET: ACONFIG2

etc/conf/dfile.full
etc/conf/dfile.full.lan
etc/conf/dfile.min
etc/conf/dfile.support
etc/conf/libdevelop.a
etc/conf/libsysV.a
etc/conf/libdreq.a
etc/conf/libkreq.a

PARTITION: TEXT

This partition is contained on the orange labeled micro disc.

FILE SET: AMANUAL
Description: This file set contains formatted manual pages which give you a description of the commands available to you. If you load this file set, you can use the man command.

usr/man/cat1/asa.1
usr/man/cat1/awk.1
usr/man/cat1/banner.1
usr/man/cat1/basename.1
usr/man/cat1/bfs.1
usr/man/cat1/bifchmod.1
usr/man/cat1/bifchown.1
usr/man/cat1/bifcp.1
usr/man/cat1/biffind.1
usr/man/cat1/biffsck.1
usr/man/cat1/bifls.1
usr/man/cat1/bifmkdir.1
usr/man/cat1/bifmkfs.1
usr/man/cat1/bifrm.1
usr/man/cat1/cat.1
usr/man/cat1/cd.1
usr/man/cat1/chmod.1
usr/man/cat1/chown.1
usr/man/cat1/cmp.1
usr/man/cat1/cp.1
usr/man/cat1/cpio.1
usr/man/cat1/csh.1
usr/man/cat1/cut.1
usr/man/cat1/date.1

usr/man/cat1/dd.1
usr/man/cat1/du.1
usr/man/cat1/echo.1
usr/man/cat1/ed.1
usr/man/cat1/edit.1
usr/man/cat1/enable.1
usr/man/cat1/ex.1
usr/man/cat1/expr.1
usr/man/cat1/find.1
usr/man/cat1/fold.1
usr/man/cat1/grep.1
usr/man/cat1/help.1
usr/man/cat1/hostname.1
usr/man/cat1/hp.1
usr/man/cat1/ipcrm.1
usr/man/cat1/ipcs.1
usr/man/cat1/intro.1
usr/man/cat1/kill.1
usr/man/cat1/lifcp.1
usr/man/cat1/lifinit.1
usr/man/cat1/lifls.1
usr/man/cat1/lifrename.1
usr/man/cat1/lifrm.1
usr/man/cat1/line.1
usr/man/cat1/login.1
usr/man/cat1/lp.1
usr/man/cat1/lpstat.1
usr/man/cat1/ls.1
usr/man/cat1/man.1
usr/man/cat1/mediainit.1

```
usr/man/cat1/mkdir.1          usr/man/cat1/whoami.1
usr/man/cat1/more.1           usr/man/cat1m
usr/man/cat1/nice.1           usr/man/cat1m/accept.1m
usr/man/cat1/pam.1            usr/man/cat1m/backup.1m
usr/man/cat1/passwd.1         usr/man/cat1m/brc.1m
usr/man/cat1/pr.1             usr/man/cat1m/chroot.1m
usr/man/cat1/ps.1             usr/man/cat1m/clri.1m
usr/man/cat1/pwd.1            usr/man/cat1m/config.1m
usr/man/cat1/rm.1             usr/man/cat1m/devnm.1m
usr/man/cat1/sh.1             usr/man/cat1m/fsck.1m
usr/man/cat1/sleep.1          usr/man/cat1m/fsclean.1m
usr/man/cat1/sort.1           usr/man/cat1m/getty.1m
usr/man/cat1/stty.1           usr/man/cat1m/init.1m
usr/man/cat1/su.1             usr/man/cat1m/lpadmin.1m
usr/man/cat1/sync.1           usr/man/cat1m/lpsched.1m
usr/man/cat1/tabs.1           usr/man/cat1m/mkdev.1m
usr/man/cat1/tail.1           usr/man/cat1m/mkfs.1m
usr/man/cat1/tar.1            usr/man/cat1m/mknod.1m
usr/man/cat1/tcio.1           usr/man/cat1m/mount.1m
usr/man/cat1/tee.1            usr/man/cat1m/mvdir.1m
usr/man/cat1/touch.1          usr/man/cat1m/newfs.1m
usr/man/cat1/tr.1             usr/man/cat1m/reboot.1m
usr/man/cat1/true.1           usr/man/cat1m/reconfig.1m
usr/man/cat1/tset.1           usr/man/cat1m/setmnt.1m
usr/man/cat1/umask.1          usr/man/cat1m/shutdown.1m
usr/man/cat1/uname.1          usr/man/cat1m/syncer.1m
usr/man/cat1/vi.1             usr/man/cat5
usr/man/cat1/wc.1             usr/man/cat5/bif.5
usr/man/cat1/what.1           usr/man/cat5/lif.5
usr/man/cat1/whereis.1        system/AMANUAL/customize
usr/man/cat1/who.1
```

Determining Swap Size   **E**

This appendix briefly describes what swap space is, then explains how to determine the amount of swap space you need on your system. The section describing swap space is fairly technical; read it only if you are interested. **You do not need to understand the information in "What is Swap Space?" to determine the amount of swap space you need.**

What is Swap Space?

Swap space is a contiguous area on the secondary storage, usually a hard disc drive, reserved for use by the Series 300's virtual memory management system. The virtual memory management system keeps an image copy of all existing processes and shared memory objects. Swap space is separate from the file system, but is usually on the same hard disc as the root file system. Series 200/300 computers support both single and multiple swap devices. The multiple swap device mechanism allows the swap space to be present on several disc drives for ease of expanding the swap space. Also, if your applications require above average number of I/O operations, multiple swap devices may increase throughput.

The space for the entire image of every existing segment is allocated on the swap space; therefore swap space must be large enough hold all segments of all existing processes. If there is not enough swap space the system will either return an error (such as ENOMEM) for some system calls, or it will kill the user process. If you need more swap space, you can add more swap devices or you can rebuild the file system and reserve more swap space on your existing swap device. Use the procedures in "Reconfiguring HP-UX" in Chapter 10 to create more swap space.

Determining the Amount of Swap Space You Need

You must have enough swap space to hold your process or the process can't execute. When you create a file system, *newfs* creates a default amount of swap space. A file system is automatically created during the installation of AXE.

Determining Swap Space for Installation

If you have not yet installed AXE, do the following:

Determine the largest amount of swap space (in Kbytes[1]) needed   _____
by your largest application (look in the manual supplied with your
application or ask the manufacturer).

Add system overhead. If your largest application is less than 2 048   _____
Kbytes, add 512 Kbytes. If your largest application is more than
2 048 Kbytes, add 2 048 Kbytes[2].

If you will be running HP Windows/9000, add 4 096 Kbytes   _____

TOTAL swap space needed (in Kbytes[1])   _____

Enter this total on your "Pre-Installation Checklist". When you see the "Disc Parameters Menu" during installation, compare your total with the default swap space shown in the menu. If your total is less than the swap space shown, do not change the swap space. If your total is more than the swap space shown, change the swap space.

Determining Swap Space After Installation

If you need to *increase* your swap space, estimate the amount of swap space you need by adding the space required by your largest application to the current amount of swap space.

Determine the swap space (in Kbytes[1]) required by your largest   _____
application (look in the manual supplied with your application or
ask the manufacturer).

Add the current amount of swap space from the messages on your   _____
display at boot up[3], divided by 2. (Current swap space $\div$ 2)

TOTAL swap space needed (in Kbytes[1])   _____

---

[1] 1 Kbyte = 1024 bytes.

[2] The exact amount required varies. 2 048 Kbytes should be sufficient in all cases.

[3] At powerup the size and location of the swap space on each swap device is displayed in 512 byte blocks. "start = xxxxxx" indicates the swap space's starting disc block number and "size = xxxxxx" indicates size of swap space.

Use this total to change the amount of swap space, using the procedures outlined in Chapter 10, "Reconfiguring Swap Space and System Parameters".

Notes

Installing Applications

F

One of the main purposes of AXE is to allow you to run applications programs. AXE will have a number of applications available. If you purchase an application for your AXE system, you need to follow all instructions that come with the application to install and to run it.

Things To Look Out For While Installing AXE

When you install the AXE system, you have the option to increase swap space. Some of your applications, such as $Alis^{TM}/HP-UX^1$ or $TK!Solver®/HP-UX^2$, may require more than the default amount of swap space. Therefore, is important to know if you have enough space for application. The swap space required for an application may be found in the application's documentation. If it is not in the documentation, contact your vendor. If you purchased the application from Hewlett-Packard, contact your HP Sales Engineer or your local HP Sales Office.

For your information, the following table lists some of the available applications and their swap spaces. There are also many other packages available for your system. **These swap spaces are subject to changes.** Make sure, if you use Table F-1, that you have the same revision of the application.

---

[1] Alis ^{TM} is a trademark of Applix, Incorporated.
[2] TK!Solver® is a registered trademark of Software Arts, Incorporated.

Table F-1. Applications and Their Swap Spaces[3]

Application	HP Part Number	Swap Space
Alis(TM)/HP-UX	98801V (single user)	12 288 Kbytes, 1st user
	98801W (multi user)	1 024 Kbytes, each additional user
TK!Solver(R)/HP-UX	45515V (single user)	250 Kbytes
	45515W (multi user)	
PloTrak(TM)/HP-UX[4]	98800V (single user)	250 Kbytes
	98800W (multi user)	
MicroTrak(TM)/HP-UX[5]	45524V (single user)	250 Kbytes
	45524W (multi user)	
Diagraph(TM)/HP-UX[6]	45463V	768 Kbytes
Picture Perfect(TM)/HP-UX[7]	45462V	768 Kbytes
MemoMaker/HP-UX	45420V (single user)	150 Kbytes
	45420W (multi user)	
Multiplan(R)/HP-UX[8]	45473V (single user)	128 Kbytes
	45473W (multi user)	

To determine the total amount of swap space you require, go the Appendix E, "Determining Swap Space".

Some other questions to ask are:

- Do I need any peripheral devices?

  If so, install them as described in the appropriate section in Chapter 10.

- Do I need extra memory?

  If so, you may need to purchase more memory. See your local HP Sales Office.

- Do I need special AXE commands?

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[3] These swap spaces are subject to changes. The amounts given here are accurate as of December, 1985.
[4] PloTrak(TM) is a trademark of SofTrak(TM) Systems.
[5] MicroTrak(TM) is a trademark of SofTrak(TM) Systems.
[6] Diagraph(TM) is a trademark liscensed to Computer Support Corporation.
[7] Picture Perfect(TM) is a trademark of Computer Support Corporation.
[8] Multiplan(R) is a U.S. registered trademark of Microsoft Corporation.

If so, look up the commands in the filesets in Appendix D. Either load these optional filesets when you install your AXE system, or load them using the procedures in Chapter 10, the section "Updating AXE".

- Do I need to change any system parameters to run my application?

  For most applications you will NOT need to change system parameters. If you do, follow the procedures in Chapter 10, the section "Reconfiguring Swap Space and System Parameters" to change the parameters.

Loading Applications

When you receive your application, it will come with instructions on how to load the application (how to get the program on the computer). This section shows an example of an installation process for the TK!Solver application (an equation-solving program for engineering, business, education and science).

Example: Installing TK!Solver

Remember this is **not** an applications installation guide. **You will need to follow the instructions given to you by the application.** The procedure will, however, be similar. So, after reading through this example, you will understand the installation process better.

Let us assume this application was received before you installed of AXE, so you can determine the amount of swap space required before installation. TK!Solver requires 250 Kbytes of swap space. Assume, also, that you will be using HP Windows/9000.

1. Determine the amount of swap space required.

   Following the procedures in Appendix E, add 250 Kbytes for TK!Solver, 512 Kbytes for system overhead (since your application is less than 2 048 Kbytes), and 4 096 Kbytes for HP Windows/9000, to get 4 858 Kbytes of swap space required.

   Write this number on your Pre-installation Checklist (See Chapter 2).

2. Install AXE using the procedures in Chapter 2.

   When you get to the system parameters menu, you will see the default swap space for your hard disc. Compare this value with the value listed for "Swap Size". Let's say the swap size value is 10 192 Kbytes. Since the swap space you require is less than the default amount of swap space, do not change the value in the system parameters menu.

3. Complete the installation, then login as the super-user root. If you are not the super-user, you will not be able to access certain files or folders to install the application. See "Becoming the Root User" in Chapter 10.

4. Insert the TK!Solver disc (or tape) into the drive.

   At this point you need to know if you will be using TK!Solver in a multi-user or single-user environment (AXE is a single-user environment). There are two versions of TK!Solver, and you need to make sure you have the correct one. Other applications may be similar, so look for this when installing them.

5. Change to the folder suggested in the TK!Solver documentation. For example, change to the "root" folder by typing:

       `cd /` `Return`

   This command opens the / ("root") folder. From this folder, the super-user can access the files needed for installation.

6. Type: `tar -xvf /dev/`*devicefile_name* `Return`
   where *devicefile_name* is the name of the device file associated with the tape or flexible disc drive containing the TK!Solver disc (or tape). Usually, flexible disc drives are named `/dev/rfd` and tape drives are named `/dev/rct`.

   This command will load the disc onto the system and place the TK!Solver files in the correct folders. It would be rare that you had files with the same name as those used by TK!Solver (or any application for that matter), but if you do, the original files will be lost. Therefore, if you have similar file and folder names (as listed by the application documentation) you need to either rename them or move them to another folder.

   When the application installation is finished:

7. Remove the TK!Solver disc (or tape) from the drive. Store it in a safe place.

The installation is finished. *TK!Solver* is installed on the hard disc and available for your use without having to load the application every time you wish to use it.

Glossary

The following terms and definitions are defined as they apply to the Series 300 AXE operating system.

address
In the context of peripheral devices, a set of values which specify the location of an I/O device to the computer. The address is composed of up to four elements: select code, bus address, unit number and volume number. You can read about addresses in the *Peripheral Installation Guide*.

archive
A complete backup of the system.

AXE
Applications Execution Environment

AXE folder structure
The hierarchical grouping of folders and files on AXE.

Autost
A script file executed automatically when PAM is started.

backup
The procedure to save a copy of the operating system and files.

block
The primary logical unit of information in the HFS file system. Block size on an HFS file system can be either 4 Kbytes or 8 Kbytes, and is set at file system creation. The default block size is 8 Kbytes. Blocks can be divided into 1 Kbyte, 2 Kbyte, or 4 Kbyte fragments.

block mode
Buffered I/O: data is transferred one block at a time. Block size for buffered I/O is not the same as block size on the file system. Block size for block mode is defined as BLKDEV_IOSIZE in */usr/include/sys/param.h*.

block special file

A type of file used to communicate with a peripheral device in "block" mode. Block special files are created with a *mknod* command and have a "b" as the first character in the permission field (the permission field is the leftmost set of characters seen on your screen when you execute the 11 command). Block special files and character special files usually reside in the */dev* folder.

boot or boot-up

The process of loading, initializing and running an operating system.

boot area

The first 8 Kbytes of the disc that are reserved for system use. This area contains the LIF volume header, the folder that defines the contents of the volume, and the bootstrapping program.

boot ROM

A program residing in ROM (Read Only Memory) that executes each time the computer is powered-up. The function of the boot ROM is to run tests on the computer's hardware, find some devices accessible through the computer and then load either a specified operating system or the first operating system found according to a specific search algorithm. The bootstrap program uses the boot ROM's mass storage drivers to load and pass control to the kernel. When the kernel gains control, it completes the job of bringing up the AXE operating system.

Depending on your boot ROM version, the boot ROM displays may differ slightly from those shown in this manual; any differences between boot ROM versions are noted in this manual when the topic in question is discussed. The boot ROM identifies its version when power is applied to the computer.

bus address

Part of an address used for devices, especially devices on an HP-IB (HP Interface Bus); a number determined by the switch setting on a peripheral which allows the computer to distinguish between two devices connected to the same interface. A bus address is sometimes called a "device address", and no two devices on the same HP-IB can have the same bus address.

bytes per inode

This specifies the number of data bytes (amount of user file space) per inode slot. The number of inodes is calculated as a function of the file system size. The default value is 2048.

cartridge tape
You can use either a flexible disc or a cartridge tape to backup your system, install your system, create a recovery system, and update your system.

character special file
A type of file used to communicate with a peripheral device in "raw" mode, character by character. Character special files are created with a *mknod* command and have a "c" as the first character in the permission field (the permission field is the leftmost set of characters seen on your screen when you execute the 11 command). Character special files and block special files usually reside in the */dev* folder.

control key
Used with other keys (in the same manner as the Shift key) to generate special characters.

cursor
A visual position indicator which moves with characters entered with the keyboard or with cursor movement keys.

data
Computer information supplied to a program or produced by a program.

destination device
The mass storage device on which AXE is to be installed. The destination device must be a hard disc drive.

device file
The file associated with an I/O device. Device files are read and written just like ordinary files, but requests to read or write result in activation of the associated device. These files normally reside in the */dev* folder.

directory
Another name for folder.

disc
A platter for recording and storing information. A disc can be either a flexible disc or a hard disc. In this manual, when the term "disc" is used alone, it refers to a hard disc.

driver number
A pointer to the part of the kernel needed to use the device. The driver number is used in the *mknod* command when setting up a device file. The driver number, for a particular device, can be found in the sections in Chapter 10 explaining how to set up a particular device.

edit
Making changes in a file containing text, data or a program.

.environ
The file used to set up the active environment in the PAM shell. It contains a search path for locating files, the HOME folder, and other information PAM needs to execute commands.

environment
System defaults which affect AXE operation.

/etc/shutdown
A shell script that has the primary function of terminating all currently running processes in an orderly and cautious manner. See "Shutting Down Your System" in Chapter 10 for details on this shell.

execution
Carrying out the instructions of a program or command.

file
A collection of computer information: program or data residing on a mass storage medium (e.g. a hard disc).

file system
The organization of files and folders, associated with a block special file, on a hard disc. The HFS file system is an implementation of the AXE folder structure.

file types
Several file types are recognized by AXE. The file type is established at the time of the file's creation. The types are:

- Regular files - Contains a stream of bytes. Characters can be either ASCII or non-ASCII. This is generally the type of file a user considers to be a file: object code, text files, nroff files, etc.

- Folder - AXE treats folders like regular files, with the exception that writing directly to folders is not allowed. Folders contain information about other files.

- Block special files - Device files that buffer the I/O. Reads and writes to block devices are done in block mode.

- Character special files - Device files that do not buffer the I/O. Reads and writes to character devices are in raw mode.

- Network special files - contain the address of another system.

- Pipes - A temporary file used with command pipelines. When you use a pipeline, AXE creates a temporary buffer to store information between the two commands. This buffer is a file, and is called a pipe.

- FIFO - A named pipe. A FIFO (First In/First Out) has a folder entry and allows processes to send data back and forth.

flexible disc
$3\frac{1}{4}$ inch flexible disc. You can use either a flexible disc or a cartridge tape to backup your system, install your system, create a recovery system, and update your system.

folder
A collection of files.

fragment
A piece of a block. This is the smallest unit of information HFS will read or write. The lower limit of a fragment is DEV_BSIZE (defined in */usr/include/sys/param.h*). Fragment size is set at file system creation.

free space threshold
Specifies minimum **percentage** of free disc space allowed. Once the file system capacity reaches this threshold, only the super-user is allowed to allocate disc blocks. The default is 10%.

function key
A key on the keyboard which, when pressed, executes a specified computer function.

HP-UX
The computer's operating system (AXE is a subset of HP-UX). HP-UX is an enhanced version of UNIX[1].

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[1] UNIX is a trademark of AT&T Bell Laboratories, Inc.

hard disc

A collection of recording platters contained in a single hard disc drive. Hard disc, or disc, is synonymous with disc pack.

hex

A numbering system using base 16 rather than base 10. Base 16 uses the following numbers:

Decimal number	Hex number
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	a
11	b
12	c
13	d
14	e
15	f

HFS file system

High performance File System. This is the file system implemented on your Series 300 AXE system. Other models of Hewlett-Packard computers running AXE or HP-UX may have a different file system.

hidden file

A file name not seen in the folder area.

identifier

A label.

inode
A data structure containing information about a file such as file type, pointers to data, owner, group, and protection information.

input
Designated data to a program, or to type on the computer.

internal memory
Electronic data storage located in the computer for program and computer operations execution.

itf
Integrated Terminal Family: the name for the standard keyboard used with AXE.

Kbyte or kilobyte
1024 bytes.

kernel
The core of the AXE operating system. The kernel is the compiled code responsible for managing the computer's resources; it performs such functions as allocating memory and scheduling programs for execution. The kernel resides in RAM (Random Access Memory) whenever AXE is running.

LIF
Logical Interchange Format. LIF is Hewlett-Packard's standard file format, used for transferring files between Hewlett-Packard systems. Since LIF is a standard, files with LIF format can easily be transferred between different Hewlett-Packard computers (see the *LIF(5)* entries in the *HP-UX Reference*.

login
The process of a user gaining access to a secure AXE system. This process consists of entering a valid user name and its associated password (if one exists).

Mbyte or megabyte
1 048 576 bytes.

magnetic tape

Nine-track tape used for recording and storing information. Magnetic tape is often used for backups and archives.

magtape

Same as magnetic tape.

major number

Same as driver number.

message

An item of information generated by the computer to inform the user of an operation or error resulting from a command.

microflexible disc

Same as flexible disc.

minor number

A hexidecimal number made up of a select code, bus address, unit number, and volume number of the device.

MUX

MUX is an abbreviation for Asynchronous Multiplexer. The HP 98642 four channel MUX is available for the Series 300. Each channel is an RS-232C port which is normally associated with a */dev/ttyXX* file.

network

A system of a computer and terminals providing access from each terminal to the computer and other terminals.

non security system

A system allowing anyone to use it.

non sequential

In no particular order (at the same time).

operating system

The part of the system that interacts with the user and executes the user's commands. AXE is an operating system.

output

The data that results from a program or computer process.

PAM

Personal Applications Manager; the interface between you and the operating system.

parameter

The second (and subsequent) words/data after a command or program. Parameters are used to pass information to a program or command.

password

A security measure to insure the correct user is using the system.

path

An ordered sequence of steps from origin to destination.

path name

A series of folder names separated by / characters, and ending in a folder name or a file name.

peripheral

A device you have connected to your computer, such as a printer, mouse, or terminal.

permission

Operation allowed to a specified type of user.

pipe

The name given to a command line where the output of one command becomes the input to another command. The commands must be connected by a "|" character.

process

A process is the environment in which a program (or command) executes. It includes the program's code, data, status of open files, and value of variables. For example, whenever you execute an AXE command, you are creating a process; whenever you log in, you create a process.

program

A sequence of instructions performing a task.

purge

To erase, delete.

raw mode

Unbuffered I/O: information is written to, or read from, a peripheral device character by character.

redirection

Changing the default path of input or output (sending output to a file instead of to the screen, for example).

root

Root refers to the highest level folder (root folder or /). Root also refers to the super-user login name.

screen

The device with which the user sees computer output (the CRT or terminal).

script file

A file containing commands (each on a separate line). When the entire file is executed, the commands are executed in the order in which they appear in the file.

secure system

An AXE operating system is secure if you chose "Security" in *reconfig*. See the discussion of security in "After Installing AXE" in Chapter 2.

select code

Part of an address used for devices; a number determined by switch settings on the interface card. Each interface card is in turn connected to a peripheral. Multiple peripherals connected to the same interface card share the same select code.

sequential

In order (not at the same time).

shell

A program that interfaces between the user and the operating system. HP-supported shells are:

/bin/sh
/bin/csh
/bin/rsh
/bin/pam

special file

See device file.

source device

The mass storage device from which AXE is installed. The source device can be either a cartridge tape drive or flexible disc drive.

superblock

A data structure containing global information about the file system such as file system size, disc information, and cylinder group parameters. The superblock is created at the same time as the file system and is replicated into each cylinder group.

super-user

A user who has special privileges. The super-user has a login name called root.

system console

A keyboard and display (or terminal) given a unique status by AXE and associated with the special device file /dev/console. All boot ROM error messages (messages sent prior to loading AXE), AXE system error messages, and certain system status messages are sent to the system console. Under certain conditions (for example, run-level s), the system console provides the only mechanism for communicating with AXE.

unit number

Part of an address used for devices; a number whose meaning is software- and device-dependent but which is often used to specify a particular disc drive in a device with a multi-drive controller. When referring to single-controller integrated disc/tape or disc/flexible disc drive, a unit is used to distinguish between disc and cartridge tape drives or hard disc and flexible disc drive.

The unit number also selects a single partition on the 913x series.

user name

The login identifier required to access secure systems.

variable

See Parameter.

vi

The vi editor (visualize).

virtual memory management

A method of coordinating a limited amount of physical memory in a computer. The Hewlett-Packard Series 300 computers running AXE or HP-UX use demand page virtual memory management.

volume number

Part of an address used for devices; a number whose meaning is software- and device-dependent but which is often used to specify a particular volume on a multi-volume disc drive. The volume number is also used to inform the device driver of special handling semantics (such as printer drivers skipping over perforations).

window

A graphic device to visually emulate a device. Several windows can be placed on a terminal to allow a visual means to monitor several tasks at the same time.

yank

To copy specified information into a buffer (to be used in an editor to move text).

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MANUAL COMMENT CARD

Application Execution Environment
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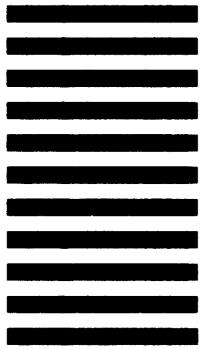Manual Reorder No. 98515-90000

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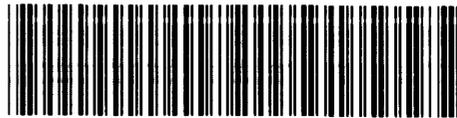FIRST CLASS   PERMIT NO. 37   LOVELAND, COLORADO

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