Models 745i/50, 745i/100, 747i/50, and 747i/100

Owner's Guide for HP-UX Users

HP 9000 Series 700i Industrial Workstations

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August, 1993 Edition 1

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OSSD Learning Products
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Fort Collins, Colorado 80525

Safety Symbols and Conventions

The following conventions are used throughout this manual:

Note	Notes contain important information set off from the text.
Caution	Caution messages indicate procedures which, if not observed, could result in loss of data or damage to equipment. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.
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■ **Turvallisuusyhteenveto (Finland Only)**

Laserturvallisuus
Luokan 1 Laserlaite
Klass 1 Laser Apparat
HP 9000 Model 745i/747i tietokoneeseen voidaan asentaa muistilaitteeksi laitteensisäinen CD-ROM-levyasema, joka on laserlaite. Tällöin myös päälaitteena toimiva tietokone katsotaan laserlaitteeksi.

Kyseinen CD-ROM-livyasema on käyttäjän kannalta turvallinen luokan 1 laserlaite. Normaalissa käytössä levyaseman suojakotelo estää lasersäteen pääsyn laitteen ulkopuolelle.

HP 9000 Model 745i/747i tietokoneen on tyyppihyväksynyt Suomessa laserturvallisuuden osalta Työsuojeluhallitus, Työsuojeluhallituksen hyväksyntänumero TSH 222/6019/90. Laitteiden turvallisuusluokka on määritetty valtioneuvoston päätöksen No: 472/1985 ja standardin SFS-IEC 825 mukaisesti. Tiedot CD-ROM-levyasemassa käytettävän laserdiodin säteilyominaisuuksista:

Aallonpituus 780 nm
Teho 0,4 mW
Luokan 1 laser

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Printing Conventions

This book uses the following typographical conventions:

If you see ...	**It means ...**
Colored Text	Text material which is in color is to be typed by you.
`computer text`	Text displayed by the computer system. For example, `login:` indicates a login prompt displayed by the system.
italic text	Variable text supplied by you. For example, *file_name* means that you type a file name of your choice. Italic text is also used for text emphasis and for document titles.
Key	Type the corresponding key on the keyboard. For example, CTRL-D means you hold down the CTRL key, and press the D key.
`Displayed Item`	Select an on-screen item or a corresponding softkey. For example, `Help`

Contents

1

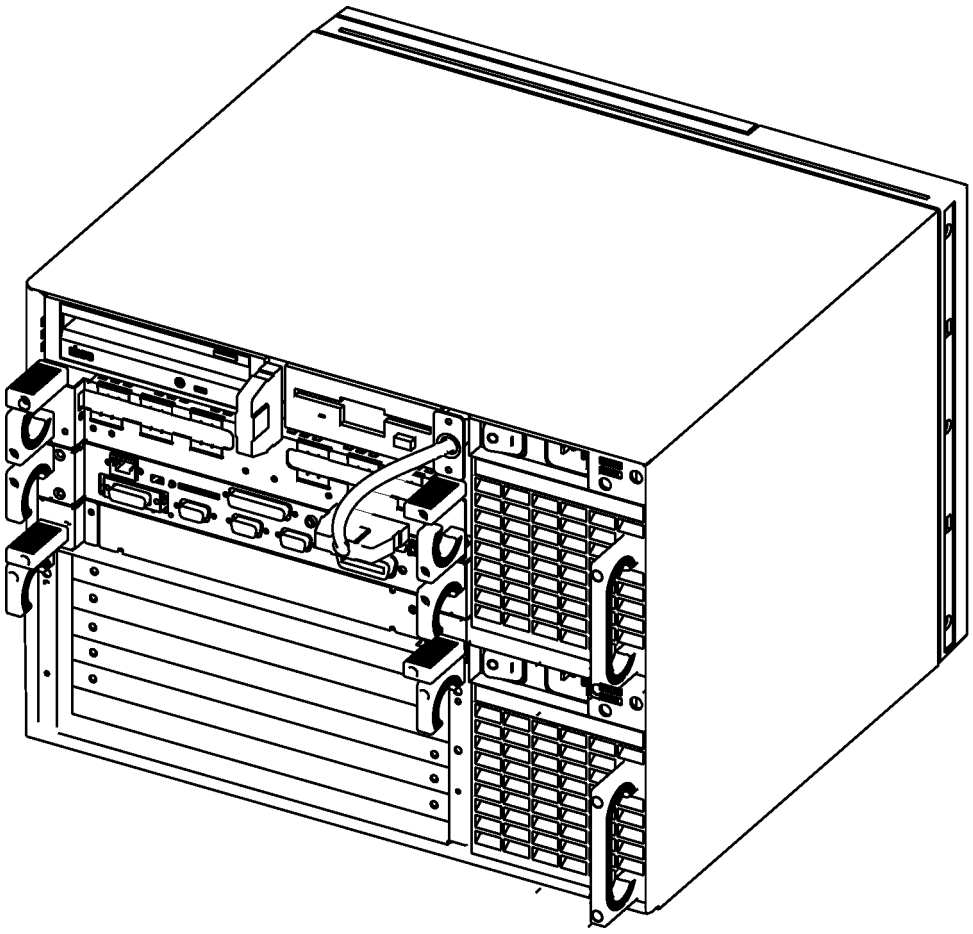
Product Description

Overview

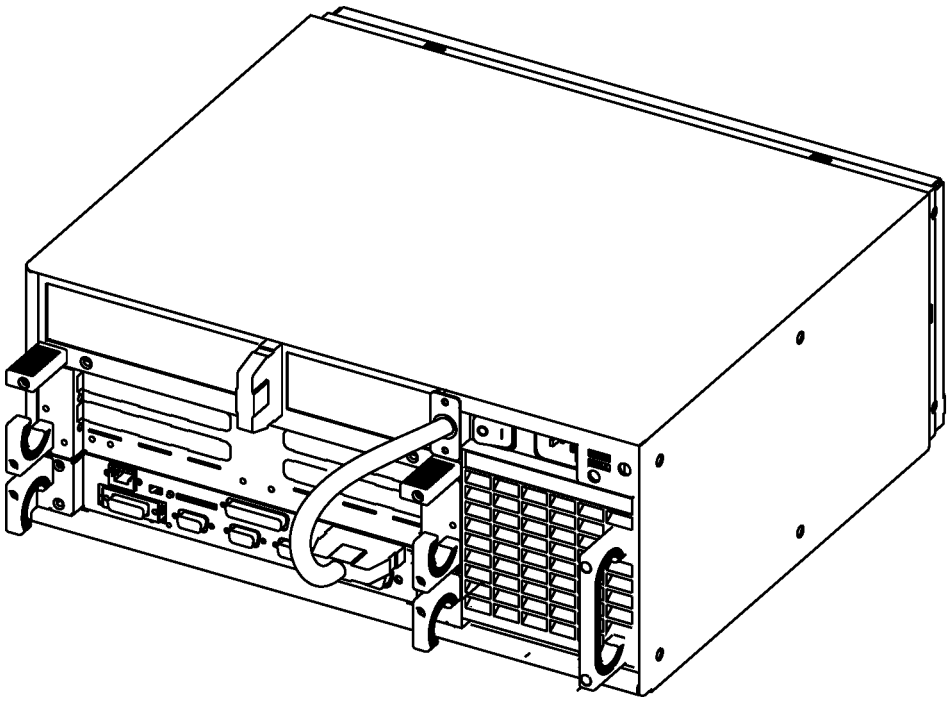
The HP 9000 Series 700i/50 and Series 700i/100 workstations are exceptionally flexible, high-performance Precision Architecture systems based on the Hewlett-Packard PA RISC 7100 technology.

This manual covers the Models 745i/50, 747i/50, and their higher-speed counterparts, the Models 745i/100 and 747i/100. The features and options of these systems are outlined in this chapter.

The 700i/50 and 700i/100 Industrial Workstations



Model 747i/50 and 747i/100 Workstations



Model 745i/50 and 745i/100 Workstations

Features of the Models 745i/50, 745i/100, 747i/50, and 747i/100

These models of the Series 700i/50 and 700i/100 have the following features:

- 50 or 100 Mhz PA-RISC processor.
  - The 50 Mhz processor delivers the following performance:
    - 69 SPECmark, 62 MIPs, 13 MFLOPs.
    - 36 SPEC int92.
    - 72 SPEC fp92.
  - The 100 Mhz processor delivers the following performance:
    - 136 SPECmark, 115 MIPs, 41 MFLOPs.
    - 81 SPEC int92.
    - 138 SPEC fp92.

- Error-Checking and Correcting (ECC) RAM memory is configurable as follows:
  - Series 700i/50: 16 to 128 MB main memory:
    installable as pairs consisting of 8, 16, or 32 MB RAM boards.
  - Series 700i/100: 16 to 256 MB main memory:
    installable as pairs consisting of 8, 16, 32, or 64 MB RAM boards.

  (See "Memory Upgrades" below, for details).
- External Caching:
  - Series 700i/50: 64 Kbyte instruction cache and 64 Kbyte data cache.
  - Series 700i/100: 256 Kbyte instruction cache and 256 Kbyte data cache.
- Three mass storage bays for hard disk, 3.5-in. flexible disk, CD ROM, and DDS ("DAT") drives. Variable configurations, include the following:
  - One 3.5-in. fixed disk and the following alternatives:
    - Two additional 3.5-in. fixed or removable devices or
    - One 3.5-in. and one 5.25-in (CD ROM) device.
- Front or rear access to removable media can be changed optionally.
  - Front access is the default for the 745i/50 or 745i/100
  - Rear access is the default for the 747i/50 or 747i/100.
- Input/Output:
  - RS-232-C (2).
  - LAN
  - AUI
  - SCSI-II SE
  - HP Parallel.
  - HP-IB (instrument only).
- Voice quality audio I/O.
- Standard interfaces.
- Rack-mount packages.
- Internal speaker on board.

Memory Upgrades

Factory-integrated RAM provides 16 MB, 32 MB, 64 MB, and 128 MB upgrade increments. See Appendix A for installation details.

Keyboards

The HP-HIL connector on the rear panel accepts a variety of HP-HIL input devices, including the following keyboards available in the Localization Kits under the following product numbers:

A1099C	HP 46021A/B Integrated Terminal Format (ITF) Keyboard.
A2205B	C1429A/B Personal Computer (PC101) Keyboard.

Other HP-HIL devices may also be connected to the keyboard or HP-HIL connector. See Appendix D for a functional comparison of the two keyboards.

Displays

Available monitors are the following:

HP D1196A	15-in.,(70 Hz.), 1024x768, color.
HP A2287A	17-in., (75 Hz.), 1024x768, color.
HP A1097A/B	19-in., (72 Hz.), 1280x1024, color.
HP A2094A	19-in., (72 Hz.), 1280x1024, color.

Note that, with Series 700i products, the A2094A monitor is available only by separate purchase.

Graphics

Supported graphics upgrades for the Models 747i/50 and 747i/100 are as follows:

HP A2269A: Adds dual CRX-accelerated color graphic board, including SGC CRX card, and two 19-in. 1280 X 1024 color monitors.

HP 98768A: CRX-accelerated color graphics and a 19-in. 1280 X 1024 color monitor.

HP A2262A: Adds dual CRX-accelerated color graphic board, with no monitor.

HP A2270A: CRX-24 color graphics and a 19-in. 1280 X 1024 color monitor.

HP A1439A: CRX-24 color graphics, with no monitor.

- SGC graphics option operate concurrently with on-board graphics. The Models 747i/50 and 747i/100 function as single workstations, accepting user input from single keyboards, but delivering graphics output to as many as three monitors.
- The Models 747i/50 and 747i/100 have only one SGC interface. Upgrade products may not be used concurrently.
- The 745i/100 or 747i/100 systems and upgrades are configured for a 70 Hz refresh rate monitor. The socket-installed 75.0000 Mhz crystal for the fast refresh rate display is identified as Part Number 18130940. The corresponding STI ROM is identified as Part Number 18185347.

Switches for Changing Graphics Formats

Note that both on-board graphics and CRX upgrades may be used concurrently in the Models 747i/50 and 747i/99. On the system board, four switches near the edge are used to configure the graphics circuit for different situations. *These switches are appropriately set for your monitor as shipped from the factory.* However, if you should choose to upgrade your system with a different HP monitor, the following information will help in configuring the system to communicate appropriate resolution and scan-rate.

Table 1-1 lists the switch settings for these monitors:

Table 1-1. Graphics Switch Settings and Supported Monitors

Monitor	Switch 1	Switch 2	Switch 3	Switch 4
HP D1196A 15-in.	UP	UP	DOWN	UP
HP A1097A 19-in.	UP	DOWN	UP	UP
HP A2287A 17-in.	UP	DOWN	DOWN	UP
HP A2094A 19-in.	UP	DOWN	UP	UP

A label next to the configuration switches will also tell you the correct switch positions.

Built-In Interfaces

All models provide the following I/O interfaces:

- HP-IB Instrument Interface: IEEE-488, 350 KB/sec.
- HP-HIL Interface.
- HP Parallel Interface: 25-pin female D-sub (PC standard).
- 2 Asynchronous RS-232 Interfaces: 9-pin male DTE (PC standard).
- SCSI-II Interface: 50-pin high density; single-ended 8-bit, up to 5 MB/sec. synchronous.
- Local Area Network (IEEE 802.3 Ethernet; AUI, requires MAU) 10MBit/sec.
- Audio I/O. (1/8-in. jacks; 8Khz, limit >20 ohms per output)

The Models 745i/50 and 745i/100 additionally provide the following:

- 4 EISA Interface Slots.

The Models 747i/50 and 747i/100 additionally provide the following:

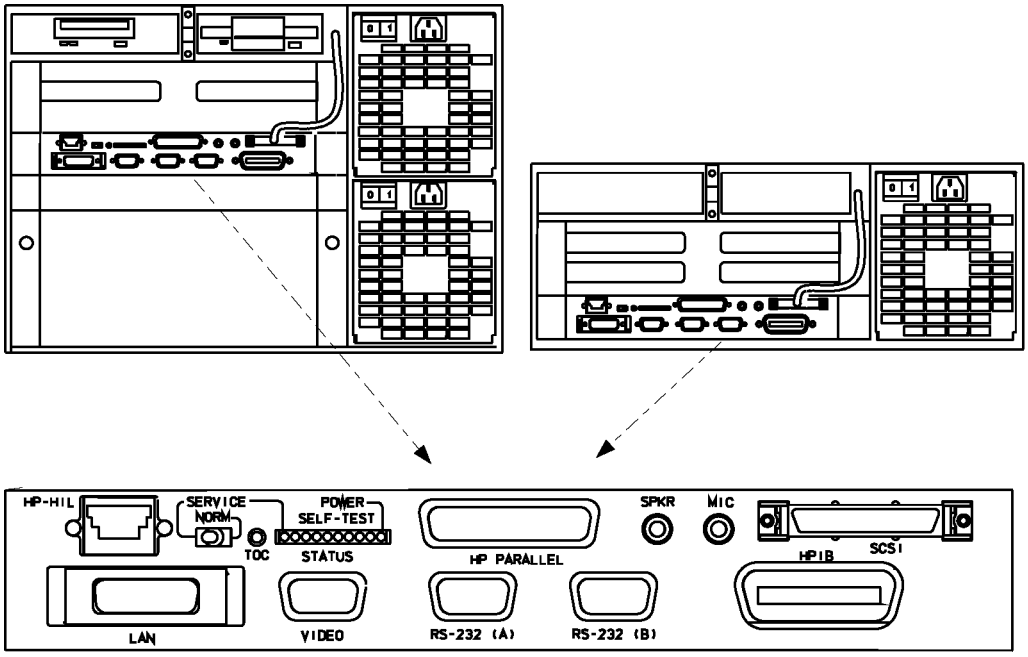
- 2 EISA Interface Slots.
- 6 VME Bus Slots.
- 1 SGC slot.

See "VME Performance" in Appendix B and "EISA Performance" in Appendix B for performance specifications on these interfaces.

Physical Configurations

The rear panels for the all models are shown in the following figures. Note that the System Module panels are the same.

Panel for All Models



Physical Dimensions and Power Requirements

- Height: 176.75 mm. (6.97 in.) (Model 745i/50 and 745i/100); 310.15 mm. (12.2 in.) (Model 747i/50 and 747i/100).
- Width: 425.45 mm. (16.75 in.) (all models).
- Depth: 412.6 mm. (16.2 in.) (all models).
- Weight: 18.6 Kg. (4l lb.) (Model 745i/50 and 745i/100); 29 Kg. (64.1 lb.) (Model 747i/50 and 747i/100).
- Power
  - Model 745i/50 or 745i/100: 350 watts maximum.
  - Model 747i/50 or 747i/100: 700 watts maximum.
- Line select: 90-130 volts or 180-250 volts, auto ranging.

Audio I/O

All models feature 8 Khz voice quality audio with 128 Byte I/O channel buffering. The audio I/O is as follows:

- Output connector (1/8 in.) for external speaker or headphones.
- Input connector (1/8 in.) for microphone or other audio source.

These interfaces allow you to use a microphone to digitize speech-quality, provide single-channel audio for voice annotation, and use applications for voice-mail and voice recognition. HP-UX provides software control for recording audio files on hard disk drives. *Note however that audio CD ROMs cannot output directly to the audio-out connector.* See "Using Audio Input/Output" in Chapter 4 for an overview of audio access with these workstations.

Internal Mass Storage Devices

The Series 700i industrial workstations may use up to three internal mass storage devices connected to the internal SCSI interface. Each workstation is also available in diskless as well as disked configurations. Two removable-media mass-storage bays (one 3.5-in. and one 5.25-in.) can be fitted with a combination of a CD ROM, DDS tape drive, hard disk, or flexible disk drive. One fixed-media mass storage bay can have one of two optional pre-formatted disk drives installed.

Factory-installed and customer-installable mass storage devices include the following. The HP upgrade product numbers are given at the left:

- HP A2640A: 525 MB hard disk drive.
- HP A2641A: 1.05 GB hard disk drive.
- HP A2645A: 3.5-in. flexible disk drive.
- HP A2644A: 600 MB CD ROM Disk Drive.
- HP A2642A: 2GB DDS Tape Drive
- HP A2643A: 4 - 8 GB DDS (Data Compression) Tape Drive

Operating System

HP-UX 9.01 or 9.03 for the Series 700i/50 or 700i/100 includes the HP VUE interface, and the X Window System. Instant Ignition is standard with HP A2637B and otherwise optionally available.

Table 1-2 lists the HP-UX operating system features and languages for these workstations.

Table 1-2.
HP-UX Operating System and Languages for the Series 700i Workstations

Operating system:	HP-UX 9.0 for Model 745i/50; otherwise HP-UX 9.01 or later. HP-UX complies with XOpen, and POSIX specifications.
Languages:	HP-PA Assembly, ANSI/C, C++, Pascal, HP-UX FORTRAN/9000.
User interface:	X Window System 11R5 (OSF/Motif 1.2), HP VUE 3.0, HP SharedX.
Network Features:	IEEE 802.3/Ethernet Local Area Network: ■ S.25. ■ SNA. ■ RJE. ■ TCP-IP. ■ HP Diskless.

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Finding Information About Your System

Overview

Your new HP workstation uses the HP-UX operating system and the HP Visual User Environment (HP VUE). HP-UX is a versatile operating system that you can use to run application programs and perform a variety of tasks. HP VUE is a graphical interface to HP-UX that can simplify many of your daily tasks.

Chapter Contents

- Information About Installing Your Workstation.
- Online Sources of Information.

2 Information About Installing Your Workstation

If you have not installed your hardware or started your workstation, refer to the *Installation Guide* for your workstation before going further.

Finding Out About Your Workstation

After you have read the *Installation Guide* for your system, you may want to see the following sources for further information:

- For a quick reference to commonly-used HP-UX commands, see the Appendix in *Using HP-UX*.
- HP VUE is the default interface for HP-UX. If you are planning to use the X Window System, see *Using the X Window System* or *Using HP-UX*.
- For information on HP VUE, see the *HP VUE User's Guide*.
- The following manuals will also be useful:
  - If you have not yet installed your HP-UX system, see *Installing and Updating HP-UX 9.0*.
  - For administration information, see *System Administration Tasks*.
  - For troubleshooting HP-UX, see *Solving HP-UX Problems*, and Chapter 7 in this manual.
  - For VME configuration information, see the *VME Configuration Guide for HP-UX*

Online Sources of Information

HP-UX is designed so that you can access many sources of information without leaving your workstation. Some of these information sources are available in the HP VUE interface; others can be accessed through a shell command line. You will find information on help in *Using HP-UX*. All the current HP-UX manuals can be accessed and searched online if you purchase the LaserRom optional product.

- Online HP VUE Help: If you are using HP VUE, click on the `?` button (with the picture of books behind it), on the VUE front panel, will get you help on using HP-UX and HP VUE.

  If you click on the up-arrow above the `?` you will get a slide-up sub panel with help subcategories, including HP VUE Help and HP-UX help on specific tasks.

- Man Pages: The information on HP-UX which is found in *HP-UX Reference* is also on line and accessible by clicking on the Toolbox button at the right of your Front Panel, or by entering the following at a shell prompt:

  `man` *command*

  In place of *command*, enter the name of the HP-UX command you want to get information on. If you're not sure of the command name you can enter `man -k` *keyword*, where *keyword* is a likely topic word to search on. This will result in a display of commands having that keyword in their description.

- Optional LaserROM: If you have a CD ROM drive attached to your system, you can access and print out all the HP-UX manuals, as well as obtain other current information, using LaserRom. Your Hewlett-Packard sales representative can help you with information on obtaining and using online manuals with LaserROM.

There are many files on your system which contain information which will be useful in administering and configuring cards and devices for your version of HP-UX. Among these are the following:

- Release Notes: This is the online version of the Release Notes which came with your system. It contains all the late information, undocumented changes and bug fixes for your release of HP-UX. Release Notes is found in the `/etc/newconfig` directory, and may be named by its release number, e.g., `90RelNotes`, for HP-UX 9.0.
- Terminfo: The directory `/usr/lib/terminfo` contains subdirectories containing information about terminal configurations, indexed by the first character of the terminal name. For example, to find configuration information about the hp98546, you can look in `/usr/lib/terminfo/h` for a listing of information files for all the terminal names beginning with "h".

  These filenames also constitute all the acceptable arguments for setting the TERM variable, in case you are using a non-default terminal configuration.
- Newconfig: The directory `/etc/newconfig` contains information and new versions of HP-UX product configuration files, as well as shell scripts which may have been customized (localized) on your system. The contents of this directory will vary depending on which products you have loaded on your system. In most cases, old versions of these files, in their regular locations in the file system, are not overwritten by the update process. See the README file in `/etc/newconfig` for information on the contents of this directory.

3

Logging In and Getting Started

Chapter Contents

Before Logging In the First Time

If your system has HP-UX preloaded on its disk (this is indicated by a label over the power switch), HP-UX will automatically load itself when you first turn the power on.

If your system does not have a hard disk installed, or if it has a file system disk, and you want your workstation to be a cluster client node (cnode), refer to the manual *Managing Clusters of HP-UX Computers* for instructions on setting up clusters and cnodes.

This chapter reviews some initial procedures and provides information on using both HP VUE sessions and HP-UX. For more detailed information about using HP VUE after login, see the *HP VUE User's Guide*.

When you turn on your workstation to complete the installation process, you will be asked for the following information. If you do not have this information readily available, simply press Return after the questions, and you can supply this information later:

- The time zone where your workstation is located.
- The host name for your workstation; any alphanumeric, single-word name with eight or fewer characters.
- The network address number, also called an IP number, for your workstation. This consists of four address fields separated by periods: for example, *255.32.3.10*. You may need to consult with your system administrator for this information. Or, if your host name and IP number have already been assigned, you can find out the host name, after boot, by entering `uname -a`. If you know your host name, you can find out your IP number by entering `nslookup` *host_name*, at the system prompt.

If you can't supply this information at boot time, you can configure it into the system later, after logging in, by entering the command `set_parms`, as `root`. You can then enter the information at the prompts.

Turning On Your System

With all peripheral devices turned *off*, do the following:

1. Turn *on* the power to your monitor. The power indicator LED will show that it is turned on, even though the screen remains dark during initial self-testing.
2. Turn on the power to any other external devices.
3. Turn your system on. The LEDs will light, showing that the power is on.

Note

These models of the Series 700i have power switches on both the front and rear of the system unit. There are several ways to switch the power on or off. *In all cases, if one power switch is OFF, power for the entire unit will be turned OFF.*

To activate power for the system:

- If your unit is rack-mounted and placed with the *front* of the unit facing out:
  a. Turn the rear power switch(es) *on*. (These are the rocker switches.)
  b. Then use the front (push button) power switch to toggle power *on* or *off*. The rightmost green LED (labeled "P") on the front of the system module will confirm power *on*, as will the corresponding LED on the rear of the unit.
- If your unit is rack-mounted and is placed with the *rear* of the unit facing out:
  a. Make sure that the push-button power switch on the front is pushed *on*.
  b. Turn *on* the power switch(es) to activate the system. The rear LEDs will confirm power on.
  c. Turn rear power switch(es) *off* to turn off the system.

4. For about 20 seconds the system performs keyboard and other testing routines with a black screen. Then you will see a color test of the display, followed by a sequence of boot messages. Allow the boot to continue.
5. You will be prompted for the host name, IP number, and time zone. If you have this information, enter it as requested. Otherwise, press Return. You can also enter this information after login by typing `set_parms` Return at a shell prompt.
6. You will be asked if you want to set a root password at this time. If you choose to do this, see "Selecting a New Password", in this chapter, for password requirements.

The system will finish the boot sequence, and you will see the HP VUE Login window. If you don't have HP VUE, and you see the "`Console login:`" prompt, go to the section "Logging In and Out Using HP VUE".

Caution

If your system has its own disk and you are running a local operating system, do not turn off power to your system without first shutting down the operating system software according to the procedure in this chapter, "Shutting Down Your System". Turning off the power for your stand-alone system without first doing the shutdown procedure may result in damage to data on your disk. Always execute the shut-down process to completion first.

If you are running your system as a node in a cluster (without a file system disk) you can, in any case, shut down your system by turning off the power after you have properly closed files and terminated processes. If you have a mounted file system disk, you must become `root` and perform the procedure in "Shutting Down Your System", or have your system administrator do so. You can run `shutdown` *without* being `root` by being listed in the file `/etc/shutdown.allow`. See *System Administration Tasks* for details.

Interpreting the LED Indicators

There are nine LEDs ("Light Emitting Diodes"), which you can view on the front or rear panel. Eight of these are diagnostic, or indicate the normal activity of your system. The one on the far right indicates power "on".

The normal running indications for HP-UX are shown in Table 3-1. The right four of the eight diagnostic LEDs will always be blinking to reflect activity during normal operation. For LED indications of error conditions during boot, see Table 7-1.

The green power-indicator LED is omitted from the table below.

Table 3-1. Normal LED Display During HP-UX Operation

LED Display	Meaning
○ ○ ○ ○ ● ○ ○ ○	Operating system running
○ ○ ○ ○ ○ ● ○ ○	Disk access in progress
○ ○ ○ ○ ○ ○ ● ○	Network receive in progress
○ ○ ○ ○ ○ ○ ○ ●	Network transmit in progress

Logging In and Out Using HP VUE

Once HP-UX is running on your system, you must log in. The process of logging in is one of the ways that HP-UX prevents unauthorized persons from using your system. This is especially important if your system is attached to a network.

Logging In the First Time: Screen Appearances

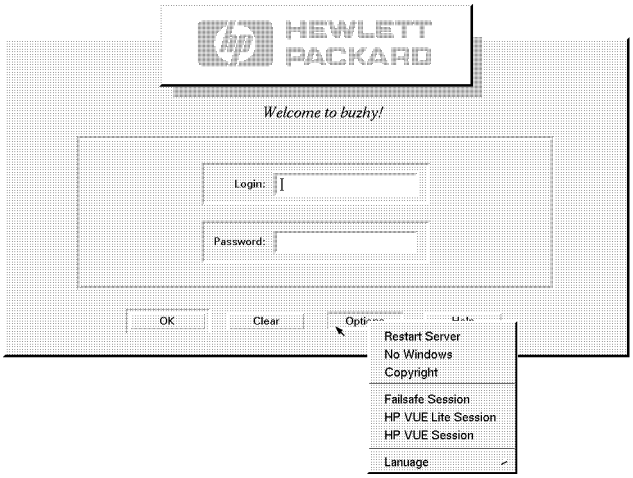
Your screen after login will have a slightly different appearance the first time you log in from the way it will look subsequently:

- If you have a pre-loaded operating system, the first time you log in, you will see a `Welcome` window displayed along with the HP VUE Front Panel, the first time you log in. The information in this screen will help you explore the capabilities of your system and perform some basic tasks.
- If you are only updating your HP-UX system to the current version and you have installed HP VUE, then you will see the `Welcome` window and the HP VUE Front Panel.
- When you log in to HP VUE for subsequent sessions, you will see the Front Panel and the File Manager for your home directory.
- When you log in using "`login:`" (or "No Windows") for subsequent sessions, you will see the shell prompt ("`$`").

Preparing to Log In to an HP VUE Session

The HP VUE login screen provides a place for you to type your login name and password.

The `Options` menu on the login screen allows you to select several alternative types of sessions, such as HP VUE Lite, or a failsafe session. You can also select the language for your session. See *HP VUE User's Guide* for the details of these HP VUE configurations.



Login Options Menu

- During the login process, if you need help logging in, click the login screen `Help` button.
- If you choose *not* to use HP VUE for the current session only, you can select `Options` from the login window menu and `No Windows` from the VUE login screen. Then, enter your login name and password after the appropriate prompts. You will see the shell command line prompt.
- If you are *not* running HP VUE at boot, you will log in using "`login:`".

Logging In to an HP VUE Session

1. Select the `Login` box and type your login name. Press Return or choose `OK`.
2. Type your password. Press Return or choose `OK`.

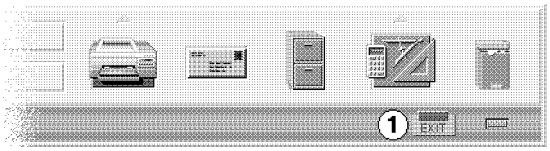
If the Login Manager does not recognize your name or password, you will see an error message. If this happens, choose `Clear` and start over.

Logging Out in HP VUE

You can secure your workstation temporarily and leave processes running by clicking on the "lock" control icon on the Front Panel. You will type your password to unlock the screen.

If you are going to log out of the session, close your current files and do the following:

- Choose the logout control on the Front Panel.



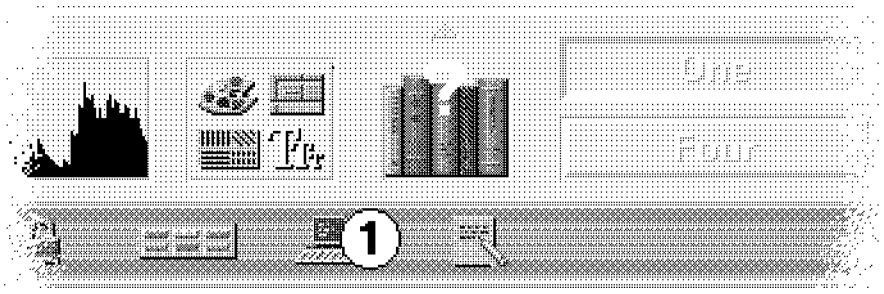
The Logout Control ①

Opening and Closing a Terminal Window

For using a shell prompt to enter HP-UX commands while you are in HP VUE, you will generally be using a terminal window. There are two types of terminal windows, HP Term and X Term. Each has slightly different behavior. For example, HP Term windows (Term0 compatible) can utilize softkey representations, whereas X Term emulates a VT102 (ANSI compliant) terminal. For more information, see the *HP-UX Reference* or online man page entries *hpterm*(1) and *xterm*(1).

To open a terminal window from a shell prompt, type `hpterm`.

To open a terminal window in HP VUE, click on the Front Panel button that resembles a keyboard and screen. For a regular HP VUE session the button is found in the following location:



The HP VUE Terminal Button Location

Cutting and Pasting Text

Cutting and pasting is a way of copying which eliminates the need to retype text. You can cut from, and paste into, the following:

- Text fields.
- Terminal windows.
- Editor windows.

Cutting Text

1. Move the pointer to the start of the text block.
2. Hold down mouse button 1 and drag the pointer to the end of the text block. This will highlight the text that you are going to "paste" (copy).

Pasting Text

1. Put the text insertion cursor at the target location.
2. Click mouse button 2 to paste the text into the field.

To unselect text, click mouse button 1 in an empty area of the window that has the text selected, or press ESC.

Logging In and Out Using HP-UX

If you are not using HP VUE, then a command-line login prompt appears after boot:

```
login:
```

1. Type your login name (or `root`).
2. Press Return.

   If you *haven't* yet set a password, you will get a a system prompt (`#` for root, or `$` for user), and you can begin using the system.
3. Otherwise, type your password when the system gives the following prompt:

   ```
   Password:
   ```
4. Press Return. The system prompt (`#` or `$`) appears and you can use the system.

Logging Out

If you are not using HP VUE, you can use the `lock` command to temporarily leave your workstation (while leaving processes running). If you want to log out of your current work session entirely, use the following command:

```
exit
```

Creating a New User Account

Using HP VUE

If you have access to a system administrator, that person may have already set up a user account for you. If you are doing your own system administration, you will need to do the following to set up a user account.

The home directory or "account" in which you work is where you log in at every new session and where most of your default files are found. As "owner" of this directory and its subdirectory, you also have control over who can access any of its files.

If you have not already created a user account, do the following steps to create one:

1. Log into HP VUE as `root`. (You will need the `root` password).
2. Click on the up arrow (the small triangle) over the Toolbox control icon at the right side of the Front Panel. A slide-up menu ("subpanel") appears.
3. Choose the `General` icon on the Tools subpanel. You will see a window which lists applications in the General Toolbox. Select the `System_Admin` folder.
4. The System Administration window appears. Choose `Sam`.

Caution In order to use SAM, you must be logged in as `root`. The `root` account is a separate login account providing unlimited permissions on your system. This means that you need to take actions more carefully when you are `root`. The `root` account is only used to do system administration tasks, and, for security reasons, it should use a password which is different from your everyday user password. *Using HP-UX* and *System Administration Tasks* give you more details on using SAM.

5. At the opening menu, choose `Users and Groups->` by clicking on it and then clicking on `Open` (or just double-click on the item).

6. At the next screen, choose `Users`. After a pause, you will see a screen displaying a list of logins and real names.
7. Select `Add` from the `Actions` pull-down menu. You will see a form `Add a User Account`.
8. Fill in your login name, choice of start-up program and environment (if different from the defaults given), and the optional information.

Note At this point you can select X Windows as your login default environment, if you so desire.

---

9. Choose `OK` when you are finished.
10. You will be asked to select a password. (See "Selecting a New Password" for password requirements. If you wish, you can select a temporary password and reset it later). Type the password and click on `OK`. Re-enter the password, as requested. The re-entered password must match the first.
11. Choose `OK`
12. When the "Task Completed" message appears, choose `OK`.
13. In the Users window, select `Exit` from the `List` menu (or double-click on the `-` in the upper-left corner).
14. Choose the `Exit SAM` button.

Using SAM

If you are not running HP VUE, you can set up a user account by accessing SAM directly. You can then use SAM with or without a mouse. Note that, if you are not already logged in as `root` you will be asked for your root password in order to begin using SAM.

1. Type `usr/bin/sam`, as `root`, followed by (Return).
2. At the opening menu, choose `Users and Groups->` by clicking on it and clicking on `Open` (or press (Return), if you are using a keyboard).
3. At the next screen, choose `Users`. You will see a screen displaying a list of logins and real names.
4. Select `Add` from the `Actions` pull-down menu. You will see a form `Add a User Account`.
5. Fill in your login name, choice of start-up program and environment (if different from the defaults given), and the optional information.

Note At this point you can select X Windows as your login default environment, if you so desire.

---

6. Choose `OK` when you are finished.
7. You will be asked to select a password. (See "Selecting a New Password" for password requirements. If you wish, you can select a temporary password and reset it later). Type the password and choose `OK` (or press (Return)). Re-enter the password, as requested, and choose `OK`. The re-entered password must match the first.
8. Choose `OK`.
9. When the "Task Completed" message appears, choose `OK`.
10. In the Users window, select `Exit` from the `List` menu (or double-click on `-`).
11. Choose the `Exit SAM` button.

Setting Audio Volume

Your system is equipped with several audio systems which be used either for the output of audio beeps from various applications or for the recording and reproduction of speech-quality digital audio. For more details on digital audio, see "Using Audio Input/Output" in Chapter 4. The volume for the beep and for other audio is controlled in separate ways.

Your system has an internal audio speaker. The beeper output, as well as other audio, is also routed to the output jack on the system panel. This output can be used for either headphones or external speakers. So you have three possible modes of hearing audio:

- Internal speaker.
- External headphones.
- External speaker(s).

For high-quality audio, headphones or external speakers are recommended.

In HP VUE, the beeper audio volume, by default, is set to a level of 50%. If you are using your system with the internal speaker only, the audio volume from the internal speaker may be too low to be audible in some surroundings and you may have trouble hearing the beeper.

On the other hand, if you are using your system with headphones plugged into the Audio Out jack, and you are running HP VUE, the 50% audio volume level is more appropriate and you may find the 100% level to be uncomfortably loud.

In case you need to adjust the audio volume, do the following while you are running HP VUE:

1. Click on the Style Manager icon at the left side of the HP VUE Front Panel. An elongated window showing various HP VUE configuration options appears.
2. Click on the Audio icon. An audio configuration window appears.

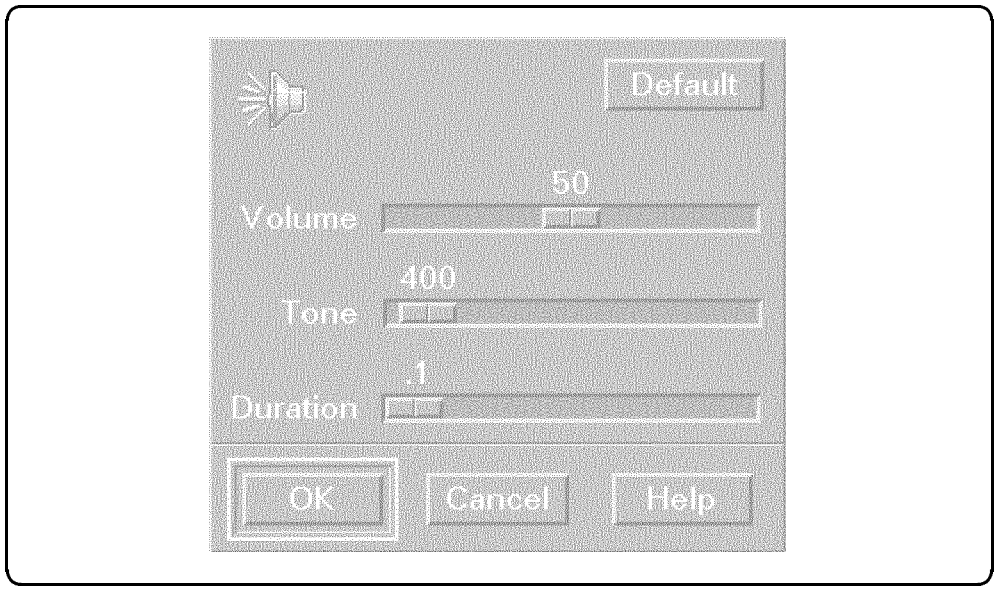


Figure 3-1. Audio Configuration Screen

3. The volume control slider for a new installation will be set by default at "50%". Click and drag the slider to "100%", or an intermediate setting that produces a comfortable level for the system beep. Wherever you release the mouse button, the system gives a test beep.

4. If you wish, you can also reset the Tone and Duration parameters in this screen, in the same way, by clicking and dragging the sliders. Tone and Duration can be configured in the following ranges:

   a. Tone: 82 — 4,000 Hz. (*Although the slider indicates up to 9,000 Hz, the tone generator is designed to function to 4,000 Hz.*)
   b. Duration: .1 — 2.5 seconds.

   You will hear a sample result for each parameter, as soon as you release the mouse button.

5. When you have finished with the Audio screen, close it by clicking on `OK`.

6. To ensure that the new setting(s) become a part of your next HP VUE login session (i.e., that the configurations will remain in effect after you log out and log back in), click on the Startup icon, (also on the Style Manager window).
7. In the Startup window, click on `Resume current session` if it isn't already "pushed" or illuminated.
8. When you are ready, logout in the customary way by clicking on the `EXIT` button at the far right of your HP VUE Front Panel. If you want to change back later, you can do either of the following:
   a. Reconfigure the Audio and log out with the current session configurations specified as your login session. Or:
   b. Configure the Startup screen to cause your interface to return to the "Home Session" when you next log in.

In case you need to adjust the audio volume additionally for the `audio_editor`, do the following while you are running the `audio_editor` widget. (See "Using Audio Input/Output" in Chapter 4 for instructions for using the `audio_editor`).

- For these models of the Series 700i, the output default for the `audio_editor` is the internal speaker. Using the `Options` menu, change the output to `External`, even if you are using the internal speaker. All audio output goes to an "external" channel regardless whether you have an external speaker plugged in or not.
- Drag the `audio_editor` audio-level adjustment slider to another point on the scale.
- In the Files menu, click on "Load" and select an audio sample file. Click on "Play" to check the sound level, using your headphones, external speaker, or the internal speaker.

Setting or Changing a Password

Using HP VUE

To change or create a new password for your new user account or for `root`, you can also use the HP VUE Toolbox:

- Choose the Toolbox control icon at the right side of the Front Panel. You will see the Personal Toolbox. (The `ChangePassword` action can be accessed either here or in the General Toolbox, which appears on the Toolbox subpanel).
- Choose `ChangePassword`. You will see a `Changing password` screen.
- Enter your old password, at the prompt.
- Enter the new password. (See "Selecting a New Password", if necessary).
- Re-enter the new password, as requested.

Using HP-UX

From a command line shell prompt, you can use the `passwd` command directly to set or change a password. Enter the following:

```
passwd
```

You will be prompted for your old password. Then you will be prompted to enter and re-enter your new password. The re-entered password must match the first entry.

See the later section in this chapter, "Selecting a New Password", if you need help with selecting passwords. Use the same procedure to change an old password as to add a new password. If you already have one, you will be prompted appropriately for the old password.

Selecting a New Password

If you have already booted and used your system, you should already have set different passwords for your user account and for `root`.

However, you will also want to change your password from time to time as a matter of good security practice. The following gives the general requirements of setting passwords.

A password must meet four criteria to be valid:

- Contains at least six characters.
- At least two characters must be alphabetic.
- At least one character must be a number (0-9) or a special character (/, ?, !, or other punctuation mark).
- Differ from your previous password by at least three characters.

Your password is case-sensitive, so the password `?Secret` is different from the password `?secret`. Your password can also be as long as you want, but only the first eight characters are checked.

If you are adding many users to your system, see *System Administration Tasks* for the details of controlling access to your system.

If you have not yet set your password, you can do so using SAM or a shell command line.

Getting Help

HP VUE help is accessed by clicking on the ? icon (with books) on the VUE Front Panel. You can also get a help sub-panel by clicking on the up arrow above the ?.

- If you have HP VUE and need to learn more about using it, see *Using HP-UX* or *HP VUE User's Guide*.
- If you do not have HP VUE or have decided to remove it and work with the command line, *Using HP-UX* will help you with all the basic aspects of HP-UX.
- For advanced information, refer to *System Administration Tasks*, *HP-UX Reference*, *User's Guides*, or to the online "Man Pages". The *Ultimate Guide to the vi and ex Text Editors* has advanced information on using text editing tools.

Shutting Down Your System

If you need to cycle power on a system using a local disk, you will have to execute the `shutdown` command first. You can do this either from the command line, with SAM or by using the HP VUE Toolbox.

Using the Shutdown Command to Stop Your System

Caution Do not turn off power to your system without first shutting down the operating system software according to the following procedure. Turning off the power for your system without first doing the shutdown procedure may result in damage to data on your disk. Always execute the shut-down process to completion first.

1. As `root`, enter the following command:

   ```
   shutdown -h
   ```

   This will give you and any other users on your system a one-minute "grace period" to save files and terminate processes before the system goes down to the halted state.

2. You will see a message:

   ```
   Waiting a grace period of 60 seconds for users to logout.  Do not turn
   off the power or press reset during this time.
   ```

   (You can specify this message and you can determine the "grace period" that `shutdown` allows. See *shutdown*(1M) and *System Administration Tasks* for instructions on using various options.)

3. At the end of the period, you will see another warning and the following request for confirmation:

   ```
   Do you want to continue?  ...
   ```

4. Respond with `y`. You will see another message confirming shutdown. Finally, you will see the following message:

   ```
   Halted, you may now cycle power.
   ```

5. At this time the system no longer responds to keyboard input and you may turn off the power. Turning the system back on again will initiate the boot process.

If you want to shutdown and reboot automatically enter the following:

```
shutdown -r.
```

4

Using the Command Line

Chapter Contents

- The Command Line Prompt.
- Working with Shells.
- Using Files and Directories with Command Lines.
- Viewing and Printing Files.
- Editing Files.
- Using Audio Input/Output.
- Networking Overview.

The Command Line Prompt

Whenever you see the command line prompt, you can begin typing commands. If you are logged in as *user*, the command line prompt is either `$` or `%`, depending on your shell. HP-UX displays the prompt every time you press Return.

Running Commands

To run a command, type the command's name after the prompt and press Return. The command then will begin running. When the command finishes, the prompt reappears. For example, run the following `whoami` command now:

```
$ whoami Return
leslie          Your user name appears here.
$               Then the command line prompt reappears.
```

If you make a mistake when typing a command, use the Back space key to back up and correct it.

Note Commands are generally followed by Return to enter the command. From this point on, the Return at the ends of commands will be assumed.

Working with Shells

Whenever you enter a command you are making use of a command interpreter which interprets that command for HP-UX. The command interpreter is called a **shell**.

When you log in, you are said to be "in" a **shell**. HP-UX supports several different shells which behave in slightly different ways and give you varying amounts of interactive support at your display. These are called the Bourne, Korn, Posix, Key, and C Shells. Your system administrator determines which shell you get when you first log in, and you have the option of changing shells later.

Basics of Shells: Characteristics, Choosing and Using

HP-UX gives you your choice of several different shell-types which you can run: the Bourne, Korn, Posix, Key, and C Shells. Each of these shells has different characteristics, and you can increase the speed and efficiency with which you interact with HP-UX inside windows if you learn to use some of the built-in features of the shell of your choice.

For details on shell features and behavior, please see the *Using HP-UX* and the *Shells: User's Guide*.

Shell Features

Below are listed some of the features which may help you make a decision on which shell would be best for the kind of work you are doing:

Table 4-1. Comparison of Shell Features

Features	Description	Bourne	Posix, Korn, Key	C
Command history	A feature allowing commands to be stored in a buffer, then modified and reused.	No	Yes	Yes
Line editing	The ability to modify the current or previous command lines with a text editor.	No	Yes	No
File name completion	The ability to automatically finish typing file names in command lines.	No	Yes	Yes
`alias` command	A feature allowing users to rename commands, automatically include command options, or abbreviate long command lines.	No	Yes	Yes
Restricted shells	A security feature providing a controlled environment with limited capabilities.	Yes	Yes *(Not Posix Shell)*	No
Job control	Tools for tracking and accessing processes that run in the background. *See Shells: User's Guide*	No	Yes	Yes

Determining Your Login Shell

The command `echo $SHELL` displays the file name of the shell you entered when you logged in.

```
$ echo $SHELL
/bin/sh
$ _
```

Temporarily Changing Your Shell

Unless you are in a restricted shell, you can temporarily change your shell by using this command:

shell_name

where *shell_name* is the name of the shell (for example, `sh`, `ksh`, or `keysh`). Temporarily changing your shell lets you experiment in other shells. By typing the name of the shell you want to run, you *invoke* (enter) that shell, and the correct prompt is displayed. After experimenting in the new shell, return to your original shell by typing either `exit` or CTRL-D.

Permanently Changing Your Shell

To permanently change your *login shell* (the default shell you get when you log in), use the `chsh` (`ch`ange `sh`ell) command:

`chsh` *username shell_path_name*

where *username* is your user name and *shell_path_name* is the full path name (e.g., `/bin/ksh`) of the shell you want as your default. After you use the `chsh` command, you must log out and log in again for the change to take effect. For example, if `terry` changes the default login shell to the Korn Shell, the command reads:

```
$ chsh terry /bin/ksh
$ _
```

Using Key Shell: Visual Help for Korn Shell

Key Shell gives you help on most HP-UX commands in Korn Shell by displaying softkey command-names and options in sequence. You can select from these and let Key Shell build your command lines "in English" before you have mastered the commands and command syntax of HP-UX.

Key Shell gives you softkey displays at the bottom of your screen which provide a "menu" of basic Korn Shell commands, along with their options in sequence. You will first see a status line like the following

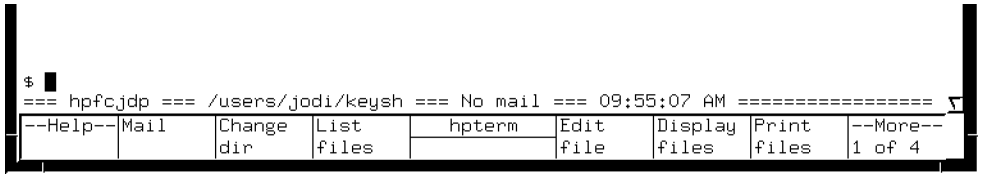


Figure 4-1. Key Shell Softkey Display

You can enter commands from the Key Shell softkey menu or you can enter standard HP-UX commands as usual. If you enter standard HP-UX commands, Key Shell will often display an appropriate left-to-right set of menu options in the softkey label area at the bottom of your screen. Each label corresponds to a softkey, `f1` through `f8`. The `hpterm` at the center separates the softkeys into groups of four. You may select any or none of the options successively by pressing the corresponding softkey.

When you want to see more commands, or more options to go with a command you've already chosen, press the `--More--` softkey, `f8`. This will cause the Key Shell to display the next "bank" of softkeys in sequence, eventually cycling back to the first, if you press `f8` repeatedly.

After you make a selection by pressing a softkey, your choice will appear on the command line in "English," just as it appeared in the softkey display, with the correct order and spacing.

Displaying the HP-UX Manual Pages from the Command Line

Type `man` *command_name* at the command prompt. For example, to learn more about the `cp` command type:

```
$ man cp
```

After a few seconds, an information display appears.

The message `- More -(11%)` means you've viewed 11% of the file, and 89% remains. (Some systems will just display `- More -`). At this point, you can do any of the following:

- Step through the file a page at a time by pressing the space bar.
- Scroll through the file a line at a time by pressing Return.
- Quit viewing the reference page by pressing q.

To print a `man` page for a command named *command*, enter the following:

```
man command | col -b | lp
```

You can use the `man` command to get a complete listing of HP-UX manuals by entering:

```
man manuals
```

For More Information

Your shell has many productivity-enhancing capabilities you may find useful. To learn about shells in detail, also refer to *Using HP-UX* and to *Shells: User's Guide*.

Using Files and Directories with Command Lines

The following gives you some basic information on using the HP-UX directory system. If you need more information on using files, directories, and command lines, see *Using HP-UX*.

Creating Directories

The `mkdir` (make directory) command creates a new directory. After you create a directory, you can move files into it, and you can even create more directories underneath it. For example, to create a sub-directory in your current working directory named `projects`, type:


```
$ mkdir projects
```

To verify that it worked, you can use either the `ls` or `lsf` command. Both commands display the new directory, but `lsf` appends a slash (`/`) to the end of directory names to differentiate them from file names. For example:

```
$ ls                 List files, directories in your current working directory.
myfile  projects     It worked!
$ lsf
myfile  projects/    The lsf command appends a slash to directory names.
```

Figure 4-2 shows the resulting directory structure.

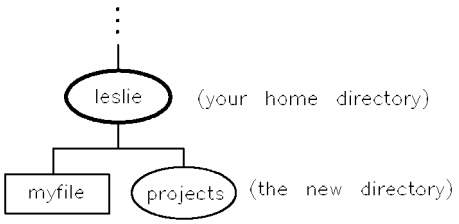


Figure 4-2. Creating the "projects" Directory

The general form of the `mkdir` command is as follows:

`mkdir` *new_dir_path*

where *new_dir_path* is the path name of the directory you want to create.

Moving and Copying Files between Directories

The `mv` command can be used to move files from one filename to another or from one directory to another. For example, to move `myfile` into the `projects` directory, type:

```
$ cd                                    Move to your home directory first.
$ mv myfile projects
```

The general form of the `mv` command is as follows:

`mv` *from_path to_path*

where *from_path* is the file name or path name of the file you want to move, and *to_path* is the name of the path where you are moving the file.

Copying Files

To copy a file into a different directory, use the `cp` command. For example, to make a copy of `myfile` named `myfile2` in the `projects` directory, type:

```
$ cp myfile projects/myfile2
```

To make a new version of `myfile2` named `myfile3` in your current directory, type:

```
$ cp projects/myfile2 myfile3
```

The general form of the `cp` command is as follows:

`cp` *from_path to_path*

where *from_path* is the file name or path name of the file you want to copy, and *to_path* is the path name of the directory or file to which you are copying.

Caution If you copy a file to a directory, even if the directory has the same name as the file, the directory will not be destroyed. But a file of the same name *in* that directory would be.

As a general rule, before using `mv` or `cp`, use `ls` or `lsf` to ensure that the target file name to which you want to move or copy doesn't already exist.

Removing Files and Directories

If you have files that are no longer needed, you should remove (delete) them. Deleting unnecessary files leaves more room on your system. For example, suppose you've finished using `myfile2`, and it is no longer needed. To remove `myfile2`, type:

```
$ rm myfile2
```

To remove an *empty* directory, type the following:

`rmdir` *dirname*

4

If there are any visible or invisible ("dot") files still in the directory, this command will not be executed, and you will get a message that the directory is not empty. Also, if there are any subdirectories in the directory, you will get a message. In either case you can do the following:

`cd` *dirname*	*Any invisible "dot" filenames remaining will be displayed.*
`rm *`	
`ll -a`	
`rm` *.filenames*	*You may have to repeat this command for all dot files.*
`rmdir *`	*This removes any empty subdirectories.*
`cd ..`	*To get to the parent directory again.*
`rm` *dirname*	

To avoid this process and remove a directory *and all its files and directories* in one action, type the following:

`rm -rf` *dirname*

Caution Use `rm -rf` with great caution, since it does remove a directory and all its contents, irretrievably, in one action.

Viewing and Printing Files

The `more` command displays a text file's contents on the screen. For example, the following line displays the contents of `myfile`:

```
$ more myfile
This is the text of "myfile", which I had previously
entered.
$
```

If the file contains more lines than are on your screen, `more` pauses when the screen is full. With a longer file, you can press space to continue looking at additional screens, and press Q when you are finished. Then `more` returns you to the system prompt.

For using the `vi` text editor, see "Editing Files", in this chapter.

Printing a File with lp

If your system is appropriately configured, you can print a text file using the `lp` (*l*ine *p*rinter) command. Before using the `lp` command you may need to find out whether your system is set up so that you can use the `lp` command. If it is not, basic installation information is in Chapter 5, in this manual. You can find detailed information on installing and configuring printers in *System Administration Tasks*.

If `lp` does work on your system, you may also need to find out the location of the printer, on an extensive system. When you have this information, print `myfile` by running the `lp` command:

```
$ lp myfile
```

If the `lp` command is working properly, it should display a message indicating that it sent your file to the printer. For example:

```
request id is lp-number (1 file)
```

The *number* is an i.d. number assigned to the print job by the `lp` command. If you don't see this message, or if you get an error message, consult your system administrator. If `lp` works successfully, you should get a printout with your username displayed on the first page. The time required for a printout depends on the number of tasks being run by the system and the speed of the printer.

To display a report on the printer status, including the order of your print job in the printer queue, type:

```
$ lpstat -t
```

To cancel a print job, enter the `cancel` command, with the i.d. number for your job:

```
$ cancel request_id
```

Editing Files

You can use the HP VUE Text Editor (see *HP VUE User's Guide*) or the HP-UX interactive text editor `vi` to view and edit text files, as well as to create new ones. The `vi` editor is the default for the Elm mailer, command line editing, and for some HP VUE functions. This section introduces the basics of using `vi`. For detailed information, see *The Ultimate Guide to the vi and ex Text Editors*.

Starting vi

Start `vi` by entering the command `vi` *filename* at the prompt. If a file called *filename* exists, you will see the first screen of that file. If the file does not exist, it is created, and you will see a blank screen.

Selecting vi Editing Functions

The `vi` editor has several functional modes. When you enter `vi` you are in **command mode** and it is in this mode that you select all editing functions. Your selection determines what you can do to the text.

Press ESC to ensure that `vi` is in command mode. Then you can execute any of the following commands (among others):

`i` (the insert command)	Places your file in text mode and enters whatever you type preceding the cursor. Everything after the cursor will be moved to the right.
`a` (the append command)	Places your file in text mode and enters whatever you type after the cursor. The cursor moves to the right, and then text is inserted as with `i`.
`x` (the delete command)	Deletes the character that is highlighted by the cursor. This command does not put your document in text mode.

Each command in command mode allows you to perform only that function. For example, if you place your file in text mode by typing `r` ("replace a single character" command), then you may only replace one character. You are then placed in command mode, and you can return to text mode by typing `i` or `a` before inserting text.

Positioning the Cursor

The most commonly-used method to move the cursor is to use the `h`, `j`, `k`, and `l` keys. You can also use the arrow keys. These keys move the cursor as follows (press ESC first for command mode):

Table 4-2.

To Do This:	Type This Command:
Move the cursor right.	`l` or →
Move the cursor left.	`h` or ←
Move the cursor up.	`k` or ↑
Move the cursor down.	`j` or ↓

Saving Your Work and Quitting

You can save your work with or without quitting `vi`. Your document must be in command mode for you to be able to use the following commands to save your work. Press ESC to ensure that your document is in command mode:

Table 4-3.

To Do This ...	Type This Command ...
Save without quitting `vi`	`:w`
Save and quit `vi`	`:wq`
Quit `vi` without saving changes	`:q!`
Save under another file name	`:w` *filename*
Save in an existing file and overwrite that file	`:w!` *filename*

For More Information on vi

Refer to *Using HP-UX* or *The Ultimate Guide to the vi and ex Text Editors* for more complete information about `vi`.

Using Audio Input/Output

HP-UX includes audio software comprising an audio editor, Audio Application Program Interface (AAPI), and some sample programs. Audio output is available either through an internal speaker in your Series 700i/50 or 700i/100 SPU module, or via an audio output jack on the SPU module panel. For highest quality audio, an external headphone set or speaker is recommended. (See "Setting Audio Volume" in Chapter 3 for setting volume for specific output requirements).

4

Developing Audio Applications

The HP-UX audio software package contains client and server components, which can run on separate systems. Audio data may reside on still a third system.

The Audio Applications Programming Interface (AAPI) includes a library of functions that can be called by an application program written in C language. The functions interact with the audio server, enabling the application to record and play audio data files and also convert audio data files from one format to another.

The AAPI also includes audio widgets for play and record, and a toolkit of functions that initialize, register, and unregister these widgets. The toolkit and widgets enable application programs based on Motif or similar graphical user interface toolkits to integrate audio capabilities.

Using the Audio Demonstration Program

The audio demonstration program is designed to demonstrate many of the capabilities of the AAPI. It provides a Motif-like interface to play, record, and edit functionality. A waveform is displayed to facilitate editing and traversal of the audio selection.

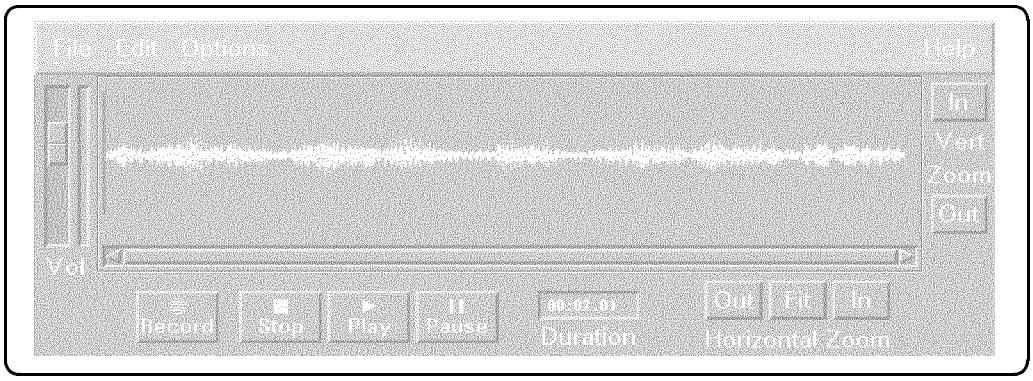


Figure 4-3.

After connecting a microphone to the input jack on your system, you can use the demonstration program to create and record an audio file. To ensure user privacy, be sure to turn off the microphone when it is not in use.

To use the play features of the demonstration program, one or more audio data files must be present. These can be created by using the program's record feature, or you can run the demonstration audio in `/usr/audio/examples`. If you wish to run the demonstration audio, it may be easiest to `cd` to that directory before you run `audio_editor`.

You can open an audio file, play it, look at its waveform, and use the waveform to edit the file. To send output to a speaker or headphone connected to the output jack on your system, direct the play output to the external device.

To run the demonstration program, follow these steps:

1. Start the NCS Local Location Broker Daemon.
2. Log in as `root`, if you have not already done so.
3. Enter the following command line:

   ```
   /usr/etc/ncs/llbd
   ```

4. Set the `AUDIO` environment variable to specify the node where the audio client should look for the audio server. If `AUDIO` is not set or if it is set to :0, the client connects with a server on the same node.

5. Normally, the audio server starts whenever the system is booted. Check for the existence of the Aserver processes by typing

   ```
   ps -e | grep Aserver
   ```

   You should see two Aserver processes. If the server is not running, start the audio server by hand by typing the following:

   ```
   /usr/audio/bin/Aserver
   ```

   Then type the following:

   ```
   ps -e | grep Aserver
   ```

   Check that there are two active server processes.

6. Start the demonstration program by typing the following:

   ```
   /usr/audio/bin/audio_demo
   ```

There is also online help for the demonstration program.

To use the Audio Editor for playback, recording and editing, type the following:

```
/usr/audio/bin/audio_editor
```

For More Information

For information on programming for audio, see *Using the Audio Application Program Interface* and the man page *audio*(1).

For the procedures for using audio annotation with HP VUE, see the *HP VUE User's Guide*.

Networking Overview

Your HP-UX system can use a variety of networking services to enable you to transfer copies of files to or from other computer systems. These services can also enable you to log onto remote machines on the network and run commands and processes remotely.

This section gives you basic procedures for using the following networking functions:

- Copying files to and from a remote computer: `ftp`.
- Copying files remotely: `rcp`.
- Logging onto another computer on the network: `rlogin`.
- Displaying remote graphics programs locally.

For information on using HP-VUE on remote systems, NFS-mounting remote file systems, and exporting file systems to remote systems, see *Using HP-UX*, *HP VUE User's Guide*, or *Using Network Services*.

Using the ftp File Transfer Program

The `ftp` file transfer program allows you to copy files between your local system and remote systems and among remote HP-UX, UNIX, and non-UNIX network hosts that support ARPA services. The `ftp` program not only allows you to perform remote file copying , but also facilitates file management operations such as changing, listing, creating, and deleting directories on a remote system for which you have a valid login or account.

Using `ftp` you can copy a local file to a remote file or vice versa. You can also append a local file to the end of a remote file. The file to which you are copying can have either the same or a different directory path and/or name as the one on the originating system.

Preparing to Use ftp

If the host system you wish to use is configured for anonymous ftp, you will not need an account to use ftp in public directories. Anonymous ftp does not require entries in your `/etc/hosts` file.

If you wish to have more general access to the host system, do the following:

- Make sure that your `/etc/hosts` file contains entries for the remote hosts with which you will communicate.
- Ask the system administrator for each remote host to give you an account and a password, so that you can ftp in and access more general directories. The following procedures will assume that you have such an account.

Transferring Files with ftp

1. To invoke `ftp` and connect to a remote host in one step, type the following:

   `ftp` *remote_hostname*

   This connects you to the remote host. `ftp` then confirms the connection and prompts you for a remote login name:

   `Name (`*remote_hostname*`):`

   If you intend to log in with the same remote login name as your local login name, just press Return.

2. Enter the password associated with your remote login name and `ftp` will confirm this action with a message and a confirmation that you are logged in. (If you are using anonymous ftp, you can enter "anonymous" as the login name, and your login name as the password.)

   `Password (`*remote_hostname*`):`

   `Password required for` *remote_login_name*
   `User` *remote_login_name* `logged in.`

3. If you are going to transfer binary files (as opposed to "readable" text), type `bin` at the prompt, before proceeding.

- Use `get` to transfer files from a *remote host* to your *local directory*.

  - At the `ftp>` prompt, type:

    `get` *remote_filename*

    The *remote_filename* is the name of a file in the remote working directory. In that case, `ftp` copies the file to the local working directory and gives it the same file name as the *remote_name*. If the file is in another directory on the remote host, *remote_filename* is the absolute or relative path for that file. The `ftp` program copies the file to a file name with the same path on your local system. (For example, `get /user/doc/`*filename*). If there is no matching path, `ftp` gives you a message, "`No such file or directory`". If the destination file already exists, `ftp` overwrites its contents with the contents of the remote file.

When copying successfully, `ftp` gives you messages confirming the copy and the length of time it required.

- Use `put` to transfer files from your *local directory* to a *remote host*.
  - At the `ftp>` prompt, type:

    `put` *local_filename remote_filename*

    - In this case, *local_filename* is copied to the remote file name in the specified remote directory.
      - *local_filename* can be the name of the local file in your current local working directory. `ftp` will copy the file into a file of the same name in *remote_file*.
      - *remote_filename* can be an absolute or relative path to a file name on the remote host. If not specified otherwise, it will be in the current working directory on the remote host.

General File-Manipulation Commands for ftp:

See *Using HP-UX* for information on how to use `ftp` file-manipulation commands, such as `cd`, `mkdir`, `pwd`, and `rmdir`, many of which function in the same way as the corresponding HP-UX commands.

If you need information on any of the `ftp` commands, just type `help` (or `?`) at the `ftp` prompt.

Exiting ftp

To close the connection with the remote host and exit `ftp`, enter the following:

```
bye
```

Copying Files Remotely Using rcp

You can copy files between HP-UX or other UNIX hosts on the network using `rcp`. Also, using appropriate options, you can copy directories between systems using `rcp`, if the configuration files that the service uses are set up properly.

Preparing to Use rcp

To use `rcp`, you'll need the following prerequisites:

- An account (login) on the remote host.
- A `.rhosts` file in the remote host home directory containing the names of your local host system and your local login name.
- A `.rhosts` file on your local system, as well. This contains the names of all the systems you will copy from. It will ensure that you will be able to use `rcp` when you use `rlogin` on the remote system.

Note A `$HOME/.rhosts` file creates a significant security risk. To prevent unauthorized users form gaining `remsh` access to your remote account and host, *only you* should be able to create and write to a `.rhosts` file in your remote home directory. Permissions need to be set accordingly.

- A `/etc/host` file on your local system which lists hosts with which you can communicate using ARPA/Berkeley Services. For each host, the file has a line containing information about the remote host in the following form:

  internet_address official_name alias

You will find that the `/etc/hosts` file is useful for looking up names and addresses on the network. To facilitate such a lookup, use the `grep` tool described in *grep*(1) and in *Using HP-UX*.

Copying a Local File to a Remote Host

To copy from your system to a remote system, use the following syntax:

`rcp` *local_filename remote_hostname*:*remote_filename*

Note that, if *local_file* is not in your current directory, you will need to supply the relative path (to get from your current directory) or the absolute path (from `/`), in addition to the local file name. You will need to specify the complete (absolute) path for the *remote_filename* on *remote_hostname* only if you want it to go into a directory other than the remote home directory.

For example, to copy `myfile` from your current directory to a remote system called `xyz`:

```
rcp myfile xyz:/users/leslie/otherdir
```

In this case, `myfile` will be copied as `myfile` into the remote subdirectory, `otherdir`. If you had only supplied the remote host name, `rcp` would have copied `myfile` into the remote home directory, also as `myfile`.

You can also include a filename in the destination. For example, to copy to a system named `xyz`:

```
rcp myfile xyz:/users/leslie/otherfile
```

In this case, you have copied `myfile` as `otherfile`, in the remote directory `leslie`.

Copying a File on a Remote Host to Your Local Directory

Now, to reverse the process, here is how you would copy a file *from* a remote host into your local directory. Use the following syntax:

`rcp` *remote_hostname*:*remote_filename* *local_filename*

For example, to copy `myfile` from your account in a remote system `xyz` into your current directory:

```
rcp xyz:/users/leslie/myfile .
```

The dot (`.`) is shorthand for "current directory". In this case, `myfile` will be copied as `myfile` from the remote directory into your current directory. You do not have to supply the destination filename if you don't want to copy it to a new name.

If you want to copy `myfile` into another directory in your home system, use a path name, absolute or relative, as shown:

```
rcp xyz:/users/leslie/myfile otherdir/
```

Or, if you want to copy the file to another file name in another directory:

```
rcp xyz:/users/leslie/myfile otherdir/otherfile
```

Run the `ls` command to confirm what you have done.

Logging In on Another Computer Using rlogin

If you have an account on a **remote host**, then you can use `rlogin` to log in on a remote host by supplying your remote login name and password. You can then work on that system just as you would on your home system.

If the remote host is configured to allow it, you can also log in on a remote host automatically, without having to supply your login name and password.

Logging In on a Remote Host

- At the shell prompt, use the form:

  `rlogin` *remote_hostname*

  The *remote_hostname* is the name of an appropriately configured remote system. As before, this system is named in your `/etc/hosts` file and in your `.rhosts` file. The remote host prompts you for your remote password.

- Enter your remote password. The remote host logs you in with the login message and the remote host prompt.

If for some reason you should make an error in entering your password, the remote host will give you the error message, `Login incorrect`, and will prompt you for your login, and your password:

```
Login incorrect
login:
```

Getting the Same Working Environment on the Remote Host

To get the remote host environment to behave in the same way as your home environment, you can set the `.profile` or `.login` values to be the same by copying your local `.profile` or `.login` files to your home directory on the remote system. As with your home system, the values in your `.profile` or `.login` will take precedence over the values in the remote system's `/etc/profile` or `/etc/csh.login` file.

Logging Out and Exiting the Remote Host

You can log out of the remote host just as you would from your home system, by typing:

```
exit
```

Typing CTRL-D also logs you out on most system.

At this point you are logged out of the remote host, disconnected, and returned to HP-UX on your local system, which displays a message and your local prompt:

```
Connection closed.
$
```


Displaying Remote Graphical Programs Locally

If you are running HP VUE or the X Window System, you can run a program using windows on a remote machine and display the results locally. This is done by setting the `DISPLAY` environment variable on the remote system. `DISPLAY` sets the host, display number, and screen number to which a system sends bitmapped output for clients.

For example, if the remote machine is called *remote*, your local system is *local*, and the remote program is called `xwijit`, enter the following on your system:

`xhost +`*remote*	*This enables your system to recognize the remote host.*
`rlogin` *remote*	*Log in on a remote machine on which you have an account.*
`DISPLAY=`*local*`:0.0`	*On the remote machine, set the DISPLAY variable to display on your local system.*
`export DISPLAY`	*Export the variable*
`xwijit`	*Run the program*

For More Information

For detailed information on running HP VUE in a networked environment, see the *HP VUE User's Guide*.

5

Configuring HP-UX for Printers and Drives

Chapter Contents

Preparing for Installation

If your system was shipped with its internal mass storage devices factory-installed, you will not need to do further installation to enable the device to communicate with HP-UX. If you have purchased a new (upgrade) device, you will have to install it on HP-UX. You may also have to do some configuration for appropriate data interchange with a new printer. This chapter gives you general guidance for these tasks.

For peripherals devices in general:

- For a list of device upgrades which are supported by the Models 745i/50 or 745i/100 and 747i/50 or 747i/100, see Chapter 1.
- See the *Installation Guide* for the device you are installing for information on hardware installation. You can also get installation information from *Installing Peripherals*.

5

- Ensure that each new device you install which communicates through the SCSI protocol has a *unique bus address*. You can use `/etc/ioscan` (see "Finding the Status of Existing SCSI Bus Addresses") to determine this, or you can use SAM (System Administration Manager). The factory-set SCSI addresses for the upgrade devices in this chapter are as follows:
  - Hard Disk Drive: `6`
  - Flexible Disk Drive: `0`
  - CD ROM Drive: `2`
  - DDS Drive: `3`
- This chapter shows you how to use basic SAM (System Administration Manager) procedures. SAM will determine the status of any of your connected devices and will perform many installation tasks for you.

  If you don't want to use SAM, or it is not on your system, you can also HP-UX commands directly to accomplish the same tasks. For information on using manual system administration procedures, see *System Administration Tasks*.

Configuring HP-UX for a Printer

You will need to supply certain items of information needed to identify the printer you are installing. It will help to have this information available to refer to during the software installation process:

- Printer Interface:
  - □ Parallel: _____
  - □ Serial (RS232) Port 1:_____
  - □ Serial (RS232) Port 2:_____
- Printer Name (a name the system uses to identify the printer. It can be any name.): _____
- Printer Model Number (see label on the back of the printer): _____

Procedure:

To install your printer:

1. Log in as `root`.
2. Run SAM by typing:

   ```
   /usr/bin/sam
   ```

   To get help in SAM, pressing the f1 key gives you context-sensitive information for the object at the location of the cursor.

   In case you are not using a mouse, arrow keys and Tab also are used for moving the highlighted areas around the screen. Pressing Return is equivalent to clicking the mouse on `OK`. See *Using HP-UX* for the details of keyboard equivalents.
3. At the SAM opening screen, choose (highlight and open) `Printers and Plotters`.
4. Choose `Printers/Plotters` from the next screen.

If your workstation doesn't have any printers connected, you will see a message. Make sure you have a printer connected. Click on `OK` or press Return.

5. From the `Actions` menu (on the menu bar at the top of the window), click on `Add Local Printer/Plotter`
6. Click on an appropriate selection on the sub-menu giving options for Parallel, Serial, HP-IB, etc.
7. A window will give you information on available parallel or serial interfaces.
8. If you chose `Add Serial (RS-232) Printer/Plotter`, more than one serial interface could be listed. The serial interfaces are listed in ascending order. The lowest-numbered serial interface corresponds to the lowest-numbered serial connector on your system. Choose the one to which you have connected your printer.

9. Click on `OK`

   The window opens for `Add Local Printer/Plotter`.

10. Click on the box labeled `Printer Name` and enter your *printername* for the new printer (entered in the blank earlier).
11. Click on `Printer/Model Interface`
12. Scroll down the next screen to find the Model Name of your printer.
13. Click on the Model Name.
14. Click on `OK`.

15. In the `Add Local Printer/Plotter` window which reappears, select and click on the box labeled `Make this the system default printer`.
16. Click on `OK`.
17. If you are running HP VUE, you will asked a question about adding the printer name to the VUE `Printers` subpanel.
18. If the print spooler was not previously running, a window will appear with the question: `Do you want to start the print spooler now?`. Click on `Yes` or press Return.
19. You will see a confirmation screen asking if your printer is turned on, connected to your system, and online. Check your printer to ensure that it is ready, and press Return.
20. You will see the message `Task completed`. Press Return.
21. Exit the task and choose `Exit SAM`.
22. Type `exit` to leave `root` and return to `user` status.

Refer to *System Administration Tasks*, for additional SAM information.

Testing the Printer Installation

If you made your printer the default system printer, enter the following commands to test it:

```
cd

lp .profile Return
```

(If your printer (called *printername*) isn't the default system printer, enter the following command to test it:)

```
lp -dprintername .profile
```

The contents of the file named `.profile` should print out on your new printer.

Dealing With Printer Problems

If you experience problems in printing, ensure that the following are correctly installed:

- The power cord for the printer is plugged in.
- The printer is turned on.
- The printer selection switches are set for online.
- Paper is loaded into the printer (and it isn't jammed).
- The correct interface has been set up.
- The printer cable is connected to the correct interface port on your printer.
- The cable is connected to the correct port on your system.

Hardware Installation for Drives

Tools Required

You'll need these tools to access the mass storage devices:

- Medium flat-tipped screwdriver.
- No. 1 Phillips screwdriver.
- Static-free work area.

Removing the Mass Storage Module

1. Modules can only be removed from the back.

   If your system is rack-mounted front side out, and there is not enough room to remove a module from the back, remove the system from the rack.

2. Unplug the SCSI cables attached to the system module's SCSI connector and the mass storage module's SCSI connector.
3. Inside the handle for each module is a slotted screw. Unscrew the screw about 7 turns (until it pops out), then pull out the mass storage module.

Removing a Device from the Mass Storage Module

Before you can change the configuration for a device, you will need to remove the drive from the mass storage tray. Follow these steps to remove the drive.

Caution Hard disk drives are vulnerable to physical shock. *Dropping a hard disk drive from even a small height will damage its heads and platters.*

Always handle hard disk drives with extreme caution.

Do not place a hard disk drive upside down on any surface.

1. Remove the screw at the rear of the mounting bracket for the drive.
2. Slide the bracket back about 12mm (0.5-in.) to unlock the bracket tabs, then lift the bracket with attached drive up and out of the tray.

Finding the Status of Existing SCSI Bus Addresses

Before you install a new SCSI drive, to ensure that the SCSI bus address of your device is currently unused, you can use SAM, or you can use the `ioscan` tool to help determine which devices are currently connected. To determine the currently connected SCSI bus IDs, enter the following command line:

```
/etc/ioscan -fb
```

The result will be a display of information, such as the following:

```
Class      H/W Path  Driver   H/W Status    S/W Status   Description
============================================================================

   ...

disk       2.0.1.2.0 scsi     ok(0x5800101) ok         TOSHIBA CD-ROM
tape_drive 2.0.1.3.0 scsitape ok(0x1800202) ok         HP      HP35450A
disk       2.0.1.6.0 scsi     ok(0x101)     ok         MICROP  1528

   ...
```

For example, the SCSI bus address for the "MICROP" disk device is in the fourth column of its hardware address as "6" (2.0.1.*6*.0). If you were installing another disk, for file system use, it would best be accessed at the adjacent SCSI bus address in the "scanning" order, "5". SAM would help you determine where to put it when you did the installation.

Configuring for a Hard Disk Drive

Hard disk drive upgrades can be installed to accommodate local file systems and swap space on your workstation.

Software Installation of the Hard Disk Drive Upgrade

After hardware installation has been completed (see the *Installation Guide* for this device), you'll need to ensure that your operating system is prepared to exchange data with the device. This section provides instructions for manually configuring HP-UX to communicate with hard disk drive upgrades, in order to use the disks for mass storage and/or swap space. Note that your HP disk is pre-formatted.

Caution Although the device is well-protected from physical shock when installed in the workstation, it is very easily damaged when separate. Avoid dropping or striking a device.

The factory-set SCSI bus address for the disk drive:

- For an upgrade disk drive: SCSI bus address: `6`

This SCSI address assumes usage of the disk as `root`. Although the configuration jumpers in the back of the drive are factory-installed and should not require reconfiguring, it is possible that the SCSI bus address jumpers for an upgrade may be shipped with different settings. Therefore, please see the *Installation Guide* for the drive for the procedure for resetting jumpers, should it be necessary.

The following list outlines the software procedures you'll find in this section for installing the hard disk drive as a file system disk:

- Verify that you have an unused device file with the correct select code and bus address for your device. (Use SAM or the script in "Finding the Status of Existing SCSI Bus Addresses").
- Use SAM to:
  - Install a disk on HP-UX.
  - Build a file system on the disk (done automatically by SAM).
  - Mount the disk so that you can access it as a file system.

Note

- SAM does not support the following:
  - Changing the hardware address of a disk drive containing the root file system.
  - Changing the hardware address of a disk array.
  - Changing the hardware address of a disk that is part of software disk striping.

After hardware installation has been completed (see the *Installation Guide* for this device), you'll need to ensure that your operating system is prepared to exchange data with the device. This section provides instructions for doing this.

1. Run SAM by typing:

   ```
   /usr/bin/sam
   ```

   Pressing the f1 key gives you context-sensitive information for the object at the location of the cursor.

2. Choose `Disks and File Systems` (highlight and click on OK or press Return).

3. Choose `CD-ROM, Floppy, and Hard Disks`.

4. Choose the line identifying the type of new disk you have connected. In the "Use" column, it will be designated as "unused".

5. In the next screen, choose the line identifying the model of the new disk.

   If the device you have connected does not appear on the list:

   a. Check your hardware connections, and make sure that the device is turned *on*.

   b. Click on the button `Device Missing`, and you will be given the following options:

      i. Have SAM rescan the system for the device. If you have connected the device *after* starting SAM, you should click on `Yes`. Otherwise, click on `No`.

      ii. Respond to the confirmation screen regarding whether the device is connected and powered up.

      iii. Respond to the confirmation screen regarding whether additional device drivers are needed. (Unless the kernel has, for some reason, had drivers removed, the drivers needed for a hard disk should currently be in the kernel.)

      iv. You will be given an information screen suggesting things to try if the device still cannot be found. If this is the case, you will need to consult *Installing Peripherals*.

6. After you choose the device, you will see a form giving three tasks:

   a. `Select a Disk to Add`. (You have already done this).

   b. `Set Disk Usage and Options`.

   c. `Modify Defaults...`. (This task is optional).

   Choose `Set Disk Usage and Options`.

7. On the form which appears, select how you want to use the disk ("File System", or other usage).

8. Click on `OK` when you have finished with this form.

9. A "Messages" Box appears, reporting the progress of the task. When the task is finished, click on [OK].

10. Exit SAM. (SAM copies your original `/etc/checklist` to `/etc/checklist.old`).

Testing Your Installation

A simple test to make certain that the drive has been installed correctly (whether it is mounted or not) is to execute the command `diskinfo` (using the appropriate character device file name as the argument). For example:

```
diskinfo /dev/rdsk/c201d5s0
```

If the disk is installed correctly, `diskinfo` will display a listing of information about it, such as the following:

```
SCSI describe of /dev/rdsk/c201d5s0
             vendor: Quantum
         product id: XXXXXXX
               type: direct access
               size: 200000 Kbytes
   bytes per sector: 512
```

After mounting a new disk on a directory, an `ll` listing of the directory should give you at least one file or directory entry. For example:

```
total 1024
drwxr-xr-x   2 root     root        8192 Aug 31 15:24 lost+found
```

Configuring for a Flexible Disk Drive

Caution Although the device is well-protected from physical shock when installed in the workstation, it is very easily damaged when separate. Avoid dropping or striking a device.

Note the flexible disk drive jumpers are pre-configured correctly at the factory. It should not be necessary to change jumper settings.

The factory-set SCSI bus address for the drive:

- SCSI bus address: `0`

As it is possible that the SCSI bus setting for an upgrade may be shipped differently, please check the setting before installation. See the *Installation Guide* for the device for the procedure for resetting the device, should it be necessary.

After hardware installation has been completed, you'll need to ensure that your operating system is prepared to exchange data with the device. This section provides instructions for doing this.

1. If you wish to initialize a new disk, make sure you have the disk loaded in the drive.
2. Run SAM by typing:

   ```
   /usr/bin/sam
   ```

   To get help in SAM, pressing the f1 key gives you context-sensitive information for the object at the location of the cursor.
3. Choose `Disks and File Systems` (highlight and click on OK or press Return).
4. Choose `CD-ROM, Floppy, and Hard Disks`.
5. From the `Actions` menu, select `Add a Floppy Disk Drive...`. You will see a list of unused disks, including the new one you have connected.

6. Choose the line identifying the model of the new disk.

   If the device you have connected does not appear on the list:

   a. Check your hardware connections, and make sure that the device is turned *on*.

   b. Click on the button `Device Missing`, and you will be given the following options:

      i. Have SAM rescan the system for the device. If you have connected the device *after* starting SAM, you should click on `Yes`. Otherwise, click on `No`.

      ii. Respond to the confirmation screen regarding whether the device is connected and powered up.

      iii. Respond to the confirmation screen regarding whether additional device drivers are needed.

      iv. You will be given an information screen suggesting things to try if the device still cannot be found.

7. After you highlight the device, note that the `Initialize disk` button is toggled *on* (the default). Click on this button to turn it *off* if you do not wish to initialize a disk (or if the disk is preformatted).

8. Click on `OK` when you have finished with this form.

9. A "Messages" Box appears, reporting the progress of the task. When the task is finished, click on OK.

10. Exit SAM. (SAM copies your original `/etc/checklist` to `/etc/checklist.old`).

Testing Your Installation

A simple test to make certain that everything has been installed correctly is to execute the command `diskinfo`.

1. Make sure a flexible disk is inserted in the drive (otherwise, a core dump may result).
2. Type the following, using the appropriate device file name as the argument. For example:

   ```
   diskinfo /dev/rfloppy/c201d0s0
   ```

   If the disk is installed correctly, `diskinfo` will display a listing of information about it, such as the following:

   ```
   /dev/rfloppy/c201d0s0
   SCSI describe of 0.rdsk:
               vendor: TEAC
           product id: XXXXXXX
                 type: direct access
                 size: 1400000 bytes
      bytes per sector: NNN
   ```


If you wish to test the installation of your flexible disk drive *without* a disk installed, use the `ioscan` command.

Archiving Files to a Flexible Disk

Data can be stored on flexible disk media in a variety of formats. The capacity of these devices is generally too small to hold useful HP-UX file systems. Instead, DOS or LIF file systems are commonly used. Data can also be stored in an archive-utility format. For example, `tar` and `cpio` are commonly used to share data with other HP-UX systems.

See the man pages or *HP-UX Reference* references *dosif*(4) and *lif*(4) for detailed descriptions of the file systems. For information on `tar` and `cpio`, see *tar*(1) and *cpio*.

To save files archivally to a flexible disk using `tar`, use a formatted disk and enter the following command line, where *pathname* is the file directory.

```
tar -cvf /dev/rfloppy/c201d0s0 pathname
```

Retrieving Files from a Flexible Disk

To list files stored in a `tar` archive on a flexible disk, without transferring them to your hard disk, use the following command line:

```
tar -tvf /dev/rfloppy/c201d0s0
```

This lists all the files on the flexible disk.

To transfer or restore files from a flexible disk to your hard disk drive, do the following:

1. Load the source disk into the flexible disk drive.
2. Using `cd`, make sure you are in in directory you want the files to reside in.
3. Enter the following command line to restore *pathname* on the disk to your current directory:

   `tar -xvf /dev/rfloppy/c201d0s0` *pathname*

Mounting a New Flexible Disk

If you want HP-UX to be able to address a newly-inserted flexible disk as a small file system, you will need to mount it. Execute the following to mount the new disk. For example, using "`/flex`" as the mount directory:

```
mount /dev/floppy/c201d0s0 /flex
```

See the next section for information on mounting and unmounting a disk used as a file system.

Removing and Inserting a File-System Flexible Disk

Caution If you wish to use the disk as a mounted file system, you must mount it every time you insert it into the drive, and you must unmount the disk before you eject it from the drive.

You will need to do the following:

- Before you remove a disk:
  1. Temporarily unmount the file system for the disk by executing the following. For example, if the disk is designated by the block device file `/dev/floppy/c201d0s0`:

     ```
     umount /dev/floppy/c201d0s0
     ```

  2. Remove the disk.

- After you insert a disk:

  1. Mount the disk file system so that HP-UX will recognize it. If, for example, you are mounting the disk in a drive designated by the device file `/dev/floppy/c201d0s0` under a pre-existing directory `/flex`, execute the following:

     ```
     mount /dev/floppy/c201d0s0 /flex
     ```

     (Note that the directory `/flex`, in the example, must be given an absolute path name).

     In this example, the `mount` command announces to the system that a removable file system is to be attached at the directory `/flex`.

  2. Now you can access the flexible disk as you would any other disk.

Configuring for a CD ROM Drive

You can use a CD ROM ("Compact Disc Read-Only Memory") drive to accommodate read-only use of a wide variety of software, including HP-UX system updates.

After hardware installation for a drive has been completed (see "Hardware Installation for Drives" and the *Installation Guide* for this device), you'll need to ensure that your operating system is prepared to exchange data with the device. This section provides instructions for configuring HP-UX to communicate with the CD ROM drive.

Note

- The use of audio-mode for a CD ROM is not supported.
- The CD ROM drive cannot be locally-mounted on a diskless node, although its driver must be configured into each cluster node's kernel.

This section deals with the following topics:

- Installing the CD ROM with SAM.
- Testing the installation.
- Mounting the new CD ROM.
- Removing and inserting a disc.

The factory-set SCSI address for this device:

- SCSI bus address: 2

As it is possible that the CD ROM drive may be shipped with a different SCSI bus setting, please see the *Installation Guide* for the device for guidance on resetting it, if necessary.

Inserting the disc in your CD ROM drive.

Note that a rigid plastic caddy holds and protects the disc. Before inserting the disc, make sure you have the disc installed in the appropriate disc caddy. When inserted into the disc port, data is read from the disc through a shutter in the caddy. When you eject the caddy, the shutter closes to protect the disc's data surface.

The disc caddy for an HP upgrade drive, such as the HP A2644A, is not interchangeable with the HP C1707A CD ROM Drive disc caddy. However, you can remove the disc from one caddy and use the other, if necessary, in order to fit the appropriate drive. Disc caddies are available from Hewlett-Packard.

Caution Do not open the disc caddy shutter manually. Opening the shutter will expose the disc's data surface to dust and damage. If the data surface gets too much dust or damage, its readability by the CD ROM read head will be reduced.

Installing the CD ROM Drive with SAM

It is a good idea to make a note of your CD ROM drive product number and its hardware address (select code and bus address), before you do the software installation.

- CD ROM Product Number: _____
- Bus Address: _____

Configuring the Drive on HP-UX:

1. Log on as `root`.
2. Run SAM by entering the following:

   ```
   $ /usr/bin/sam
   ```

3. Choose `Disks and File Systems->`.
4. Choose `CD-ROM, Floppy, and Hard Disks`.
5. From the `Actions` menubar in the "Disk and File System Manager" window, highlight and choose `Add a Hard Disk Drive...`
6. Within the "Add a Hard Disk Drive" window, choose `Select disk to add`.

7. Within the "Select a Disk to Add" window, highlight the line identifying the new drive you have just connected. It will be described as, for example, "CD ROM-SCSI", followed by its model number and bus address. Click on `OK` or press (Return).

   If the device you have connected does *not* appear on the list:

   a. Check your hardware connections, and make sure that the device is turned *on* and that there is a disc in it.

   b. Click on the button `Device Missing`, and you will be given the following options:

      i. Have SAM rescan the system for the device. If you have connected the device *after* starting SAM, you should click on `Yes`. Otherwise, click on `No`.

      ii. Respond to the confirmation screen regarding whether the device is connected and powered up.

      iii. Respond to the confirmation screen regarding whether additional device drivers are needed.

      iv. You will be given an information screen suggesting things to try if the device still cannot be found. If this is the case, you will need to consult *Installing Peripherals*.

8. From the `Actions` menu, select `Add a Hard Disk Drive`. You will see a form giving three tasks:

   a. `Select a Disk to Add`. (Make sure the correct device is displayed and highlighted).

   b. If you need to add drivers to the kernel, SAM will prompt you for doing so and will ask whether you wish to recreate the kernel now or later. Make this selection by pressing (Return) when your selection is highlighted. Then the selection is designated by an asterisk (*) in its blank. Click on `OK` to activate that selection.

   c. `Set Disk Usage and Options`. (File system usage is already set for a CD ROM.)

d. `Modify Defaults...`. (This task is optional). You may want to change certain options, such as when to mount the disk and how its access permissions are set. If so, within the "Add a Hard Disk Drive" window, highlight and activate `Modify Defaults`, then within the dialog box, turn on the checkboxes that apply.

9. Click on `OK` when you have finished with this form.
10. A "Messages" Box appears, reporting the progress of the task. When the task is finished, click on OK.
11. Exit SAM by returning to opening screen and activating Exit SAM.

Testing Your Installation

A simple test to make certain that everything has been installed correctly is to execute the command `diskinfo`.

1. First make sure a CD ROM is inserted in the drive.
2. Then, type the following (using the appropriate device file name as the argument). For example:

   ```
   diskinfo /dev/rdsk/c201d2s0
   ```

   If the disk is installed correctly, `diskinfo` will display a listing of information about it, such as the following:

   ```
   c201d2s0
   SCSI describe of /dev/rdsk/c201d2s0
                vendor: TOSHIBA
            product id: CD-ROM DRIVE:XM
                  type: CD-ROM
                  size: nnnnnn Kbytes
     bytes per sector: nnn
   ```

Mounting the New CD ROM Drive

SAM will mount the disc for you when you install the drive. You can then mount it and unmount it manually, using the `mount` and `umount` commands, as with a flexible disk.

If you have not already had SAM do so, in order for your system to boot with the new CD ROM mounted, you will need to edit your `/etc/checklist`. Add the following line to the `/etc/checklist` file:

```
/dev/dsk/c201d2s0 /cdrom cdfs ro 0 0 # CD ROM
```

If you have only made this change to your system, executing `mount -a` will mount the new disk automatically, and it will stay mounted until you reboot your system. (Note that using the `-a` option mounts *all* unmounted devices in `/etc/checklist`.)

After mounting a new disk on a directory, an `ll` listing of the directory should give you at least one file or directory entry. For example:

```
total 1024
drwxr-xr-x   2 root     root        8192 Aug 31 15:24 filename
```

See the next section for information on unmounting the disc before you remove it.

Removing and Inserting a Disc

You must mount a CD ROM disc every time you insert it into the drive, and you must unmount the disc before the system will allow you to eject it from the drive.

Note The eject button on the CD ROM drive is disabled while the device is mounted or in use.

- Before you remove a disc:

  1. For example, if the disc is designated by the block device file `/dev/dsk/c201d2s0`, temporarily unmount the disk's file system by executing the following:

     ```
     umount /dev/dsk/c201d2s0
     ```

  2. Press the eject button to remove the disk

- After you insert a disk:

  1. Mount the CD ROM file system so that HP-UX will recognize it. If, for example, you are mounting the CD ROM designated by the device filename `/dev/dsk/c201d2s0`, create a directory `/cdrom` (if it doesn't exist already) and execute the following:

     ```
     mount /dev/dsk/c201d2s0 /cdrom
     ```

     (Note that the directory `/cdrom`, in the example, must be given an absolute path name).

     In this example, the `mount` command announces to the system that a removable file system is to be attached at the directory `/cdrom`. This directory becomes the name of the root of the newly-mounted file system.

  2. Now you can access the CD ROM as you would any other disk, except that you cannot write to it.

  3. A flashing busy light indicates normal activity with the system.

For More Information

- For more information on the `mount`, `umount`, and `reboot` commands, please see the appropriate entries in *HP-UX Reference*. You can also use your online command help system by typing `man`, followed by the name of the command, and Return.
- Information on the installation of external peripheral devices can be found in *Installing Peripherals*.

Configuring for a DDS Tape Drive

This section contains instructions for configuring a new DDS drive on HP-UX.

The DDS ("Digital Data Storage") Tape Drive is a sequential-access, read-write device using removable DDS cassettes. Although DDS drives are similar to DAT players in the audio industry, the cassettes are *not* interchangeable. There are two major differences:

1. Audio cassette tapes transfer data in streaming mode. That is, they are left in motion for periods of minutes. Tapes used for data are continually starting, stopping and repositioning, which is stressful to the tape. DDS tapes are made rugged enough to stand this kind of treatment. Audio tapes are not expected to perform this well, and as a result fail very quickly in a data environment.
2. DDS cassettes have a much tighter case dimension specification than DAT cassettes. As a result, DAT cassettes can get stuck in a DDS drive, requiring the drive to be disassembled. For this reason, only Hewlett-Packard supported or properly certified DDS tape cartridges should be used. Use of DAT tapes intended for audio use could void your warranty.

Caution Do not attempt to extricate a DAT cassette which is stuck in a DDS drive. You may damage the drive. Have the drive disassembled by someone qualified to do so.

The steps for adding a DDS tape drive to your system are:

1. Make sure that the necessary device drivers are configured into the kernel. SAM will make this test.
2. Shut you system down and turn off the power.
3. Choose a SCSI bus address for the new tape drive that does not match the bus address for any other SCSI device.
4. Make all necessary hardware connections for the device.
5. Turn the new tape drive *on*.
6. Turn your system *on*.
7. Run SAM to create the device files for the new tape drive.

The factory-set SCSI address for the DDS drive:

- For an upgrade drive: SCSI bus address: `3`

As it is possible that the SCSI bus address jumpers for an upgrade may be shipped with different settings, please check the settings before installing the device. See the *Installation Guide* for the device for information on resetting it, should it be necessary.

Configuring the Drive on HP-UX

The SAM `Kernel Configuration` procedure will confirm which drivers are active for your tape devices and will configure them as needed, for connected devices. Reconfiguring the kernel will involve rebooting your system.

Before you begin:

First make a note of the tape drive product number and its hardware address (SCSI bus address) so that you will be able to identify it later.

- DDS Drive Product Number: _____

- Bus Address: _____

1. Log on as `root`.

2. Run SAM by entering the following:

   ```
   $ /usr/bin/sam
   ```

   To get help in SAM, pressing the f1 key gives you context-sensitive information for the object at the location of the cursor.

3. Highlight and select `Peripheral Devices ->`

4. At the next screen highlight and select `Tape Drives ->`

5. The `Tape Drive Manager` screen lists what tape devices are connected, including your new device. Highlight that device.

6. From the `Actions` menu, choose `Add...`. A message screen gives you the hardware steps for adding the tape drive. Click on `OK` or press Return.

7. A confirmation screen indicates whether any related device drivers needed to be added to the kernel. Click on `Yes` or press Return.

8. If you needed to add a device driver, you will also need to create a new kernel and (eventually) reboot the system. Select from the menu on the `Create a New Kernel` screen whether you want to create the new kernel now, later, or cancel the proposed modifications. (Make sure your choice has an asterisk placed by it, by pressing `Return` while that line is highlighted.) Click on `OK` to confirm your choice of action.

9. You will next be given a choice of whether to install the new kernel now or later. If you move the kernel into place now, the system will also reboot. If you choose to do it later, you can then move the new kernel, `/etc/conf/dfile.SAM` to `/hp-ux` and reboot. You should also move `/etc/conf/dfile.SAM` to `/etc/conf/dfile` at the same time.

   If you reboot, the old kernel will be backed up as `/SYSBCKUP`.

10. Exit SAM, if you have not already done so.

Note If you are modifying a cluster client's kernel, its kernel is not backed up, since `/SYSBCKUP` is used exclusively for the cluster server's kernel.

Your system is now running the added driver for SCSI DDS tape drive. You are ready to use the drive to load a tape into your system.

Testing Your Installation

Note that a write-protect tab on the cassette allows you to protect data from being over-written. You will need to make sure that the tab is moved to the "writable" position in order for it to serve as a back up medium.

A simple test to make certain that everything has been installed satisfactorily is to load a tape in the drive, wait for the "busy" light to stop blinking, and execute the `ioscan` command:

```
/etc/ioscan
```

The LED on the drive should flicker briefly. If the command completes successfully, a listing of your devices, including the tape hardware address, name and status will be displayed, indicating that it is installed correctly. Note that the command may fail with a busy error if the command is executed before the tape has completed loading.

DDS Tape Drive LED Indicators

Two LED indicators on the drive's front panel indicate several operational and test states. The following table shows the LED combinations and explains what they indicate.

Table 5-1. DDS Tape Drive LED State Codes

States	Cassette	Drive	Meaning
Read/Write			Cassette (un)loading
			Cassette loaded/online
			Cassette loaded/Activity
			Cassette loaded/offline
Write-Protect			Cassette (un)loading
			Cassette loaded/online
			Cassette loaded/Activity
			Cassette loaded/offline
Error			Media wear (Caution Indicator)
			High humidity/No termination on SCSI bus
			Self-test (normal)
			Self-test (failure)

LED Symbol	Meaning
	Off
	Green
	Amber
	Pulse Green
	Pulse Amber
	Pulse Green/Amber

Caution Indicator

The DDS drive continually monitors the number of errors it has to correct when reading or writing a tape. This information is presented to the user through the Caution Indicator (see above chart).

A caution indication has two common meanings:

- The tape heads need cleaning.
- The tape itself is approaching the end of its useful life.

Maximum Usage of DDS Cassettes

Under optimal environmental conditions (50% relative humidity, 22°C), Hewlett-Packard DDS cassettes are currently specified to 2000 passes over any part of the tape. In operational terms, this can be translated into approximately 200 to 300 backup operations. This takes into account that, during a backup, an area of tape may have several passes because streaming cannot be maintained, or because the backup software requires that certain areas of the tape are accessed frequently.

Under certain conditions, the recommended number of backup operations needs to be reduced. These conditions are as follows:

- Sustained use at low humidity.
- Use in a low-performance workstation, requiring an increased number of passes.
- Backup software requiring certain areas of the tape being accessed frequently.

As a guideline, HP recommends that the number of backup operations should be limited to 100 per cassette in extreme cases of the above conditions.

In Case of Difficulty

If you experience any problems with the operation of the new drive, contact your HP service representative for assistance.

FINAL TRIM SIZE : 7.0 in x 8.5 in

6

Backing Up, Restoring, and Updating Software

Chapter Contents

Backing Up Your System and Software

The most important part of your system is the data you have accumulated. It is also especially important to protect your system in general from corruption if your HP-UX has been supplied as a pre-installed "Instant Ignition" disk. You can protect your data and system from loss, using the general procedures given in this chapter. (For detailed procedures, see *Installing and Updating HP-UX 9.0* and *System Administration Tasks*.)

- Make sure you create and maintain a backup HP-UX kernel (`/SYSBCKUP`) on your disk from which you can boot in an emergency. A `/SYSBCKUP` is automatically created by SAM whenever you reconfigure and reboot a new kernel from your system console.
- To build your recovery system, you can use the following devices:
  - Cartridge tape drives.
  - DDS-Format (similar to "DAT") drives. (See warnings regarding using DAT tape in "Configuring for a DDS Tape Drive" in Chapter 5).
  - Magneto-optical disk drives.
  - Other hard disk drives.
- Back up your file system.
- Restore your file system, if needed.

6

If you received your workstation with Instant Ignition, it is important to create your first recovery tape and to archive your existing file system *as soon as possible*.

Creating a Recovery System

A "recovery system" is a special tape containing a subset of the HP-UX operating system. In the event of an operating system failure that prevents you from booting or logging into HP-UX, you can boot from the recovery system tape and use the tools on the tape to repair the file system on your disk. A recovery system is created by using commands rather than by using SAM.

You can also restore your system from a system CD ROM that you can purchase from your HP sales representative.

You should make a recovery tape using `mkrs` at the following times:

- Immediately after you set up your new workstation.

- Each time you update your operating system or make a change in your disk swap configuration.

To do this, you will need a tape drive (cartridge or DDS-format) and one or more tapes.

Using mkrs to Create a Recovery System:

The `mkrs` command constructs a recovery system on removable media (or a formatted hard disk drive). If a system later becomes unbootable due to a corrupt root disk, then you can boot your system from the recovery tape. Once booted on the recovery system, you can then use the tools it provides to repair the corrupt root disk.

Some Options for mkrs

Note The -s option is necessary for building Series 700 DDS-format tape recovery systems.

If enough free disk space is available in `/usr/tmp` (typically 10-20Mb), the `-q` option can be used to make `mkrs` create an image of the recovery system in this directory before copying it to the recovery media. This option generally saves a great deal of time due to reduced seeking on non-random-access recovery media (cartridge tape and DDS-format). Note: for DDS-format tape recovery systems, the `-q` option is assumed.

When creating a DDS-format recovery system for a small memory workstation (8Mb or less), the `-s` option should be used to specify that a smaller set of files be placed on the recovery system.

See *mkrs*(1M) for more options with `mkrs`.

Source Device Files

By default, `mkrs` uses the following device files:

```
/dev/update.src
/dev/rct/c0
/dev/rct
```

If none of the above defaults exist on the system, *one of these device files must be created* or the `-f` option must be used to specify the device file to be used. The recovery device file can be either a block or a character device file.

Root Device Files

`mkrs`, by default, uses the following device files for the root device:

```
/dev/dsk/0s0
/dev/root
/dev/hd
```

If none of the above defaults exist on the system, one of these device files must be created or the `-r` option must be used to specify the device file to be used. The root device file must be a block device file.

If You Have a Problem

An error message results if:

- None of the default device files for the recovery device exist and the -f option is not used to specify a recovery device file.
- None of the default device files for the root device exist and the -r option is not used to specify a root device file.
- The machine type cannot be determined and the -m option is not used to specify the machine type.

Backing Up Your File Systems

Preparation:

The following procedure sets up a scheduled backup:

1. If your system is more than six months old, you have non-HP supported software, or you have never done a backup before, see *System Administration Tasks* or *Installing and Updating HP-UX 9.0* before proceeding. Otherwise, SAM will provide interactive guidance. To use SAM, do the following:
2. Log in as `root`.
3. Type `/usr/bin/sam`.
4. Choose `Backup and Recovery` from the opening menu.
5. Choose `Backup Devices` (to determine what backup devices are connected) or `Automated Backups`.
   a. If you opened `Backup Devices`, and no devices are shown, make sure the device is connected and the tape is inserted.

Note If you have to connect a device during this process, choose `Refresh` from the `Options` menu.

---

   b. Choose the entry for the desired device.
   c. Choose `Add an Automated Backup` from the `Actions` menu.

1. If you go directly to `Automated Backups`, you can select your local or remote backup device from `Actions` → `Add an Automated Backup` (Local or Remote) → `Specify Backup Device`. A form will display any existing backup devices.
2. Before initiating the backup, verify that your tape is *not* write-protected by checking that the write-protect device is in "writable" position.
3. Load a tape into the tape drive. Depending on what tape drive you are using, you may see activity lights flashing while the tape is loading. You can proceed when one light remains on, indicating that the drive is ready to accept data.
4. From the `Add an Automated Backup` screen, you can select the options which will bring up additional forms for specifying the following required items:
   a. `Select Backup Device` (if you have not already specified it).
   b. `Select Backup Scope`: what filesets to include or exclude. The default is to backup the entire system.
   c. `Select Backup Time`: time, day, date. You can also set whether you want a full or incremental backup, for each time specification.

5. `Additional Parameters` (optional) allows you to specify the following:

   a. If you want your backups to cross NFS mount points.
   b. If you want the tape (cartridge or autochanger) rewound.
   c. If you want an index log to be created for each backup. (Results can be mailed to a specified user).

6. After the minimum required forms are filled out, SAM will then use your specified tape device to complete the backup according to your specifications.

Restoring Individual Files

To restore specified files from a local device using SAM, first you will need to have the following information and materials:

- A list of files you need.
- The media on which the data resides.
- The location on your system to restore the files (original location or relative to some other location).
- The device and device file for restoring the data.

Note

- To restore data to disks physically connected to another system, enter the `Remote Administration` functional area of SAM.
- When restoring files that are NFS mounted to your system, `frecover` can only restore those files having "other user" write permission. The `frecover` command normally operates in `user`-mode when crossing NFS mount points; not `root`-mode. To ensure that `frecover` can restore the files exported from the NFS server, login as `root` on the NFS file server and use the `root=` option to the `/usr/etc/exportfs` command to export the correct permissions. Refer to *exportfs*(1M) in the *HP-UX Reference* and the *Installing and Administering NFS Services* manual.

To restore individual files:

1. Ensure that you have `root` capabilities.
2. Run SAM; type:

   ```
   /usr/bin/sam
   ```

3. Choose `Backup and Recovery`
4. Choose `Backup Devices`.
5. Highlight the device in the list from which the data is to be restored.

6. Choose `Recover Files or Directories` from the `Actions` menu and highlight `Select Recovery Scope`. Click on `OK` or press (Return).

7. Choose the `Selected Files` checkbox (it should have an asterisk (*) in it. Do either of the following:

   - Fill in the filename containing a list of files to restore. The filenames should be full pathnames. This file is *not* a graph file. This file is used to create a graph file. You can use the on-line index file created by a previous backup, but it must be edited to containing only the full pathnames of the files to be restored.
   - Or enter each file name in the "Included" and "Excluded" boxes and click on `Add`. If you make a mistake, highlight the entry with the error and use `Modify` or `Remove` to correct the mistake. Only the "Included" box is required, if you choose this method.

     You can use both the file and the included/excluded method simultaneously to specify files to be restored.

   When you have completed determining the selected files to be recovered, click on `OK`.

8. To do any of the following during the restore process, activate `Set Additional Parameters`:

   - Overwrite new files.
   - Maintain original ownership.
   - Recover files using full path name, or
   - Place files in a non-root directory.

   Turn on the appropriate checkbox(es).

   To restore files relative to a particular directory, fill in the directory.

   Activate the `OK` control button to set the additional parameters.

9. Activate the `OK` control button to start the restore process.

   If confirmation messages appear, read the message(s) and activate the `OK` control button to proceed in each case. SAM displays a window containing the output of the executed `frecover` command.

Restoring Your Operating System Using the Recovery Tape

If your operating system or the entire root disk becomes corrupted and not usable, you can restore your system using your recovery system tape and your archive backup tape(s). Also see "Booting the Workstation" in Appendix C for information on using the Boot ROM to find and boot from a recovery tape.

If your operating system is still usable but not functioning correctly, you can load the fileset `TOOL` from an update tape to obtain diagnostic utilities,

You can boot a memory-based version of `/hp-ux` (known as a *recovery system*) from the tape cartridge or DDS-format recovery tape which you have made. From the recovery system, you can mount and unmount file systems, run `fsck` to check and repair file systems, copy files back onto your system disk, and various other tasks.

Caution Do not run `fsck` on a file system that is mounted and active. This could introduce data corruption. Run `fsck` in single-user mode when checking the root file system. For file systems other than the root file system, unmount the file system, run `fsck`, and then remount the file system.

If your system disk (including `/SYSBCKUP`) is unbootable, do the following:

1. Verify that the recovery tape is *not* write protected. HP-UX needs to have write access to your recovery tape when you boot it.
2. Load the recovery tape in your tape drive and be sure that the drive is turned on.
3. Wait for the drive to become ready (the "busy" light remains off).
4. Reset your computer by turning it off and then back on. Boot the system and pause the boot process by pressing ESC after the computer performs its color self-test and prompts for boot selection.

5. At the boot selection screen, select the operating system that is on the tape drive as the one you want to boot from. For example, for the tape drive:

```
...

P1  scsi.3.0  HP35450A
...
```

   Enter `b` and the *device_specification*, such as `P1`:

   `b` *device_specification*

6. Your recovery system should begin loading from the tape. Once your recovery system is up and running you will have a minimum set of commands to use, in order to help you repair and restore your primary (disk-based) operating system.
7. From this point, the specific things you need to do to recover your primary system depend on the nature of the boot problem. Some of the things that you might need to do are outlined in the following list:

Note If your inability to boot your system is caused by faulty hardware, it will be necessary to have that hardware repaired before you can proceed with the items in this list.

---

   a. You might need to run the `fsck` program to repair your root file system. *Do so in single-user mode only.*
   b. The `/hp-ux` kernel file can be restored, if it has been corrupted or removed, by doing the following:
      i. Mounting your system disk to an empty directory (make one if necessary) in your memory-based recovery system.
      ii. Using the `cp` command to copy the `/hp-ux` file from your memory-based system (it is a copy of your *real* `/hp-ux` file) to the directory you used as a mount point for your system disk. The destination file should be called `hp-ux`.

c. You might need to restore important system files such as `/etc/inittab`, `/etc/rc`, etc. from your memory-based system to your system disk. The procedure for doing this is almost identical to the procedure for restoring `/hp-ux`. Only the file names and directories will be different.
d. You might also need to move, remove, copy, or search for other files.

Note that the memory-based system has limited capabilities. Your primary objective is to restore your disk-based system to a bootable condition and then reboot your computer from your system disk. From that point, you can recover lost files from backup tapes, or whatever else is necessary to restore your system to its normal operational condition.

For More Information

For more information on backup and recovery, see *Installing and Updating HP-UX 9.0*, *System Administration Tasks*, and the references for *mkrs*(1m), *cpio*(1), and *tcio*(1) in the `man` pages or in HP VUE Help. Also see, *Solving HP-UX Problems*.

7

Dealing With Problems

Chapter Contents

- Interpreting the LED Indicators.
- Managing a Boot Failure.
- Dealing with HP VUE Problems.
- Recovering from a System Panic.
- Dealing with Network Failures.

Interpreting the LED Indicators

There are eight diagnostic LEDs, which you can view from the front or rear of the system module. The normal indications of these LEDs during operation are given in Table 3-1.

Abnormal boot indications are given in Table 7-1. These refer to conditions which might happen during boot, including hardware failures, *before* HP-UX is running:

Table 7-1. Hardware-Error LED Indications

Self-Test LED Error Display	Hex Code	Possible Assembly Replacement Priority
○ ○ ○ ● ○ ○ ○ ○ ⋮ ○ ● ○ ○ ● ● ● ●	10 ⋮ 4F	System board.
○ ● ○ ● ○ ○ ○ ● ⋮ ○ ● ○ ● ● ○ ○ ●	51 ⋮ 59	1. EISA converter board. 2. Mother board. 3. System board.
○ ● ○ ● ● ● ● ●	5F	1. Boot ROM. 2. System board.
○ ● ● ○ ○ ○ ○ ○	60	1. RAM in slot 0A. 2. System board.
○ ● ● ○ ○ ○ ○ ●	61	1. RAM in slot 0B. 2. System board.
○ ● ● ○ ○ ○ ● ○	62	1. RAM in slot 1A. 2. System board.
○ ● ● ○ ○ ○ ● ●	63	1. RAM in slot 1B. 2. System board.
○ ● ● ● ○ ○ ○ ○ ⋮ ○ ● ● ● ● ● ● ●	70 ⋮ 7F	1. System board. 2. RAM board.
● ○ ○ ○ ○ ○ ○ ●	81	1. Mass storage device at SCSI address *n* in `0x.0`*n*`00.81`. (Note that you can display this number in "Service" mode through the RS-232A.) 2. SCSI cable. 3. System board.

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Table 7-1. Hardware-Error LED Indications (continued)

Self-Test LED Error Display	Hex Code	Possible Assembly Replacement Priority
● ○ ○ ○ ○ ○ ● ○	82	1. LAN cable or server. 2. System board.
● ○ ○ ○ ○ ○ ● ●	83	1. HIL connector or device. 2. System board.
● ○ ○ ○ ○ ● ○ ○	84	1. RS232A cable or device. 2. System board.
● ○ ○ ○ ○ ● ○ ●	85	1. RS232B cable or device. 2. System board.
● ○ ○ ○ ○ ● ● ○	86	1. HP Parallel cable or device. 2. System board.
● ○ ○ ○ ○ ● ● ●	87	1. Graphics switch settings. 2. System board.
● ○ ○ ○ ● ○ ○ ○	88	1. SGC card. 2. Mother board.
● ○ ○ ○ ● ○ ○ ●	89	1. EISA card in slot 1. 2. EISA converter board.
● ○ ○ ○ ● ○ ● ○	8A	1. EISA card in slot 2. 2. EISA converter board.
● ○ ○ ○ ● ○ ● ●	8B	1. EISA card in slot 3 (Models 745i only). 2. EISA converter board.
● ○ ○ ○ ● ● ○ ○	8C	1. EISA card in slot 4 (Models 745i only). 2. EISA converter board.
● ○ ○ ● ○ ○ ● ●	93	1. VME configuration file. 2. VME card cage. 3. `bpn` configuration parameters, if used.
● ○ ○ ● ● ● ● ●	9F	1. Keyboard. 2. System board.
● ○ ● ○ ● ○ ● ○	AA	1. EISA converter board. 2. Mother board. 3. System board.

Table 7-1. Hardware-Error LED Indications (continued)

Self-Test LED Error Display	Hex Code	Possible Assembly Replacement Priority
● ○ ● ○ ● ○ ● ●	AB	1. EISA converter board. 2. Mother board. 3. System board.
● ○ ● ○ ● ● ○ ○	AC	1. VME card cage or converter board. 2. Mother board. 3. System board.
● ○ ● ● ○ ○ ○ ●	B1	1. EEPROM. 2. System board.
● ○ ● ● ○ ● ○ ●	B5	System board.
● ○ ● ● ○ ● ● ○	B6	1. RAM boards. 2. System board.
● ○ ● ● ● ○ ○ ●	B9	1. EEPROM. 2. System board.
● ● ● ○ ○ ○ ○ ●	E1	System board.
● ● ● ○ ○ ○ ● ○	E2	1. Set RTC clock or check battery. 2. System board.
● ● ● ○ ○ ○ ● ●	E3	1. RS-232A cable or device. 2. System board.
● ● ● ○ ○ ● ○ ○	E4	1. RS-232B cable or device. 2. System board.
● ● ● ○ ○ ● ○ ●	E5	1. SCSI cable or device. 2. System board.
● ● ● ○ ○ ● ● ○	E6.	1. LAN cable or server. 2. System board.
● ● ● ○ ○ ● ● ●	E7	1. Graphics switch settings. 2. System board.
● ● ● ○ ● ○ ○ ○	E8	1. SGC card. If SGC not installed, ignore. 2. Mother board. 3. System board.

Table 7-1. Hardware-Error LED Indications (continued)

Self-Test LED Error Display	Hex Code	Possible Assembly Replacement Priority
● ● ● ○ ● ○ ○ ●	E9	1. HIL device or cable. 2. System board.
● ● ● ○ ● ○ ● ○	EA	1. HPIB cable or device. 2. System board.
● ● ● ○ ● ○ ● ●	EB	1. HP Parallel. 2. System board.
● ● ● ○ ● ● ○ ○	EC	1. VME converter board. 2. Mother board. 3. System board.

Table 7-2. Operating-System Error (After ISL Has Loaded)

Self-Test LED Error Display	Hex Code	Possible Operating System Problem
○ ○ ○ ○ ○ ○ ● ○	02	ISL cannot find an autoexecute file. Autoboot aborted.
○ ○ ○ ○ ○ ○ ● ●	03	No console found. ISL will attempt autoboot.
○ ○ ○ ○ ○ ● ○ ●	05	Directory of utilities is too big. (>2 Kbytes).
○ ○ ○ ○ ○ ● ● ○	06	Autoexecute file is inconsistent. Autoboot aborted.
○ ○ ○ ● ○ ○ ● ○	12	Error reading autoexecute file.
○ ○ ○ ● ○ ○ ● ●	13	Error reading from console.
○ ○ ○ ● ○ ● ○ ○	14	Error writing to console.
○ ○ ○ ● ○ ● ○ ●	15	Not an ISL command or utility.
○ ○ ○ ● ○ ● ● ○	16	Utility file header inconsistent. Invalid sys. ID.
○ ○ ○ ● ○ ● ● ●	17	Error reading utility file header.
○ ○ ○ ● ● ○ ○ ○	18	Utility file header inconsistent. Bad magic number.
○ ○ ○ ● ● ○ ○ ●	19	Utility would overlay ISL in memory.
○ ○ ○ ● ● ○ ● ○	1A	Utility requires more memory than configured.

Table 7-2.
Operating-System Error (After ISL Has Loaded) (continued)

Self-Test LED Error Display	Hex Code	Possible Operating System Problem
○ ○ ○ ● ● ○ ● ●	1B	Error reading utility into memory.
○ ○ ○ ● ● ● ○ ○	1C	Incorrect checksum.
○ ○ ○ ● ● ● ○ ●	1D	System console needed.
○ ○ ○ ● ● ● ● ○	1E	Internal inconsistency. Invalid boot device class.
○ ○ ● ○ ○ ○ ○ ●	21	Destination memory address of utility is invalid.
○ ○ ● ○ ○ ○ ● ○	22	Internal inconsistency: pdc_cache entry.
○ ○ ● ○ ○ ○ ● ●	23	Internal inconsistency: IODC ENTRY_INIT.
○ ○ ● ○ ○ ● ○ ○	24	Internal inconsistency: IODC ENTRY_INIT console.
○ ○ ● ○ ○ ● ○ ●	25	Internal inconsistency: IODC ENTRY_INIT boot device.
○ ○ ● ○ ○ ● ● ○	26	Utility file header inconsistent: bad aux_id.
○ ○ ● ○ ○ ● ● ●	27	Bad utility file type.
○ ○ ● ○ ● ○ ○ ○	28	`FAST SIZE` parameter is set to an incorrect value.
● ○ ● ● ○ ● ● ●	B7	HPMC due to bus error.

Managing a Boot Failure

The boot program is located in the Boot ROM of your workstation.

Problems during this first stage of the boot process are rare, but in this section are some items to check if you encounter a problem at this point.

"Missing Driver" Message During Boot

If you do not have the optional SICL software installed, you may get a message during the HP-UX boot process indicating the need for an instrument driver for the HP-IB port. The message looks like the following:

```
...

  HIL interface at select code 0x20: function number 3
  Built-In RS-232C Serial Interface at select code 0x20: function number 4
  Built-In RS-232C Serial Interface at select code 0x20: function number 5
  parallel port at select code 0x20: function number 6
driver not in kernel: id=80 and my_isc=20
  Digital Audio Interface at select code 0x20: function number 8

...
```

The message "`driver not in kernel`" can be disregarded if you do not intend to run instrument-controller HP-IB hardware.

Initializing the System Hardware

Problems can be caused by:

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- No power to the workstation (check your building's circuit breakers and the power connections to your workstation equipment)
- Processor hardware failure (see Table 7-1, in this chapter).
- Interface card hardware failure.
- Incorrectly connected internal SCSI cable.

Turn off the power to the workstation (leave any external disks powered up and running). Wait five or ten seconds and turn the power to the workstation back on.

If the problem recurs, record the symptoms, the status of any indicators (especially any LED displays) on your processor, and any messages that appear on your system console.

At this stage in the boot process, most of the problems that occur require your hardware to be serviced by a person trained and qualified to do so.

Selecting an Alternate Operating System

If your hardware is functioning correctly, but your usual boot device (such as the root disk) is not responding as it should, you can select an alternate available boot device manually by following these steps:

1. Check the LED codes (Table 7-1) to see if there is a hardware problem, or if there is an operating system loading problem (Table 7-2).
2. Turn off the power to your workstation, and then turn it back on.
3. Press (ESC) at the prompt for stopping the boot selection process.
4. You will see the following messages:

```
Terminating selection process.

...


Searching for potential boot devices.
To terminate search, press and hold the ESCAPE key.

Device Selection    Device Path   Device Type and Utilities
------------------------------------------------------------
```

Your workstation searches for devices that may hold an alternate HP-UX. As the devices are found, they appear in a list, such as the following example:

```
P0      scsi.6.0                    QUANTUM PD210s
P1      scsi.5.0                    QUANTUM PDS210s
P2      scsi.2.0                    TOSHIBA CD-ROM DRIVE:XM
P3      lan.123456-789abc.3.6       homebase
```

This process may take several minutes. You can terminate the search at any time by pressing ESC.

5. If two devices are set to the same SCSI bus address, the search terminates when it finds the duplicate. If this happens, you must change the SCSI bus address of one of the devices. (Use the *Installation Guide* for the device to guide you in changing its jumper or switch settings.)
6. If you are running a disked workstation and no disk devices are found, then you may have a hardware installation problem. In this case, you should recheck the connection to the SCSI devices and try the boot again. If this still results in no devices being listed, contact your HP service representative for assistance.
7. A successful search will result in the following list of possible actions being displayed after the list of found devices:

```
b)      Boot from specified device
s)      Search for bootable devices
a)      Enter boot administration mode
x)      Exit and continue boot sequence
?)      Help

Select from menu:
```

8. If the search locates a device, enter `b` with the device selection number to boot from that device. For example, for a SCSI disk device listed as item `P0`, enter the following after "`Select from menu:`"

```
b P0 Return
```

Boot messages should begin to appear on the screen after several seconds.

For Further Information

For detailed help in troubleshooting the boot process, see *Solving HP-UX Problems*. For additional detail about Boot ROM configuration, see "Booting the Workstation" in Appendix C, in this manual.

Dealing with HP VUE Problems

If your system is properly configured to run HP VUE automatically, you will see the HP VUE login screen when your system is booted.

If your system is not configured properly, you may see a console login prompt instead. (It is also possible that no login will appear.)

If no HP VUE login screen appears:

- Log in on your system console, if possible.
- Start "Doctor VUE" by clicking on the button in the General Toolbox, or by entering the following at a shell prompt:

```
/usr/contrib/bin/X11/dr_vue | more
```

- Examine the displayed output from `dr_vue`. It detects errors in various configuration files.

There are several reasons that HP VUE might fail to start:

- The fileset containing HP VUE is not installed properly.
- The file that controls system startup, `/etc/inittab`, may not be configured properly.
- The X server has not started properly. The X server is specified in the file `/usr/vue/config/Xservers`.

Logging In With HP VUE When All Else Fails

1. Click on `Options`.
2. Choose `Fail-safe Session`.
3. Click on the `Login` box.
4. Type your login name.
5. Press (Return).
6. Type your password.
7. Press (Return) or click on `OK`.

When you log into a fail-safe session, a window appears with a command-line prompt in it — enough of an environment so you can fix things with system commands or by editing the faulty configuration file.

Recovering from a System Panic

In HP-UX terms, a system panic simply means that the operating system encountered a condition that it did not know how to respond to, so it halted your workstation.

System panics are rare and not always the result of a catastrophe. They sometimes occur at boot if your system was previously not shut down properly. Sometimes they occur as the result of a hardware failure. In a clustered environment, a diskless client node will panic if too much time has elapsed since its last communication with its server. This could be the result of nothing more than a LAN cable that has been disconnected for too long.

Recovering from a system panic can be as simple as rebooting your system. If you have an up-to-date set of file system backup or system recovery tapes, the *worst case* scenario would involve reinstalling HP-UX and restoring any files that were lost or corrupted. If this situation was caused by a rare hardware failure such as a disk head crash, you will, of course, have to have the hardware fixed before you can perform the reinstallation.

Note It is important to maintain an up-to-date backup of the files on your system so that, in the event of a disk head crash or similar situation, you can recover your data. How frequently you update these backups depends on how much data you can afford to lose. For information on how to back up data, refer to *System Administration Tasks*.

Should your system have this problem, it is important to record and categorize the circumstances associated with the panic:

Summary Checklist of Possible Causes of Panics

Problem Area	Some Corrective Actions:
Hardware	■ If the failure appears to be associated with the peripheral: □ Check the integrity of the cable connections. □ Ensure that the peripheral is online. ■ If the above did not correct the problem, the failure may be associated with the System Processing Unit. In this case, call your designated service representative.
File System	■ Run the file system checker, `fsck`, to correct the problem. Follow the instructions that `fsck` may give, and use the `-n` option with any subsequent reboots required by `fsck`. See Chapter 6 "File System Problems," in *Solving HP-UX Problems* for detailed information.
LAN	■ Ensure the integrity of all LAN connections, including taps in any AUI cable. Check for proper 50 ohm terminations at both ends of the LAN.
Other	■ Reboot the system

Procedures for Recovering from a System Panic

Step 1: Note the Panic Message

Record the panic message displayed on the system console.

Step 2: Categorize the Panic Message

The panic message will tell you why HP-UX panicked. Sometimes panic messages refer to internal structures of HP-UX (or its file systems) and the cause might not be obvious. Generally, the problem is in one of the following categories, and wording of the message should allow you to classify it into one of them:

Category	Action Step Number
Hardware Failure	3a
File System Corrupted	3b
LAN Communication Problem	3c
Other Situations	3d

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Step 3a: Recovery from Hardware Failure

If the panic message indicated a hardware failure, the text or context of the message should indicate what piece of hardware failed.

If the hardware failure appears to be associated with a peripheral, check to be sure that its cables are tightly connected to their proper locations and that the device is powered on and in an "online" state. If there is an error indicated on the device's display:

1. Keep a log book and record error messages in it.
2. Turn the device off.
3. If the device is a disk drive, wait for it to stop spinning.

4. Turn the device back on.

If the problem reappears on the device or if the hardware failure appears to be associated with an interface card or an internal component of the system module, you should refer the problem to your HP service representative.

Proceed to Step 4 ("Rebooting Your System").

Step 3b: Recovering from a File System Problem

If the panic message indicates a problem with one of your file systems, you will need to run the file system checker *fsck*(1m) to check and correct the problem(s). This is normally done automatically at boot time (from the `/etc/rc` file) so you should proceed to step 4 (rebooting your system). Follow all directions that `fsck` gives you *especially if it is your root file system (the one with the "/" directory) that has the problem.* It is important to use the "`-n`" option to the *reboot*(1m) command if requested to do so by `fsck` during any subsequent reboot.

Step 3c: Recovering from a LAN Communication Problem

If the panic messages indicates a problem with LAN communication (such as when a diskless cluster client node is prevented from communication for too long), check all LAN cable connections to be sure of the following:

- All connectors are tightly fastened to the LAN cable and the media access units (MAU's).
- LAN is assembled correctly and does not exceed recommended lengths. If you use an AUI, the LAN must be connected *directly* to the MAU with no intervening length of cable between the MAU on your workstation to the LAN tee.
- Your LAN is properly terminated.

Proceed to step 4 (rebooting your system).

Step 3d: Recovering from Other Situations

When you suspect the problem was something other than the above (or when you do not know where to classify it), proceed to step 4 "*Rebooting your system.*" In this case, it is *especially* important that you write down the *exact*

text of the panic message, just in case you need it for future troubleshooting or help from HP service personnel.

Step 4: Rebooting Your System

Once you have checked for and corrected any problems from Step 3, you are ready to reboot your system. You can reboot your system using the TOC button on the back of the workstation. Otherwise, you can turn your workstation off and then back on to initiate the boot sequence.

You will probably notice a few differences in boot behavior as compared with your normal boot sequence. Your workstation might save a "core" file to disk. This core file is a "snapshot" of the previously running kernel at the time that it panicked. If it becomes necessary, this core file can be analyzed using special tools to determine more about what caused the panic.

Note Core files are quite large and are saved to the directory `/tmp/syscore`. If you feel you need to save these files for future analysis (something that isn't usually required), it is best to save them to tape and remove them from your file system in order to free up space. If you *know* why your system panicked, you can delete the core files; it is unnecessary to keep them. The core files are used in rare circumstances to diagnose hard-to-find causes of system panics.

If the reason your system panicked was because of a corrupted file system, `fsck` will report the errors and any corrections it makes. If the problems were associated with your root file system, `fsck` will ask you to reboot your system when it's finished. When you do this, use the command:

```
reboot -n
```

The `-n` option tells reboot *not* to sync the file system before rebooting. Since `fsck` has made all the corrections on disk, you do not want to undo the changes by writing over them with the corrupt memory buffers.

Step 5: Monitor the system closely

If your system successfully boots, there is a good chance that you can resume normal operations. Many system panics are isolated events and are unlikely to recur.

Check your applications to be sure that they are running properly and (for a day or so) monitor the system closely. For a short while, you might want to do backups more frequently until you are confident that the system is functioning properly.

For Further Information

- Refer to *Solving HP-UX Problems* and to *System Administration Tasks* for further information on operating-system related problems.
- To restore a corrupted operating system, see the procedures for restoring in Chapter 6 of this manual.

Dealing with Network Failures

If the program you have been running uses resources from a local area network and it stops unexpectedly, the following may help locate the source of the problem:

Table 7-3. Problems with the Network

Problem	Action
No systems respond to the `/etc/ping` *hostname* command.	Check the network connection at the back of your workstation. Make sure that the cable is securely fastened to the connector.
Your system does not respond to `/etc/ping` from another system on the network.	Check to see if the networking software is still running on your system. Use `ps -ef` to do so. If it is not running, restart it by logging onto your system as `root` and running `/etc/rc`.
Some systems respond to `/etc/ping`, but others do not.	Contact your network administrator, if you have one. This condition either indicates that some systems are down, or that there is a fault with the network.

A

Installing Additional Memory

Appendix Contents

- RAM Upgrade Contents.
- Tools Required.
- Planning for Installation of the RAM Upgrade
- Installing the RAM Upgrade.
- Verifying the Upgrade.

The upgrade information in this appendix applies to any of the Models 745i/50, /745i/100, 747i/50, or 747i/100..

RAM Upgrade Contents

Three RAM board upgrades covered include RAM upgrades as follows:

- HP A2815A; two 4 MB RAM boards that add an 8 MB block of memory.
- HP A2816A; two 8 MB RAM boards that add a 16 MB block of memory.
- HP A2827A; two 16 MB RAM boards that add a 32 MB block of memory.
- HP A2829A; two 32 MB RAM boards that add a 64 MB block of memory.
- HP A2875A; two 64 MB RAM boards that add a 128 MB block of memory. *Available for Models 745i/100 and 747i/100 only.*

This Appendix is a general guide to RAM installation. Be sure to read the *Installation Guide* that comes with your upgrade before proceeding with any installation procedure.

Tools Required

You will need these tools:

- A medium flat-tipped screwdriver to remove the system module.
- An anti-static grounding strap. One is provided with the RAM upgrade.

Planning for Installation of the RAM Upgrade

Determining Existing Memory

Follow these steps to determine how much memory your workstation already has:

1. If your workstation is operating, shut down the operating system following the procedure in "Shutting Down Your System" in Chapter 3.
2. Turn *off* the power for your workstation, and then turn it back *on*.
3. Note the amount of memory listed, such as 16 MB, when the power-up display shows the memory line, such as the following example:

   ```
   16 MB of memory have been configured
   ```

4. Write the amount here:
   RAM _____ MB.

RAM Board Installation Requirements

- If your workstation has four RAM boards installed, you must remove two of them before you install the RAM upgrade.
- Boards must be installed in pairs; each board must be the same size.
- Any board pair can occupy either slot pair; the larger pair can be in either slot pair.

Installing the RAM Upgrade

Caution

A static charge of almost *40,000 volts* can be generated on a carpeted floor. This exceeds the limits of these RAM boards and can cause unsuccessful operation or damage.

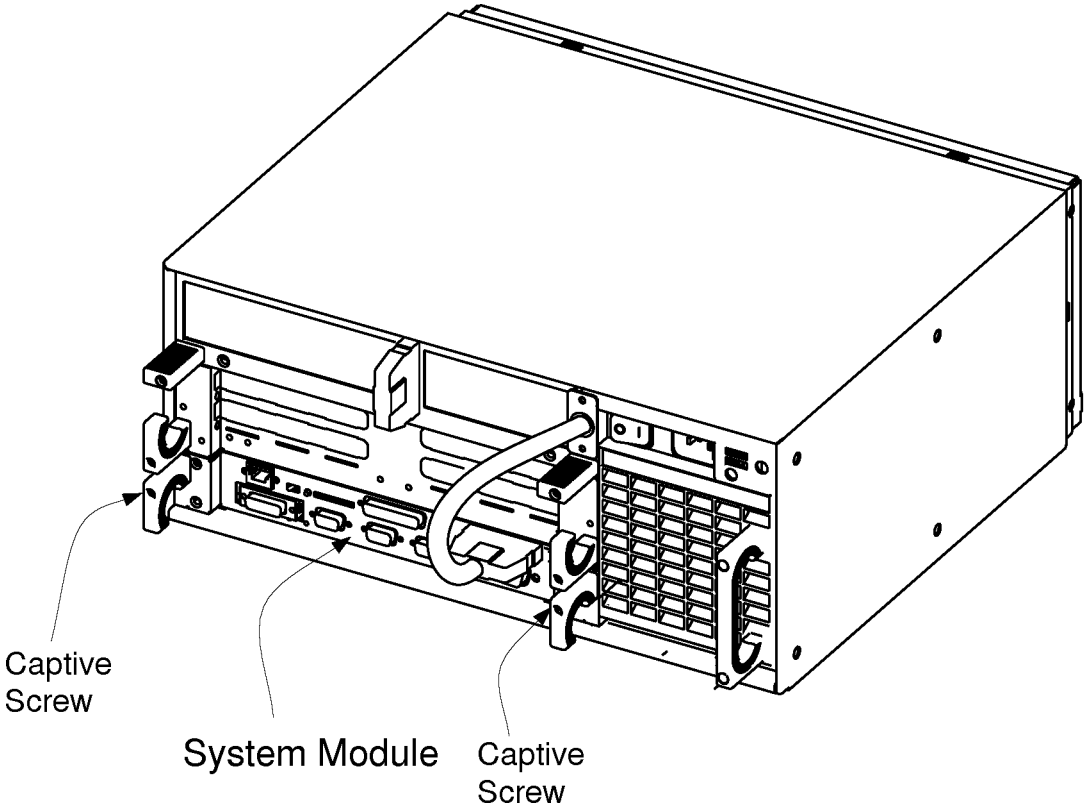
Integrated circuits on printed circuit boards can be damaged by electrostatic discharge. Use the following precautions:

- Use the grounding wrist strap supplied with this upgrade. Follow the instructions printed on the strap's package.
- Do not wear clothing subject to static charge buildup, such as wool or synthetic materials.
- Do not handle integrated circuits in carpeted areas.
- Do not remove the device from its anti-static bag until you are ready to install it.
- Avoid touching electrical contacts.

1. Before you start:

1. Shut down the operating system.
2. Turn *off* the workstation.
3. Remove all cables connected to the system module.

2. Use a flat-tipped screwdriver, unscrew the system module captive screws in each handle about 5 turns (or until each screw pops out to its captive position).

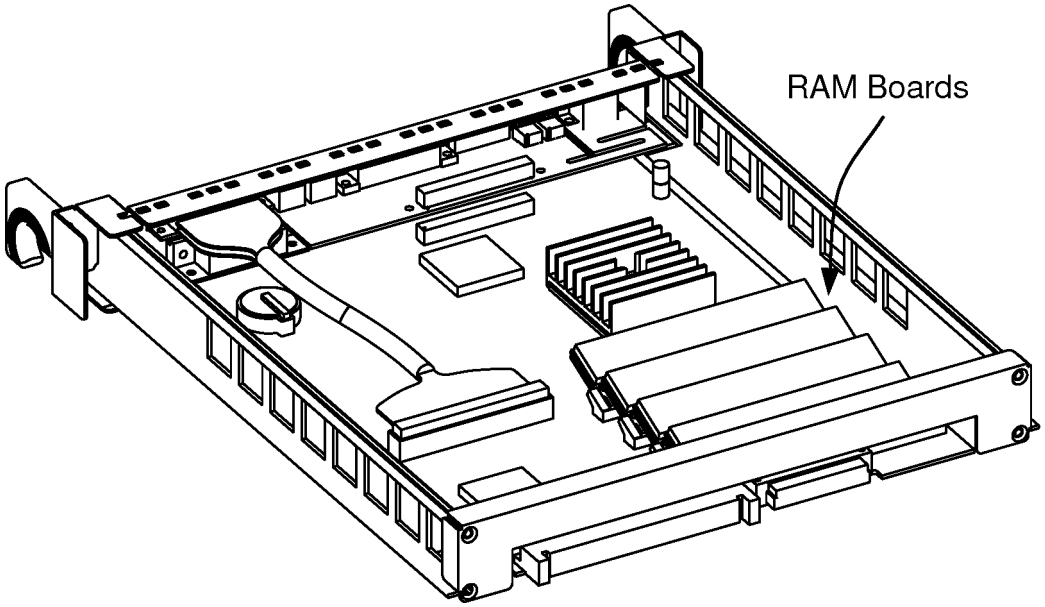


3. Pull the system module out of the workstation and place it on a static-free surface.

4. Place one end of a grounding strap around your wrist; attach the other end to the system module frame.

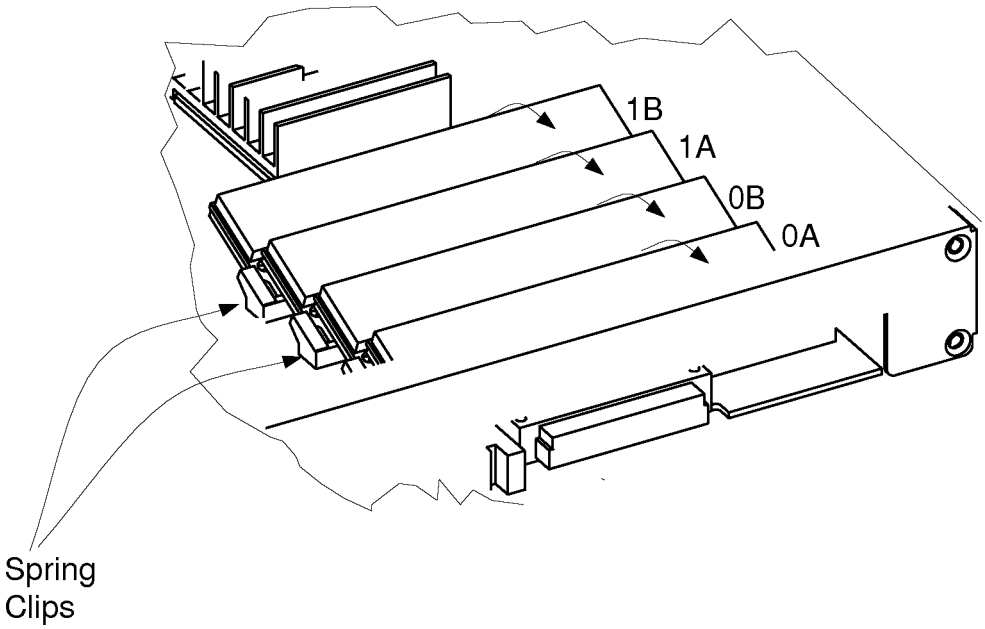
5. If you need to remove RAM boards before you install your RAM upgrade, identify the RAM boards by their part numbers:

   - 98236-66522; 4 MB board.
   - 98236-66524; 8 MB board.
   - A2576-60001; 16 MB board.
   - A2575-60001; 32 MB board.
   - A2628-66006; 64 MB board.



Memory Location on SPU Module

6. Spread the clips holding the RAM board in place, then tilt the RAM board to the vertical position and lift it out. Repeat this for the other RAM board.



Removing the RAM Boards

7. Note that the RAM board is notched on one end to fit the keyed connector. Place the first RAM board you install in an empty slot. Snap the RAM board in place by moving it to the angled position of the old boards. Its ends will snap into the spring clips at about 45°.

8. Install the second RAM board next to the previous one. If you are installing two pairs, repeat the steps accordingly.

9 Verify that each slot pair, labeled `0A` and `0B` or `1A` and `1B`, has RAM boards of the same size. (It is o.k. for slots `1A` and `1B` to be empty.)

10. Remove the grounding strap from the system module, then install the system module in the workstation and tighten the handle screws.

11. Reconnect all cables to the system module.

Verifying the Upgrade

Follow these steps to verify your RAM upgrade for your workstation:

1. Turn *on* your workstation.
2. Note the amount of RAM in bytes listed in the power-up display. The amount of memory you upgraded to should be displayed. If it is not, check your memory installation. For example:

```
64 MB of memory have been configured
```

B

VME and EISA Accessory Cards

Appendix Contents

- VME Overview.
- Installing VME Accessory Cards.
- Installing EISA Accessory Cards.

VME Overview (Models 747i/50 and 747i/100)

VME ("Versa Module Eurocard") cards use a VME bus protocol which allows various kinds of microprocessors to communicate with one another. The protocol is microprocessor independent, implements a reliable mechanical standard, and allows independent vendors to build compatible products.

One feature of VME is that multiple CPUs, such as the Model 742rt, can be configured into the same VME backplane. Each one functions as a completely separate processor, but they all must be able to access address space that may or may not exist on the local computer board. The address space that one CPU needs to access may be on a separate memory card or on an entirely different CPU board.

The VME standard allows two board sizes:

Half height or 3U boards. These boards connect to the VME backplane utilizing only one of the two backplane connectors.

Full height or 6U boards. These boards connect to the VME backplane utilizing both of the backplane connectors.

3U size boards are often provided with either 3U size or 6U size cover plates allowing them to be placed in either a half height or full height chassis.

The Model 747i/50 or 747i/100 provides six full height VME slots. The VME System Controller occupies slot 1 and is built into the chassis, leaving slots 2 through 7 available for use. *In the backplane, slot two is the uppermost slot and slot 7 is at the bottom.*

The vendor of your VME card should have provided installation configuration settings for the card, for your particular application. These usually allow the card to be installed in one of several default locations.

All VME cards require kernel drivers. The HP-UX kernel provides a set of services in the fileset `VME-SERV` which allows the user-provided kernel drivers access to VME space. You can use SAM to ensure that the `vme2` driver is in your HP-UX kernel.

Your vendor should have provided you with the necessary files and instructions for linking the driver for your card into the HP-UX kernel. Documentation for creating these drivers is contained in the *HP-UX 9.01 VME Driver Development Guide* (Part Number A2261 90022).

VME Performance

Table B-1. VME Performance at 50/100 Mhz

Transaction	Transfer Rate (Mb/s)	
	Read	Write
CPU Master — Ideal Slave	10	10
CPU Master — Typical Slave	8	8
External Master — Single Cycle	8	8
External Master — Burst (D32)	17	17
External Master — Burst (D64)	35	35
DMAC Master — D64 BLT (YETI only)	40	40

Overview of Installing VME Cards

Following is an outline of the steps for installing VME Cards. For complete instructions for installing VME cards and configuring VME resources, please refer to the *VME Configuration Guide for HP-UX* (Part Number A2261 90021). You will need this *Guide* to configure VME resources.

VME Installation Outline

VMEbus physical slot numbers are:

- Slot 1 is the internal VME converter board in the VME module that converts CPU information for the 6 backplane slots. The VME converter board cannot be removed.
- Slots 2 through 7 are the accessible slots in the VME module. These slots are numbered on the VME module.

There are no switches or jumpers on the VME backplane to set.

The installation procedure requires these general steps:

1. First, add the new configuration information to the `.CFG` file.
2. Run the `vme_config` utility to configure VME resources.
3. Make device files for the card and driver with `mknod`.
4. Add the driver to the dfile.
5. Compile the driver if necessary.
6. Add the driver to `/etc/master`.
7. Run the `config` command to generate a new kernel containing the driver.
8. Build and install the new kernel.
9. Make a backup copy of the kernel.
10. Shut down and turn *off* the system.
11. Plug in the card(s) (according to the procedure in "Installing VME Accessory Cards").
12. Turn *on* the system.

Installing VME Accessory Cards

You'll need these tools to access the VME cards:

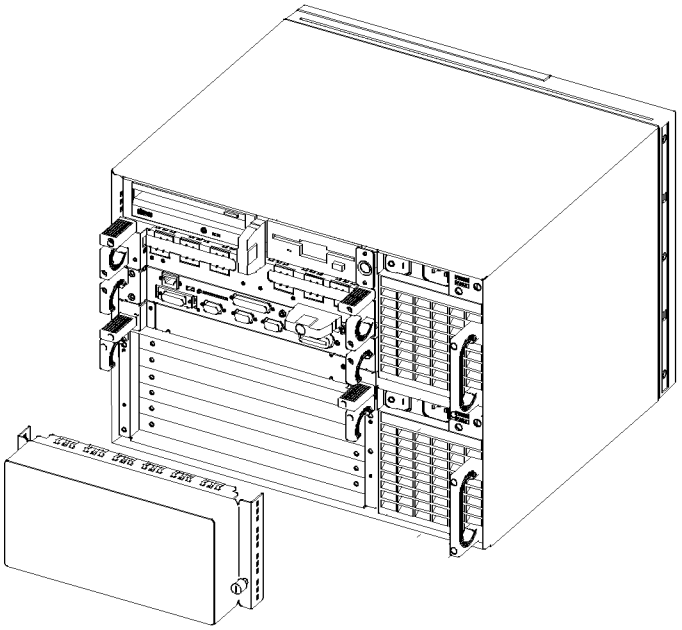
- Small flat-tipped screwdriver.
- Medium flat-tipped screwdriver.
- Static-free work space.

Installation Procedures

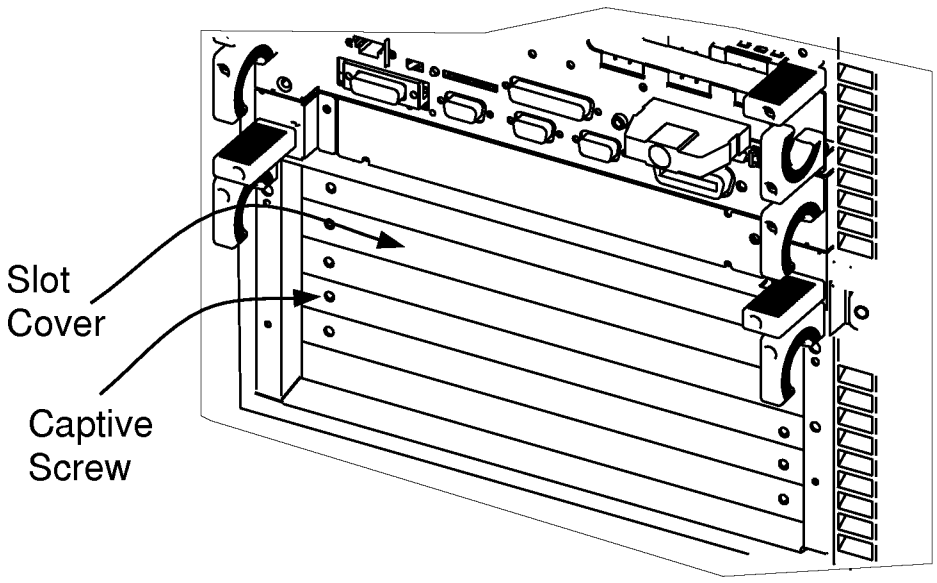
1. Stop any application programs, and then shut down your workstation.

   Turn the workstation *off*, and then unplug the power cords.

2. Loosen the VME module RFI cover thumb screws, and then remove the RFI cover.



3. Loosen the captive screw on each end of the slot covers where you will install VME card(s), and then remove the covers.



4. Refer to your VME card installation manual, and then set any configurations that may be required for your application. The illustration shows the location of the hardware configuration switches on an HP 9000 Model 742i VME, as an example.

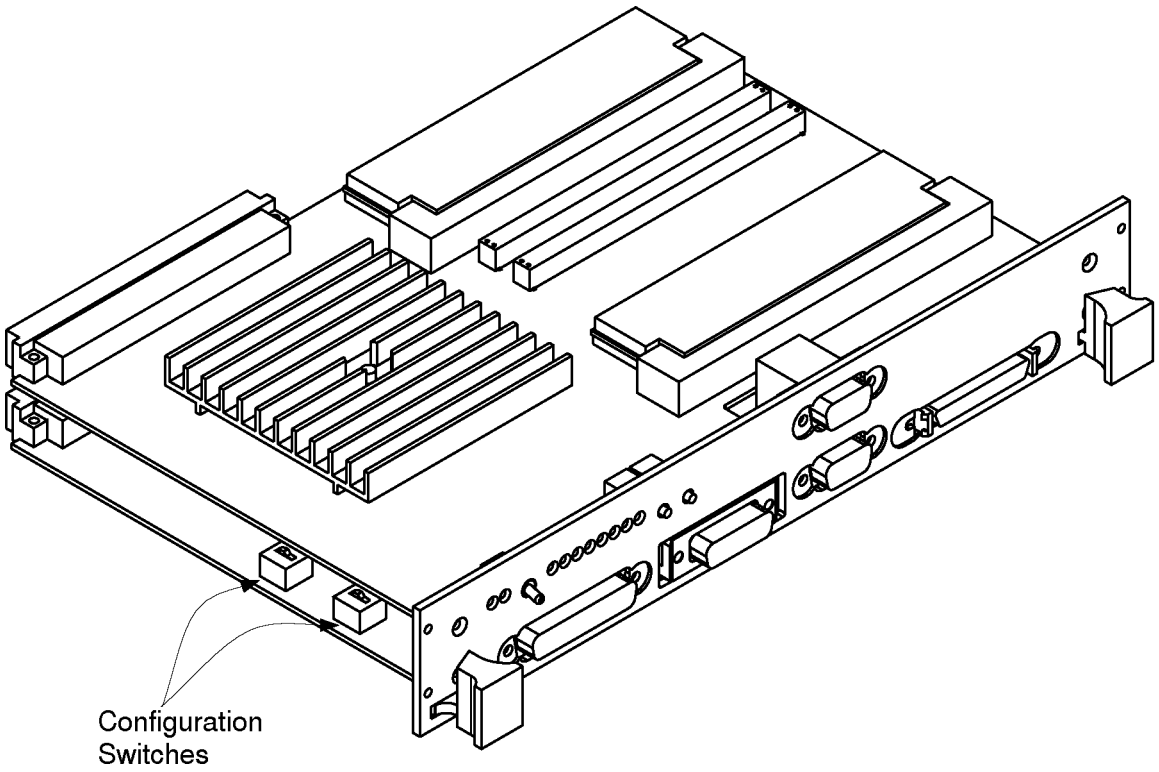


Figure B-1. VME Card Example

5. Slide the VME accessory card into the slot, and then tighten its screws.

6.

RFI and ESD Cautions:

In order to meet regulatory requirements for emitted radio frequency interference (RFI) and electrostatic discharge (ESD) protection, an extension cable must be made and installed between the VMEbus accessory card cable connectors and the VME module RFI cover. The RFI cover is the RFI and ESD protection for the workstation and needs to be installed while you are operating the workstation. Peripheral device cables will then plug into the cable connector on the RFI cover.

As Hewlett-Packard does not know what VMEbus accessory cards you may use, you will need to have these extension cables made locally. For example, if a VMEbus accessory card has a SCSI connector, a short extension cable with a SCSI male connector on the accessory card end and a SCSI female chassis connector on the other end. A connector port must be drilled or milled into the RFI cover at a location suitable for the extension cable. The chassis connector is installed on the RFI cover and the accessory card connector is plugged into the VMEbus accessory card. After putting the RFI cover back on the VME module, connect the peripheral cables. Steps 7 through 10 show an example of how this is done.

If you elect not to install an extension cable between the VMEbus accessory card and the RFI cover, or install the RFI cover, RFI and ESD performance are likely to be inadequate.

7. For each VMEbus accessory card cable connector, make an extension cable. Keep the extension cable length as short as possible.

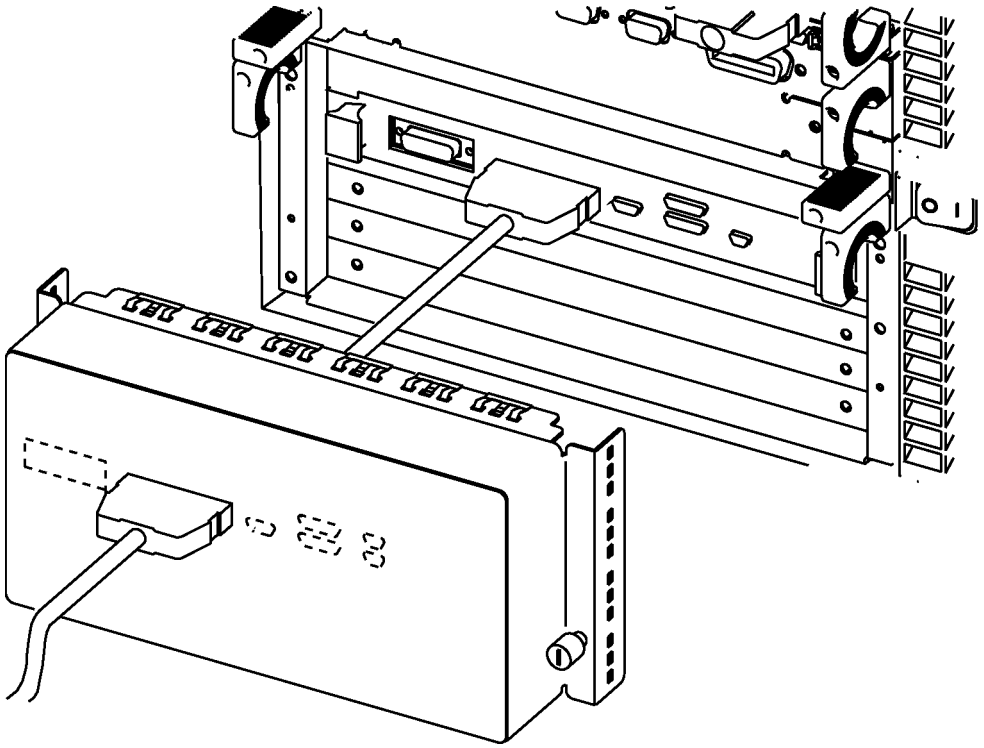


Figure B-2. Connector Holes (Example) in the VME RFI Cover

8. Determine the extension cable connector dimensions and location, and then cut out the connector holes, as in the above example. (*Note that your configuration may be different from the example illustration*).

9. Install the extension cable connector in the VME module RFI cover, and then plug the other end into the VMEbus accessory card connector.

10. Replace the RFI cover on the VME module, and then plug in the external cable to the RFI cover connector.

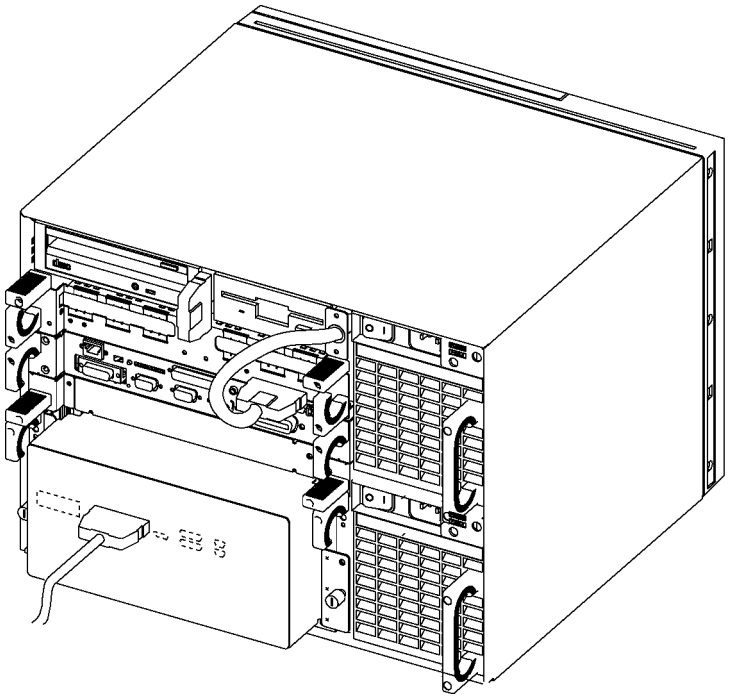
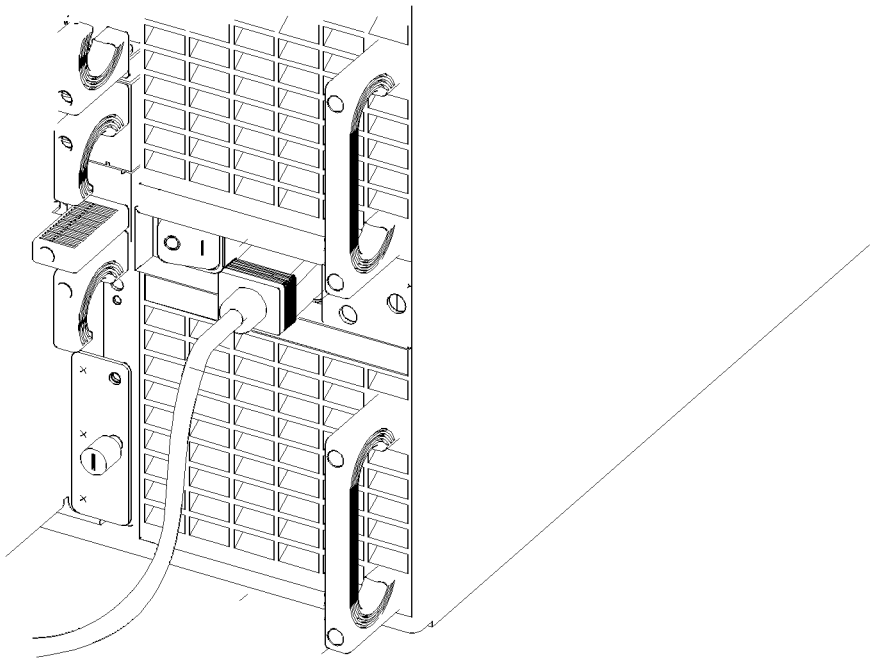


Figure B-3. Reinstalled RFI Cover with Connector Position (Example)

11. Plug in the power cords, and then turn on your workstation and boot the operating system.



Note that the electrical systems in some countries may require that a ground line be run from the ground connection to the right of the power socket for each power supply.

For More Information

For detailed procedures for installing VME cards on HP-UX, see the *VME Configuration Guide for HP-UX*.

Installing EISA Accessory Cards

Note

Please see *Installing Peripherals* for information on installing your EISA card(s) on HP-UX using the `eisa_config` utility.

The configuration for EISA cards is determined when the system reads a file in the following directory:

```
/etc/eisa
```

A file in this directory applies to your system and contains information as to how many slots are available and how they are identified. Your system will give you an error message should you attempt to address a card having a numerical i.d. which exceeds the number of EISA slots available on your system.

The available number of EISA slots is as follows:

- Models 745i/50 or 745i/100: 4 EISA slots.
- Models 747i/50 or 747i/100: 2 EISA slots.

EISA Performance

Table B-2. EISA Performance at 50/100 Mhz

Transaction	Transfer Rate (Mb/s)	
	Read	Write
Ideal Slave	25	25

Tools Required

You'll need these tools to access the EISA cards:

- Medium flat-tipped screwdriver.
- Static-free work area.

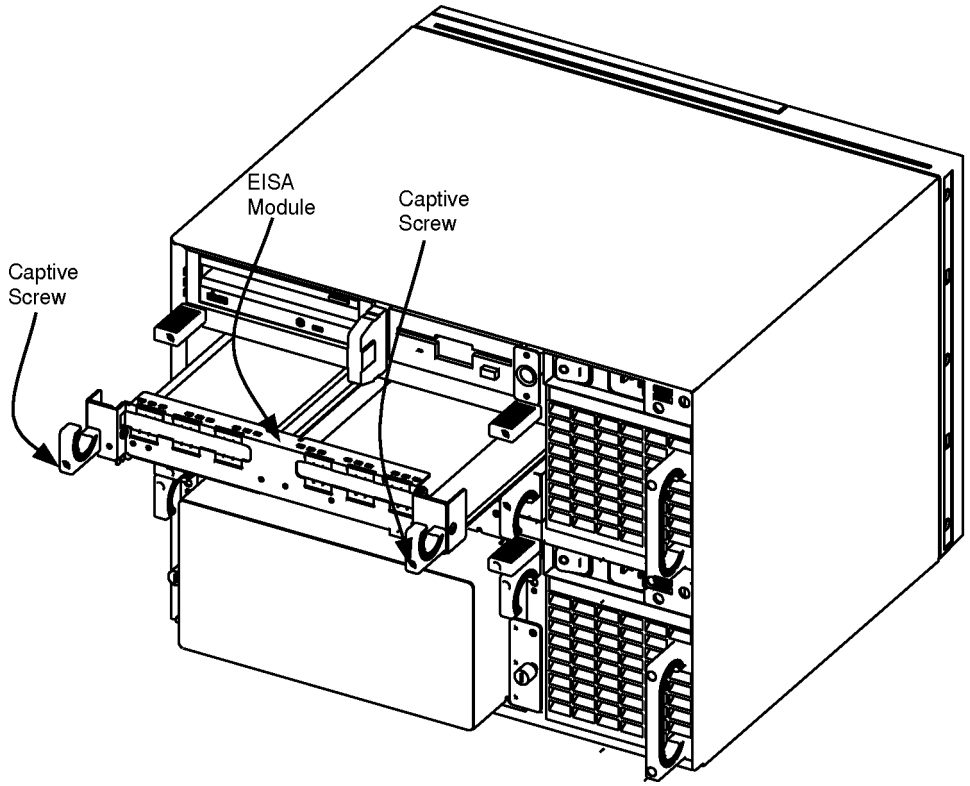
Procedure

1. Stop any application programs, and then shut down your workstation.

   Turn the workstation *off*, and then unplug the power cord(s).

2. Remove the SCSI cable from the system module.

3. Using a flat-tipped screwdriver, unscrew the captive screws inside the EISA module handles 5 - 7 turns (until each screw pops out).



4. Grasp the EISA module handles and pull the EISA module out of the workstation.

5. Note that the slots are numbered from 1 to 4 (for the Model 745i/50 or Model 745i/100).

Cards for slots 1 and 2 are installed component side *up*; cards for slots 3 and 4 are installed component side *down*.

Loosen the card clamp captive screw for the appropriate slot, and then remove the card clamp.

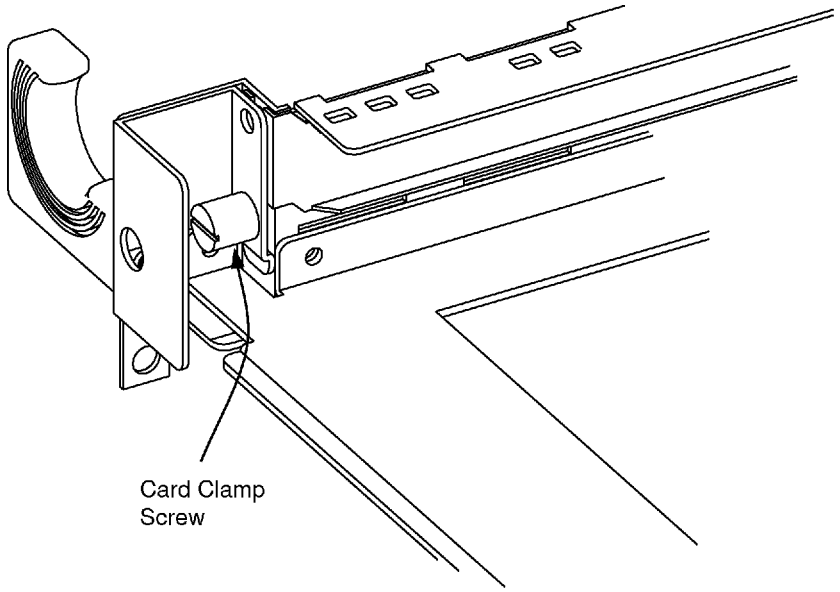
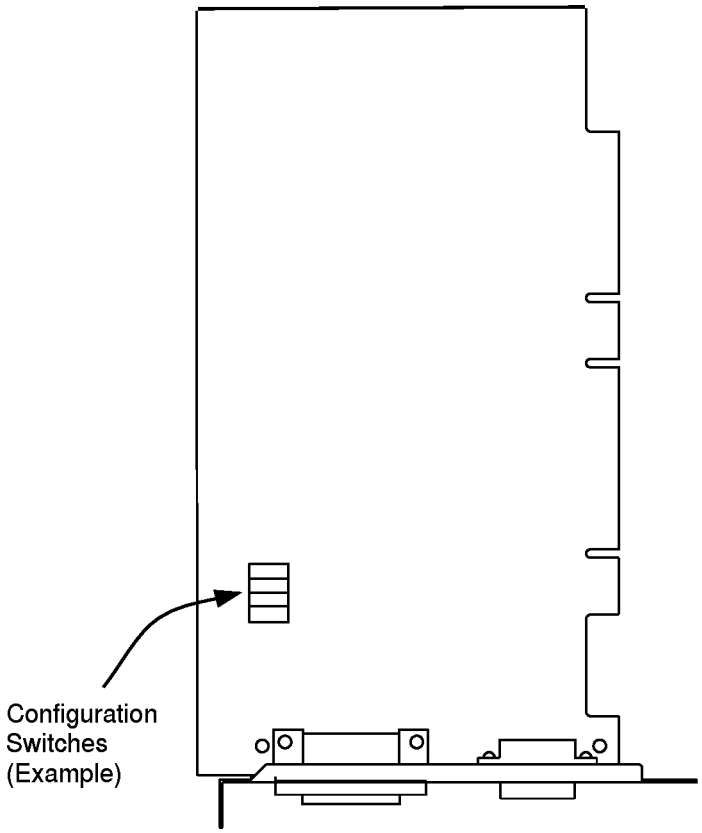
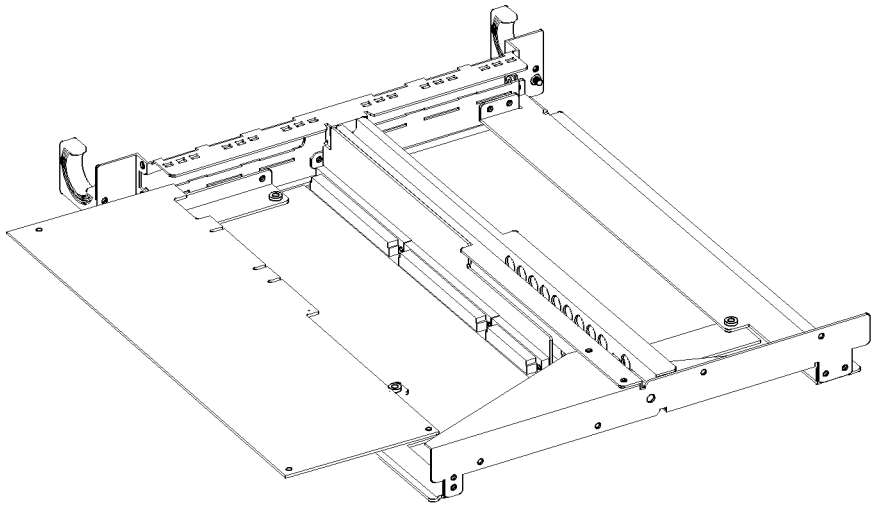


Figure B-4. EISA Card Clamp and Screw

6. Remove the slot cover plate by pulling it out of the EISA module.
7. Refer to your EISA card installation manual, and then set any configurations that may be required for your application. The illustration is a generic example.



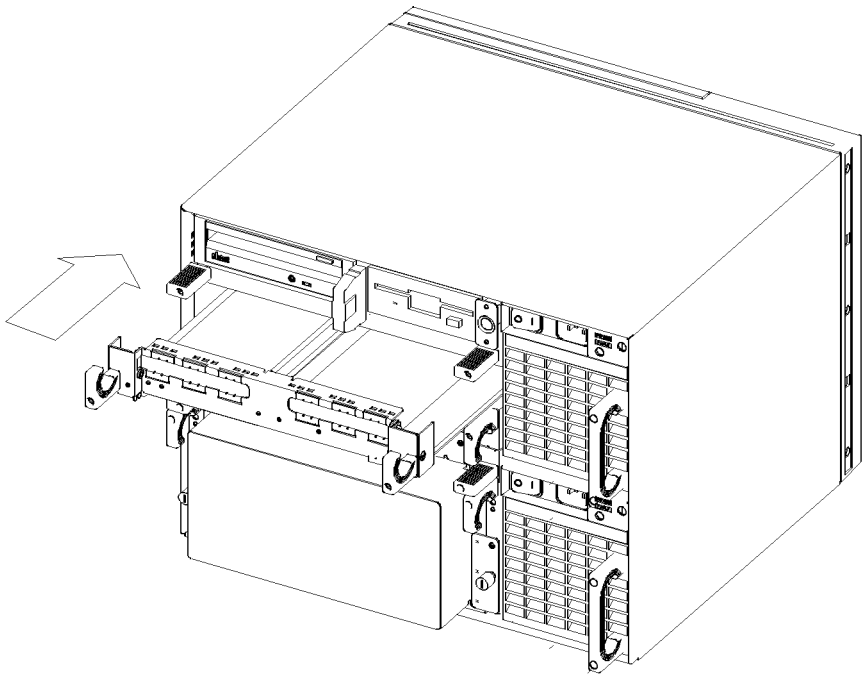
8. Install the EISA card in the slot. Make sure its connector is well seated in the EISA backplane.



Note that, due to clearance problems with the cable connectors, EISA HP-IB cards cannot be installed vertically adjacent to each other. These should be installed side-by-side. If you find it necessary to install an EISA HP-IB card directly over another one, you will have to use connectors furnished by other manufacturers.

9. Replace the EISA card clamp, and then tighten its screw.

10. Slide the EISA module back into the workstation, and then tighten its handle screws.



11. Replace the SCSI cable on the system module SCSI connector.

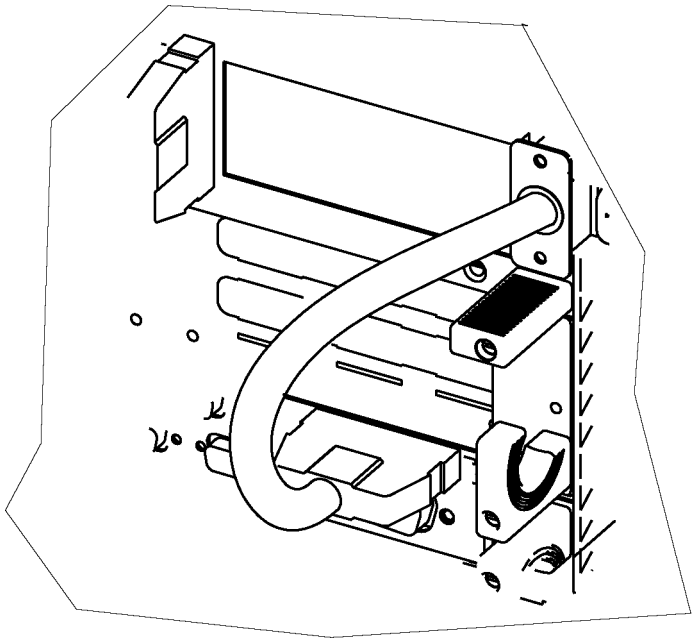


Figure B-5. Replacing SCSI Cable on Connector

12. Plug in the power cord, and then turn on your workstation and boot the operating system.

For More Information

Refer to *Installing Peripherals* and your EISA installation guide for information on the EISA accessory card application, loading the software and running it.

FINAL TRIM SIZE : 7.0 in x 8.5 in

C

Using the Boot ROM

Appendix Contents

- The Boot Console User Interface.
- Entering the Boot Administration Mode.
- Exiting the Boot Administration Mode.
- Getting Help for the Boot Console User Interface Commands.
- Booting the Workstation.
- Searching for Bootable Media.
- Redisplaying the Results of a Search.
- Displaying and Setting Paths.
- Resetting the Workstation.
- Displaying and Setting the Real-Time Clock.
- Displaying and Setting the Autoselect Flag.
- Displaying and Setting the Secure Boot Mode.
- Displaying and Setting the Fastboot Mode.
- Displaying the LAN Station Address.
- Setting the VME Backplane Networking Parameters.

Boot Console User Interface

Introduction

There are times when you want to interact directly with the hardware of your workstation before it boots the operating system. Your workstation provides a boot console user interface to allow you to perform special tasks, display information, and set certain system parameters, even if the operating system is unavailable.

Special Tasks

Here are the special tasks that you can perform:

- Boot your workstation from any specified hardware device.
- Search for hardware devices that contain media from which your workstation can be booted.
- Reset the workstation.

Information Displayed

Here are some of the kinds of information that your system can display:

- A list of the commands you may issue from the boot console user interface.
- Real-time clock time and date.
- Settings of the Autoselect.
- Status (*on* or *off*) of the secure boot mode.
- Station address for the built-in LAN interface.
- Primary and secondary boot path.
- Console and keyboard path.
- VME Backplane Networking parameters.

System Parameters

Here are some of the system parameters that you can set:

- Real-time clock time and date.
- Autoselect.
- Status (*on* or *off*) of the secure boot mode.
- Status (*on* or *off*) of the fastboot mode.
- Primary and secondary boot path.

- Console and keyboard path.
- VME Backplane networking parameters.

Using the Boot Console User Interface

To use the boot console user interface, follow these steps:

1. Shut down your workstation.
2. Turn *off* the workstation, for a few seconds. Then, turn it back *on*.
3. Press (ESC) at the prompt "`Searching for system ...` "

In a few seconds, this message appears:

```
Terminating selection process.
```

A short time later, this message appears and devices that can boot HP-UX are listed as they are found. For example:

```
Searching for potential boot devices. To terminate search, press
and hold the ESCAPE key.

Device Selection    Device Path       Device Type and Utilities
------------------------------------------------------------------

      P0            scsi.6.0                disk_drive_identifier
      P1            scsi.5.0                disk_drive_identifier
      P2            scsi.4.0                DDS-format_tape_drive_identifier
      P3            scsi.3.0                CD_ROM_drive_identifier
      P4            lan.123456-789abc.3.6   cluster_server_identifier
```

If your workstation is a member of a cluster (a group of computers that share the file system of a host by means of a network connection), there may be no disks listed because your workstation has no disks directly attached to it.

This process may take several minutes. When the search ends, this list of actions appears as the Boot Console User Interface Menu:

```
b) Boot from specified device
s) Search for bootable devices
a) Enter boot administration mode
x) Exit and continue boot sequence
?) Help

Select from menu:
```

When you type in your entry, it appears to the right of the prompt "`Select from menu:`"

Entering the Boot Administration Mode

To change system hardware parameters, you must enter the boot administration mode. *If your system has been switched into service mode, using the "Service/Normal" switch, it will automatically enter boot administration mode upon power-up.*

To enter the boot administration mode, type:

`a` Return

and the following prompt is displayed:

```
BOOT_ADMIN>
```

From within this mode, you may enter any of the commands used in the task descriptions that follow.

Exiting the Boot Administration Mode

To exit the boot administration mode, take *one of the following* actions, depending on your need:

- Type `exit` Return at the `BOOT_ADMIN>` prompt.

  This returns you to the boot console user interface menu.

- Type `reset` Return.

  This restarts the workstation.

- Issue a boot command.

  See the section "Booting the Workstation" for details.

- Turn *off* the workstation. There is no need to shut down the workstation with the special procedure described in Chapter 3, since the workstation has not yet been booted, and the file system has not been activated.

Getting Help for the Boot Console User Interface Commands

You may issue many different commands in the boot administration mode. For a complete listing, at the `BOOT_ADMIN>` prompt type one of these commands:

`h` Return

`help` Return

`?` Return

To get help for a particular command, type the following at the `BOOT_ADMIN>` prompt:

`help` *command_name* Return

where *command_name* is the name of one of the listed commands.

The displayed help information usually includes a description of the command, its options, and the format for parameters.

Booting the Workstation

Usually, you start your workstation in Normal Mode by turning it on and waiting for HP-UX to boot automatically. However, you may not want the usual sequence to occur.

For example, you may want to start your workstation from an operating system that is stored on a device that is different from your usual boot device. If your normal operating system kernel or the disk on which it resides becomes damaged or unusable, you may wish to boot from a different disk or perhaps another type of device, such as a DDS-format tape drive.

Here are some situations and examples:

- If you know which device you want to boot from, and you know that it contains a bootable operating system, type the following at the `BOOT_ADMIN>` prompt:

  `boot` *device* (Return)

  where *device* is one of the following:

  The hardware path to the device, specified in Mnemonic Style Notation

  The *pn* designation of the device, as listed in the device search

  For example, if you wish to boot an operating system that is stored on a DDS-format tape in a drive that is located at `scsi.1.0` and is designated by the search as device `P2`, type *one of the following* commands at the `BOOT_ADMIN>` prompt:

  ```
  boot scsi.1.0 (Return)

  boot P2 (Return)
  ```

  The operating system on the specified device is used to start your workstation.

- If you wish to interact with the Initial System Loader (ISL) before booting your workstation, type the following at the `BOOT_ADMIN>` prompt:

  `boot` *device* `isl` (Return)

  This causes the ISL to be loaded from the specified device. After a short time, the following prompt appears on your screen:

  ```
  ISL>
  ```

  ISL is the program that actually controls the loading of the operating system. By interacting with ISL, you can choose to load an alternate version of the HP-UX operating system.

  For example, if the usual kernel (`/hp-ux`) on your root disk (`scsi.6.0`) has become corrupted, and you wish to boot your workstation from the backup kernel (`/SYSBCKUP`), type the following at the `ISL>` prompt:

  ```
  hpux boot disk(scsi.6;0)/SYSBCKUP  (Return)
  ```

- If you do not know the locations of the bootable operating systems on the various media in your file system, you can find them with the search command.

* You may also boot the workstation from the main menu of the Boot Console User Interface by typing this command from the `Select from menu:` prompt:

`b` *device_path* (Return)

where *device_path* is a designator for the path to the device that contains a bootable file system.

Searching for Bootable Media

The initial search conducted by the boot console user interface locates devices that might contain bootable media. This search might find a DDS-format tape drive which actually does not contain a bootable tape. To check which devices actually contain bootable media, type the following at the `BOOT_ADMIN>` prompt:

`search` (Return)

This causes your workstation to search exhaustively for bootable media. It searches all types of I/O devices in the following order:

1. Built-in SCSI.
2. Built-in LAN.
3. VME backplane networking.
4. EISA.

The search may turn up more devices than there are lines on your display. If you are using a text terminal, you may control the progress of the search from your terminal's keyboard by performing one or more of the following steps:

- To hold the display temporarily, press (CTRL)-(S).
- To continue the display, press (CTRL)-(Q).
- To halt the search, press (ESC).

These flow-control commands do not work with a bitmapped display, but such a display can show more than forty lines of text, so you are unlikely to need them.

Note If the search discovers ten devices, the label in the Device Selection column for the tenth entry is labeled `P9`. Any subsequent entries are labeled `P*`.

`P*` cannot be used as a device designator for boot administration commands because it is ambiguous. To refer to a device labeled P* in a search, specify it by means of its entry in the Device Path column.

To search to see which devices of just one type actually contain bootable media, type the following at the `BOOT_ADMIN>` prompt:

`search` *device_type* Return

where *device_type* is one of the following:

- `scsi` is the built-in SCSI bus.
- `lan` is all connections to the built-in LAN.
- `bpn` is VME backplane networking.
- `eisa` is the cards on the EISA bus.

You may also search for bootable media from the main menu of the Boot Console User Interface by using a command in *one of the following forms*:

`s` Return

`s` *device_type* Return

where *device_type* is the type of device (`scsi` or `lan`) for which you wish to search.

Redisplaying the Results of a Search

The list of bootable devices is stored until you conduct another search or you reboot your system. To see the list of devices again, type the following at the `BOOT_ADMIN>` prompt:

`show` Return

It is much faster to redisplay the list with show than it is to conduct the search again.

Displaying and Setting Paths

A path is the hardware address of a device that is attached to the I/O system of your workstation. The path command can set any of the paths shown in Table C-1.

Table C-1. System Paths

Path Type	Device
`primary` or `pri`	Your workstation's default boot device (usually the root disk)
`alternate` or `alt`	Your workstation's alternate boot device (usually a DDS-format tape device)
`console` or `con`	Your workstation's primary display device
`keyboard` or `key`	Your workstation's primary ASCII input device

To display the current settings for the system paths, type the following at the `BOOT_ADMIN>` prompt:

```
path  Return
```

The paths are displayed in Mnemonic Style Notation as shown in Table C-2.

Table C-2. Mnemonic Style Notation

I/O Type	Specification Format
Built-in SCSI	`scsi.`*scsi_address.logical_unit_number*
Built-in LAN	`lan.`*server_address.init_timeout.io_timeout*
Built-in HIL	`hil`
RS-232 Port A	`rs232_a.`*baud_rate.word_length.parity_option*
RS-232 Port B	`rs232_b.`*baud_rate.word_length.parity_option*
On-board Graphics	`graphics_1`
SGC Graphics Slot (Model 747i only)	`graphics_2`
EISA slot	`eisa.eisa_slot.optional_info`
VME backplane networking	`bpn.`*server_address*

To display the current setting for a particular system path, type the following at the `BOOT_ADMIN>` prompt:

`path` *path_type* Return

where *path_type* is one of the path types listed in Table C-1.

For example, to get the path to the primary boot device, type the following at the `BOOT_ADMIN>` prompt:

`path primary` Return

To set a system path to a new value, type the following at the `BOOT_ADMIN>` prompt:

`path` *path_type path* Return

where *path_type* is one of the path types listed in Table C-1 and *path* is the specification of the path in Mnemonic Style Notation as described in Table C-2.

For example, to set the console path to:

- RS-232 Port A,
- a baud rate of 4800,

- a word length of 7, and
- even parity,

type the following at the `BOOT_ADMIN>` prompt:

```
path console rs232_a.4800.7.even Return
```

For help in using the path command, type the following at the `BOOT_ADMIN>` prompt:

```
help path Return
```

The help screens offer complete descriptions of all `path` options.

Resetting the Workstation

The act of resetting your workstation causes it to restart completely. It's similar to turning the workstation *off* and then back *on* again.

To reset your workstation, type the following at the `BOOT_ADMIN>` prompt:

```
reset Return
```

Displaying and Setting the Real-Time Clock

It is usually a good idea to set the real-time clock in your workstation with the HP-UX `date` command. That command contains special safeguards that can help you to avoid disruption of time-related processes (like those controlled by the `cron` command). But you may also set the clock from within the boot administration mode.

To display the current setting of the real-time clock, type the following at the `BOOT_ADMIN>` prompt:

```
date Return
```

Your workstation reports the information in this form:

```
Mon Jul 1 14:55:05 UTC (19:91:7:1:14:44:5)
```

To set the real-time clock, type the following at the `BOOT_ADMIN>` prompt:

`date` *century:year:month:day:hour:minute:second* Return

For example, to set the clock to July 1, 1991, 2:44:05 PM, UTC, type the following at the `BOOT_ADMIN>` prompt:

`date 19:91:7:1:14:44:5` Return

Note The boot administration mode date command only understands Coordinated Universal Time (UTC). You must compute UTC relative to your own time zone to get the correct value for *hours*, and, in some time zones, *minutes*.

Displaying and Setting the Autoselect Flag

Autoselect is a variable stored in your workstation's EEPROM that retains its contents even after power is turned off. If you reset this flag to new values, the change takes effect the next time you reboot the workstation.

To examine the state of the Autoselect flag, type the following at the `BOOT_ADMIN>` prompt:

`auto` Return

If Autoselect is set to "`on`", when your workstation is turned on, in normal mode, it automatically attempts to boot the operating system. If it is set to "`off`", your workstation enters the boot console user interface instead.

To change the state of the Autoselect flag, type the following at the `BOOT_ADMIN>` prompt:

`autoselect` *state* Return

where *state* is "`on`" or "`off`".

Note Set Autoselect to "`on`" if you wish to have your system boot automatically from the first device it finds in its search. If you wish to have your system come up in the Boot Console User Interface, set Autoselect to "`off`".

Displaying and Setting the Secure Boot Mode

In Normal Mode, there may be circumstances in which you would not wish to allow anyone to attempt to boot your workstation from a device other than the device you have specified, nor to control the system from any console other than the one you have designated. This can be an important consideration in secure installations.

If you set up your system in such a way that it is physically impossible for unauthorized persons to disconnect it from its designated boot device, you can guarantee that the boot console user interface cannot be used to boot the system from an unauthorized device or to change the console path. If the secure boot mode is set to on, the boot console interface cannot be activated; thus, you are assured that your system's security cannot be compromised through interaction with that interface.

To check the status of the secure boot mode, type the following at the `BOOT_ADMIN>` prompt:

`secure` Return

The status "`on`" or "`off`" is displayed.

To change the value of the secure boot mode, type the following at the `BOOT_ADMIN>` prompt:

`secure` *state* Return

where *state* is "`on`" or "`off`".

Caution Once the secure boot mode is set to on, the only way to turn it *off* is to disconnect the boot device. When you turn on your workstation after isolating it from its boot device, the boot console interface reappears. You can then turn the secure boot mode off, turn *off* your workstation, reconnect the boot device, and turn the system back on.

Displaying and Setting the Fastboot Mode

When fastboot is enabled (set to "on"), your workstation does a shorter self-test. This enables your workstation to complete its boot process quicker. When fastboot is disabled (set to "off"), more extensive testing is performed during the self tests causing the boot process to take significantly longer. The default factory setting is for fastboot to be disabled ("off").

If your workstation has a large amount of memory installed, the power-on tests may take several minutes to complete with fastboot set to OFF.

To display the status of fastboot, type the following at the BOOT_ADMIN> prompt:

```
fastboot Return
```

To disable fastboot, type the following at the BOOT_ADMIN> prompt:

```
fastboot off Return
```

To enable fastboot, type the following at the BOOT_ADMIN> prompt:

```
fastboot on Return
```

Displaying the LAN Station Address

The LAN (or LANIC) station address of your workstation is the label that uniquely identifies the LAN connection for your workstation at the link level (the hardware level). It is sometimes necessary for you to supply this address to other users. For example, if your workstation is to become a member of a cluster, the cluster administrator needs to know your LAN station address in order to add your workstation to the cluster.

To display your workstation's LAN station address, type the following at the BOOT_ADMIN> prompt:

```
lan_addr Return
```

The LAN station address is displayed as 12 numerals and an included hyphen, in hexadecimal notation, such as the following example:

```
LAN Station Address:  123456-789abc
```

Setting the VME Backplane Networking Parameters

The boot-administration `bpn_config` command allows you to configure the VME backplane networking parameters: the CPU number on the backplane, the backplane anchor address, and the backplane anchor AM code. To display this information, type the following at the `BOOT_ADMIN>` prompt:

```
bpn_config
```

The CPU number, backplane anchor address, and AM code will be printed as in the example below:

```
Current configuration:
   CPU No. 0
   Anchor  0x00200000
   AM code 0x3d
```

The values given above are also the default values for these models of the Series 700i.

To change the VME configuration CPU number, Anchor, or AM code, you will need to change the position of the Service/Normal switch to "Service". (This can be done without restarting the boot sequence or exiting the Boot Admin mode.) Then enter the numbers to be changed after the `bpn_config` command, in the following order:

1. *CPU_number*
2. *Anchor_number*
3. *AM code*

To obtain help with this command, type `help bpn_config`.

FINAL TRIM SIZE : 7.0 in x 8.5 in

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Keyboard Comparisons

Appendix Contents

D

Introduction

There are two types of Hewlett-Packard keyboards available for use with Hewlett-Packard workstations. This appendix gives comparative information for these keyboards.

Note that only Hewlett-Packard HIL keyboard devices are supported for the HIL port.

Table D-1.

A1099C	ITF Keyboard	Also known as the HP 46021A/B Keyboard.
A220SB	PC Keyboard	Also known as: PC-101 (HIL) Keyboard, "Enhanced Vectra" Keyboard, and the C1429A/B Keyboard.

Keyboard Differences

Aside from the obvious difference in the appearance of the ITF and PC keyboards due to the arrangement of the keys, there is also a difference in the keys and their output codes. Some keys on one keyboard (the ITF for example) may not exist on the other keyboard. These keys generate codes which also may not exist as output from the other keyboard (or may be generated by a different key). Codes that are generated when a key is pressed are called *keycodes*.

Some applications expect to use specific *keycodes* generated by keys existing on one of the keyboards (the ITF keyboard for example). Since the keys do not exist on the other keyboard (the PC keyboard for example), an accommodation must be made if the PC keyboard is to be used. In most cases, it is still possible to use some other key that is equivalent (generates the same *keycode* from a different keycap). To do this, it is necessary to know which keys are equivalent on the two keyboards.

The following tables compare the "equivalent" keys of the ITF and PC keyboards. Keys not mentioned in either table have the same key symbols and keycodes.

Some common keys perform the same function but may have slightly different keycap wording. The following table addresses these keys.

Common Equivalent Keys (PC-to-ITF)

PC Keycap Symbol	ITF Keycap Symbol
Esc	Esc/Del
Insert	Insert Char
Home	↖
Delete	Delete Char
Caps Lock	Caps
Esc Shifted	Esc/Del Shifted
Pause/Break Shifted	Break/Reset Shifted
Num Lock Shifted	System/User Shifted
0/Ins (Numbers keypad)	0 (Numbers keypad)
1/End (Numbers keypad)	1 (Numbers keypad)
2/▼ (Numbers keypad)	2 (Numbers keypad)
3/Pg Dn (Numbers keypad)	3 (Numbers keypad)
4/◀ (Numbers keypad)	4 (Numbers keypad)
6/▶ (Numbers keypad)	6 (Numbers keypad)
7/Home (Numbers keypad)	7 (Numbers keypad)
8/▲ (Numbers keypad)	8 (Numbers keypad)
9/Pg Up (Numbers keypad)	9 (Numbers keypad)
./Del (Numbers keypad)	. (Numbers keypad)
Ctrl (left)	Ctrl
Ctrl (right)	No equivalent key

The right Ctrl key on the PC keyboard generates a keycode that has no equivalent on the ITF keyboard. This key has the same effect as the left Ctrl key by default.

Other Equivalent Keys (PC-to-ITF)

PC Keycap Symbol	ITF Keycap Symbol
F9	blank1 (left)
F10	blank2
F11	blank3
F12	blank4 (right)
PrintScreen/SysRq	Menu
Scroll Lock	Stop
Pause/Break	Break/Reset
Page Up	Prev
Num Lock	System/User
End	Select
Page Down	Next
Enter	Return
Alt (left)	Extend Char (left)
Alt (right)	Extend Char (right)
No Equivalent Key	Clear line
No Equivalent Key	Clear display
No Equivalent Key	Insert line
No Equivalent Key	Delete line
No Equivalent Key	Print/Enter
No Equivalent Key	. (on number pad)
No Equivalent Key	Tab (on number pad)

For More Information

You may also want to refer to Appendix B of *Using the X Window System*. This manual also contains information on how to change key mapping using X commands (such as `XPCmodmap`, and `XHPmodmap`).

Glossary

absolute path name
The name of a file which lists all the directories leading to it, starting with root ("/") and ending with the file base name itself. If the path name indicates a *directory*, leave the trailing slash. For example, `/users/jth/`. See *Using HP-UX* for more information on path names and directory structures in HP-UX.

access permissions
File name characteristics (including *read, write*, and *execute*) which determine whether a process can perform a requested operation on the file (such as opening a file for writing). Access permissions can be changed by a *chmod*(1) command.

application
A program used to perform a particular task, usually interactively, such as computer-aided design, text editing, or accounting.

argument
The part of a command line which identifies what (file, directory, etc.) is to be acted upon.

backup
A copy of all or part of the file system.

boot
To start or activate a system.

boot ROM
A read-only memory which is incorporated into a system for the purpose starting the operating system, testing the terminal, and producing a standard display.

Bourne Shell
A command interpreter, invoked as `/bin/sh`. The Bourne Shell is the default shell in HP-UX.

bus address
A number which makes up part of the address HP-UX uses to locate a particular device. The **bus address** is determined by a switch setting on a peripheral device which allows the computer to distinguish between two devices connected to the same interface.

button
A graphic element in a display that functionally represents an actual push button. It is usually accessible by mouse pointer and is used to start an action.

C
A standardized and highly-portable computer language. Also the name of the NLS default language/environment (formerly n-computer). Also the name of one of the HP-UX command interpreters, the C Shell (`csh`).

CD-ROM
Compact Disc Read-Only Memory.

CD ROM file system
A read-only memory file system on compact disk. Typically, you can read data from a CD ROM file system, but you cannot write to one.

character
An element used for the organization, control, or representation of text. Characters include graphic characters and control characters.

click
To press *and release* a mouse button rapidly.

cluster
A group of workstations connected via a LAN. One computer, the **cluster server**, performs as a file-system server for the **cluster clients**.
(For information on clusters, see *Managing Clusters of HP9000 Computers: Sharing the HP-UX Filing System*).

cluster client
A cluster node that does not have a local HP-UX file system. Its file system resides on the cluster server. A **client** can also refer to any process run by a server.

cluster node
Any workstation networked into an HP-UX cluster. (Also called "cnode".)

cluster server
The cluster node which acts as a file system server and operating system server for all the cluster nodes in an HP-UX cluster. Also called **cluster root server**.

cnode
Abbreviation for **cluster node**.

CPU
Central Processing Unit. The instruction-processing module of the computer. *See also* **SPU**.

C Shell
An HP-UX command interpreter, invoked as `csh`.

current working directory
The directory in which relative path name searches begin. It is also called the "current directory" or "working directory", and is identified by entering the command `pwd`.

device file
A file used for the computer to communicate with a device such as a tape drive or a printer.

DDS
Digital Data Storage. HP-supported format for data storage.

dialog box
A subwindow of an application used to request information, or to display status or error conditions.

directory
A table of identifiers and references (such as file names) that refer to corresponding files and items of data. Used in a typical HP-UX organizational structure to provide an organizational and logical identity for a given group of files and directories.

EISA
Extended Industry Standard Architecture.
EISA is an extension of ISA (Industry Standard Architecture) to 32 bits.

environment
The set of defined shell variables (some of which are PATH, TERM, SHELL, HOME) that define the conditions under which your commands run. These conditions can include your terminal characteristics, home directory, and default search path.

file access permissions
File name characteristics (including *read, write*, and *execute*) which determine whether a process can perform a requested operation on the file (such as opening a file for writing). Access permissions can be changed by the *chmod*(1) command.

fileset
A logically-defined, named set of files on an update or installation tape.

file system
The organization of files on a given storage device, possibly including hierarchical directories.

$HOME
The value of the environment variable representing the **home directory**.

home directory
The directory name given by the value of the shell variable HOME. This is the directory where the user starts after logging in, typically `/users/`*login*, where *login* is your login name.

host name
Refers to a string which uniquely identifies a system in a network. There

are generally different **host name** domains associated with different networks.

HP-HIL
Hewlett-Packard Human Interface Link.

HP-IB
Hewlett-Packard Interface Bus (IEEE 488 standard).

HP-UX cluster
A group of workstations connected via a LAN. One computer, the **cluster server**, performs as a file-system server for the **cluster client**.

kernel
The part of the HP-UX operating system that manages the computer's resources.

Korn Shell
An HP-UX shell, featuring command history recall and line-editing. Invoked as `/bin/ksh`.

LAN
See **Local Area Network**.

LANG
An NLS environment variable that is used to inform a computer process of the user's requirements for "native language," "local customs," and "coded character set."

LED
Light-emitting diode.

Local Area Network
The systems and/or clusters which share data, hardware, and software resources via Networking Services software.

locally-mounted file system
A file system mounted on a disk attached to a cluster client and shared by other nodes in the cluster.

login
Your login name, the name by which you are known to the workstation. This may be any group of characters, so long as it meets system rules.

mother board
The vertical system backplane board into which the **system board** plugs.

mount
To add an auxiliary (removable) file system to an active existing file system.

mount directory
The directory in an existing file system that is the root directory of a mounted auxiliary file system.

multiuser state
The condition of the HP-UX operating system in which the cluster nodes (and console) allow communication between the system and all its users.

Native Language Support (NLS)
A feature of HP-UX that provides the user with internationalized software and the application programmer with tools to develop this software.

NFS
Network File Services.

NFS file system
A file system accessible over a network via the NFS Services product.

node name
A unique string used to identify each node in a cluster.

operating system
The contents of `/hp-ux`, including the kernel, commands, input-output control, system accounting, storage assignment, and other services. *Also see* **kernel**.

owner
The owner of a file is usually the creator of that file. However, the ownership of a file can be changed by the superuser or the current owner with the *chown(1)* command or the *chown(2)* system call.

parent process ID
A parent process identification. *Also see* **PID**.

password
An encrypted sequence of characters used by HP-UX to identify an authorized user and to permit authorized login on a system.

path name
A sequence of directory names, separated by slashes, which specify the location of any file or directory.

PID
Process identity (number).

Posix Shell
POSIX-compliant version of the Korn Shell.

process
An invocation of a program. Generally, **process** refers to a program running in memory, while **program** is the code stored on disk.

process ID
A unique identification number assigned to all processes by the operating system. *Also see* PID.

pty
Pseudo-terminal.

RAM
random-access memory.

regular expression
A string of characters that selects text.

relative path name
The name of a file, listing all the directories leading to that file in relation to the current working directory.

ROM
read-only memory.

root directory
The highest level directory of the hierarchical file system, from which all other files branch. In HP-UX, the slash (/) character refers to the "root directory." The root directory is the only directory in the file system that is its own "parent directory."

root file system
The file system mounted on the cluster server.

root server
The node in a cluster to which the storage device containing the root file system of the cluster is physically attached. *Also* **cluster server**.

root user
The user with root permission, having a separate "root" account and password.

run-level
The system state determined at boot which defines, among other things, multi- or single-user status.

SAM
System Administration Manager. A subsystem of HP-UX that does a wide range of system administration tasks interactively.

script
A file that contains commands that a shell can interpret and run.

SCSI
Small Computer System Interface.

server
A computer program that provides file access, login access, file transfer, printing and other services across a network. Sometimes, but not always, a server consists of a dedicated computer.

shell
An HP-UX command interpreter (Bourne, Korn, Key, Posix or C), providing a working environment interface for the user. The shell takes command input from the keyboard and interprets it for the operating

system. See *Shells: User's Guide* for information on the characteristics of the various shells.

shell script
A file that contains commands that a shell can interpret and run. Also "shell program."

shut down
To take the system from multi-user state to a state in which no processes are running, using the `shutdown` command.

single-user state
The state of a computer where there is little or no process activity and no users logged in. The system is only accessible to the current system administrator (root). This mode is brought about by execution of *shutdown*(1). Also called **single-user mode**.

SPU
System Processing Unit. The instruction-processing module of the computer.

standard error
The destination of error and special messages from a program, intended to be used for diagnostic messages. The standard error output is often called `stderr`, and is automatically opened by the shell for writing on file descriptor 2 for every command invoked. Standard error usually appears on the display unless it is directed otherwise.

standard input
The source of input data for a program. The standard input file is often called stdin, and is automatically opened by the shell for reading on file descriptor 0 for every command invoked.

standard output
The destination of output data from a program. Standard output appears on the display unless it is redirected otherwise.

su
Super User. *See* **root user**.

system board
The printed-circuit board where the CPU and memory RAM reside. For these models of the Series 700i, the system board is incorporated (with the backplane and the **mother board**) into a **System Module**.

system module
The pull-out unit on this model of the Series 700i which comprises the system board, the mother board and the back plane panel.

system name
The eight-character (or less) string which uniquely identifies a system. Usually identical with the system's host name found in `/etc/hosts`. The Internet Protocol (IP) number is sometimes used instead of a system name to identify the system.

tree structure
The HP-UX method of organizing files and directories into a branching hierarchical structure. This structure looks like an inverted tree with the "root" directory at the top, descending into multiple directory/file branches that end in clusters of files.

user
Any person who interacts directly with a computer system.

user interface
The medium through which users communicate with their workstations. The command-line prompt is one type of interface. The graphical objects of HP VUE are another type of interface.

VME
Versa Module Eurocard. A data protocol for optional microprocessor cards allowing multiple CPUs to be configured into the same computer backplane.

working directory
This is the directory in which relative path name searches begin. It is also called the current directory, or the current working directory.

workstation
A compact, graphics-oriented computer, generally high-speed and high-capacity, designed for use in a variety of industrial situations.

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