

**HP 9000 Model 742i
Owner's Guide
for HP-UX Users**

HP 9000 Series 700i Industrial Workstations



**HP Part No. A2260-90014
Printed in USA February 1993**

**Edition 1
E0293**

FINAL TRIM SIZE : 7.0 in x 8.5 in

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February, 1993 Edition 1

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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.
----------------	---

Warning	Warning messages indicate procedures or practices which, if not observed, could result in personal injury. Do not proceed beyond a WARNING 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 742i 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. Normaalisissa käytössä levyaseman suojakotelo estää lasersäteiden pääsyn laitteen ulkopuolelle.

HP 9000 Model 742i 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 ...
<code>computer text</code>	Text displayed by the computer system. For example, <code>login:</code> indicates a login prompt displayed by the system.
<i>italic text</i>	Variable text supplied by you. For example, <i>file_name</i> means that you type a file name of your choice. Italic text is also used for text emphasis and for document titles.
<code>(Key)</code>	Type the corresponding key on the keyboard. For example, <code>(CTRL)-(D)</code> means you hold down the <code>(CTRL)</code> key, and press the <code>(D)</code> key.
<code>Displayed Item</code>	Select an on-screen item or a corresponding softkey. For example, <code>Help</code>

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Product Description

Chapter Contents

The HP 9000 Model 742i is an exceptionally flexible, high-performance Precision Architecture system based on the Hewlett-Packard PA RISC 7100 technology. Some features are outlined in the following sections.

The HP9000 Model 742i

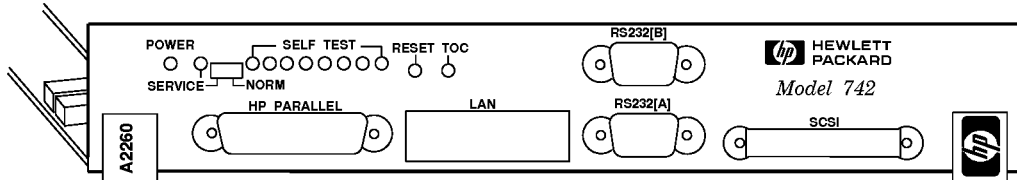


Figure 1-1. Model 742i Front Panel

Features of the 742i

The Model 742i has the following features:

- 50 Mhz PA-RISC processor delivering 61 MIPs.
- Configurable with 8 to 64 MB main memory (see “Memory Upgrades”). For an HP-UX system, at least 16 MB of main memory is required.
 - ECC RAM correction.
 - 2 memory module slots.
- External Cache: 64 KB instruction cache and 64 KB data cache.
- Input/Output:
 - RS-232-C (2).
 - AUI
 - SCSI-II SE

Memory Upgrades

Upgrades or factory-integrated RAM provide 16 MB, 32 MB, and 64 MB memory configurations. See Appendix A.

1-2 Product Description

Built-In Interfaces

For graphics, printing, and LAN communications, the Model 742i provide the following I/O interfaces:

- HP-Parallel Interface.
- LAN AUI (15-pin D-subminiature; requires MAU for connection to LAN).
- 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.

The I/O for the Model 742i is on the front panel, shown on the opposite page.

Physical Dimensions and Power Requirements

- Height: 40.6 mm. (2 VMEbus slots).
- Width: 233.3 mm. (9.2 in.)
- Depth: 160 mm. (6.3 in.)
- Weight: .91 kg. (2.0 lb.)
- Power:
 - 35 watts @ +5 vdc.
 - 0.12 watts @ +12 vdc.
 - 0.12 watts @ -12 vdc.

Operating System

HP-UX 9.01 for the Model 742i the HP VUE interface, and the X Window System.

Table 1-1 lists the HP-UX operating system features and languages for the Model 742i.

Table 1-1.
HP-UX Operating System and Languages for the Model 742i

Operating system:	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:	Terminal Interface via RS232 only. By using LAN, the X Window System 11R5 (OSF/Motif 1.2) and HP VUE 3.0 can be used on a suitable X Terminal display).
Network Features:	IEEE 802.3/Ethernet Local Area Network: <ul style="list-style-type: none"> ■ S.25. ■ SNA. ■ RJE. ■ TCP-IP. ■ HP Diskless.

1-4 Product Description

Finding Information About Your System

Overview

Your Model 742i uses the standard HP-UX 9.01 operating system, a highly versatile system for multitasking, running your application programs, and performing a variety of other tasks.

Chapter Contents

- Installing Your Model 742i.
- Online Sources of Information.

Installing Your Model 742i

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

Basic Information

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*.
- At some point, you may want to interact with the Model 742i via the LAN using HP VUE with an X Window System display. HP VUE is the default interface for HP-UX. As a simpler window alternative, you can also use the X Window System. Both are included in HP-UX. For further information, see the manual *Using the X Window System*, *Using HP-UX*, or *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*, which covers HP-UX 9.01.
 - For administration information, see *System Administration Tasks*.
 - For troubleshooting HP-UX, see *Solving HP-UX Problems*, and Chapter 6 in this manual.
 - For VME configuration information, see *VME Configuration Guide for HP-UX*

2-2 Finding Information About Your System

Online Sources of Information

HP-UX is designed so that you can access many sources of information without leaving your system. Some of these information sources are available through a shell command line.

- **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 on a command line `man command`, where *command* is 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 listing commands having the keyword in their description.

There are also a variety of files on your HP-UX system which contain version-specific 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.

2-4 Finding Information About Your System

Logging In and Getting Started

3



Chapter Contents

- Before Logging In the First Time.
- Turning On Your System.
- Interpreting the LED Indicators.
- Logging In and Out.
- Creating a New User Account.
- Setting or Changing a Password.
- Getting Help.
- Shutting Down Your System.

Before Logging In the First Time

If your Model 742i system does not have a hard disk attached, or if it has a file system disk, and you want it 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.

3

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 Model 742i 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 system is located.
- The host name for your system; any alphanumeric, single-word name with eight or fewer characters.
- The network address number, also called an IP number, for your system. 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.

3-2 Logging In and Getting Started

Turning On Your System

With all peripheral devices turned off, do the following:

1. Turn on the power to your display. The power indicator LED on the display unit will show that it is turned on, even if the screen remains dark. Make sure of the following:
 - a. The appropriate LAN connection has been made to the Model 742i.
 - b. Normally, you will use a character terminal connected to the RS232A port on the Model 742i. If you use a remote graphical display host connected via LAN, make sure the remote system is configured to host the Model 742i. See “Displaying Graphics on a Remote X Host”, in this chapter, for the specifics of setting this up.
2. Check SCSI connections and turn on the power to any peripheral devices.
3. Turn your Model 742i system on. The LEDs on the front panel will light, showing that the power is *on*.
4. You should see a sequence of boot messages. Allow the boot to continue.
5. During the boot process, messages will prompt you 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 later by typing `set_parms` **Return** after login.
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 “Console login:” prompt.

Displaying Graphics on a Remote X Host

With the Model 742i, you can run HP VUE or the X Window System, but you cannot directly display them. However, you can use a remote computer which has graphical capability to display the system running on the Model 742i and interact with it. This is done by setting the `DISPLAY` environment variable on the Model 742i. `DISPLAY` sets the host, display number, and screen number to which a system sends bitmapped output for clients.

For example, if the Model 742i is called *server_system*, your remote system is *xhost_system*, and the program running on the Model 742i is called `xwjit`, enter the following on your remote X host system to get it to display the Model 742i bits:

```
xhost +server_system      This enables the Model 742i to recognize the
                           remote X host.

rlogin server_system      Log in on the Model 742i.
DISPLAY=xhost_system:0.0 On the Model 742i, set the DISPLAY variable so
                           that it will display on your remote X system.

export DISPLAY            Export the variable
xwjit                     Run the program on the Model 742i
```

For More Information

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

3-4 Logging In and Getting Started

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. Eight of these are diagnostic, or indicate the normal activity of your system. The one on the far left indicates power “on”.

3

The normal running indications for HP-UX are shown in Table 3-1. The right four of the eight diagnostic LEDs will blink to reflect activity during normal operation. For LED indications of error conditions during boot, see Table 6-1.

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

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

3-6 Logging In and Getting Started

Logging In and Out

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 with 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 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 with HP-UX

If you are not using HP VUE, you can use the **lock** command to temporarily leave your system (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

If you have access to a system administrator, that person may have already set up a user account for you. Otherwise, you will need to do the following to set up a user account so that you can interact with the system as non-`root` and not incur the risk of accidentally damaging data.

You usually work in your home directory or “account”, and most of your default files are kept there. As “owner” of this directory and its subdirectories, you also have control over access to the files in the account.

Using SAM

To create a user account, you will need to use “SAM”, the System Administration Manager.

Caution

In order to use SAM, you must be logged in as `root` (indicated by the command prompt “#”). 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.

You can navigate around a SAM screen on a character terminal using the arrow keys and `(Tab)` to illuminate the selection you want to activate. When the selection is illuminated, press `(Return)` to activate, or “choose” it.

1. Type `usr/bin/sam`, as `root`, followed by `(Return)`.
2. At the opening menu, choose `Users and Groups->` pressing `(Return)` with `Users and Groups->` illuminated.
3. At the next screen, choose `Users`. You will see a screen displaying a list of logins and real names.

3-8 Logging In and Getting Started

4. Go to the **Actions** menu (use the appropriate function key to get to the menu bar). 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. Press the **Exit SAM** function key.
11. Type **exit** **Return** to leave SAM.

Setting or Changing a Password

From a command line shell prompt, you can use the `passwd` command directly to set or change a password. (You do not have to be `root`). Enter the following:

3 `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:

- Contain 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.

3-10 Logging In and Getting Started

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 or within SAM.

Using the Shutdown Command to Stop Your System

Caution If your Model 742i uses a local system disk, 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 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 type the following command:

```
shutdown -r.
```

If you want to shutdown immediately with no grace period, type the following:

```
shutdown -h 0
```

Using SAM to Stop Your System

If you happen to be using SAM, you might also want to use it to shut down 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 shutdown process to completion first.

You can log in as `root` and shut down your system, using SAM.

1. As `root` type `/usr/bin/sam`.
2. Choose **Routine Tasks** from the opening menu.

3-12 Logging In and Getting Started

3. Choose **System Shutdown**.
4. You will be given a choice of the following:
 - a. **Halt the System**. All currently executing processes except those essential to the system are terminated. Then the system is halted.
 - b. **Reboot (Restart) the System**. The system is shut down and rebooted automatically.
 - c. **Go to Single User State**. The system is put in single-user mode for administrative purposes such as backup or file system consistency checks.
5. Exit SAM using the appropriate function key.

3

Using the Command Line

For guidance on entering commands and using the HP-UX file system, tools, and networking commands, see the manual, *Using HP-UX*. For more advanced work with shell programming, see the manual *Shells: User's Guide*.

FINAL TRIM SIZE : 7.0 in x 8.5 in

4

Configuring HP-UX for Printers and Drives

Chapter Contents

- Preparing for Installation.
- Configuring HP-UX for a Printer.
- Finding the Status of Existing SCSI Bus Addresses.
- Configuring for a Hard Disk Drive.
- Configuring for a Flexible Disk Drive.
- Configuring for a CD ROM Drive.
- Configuring for a DDS Tape Drive.

4



Preparing for Installation

If you have external devices attached to your system, you will have to install (or configure) them 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.

In general:

- For a list of devices which are supported by the Model 742i, 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*.
- 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 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 essential SAM (System Administration Manager) procedures. SAM will determine the status of any of your connected devices and will perform software installation tasks for you.

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

4-2 Configuring HP-UX for Printers and Drives

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 (located on a 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.

Use the arrow keys and `Tab` to move the highlighted areas around the screen. Press `Return` to “choose” an item when illuminated (such as `OK`).

3. At the SAM opening screen, choose `Printers and Plotters`.
4. Choose `Printers/Plotters` from the next screen.

If your system doesn't have any printers connected, you will see a message. Make sure you have a printer connected. Choose **OK** or press **(Return)**.

5. From the **Actions** menu (on the menu bar at the top of the screen), choose **Add Local Printer/Plotter**
6. Choose an appropriate selection on the sub-menu giving options for Parallel, Serial, HP-IB, etc.
7. A screen 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. Choose **OK**

A display opens for **Add Local Printer/Plotter**.

10. Choose the box labeled **Printer Name** and enter your *printername* for the new printer (entered in the blank earlier).
11. Choose **Printer/Model Interface**
12. Scroll down the next screen, using the arrow keys, to find the Model Name of your printer.
13. Choose the Model Name (press **(Return)** when illuminated).
14. Choose **OK**.
15. In the **Add Local Printer/Plotter** display which reappears, select and choose the box labeled **Make this the system default printer**.
16. Choose **OK**.
17. If the print spooler was not previously running, a screen will appear with the question: **Do you want to start the print spooler now?**. Choose **Yes** or press **(Return)**.

4-4 Configuring HP-UX for Printers and Drives

18. 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)`.
 19. You will see the message `Task completed`. Press `(Return)`.
 20. Exit the task and press the `Exit SAM` function key.
 21. Type `exit (Return)` to exit `root` and return to `user` status.
- Refer to *System Administration Tasks*, for additional SAM information.

Testing the Printer Installation

4

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

```
cd (Return)
```

```
lp .profile (Return)
```

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

```
lp -dprintername .profile (Return)
```

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

Dealing With Printer Problems

If you experience problems in printing, check the following:

- 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.



4

4-6 Configuring HP-UX for Printers and Drives

Finding the Status of Existing SCSI Bus Addresses

Before you attach 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 drives can be attached for accommodating HP-UX, local file systems, and swap space on your Model 742i system.

Software Installation of the Hard Disk Drive Upgrade

After all connections have been made (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 drives, in order to use the disks for mass storage and/or swap space. Note that your HP disk is pre-formatted.

The factory-set SCSI bus address for the 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 the disk 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.

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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 all appropriate connections have been made (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 the selection and 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 connections, and make sure that the device is turned *on*.
- b. Choose 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 choose **Yes**. Otherwise, choose **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. Choose **OK** when you have finished with this form.
9. A “Messages” Box appears, reporting the progress of the task. When the task is finished, choose **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/rdisk/c201d5s0
```

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

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```
SCSI describe of /dev/rdisk/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
```

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Configuring for a Flexible Disk Drive

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 the drive 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 connections have been made, 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 choose **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. Choose the button **Device Missing**, and you will be given the following options:

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- i. Have SAM rescan the system for the device. If you have connected the device *after* starting SAM, you should choose **Yes**. Otherwise, choose **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). Choose this button to turn it *off* if you do not wish to initialize a disk (or if the disk is preformatted).
8. Choose **OK** when you have finished with this form.
9. A “Messages” Box appears, reporting the progress of the task. When the task is finished, choose **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.rdisk:
```

```
        vendor: TEAC
product id: XXXXXXX
        type: direct access
        size: 1400000 bytes
bytes per sector: MNM
```

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

4

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 directory where the files reside:

```
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.

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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.

4



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.

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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 connections have been made (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 configuring HP-UX to communicate with the CD ROM drive.

Note The CD ROM drive cannot be locally-mounted on a diskless node (cnode), although its driver must be configured into each cluster node’s kernel.

4

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 drive 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 drive's laser 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 model and its hardware address (select code and bus address), before you do the software installation.

■ CD ROM Model: _____

■ 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" screen, highlight and choose **Add a Hard Disk Drive...**
6. Within the "Add a Hard Disk Drive" screen, choose **Select disk to add**.
7. Within the "Select a Disk to Add" screen, highlight the line identifying the new drive you have just connected. It will be described as, for example,

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“CD ROM-SCSI”, followed by its model number and bus address. Choose **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. Choose 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 choose **Yes**. Otherwise, choose **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. Choose **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”

screen, highlight and activate **Modify Defaults**. Then, within the dialog box, turn on the checkboxes that apply.

9. Choose **OK** when you have finished with this form.
10. A “Messages” Box appears, reporting the progress of the task. When the task is finished, choose **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/rdisk/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/rdisk/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:

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```
/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.

4

■ 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*.

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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 your 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:

- SCSI bus address: 3

As it is possible that the SCSI bus address jumpers for a drive 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 model and its hardware address (SCSI bus address) so that you will be able to identify it later.

■ DDS Drive Model: _____

■ 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. Choose `OK` or press `Return`.
7. A confirmation screen indicates whether any related device drivers needed to be added to the kernel. Choose `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.) Choose `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.

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DDS Tape Drive LED Indicators

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

DDS Tape Drive LED Symbols Used in Table 4-1

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

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Table 4-1. 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)

4

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.

4-28 Configuring HP-UX for Printers and Drives

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.
- 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

5

Backing Up, Restoring, and Updating Your Software

Chapter Contents

- Backing Up Your System and Software.
- Restoring Individual Files.
- Restoring Your Operating System Using the Recovery Tape.

5



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 from corruption. 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 (“DAT”) drives
 - Magneto-optical disk drives
 - Other hard disk drives
- Back up your file system.
- Restore your file system, if needed.

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 the Model 742i.
- 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.

5-2 Backing Up, Restoring, and Updating Your Software

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 system (8Mb), the `-s` option should be used to specify that a smaller set of files be placed on the recovery system.

See `mkrs1M` 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**.

5-4 Backing Up, Restoring, and Updating Your Software

- 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.

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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.

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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.

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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**.

5-8 Backing Up, Restoring, and Updating Your Software

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.

Choose **OK** to set the additional parameters.

9. Choose **OK** to start the restore process.

If confirmation messages appear, read the message(s) and choose **OK** to proceed in each case. SAM displays a screen containing the output of the executed **frecover** command.

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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 Model 742i” in Appendix B 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 **T00L** 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.

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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 **/SYSBACKUP**) 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.

5-10 Backing Up, Restoring, and Updating Your Software

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. Also see, *Solving HP-UX Problems*.

6

Dealing With Problems

Chapter Contents

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

Interpreting the LED Indicators

There are eight diagnostic LEDs, which you can view on the front panel of the Model 742i. The normal indications of these LEDs during operation are given in Table 3-1.

Abnormal boot indications are given in Table 6-1. These refer to conditions which might happen during boot, including hardware failures, *before* HP-UX is running:

Table 6-1. Hardware-Error LED Indications

Self-Test LED Error Display	Hex Code	Possible Assembly Replacement Priority
○ ○ ○ ● ○ ○ ○ ○ ⋮ ○ ● ○ ○ ● ● ● ●	10 ⋮ 4F	1. System board
○ ● ○ ● ○ ○ ○ ● ⋮ ○ ● ○ ● ○ ○ ○ ●	51 ⋮ 59	1. System board
○ ○ ○ ● ● ● ● ●	5F	1. Boot ROM 2. System board
○ ● ● ○ ○ ○ ○ ○	60	1. RAM in rear RAM slot 2. System board
○ ● ● ○ ○ ○ ○ ●	61	1. RAM in front RAM slot 2. System board
○ ● ● ● ○ ○ ○ ○ ⋮ ○ ● ● ● ● ● ● ●	70 ⋮ 7F	1. System board 2. RAM board 3. RAM configuration 4. RAM pair mismatch or System board(7C-7D)
● ○ ○ ○ ○ ○ ○ ●	81	1. System board 2. Mass storage device at SCSI address <i>n</i> in 0.0 <i>n</i> 00.81.

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6-2 Dealing With Problems

Table 6-1. Hardware-Error LED Indications (continued)

Self-Test LED Error Display	Hex Code	Possible Assembly Replacement Priority
● ○ ○ ○ ○ ○ ● ○ ⋮ ● ○ ○ ○ ○ ● ● ●	82 ⋮ 87	1. System board 2. If 0x0006.82 through 0x000A.82, check LAN cable or server. 3. If 0x0000.84, check “A” serial connection. 4. If 0x0000.85, check “B” serial connection. 5. Operating system
● ○ ○ ● ○ ○ ● ●	93	1. BPN Server 2. VME converter board
● ○ ○ ● ● ● ● ●	9F	1. System board
● ○ ● ○ ● ● ○ ○	AC	1. System board 2. VME converter board
● ○ ● ● ○ ○ ○ ○	B1	1. EEPROM 2. System board
● ● ○ ○ ○ ● ● ○	B6	1. RAM board 2. System board
● ○ ● ● ○ ○ ○ ○	B4	System board
● ○ ● ● ○ ○ ● ●	B7	System Board
● ● ○ ○ ● ○ ○ ●	B9	1. EEPROM 2. System board
● ● ● ○ ○ ○ ○ ● ⋮ ● ● ● ○ ○ ○ ○ ●	E1 ⋮ EC	1. System board 2. If 0x000D.E2, set RTC clock or check battery. 3. Operating system

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Table 6-1. Hardware-Error LED Indications (continued)

Self-Test LED Error Display	Hex Code	Possible Assembly Replacement Priority
● ● ● ○ ● ○ ● ○ ● ⋮	E8 ⋮ EB	System board
● ● ● ○ ● ● ● ○ ●	EC	1. VME converter board 2. Motherboard

Table 6-2. Operating-System Error LED Indications

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.
○ ○ ○ ○ ● ○ ○ ○	08	Auto input error.
○ ○ ○ ○ ● ○ ○ ●	09	CMD utility too long.
○ ○ ○ ● ○ ○ ● ○	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 system 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 is configured.

6-4 Dealing With Problems

Table 6-2. Operating-System Error LED Indications (continued)

Self-Test LED Error Display	Hex Code	Possible Operating System Problem
○ ○ ○ ● ● ○ ● ●	1B	Error reading utility into memory.
○ ○ ○ ● ● ● ○ ○	1C	Incorrect checksum. Reading utility into memory.
○ ○ ○ ● ● ● ○ ●	1D	System console needed.
○ ○ ○ ● ● ● ● ○	1E	Internal inconsistency. Invalid boot device class.
○ ○ ● ○ ○ ○ ● ●	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	Bad fastsize.
○ ○ ● ○ ● ○ ○ ●	29	Batch file read.
○ ○ ● ○ ● ○ ● ○	2A	No batch file.
○ ○ ● ○ ● ○ ● ●	2B	Batch input error.
○ ○ ● ○ ● ● ○ ○	2C	Bad batch file.
○ ○ ● ○ ● ● ○ ●	2D	EST file read.
○ ○ ● ○ ● ● ● ○	2E	No EST file.
○ ○ ● ○ ● ● ● ●	2F	EST input error.
○ ○ ● ● ○ ○ ○ ○	30	Bad EST file.

Managing a Boot Failure

The boot program is located in the Boot ROM of your Model 742i.

Here are some things to check if something has gone wrong at this point in the boot process:

Boot Program Initializes Hardware

Problems during this first stage of the boot process are rare. At this stage problems can be caused by:

- No power to the system (check your building's circuit breakers and the power connections to your system equipment)
- Processor hardware failure (see Table 6-1, in this chapter).
- Interface card hardware failure.
 - Model 742i isn't fully plugged in its VME slot.
 - LAN MAU connector is loose.
- Incorrectly connected SCSI cable.

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Turn off the power to the Model 742i (leave any external disks powered up and running). Wait five or ten seconds and turn the power to the system 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 6-1) to see if there is a hardware problem, or if there is an operating system loading problem (Table 6-2).
2. Turn off the power to your Model 742i, and then turn it back on.

6-6 Dealing With Problems

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 system 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  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 system 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:
 - 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 disk, 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

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

For detailed help in troubleshooting the boot process, see *Solving HP-UX Problems*. For additional detail about Boot ROM configuration, see “Booting the Model 742i” in Appendix B, in this manual.

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 system .

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 <i>System Administration Tasks</i> .
-------------	---

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	<ul style="list-style-type: none"> ■ If the failure appears to be associated with the peripheral: <ul style="list-style-type: none"> □ 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	<ul style="list-style-type: none"> ■ 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 <i>Solving HP-UX Problems</i> for detailed information.
LAN	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ 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	Step 3a
File System Corrupted	Step 3b
LAN Communication Problem	Step 3c
Other Situations	Step 3d

6

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 Model 742i 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.

6-12 Dealing With Problems

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 panel of the Model 742i. Otherwise, you can turn the system 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 system 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 reoccur.

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 5 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 6-3. Problems with the Network

Problem	Action
No systems respond to the <code>/etc/ping hostname</code> command.	Check the network connection on the panel of your Model 742i. Make sure that the cable is securely fastened to the connector.
Your system does not respond to <code>/etc/ping</code> from another system on the network.	Check to see if the networking software is still running on your system. Use <code>ps -ef</code> to do so. If it is not running, restart it by logging onto your system as <code>root</code> and running <code>/etc/rc</code> .
Some systems respond to <code>/etc/ping</code> , 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.

FINAL TRIM SIZE : 7.0 in x 8.5 in

A

Installing Additional Memory

Appendix Contents

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

A



RAM Replacement Contents

The RAM replacements for the Model 742i are as follows:

- HP A2816A; two 8 MB RAM boards that add a 16 MB block of memory.
- HP A2829A; two 16 MB RAM boards that add a 32 MB block of memory.
- HP A2827A; two 32 MB RAM boards that add a 64 MB block of memory.

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

Note Be sure to use the anti-static grounding strap which is provided with the RAM upgrade.



A-2 Installing Additional Memory

Planning for Installation of the RAM

Determining Existing Memory

Follow these steps to determine how much memory your Model 742i already has:

1. If your system is operating, shut down the operating system following normal shutdown procedures (see “Shutting Down Your System” in Chapter 3, in this manual).
2. When **shutdown** has completed, turn off your host workstation or card cage. Then turn it on.
3. Note the amount of memory listed when the Boot ROM display shows the memory line, such as the following example:

16 MB of memory have been configured

4. Write down the current amount of memory on your system: RAM
_____ Bytes.

RAM Board Installation Requirements

- Boards must be installed in pairs; each board must be the same size.



Installing the RAM Replacement Pairs

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 before working with the Model 742i board or the RAM modules:

- 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 circuit leads as much as possible.

-
1. Before you start:
 - a. Shut down the operating system.
 - b. Turn off the host workstation or the card cage power.
 2. When you are facing the front panel of the Model 742i, use a flat-blade screwdriver to remove the four screws at the corners of the panel.
 3. Spread the two handles in the front panel. This will have the action of extracting the Model 742i board out of its rear connector.
 4. Pull the board out of the workstation or cage and place it on a static-free surface.

**A**

A-4 Installing Additional Memory

5. Identify the existing RAM boards by their part numbers:
 - a. 98236-66522; 4 MB board.
 - b. 98236-66524; 8 MB board.
 - c. A2576-60001; 16 MB board.
 - d. A2575-60001; 32 MB board.
6. Spread the clips holding one of the RAM boards in place,
7. Raise the RAM board to an angle of 45°. With your fingers near the middle of the raised edge of the board, pull it gently away from you until it is free.
8. Repeat this for the other RAM board.

To insert one new board of the pair you are replacing:

1. Note the RAM board is notched at one end to fit the keyed connector.
2. Place the first RAM board you will install in an empty slot with the labelled side up, the notch to your left and the contacts facing you. Avoid touching the RAM board contacts.
3. Holding the board at the outer (non-contact) edge with the label side up, place it in one of the memory RAM slots at a 45° angle to the system board.
4. Snap the RAM board in place by moving it to the horizontal. Its ends will snap into the slot's spring clips.
5. Install the second RAM board.
6. Re-install the system module in the workstation or cardcage by pushing it back into its slot until it snaps in place.

Replace the four screws in the Model 742i front panel.

A



Verifying the Installation

Follow these steps to verify your RAM upgrade for your Model 742i:

1. Turn on the power to your host workstation or card cage.
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.



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 Model 742i.
- Searching for Bootable Media.
- Redisplaying the Results of a Search.
- Displaying and Setting Paths.
- Resetting the Model 742i.
- 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.
- Using the VME Backplane Networking Parameters

Boot Console User Interface

Introduction

There are times when you want to interact directly with the hardware of your Model 742i before it boots the operating system. The Model 742i 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 system from any specified hardware device.
- Search for hardware devices that contain media from which your system can be booted.
- Reset the system.

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.
- VME backplane network configuration.
- Primary and secondary boot path.
- Console and keyboard path.

System Parameters

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

B-2 Using the Boot ROM

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

Using the Boot Console User Interface

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

1. Shut down your system.
2. Turn *off* the system, 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	cluster_server_identifier

If your Model 742i 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 system 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.* From within this mode, you may enter any of the commands used in the task descriptions that follow.

To enter the boot administration mode, type:

a

and the following prompt is displayed:

BOOT_ADMIN>

Exiting the Boot Administration Mode

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

- Type `exit` at the `BOOT_ADMIN>` prompt.
This returns you to the boot console user interface menu.
- Type `reset` .
- Issue a boot command.

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See the section, “Booting the Model 742i”, for details.

- Turn *off* the Model 742i. There is no need to shut down the system with the special procedure described in Chapter 3, since it 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 
```

```
help 
```

```
? 
```

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

```
help command_name 
```

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 Model 742i

Usually, you start your Model 742i in Normal Mode by turning it on and waiting for HP-UX to boot automatically. However, in some cases, you may not want the usual sequence to occur.

For example, you may want to start your system 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.

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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 
```

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 
```

```
boot P2 
```

The operating system on the specified device is used to start your Model 742i.

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

```
boot device isl 
```

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 system from the backup kernel (`/SYSBCKUP`), type the following at the `ISL>` prompt:

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

B-6 Using the Boot ROM

- 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 system from the main menu of the Boot Console User Interface by typing this command at the prompt “Select from menu:”

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 to see which devices actually contain bootable media, type the following at the `BOOT_ADMIN>` prompt:

search **(Return)**

This causes your system 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 network.

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 the 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 
```

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 the VME backplane network.

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 
```

```
s device_type 
```

where *device_type* is the type of device (`scsi`, `lan`, or `bpn`) 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 
```

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

B-8 Using the Boot ROM

Displaying and Setting Paths

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

Table B-1. System Paths

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

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

```
path 
```

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

Table B-2. Mnemonic Style Notation

I/O Type	Specification Format
Built-in SCSI	<code>scsi.scsi_address.logical_unit_number</code>
Built-in LAN	<code>lan.server_address.init_timeout.io_timeout</code>
RS-232 Port A	<code>rs232_a.baud_rate.word_length.parity_option</code>
RS-232 Port B	<code>rs232_b.baud_rate.word_length.parity_option</code>
VME backplane network	<code>bpn.server_address</code>

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 B-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 B-1 and *path* is the specification of the path in Mnemonic Style Notation as described in Table B-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 *one of the following* at the `BOOT_ADMIN>` prompt:

```
help path (Return)
```

```
help io_type (Return)
```

where *path_type* is one of the path types, except for HP-HIL and SGC, listed in Table B-2. The help screens offer complete descriptions of all path options.

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B-10 Using the Boot ROM

Resetting the Model 742i

The act of resetting your system causes it to restart completely. It's similar to turning the system *off* and then back *on* again.

To reset your system, type the following at the `BOOT_ADMIN>` prompt:

```
reset 
```

The same task is also accomplished by pressing the switch on the front panel of the Model 742i.

Displaying and Setting the Real-Time Clock

It is usually a good idea to set the real-time clock in your system 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 
```

Your system 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 
```

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 
```

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*.

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Displaying and Setting the Autoselect Flag

Autoselect is a variable stored in your system'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 system.

To examine the state of the Autoselect flag, type the following at the `BOOT_ADMIN>` prompt:

```
auto 
```

If Autoselect is set to “on”, when your system is turned on, in normal mode, it automatically attempts to boot the operating system. If it is set to “off”, your system 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 
```

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”.

Hewlett-Packard does not recommend setting Autoselect to any other values.

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 system 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

B-12 Using the Boot ROM

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 
```

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 
```

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 system after isolating it from its boot device, the boot console interface reappears. You can then turn the secure boot mode off, turn *off* your system, reconnect the boot device, and turn the system back on.

Displaying and Setting the Fastboot Mode

When fastboot is enabled (set to “on”), your system does a quick check of the memory during its power-on self tests. This enables your system to complete its boot process quicker. When fastboot is disabled (set to “off”), more extensive memory testing is performed during the self tests causing the boot process to take significantly longer. The default factory setting is for fastboot to be enabled (“on”).

If your system 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 
```

To disable fastboot, type the following at the `BOOT_ADMIN>` prompt:



```
fastboot off 
```

To enable fastboot, type the following at the `BOOT_ADMIN>` prompt:

```
fastboot on 
```

Displaying the LAN Station Address

The LAN station address of your system is the label that uniquely identifies the LAN connection for it at the link level (the hardware level). It is sometimes necessary for you to supply this address to other users. For example, if your system is to become a member of a cluster, the cluster administrator needs to know your LAN station address in order to add your system to the cluster.

To display your system's LAN station address, type the following at the `BOOT_ADMIN>` prompt:

```
lan_addr 
```

The LAN station address is displayed as a thirteen-digit number in hexadecimal notation, like the following:

```
LAN Station Address: 123456-789abc
```

Using the VME Backplane Networking Parameters

You may sometimes want to display or set the VME configuration information for the Model 742i, in case it is connected via the card connector to the VME backplane of the host. 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. 1
  Anchor 0x00200000
  AM code 0x3d
```

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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*

For example, in case you are running more than one Model 742i and want to change the CPU number of the second one to 2, enter the following, in Service Mode:

```
bpn_config 2
```

B



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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.

ARPA/Berkeley host name

A system name assigned to each system that supports ARPA services.

ASCII

American Symbolic Code for Information Interchange

backup

A copy of all or part of the file system.

**Glossary****boot**

To start or activate a system.

boot ROM

A read-only memory which is incorporated into a terminal 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.

BSD

Berkeley Software Distribution.

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 (`cs`).

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.

Glossary-2

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. However for HP-UX 8.0, cluster clients can have locally mounted disks for local data storage. 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

**Glossary**

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 “DAT” 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.

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 a `chmod(1)` command.

fileset

Describes 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.

Glossary-4

heterogeneous cluster

A cluster containing both Series 800 and Series 300 cluster nodes.
Also may be used to refer to a mix of other, non-HP hardware systems in the same cluster.

\$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.

homogeneous cluster

An HP-UX cluster containing only Series 300 or only Series 800 cluster nodes.

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 is responsible for managing the computer's resources.

Korn Shell

An HP-UX shell, featuring command history recall and line-editing.
Invoked as */bin/ksh*.

**Glossary****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.

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.

Glossary-6

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.

ppid

Parent process ID.

Glossary

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.

Glossary-8

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 helps you to do 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 *Using HP-UX* or *Shells: User's Guide* for information on the characteristics of the various shells available with HP-UX.

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**.

**Glossary****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. The standard output file is often called `stdout`, and is automatically opened by the shell for writing on file descriptor 1 for every command invoked. Standard output appears on the display unless it is redirected otherwise.

SU

Super User. *See* **root user**.

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 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.

uid

User ID.

Glossary-10

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.

user ID

An integer which identifies each system user.

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 flexible, graphics-oriented computer, generally high-speed and high-capacity, designed for use in a variety of industrial situations.

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