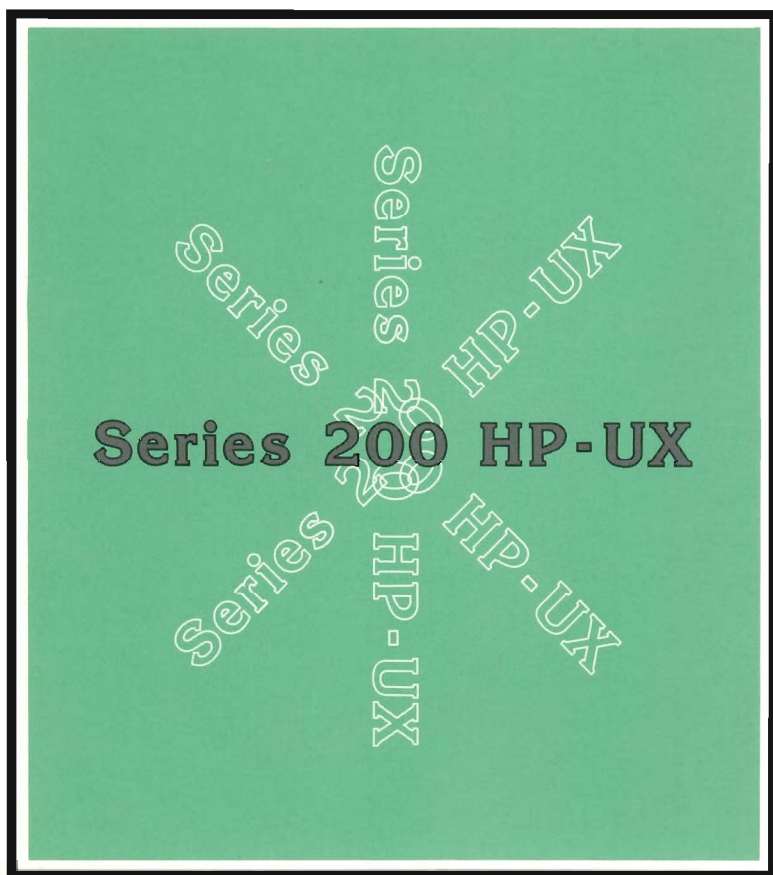


HP 9000 Series 200 Computers
Model 217



Setting Up HP-UX





Setting Up HP-UX for the HP 9000 Series 200 Model 217 Computers

Manual Part No. 98670-90015

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Printing History

New editions of this manual will incorporate all material updated since the previous edition. Update packages may be issued between editions and contain replacement and additional pages to be merged into the manual by the user. Each updated page will be indicated by a revision date at the bottom of the page. A vertical bar in the margin indicates the changes on each page. Note that pages which are rearranged due to changes on a previous page are not considered revised.

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**FEDERAL COMMUNICATIONS COMMISSION
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STATEMENT (U.S.A. ONLY)**

The Federal Communications Commission (in Subpart J of Part 15, Docket 20780) has specified that the following notice be brought to the attention of the users of this product.

Warning: This equipment generates and uses radio frequency energy and if not installed and used properly, that is in strict accordance with the manufacturers instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following:

- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so the computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

- "How to Identify and Resolve Radio-TV Interference Problems".

This booklet is available from the U.S. Government Printing Office, Washington DC 20402, Stock No. 004-000-00345-4.



Chapter 1

Getting Started

Introduction

If you're like most people, reading computer manuals is not your favorite pastime. We strongly urge that you read the remainder of this chapter. This book assumes that you have read these first seven pages; if you choose not to, you are on your own.

One other note: the best way for us to improve the quality of documentation is through your feedback. Please use one of the reply cards at the back of this manual to tell us what was helpful, what was not, and why. Feel free to comment on depth, technical accuracy, organization, and style. Your comments are always appreciated.

This manual will help you get your new "LX" system up and running. It supplements material found in the other HP-UX manuals listed on page 3. Together, these manuals provide all the information you need to install, configure, and begin using the system.

Much of the material in this manual is not covered in other HP-UX documentation supplied with your system. Because this manual was written specifically for the 2.2L version of HP-UX on the Model 217, consider it the final word when using your manuals. In the event of conflicts between the *Series 200 System Administrator Manual* and this book, believe this book. The administrator manual documents the 2.1 version of the HP-UX system, most of which applies to the 2.2L version you received. All differences between the two are documented here.

NOTE

This manual documents **only** the 2.2L version of HP-UX running on specific hardware. See the "Product Overview" in this chapter for a complete description.

How this Manual is Organized

The following is an overview of the chapters in this manual.

Chapter 1: Getting Started

Provides this overview of *Setting Up HP-UX on the Model 217*, discusses using other HP-UX manuals, explains the conventions used in this manual, and describes required and optional accessories, interfaces, and peripherals supported by the 2.2L version of HP-UX.

Chapter 2: Installing Required Hardware

Contains an overview of (and checklist for) the installation process, explains aspects of installing your computer not covered in the Installation Guide, tells how to install the HP 9133D disc drive, and describes how to use the Media Utilities to initialize both the hard disc and other media. Use this chapter, the *Model 217 Installation Guide*, and the installation manual supplied with your hard disc to install all required hardware.

Chapter 3: Installing the HP-UX Software

Tells how to install the HP-UX Operating System. The chapter also describes the "partitioning" of HP-UX as shipped on micro-discs. This technique allows you to install only those parts of the system which you want, conserving disc space. Use this chapter to install the HP-UX system software.

Chapter 4: Installing Optional Hardware & Peripherals

Contains a list of optional hardware (interface boards, mass storage devices, printers, etc.) and describes how to install it. Use this chapter to install optional hardware and to add or move peripheral devices; this chapter **supersedes all information** in the "Adding/Moving Peripheral Devices" section of the *System Administrator Manual*.

Chapter 5: Differences Between 2.1 and 2.2L HP-UX

Presents a complete description of functional differences between the 2.1 and 2.2L releases of Series 200 HP-UX. Use this chapter to find out differences in things such as swap space parameters, the internal terminal emulator (ITE), modifications to the */etc/backup* script, etc.

Appendix A: File Sets

Contains a list of file sets shipped with your 2.2L system. Under each file set heading is a list of each file contained in that file set.

Using Other HP-UX Manuals

This manual should be used in conjunction with other HP-UX documentation shipped with your system. You will be informed when and where to look in these other manuals.

A tabbed page and spine insert are supplied with this book. This manual will fit in the same 3-ring binder that contains the *Model 217 Installation Guide*. Put this manual (*Setting Up HP-UX on the Model 217*) and its tabbed page in front of the Installation Guide; once the hardware is installed, you will probably use this book more often than the Installation Guide.

- Use the HP 9000 *Model 217 Installation Guide* (HP Part No. 09817-90000) and the material in Chapter 2 of this manual to install and test your computer and other required hardware.
- Use the Series 200 *System Administrator Manual* (HP Part No. 98680-90011) and the material in Chapters 3 through 5 of *Setting Up HP-UX on the Model 217* to install, configure, and maintain the HP-UX system.
- The *HP-UX Reference* manual (HP Part No. 09000-90007) contains the syntactic and semantic details of all commands and application programs, system calls, subroutines, special files, file formats, miscellaneous facilities, and system maintenance procedures available on the Series 200 HP-UX Operating System. Use the *HP-UX Reference* when looking for complete specifications of a given command, special file, etc.
- The *HP-UX User's Guide* (HP Part No. 98680-90040) contains information for both the user and the system administrator. Many of the procedures described in the *System Administrator Manual* are covered in less detail in the *HP-UX User's Guide*. The "Task Reference" section of the guide contains a handy summary of typical user and administrator tasks.

In the event of conflicting information between this manual, *Setting Up HP-UX on the Model 217*, and the manuals listed above, follow the procedures or guidelines contained in this manual. The differences — significant but not numerous — are summarized in Chapter 5 of this manual.

Conventions Used in this Manual

The following naming conventions are used throughout this manual.

- Italics indicate files and HP-UX commands, system calls, subroutines, etc. found in the *HP-UX Reference* manual as well as titles of manuals. Examples include */etc/profile*, *date(1)*, *getpid(2)* and *tty(4)*. The parenthetical number shown identifies the *HP-UX Reference* manual section containing that entry.
- The first time a file is mentioned, the complete pathname is given; subsequent references to that file contain only the final file name. Exceptions are made when there is some chance of ambiguity. For example, */etc/profile* is used instead of *profile* to avoid possible confusion with a user's personal *.profile* file.
- Boldface is used when a word is first defined (as **path name**) and for general emphasis (**do not touch**).
- The following typewriter-like font indicates a literal typed by the user or displayed by the system. Keys are shown enclosed in a rectangle.

`fsck /dev/rhd` Return

Note that when a command and/or file name is part of a literal, it is shown in the typewriter-like font and not italics.

- Environment variables such as `PATH` or `MAIL` are represented in uppercase characters. (Environment variables are explained in the *sh(1)* entry of the *HP-UX Reference*.)
- References such as “see *login(1)*” refer to entries in the *HP-UX Reference* manual. Some of these entries will be under an associated heading (the *chgrp(1)* entry is under the *chown(1)* entry). If you cannot find an entry where you expect it to be, use the *HP-UX Reference* manual's permuted index to locate the entry.

Product Overview

This section contains a brief summary of the required and optional hardware, accessories, interfaces, and peripherals for HP-UX 2.2L.

Required Hardware and Software

All of the following are required for proper operation of HP-UX and are part of the “bundled” product that you purchased:

- HP 9817H, Option 001 — HP 9000 Series 200 Model 217 computer with memory management hardware and a Motorola 68010 CPU (Central Processing Unit).

The “Option 001” indicates that the Model 217 contains an HP 98257A card installed at the factory. This plug-in card contains 1048576 bytes of Random Access Memory.

- HP 98204B — a Composite Video Interface card set for your monitor.
- HP 46020Ax HP-HIL (Hewlett-Packard Human Interface Loop) keyboard where x indicates the language version. Although all language versions are supported by the hardware, foreign (non-U.S. ASCII) characters are generally ignored by HP-UX.
- HP 35721A/B/C 14” monitor. The “A”, “B”, “C” suffixes indicate power requirements (the “A” option is for the U.S.).
- HP 9133D winchester disc with Option 001 which indicates a default 1024 byte sector size. This disc has a capacity of 16 645 120 bytes, loosely referred to as 16.64 megabytes, with an integrated 770 Kilobyte (a Kilobyte is 1024 bytes) 3 1/2” micro-disc. It uses a Hewlett-Packard proprietary protocol known as subset-80 and is referred to as an “SS/80” disc.
- Single-user Series 200 HP-UX Operating System, release 2.2L, distributed on 20 double-sided 3 1/2” micro-discs.
- A complete set of HP-UX manuals (including this one). The *HP CS/80 Exerciser* manual you received as part of the HP-UX documentation does not apply to the 2.2L version of HP-UX — please ignore it.

Optional Hardware and Peripherals

The optional hardware, interfaces and peripherals supported by the 2.2L HP-UX system include:

Product	Description	Comments
2225A-AY	"Thinkjet" printer	160 cps ink jet printer
2686A	"Laserjet" printer (requires 98626A, Opt. 001 or 98644A)	8 pgs/min laser printer (see Notes)
46080A	HP-HIL Repeater	Extends keyboard cable
7470A	A-size 2-pen plotter w/ Opt. 002	Must specify Option 002
	HP-IB interface	Replaces RS-232C
7475A	A/B-size 6-pen plotter w/ Opt. 002	Must specify Option 002
	HP-IB interface	Replaces RS-232C
9122D/S	Double-sided 3 1/2" disc drive	Optional (see Notes)
9133D	16.6 Mbyte SS/80 winch. w/ Opt. 001	Optional (see Notes)
	9122S and 1024 byte sectors	Required option
9134D	16.6 Mbyte SS/80 winchester w/ 1024 byte sectors	Optional (see Notes)
		Required option
98256A	256 Kbyte RAM board	For additional memory
98257A	One Mbyte RAM board	For additional memory
98620B	DMA controller board	Improves disc performance
98624A	HP-IB interface	For peripherals (see Notes)
98626A	Async. Serial interface	For peripherals (see Notes)
98628A	Datacomm interface	For Async datacomm only
98644A	Serial interface	For peripherals (see Notes)
98635A	Floating Point Math board	Improves math performance
5061-4215	Male DTE (Modem) cable	For built-in RS-232C
92211L	Design-Plus cabinet rack	For Model 217 and disc(s)

Configuration Notes

The 2.2L version of HP-UX supports a maximum of two hard disc peripherals and two micro disc peripherals. Note that the HP 9133D counts as one of the two possible hard disc peripherals as well as one of the two possible micro disc peripherals. Thus, **only** the following combinations of disc peripherals are supported by the HP-UX 2.2L system. (The first “combination” below is the single HP 9133D shipped as part of your “LX” system.)

1. One HP 9133D
2. Two HP 9133Ds
3. HP 9133D, HP 9134D
4. HP 9133D, HP 9122D/S
5. HP 9133D, HP 9134D, HP 9122D/S

With the exception of the built-in HP 98626A Asynchronous Serial Interface, only a single additional serial interface (HP 98626A, HP 98628A, or HP 98644A) for printers or modem is supported.

Only a single (optional) HP 98624A HP-IB interface is supported. It is used for up to four printers and/or plotters. Details are in the “Installing Optional Hardware and Peripherals” chapter in this manual.

Note that the HP 2686A “Laserjet” printer requires an HP 17255B cable and one of the following RS-232 interface/cable combinations (the HP 98628A Datacomm Interface cannot be used with the “Laserjet” printer):

- built-in RS-232 interface with an HP 5061-4215 Male DTE cable.
- HP 98626A with an HP 5061-4215 Male DTE cable (Option 001).
- HP 98644A with an HP 13242N Male DTE cable.



Chapter 2

Installing Required Hardware

Installation Overview/Checklist

If you have not read Chapter 1, please do so before continuing. Here is a checklist of the steps necessary for the complete installation of the HP-UX Operating System. Use a copy of this list (included in the back of this manual) to check off items as you complete them.

- ___ Install and test the Model 217 computer and monitor.
- ___ Install the HP 9133D (SS/80 protocol) hard disc.
- ___ Confirm proper operation of the computer using the boot ROM.
- ___ Execute the Media Initialization utility shipped with your system.
- ___ Initialize the HP 9133D hard disc and other SS/80 media.
- ___ Execute the System Image Copy utility shipped with your system.
- ___ Copy a miniature HP-UX system to the HP 9133D disc drive.
- ___ Load the miniature HP-UX system and log in as the `root` user.
- ___ Execute the `/etc/sysinstall` shell script.
- ___ Re-boot the system when `/etc/sysinstall` is finished.
- ___ Run the `/etc/sysload` script to install mandatory partitions.
- ___ Install other, non-mandatory partitions.
- ___ Follow the “After Installing HP-UX” guidelines.
- ___ Install/configure optional hardware/peripherals (see Chapter 4).
- ___ Customize certain configuration files (see Chapter 5).

Getting Down to Business

Before installing the HP-UX Operating System software, all required hardware must be properly installed. Most of the information you need to accomplish this task is in the *Model 217 Installation Guide* supplied with your HP-UX system. Here is the procedure:

1. Read Chapter 1 of the *Model 217 Installation Guide*.
2. Follow the instructions in Chapter 2 of the Installation Guide to install your HP 9000 Series 200 Model 217 computer.
3. Follow the instructions in Chapter 3 of the Installation Guide to confirm that the HP 98257A memory card and the HP 98204B Composite Video Interface card are properly installed. See the "If You Have an HP 9817H" section in that chapter.
4. Follow the instructions in Chapter 4 of the Installation Guide to install your HP 46020A HP-HIL keyboard and HP 35721A/B/C monitor.
5. Connect all the cables and power cords as described in the Installation Guide.
6. Follow the instructions in the "Reference" section of the Installation Guide to confirm that the HP-IB System Controller switch on the processor board is set to one (1); this configures it as the "system controller".
7. Follow the instructions in the "Reference" section of the Installation Guide to confirm that the Remote Keyboard Status switch on the processor board is set to zero (0); this indicates a "local" keyboard.
8. Follow the instructions in the "Reference" section of the Installation Guide to set the Control Line Defeat switch on the processor board as follows:

If connecting the built-in RS-232 interface to a modem, confirm that the switch is set to the default of one (1); this "enables" the control lines.

If connecting the built-in RS-232 interface to any device **other than** a modem, set the switch to zero (0); this "disables" (defeats) the control lines.

When HP-UX is powered up it overrides any other settings on the built-in RS-232 interface. You can ignore the remaining RS-232 settings.

Installing the HP 9133D Disc

Install the HP 9133D disc by following the instructions in the operator's manual supplied with the disc. The disc's CONFIGURATION switch **must be set to either zero (0) or one (1)** — they are equivalent — and the disc's ADDRESS switch **must be set to zero (0)** for the disc to work properly with 2.2L HP-UX. Both of these switches are located on the back of the disc and are described in the operator's manual supplied with the disc.

Finally, use an HP-IB cable to connect the HP 9133D disc to the **built-in** HP-IB on the Model 217. The connector is labeled "HP-IB" on the back of the disc unit and on the lower back of the Model 217. See the operator's manual supplied with the disc and Chapter 5 ("Installing HP-IB Peripherals") in the *Model 217 Installation Guide* for details.

Testing the Hardware

Now that all the hardware is connected, it's time to test it. First, a few words about the HP 9133D disc drive.

Turn on the disc drive and the monitor. Wait a minute or so for them to warm up. On the HP 9133D disc drive, both the yellow "fault" light and the red "on-line" light are lit as the power-up cycle and self-test occur. After about 40 seconds both lights on the disc drive should go out — indicating that the disc is in a "ready" state. If the lights remain on, turn off the disc drive then power it up again to repeat the self-test. If the fault light remains lit after the second self-test, contact your local HP Sales Office for help.

Generally, the red "on-line" light indicates that the disc has just been powered up or is being accessed — read from or written to. The yellow "fault" light indicates that the HP 9133D is executing a self-test on the hard disc and micro disc drives during power up.

After the HP 9133D's lights go out, press the power switch on the front of the Model 217. Now, turn to Chapter 7 in the *Model 217 Installation Guide*. Follow the instructions there to check all your connections and confirm that your computer and the installed hardware is working properly. After the boot ROM goes through a test of the computer's memory (which takes a few seconds), the display should look similar to:

```
9817A  <serial #>
Copyright 1984,
Hewlett-Packard Company.
All Rights Reserved.
```

```
BOOTROM 4.0
MC68010 Processor
Keyboard
Graphics
HP-IB
HP 98626 at 9
1048416 Bytes
```

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

This display is described in Chapter 7 of the *Model 217 Installation Guide* as well as in the following section, "Using the Media Utilities". If your computer fails to come up with a display similar to the one shown, review the process above, double-check all the settings and connections, and try it again.

NOTE

If your screen's display is markedly different from the one shown here, see the "Power-Up Self-Test" section in the *Model 217 Installation Guide*. If no message is displayed, repeat the steps provided in the preceding sections of this manual and in the *Model 217 Installation Guide*. If unable to correct the problem by doing so, call your local HP Sales Office for help.

Using the Media Utilities

This section assumes that you have confirmed the proper operation of the monitor, computer, and the HP 9133D disc drive and that they are working correctly and powered up. Now, find the micro disc labeled `SYS_CORE`, Disc 1 of 6 that was shipped with your system. This micro disc contains two distinct stand-alone operating systems that function as utilities:

- `SYSTEM_CP` — the System Image Copy Utility — is used to copy a miniature HP-UX system onto the HP 9133D disc drive. This miniature system is then used to install the HP-UX partitions on the HP 9133D (SS/80 protocol) hard disc.
- `SYSTEM_MI` — the Media Initialization Utility — is used to initialize any media supported by the 2.2L version of HP-UX. This media is restricted to the disc drives listed in Chapter 1, all of which use SS/80 protocol.

NOTE

Both of these utilities **require** that the HP 9133D disc used for system installation has completed its power-up cycle **before** the utility is executed. The HP 9133D is in its “ready” state when the disc’s self-test is completed and both the yellow (fault) and red (on-line) lights go out. Typically, this takes less than a minute.

The micro discs containing the HP-UX Operating System and utilities are double-sided discs with an “auto-shutter” mechanism. This mechanism automatically opens the protective shutter when the disc is inserted in the drive and closes it when the disc is removed. You never have to manually open the shutter to use the disc (and should not do so). The HP 9133D also has a feature called “Media Monitor” that automatically monitors the accumulated wear on micro discs; see Chapter 3 of the Operator’s Manual supplied with your disc drive for details.

Interacting with the Boot ROM

Before inserting the micro disc (labeled `SYS_CORE`, Disc 1 of 6) into the disc drive, press the `Return` key. This tells the boot ROM to pause its search for available operating systems. When you press `Return` the boot ROM's status message on the bottom of the screen indicates that it is "paused" by displaying:

```
PAUSED (RETURN To Continue)
RESET To Power-Up
```

Of the eight ways you can attempt to insert the micro disc in the drive, only one is correct. Holding the micro disc with the protective shutter facing the disc drive and the metal spindle on the bottom, insert it into the drive. Push the micro disc in until it latches in the drive. This requires very little force. The micro disc drive's red light will come on briefly as the disc settles in place.

Once the micro disc is in the drive and **after** the micro disc drive's access light has gone out, press `Return` again to tell the boot ROM to continue searching for an available operating system. The boot ROM will indicate this by replacing the message shown above with the message:

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

Here are the typical sequences for booting (i.e., loading and running) an operating system:

1. Make sure that the monitor and disc drive are powered up and that the HP 9133D disc has completed its power-up cycle (its indicator lights have gone out). The computer should not be powered up yet.
2. Turn on the Model 217 computer's power switch. Once the boot ROM has "found" the keyboard, indicated by `Keyboard` on the left side of the screen, follow step 3, 4 or 5 depending on the circumstances.

3. **If** you are loading a stand-alone utility (that functions as an independent operating system) from a micro disc:
 - a. Press **Return**, to pause the boot ROM's search for an operating system.
 - b. Insert the micro disc containing the stand-alone system into the micro disc drive and wait a moment for the micro disc drive's access light to go out.
 - c. Then press the **Return** key to tell the boot ROM to continue its search.
 - d. The boot ROM will then search for and display all available operating systems and wait for you to specify which one to load.
4. **If** you are loading an operating system (HP-UX) from the hard disc but want to see what other operating systems are available:
 - a. After the **Keyboard** entry is displayed, press the space bar once to tell the boot ROM to search and display all available operating systems without loading the first one it finds.
 - b. The boot ROM will then search for and display all available operating systems and wait for you to specify which one to load.
5. **If** you want to load HP-UX and it is on your hard disc, you need not do anything due to the boot ROM's search priorities. Because the boot ROM will always "find" an operating system on the hard disc before one on a micro disc, the HP-UX system on the hard disc will be found and loaded first. Thus, once HP-UX has been installed on the hard disc, simply powering up the equipment will result in HP-UX being booted (loaded and run).

Let's get back to the stand-alone utilities. The boot ROM's status message (on the bottom of the screen) should indicate that it is searching for an operating system. Remember, pressing the space bar **after** the boot ROM displays that it has found the keyboard **but before** it finds and loads an operating system tells the boot ROM to go through its self-tests and show available system resources without automatically loading the first operating system it finds. Once this has been done, you must specify which operating system to load, but do not do so yet.



After the self-test and search sequence has completed (one or two minutes), your display should look like this:

```
9817A  <serial #>                :HP9133 REMV, 700, 1, 0
Copyright 1984,                  1M SYSTEM_MI
Hewlett-Packard Company.        1C SYSTEM_CP
All Rights Reserved.
```

```
BOOTROM 4.0
MC68010 Processor
Keyboard
Graphics
HP-IB
HP 98626 at 9
1048416 Bytes
```

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

Your display will vary depending on the number and type of installed interface and memory cards. This display reflects the standard configuration described in Chapter 1.

The left side of the screen shows system resources (the built-in HP 98626 card at select code 9, the built-in HP-IB interface card, other interface cards if present, memory, etc.) and the right side of the screen shows all accessible operating systems. The display above indicates that two operating systems — SYSTEM_MI and SYSTEM_CP — are present on a removable medium (REMV) in the HP 9133D disc drive at select code 7, bus address 00, unit 1, volume 0. One of the two operating systems can be loaded by typing 1M or 1C respectively.

The message at the bottom of the screen indicates the current status of the boot ROM. Further details on the boot ROM's operation are provided in the *Model 217 Installation Guide* and in Chapter 4 ("System Boot and Login") of the *System Administrator Manual*.

If you have an optional HP 98620B DMA Controller, you should install it **before** initializing your HP 9133D disc drive. See Chapter 4 of this manual for instructions on installing the HP 98620B.

Initializing the HP 9133D Hard Disc

The HP 9133D hard disc **must** be initialized before installing HP-UX. Initializing the disc's medium performs a read/write test on the entire medium and "spares", or marks as inaccessible, any areas not verified to be reliable. The typical initialization time for the HP 9133D hard disc is about 20 minutes; for the micro discs, about 1.5 minutes.

The disc drive and computer should still be powered up. If they are and the display shows the two available media utilities (stand-alone operating systems), proceed with step 2 below; otherwise, begin with step 1.

1. Turn on the power switches on the disc drive, monitor, and computer. Wait a minute or so for the HP 9133D disc to complete its power-up cycle — the disc **must** be in a "ready" state (i.e., have completed its self-test after which both the yellow and red lights will go out) **before** attempting to load the Media Initialization Utility. Once the disc drive's lights have gone out and the boot ROM is displaying:

SEARCHING FOR A SYSTEM (RETURN To Pause)

at the bottom of the screen, press **Return** (to pause the boot ROM's search for an operating system). The boot ROM will indicate its "paused" state by replacing the message above with the message:

PAUSED (RETURN To Continue)

Now insert the micro disc labeled SYS_CORE, Disc 1 of 6 into the micro disc drive and wait for the micro disc drive's access light to go out. Then press **Return** to tell the boot ROM to continue its search for an operating system. The boot ROM will again display the message:

SEARCHING FOR A SYSTEM (RETURN To Pause)

Soon, the right side of the screen will display:

```
:HP9133 REMV, 700, 1, 0
1M SYSTEM_MI
1C SYSTEM_CP
```

When you see the display above, go on to step 2. If the display does not appear as shown, confirm that the proper disc is in the HP 9133D disc drive and that the disc drive has completed its power-up cycle as described above, then repeat the previous step.

2. Now type:

1M

to choose the Media Initialization Utility, `SYSTEM_M1`. The characters you type will be echoed on the lower, right-hand corner of the screen.

If the characters are entered correctly, the system will respond by replacing:

`SEARCHING FOR A SYSTEM (RETURN To Pause)`

on the bottom of the screen with the message:

`BOOTING A SYSTEM`

If you type in the characters incorrectly (for example, as `1m`), the system will take no action and you must re-enter the characters correctly.

3. While the boot ROM loads the utility, the red access light on the micro disc drive is lit. Loading the utility takes about a minute; messages are displayed indicating that the utility is booting. Once the utility is running, the following messages appear:

`c Copyright Hewlett-Packard Company, 1984.`

`* All rights reserved.`

`HP-UX Media Initialization Utility
for Series 200 Computers
Rev [2.2] 8/24/84`

`Do you want to proceed (Y/N)?`

4. Answer by pressing `Y` for "yes". You will not need to press `Return` unless requested to do so. The utility then scans for all accessible disc devices with media and lists them numbered 1 to N where N is the number of disc devices that it finds. Here is a typical display:

```
1: HP9133 removeable disc, 700, 1, 0
2: HP9133 fixed disc, 700, 0, 0
```

The utility then prompts:

`Initialize which device? (repeat scan)`

Supply the number that corresponds to the HP 9133 fixed disc entry (2 in the example above) on which the HP-UX system will reside followed by `Return`. If the number you type is not in the list, the utility repeats its request. The utility will repeat the scan if you enter nothing and press `Return`.

5. The utility then lists the device you chose to initialize and asks for confirmation before proceeding. If it was not the device you intended, press **N** for "no". You then have a choice of going through the same process or exiting the utility and returning to the boot ROM display. If the device shown is the one you want to initialize, press **Y** for "yes".

Step 6 is different than described below if you are initializing micro discs; see the "Initializing Other SS/80 Media" section which follows this procedure.

6. You then are prompted for an interleave factor for the installation disc and supplied with three values: the minimum and maximum allowable interleave factor and a default interleave factor. Your display may vary, but will look similar to:

Interleave factor[1..8] (defaults to 3)

indicating that the interleave must be in the range 1 through 8 inclusive and that the default interleave factor is 3. The minimum and maximum values are always shown as a range enclosed in brackets.

- a. If you are **not** using an optional HP 98620B DMA interface, respond with 7 followed by **Return**.
- b. If you **are** using an optional HP 98620B DMA interface, respond with 4 followed by **Return**.

CAUTION

Do **NOT** interrupt power to the computer or SS/80 device during disc initialization. Terminating the initialization process this way may **DAMAGE** the disc medium.

7. The utility begins initializing the disc and displays:

Medium initialization in progress

Because the utility takes about 20 minutes to initialize the HP 9133D hard disc drive, you might want to read the remainder of this chapter and the first part of Chapter 3 while you are waiting.

When the utility has finished the process it will display:

Medium initialization completed

8. Once the hard disc is initialized, the utility gives you the choice of initializing another mass storage medium or returning control to the boot ROM by prompting:

Exit to the BOOTROM? (Y/N)

If you wish to initialize one or more micro discs (see the following section), respond to the prompt with ☐N and the utility will re-execute as in step 3. When you are finished with the initialization utility:

- a. If you have removed the micro disc labeled SYS_CORE, Disc 1 of 6 from the micro disc drive, re-insert it now and wait for the drive's access light to go out.
- b. Now respond to the prompt above with ☐Y then immediately press the space bar once to keep the boot ROM from loading the first system it finds. You will again see:

```
:HP9133 REMV, 700, 1, 0  
  1M SYSTEM_MI  
  1C SYSTEM_CP
```

on the right-hand side of the screen and the message:

SEARCHING FOR A SYSTEM (RETURN To Pause)

at the bottom of your display. Leave the computer in this state for the next phase of the installation process.

Initializing Other SS/80 Media

After initializing the HP 9133D hard disc, you may want to take time to initialize one or more micro discs for system backup or data storage. **Note that the media utilities cannot be used while HP-UX is running** because they are supplied as a separate operating system. To initialize more media, respond as indicated in step 8 above or re-execute the Media Initialization Utility beginning at step 2 above. To initialize micro discs:

1. Once the Media Initialization Utility is running, remove the micro disc labeled `SYS_CORE`, Disc 1 of 6 from the micro disc drive and replace it with an uninitialized micro disc.
2. Follow the procedures described in steps 4 and 5 above. In step 4 above, be sure to supply the number that corresponds to the HP 9133 removable entry (shown as 1 in the preceding example).
3. The remaining steps are as described above with the exception of step 6. Replace step 6 in the description above with the following:
 - a. You will be prompted for a **formatting option** for the micro disc. For the micro disc drive on the HP 9133D (or an HP 9122D/S), respond with formatting option 3 which specifies 1024 bytes per sector, double-sided media and provides a total of 770 Kbytes per micro disc.
 - b. The utility will format the disc then prompt you for an interleave factor as described in step 6 of the preceding section. Ignore the references to the optional HP 98620B DMA interface.

The appropriate response **for the HP 9133D or HP 9122D/S micro disc** is 2. You may also initialize micro discs for other systems using this utility. See the operator's manual supplied with the HP 9133D for other format and interleave information.

After you give the utility the interleave factor, it responds as described in steps 7 and 8 in the preceding section. You will again have the choice of initializing other media or terminating the utility. When you are ready to terminate the utility, follow the instructions in step 8 of the preceding section to leave the computer ready for the next phase of the installation process.

What to do Next

It is assumed that you have properly installed and tested your hardware. The HP 9133D hard disc on which the system will be installed should be initialized and operating correctly. If all these conditions are not met, complete them before going on to Chapter 3 where you will install the HP-UX Operating System software.

Before continuing with the next chapter, skim Chapter 1 in the Series 200 *System Administrator Manual* shipped with your system to gain familiarity with that manual as well as with the system administrator's responsibilities. After reading that short chapter, continue with Chapter 3 in this manual.

Chapter 3

Installing the HP-UX Software

Overview of the Process

This chapter explains how to install the HP-UX Operating System software. The topics covered as part of the software installation procedure include:

- Using the System Image Copy utility to install a miniature HP-UX system on your HP 9133D hard disc.
- Booting the miniature HP-UX system and logging in as the root user.
- Executing the */etc/sysinstall* shell script.
- Re-booting the miniature HP-UX system after */etc/sysinstall* is finished.
- Understanding the partitioning of the HP-UX Operating System into “partitions” and “file sets”.
- Installing the “Core” partition.
- Installing other, non-mandatory partitions and file sets.
- Booting up the complete HP-UX system for the first time.
- Following the provided guidelines for tasks to perform once the software installation is complete.

Note that all of the tasks in Chapter 2 **must be completed before** attempting to install the HP-UX software.

Most of the installation process — from installing the miniature HP-UX system to installing partitions and file sets — takes between 25 minutes and 2 hours. The former time applies if you are a fast reader and install only the first two partitions (the mandatory and recommended ones); the second time is more accurate if you read a tad slower and install all six of the HP-UX partitions.

Software Installation Process

This section explains how to install the miniature HP-UX system on your HP 9133D hard disc drive as well as other required installation tasks that **must** be completed before installing any HP-UX partitions and/or file sets.

Using the System Image Copy Utility

The following steps explain how to install a miniature HP-UX system; the software “tools” contained in this miniature system will then be used to install the remaining HP-UX software. Three micro discs in the `SYS_CORE` partition contain the miniature HP-UX system. These micro discs are labeled `SYS_CORE 1 of 6`, `SYS_CORE 2 of 6`, and `SYS_CORE 3 of 6`.

General Usage Notes

First, a few general usage notes about the System Image Copy Utility.

- To exit the utility at any time, press `Stop`. This causes the utility to abort the operation and to begin execution at the initial display shown in step 2 below.
- To exit the utility when it is waiting for a response other than `Y` or `N`, press `ESC` followed by `Return` to return control to the boot ROM. If you press these keys, the utility will begin execution as described in step 2 below.
- Because the following description includes error handling and some special cases, it appears long. If you execute the utility without making any mistakes — such as removing a micro disc from the drive as it is being accessed — the procedure will not take long; the screen will be about two-thirds full when you are done.

Loading the Utility

The monitor, computer, and HP 9133D disc drive should still be powered up and the right side of the screen should display:

```
:HP9133 REMV, 700, 1, 0
 1M SYSTEM_MI
 1C SYSTEM_CP
```

The message:

SEARCHING FOR A SYSTEM (RETURN To Pause)

should appear at the bottom of the screen. If you have changed the state of the computer, disc drive, or monitor since the final step of initializing the HP 9133D hard disc described in Chapter 2, follow the appropriate instructions in that chapter to achieve the display shown above. The micro disc labeled **SYS_CORE, Disc 1 of 6** must be in the micro disc drive and the HP 9133D disc **must** be in its "ready" state (i.e., both access lights must be out) **before** executing the System Image Copy Utility. Once these conditions are met, proceed with step 1.

1. Type **1c** to load the System Image Copy Utility (**SYSTEM_CP**). The boot ROM status message at the bottom of the screen should now read:

BOOTING A SYSTEM

If you type in the characters incorrectly (for example, as **1c**), the system will take no action and you must re-enter the characters correctly.

The disc drive's light will come on as the boot ROM loads the utility. It takes about two minutes during which time you will see a series of messages indicating that the utility is booting. Once the utility is running, the following copyright display appears:

**c Copyright Hewlett-Packard Company, 1984.
* All rights reserved.**

2. This is followed by:

**HP-UI System Image Copy Utility
for Series 200 Computers
Rev [2.2] 8/24/84**

Do you want to proceed (Y/N)?

Answer the prompt with **Y** (for "yes") to continue. If you answer with **N** (for "no"), the installation utility terminates and returns control to the boot ROM. All keys except **Y**, **N**, and **Stop** are ignored.

3. The utility then scans for all accessible disc devices with media and lists them numbered 1 to N where N is the number of disc devices that it finds. Here is a typical display:

```
1: HP9133 removeable disc, 700, 1, 0
2: HP9133 fixed disc, 700, 0, 0
```

The utility then prompts:

Destination device for image copy? (repeat scan)

for you to supply the number that corresponds to the disc on which you are going to install the system, followed by **Return**. If the number you type is not one shown in the scan, the utility repeats the request.

In the case shown above you would type in 2, followed by **Return**. You can also enter nothing and press **Return** to have the utility repeat its scan. This is convenient if the disc was not in the drive when the utility did its initial scan. Remember, the scan searches for all accessible disc devices that contain media.

If the device you choose is not a legal destination device, the scan of disc devices is repeated and you are asked to re-enter the destination device number. Once a legal destination unit is specified, the utility continues with step 4.

4. The utility then prompts:

Source device for image copy? (repeat scan)

for you to supply the number associated with your source disc device as displayed in the scan above. In the case shown above, you would type in 1, followed by **Return**.

If the number you type is not one shown in the scan, the utility repeats the request. You can also repeat the scan by pressing **Return** without entering anything. If you repeat the scan, the utility will display the destination device previously selected.

The correct disc for installing your system (labeled SYS_CORE, Disc 1 of 6) must be on the source device and be accessible or the message:

```
Disc in source device was not disc 1.
Insert disc 1.
```

is displayed. If the source device is not accessible (or not initialized, not in LIF format, etc.), the utility gives a message to that effect and repeats the scan. If everything is in order, the utility proceeds with step 5.

5. Next, the utility prompts:

Name of image source file? (HP_UX)

For installation of the system, just press `Return` for the default file name HP_UX. If the default source file is not found or the wrong micro disc is in the drive, the utility provides an appropriate message, repeats its scan of disc devices, and returns to step 4 where it again prompts for a source device.

If the correct micro disc is in the drive (labeled SYS_CORE 1 of 6), the system soon responds with:

Place disc 2 into device 1 and press `Return`

where disc 2 is the next disc in the sequence (labeled SYS_CORE 2 of 6) and device 1 refers to the micro disc drive as shown in the sample display.

When you get the above message, remove disc 1 from the micro disc drive, insert disc 2 and, after the drive's access light goes out, press `Return`. The utility then begins copying the file from the source device while displaying:

Reading

If, after successful reading, the utility discovers something wrong with the destination device (it was disconnected from the system or otherwise inaccessible), the utility displays an appropriate message. Press any key to continue and the utility will begin execution again at step 2.

Otherwise, if all is well, the message:

Writing

is displayed. **Do not remove the source disc yet.**

6. Because the source is a multi-disc file, after the information from the second disc has been copied to the destination device, the message:

Place disc 3 into device 1 and press `Return`

is displayed where 3 refers to the disc labeled SYS_CORE 3 of 6) and device 1 refers to the micro disc as before. **Do not remove the source disc** until this message appears. When it does, remove the micro disc that was just copied and insert the third and final disc. After the access light on the micro disc drive goes out, press `Return`.

If you insert a disc out of sequence, the message:

Wrong disc of file HP_UX

appears. If the disc is the correct one but the utility cannot access the HP_UX file, the message:

File HP_UX was not found on device.

appears. Either of these two messages will be followed by a return to the beginning of step 6 where the message:

Place disc N into device M and press [Return]

is repeated. If this happens, correct the situation by inserting the correct disc. Otherwise, you will see the Reading and Writing messages as in step 5 above.

7. After successfully copying the third disc in this sequence, the utility displays:

Copy completed.

Exit to the BOOTROM? (Y/N)

Once this message appears, remove the third micro disc from the disc drive. Then press **[Y]** to return control to the boot ROM and **immediately** press the space bar once to keep the boot ROM from loading the first operating system it finds. (Pressing **[N]** causes the utility to repeat execution starting at the initial display shown in step 1.)

The miniature HP-UX system is now installed on your HP 9133D disc.

Booting the Miniature HP-UX System

If you followed the final directions in step 7 above (and properly exited to the boot ROM), the system console should now display:

```
9817A  <serial #>                :HP9133, 700, 0, 0
Copyright 1984,                    1H HP-UX
Hewlett-Packard Company.
All Rights Reserved.
```

```
BOOTROM 4.0
MC68010 Processor
Keyboard
Graphics
HP-IB
HP 98626 at 9
1048416 Bytes
```

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

As before, your display varies depending on the number and type of installed interface and memory cards. Notice the presence of the miniature HP-UX system represented by:

```
:HP9133, 700, 0, 0
1H HP-UX
```

on the right-hand side of the screen. This indicates that the miniature HP-UX system now resides on your HP 9133D disc (at select code 7, bus address 00, unit 0, volume 0) and can be loaded by typing 1H.

Now load the HP-UX system by typing `lh`. The hard disc drive's access (on-line) light will come on as the system is loaded and, in a few seconds, a display similar to the following will appear:

```
CONSOLE is ITE
ITE + 1 port(s)
98626 at select code 9
Internal HPIB present
real mem = 1048576
avail mem = 703488
(c) Copyright 1983, 1984 Hewlett-Packard Company.

.  <other copyright notices>
.

Root device major is 0, minor is 0
Swap device major is 0, minor is 0, start is 14255, size is 2000

login:
```

indicating that the system console is the Internal Terminal Emulator (ITE), that there is a single port available (for a modem or printer) besides the one associated with the system console, that the built-in HP 98626A interface is at select code 9, and that there is an internal HP-IB interface present.

The amount of actual and available memory is displayed in bytes. The major and minor numbers for both the root and swap devices should be 0. Major and minor numbers and "swapping" are explained later in this manual. The swap device's `start` parameter is the block number (14255 by default) where the swap space starts. The swap device's `size` parameter is the size in 1024-byte blocks of the swap area — a default of 2000 blocks when installed. Note that the swap device's parameters can be changed with the `sconfig(8)` command as discussed later in this chapter and in Chapter 5 of this manual.

If you do not see a close approximation of the screen display shown above, something is wrong. If this is the case, turn off the computer, wait a few seconds, turn the computer on again, press the space bar as before, and repeat the procedures beginning at the "Booting the Miniature HP-UX System" heading above. If this isn't successful, contact your local HP sales and service office for assistance.

The final line in the display above is prompting you to “login” to the system. Respond with:

```
root 
```

The user `root` does not have a password at this time. If you mis-type `root`, the system may prompt you for a password because the system interprets virtually all input as valid for a login name then prompts for a password as part of its protection protocol. If this happens, respond with then, after the system displays `Login incorrect` followed by another `login:` prompt, type `root` again.

You should soon see:

```
login: root
(c) Copyright 1983, 1984 Hewlett-Packard Co.
.
.    <other copyright notices>
.
#
```

where the `#` character indicates that you are the “super-user” `root` and the system’s readiness to accept your input. You have just logged in to the miniature HP-UX system and are ready to run the `/etc/sysinstall` shell script to increase the number of available blocks in the file system.

Using the `/etc/sysinstall` Script

This section describes how to use the `/etc/sysinstall` shell script to increase the number of blocks available to the file system. Remember that only a miniature file system containing HP-UX was loaded earlier. The size of the swap space and the size of the file system should always total 16255 — the number of 1024-byte blocks on the HP 9133D hard disc.

By default, the size of the swap space is 2 Mbytes (i.e., 2000 1024-byte blocks). This should be more than sufficient for most purposes on your single-user system. However, **if you have more than 2 Mbytes of RAM installed in your computer or expect to be running more than 2 Mbytes of processes in addition to the processes that fit in the computer's RAM at one time**, consider running the `sconfig(8)` command to increase the swap space on your disc. If you want to increase (or decrease) the amount of swap space on your system, you should do it now; waiting until later will require a complete re-installation of the system at that time.

If you do choose to execute `sconfig` to change the default size of the swap space, remember that the size of the HP 9133D **not including swap space** is 16255 blocks. See the “Configuring HP-UX” section of the “System Administrator’s Toolbox” chapter in the *System Administrator Manual* and the `sconfig(8)` entry in the *HP-UX Reference* if you want to change the size of the swap space. Most of you can safely ignore this and continue with the installation process. The system’s swap space is explained in the “File System Implementation” and “Memory Management” sections of Chapter 3 (“Concepts”) in the *System Administrator Manual* and discussed further in Chapter 5 of this manual.

Now type the following at the system console:

```
/etc/sysinstall RETURN
```

When the `/etc/sysinstall` shell script executes, it will display:

Enter number of blocks:

on the screen. The `sysinstall` script is prompting you to enter the number of 1024-byte blocks available for the file system on your HP 9133D hard disc. Assuming that you want to use the default size swap space of 2000 blocks, respond with:

This number of blocks will be the size of your file system, leaving 2000 blocks allocated for the swap area on the disc.

After doing some "magic" with the file system on the HP 9133D disc drive, *sysinstall* executes an HP-UX command, *fsck(8)* to check the new file system's integrity. On the miniature HP-UX system, the *fsck* command takes about one minute to execute. When *fsck* is finished, the screen will look similar to:

```
/dev/hd
File System:   Volume:

** Phase 1: Check Blocks and Sizes
** Phase 2: Check Pathnames
** Phase 3: Check Connectivity
** Phase 4: Check Reference Counts
** Phase 5: Check Free List (Ignored)
** Phase 6: Salvage Free List
78 files 1119 blocks 12910 free

***** BOOT HP-UX (DO NOT SYNC!) *****
```

This indicates that your file system currently contains 78 files using a total of 1119 1024-byte blocks and that 12910 1024-byte blocks are currently available (free) for data storage. The figures on your display may vary slightly; the substance of the messages should be the same.

The final message shown above indicates that, because of the special circumstances (magic) that *sysinstall* performs, **you must re-boot the system before taking any other action** to save the work done by *fsck*. To re-boot the system: power down the computer, wait a few seconds, then switch on power to the computer again. Because of the boot ROM's search priorities, it will find the new HP-UX system on the HP 9133D hard disc before any other operating systems, such as the stand-alone utilities. Thus, without intervention, the boot ROM automatically loads and runs (boots) HP-UX.

After the system boots, the system console's display will look like the one previously shown. Respond to the system's login: prompt with: `root RETURN` as before.

The next step is to read the following material on partitions and file sets. After that, you will begin installing partitions on the HP 9133D disc.

Partitions and File Sets

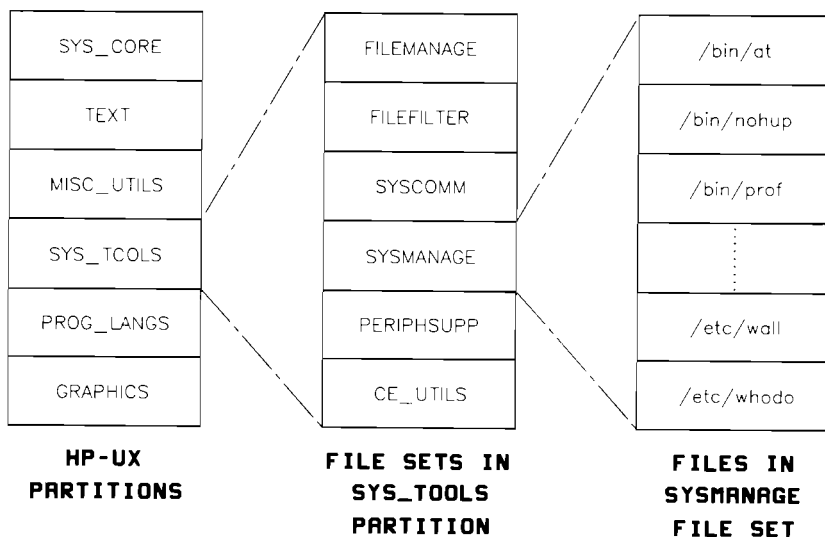
The HP-UX Operating System is "partitioned" to provide you the greatest flexibility in using the space on your HP 9133D disc. This section provides both logical and functional descriptions of how the partitions work and how they are structured. Included in this section are two typical scenarios which illustrate how people with different needs might set up their systems.

The concepts of partitions and file sets are unique to the 2.2L version of the HP-UX Operating System. The separation of the operating system into discrete groups of files allows you to install only those elements of the operating system that you will use. This mechanism also allows you to install or remove elements of the operating system at any time.

Except for guarding against the possibility of attempting to install files which your disc does not have enough space to contain, not much planning is required. If you need features that have not yet been installed on your system, and you have sufficient space on your disc, load them. Conversely, if you find that you are not using parts of the system and wish to release the disc space that those parts use, remove them. The procedures for installing and removing file sets and partitions are described in the section following this one.

How Partitions and File Sets Work

You can think of partitions, file sets, and files as “building blocks” of the HP-UX system. The smallest unit of information in this scheme is a **file**. Groups of logically related files are grouped into **file sets**. File sets, in turn, are grouped into logical entities called **partitions**. Finally, the partitions — taken as a whole — comprise the HP-UX Operating System. Each of the six color-coded partitions represents a logical grouping of file sets; each file set, a logical grouping of files. The following diagram illustrates the relationship between the operating system, partitions, file sets, and files.



Relationship between HP-UX, partitions, file sets and files

When, earlier in this chapter, you installed the miniature HP-UX system, a shell script called `/etc/sysload` was copied to the HP 9133D hard disc. This script allows you to copy one or more of the file sets that make up a partition.

In some cases, a file set will depend on other file sets. A **dependency** is another file set that must be installed along with (either before or after) the file set in question. When trying to load a file set that has a dependency, the `/etc/sysload` script loads the file set, then informs you of the dependency. If necessary, the script prompts you to insert a different micro disc from the same partition; it specifies the number of the micro

disc. The script then loads the dependency file set. If more than one dependency exists, the script may prompt for yet another micro disc in the same partition.

Everything in a partition is discrete. A partition contains file sets, including any related dependent file sets. Dependencies do not cross partition boundaries. Also, file sets never cross disc boundaries although a given file set may have dependencies on other micro discs within a partition.

The smallest object that you can control (i.e., install, remove, or replace) in this scheme is a file set; single files may not be installed using the */etc/sysload* script. You can install or replace file sets and/or partitions at any time using *sysload*.

Another script — */etc/sysrm* — lets you remove file sets from the system. The */etc/sysrm* script is mentioned below and described in the “Removing File Sets” section later in this chapter.

The */etc/filesets* Directory

The *sysload* and *sysrm* scripts build and maintain a directory called */etc/filesets*. This directory contains files whose names represent all **currently installed** file sets. Each of these files contain the names of all the files in that installed file set. (You may want to read that sentence again.) The *sysload* and *sysrm* scripts use the information in the */etc/filesets* directory to inform you that a file set is already installed (if you attempt to install it twice) or that a file set does not exist (if you attempt to remove a non-existent file set).

Some files should **never** be removed from the system. All the files in the *FSET_CORE1*, *FSET_CORE2*, and *FSET_CORE3* file sets fall in this category. These files must remain present for the minimal operation of the 2.2L version of HP-UX.

In addition to the names and contents of installed file sets, the */etc/filesets* directory contains a file called *noremove*. The *noremove* file contains names of specific files used by the *sysload* and *sysrm* scripts that must not be removed from the system under any circumstances. If you have additional files that you do not want removed from the system by the *sysrm* script, add their complete pathnames (without the leading */*) to this list. Do **not** delete any file names from this file.

Except for adding file names to */etc/filesets/noremove* as described above, **do not modify the */etc/filesets* directory or its contents**; doing so will defeat its important role in the system.

You need not execute either the *sysload* or *sysrm* scripts to access the information in the */etc/filesets* directory. For example, use the following command to ascertain whether or not a particular file is on the system:

```
grep 'fname' /etc/filesets/* Return
```

where *fname* is the name of the file for which you are looking. Similarly, use the following to look at the contents of the */etc/filesets* directory:

```
ls /etc/filesets Return
```

This will tell you whether or not a given file set has been installed. If you attempt to install an already-installed file set using *sysload*, you are informed that it is already on the system and given a choice to remove it and continue or not. One implication of this is that you can re-install a file set if the files in that file set are lost or damaged. The *sysload* and *sysrm* scripts update the *filesets* directory as needed.

Mandatory vs. Non-mandatory Partitions

Only one partition **must** be installed on your system: *SYS_CORE*. This partition contains the *FSET_CORE* file sets which in turn contain essential shell programming facilities and commands used by other file sets. The *SYS_CORE* partition also contains the stand-alone operating systems *SYS-TEM_MI* and *SYSTEM_CP* and *HP_UX* — the miniature HP-UX system. All the other partitions contain only file sets. The *SYS_CORE* partition is **essential** for the minimal operation of HP-UX. It is on the micro discs which have no colored labels. You can run HP-UX with only this single partition installed.

All the other partitions are considered “non-mandatory”; they need not be installed for the proper operation of HP-UX. However, for most needs we strongly recommend that you install the *SYS_TOOLS* partition as well. This partition contains fundamental tools for file management, file manipulation, process control, inter-computer communication, and peripheral support. It also contains the Customer Engineer (CE) Utilities which should be installed to allow CEs to perform on-site testing. Note that the *CE_UTILS* file set requires both the *c* and *dgl* file sets to compile correctly. The *SYS_TOOLS* partition is on the micro discs with the red labels.

Besides these two partitions, the installation of all other partitions and file sets depends on your intended use of the system. This factor must be weighed against your need for available storage space on the HP 9133D hard disc.

The next section describes two typical combinations of installed file sets and partitions to serve as guidelines. Remember too, the ability to later add or delete file sets as need dictates gives you flexibility; you will not be limited by decisions you make when initially setting up the system. Note that you may later be limited by available disc space; be sure to read the section "A Warning about Disc Space" below.

Two Typical Scenarios

Consider a user who is doing software development. She installs most of the software development and support tools partitions (not including the miscellaneous utilities partition) as well as some of the programming language partition. Because she prefers not to program in FORTRAN, she does not install the file set containing that language. She wants to do text processing work but does not use the "on-line" manuals, so she does not install those file sets. Her software does not use graphics so she ignores that partition altogether. This user's system now occupies approximately 9 megabytes on her HP 9133D disc leaving about 7 megabytes of working space.

Consider another user whose focus is on documentation development. This user installs all of the software development and support tools partitions along with the text partition. Because he fills his programming needs with shell scripts, he ignores the programming languages partition. He prefers using the C shell over the Bourne shell, so he installs the appropriate file set from the miscellaneous utilities partition. He does not care about graphics, so he ignores that partition. When finished, his system occupies approximately 9 megabytes of his disc space leaving about 7 megabytes for his use.

A Warning about Disc Space

In the future you may decide to install a file set or partition that you did not load when you installed the rest of the system. Between the time you originally installed the system and the time you install this file set or partition, you may have created many additional files. At that point, you may not have sufficient space on the hard disc to load the file set or partition in question. The */etc/sysload* script cannot check for this possibility ahead of time.

If sufficient space does not exist, *sysload* attempts to load the file set/partition and — after failing — recovers by removing any partially loaded file set and printing an appropriate error message. Be aware that attempting to load a file set or partition for which room does not exist on your hard disc may endanger the HP-UX file system.

A simple solution exists for this potential problem: perform a *df(1)* command. The *df* command is part of the *FSET_CORE1* file set and can be used after the mandatory *SYS_CORE* partition is installed. The “disc free” command responds with the amount of available storage space on the hard disc displayed in one kilobyte (1024-byte) blocks. Subtract 100 Kbytes (i.e., 100 blocks) from this number for the overhead and temporary files that *sysload* uses. Use the resulting number and the file set and partition sizes (also given in one Kbyte blocks) supplied later in in this chapter to ascertain whether sufficient space exists to load the file set or partition. The partition and file set information also provides a list of dependent file sets. You will have to add the size of any dependent file sets if they are not already installed on the system.

If you do not have enough room for the partition or file set (and its dependencies, if any), you have three options:

1. Do not load the file set or partition in question.
2. Use micro discs to archive files on the system disc that you are not using, then remove those files from the system disc to increase available disc space.
3. Use the */etc/sysrm* script to remove file sets that you are not using to increase available disc space.

Some Further Size Guidelines

If you install only the `sys_core` and the `sys_tools` partitions from 10 of the 20 micro discs on which the system is shipped, the HP 9133D will have approximately 9 to 10 megabytes of available storage space. This approximate figure includes “overhead” for the file system and the default size (2 Mbyte) swap space.

If you install the entire 2.2L version of the HP-UX Operating System, the HP 9133D will have slightly less than 3 Mbytes of available storage space. This approximate figure includes all six partitions, “overhead” for the file system, and the default size (2 Mbyte) swap space.

With this understanding of partitions, file sets, and mass storage considerations, you are ready to install the HP-UX partitions.

Installing Partitions and File Sets

This section describes how to use the */etc/sysload* shell script to install mandatory and non-mandatory partitions and file sets on the HP 9133D hard disc.

Installing the “Core” Partition

This section assumes you have successfully executed the */etc/sysinstall* script and re-booted the system as described earlier. Installing the mandatory `SYS_CORE` partition **requires** that you be logged in as `root`. This requirement applies to using the */etc/sysload* script to install and the */etc/sysrm* script to explicitly remove **any** partitions or file sets. If you are not already logged in as `root`, do so now. You should also be in the “root” directory (`/`) of the file system. Confirm this by typing:

```
pwd 
```

If the system does not respond by printing `/`, move to the root directory by typing:

```
cd / 
```

Now execute the */etc/sysload* script by typing:

```
/etc/sysload 
```

Some */etc/sysload* Conventions

The *sysload* script displays information as it is being computed. Because shell scripts are inherently slow, this results in short delays while processing is being done; do not expect the messages described in this section to appear instantaneously.

The *sysload* script is designed to deal with one partition at a time in a given “session” (i.e., execution of the script). You can still load multiple partitions in a single session. After *sysload* loads a file set from the partition being processed, it updates the file set menu such that the file set just loaded is no longer displayed. The “file set menu” is explained shortly; one thing at a time. Thus, the script helps you remember what file sets have and have not been loaded from the partition in a given session.

When [Return] is shown as a menu choice, pressing [Return] by itself tells *sysload* to read the "table of contents" on the micro disc currently in the micro disc drive of the HP 9133D. The table of contents contains information about the partition and the file sets that belong to that partition. The *sysload* script uses this information to update the menu mentioned in the previous paragraph. Using the [Return] choice allows you to change partitions by inserting a micro disc from a different partition.

If an error occurs, an error message appears on the display's top line and you are given various options to deal with the error. Typically, you are allowed to repeat the most recent operation.

Whenever *sysload* is expecting your input, you will see either ? or >> following a prompt. If you do not see one of these, the script is busy and you should wait for it to complete its task. Choices in *sysload* are represented in one of three ways:

1. The choice letter is shown in quotes. This indicates that you must type the letter (upper- or lower-case) followed by [Return].
2. A default choice is given in parentheses following a question. This only requires a press of [Return] to choose it.
3. The choice is a number corresponding to a file set you want to load. Type the number followed by [Return].

When *sysload* runs, it takes a minute or so to do some "set up" work. During this time you will see the message:

Setting up ...

soon followed by the "main menu":

```
*****
SYSLOAD -- MAIN MENU
*****
```

Choice	Description
"C" or "c":	CHANGE source device
"Q" or "q":	EXIT sysload
[Return]:	READ table of contents and CONTINUE (Place new media in source drive)

```
Source device is: /dev/devload  Major: 0  Minor: 1
Destination device is: /dev/hd   Major: 0  Minor: 0
```

Please enter choice >>

Thus, the utility identifies itself and the active menu (there is also a "file sets menu"). The display also shows your choices or options as well as the default source device and destination device for the loading process. The default source device is the special file */dev/devload* which is created by *sysload* when it executes. The major and minor numbers it uses are the same as those of the special file */dev/fd* shipped with your system and correspond to the built-in micro disc drive on the HP 9133D. The destination device (*/dev/hd*) corresponds to the HP 9133D hard disc drive. The destination device **can not** be changed. Remember that the HP 9133D is the **only** supported installation device on the 2.2L version of HP-UX. Because *sysload* creates one of these special files and confirms the existence of the other before displaying its results, it takes a moment for the entire display shown above to appear.

The Sysload Choices

If you enter anything but the legal choices shown, an error message will be displayed at the top of the screen, the information in the original display will be re-computed and displayed, and you will get another chance.

The first choice allows you to change the source device although **this is not recommended** unless you have changed the name of the special file associated with the blocked version of the integrated micro disc drive. Devices are classed as "character" or "blocked" which determines certain access characteristics of the device. Devices also have "major" and "minor" numbers which, loosely speaking, define them. Do not be concerned if you are not familiar with these terms; it need not concern you here. Character and blocked designations and major and minor numbers are discussed in the "Concepts" chapter of the *System Administrator Manual* and in the "Adding/Moving Peripheral Devices" section of Chapter 4 in this manual. The *sysload* script only uses blocked devices.

If you choose to change the source device, you will be prompted to enter its major and minor numbers. Be aware that any illegal parameters given while using this option will cause *sysload* to terminate. If this happens, execute the script again (and quit tempting fate).

The quit choice gracefully terminates the *sysload* utility and returns you to the "shell" (the HP-UX command interface). Terminating *sysload* takes a minute or two because the script does some "clean up" work before exiting.

The [Return] choice is the one you want. Insert the disc labeled **SYS_CORE Disc 4 of 6** into the micro disc drive **before choosing the [Return] choice**. Any of the 6 discs labeled **SYS_CORE** (those without a colored label) will work, but the fourth disc contains the first file set you should load. After the access light on the micro disc drive goes out, press **[Return]**. The *sysload* utility responds by reading the "table of contents" on the micro disc and displaying:

```
... reading ...
```

followed by:

```
Rebuilding current FILE SET MENU ...
```

The table of contents contains information about the partition and the file sets that belong to it.

When *sysload* finishes its work, it displays the "file set menu":

```
*****
SYSLOAD -- FILE SET MENU
```

```
PARTITION: SYS_CORE                      DISC NO: 4
*****
```

Item No	Description
---------	-------------

1:	FSET_CORE1
2:	FSET_CORE2
3:	FSET_CORE3

"A" or "a": Process ALL file sets

"Q" or "q": EXIT sysload

[Return]: READ table of contents

(Place new media in source drive)

Please enter menu item number of file set
you wish to load followed by [Return] >>

This file set menu is for the `SYS_CORE` partition as shown at the top of the display. Also shown is the number of the micro disc being processed; the display above assumes that you used the fourth disc of the `SYS_CORE` partition as suggested. Following this is a table listing all file sets in the specified partition. Finally, a number of other choices and their descriptions are supplied.

The "A" or ALL choice automatically loads an entire partition prompting you to change micro discs as necessary. Use this choice if you want to install all the file sets in a given partition. The QUIT and [Return] choices have the same meaning as in the previous display.

You may also enter a number shown in the `Item No` column corresponding to the specific file set you want to install. This "number" choice allows one or more file sets to be installed from a given partition. Because you must install the entire `SYS_CORE` partition for HP-UX to work properly, press `A` followed by `Return` to choose the ALL choice.

The system responds with the messages:

```
*** Processing "FSET_CORE1" file set ***
```

```
... locating ...
```

```
Loading files from "FSET_CORE1" file set ...
```

indicating that it is: attempting to process the FSET_CORE1 file set, verifying that FSET_CORE1 is contained on the micro disc in the disc drive, and then beginning to load files from the FSET_CORE1 file set, respectively.

If you inserted a micro disc from the SYS_CORE partition **other** than the one labeled SYS_CORE Disc 4 of 6, the *sysload* script will prompt:

```
Please insert disc << 4 >> and press [Return]
OR type "S" or "s" to skip "FSET_CORE1" file set >>
```

Once you have inserted the proper disc, and **after** the micro disc drive's access light has gone out, press **Return**. You should soon see the "processing" messages shown above.

If, during later executions of */etc/sysload*, you decide not to install the file set, respond to the message above by pressing **S** followed by **Return** to skip the file set. If you are loading an entire partition (the **ALL** choice) and then use the "skip" choice, you will be prompted to load the next file set (if any) in the partition.

Once the message:

```
Loading files from "FSET_CORE1" file set ...
```

shown above appears, *sysload* begins copying FSET_CORE1's files from the micro disc to the hard disc drive. For a few minutes, the access lights on both the hard disc and micro disc drives will be lit as *sysload* does its work. You will eventually see a list of the files that comprise FSET_CORE1 shown as:

```
Loading: .profile
Loading: bin/ar
.
.
Loading: bin/sed
```

where *.profile*, *bin/ar*, and *bin/sed* are names of FSET_CORE1 files being loaded. The list of file names is fairly long.

When this task is completed, the message:

```
... checking for dependencies ...
```

is displayed. This message appears every time a file set is loaded. Next the message:

```
Processing dependencies ...
```

appears. This indicates that *sysload* is attempting to load any of this file set's dependencies which are not already loaded on the system. If dependencies need to be processed, this is done immediately following the loading of the file set selected. Because the FSET_CORE1, FSET_CORE2, and FSET_CORE3 file sets are inter-dependent — each file set depends on the presence of the other two file sets — you will be prompted:

```
Please insert disc << 5 >> and press [Return]
OR type "S" or "s" to skip "FSET_CORE2" file set >>
```

Remove the current micro disc (labeled SYS_CORE Disc 4 of 6) from the micro disc drive. Insert the micro disc labeled SYS_CORE Disc 5 of 6 and, **after** the micro disc drive's access light goes out, press Return. You will soon see:

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

```
... locating ...
```

```
Loading files from "FSET_CORE2" file set ...
```

and, a few minutes later:

```
Loading: filename1
```

```
Loading: filename2
```

```
      .
```

```
Loading: filenamex
```

indicating that the script is loading the files *filename1*, *filename2*, and *filenamex* from the FSET_CORE2 file set. When this is done, the *sysload* script prompts:

```
Please insert disc << 6 >> and press [Return]
OR type "S" or "s" to skip "FSET_CORE3" file set >>
```

Remove the current micro disc (labeled SYS_CORE Disc 5 of 6) from the micro disc drive and replace it with the micro disc labeled SYS_CORE Disc 6 of 6. **After** the micro disc drive's access light goes out, press Return.

The *sysload* script will respond with a series of messages similar to those previously shown and, when finished, will display:

```
... updating menu ...
```

This is soon followed by the updated file set menu:

```
*****
SYSLOAD -- FILE SET MENU

PARTITION: SYS_CORE                      DISC NO: 6
*****
```

Item No	Description
---------	-------------

"Q" or "q":	EXIT sysload
[Return]:	READ table of contents and CONTINUE (Place new media in source drive)

Please enter menu item number of file set
you wish to load followed by [Return] >>

Note that the original:

1:	FSET_CORE1
2:	FSET_CORE2
3:	FSET_CORE3

"A" or "a": Process ALL file sets

entries are no longer present. This is because the ALL choice completed successfully (thus the choice is no longer available) and all three file sets in this partition were processed. The *sysload* script deletes file set entries from the menu as they are loaded. Remember that this "updating" of the file set menu only reflects file sets loaded from a given partition in the current invocation of the script.

The SYS_CORE partition is now loaded on the HP 9133D hard disc.

At this point, you can either exit *sysload* by pressing **q** or insert a disc from a different partition and press **Return**. Using the latter [Return] choice results in *sysload* reading the table of contents from the newly-inserted disc and building a new file set menu based on the new partition.

We suggest that you leave *sysload* in its current state, skim the following material on file sets, and continue with *sysload* as described in the “Installing Other Partitions and File Sets” section which follows. This advice assumes that you plan to load further file sets and partitions.

Partition and File Set Descriptions

Here is a list of all the partitions and file sets shipped with the 2.2L version of HP-UX. Appendix A (at the end of this manual) contains a list of all the files contained in each file set. Use the appendix list to find specific files that you want to load.

Use the descriptions provided below to determine the general contents and relative sizes of file sets and partitions. Remember to add 100 blocks (100 kilobytes) for */etc/sysload*’s overhead as well as the size of any dependent file sets not already installed on the system. Then, **after** executing two *sync(1)* commands, use the *df(1)* command (contained in the *FSET_CORE1* file set) to determine if the HP 9133D has enough available space to load the file set or partition in question. See the guidelines offered in the section “A Warning about Disc Space” earlier in this chapter. The partition and file set descriptions below include:

- Each partition’s name, total number of micro discs, label color (if any), and total size. Sizes are given in 1024-byte blocks; one block equals one kilobyte (Kbyte).
- The name of all file sets contained in that partition.
- Each file set’s size, dependencies (if any), and description. File set sizes are rounded upward slightly.

In some cases, file sets are inter-dependent. For example, each of the three *FSET_CORE* file sets depends on the other two. In these cases the *Depends On* column has an *each other* entry and only a single size is shown — the total of all three file sets.

SYS_CORE Partition

Contains 6 discs, no label color, with a total size of 2930 blocks.

File Set	Size	Depends On	Description
SYSTEM_MI	N/A	none	Media Initialization utility
SYSTEM_CP	N/A	none	System Image Copy utility
HP_UX	1120	none	Miniature HP-UX system
FSET_CORE1	1810	depend on	Mandatory -- shell programming
FSET_CORE2		each	
FSET_CORE3		other	

SYS_TOOLS Partition

Contains 4 discs, red labels, with a total size of 1825 blocks.

File Set	Size	Depends On	Description
FILEMANAGE	300	none	File management (disc copy utilities)
FILEFILTER	385	none	File manipulation (compare, list, sort)
SYSCONM	620	none	Computer to computer communication
SYSMANAGE	410	none	System management (status inquiry/ctrl)
PERIPHSUPP	40	none	Peripheral support (tset, tabs, and mt)
CE_UTILS	70	Filemanage, Filefilter	Peripheral tests for Customer Engineers Note: C and DGL required for compile.

TEXT Partition

Contains 3 discs, orange labels, with a total size of 2400 blocks.

File Set	Size	Depends On	Description
TEXT_TOOLS	790	none	Text processing (nroff, mm, spell)
EDITORS	190	none	Screen editors (vi and ex)
MANUALS1	1420	Text_tools,	On-line manuals
MANUALS2		each other	

PROG_LANGS Partition

Contains 4 discs, blue labels, with a total size of 2290 blocks.

File Set	Size	Depends On	Description
PROG_UTILS	615	none	Programming utilities (debugger, make)
C	740	Prog_Utils	C programming tools
FORTTRAN	500	Prog_Utils	Fortran support
PASCAL	435	Prog_Utils	Pascal support

MISC_UTILS Partition

Contains 1 disc, green label, with a total size of 680 blocks.

File Set	Size	Depends On	Description
SCCS	300	none	Source code control system
APPLIC	380	none	Misc. applications (bc, bs, csh)

GRAPHICS Partition

Contains 2 discs, magenta labels, with a total size of 1125 blocks.

File Set	Size	Depends On	Description
DGL1	1125	each	Device graphics library support
DGL2		other	

Installing Other Partitions and File Sets

To load other file sets and partitions, use the information in the “Partition and File Set Descriptions” section and the size guidelines provided earlier in this chapter to make sure you have enough room on the HP 9133D hard disc to install the file set and/or partition. Remember to include 100 blocks for *sysload*'s overhead as well as the size of any dependent file sets in your estimates. The previous procedure (for loading the mandatory `SYS_CORE` partition) and the procedure given below (showing how to load a single file set) should serve as guidelines for loading any given file set or partition.

Attempting to Load a Resident File Set

When you attempt to load a file set that is already installed on the system or when *sysload* attempts to process a dependency file set already on the system, you will be prompted:

```
"FILESET" already exists on system.  
Remove it ("Y"/"N")?
```

where `FILESET` is the name of the file set in question. You should answer this question with `N` for “no” unless you explicitly want to replace the existing file set. Replacing an existing file set makes sense if you have some reason to believe the files in that file set have been damaged. If you answer with `Y` for “yes”, the *sysload* script executes the `/etc/sysrm` script to remove the file set and allows you to continue; the *sysrm* script is discussed later in this chapter.

A Sample Session

The following is an example of running *sysload* to install a single file set in a partition. The example shows how to load the **FILEFILTER** file set from the **SYS_TOOLS** partition. This example is somewhat arbitrary since you should load the **entire** **SYS_TOOLS** partition and could use the **ALL** choice for greater efficiency. Go ahead and step through the example to gain the experience of loading a single file set. Then load the remainder of the partition using **ALL**.

It is assumed you left *sysload* in the state last shown (i.e., after installing the **SYS_CORE** partition earlier in this chapter). If you exited the script at that point, re-execute */etc/sysload* now. In either case, insert the micro disc labeled **SYS_TOOLS 1** of 4 into the micro disc drive and, **after** the micro disc drive's access light goes out, press Return. The message:

```
Rebuilding current FILE SET MENU ...
```

will soon appear followed by the new file set menu:

```
*****
SYSLOAD -- FILE SET MENU

PARTITION: SYS_TOOLS                DISC NO: 1
*****
```

Item No	Description
1:	FILEMANAGE
2:	FILEFILTER
3:	SYSCOMM
4:	SYSMANAGE
5:	PERIPHSUPP
6:	CE_UTILS

```
"A" or "a": Process ALL file sets
"Q" or "q": EXIT sysload
[Return]:  READ table of contents
           (Place new media in source drive)
```

```
Please enter menu item number of file set
you wish to load followed by [Return] >>
```

The display indicates the partition (`SYS_TOOLS`), the disc number within that partition (1), and all the file sets in the partition. Note that, even if one or more of these file sets had been installed in a different session, the display would be the same. The file set menu only keeps track of file sets loaded in the current invocation of *sysload*.

To load the `FILEFILTER` file set, press `2` followed by `Return`. The *sysload* script will respond with:

```
*** Processing "FILEFILTER" file set ***
```

```
Please insert disc << 2 >> and press [Return]
```

```
OR type "S" or "s" to skip "FILEFILTER" file set >>
```

Remove the current micro disc from the drive and replace it with the micro disc labeled `SYS_TOOLS Disc 2 of 4`. After the micro disc drive's access light goes out, press `Return`. The script soon responds with:

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

```
... updating menu ...
```

```
... locating ...
```

```
Loading files from "FILEFILTER" file set ...
```

indicating that it is: verifying that the correct disc was inserted, updating the menu with the new disc number, verifying that the file set in question actually resides on the micro disc, and loading files from the `FILEFILTER` file set, respectively. In a few minutes, these messages are followed by a series of:

```
Loading: filename
```

messages (where *filename* represents actual file names) as files are loaded. Once all the files are loaded, the message:

```
... checking for dependencies ...
```

appears and, because there are no dependencies for this file set, this is soon followed by the updated menu. The `FILEFILTER` file set is removed from the menu to reflect that it was loaded in this "session".

SYSLOAD -- FILE SET MENU

PARTITION: SYS_TOOLS

DISC NO: 2

Item No	Description
1:	FILEMANAGE
3:	SYSCOMM
4:	SYSMANAGE
5:	PERIPHSUPP
6:	CE_UTILS

"A" or "a": Process ALL file sets

"Q" or "q": EXIT sysload

[Return]: READ table of contents

(Place new media in source drive)

Please enter menu item number of file set
you wish to load followed by [Return] >>

The menu shows the most recent disc that *sysload* accessed, disc 2 in the *SYS_TOOLS* partition. Also, the *FILEFILTER* file set is no longer listed as a choice. This "reminder" that a file set has already been loaded in this session is handy when a partition contains as many as six file sets.

Now load the remainder of the *SYS_TOOLS* partition by choosing ALL. The sequence of prompts and responses are not covered here. By now you should have a good idea of what to expect.

Loading any given partition and/or file set will be similar to the procedures described in this chapter. If and when dependencies exist, you will be prompted to insert the proper disc. When loading single file sets, the file set menu is displayed after that file set is loaded (and the menu will no longer contain the loaded file set as a choice). When loading entire partitions with the ALL choice, the file set menu is not re-displayed until all file sets in the partition have been loaded.

Removing File Sets

File sets are removed using the `/etc/sysrm` shell script. This script is useful if you are not using the files in a given file set and need to recover the storage space on your HP 9133D hard disc. The `sysrm` script is also used by `sysload` allowing you to replace a file set. One or more file set names may be given as parameters to `sysrm`; at least one file set name must be specified. The `sysrm` script changes the current directory to `/` before executing.

Before executing `sysrm`, you can check that the file set you wish to remove has been installed by typing:

```
ls /etc/filesets Return
```

This command lists the contents of the `/etc/filesets` directory thus displaying the names of all file sets installed on the system.

For each file set name given to `sysrm`, the command responds by checking to see if the file set is installed. If the file set is installed, `sysrm` displays a series of:

```
Removing: filename
```

messages where *filename* is a file in the specified file set being removed from the system. The script then removes the `/etc/filesets` entry for that file set.

If a specified file set is not found, `sysrm` prints out an error message to that effect. Be aware that `sysrm` will refuse to remove the `FSET_CORE1`, `FSET_CORE2`, and `FSET_CORE3` file sets because they are necessary for the minimal operation of the 2.2L version of HP-UX. The only way you can effectively “remove” any of the `FSET_CORE` file sets, is to replace them using the `sysload` script.

As previously mentioned, the `/etc/filesets` directory has a file called `noremove` containing names of specific files **not to be removed from the system under any circumstances**. If you have additional files you do not want removed by the `sysrm` script, add their complete pathnames (without the leading `/`) to this list. Do **not** delete any file names from the `/etc/filesets/noremove` file.

The protections on the `noremove` file are set to 444. To add file names to this file, execute `chmod` to allow write permission, make the changes, then restore the file's original permissions; see `chmod(1)` in the *HP-UX Reference* for details. Also, if you are just installing the system, have not yet re-booted it, and want to add file names to the `noremove` file with the *vi* editor, make sure that:

1. The `EDITORS` file set in the `TEXT` partition has been loaded.
2. Type:

```
. /.profile Return
```

to set up the appropriate terminal characteristics for *vi*.

After the system is installed, the `/.profile` script is executed automatically whenever you log in to the system as root.

An Example of Using `/etc/sysrm`

For example, suppose you decide to remove the `SCCS` and `APPLIC` file sets, both part of the `MISC_UTILS` partition, from your system. To remove these file sets, type:

```
/etc/sysrm SCCS MISC_UTILS Return
```

Assuming that the `SCCS` file set was installed, *sysrm* responds by removing all the `SCCS` files in the specified file set while displaying a series of:

```
Removing: scs_file1
```

messages, where *scs_file1* represents file names for each file in the `SCCS` file set. The messages continue until all files in the file set have been removed.

Assume further that the `MISC_UTILS` file set was **not** installed on the system. In this case, *sysrm* responds with:

```
MISC_UTILS not found
```

and exits. When *sysrm* successfully removes a file set from the system, it also updates the `/etc/filesets` directory to reflect the change in installed file sets.

Checking the File System

Now that the complete system is installed — or as much of it as you wish to install at this time — you should execute an HP-UX command, *fsck(8)* to check the file system's integrity. Do this by typing:

```
sync; sync Return
```

to ensure that all pending I/O to the disc has completed before running */etc/fsck*. When the system's prompt returns after a single *sync*, the command has not necessarily been completed; it has only been scheduled. For this reason, users will often execute two *syncs* in a row — the second one “forces” the first one to be executed immediately. **After** the access light on the HP 9133D hard disc drive goes out, type:

```
/etc/fsck Return
```

The *fsck(8)* command takes a few minutes to execute during which time you will see:

```
/dev/hd
File System:   Volume:

** Phase 1: Check Blocks and Sizes
** Phase 2: Check Pathnames
** Phase 3: Check Connectivity
** Phase 4: Check Reference Counts
** Phase 5: Check Free List

X files Y blocks Z free
```

You should not get any errors during the five main phases that *fsck* goes through in checking the integrity of the file system. The summary message indicates that the file system currently contains *x* files using a total of *y* 1024-byte blocks and that *z* 1024-byte blocks are currently available for data storage. The total number of blocks on the disc consists of the used blocks, available blocks, system overhead, and the swap space. (See the “Concepts” chapter in the *System Administrator Manual* for a thorough discussion of the file system and how it uses a hard disc.) For details on the *fsck(8)* command, see the “Using the FSCK Command” appendix in the *System Administrator Manual* and the *fsck(8)* entry in the *HP-UX Reference*.

If Errors Do Occur....

If you have successfully installed the system up to this point and have not otherwise used the system, you should not receive any *fsck* errors. **If errors occur** during the *fsck* process, something has gone wrong with the installation process. You have three alternatives (in order of increasing difficulty):

1. Call your local HP Sales Office for assistance.
2. Respond to any prompts by *fsck* with ☐Y (for "yes") and follow the instructions in the remainder of this section.
3. Return to Chapter 2 in this manual and repeat the entire installation process again starting with initializing the HP 9133D hard disc drive. If you choose this alternative, ignore the next three paragraphs.

If certain errors occur, the final message above will be followed by the prompt:

```
***** BOOT HP-UX (DO NOT SYNC!) *****
```

If this message appears, make sure the access light has gone out **before continuing**. You must **re-boot the system before taking any other action** to save the work done by *fsck*. To re-boot the system: power down the computer, wait a few seconds, then switch on power to the computer again. The new HP-UX system residing on the HP 9133D (SS/80) disc should be the first operating system the boot ROM finds, so HP-UX automatically will be loaded and run.

After the system boots, the display will look similar to the one shown in the following section. Log in to the system as `root`, respond to the `TERM = (9336)` prompt with ☐Return, and again run *fsck* responding as explained above. The *fsck* and re-boot sequence should be repeated until no more errors are reported by *fsck*. If this does not solve the problem, call your local HP Sales Office for help.

Booting HP-UX After Installation

If you have made it this far, the most difficult part is over. This section assumes that the HP-UX system is installed and that the *fsck* command you ran earlier detected no errors in the file system. Now, to boot the complete HP-UX system, type:

```
sync
sync
```

following each *sync(1)* command with Return. **Wait** for the access light on the HP 9133D hard disc drive to go out. **After** the disc's access light is off — ensuring that all pending I/O has completed — turn off the power switch on your Model 217 computer, wait a few seconds, then switch on power to the computer again. The boot ROM will find the HP-UX system on the HP 9133D hard disc and automatically boot (load and run) HP-UX.

Soon, a display similar to the following will appear:

```
CONSOLE is ITE
ITE + 1 port(s)
98626 at select code 9
Internal HPiB present
real mem = 1048576
avail mem = 703488
(c) Copyright 1983, 1984 Hewlett-Packard Company.

.   <other copyright notices>
.

Root device major is 0, minor is 0
Swap device major is 0, minor is 0, start is 14255, size is 2000

/etc/rc 1 0 0
Fri Aug 24 12:26:49 MDT 1984
single-user
HP-UX 2.2L

login:
```

Most of the lines in the above display are explained in the “Booting the Miniature HP-UX System” section near the start of this chapter. Some additional lines appearing in this display bear comment.

The numbers following `/etc/rc` near the bottom of the display are system “state” parameters as explained in Chapter 4 of the *System Administrator Manual*. The next line contains the date, time, and time zone; `MDT` stands for Mountain Daylight Time. The following line indicates HP-UX is in the “single-user state” as defined in the terminology section of Chapter 2 in the *System Administrator Manual*. The version (2.2L) of your HP-UX system is shown. Finally, a `login:` prompt is displayed.

Respond to the `login:` prompt with:

```
root Return
```

The user `root` does not currently have a password. If you mis-type `root`, the system will prompt you for a password because the system interprets virtually all input as valid for a login name then prompts for a password as part of its protection protocol. The exceptions are the `#` and `⌫` characters which act respectively as “erase” and “kill”. If you make a mistake use `#` to erase (i.e., backspace over) a character or `⌫` to “kill” (i.e., delete) the entire line and then re-type it.

If you get prompted for a password, respond with RETURN. You will see the message: `Login incorrect` followed by another `login:` prompt. Again type `root` (correctly) followed by RETURN.

The system will soon display:

```
(c) Copyright 1983, 1984 Hewlett-Packard Co.
```

```
<other copyright notices>
```

```
Welcome to the HP 9000 Series 200 HP-UX system.
```

```
TERM = (9836)
```

where `TERM = (9836)` indicates that the system has set up “terminal” characteristics for an HP 9836 computer. This is correct for your Model 217 (HP 9817) computer because, from the point of view of HP-UX, the HP 9817 hardware and display are identical to those of the HP 9836; they have the same characteristics. Respond to this prompt with Return.

The system then displays:

```
Erase is control-H
Kill is control-U
#
```

meaning that control-H is a destructive backspace (the same as the **Backspace** key) and that control-U can be used to “kill” (effectively cancel) your current input line. The # character is a prompt indicating that you are the super-user (**root**) and that the system is ready to accept your input.

You have just logged in to the installed HP-UX system and are ready to do some after-installation cleanup work.

Securing the System Micro Discs

Store the micro discs on which the HP-UX system was distributed in a safe location: away from magnetic fields and harsh environments. If the HP 9133D disc should ever become corrupt such that HP-UX no longer boots from it, you can use the discs to re-install the system. Depending on the security needs of your installation, store the discs at a location accessible only to you and your back-up system administrator (if one exists); armed with the source micro discs, a determined individual can defeat the security of the system.

NOTE

Now that your system is installed, you have the ability to modify and customize the system. However, if you have purchased software support services from Hewlett-Packard, only limited changes can be made without voiding your agreement. Consult your support plan or an HP System Engineer regarding intended changes.

You may make certain modifications suggested in this manual without concern for voiding your agreement. Specifically, all the files listed in the "Summary" (of configuration files) section at the end of Chapter 4 and in the "Controlling Disc Use" section of Chapter 5 in the *System Administrator Manual*, may be modified within reason.

What to do Next

Now that the system is successfully installed, read and follow the instructions contained in the "After Installing HP-UX" section in Chapter 2 of the *System Administrator Manual* to perform such tasks as setting the system clock, setting a password for the `root` user, etc. Also, see Chapter 5 in this manual for suggested modifications to the `/etc/rc`, `/usr/lib/crontab`, and `/etc/backup` configuration files.

Before continuing with the next chapter, skim or read the material in Chapters 5 and 6 (the "Peripherals Installation" section) as well as the "Reference" section of the *Model 217 Installation Guide*. That useful information is not repeated in this manual. More to the point, the next chapter assumes that you have some familiarity with the topics covered in those sections.

Chapter 4

Installing Optional Hardware and Peripherals

Introduction

This chapter explains how to install all optional hardware and peripherals. You can find a complete list of all optional items in the “Optional Hardware and Peripherals” section at the end of Chapter 1. You should review the “Configuration Notes” section which follows that list for configuration restrictions that apply to your system.

Guidelines are offered in this chapter for optimizing bus usage to get the best performance out of particular hardware configurations. The chapter also includes the information needed to create the associated special (device) files for peripherals. Specifics are included on the following:

- HP 98256A (256 Kbyte) and HP 98257A (1 Mbyte) RAM Boards
- HP 98635A Floating Point Math Board
- HP 98620B DMA Controller
- HP 98624A HP-IB Interface
- HP 98626A Asynchronous Serial Interface
- HP 98628A Datacomm Interface
- HP 98644A HP Serial Interface
- Optional SS/80 Mass Storage Devices — HP 9122D/S micro disc drive, HP 9133D (second, optional disc — not root disc), and HP 9134D.
- HP 2225A “Thinkjet” and HP 2686A “Laserjet” Printers
- HP 7470A (A-size 2-pen) and HP 7475A (A/B-size 6-pen) Plotters



Installing Accessories

Accessories include additional memory cards, other non-interface accessories (such as the HP 98635A Floating Point Math board and HP 98620B DMA Controller), and all interface boards. **Never install an accessory without first switching off the computer's power.**

CAUTION

Switch off the computer **before** installing an accessory. Plugging or unplugging a board with the power on can **damage** the board and the computer.

Most accessories contain components that are sensitive to damage from electrostatic discharge. Whenever you remove, install, or handle an accessory, hold it by its extractors, edges, or cover plate. **Do not touch** its electrical components, traces, or edge connectors.

Use protective measures including anti-static workstations and personnel grounding devices, if possible. Be **especially careful** when working in carpeted areas.

HP 98256A and HP 98257A RAM Boards

One megabyte of RAM — the amount shipped with your “LX” system — is required by HP-UX 2.2L. This board should have been installed when you set up your hardware as described in Chapter 2 of this manual. If you have purchased memory cards in addition to the HP 98257A board supplied, set their switches and install them as explained in Chapter 3 (“Installing Accessories”) of the *Model 217 Installation Guide*.

HP 98635A Floating Point Math Board

The HP 98635A Floating Point Math board is **not** required for proper operation of HP-UX 2.2L but it will improve performance in computation-intensive applications. There are no switches to set on this board; insert it into one of the available accessory slots in the rear of the Model 217 as described in Chapter 3 of the *Model 217 Installation Guide*. The instructions provided in the Installation Note supplied with the card are useful.

After you have installed and configured all your interfaces and peripherals, you may want to test this card by executing one of the test programs supplied in the Installation Note that comes with the card. Doing so will ensure that the floating point card is working properly. See the appropriate compiler entries in the *HP-UX Reference* to access the improved performance of the Floating Point Math board.

HP 98620B DMA Controller

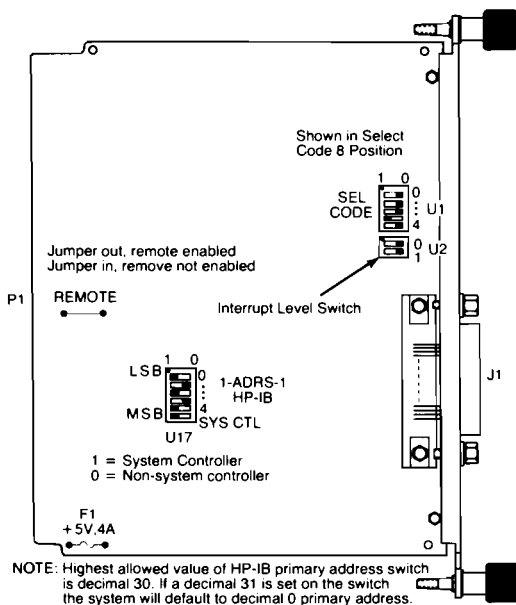
The HP 98620B DMA Controller is **not** required for proper operation of HP-UX 2.2L but it will improve disc performance. There are no switches to set on this board; insert it into one of the available accessory slots in the rear of the Model 217 as described in Chapter 3 of the *Model 217 Installation Guide*. Also, follow the instructions provided in the Installation Note supplied with the DMA Controller card.

If you installed your system without an HP 98620B DMA Controller, initialized your HP 9133D disc drive with an interleave factor of 7, and are now adding the DMA Controller, you should back up your files, re-initialize the disc with an interleave factor of 4 (to take advantage of the improved performance of the DMA Controller) and re-install the HP-UX system. Then restore the files you saved.

HP 98624A HP-IB Interface

You may install an optional HP 98624A HP-IB interface which will support up to 4 printers and/or plotters as well as additional SS/80 disc drives. Note that the HP-UX 2.2L system **supports only one additional HP-IB interface** (the HP 98624A) besides the built-in HP-IB. Configure the interface as follows (see the illustration below):

1. Set the Select Code switches (U1) to select code 8. This should be the default setting as shipped from the factory but it's always a good idea to confirm it. Set switches 4, 2, 1, and 0 to "0", and switch 3 to "1".
2. Set the Interrupt Level switches (U2) to interrupt level 3 by setting both switches to "0".
3. Set the Address/System Controller switches (U17) to address 21 by setting switches 4, 2, and 0 to "1" and switches 3 and 1 to "0".
4. Set the Address/System Controller switches (U17) to the System Controller position by setting switch 5 to "1".
5. Install the HP 98624A interface in your computer as described in Chapter 3 of the *Model 217 Installation Guide*.



Configuring the HP 98624A HP-IB Interface

Overview of Serial and Datacomm Interfaces

An RS-232 device is connected to the computer system through the built-in HP 98626A Asynchronous Serial Interface or through an optional HP 98626A Asynchronous Serial Interface, HP 98628A Datacomm Interface, or HP 98644A HP Serial Interface, all of which support the RS-232C datacomm standard. The built-in HP 98626A card (i.e., the built-in RS-232 interface) is set at select code 9. See the start of Chapter 2 in this manual for information on setting switches on the built-in RS-232 interface.

You can set an optional HP 98626A, HP 98628A, or HP 98644A HP Serial Interface to any unused select code as shown in the following table. Select codes 0 through 9 have been used or are reserved. Note that the HP-UX 2.2L system **supports only one additional serial/datacomm interface** besides the built-in HP 98626A Asynchronous Serial Interface.

HP-UX Select Codes

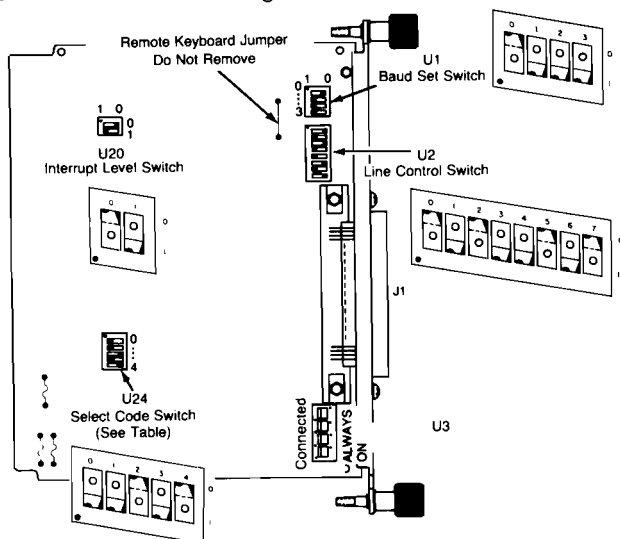
Select Code	Switch No. 43210 (98626/628) 12345 (98644)	Select Code	Switch No. 43210 (98626/628) 12345 (98644)
0-9	Do not use	21	10101
10	01010	22	10110
11	01011	23	10111
12	01100	24	11000
13	01101	25	11001
14	01110	26	11010
15	01111	27	11011
16	10000	28	11100
17	10001	29	11101
18	10010	30	11110
19	10011	31	11111
20	10100		

HP 98626A Asynchronous Serial Interface

Set the switches on your HP 98626A interface as follows (see the illustration):

1. Set the Select Code switches to the desired select code (see preceding table). Select code 11 is shown in the illustration.
2. Set the Interrupt Level switches (U20) to 5 by setting switch 1 to "1" and switch 0 to "0".
3. Make sure the "Remote Keyboard Jumper" is installed; the system console cannot be connected to this interface on 2.2L HP-UX.
4. The Modem Line switches (U3) should be set to the "Connected" position if your interface is connected to a modem. If the interface is connected directly to another RS-232 device, set the switches to the ALWAYS ON position.
5. The Baud Set (U1) and Line Control (U2) switches — including the handshake type — are ignored by HP-UX.
6. Install the HP 98626A interface in your computer as described in Chapter 3 of the *Model 217 Installation Guide*.

See the installation manual supplied with the HP 98626A interface for further details on switch settings.



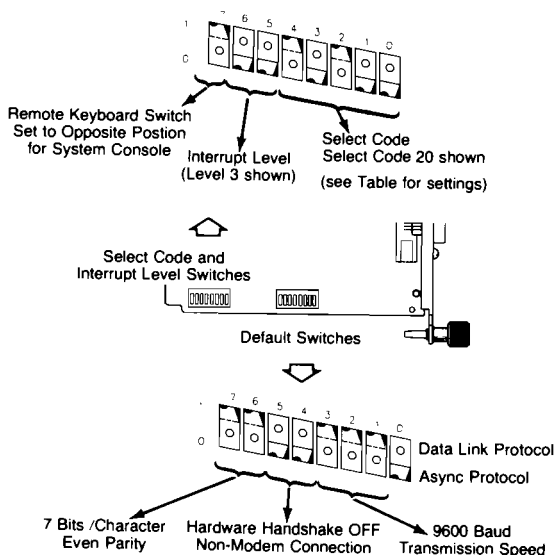
HP 98626A Asynchronous Serial Interface

HP 98628A Datacomm Interface

Set the switches on your HP 98628A interface as follows (see the illustration):

1. Set the Select Code switches to the desired select code (see preceding table). Select code 20 is shown in the illustration.
2. Set the Interrupt Level to 3 by setting switches 5 and 6 to "0".
3. Set the Remote Keyboard switch to "0".
4. On the "default" switch bank, set switches 5 and 4 as shown if you have a direct connection (no modem). Set switch 4 to the opposite position if you are using a modem connection. HP-UX ignores the other settings on this "default" switch bank, including bits per character, parity, and baud rate.
5. On the "default" switch bank, set switch 0 to "0" for asynchronous protocol.
6. Install the HP 98628A interface in your computer as described in Chapter 3 of the *Model 217 Installation Guide*.

See the installation manual supplied with the HP 98628A interface for further details on switch settings.



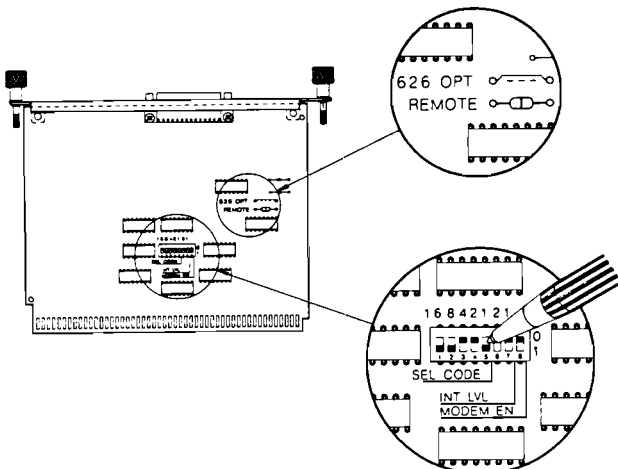
HP 98628A Datacomm Interface

HP 98644A HP Serial Interface

Set the switches on your HP 98644A interface as follows (see the illustration):

1. Set the Select Code (switches 1 through 5) to the desired select code (see preceding table). Select code 25 is shown in the illustration.
2. Set the Interrupt Level to 5 by setting switch 6 to "1" and switch 7 to "0".
3. Neither of the 626 OPT and REMOTE jumpers mentioned in the HP 98644A Installation Manual need to be modified to work with the 2.2L version of HP-UX. In particular, the REMOTE jumper should not be removed.
4. Set the Modem Line (switch 8) to the ENABLE position if your interface is connected to a modem. If the interface is connected directly to another RS-232 device, set the switch to the opposite position.
5. This card contains no switches for baud rate, line control, or hand-shake type; it uses the HP-UX defaults.
6. Install the HP 98644A interface in your computer as described in Chapter 3 of the *Model 217 Installation Guide*.

See the installation manual supplied with the HP 98644A HP Serial Interface for further details on switch settings.



HP 98644A HP Serial Interface

Installing HP-IB Peripherals

This section describes the hardware aspects of installing HP-IB peripheral devices. The software aspects of setting up peripherals, such as creating their associated special (device) files, are covered in the "Adding/Moving Peripheral Devices" later in this chapter.

Internal and External Buses

One HP-IB bus is required for HP-UX: the **internal** bus associated with the built-in HP-IB interface. One additional bus, the **external** bus associated with an optional HP 98624A HP-IB interface, is allowed.

The HP-IB connector on the built-in HP-IB allows you to connect the internal bus to peripheral devices. Remember that this internal HP-IB interface must be set as the "system controller" as described in the "Reference" section of the *Model 217 Installation Guide*.

The HP-UX operating system requires a dedicated HP 9133D disc drive which contains the HP-UX file system. This dedicated disc drive is also called the "root" device. The root device **must** connect to the internal bus.

The optional external bus provides additional HP-IB capability. The external bus (if it exists) is controlled by an HP 98624A HP-IB Interface.

Guidelines for Selecting HP-IB Bus Addresses

When installing HP-IB peripherals, set the HP-IB bus addresses and install peripherals as described in this section. The “HP-IB Bus Address Assignments” table which follows provides specific bus addresses on both the internal and external buses.

- The system root device (the HP 9133D hard disc) **must be located at bus address 0 on the internal** (built-in) HP-IB interface.
- An HP-IB printer requires the optional HP 98624A HP-IB interface (the external bus). If you have an HP-IB system printer, set the printer to bus address 1 on the external HP-IB bus.
- An HP-IB plotter requires the optional HP 98624A HP-IB interface (the external bus); a plotter should **never** share a bus with an SS/80 disc drive. Place the plotter on the external bus at unused external bus addresses 5, 6, or 7.
- Install additional HP-IB printers and/or plotters at unused external bus addresses 5, 6, or 7.
- SS/80 discs other than the root device should be placed on the external HP-IB bus (the optional HP 98624A HP-IB interface) when possible. See the “Configuration Notes” at the end of Chapter 1 for a list of supported SS/80 disc drive combinations. These discs can be placed on the internal HP-IB interface if the external HP-IB bus becomes congested. Use the following guidelines:

If you have neither a printer nor plotter, put secondary discs on the external HP-IB bus (at addresses 0, 2, 3, or 4).

Never put an SS/80 disc on the external bus with an HP-IB plotter.

If you have only an HP-IB printer, secondary discs can go on either the internal or external HP-IB bus.

Check all the bus assignments you have made to ensure that two or more devices are not assigned to the same bus address; each device **must** be assigned a **unique** bus address.

HP-IB Bus Address Assignments

HP-IB Device	Bus Address	
	Internal Bus	External Bus
System SS/80 Disc	0	
Addt'l SS/80 Device #1	2	0
Addt'l SS/80 Device #2	3	2
Addt'l SS/80 Device #3	4	3, 4
System HP-IB Line Printer		1
Addt'l HP-IB Line Printer(s)		5, 6, 7
Plotter(s)		5, 6, 7



Installing Non-HP-IB Peripherals

This section describes the hardware aspects of installing non-HP-IB peripherals on your system. This includes setting up RS-232 devices such as the HP 2686A "Laserjet" printer as well as connecting your computer to a modem or to another HP-UX system. The software aspects of installing peripherals are covered in the "Adding/Moving Peripheral Devices" later in this chapter.

Guidelines for Selecting an RS-232 Interface

Use the following guidelines for selecting interfaces for RS-232 devices. Note that the HP 98628A Datacomm Interface card **cannot be used for the HP 2686A printer**.

- If you have a modem (or a direct HP-UX connection), but no HP 2686A ("Laserjet") printer, put the modem on the internal (built-in) RS-232 interface.
- If you have an HP 2686A printer, but no modem (or direct HP-UX connection), put the HP 2686A on the internal (built-in) RS-232 interface.
- If you have both a modem (or a direct HP-UX connection) and an HP 2686A printer, put the HP 2686A on the internal (built-in) RS-232 interface and the modem (or direct HP-UX connection) on an optional HP 98626A, HP 98628A, or HP 98644A interface. Note that the HP 98628A interface gives the best performance for a direct connection.

The following section provides some general information on datacomm cables. Following that section, specific cabling information is provided for modems, direct connections to other HP-UX systems, and "Laserjet" printers.

Datacomm Cables

Datacomm cables generally fall into one of three categories.

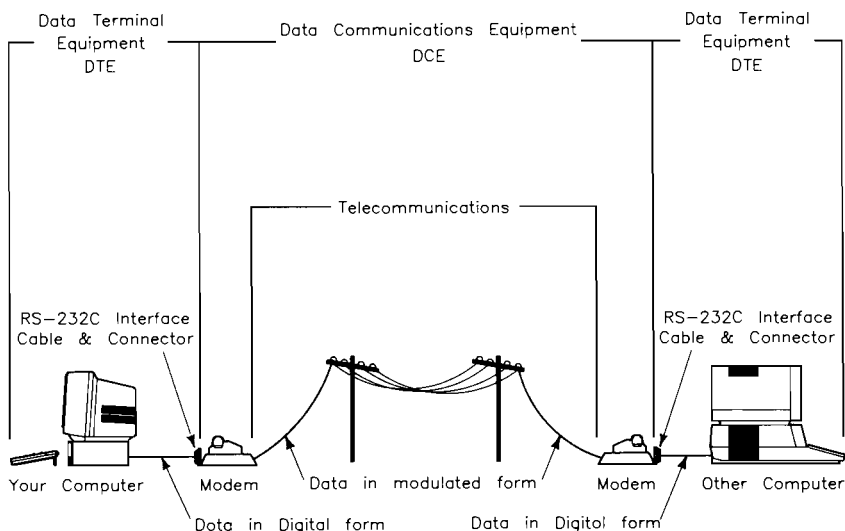
1. DTE (Data Terminal Equipment) cables connect an RS-232C interface to other RS-232C devices. DTE cables are configured such that the computer connected to the cable behaves electrically like a terminal when connected to a mating cable or device. The Series 200 DTE cable is available as an option with the HP 98626A Asynchronous Serial Interface and the HP 98628A Datacomm Interface, or it can be ordered separately (HP Part No. 5061-4215). The DTE cable for the HP 98644A HP Serial Interface must be ordered separately (HP 13242N). These cables are fitted with a male RS-232C connector that mates directly with any RS-232C modem or with an RS-232C DCE cable or modem eliminator extension cable.
2. DCE (Data Communication Equipment) cables, sometimes called direct connect cables, contain internal cross-wiring to make the interface electrically resemble a modem when connected to a DTE cable. The DCE cable **cannot** be used for direct connections between two HP-UX computers in a network.
3. Extension and modem eliminator cables are used in direct connections to lengthen the distance between computers in a network. They are usually wired straight through such that each pin on one connector is connected to the mating pin on the connector at the other end. The HP 13232U modem eliminator cable cannot be used for direct connections. Other cables are available; see the "Direct HP-UX to HP-UX Connections" heading later in this section.

Connecting a Modem

If you are using modems to connect to another computer, both devices must be connected to a suitable modem. Be sure the two modems on each link are compatible with each other, have RS-232C interface connectors (unless the modem plugs directly onto the interface), and can support the required baud rate. Contact your HP Sales and Service Office if you need assistance in selecting modems. Connect the modem to the telephone line or other wire link, following the instructions in the modem installation manual. Connect the DTE modem cable between the datacomm or serial interface on your computer and the modem, then engage the retainers so the connectors cannot inadvertently come apart.

- If connecting a modem to the built-in (internal) RS-232 or to an external HP 98626A or HP 98628A interface, use a DTE cable (HP Part No. 5061-4215) to connect the interface to the modem. The DTE cable can be ordered as Option 001 with the HP 98626A and HP 98628A interface cards.
- If connecting a modem to an external HP 98644A interface, use a "US Modem" cable (HP 13242N) to connect the interface to the modem.

The following illustration shows a modem connection between two computers.



Example of a Modem Connection

Note that when using modem connections, hardware handshake must be active. Be sure that the serial/datacomm interface Modem Line switches are in their "connected" (not "always on") positions. The modem lines are used to control and verify the interaction between a computer and modem during message transfers. They are not directly related to the data being transferred. Data transfer handshaking between computers is handled as part of the data messages.

Direct HP-UX to HP-UX Connections

To connect your HP-UX system directly to another HP-UX system, **each system requires** a dedicated serial/datacomm interface (built-in or otherwise) set to “direct connect” and a male DTE cable. The two DTE cables are connected to each other with the following female-to-female adaptor cable. You have to make this adaptor yourself.

Relation of DTE 1 to DTE 2

Connect female pin 1 to female pin 1
Connect female pin 2 to female pin 3
Connect female pin 3 to female pin 2
Connect female pin 7 to female pin 7
Connect female pin 8 to female pin 20
Connect female pin 20 to female pin 8

- If making a direct connection to the built-in (internal) RS-232 or to an external HP 98626A or HP 98628A interface, connect a DTE cable (HP Part No. 5061-4215) to the interface on your computer. The DTE cable can be ordered as Option 001 with the HP 98626A and HP 98628A interface cards.
- If making a direct connection to an external HP 98644A interface, connect a “US Modem” cable (HP 13242N) to the interface on your computer.

Connecting a “Laserjet” Printer

To connect your HP-UX system directly to an HP 2686A “Laserjet” printer, **requires** a dedicated serial interface (built-in or otherwise) and the cabling detailed below. The serial interface card’s Modem Lines switches **must** be set to the “always on” (not “connected”) positions. Certain aspects of using the “Laserjet” printer are automatically handled by the HP 2686A “model” supplied with your system for use with the LP Spooler. We recommend that you set up the “Laserjet” as a spooled printer for this reason. This topic is covered later in this chapter. Note that the HP 98628A Datacomm Interface card will **not** support the HP 2686A printer.

- If connecting an HP 2686A printer to the built-in (internal) RS-232 or to an external HP 98626A interface, connect a DTE cable (HP Part No. 5061-4215) to the interface card. The DTE cable can be ordered as Option 001 with the HP 98626A.

Connect an HP 17255B cable to the HP 2686A then connect the HP 17255B to the DTE cable.

- If connecting an HP 2686A printer to an external HP 98644A interface, connect a "US Modem" cable (HP 13242N) to the interface card.

Connect an HP 17255B cable to the HP 2686A then connect the HP 17255B to the "US Modem" cable.

Adding/Moving Peripheral Devices

The HP-UX operating system requires the existence of special (device) files to perform I/O to peripheral devices, such as disc drives, printers, and plotters. Special files and an associated topic, block and character I/O, are discussed in the “Concepts” chapter of the *System Administrator Manual*. This section introduces you to the tools necessary to set up peripherals and their associated special files.

During the system installation process, a number of special files are copied from the HP-UX distribution micro discs to your SS/80 disc. To allow you the greatest flexibility and to avoid cluttering your disc, only a partial set of the possible special files was copied to your disc. Since you have a fairly simple single-user system, the supplied set of special files may be all that you need. However, if you add other peripheral devices, you will need to create new special files to communicate with those devices. You may also want to create new special files or change existing ones if you decide to add or remove particular peripherals at some later date, or if you find it necessary to tune your system by changing the locations (interfaces or bus addresses) of peripherals.

The default set installed with your system contains, among others, special (device) files for the system console, a variety of mass storage devices, including the SS/80 hard disc drive on which your system was installed, and a printer. It also contains special files that are used and required by HP-UX to communicate with some pseudo-devices; that is, hardware not considered to be peripherals but that requires special files for system communication (such as memory). These latter files **must not be removed from the system under any circumstances, if HP-UX is to operate properly**. The “Miscellaneous Devices” section later in this chapter contains a complete list of these vital files.

NOTE

The material in this section replaces and supercedes all information in the “Adding/Moving Peripheral Devices” section of the “Toolbox” chapter of the *System Administrator Manual*. Use only the information presented here for specifics on the 2.2L HP-UX system.

To see all of the currently installed special files on your system, log in on the system and type:

```
11 /dev Return
```

The system will respond by displaying a “long” listing of all the special files in the */dev* directory. A typical entry is:

```
crw-rw-rw-  1 root  other   3  2  Sep 15  10:28 null
```

The items of interest here include the first character in the entry, which shows a blocked or character (b or c) designation, the “major” and “minor” numbers, and the name of the special (device) file. The sample entry for the special file *null* shows that it is a character device (c) with a major number of 3 and a minor number of 2.

The listing displayed should include all of the special files shown in the table which follows. The table also shows the character/blocked designation, major and minor numbers, and a brief explanation of the devices associated with these files.

Default Special (Device) Files

(located in the /dev directory)

Special File	c/b	Major	Minor	Device Description
console	c	0	0	System console (ITE)
tty	c	2	0	Process group control terminal
mem	c	3	0	Physical memory image
knmem	c	3	1	Kernel virtual memory image
null	c	3	2	Null file ("bit bucket")
hd	b	0	0	Root HP 9133D disc drive ¹
swap	b	0	0	Swap device (usually same as root)
rhd	c	4	0	"Raw" root HP 9133D disc drive
fd	b	0	1	Removable disc on HP 9133D
rfd	c	4	1	"Raw" removable disc on HP 9133D
lp	c	7	1	System printer (HP-IB) ²
rlp	c	14	1	"Raw" mode system printer
plt	c	12	0	Internal (graphics) crt

Before delving into the software aspects of adding/moving peripheral devices, be sure your peripheral hardware is set up correctly. This includes choosing unique HP-IB or RS-232 bus addresses and setting those addresses on the peripheral devices. Follow the guidelines earlier in this chapter to configure your hardware. Make sure that you gracefully shut down your system **before** you change any of the address switches on connected peripherals or create any special (device) files. To shut down the system, type:

```
/etc/shutdown 0 Return
```

This causes the script */etc/shutdown* to be executed with a "grace" period of zero (0) seconds. The *shutdown* script gracefully terminates all running processes on the system and executes a *sync* command to insure that all pending I/O to the system root disc is completed. When *shutdown* runs, it asks if you want to execute an *fsck* command to insure the integrity of the HP-UX file system. We recommend that you choose the *fsck* option; this is always a good idea when powering down the system. See *shutdown(8)* in the *HP-UX Reference* for further information. For information on using *fsck*, see the *fsck(8)* entry in the *HP-UX Reference* and the "Using the FSCK Command" appendix in the *System Administrator Manual*.

¹ The root device is located on the internal HP-IB bus at Bus Address 0.

² The HP-IB system printer is located on the external HP-IB bus at Bus Address 1.

Once these tasks are done, power down the computer and the HP 9133D disc drive.

Overview of the Task

There are several basic steps required to add or move peripheral devices on your system. Here is an overview of the tasks you will need to accomplish; they are explained in detail later:

1. Using the guidelines presented in the "Installing HP-IB Peripherals" section earlier in this chapter and in the installation manual supplied with the peripheral device, determine the best place (in terms of available HP-IB Bus Addresses, expected usage, etc.) to locate the peripheral.
2. Connect the peripheral device. If the peripheral device requires an interface card and you have not already installed the card, set the appropriate switches on the card and install it in the computer. **Never install an interface card while the computer is powered up.** Then set any required switches on the device and connect it to the computer (or interface card).
3. Ascertain whether the peripheral device will be addressed as a block or character device, or both (disc drives will require both modes of access). Block and character I/O are discussed in the "Concepts" chapter in the *System Administrator Manual*, and examples are provided later in this section.
4. Next, determine if the special (device) file necessary to communicate with the peripheral device already exists on your HP-UX system. Some special files were shipped with your system as shown in the previous table. Device files reside in the */dev* directory and follow the naming conventions explained in the *intro(4)* entry in the *HP-UX Reference*.
5. If the appropriate special (device) file does not exist for the device in question, you will have to create one. Use the *mknod* command to create a particular special file. Tables given later in this section provide the parameters (blocked or character type access and major and minor numbers) needed by *mknod* to create the device files.

Determining the Peripheral's Location

If the peripheral you wish to add/move is an **HP-IB** device, determine the interface and bus address where the device will reside. Use the guidelines in the "Installing HP-IB Peripherals" section to identify an appropriate location (from available HP-IB bus addresses) for your HP-IB peripheral. If the peripheral you wish to add/move is an **RS-232** device, determine the same information using guidelines in the "Installing Non-HP-IB Peripherals" section earlier in this chapter.

Connecting the Peripheral

Connect the peripheral to your computer at the location you have just determined. Follow the instructions presented earlier in this chapter along with the *Model 217 Installation Guide* to install any necessary interface cards and to identify and set their select codes. The manual supplied with the peripheral details the procedure for connecting it to the computer and setting its address (if the peripheral has one).

RS-232 hardware configuration is covered earlier in this chapter. You must create the associated special files for the RS-232 connections then follow the instructions at the end of this section to set up the software aspects of RS-232 configuration.

Block versus Character Special Files

Determine whether you should create a **block special file** or a **character special file**. **Block special files** are used for communicating with disc mass storage devices that are to be used for mountable file systems. **Block special files** are also used for mounting a file system from the built-in micro disc drive of the HP 9133D installation disc or from an optional disc drive.

Character special files are used for communicating with modems, printers, plotters, and, on occasion, disc mass storage devices. In most cases, discs should have both block and character special file entries. Some devices, such as printers, may have more than one special (device) file associated with them; this is explained in the "Printers" section later in this chapter. All other devices should have one or the other.

Creating Special Files

If, by examining the entries in the *dev* directory, you have determined that the appropriate special file for the peripheral does not already exist, you must create one. Special files are created with the *mknod*(8) command. The parameters that you need to execute the *mknod* command are given in tables later in this section. The remainder of this subsection explains how to use the *mknod* command to create special (device) files.

To create a special file with the *mknod* command, you need to login as root and make an entry of the form:

```
/etc/mknod path_name file_type major minor Return
```

where:

<i>path_name</i>	is the pathname of the special file to be created. You should select a file name for the special file which easily identifies the associated peripheral. The entry <i>intro</i> (4) in the <i>HP-UX Reference</i> manual describes a naming convention for special files. Using this naming convention makes your system easier to support and maintain. Special files are kept in the directory <i>/dev</i> for ease of housekeeping. Additionally, many commands expect to find special files in <i>/dev</i> and will fail if the required special file is not there.
<i>file_type</i>	is a single character <i>b</i> , <i>c</i> , or <i>p</i> ; <i>b</i> specifies that the file is a block special file, <i>c</i> specifies that the file is a character special file, and <i>p</i> specifies that the file is a named "pipe" (a special-purpose file not used in this section).
<i>major</i>	is the number of the driver used to communicate with the peripheral. A table of all major numbers is provided later in this section.
<i>minor</i>	is a value specifying the device address and characteristics and is specific to each driver. Tables of all minor numbers are provided later in this section; the tables are organized by device type, bus (internal or external), and bus address.

Besides executing *mknod* commands, you need to handle other aspects of the creation process, including setting up correct access modes on special files. Follow the guidelines in the "Setting Appropriate Permission Masks" section to ensure that access modes are set correctly. If you use printers as spooled devices, additional configuration tasks (discussed later) are required.

Using *mknod* with the Supplied Tables

The following sections are organized by "device class" and contain the information and tables you need to create special (device) files using *mknod*. Separate device class sections exist for miscellaneous devices, RS-232 devices (such as modems), SS/80 hard and micro disc drives, HP-IB printers, plotters, and CRT graphics devices.

Each line in the tables (supplied in the device class sections) corresponds to either one or two special files; two if the "raw" device entry is given on the same line as the regular entry. These tables use the following representation:

The **C/B** column specifies Character or Blocked access and the **Major** and **Minor** (or **Maj** and **Min**) columns specify the major and minor parameters to be used with *mknod*.

The **Device** column represents either the literal name of a special file or a symbolic name (as discussed in the "Naming Conventions" section below); if not obvious from context, the section specifies whether the name is literal or symbolic.

The **RawDev** column (if present) represents the "raw" special device file for the device in question and should have the same name as that in the **Device** column with an added prefix of **r**. The **Notes** column contains commentary for your information only and should **never** be entered as part of a *mknod* command. Under no circumstances should you change any table entries flagged as: **Mandatory (do not change)**.

The remainder of this section contains:

- A table of all blocked and character major numbers for each supported device class.
- Guidelines for setting "permission masks" to insure appropriate ownership of and access to special files.
- Guidelines on naming conventions.
- Specifics on Miscellaneous Devices.
- Specifics on RS-232 Devices.
- Specifics on SS/80 Hard Discs and Micro Discs.
- Specifics on HP-IB Printers.
- Specifics on Plotters and Raw Mode HP-IB Printers.
- Specifics on CRT Graphics Devices.
- RS-232 Devices Configuration Information.

Here are the blocked and character major numbers for each supported device class. The specific tables in each of the following sections also contain the applicable major numbers.

Major Numbers for Blocked Device Classes

Major #	Device Class
0	All SS/80 disc drives including the swap disc, HP 9133D root disc, and the HP 9133D root micro disc.

Major Numbers for Character Device Classes

Major #	Device Class
0	System console (/dev/console).
1	All RS-232 ports (except the system console) including modems and RS-232 serial printers.
2	System tty.
3	System functions such as null, mem, and kmem.
4	All "raw" or character SS/80 discs including the raw root disc and raw root micro disc.
7	HP-IB printers in regular character ("interpreted") mode.
12	CRT graphics devices.
14	Plotters and "raw" mode HP-IB printers.

Setting Appropriate Permission Masks

In each section on device-class-specific information, a permission mask is given. When you use the *mknod* command with the tables supplied below, you must ensure in advance that permission masks are properly set up. Do this by executing a *umask* command to modify the default protection mask used during file creation as indicated in each device class section. One of the two following forms of the *umask* command will be used:

```
umask 111
OR
umask 166
```

The first of these causes the created file's access permission to be "unrestricted", giving read and write permission for everybody. The second *umask* command causes the created file's access permission to be "restricted", giving read and write permission for the file's owner only.

Also, before creating any special files with the *mknod* command, you must log in as the user root. When creating special files, either provide the complete pathname as:

```
/dev/special_file_name
```

or move to the `/dev` directory in advance by executing:

```
cd /dev Return
```

in which case only the `special_file_name` needs to be specified.

Naming Conventions

In the tables that follow, you will see names such as `"disc.0"`; these need to be replaced with appropriate names as explained in the *intro(4)* entry in the *HP-UX Reference*.

Typically, these entries should be replaced with names based on the model number of the device in question. Consider an HP 9122 disc drive with two micro disc drives. One of the tables in the section on "SS/80 Mass Storage Devices" shows four entries in the **Device** column as:

<code>disc.0</code>	<code>rdisc.0</code>
<code>disc.1</code>	<code>rdisc.1</code>

which you should replace with:

<code>fd9122.0</code>	<code>rfd9122.0</code>
<code>fd9122.1</code>	<code>rfd9122.1</code>

where `fd` signifies a micro flexible disc, the `.0` suffix represents the left drive (unit 0), the `.1` suffix represents the right drive (unit 1), and the `r` prefix (in the entries on the right above) represents "raw" access to the left and right drives respectively.

Miscellaneous Devices

The special files associated with the miscellaneous device class are precisely those default special files that the system needs in order to run properly. Each HP-UX installation must have the special files `/dev/null`, `/dev/console`, `/dev/tty`, `/dev/mem`, and `/dev/kmem`. The special file `/dev/null` is a null file (a "bit bucket") used by many HP-UX commands. The special file `/dev/console` identifies the system console and the special file `/dev/tty` is a synonym for the control terminal associated with a process group. The special files `/dev/mem` and `/dev/kmem` refer to the physical memory image and to the kernel's virtual memory image respectively.

These miscellaneous special (device) files are copied to your system when HP-UX is installed. They should not be changed or modified. If one or more of these files is accidentally deleted or otherwise destroyed, you can recreate it by executing the `mknod(8)` command using the character/block designation, major, and minor numbers given below.

The following entries require that `umask 111` be executed before using `mknod`.

Device	C/B	Major	Minor	Notes
console	c	0	0	Mandatory (do not change)
tty	c	2	0	Mandatory (do not change)
null	c	3	2	Mandatory (do not change)

The following entries require that `umask 166` be executed before using `mknod`.

Device	C/B	Major	Minor	Notes
mem	c	3	0	Mandatory (do not change)
kmem	c	3	1	Mandatory (do not change)

For example, to recreate the special file for the null device, log in as the user `root` and type the following lines (each followed by `Return`):

```
cd /dev
umask 111
/etc/mknod null c 3 2
```

RS-232 Devices

The class of RS-232 devices includes RS-232 printers, modems, and direct RS-232 connections to other computers. All of these “communication ports” need to be identified by one or more special (device) files, depending on the intended use of the port. Special `tty` files are required for ports that receive incoming signals (“dial in”) and for hard-wired ports (including RS-232 printers). Ports that transmit signals such as modems (“dial out”) or direct connections to another HP-UX system additionally require `cua` and `cul` special files. See the “Guidelines for Selecting an RS-232 Interface” section earlier in this chapter for notes on RS-232 connections.

The following entries require that `umask 111` be executed before using `mknod`. The general template for ports is:

Device	C/B	Major	Minor	Notes
<code>ttyxx</code>	<code>c</code>	1	<code>xx</code>	<code>xx</code> is explained below
<code>cuaxx</code>	<code>c</code>	1	<code>xx+128</code>	minor = sum of <code>xx</code> + 128
<code>culxx</code>	<code>c</code>	1	<code>xx+128</code>	minor = sum of <code>xx</code> + 128

where `xx` is the minor number for the `tty` special file and the sum of `xx` plus 128 is the minor number for both the `cua` and `cul` special files.

The `tty`, `cua`, and `cul` files are character special files whose major number is 1. The minor number for `tty` files is a sequential number (explained below); for `cua` and `cul` files it is this number plus an offset of 128. The numbers used to create the `tty`, `cua`, and `cul` device files become part of the file names associated with the port. For example, the special file `/dev/tty02` would be created with minor number 2 and `/dev/cul02` would be created with minor number 130 (i.e., 2 plus an offset of 128).

Because the 2.2L version of HP-UX is a single-user system, the sequential `tty`, `cua`, and `cul` numbers consist of 00 and 01. There is potential for a total of 3 ports on the system: the `/dev/console` entry (explained below) and a maximum of two `tty` ports: one for a modem to be used with `uucp` or for a direct connection to another HP-UX system, the other for an RS-232 connection to an HP 2686A “Laserjet” printer.

HP-UX associates the system console port with the special (device) file `/dev/console`. The system console is an ITE (see the **Internal Terminal Emulator** definition in Chapter 2 of the *System Administrator Manual*) and is the first port on the system. The following table summarizes the three potential ports on the system:

Port	tty File	cua File	cul File	Description
1	<code>/dev/console</code>	no entry	no entry	ITE
2	<code>/dev/tty00</code>	<code>/dev/cua00</code>	<code>/dev/cul00</code>	Internal RS-232 (SC 9)
3	<code>/dev/tty01</code>	<code>/dev/cua01</code>	<code>/dev/cul01</code>	External RS-232 (SC 10)

This table shows the ITE (Internal Terminal Emulator) or system console associated with the file `/dev/console`. The second port is associated with the `/dev/tty00`, `/dev/cua00`, and `/dev/cul00` files and uses the built-in (internal RS-232) HP 98626A card at select code 9. The third port is associated with the `/dev/tty01`, `/dev/cua01`, and `/dev/cul01` files and uses the external RS-232 Serial Interface card (an optional HP 98626A, HP 98628A, or HP 98644A) at select code 10. Note that the HP 98628A Datacomm Interface card will **not** support the HP 2686A printer.

As a general rule, the lowest available select code is associated with the lowest available tty, cua, and cul files when you create the special files for ports.

Creating Special Files for RS-232 Ports

Assume that you want to create special files for a modem at select code 10 (on the external RS-232 interface) and associate it with `/dev/tty01`. Because the modem will be used as a dial-in and dial-out port, use the following forms of `mknod(8)` **after** logging in as the user `root`; follow each line with `Return`.

```
cd /dev
umask 111
/etc/mknod tty01 c 1 1
/etc/mknod cua01 c 1 129
/etc/mknod cul01 c 1 129
```

Notice that the minor number for the `cua01` and `cul01` special files is the minor number for the `tty01` file plus 128. There are now three special (device) files associated with the dial-in and dial-out modem at select code 10.

As another example, assume that you want to create a special file for an HP 2686A "Laserjet" printer at select code 9 (on the internal RS-232 interface) and associate it with `/dev/tty00`. Because the HP 2686A printer requires only the appropriate `tty` file, use the following form of `mknod(8)` after logging in as the user `root`; follow each line with `Return`.

```
cd /dev
umask 111
/etc/mknod tty00 c 1 0
```

Notice that the minor number for the `tty00` special file is the same as the trailing number on the special file; it is also one less than the minor number used in the previous example; this is because it is at the next lower select code. The special file `/dev/tty00` is now associated with the "Laserjet" printer at select code 9.

NOTE

A single-user Series 200 HP-UX 2.2L system can have a maximum of 3 ports: one for the system console, one RS-232 port for a modem used with `uucp` or for direct connection to another HP-UX system, and one RS-232 port for an HP 2686A "Laserjet" printer.

Using RS-232 Printers as Spooled Devices

RS-232 printers can be accessed, through the line printer spooler (see *lp(1)*), as spooled devices; files are kept in a spool directory until the device is ready to process them. If your printer is set up as spooled device, you can direct output to it at any time, whether it is busy or not.

To set up your printer as a spooled device, create the printer's special file as shown above, then follow the instructions in the "Setting Up the LP Spooler" section of Chapter 5 in the *System Administrator Manual* to change the special file's ownership, group, and permission mode. That section also explains commands which control the LP (line printer) Spooler.

A “model” (printer interface program) for using the HP 2686A printer with the LP Spooler is provided in the `/usr/spool/lp/model/hp2686a` file. Because this model automatically takes care of certain aspects of the “Laserjet”, it is **strongly recommended** that you set up this printer as a spooled device using the supplied model.

SS/80 Hard Discs and Micro Discs

A special file must be created for every SS/80 disc drive with which your system needs to communicate. Because it is sometimes difficult to predict whether or not your disc drives will be used as blocked devices or as character devices, it is common practice to create two special files for each device: a block special file and a character or “raw” special file. The address-dependent minor number is the same for both block and character entries but the major number (i.e., the driver) differs.

See the “Configuration Notes” at the end of Chapter 1 for a list of the SS/80 disc drive combinations supported by the 2.2L version of HP-UX.

There are a pair of minor numbers for each address where an SS/80 device can be placed. The first minor number of the pair corresponds to unit 0 on the controller; the second minor number corresponds to unit 1. Consider how this works on an HP 9133D. The hard disc corresponds to unit 0 and the removable micro disc corresponds to unit 1. For an HP 9122, the left drive corresponds to unit 0 and the right drive to unit 1. An HP 9134D only contains unit 0 because it consists of a single hard disc drive.

We recommend that all SS/80 entries for **hard discs** have restricted access permission (i.e., execute `umask 166` before using `mknod`). This gives read/write permission to the owner (`root`) only and is intended to prevent the mounting of unauthorized media on your system. We recommend that all SS/80 entries for **micro discs** have unrestricted access permission (i.e., execute `umask 111` before using `mknod`). If you want to later change permissions, use the `chmod` command; see the `chmod(1)` entry in the *HP-UX Reference* for details.

NOTE

Extending read and write permissions for hard discs to all users is **not recommended** as this raises the risk of a user damaging the file system.

SS/80 "root" Disc and Micro Disc

These are the default special (device) files created during the installation process and necessary for the proper operation of the HP-UX file system. You should only replace these special files if they have been destroyed or somehow damaged. **The "root" SS/80 disc must be located at bus address 0 on the internal HP-IB bus.** The names given in the **Device** column are literal; do not change or remove these entries under any circumstances.

Device	C/B	Major	Minor	Notes
swap	b	0	0	Mandatory (do not change)
hd	b	0	0	Mandatory (do not change)
rhd	c	4	0	Mandatory (do not change)
fd	b	0	1	Mandatory (do not change)
rfd	c	4	1	Mandatory (do not change)

Non-root SS/80 Discs on the internal or external HP-IB bus
 Because of the "heavy traffic" on the internal HP-IB bus caused by the root device (swapping, file transfers, etc.), additional discs should be placed on the external HP-IB bus whenever possible. However, if you have an external HP-IB bus and it contains an HP-IB plotter or is congested with other peripherals, put the additional SS/80 disc on the internal bus. Use the guidelines provided earlier and the characteristics of your own installation to weigh the trade-offs.

The following table provides the minor numbers for SS/80 discs **not** used as root devices on both the internal and external HP-IB buses. The minor numbers correspond to each physical location where a non-root SS/80 device is supported. You must use an appropriate name containing the model number of your SS/80 disc when using *mknod*; see the naming conventions in the *intro(4)* entry of the *HP-UX Reference* and the example which follows.

For each applicable unit on a given bus at a specific bus address, you should create both block and character special files. Unit 0 always corresponds to the hard disc drive on SS/80 devices that have one; other applicable units are discussed above. For the block special files, use *b* for the file type and major number 0. For the character ("raw") special files, use *c* for the file type and major number 4.

An example follows the table to clarify how this works.

Non-root SS/80 Disc Drive Minor Numbers

HP-IB Interface	Bus Address	Minor No.	Notes
Internal	2	2	Unit 0
Internal	2	3	Unit 1
Internal	3	4	Unit 0
Internal	3	5	Unit 1
Internal	4	6	Unit 0
Internal	4	7	Unit 1
External	0	8	Unit 0
External	0	9	Unit 1
External	2	10	Unit 0
External	2	11	Unit 1
External	3	12	Unit 0
External	3	13	Unit 1
External	4	14	Unit 0
External	4	15	Unit 1

An Example of Creating SS/80 Special Files

Assume that you have an HP 9133D that is not being used as a root device and you want to connect it to the external HP-IB at bus address 0. Since there is both a hard disc and micro disc drive in the HP 9133D, you need to create four special files — one block and one character version for each of the two units. To create the appropriate entries for this disc drive, execute the following commands (ending each line with **Return**):

```
cd /dev
umask 166
/etc/mknod hd9133 b 0 8
/etc/mknod rhd9133 c 4 8
umask 111
/etc/mknod fd.2 b 0 9
/etc/mknod rfd.2 c 4 9
```

Use the `/dev/hd9133` special file to access the HP 9133D hard disc in blocked mode and the `/dev/rhd9133` special file to access the hard disc in “raw” (character) mode. The `/dev/fd.2` file allows blocked access to the micro disc; the `/dev/rfd.2` file, “raw” (character) access to the micro disc.

HP-IB Printers

This section provides the *mknod* information needed to create special (device) files for HP-IB printers such as the HP 2225A. RS-232 printers, such as the HP 2686A, are discussed in the “RS-232 Devices” section earlier in this chapter. Note that an HP 98624 HP-IB interface at select code 8 (for the external HP-IB bus) is **required for an HP-IB printer**.

Although all printers on HP-UX are character devices, they can be used in different “modes”: you can communicate with printers using drivers that either interpret or do not interpret the data. The driver — major number 7 — associated with this device class section is the one that interprets the data.

To use the driver that does not interpret data, called “raw” mode, see the “Plotters and Raw Mode HP-IB Printers” device class that follows as well as the *lp(4)* entry in the *HP-UX Reference*. If used with printers, this raw mode driver treats the device as a graphics device — byte streams are output exactly as sent. You will want to use the raw mode driver if you need to send information directly to the printer, for example when using graphics on a graphics printer.

To cover all possible situations, you should set up two special files for each HP-IB printer on your system. This is how the default special files for the system printer, */dev/lp* and */dev/rtp*, are installed. First set up the special file for the “interpreting” driver according to the instructions presented here, and then set up the “raw” mode special file according to the instructions for the plotters and raw mode HP-IB printers device class.

The minor numbers associated with the “interpreting” printer driver correspond directly to the physical locations where printers are allowed: there is one minor number per location. Consult the table below to determine the correct minor number.

To create a special file for a printer, first determine the printer’s bus address. Use the guidelines given earlier in this chapter to select the appropriate location, then use the following table to find the minor number that corresponds to that location. Finally, create the special file for the printer using the *mknod* command. You must assign a **unique** special file name to each entry you create; see the *intro(4)* entry in the *HP-UX Reference* for a suggested naming convention. Also, execute *umask 111* before using *mknod* to create a special file for your printer.

Minor Numbers for HP-IB Printers

Interface	Bus Address	Minor Number
External (SC 8)	1	1
External (SC 8)	5	2
External (SC 8)	6	3
External (SC 8)	7	4

NOTE

If you have a system printer, you should always name its corresponding special file `/dev/lp` because some commands use this special file as a default. You can create an individual special file for your favorite printer and give it the pathname `/dev/lp` (there is one created for you during system installation). Alternatively, you can take an existing special file for your favorite printer and create a link to it from the pathname `/dev/lp`.

For example, to create a special file for an HP 2225 printer on the external HP-IB bus at select code 8 and bus address 5, log in as the user `root` and execute each of the following lines (followed by **Return**):

```
umask 111
/etc/mknod /dev/lp2225 c 7 2
```

As shown here, special file names for printers typically consist of `lp` followed by the printer's product number or a sequence number. You may also want to create a "raw" special file for the same printer as explained in the next section.

Using HP-IB Printers as Spooled Devices

There is one additional decision you need to make. Printers can be accessed, through the line printer spooler (see *lp(1)*), as spooled devices; files are kept in a spool directory until the device is ready to process them. If your printer is set up as spooled device, you can direct output to it at any time, whether it is busy or not.

To set up your printer as a spooled device, create the printer's special file as explained below, then follow the instructions in the "Setting Up the LP Spooler" section of Chapter 5 in the *System Administrator Manual* to change the special file's ownership, group, and permission mode. That section also explains commands which control the LP (line printer) Spooler.

Note that the default */dev/lp* and */dev/rlp* special files shipped with your system are already set up to function as a spooled printer; all you need to do is use the recommended address for the printer (on the external bus at bus address 1) and execute the appropriate LP commands (described in the "Setting Up the LP Spooler" section of Chapter 5 in the *System Administrator Manual*); the appropriate ownership, group, and permission modes have already been set for these files.

A "model" (printer interface program) for using the HP 2225A printer with the LP Spooler is provided in the */usr/spool/lp/model/hp2225a* file.

Plotters and Raw Mode HP-IB Printers

This section provides the *mknod* information needed to create special (device) files for HP-IB plotters and "raw" mode HP-IB printers.

The driver associated with this device class — major number 14 — prints its input data exactly as it is received: no data interpretation is performed. Use this driver to send data to peripherals such as plotters requiring that the input data be unmodified. As previously mentioned, this driver is also useful for accessing HP-IB printers in "raw" mode. See the *HP-IB(4)* entry in the *HP-UX Reference* for further details about this driver.

As in the preceding section, the minor numbers associated with this device class correspond directly to the physical locations where these peripherals are allowed: there is one minor number per location. Consult the table below to determine the correct minor number.

To create a special file for a device in this class, first determine the peripheral's bus address. Use the guidelines given earlier in this section to choose an appropriate location. Then use the following table to find the minor number corresponding to that location. Finally, create the special file for the printer using the *mknod* command. Remember to execute *umask 111* before using *mknod*.

Minor Numbers for Plotters and Raw Mode HP-IB Printers

Interface	Bus Address	Minor Number
External (SC 8)	1	1
External (SC 8)	5	2
External (SC 8)	6	3
External (SC 8)	7	4

Using Raw Printers as Spooled Devices

If you want to use a raw printer as a spooled device, create the printer's "raw" mode special file as explained here, then follow the instructions in the "Setting Up the LP Spooler" section in the "Toolbox" chapter of the *System Administrator Manual* to change the special file's ownership, group, and permission mode. You should use the same special file name as the printer's "interpreted" mode but prefix the raw special file name with an *r* — just like the default files */dev/lp* and */dev/rlp* shipped as part of your system.

Useful Naming Conventions

You must assign a **unique** special file name to each entry you create. The *intro(4)* entry in the *HP-UX Reference* explains special file naming conventions. Generally, use *rlp* followed by the product number for raw printers and *plt* followed by the product number for plotters. If more than one device with the same product number is present, be certain not to duplicate their special file names. For example, to differentiate between two HP 7475 plotters, name the first one *plt7475* and the second *plt7475.1*.

The `plt` name is also used for the CRT graphics devices discussed below. The internal CRT is supplied as part of your system with the special file name `/dev/plt`.

As an example, assume you want to create a raw mode special file for the same printer used as an example in the preceding section. The printer is an HP 2225 located on the external HP-IB bus at select code 8 and bus address 5. Create this special file by logging in as the `root` user and executing each of the following lines (followed by `Return`):

```
umask 111
/etc/mknod /dev/r1p2225 c 14 2
```

Now you can access the printer in either an “interpreted” mode (using the `/dev/lp2225` file created earlier) or a “raw” mode (using `/dev/r1p2225`).

CRT Graphics Devices

The peripheral in this device class corresponds to the internal graphics CRT. There is one driver — major number 12 — associated with the internal graphics CRT.

The minor number for the internal graphics CRT is always 0. Because the special file for the internal CRT — `/dev/plt` — is created automatically when you install your system, you will only need to create this special file if it has somehow been destroyed.

To replace the special file for the internal CRT (installed with your system), log in as the `root` user and execute the following lines following each with `Return`:

```
umask 111
/etc/mknod /dev/plt c 12 0
```

Chapter 5

Differences between 2.1 and 2.2L HP-UX

Introduction

This chapter contains a summary of all differences between the 2.1 and 2.2L versions of HP-UX. For completeness, topics documented elsewhere in this manual are included. In all cases, relevant 2.1 and 2.2L HP-UX documentation for the topic in question is provided. The following differences are discussed in this chapter:

- The 2.2L HP-UX Kernel.
- The Hardware Installation Process.
- The Software Installation Process.
- The Media Initialization Utility.
- The System Image Copy Utility.
- Changing the Swap Space.
- Creating File Systems.
- Customizing Configuration Files.

These sections on differences are followed by a discussion of the 2.2L HP-UX system console, the Internal Terminal Emulator (ITE), and differences in the keyboard shipped with your “LX” system. This keyboard was not supported in previous versions of HP-UX.

The 2.2L HP-UX Kernel

The “kernel” (the file */hp-ux*) in the 2.2L version of HP-UX is different from the 2.1 HP-UX kernel. See the **boot area**, **boot ROM**, and **kernel** definitions at the beginning of Chapter 2 in the *System Administrator Manual* for a description of the kernel’s role in the system.

The three primary differences between the 2.1 and 2.2L kernels are:

1. The 2.2L kernel supports SS/80 mass storage devices (the HP 9122D/S, HP 9133D, and HP 9134D disc drives) but not the CS/80 mass storage devices (HP 79xx disc drives) supported by the 2.1 kernel.
2. Other supported peripherals are different as well. All peripherals supported by the 2.2L kernel are listed in the required and optional hardware sections under the “Product Overview” heading in Chapter 1 of this manual. This information supercedes the documentation on supported peripherals contained in the *HP 9000 Series 200 Configuration Information and Order Guide* shipped with your system and referred to in the *System Administrator Manual*.
3. The 2.2L kernel supports only the Motorola 68010 (MC 68010) processor contained in your Model 217 computer. The 2.1 kernel supports only the MC 68000 processor contained on Series 200 models **other** than the Model 217. The 2.2L HP-UX Operating System **will not run** on any Series 200 computer **except** the Model 217.

The Hardware Installation Process

In the 2.1 version of HP-UX, hardware installation, including HP-UX specifics, is documented in the Installation Guide provided with the Series 200 computer.

In the 2.2L version of HP-UX, basic hardware installation is covered in the Installation Guide but HP-UX specifics are provided in this manual. See the “Product Overview” section in Chapter 1 for a summary of all required and optional hardware, Chapter 2 for instructions on installing required hardware, and Chapter 4 for instructions on installing optional hardware.

The Software Installation Process

In the 2.1 version of HP-UX, software installation is documented in Chapter 2 (“Installing HP-UX”) of the *System Administrator Manual*.

In the 2.2L version, the software installation process is documented in Chapter 3 of this manual. For the most part, the material in Chapter 3 of this manual supercedes the information given in Chapter 2 of the *System Administrator Manual*. Most of the terminology at the start of Chapter 2 (of the *System Administrator Manual*) and the guidelines given in the “After Installing HP-UX” section of the same chapter are still valid.

The Media Initialization Utility

In the 2.1 version of HP-UX, the same function is served by the System Media Initialization utility which is documented in Chapter 2 (“Installing HP-UX”) and in the “Media Utilities” section of Chapter 5 (“The System Administrator’s Toolbox”) of the *System Administrator Manual*.

In the 2.2L version, the Media Initialization utility is documented in Chapter 3 (“Installing the HP-UX Software”) of this book. This supercedes the 2.1 documentation listed above.

The System Image Copy Utility

In the 2.1 version of HP-UX, the same function is served by the System Tape Backup utility which is documented in Chapter 2 (“Installing HP-UX”) and in the “Media Utilities” section of Chapter 5 (“The System Administrator’s Toolbox”) of the *System Administrator Manual*.

In the 2.2L version, the System Image Copy utility is documented in Chapter 3 (“Installing the HP-UX Software”) of this book. This supercedes the 2.1 documentation listed above.



Changing the Swap Space

By default, the size of the swap space is 2 Mbytes (i.e., 2000 1024-byte blocks). This should be more than sufficient for most purposes on your single-user system. However, if you have more than 2 Mbytes of RAM installed in your computer or expect to be running more than 2 Mbytes of processes in addition to the processes that fit in the computer's RAM at one time, you should **increase** the swap space on your hard disc. Conversely, if you have only (the default) one megabyte of RAM installed in your computer and do **not** want to use the "sticky bit" feature discussed below, consider **decreasing** the amount of swap space on your hard disc. Increasing or decreasing the swap space on your disc has an inverse effect on the amount of mass storage space available for use by the file system.

Optimally, make these changes when first installing the system by executing the *sconfig(8)* command. Otherwise, changing the swap space with *sconfig* requires a complete re-installation of the system. If you choose to change the default size of the swap space, remember that the total size of the HP 9133D hard disc is 16255 blocks. This figure does not include swap space. See the "Configuring HP-UX" section of the "System Administrator's Toolbox" chapter in the *System Administrator Manual* and the *sconfig(8)* entry in the *HP-UX Reference* for instructions on changing the swap space size. The system's swap space is also discussed in the "File System Implementation" and "Memory Management" sections of Chapter 3 ("Concepts") in the *System Administrator Manual*.

A reasonable rule-of-thumb for the size of the swap space is that it contain twice the size of the available RAM in the machine. In the default configuration of one megabyte of RAM, the available memory is approximately 700 Kilobytes, so 1.5 megabytes should be sufficient space for the swap area. Thus, you may want to decrease the swap space to 1.5 Mbytes (i.e., 1500 instead of 2000 blocks).

Using the "Sticky Bit"

You can take advantage of the swap space by setting the "sticky bit" on high usage files such as *vi(1)*, *csh(1)*, or application programs. When the sticky bit is set on a file, that file is kept in the swap area on the root mass storage device instead of residing in the root device's file system. The result is increased speed when the file is executed (loaded from the swap area into RAM instead of from the file system into RAM).

Set the sticky bit with:

```
chmod +t filename Return
```

where *filename* is the file whose sticky bit you want to set.

If you choose to set the sticky bit on many programs you should not decrease the default swap size of 2000 blocks (2 Mbytes). If you set the sticky bit on too many files, you may get the message:

```
panic: out of swap space
```

If this happens you should re-boot the system and execute:

```
chmod -t filename Return
```

to clear the sticky bit on the offending file. You must clear the sticky bit **before** re-executing the file in question. The sticky bit is discussed further in Chapter 3 (“Concepts”) under the “File Protection” and “Memory Management” sections of the *System Administrator Manual*.

Making Swap Space Changes

The procedure for changing the location or size of the swap area is described in the “Configuring HP-UX” section of the *System Administrator Manual*. Ignore all references to sizes, CS/80 discs, and cartridge tapes in that section; be certain to backup your SS/80 hard disc(s) using micro discs. The following differences should also be noted:

1. The HP 9133D and HP 9134D hard discs — both with Option 001 indicating a 1024-byte sector size — have a capacity of 16 645 120 bytes (16255 1024-byte blocks).
2. The micro disc drive(s) in the HP 9122D and HP 9133D have a capacity of 788 480 bytes (770 1024-byte blocks).
3. The size of the swap space plus the size of the file system **must** be less than or equal to the total size of the root mass storage device.

Creating File Systems

To create a file system on an SS/80 mass storage device, see the “Creating File Systems” section in the “Toolbox” chapter of the *System Administrator Manual*. Note the following changes from that section in the *System Administrator Manual*:

- Use the Media Initialization utility supplied with 2.2L HP-UX to initialize the media.
- Use the *mknod* command and the information in Chapter 4 of this manual to create an appropriate special file for the mass storage device.
- Use the sizes of mass storage devices provided in the previous section on swap space.
- Ignore the section on “Disc Partitioning” (for the HP 7933 and HP 7935 discs). This does not apply to SS/80 mass storage devices.

Customizing Configuration Files

A number of configuration files should be customized for use with the 2.2L HP-UX system. These are detailed below.

Using the *uucp* Facilities

If you want to use the *uucp*(1) facilities on the 2.2L version of HP-UX, you must install the *SYSCOMM* file set and modify the */usr/lib/crontab* and */etc/rc* configuration files. Installing the *SYSCOMM* file set is explained in Chapter 3 of this manual; the files contained in *SYSCOMM* are listed in Appendix A of this manual. Use *vi* or some other editor to make the following modifications to */usr/lib/crontab* and */etc/rc*:

- Remove the comment sign (the # character) in front of the three *uudemon* lines in */usr/lib/crontab*.
- Remove the comment sign (the # character) in front of the *uuclean* lines in */etc/rc*.

As shipped in the 2.2L version of HP-UX, these lines are “commented out” in these two files. Because the 2.1 version of HP-UX was not partitioned, the corresponding files did not have the *uucp*-related lines commented out.

Modifying `/etc/rc` for the LP Spooler

The `/etc/rc` shell script should have the following addition to properly handle shutting down the LP Spooler when entering state 1. Note that even on a single-user system such as yours, **the normal operating state for the system is state 2**. In the “state 1” section of `/etc/rc`, you will see an:

```
else
```

followed by:

```
# Unmount secondary volumes
```

Just **before** the last line shown above, insert the following lines:

```
# Shut down the LP Spooler
echo "line printer \c"
/usr/lib/lpsht
```

Note that `/etc/rc` automatically starts the LP Spooler whenever you enter state 2. Typically, this is done by executing `init 2`; see the “System Boot and Login” chapter in the *System Administrator Manual* for further information on `/etc/rc` and system states.

The `/etc/backup` shell script

The `/etc/backup` shell script shipped with your system should be modified before it is used. The "Backing Up and Restoring the File System" section of the "System Administrator's Toolbox" in the *System Administrator Manual* contains suggestions for modifying the script. For the 2.2L release of HP-UX, the following items are of interest:

- The `outdev` variable, indicating the destination device for the backup, should correspond to your micro disc drive. This is the character (i.e., "raw") special file `/dev/rfd`.
- The `rootdev` variable, indicating the source root device for the backup, should correspond to the character ("raw") special file for the root disc drive. This is the special file `/dev/rhd`.
- Replace the `tcio` and `cpio` lines in the script with the modified `cpio` line as shown in the first part of the `backup` script. This assumes that the backup is being done to a "raw" device. This change is necessary because the `tcio` command is valid only for CS/80 cartridge tapes. The recommended replacement in the script (for the raw micro floppy) is:

```
cpio -ocBx >/dev/rfd
```

although you can minimally use:

```
cpio -oB >/dev/rfd
```

The `cpio(1)` command allows the possibility of crossing micro disc boundaries. For example, when using `/etc/backup` with the `-archive` option, `cpio` will inform you when to insert another micro disc while doing the archival backup. If you are doing an archival type backup, be sure to have enough initialized micro discs to backup the entire file system on the HP 9133D hard disc. Note that the `B` option **must** be used with the raw special file to ensure proper block alignment.

The 2.2L HP-UX System Console

All interaction with the system console is based on the Internal Terminal Emulator (ITE) code in the HP-UX kernel. There are differences in the 2.1 and 2.2L HP-UX ITEs that affect the system console. This section documents those differences.

Except for the first few sub-sections, this section is organized the same as the *Using the System Console with HP 9000 Series 200 Computers* article in the *HP-UX Concepts and Tutorials, Vol. 4* manual. The same headings (such as "Character Entry Group") are given in the same order. Only the differences are documented here. One exception: a few keys documented in the above article do not exist on the keyboard shipped with your system; ignore the descriptions of those keys. You may want to skim the System Console article and mark it with the differences described here.

Remote and Local Modes

Because the ITE emulates a terminal, the system console has both "local" and "remote" modes. In **both** modes, pressing a key causes the ASCII code associated with the key to be displayed on the screen. (ASCII stands for the American Standard Code for Information Interchange.) In **remote mode**, a key press causes the ASCII code associated with the key to be transmitted to HP-UX which echoes it on the screen. In **local mode**, the ASCII character appears on the screen without being passed to HP-UX.

How to Switch Modes

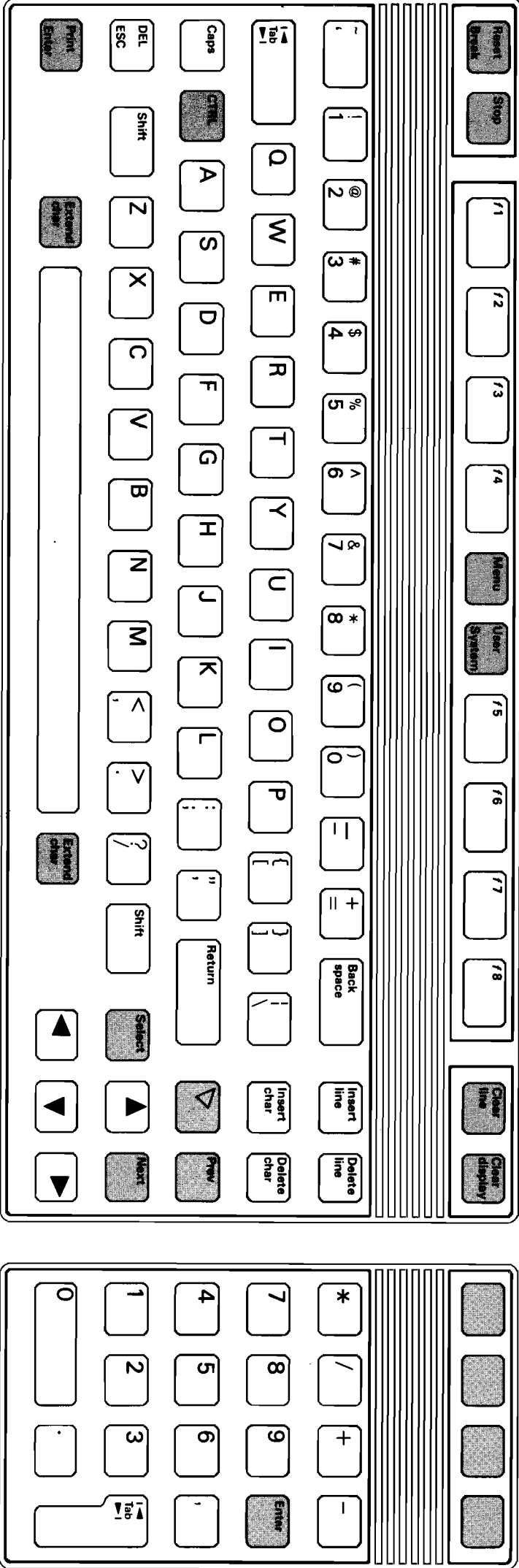
When HP-UX is booted the system console "comes up" in remote mode by default. It is occasionally useful to have the system console in local mode (or "off-line" from the point of view of HP-UX). To change from the default remote mode into local mode:

1. Press the **System** key. The "system" softkeys will be displayed on the bottom of the screen.
2. Now press **f4** (labeled **modes**).
3. Press **f4** again (labeled **REMOTE ***). The * next to the word **REMOTE** should now be off, indicating that the system console is in local mode.

To return to remote mode, press the **f4** key again. You may have to press it twice depending on whether it is currently displaying **modes** or **REMOTE** as described above. The * should again appear in the **REMOTE** label so it looks like **REMOTE ***, indicating that the system console is in remote mode.

Keyboard Overview

The highlighted keys in the following diagram are described in the text which follows.



Keys Not Implemented on HP-UX 2.2L

The **Print**, **Select**, and **Enter** keys as well as the four blank keys above the numeric keypad are not implemented but do “beep” when pressed. Beyond the beep, HP-UX ignores these keys.

Character Entry Group

The keyboard will generate any of its potential 256 ASCII characters if you hold down the **CTRL** key while entering a three digit number in the range of 0 to 255. The ASCII characters from 128 through 255 (the “Roman 8” character set) follow the same restrictions as those presented for the **Extend char** key below. This use of the **CTRL** key is not documented in the *Using the System Console with HP 9000 Series 200 Computers* article.

The **Extend char** key provides access to HP’s “Roman 8” character set. This character set uses the 8th bit (ASCII characters 128 through 255) of a byte that represents an ASCII character. Think of the **Extend char** key as a modifier that works much like the **CTRL** or **Shift** keys; you must hold down the **Extend char** key while pressing the key you want. The **Extend char** key is not documented in the *Using the System Console with HP 9000 Series 200 Computers* article.

In “remote” mode — when the console is communicating with HP-UX — using the **Extend char** key simply displaces the regular ASCII characters. That is, the keys still generate ASCII characters, but not necessarily as labeled on the key.

In “local” mode — when the console is not communicating with HP-UX — the **Extend char** key generates the Roman 8 character set. The keyboard diagram later in this section illustrates how the Roman 8 Character Set is “mapped” onto the regular keys. To use the Roman 8 Character Set in local mode, do the following:

1. While still in remote mode, set up HP-UX to handle 8-bit characters by executing:

```
stty cs8 Return
```



2. Change the system console into local mode as described earlier in this section.
3. Once in local mode, set up the ITE (Internal Terminal Emulator) to handle 8-bit characters by typing:

ESC &klI **Return**

Note that the last two characters are a “one” and a capital “I”.

4. Press the **Extend char** key while pressing another key.

Remember, you will only see these Roman 8 characters displayed on your screen while in local mode because the HP-UX shell uses the 8th bit in a character’s byte for its own purposes. You can however generate the Roman 8 characters in a program. For example, the C program:

```
main()
{
    printf("\271Como se llama?\n")
}
```

results in the following output:

```
¿Como se llama?
```

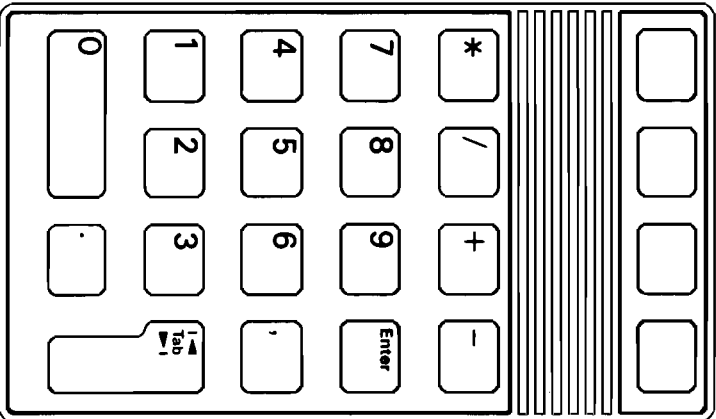
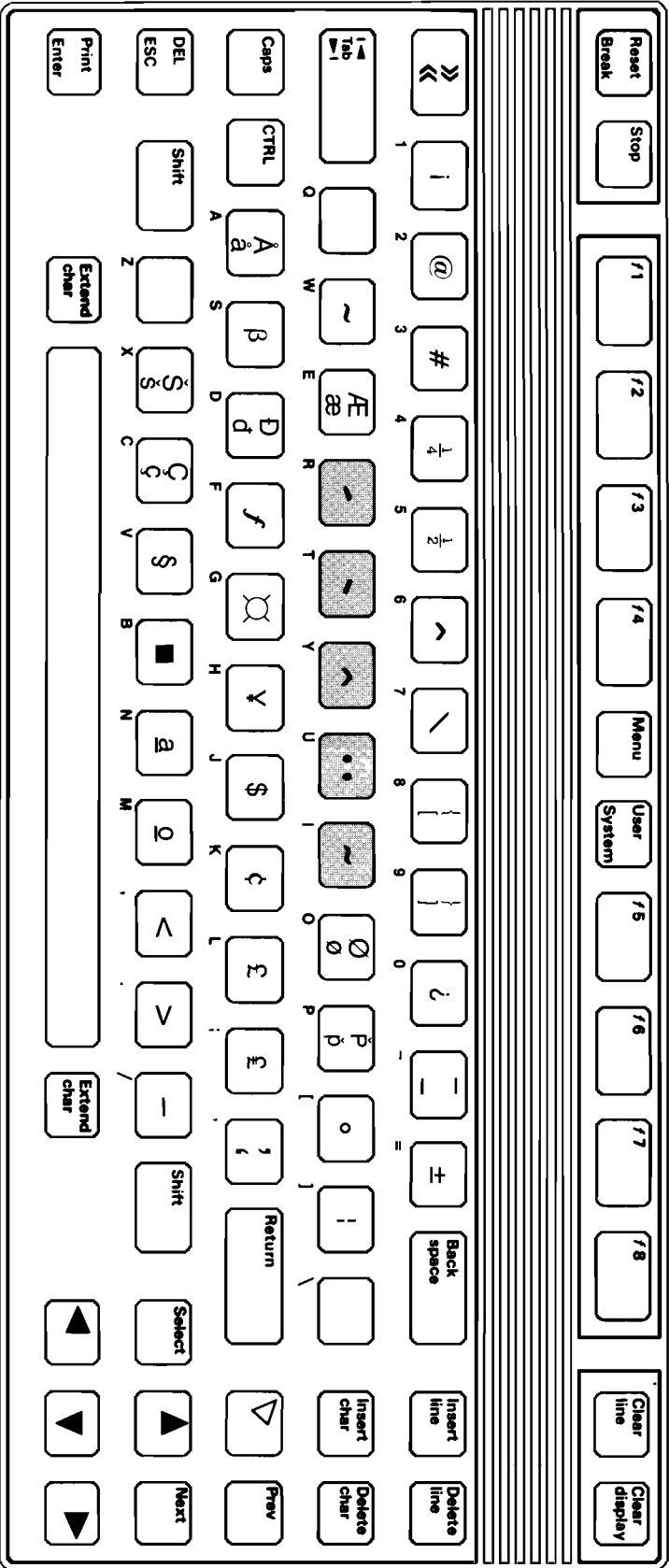
Note that the ASCII character is represented in octal; octal 271 equals decimal 185; see the “Roman 8 Character Set” table which follows. If the output of this program was directed to a file, then listed with *cat(1)* or *more(1)*, you would see the same output. However, if you examine the file with *vi*, you will not see the Roman 8 character but a “displaced” ASCII character as discussed above. Further, if you update (write) the file using *vi*, the displaced character becomes the actual character now in the file. In the above example, this results in:

```
9Como se llama?
```

where 9 is the displaced ASCII character representing ¿.

To use the “mute characters” (i.e., diacritical marks) such as ä, ñ, etc, hold down the **Extend char** key while pressing the mute character key you want, then type an appropriate character. The keyboard illustration that follows shows which keys generate the Roman 8 characters, including the mute characters. For example, to get the ä character, hold **Extend char** and press **U** (this generates the umlaut which is not yet displayed). Now press **A** and the ä character will appear on the display.

The highlighted areas indicate mute characters which combine with appropriate lower and upper case alpha characters to produce Roman 8 characters.



How the Roman 8 Characters Use the Keyboard

The following table shows the decimal and hexadecimal equivalents for the Roman 8 Character Set. Your screen as well as both the HP 2225A “Thinkjet” and HP 2686A “Laserjet” printers will print all of the Roman 8 Character Set.

The Roman 8 Character Set

CHAR.	DEC.	HEX.	CHAR.	DEC.	HEX.	CHAR.	DEC.	HEX.	CHAR.	DEC.	HEX.
N	128	80		160	A0	ä	192	C0	A	224	E0
S	129	81	À	161	A1	ê	193	C1	Â	225	E1
S	130	82	Á	162	A2	ô	194	C2	ã	226	E2
E	131	83	Ê	163	A3	ü	195	C3	ð	227	E3
E	132	84	Ë	164	A4	à	196	C4	d	228	E4
E	133	85	E	165	A5	é	197	C5	í	229	E5
A	134	86	Ì	166	A6	ó	198	C6	ì	230	E6
Q	135	87	I	167	A7	ù	199	C7	Ï	231	E7
B	136	88	´	168	A8	à	200	C8	Ò	232	E8
H	137	89	˘	169	A9	è	201	C9	Ó	233	E9
L	138	8A	˙	170	AA	ò	202	CA	ô	234	EA
V	139	8B	˚	171	AB	û	203	CB	Š	235	EB
F	140	8C	˛	172	AC	ä	204	CC	s	236	EC
C	141	8D	Ü	173	AD	ë	205	CD	Û	237	ED
S	142	8E	Ú	174	AE	ö	206	CE	Ÿ	238	EE
S	143	8F	£	175	AF	ü	207	CF	ÿ	239	EF
D	144	90	—	176	B0	Ä	208	D0	þ	240	F0
D	145	91		177	B1	ï	209	D1	þ	241	F1
D	146	92		178	B2	Ø	210	D2		242	F2
D	147	93	°	179	B3	Æ	211	D3		243	F3
D	148	94	Ç	180	B4	á	212	D4		244	F4
N	149	95	ç	181	B5	ı	213	D5		245	F5
S	150	96	Ñ	182	B6	ø	214	D6	—	246	F6
E	151	97	ñ	183	B7	æ	215	D7	¼	247	F7
C	152	98	ı	184	B8	Ä	216	D8	½	248	F8
E	153	99	¿	185	B9	İ	217	D9	¾	249	F9
S	154	9A	¿	186	BA	Ö	218	DA	°	250	FA
E	155	9B	£	187	BB	Ü	219	DB	«	251	FB
F	156	9C	¥	188	BC	É	220	DC	■	252	FC
G	157	9D	§	189	BD	ı	221	DD	»	253	FD
R	158	9E	f	190	BE	ß	222	DE	±	254	FE
U	159	9F	ç	191	BF	Ö	223	DF	■	255	FF

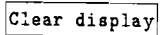
Display Control Group

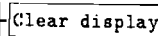
These keys manipulate the screen display.

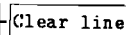
 moves the cursor to its upper home position.

- moves the cursor to its lower home position.

Using  with the  and  keys produces the same result as if they were unshifted; they move the cursor left or right one space. This differs from 2.1 HP-UX.

The  key clears the display from the current cursor position to the end of the display.

Using - clears the entire display memory. Note that this is the entire display memory, not just the current screen display.

Using - clears the entire line, not just from the cursor position to the end of the line.

Edit Group

The following edit group keys also let you scroll the screen display.

 scrolls the display backward one screen.

 scrolls the display forward one screen.

These two keys replace the  and - keys as documented in the 2.1 version of HP-UX.

Function Key Group

The following function keys differ from those documented in 2.1 HP-UX.

Menu toggles the “softkey” labels on and off. Note that the user function keys are still enabled, simply not displayed.

This replaces the **k4** key in 2.1 HP-UX.

User displays eight function keys which can be defined either locally (by the user) or remotely (by a program). These definitions conform to the descriptions given in the *Using the System Console with HP 9000 Series 200 Computers* article.

This replaces the **CONTINUE** (USER KEYS) key in 2.1 HP-UX.

Defining User Keys Locally

To define User Keys locally from the keyboard, press **CTRL-Menu**.

This replaces the **SHIFT-CONTINUE** (USER KEYS) keys in 2.1 HP-UX.

System Control Group

The following system control keys differ from the 2.1 version of HP-UX.

The **Reset** key performs a “soft reset” as described in the *Using the System Console with HP 9000 Series 200 Computers* article. The **ESC-G** key sequence produces the same effect.

The keys above replace the **SHIFT-CLR I/O** (SOFT RESET) key sequence in 2.1 HP-UX.

The **CTRL-Reset** key sequence (or **Shift-CTRL-Reset** depending on how you look at it) performs a “hard reset” as described in the *Using the System Console with HP 9000 Series 200 Computers* article. The **ESC-E** key sequence produces the same result.

The keys above replace the **SHIFT-CTRL-PAUSE** (HARD RESET) key sequence in 2.1 HP-UX.

When running either of the two, stand-alone utilities (System Image Copy and Media Initialization) supplied with your 2.2L system, the **Stop** key aborts the running utility and returns control to the computer's boot ROM.

The **Stop** key is not documented in the *Using the System Console with HP 9000 Series 200 Computers* article.

When running 2.2L HP-UX, **Stop** toggles the XON/XOFF protocol. This toggle acts like the **CTRL-S** / **CTRL-Q** toggle on many terminals and is useful for stopping output long enough to look at it.



Appendix A

File Sets

Using this Appendix

This appendix contains a list of all the individual files shipped with the 2.2L version of the HP-UX system. The material provided in Chapter 3 of this manual contains relevant information about file sets and contains general descriptions of their contents. This appendix provides a detailed breakdown of all the individual files contained in each file set. This is provided so you can determine what file set to load if you want to use a specific file.

Most of the commands in the miniature HP-UX system are contained in the file sets documented here. If any of these commands are removed or somehow destroyed, you can use *sysload* to re-load the file set containing the commands. However, some of the files and commands contained in the miniature HP-UX system are not duplicated in the file sets. These files and commands are necessary for loading files on the system. An example is the *cpio* command which is needed to copy files from micro discs to the hard disc. If any of these vital commands are removed or somehow destroyed, you will have to re-install the system to restore them.

FSET CORE1

<code>.profile</code>	<code>bin/echo</code>
<code>bin/ar</code>	<code>bin/ed</code>
<code>bin/basename</code>	<code>bin/env</code>
<code>bin/cat</code>	<code>bin/expr</code>
<code>bin/chgrp</code>	<code>bin/false</code>
<code>bin/chmod</code>	<code>bin/find</code>
<code>bin/chown</code>	<code>bin/kill</code>
<code>bin/cp</code>	<code>bin/line</code>
<code>bin/crypt</code>	<code>bin/lm</code>
<code>bin/date</code>	<code>bin/mail</code>
<code>bin/df</code>	<code>bin/mesg</code>
<code>bin/diff</code>	<code>bin/mkdir</code>
<code>bin/dirname</code>	<code>bin/more</code>
<code>bin/du</code>	<code>bin/mv</code>
	<code>bin/newgrp</code>

bin/nice
bin/passwd
bin/pr
bin/ps
bin/pwd
bin/ranlib
bin/red

bin/rm
bin/rmail
bin/rmdir
bin/rsh
bin/seed

FSET_CORE2

bin/sleep
bin/sort
bin/su
bin/sum
bin/sync
bin/touch
bin/true
bin/who
etc/checklist
etc/chroot
etc/clri
etc/cron
etc/d.profile
etc/devnm
etc/fsck
etc/fsdb
etc/getty
etc/gettydefs
etc/group
etc/init
etc/inittab
etc/link
etc/login

etc/magic
etc/mkfs
etc/mknod
etc/mnttab
etc/motd
etc/mount
etc/mvdir
etc/ncheck
etc/passwd
etc/profile
etc/rc
etc/sconfig
etc/setmnt
etc/termcap
etc/ttytype
etc/umount
etc/unlink
users/guest/.profile
usr/adm/sa
usr/bin/banner
usr/bin/bdiff
usr/bin/cancel
usr/bin/col

FSET_CORE3

usr/bin/disable
usr/bin/egrep
usr/bin/enable
usr/bin/expand
usr/bin/fgrep
usr/bin/file
usr/bin/getopt
usr/bin/help
usr/bin/hostname

usr/bin/lp
usr/bin/lpr
usr/bin/lpstat
usr/bin/news
usr/bin/tset
usr/bin/unexpand
usr/bin/what
usr/bin/xargs
usr/lib/accept
usr/lib/atrun



```
etc/mkboot
sbin/tcio
usr/bin/lifcp
usr/bin/lifinit
usr/bin/lifls
usr/bin/lifrename
usr/bin/lifrm
usr/bin/pack
usr/bin/pcat
usr/bin/tar
usr/bin/unpack
```

```
bin/dd
bin/l
bin/ll
bin/ls
bin/lsf
bin/lsr
bin/lsc
bin/make
etc/boot
etc/insboot
etc/install
```

```
etc/mkboot
sbin/tcio
usr/bin/lifcp
usr/bin/lifinit
usr/bin/lifls
usr/bin/lifrename
usr/bin/lifrm
usr/bin/pack
usr/bin/pcat
usr/bin/tar
usr/bin/unpack
```

FILEFILTER

bin/cmp	usr/bin/join
bin/grep	usr/bin/lorder
bin/head	usr/bin/nl
bin/nm	usr/bin/paste
bin/od	usr/bin/rev
bin/page	usr/bin/split
bin/rmnl	usr/bin/ssp
bin/size	usr/bin/strings
bin/tail	usr/bin/tr
bin/tee	usr/bin/tsort
bin/wc	usr/bin/uniq
bin/xd	usr/lib/diff3prog
usr/bin/awk	usr/lib/diffh
usr/bin/comm	usr/lib/libndir.a
usr/bin/cut	usr/lib/more.help
usr/bin/dircmp	

SYSMANAGE

bin/at	etc/shutdown
bin/nohup	etc/utmp
bin/prof	etc/wall
bin/time	etc/whodo
bin/tty	usr/bin/id
bin/uname	usr/bin/logname
bin/write	usr/lib/acct/fwtmp
etc/backup	usr/lib/acct/wtmpfix
etc/grpck	usr/lib/sa/sa1
etc/killall	usr/lib/sa/sadc
etc/last	usr/lib/sa/sadd
etc/lastb	usr/lib/sa/sar
etc/pwck	usr/lib/sa/sarpt

PERIPHSUPP

bin/mt	usr/lib/tabset/beehive
bin/stty	usr/lib/tabset/diablo
usr/bin/tabs	usr/lib/tabset/std
usr/lib/libtermcap.a	usr/lib/tabset/stdcrt
usr/lib/libtermplib.a	usr/lib/tabset/teleray
usr/lib/tabset/3101	usr/lib/tabset/vt100
usr/lib/tabset/9826	usr/lib/tabset/xerox1720
usr/lib/tabset/9836	usr/lib/term/tab300S
	usr/lib/term/tab300S-12

CE_UTILS

```
usr/CE.utilities
usr/CE.utilities/Crtadjust
usr/CE.utilities/Crtadjust/adjust
usr/CE.utilities/Crtadjust/adjustmenu
usr/CE.utilities/Crtadjust/adjusttest
usr/CE.utilities/Crtadjust/align.c
usr/CE.utilities/Crtadjust/bar.c
usr/CE.utilities/Crtadjust/convertmajor
usr/CE.utilities/Crtadjust/convertminor
usr/CE.utilities/Crtadjust/devmenu
usr/CE.utilities/Crtadjust/get4digits
usr/CE.utilities/Crtadjust/help
usr/CE.utilities/Crtadjust/helptext
usr/CE.utilities/Crtadjust/runtest
usr/CE.utilities/Crtadjust/table200
usr/CE.utilities/Crtadjust/white.c
usr/CE.utilities/Floatcard
usr/CE.utilities/Floatcard/float.h
usr/CE.utilities/Floatcard/float.mk
usr/CE.utilities/Floatcard/fltaccept.c
usr/CE.utilities/Floatcard/fltexhaust.c
usr/CE.utilities/Floatcard/help
usr/CE.utilities/Floatcard/helptext
usr/CE.utilities/Sft
usr/CE.utilities/Sft/convertmajor
usr/CE.utilities/Sft/convertminor
usr/CE.utilities/Sft/discmenu
usr/CE.utilities/Sft/disctest
usr/CE.utilities/Sft/disctest2
usr/CE.utilities/Sft/float.h
usr/CE.utilities/Sft/fltaccept.c
usr/CE.utilities/Sft/get4digits
usr/CE.utilities/Sft/get6digits
usr/CE.utilities/Sft/graphics.c
usr/CE.utilities/Sft/graphicsmenu
usr/CE.utilities/Sft/graphicstest
usr/CE.utilities/Sft/help
usr/CE.utilities/Sft/helptext
usr/CE.utilities/Sft/printermenu
usr/CE.utilities/Sft/printertest
usr/CE.utilities/Sft/rs232test
usr/CE.utilities/Sft/rungrafxtest
usr/CE.utilities/Sft/runtest
usr/CE.utilities/Sft/sft
usr/CE.utilities/Sft/table200
usr/CE.utilities/Sft/tablet.c
usr/CE.utilities/Sft/tablettest
```

```
usr/CE.utilities/Sft/tapemenu
usr/CE.utilities/Sft/tapetest
usr/CE.utilities/Sft/termtest
usr/CE.utilities/Sft/testpattern
usr/CE.utilities/Sft/topmenu
usr/CE.utilities/help
usr/CE.utilities/helptext
```

SYSCOMM

```
usr/bin/cu
usr/bin/mailx
usr/bin/uucp
usr/bin/uulog
usr/bin/uuname
usr/bin/uupick
usr/bin/uustat
usr/bin/uto
usr/bin/uux
usr/lib/dialit
usr/lib/dialit.c
usr/lib/mailx
usr/lib/uucp/.OLD
usr/lib/uucp/.XQTDIR
usr/lib/uucp/COMMANDS
usr/lib/uucp/L-devices
usr/lib/uucp/L-dialcodes
usr/lib/uucp/L.sys
usr/lib/uucp/SEQF
usr/lib/uucp/USERFILE
usr/lib/uucp/uucico
usr/lib/uucp/uuclean
usr/lib/uucp/uudemon.day
usr/lib/uucp/uudemon.hr
usr/lib/uucp/uudemon.wk
usr/lib/uucp/uusub
usr/lib/uucp/uuxqt
usr/spool/uucp
usr/spool/uucppublic
```

DGL1

```
lib/libA0000.a
lib/libA0001.a
lib/libA0047.a
lib/libB0000.a
lib/libB0001.a
lib/libB0004.a
lib/libB0047.a
lib/libD0001.a
lib/libD0006.a
lib/libD0015.a
lib/libD0016.a
lib/libD0019.a
lib/libD0020.a
lib/libD0031.a
lib/libD0036.a
lib/libD0042.a
lib/libD0046.a
lib/libD0047.a
lib/libD0048.a
lib/libD0053.a
lib/libD0054.a
```

DGL2

lib/libDIDD.a
lib/libK0000.a
lib/libK0001.a
lib/libL0001.a
lib/libL0002.a
lib/libL0004.a
lib/libL0006.a
lib/libL0019.a
lib/libL0031.a
lib/libL0042.a
lib/libL0046.a

lib/libP0001.a
lib/libP0002.a
lib/libP0004.a
lib/libP0006.a
lib/libP0019.a
lib/libP0042.a
lib/libV0001.a
lib/libV0004.a
lib/libV0019.a
lib/libV0042.a

usr/lib/graphics/c/cdgl1.h
usr/lib/graphics/demos/README_dgl
usr/lib/graphics/demos/chrt_dgl.f
usr/lib/graphics/demos/graph_dgl.f
usr/lib/graphics/fortran/fdgl1.h
usr/lib/graphics/fortran/tlint.f
usr/lib/graphics/fortran/z1ctb.f
usr/lib/graphics/pascal/pdgl1.h
usr/lib/graphics/pascal/pdgl2.h

SCCS

usr/bin/admin
usr/bin/cdc
usr/bin/delta
usr/bin/get
usr/bin/prs
usr/bin/rmchg

usr/bin/rmdel
usr/bin/sact
usr/bin/sccsdiff
usr/bin/unget
usr/bin/val

APPLIC

bin/bs
bin/chsh
bin/csh
usr/bin/bc
usr/bin/cal
usr/bin/calendar
usr/bin/dc
usr/bin/factor
usr/bin/primes
usr/bin/units

usr/lib/builtins/0
usr/lib/builtins/alias
usr/lib/builtins/alloc
usr/lib/builtins/case
usr/lib/builtins/cd
usr/lib/builtins/chdir
usr/lib/builtins/dirs
usr/lib/builtins/eval
usr/lib/builtins/exec
usr/lib/builtins/foreach
usr/lib/builtins/glob

usr/lib/builtins/hashstat
 usr/lib/builtins/history
 usr/lib/builtins/if
 usr/lib/builtins/jobs
 usr/lib/builtins/kill
 usr/lib/builtins/login
 usr/lib/builtins/logout
 usr/lib/builtins/newgrp
 usr/lib/builtins/nice
 usr/lib/builtins/nohup
 usr/lib/builtins/notify
 usr/lib/builtins/onintr
 usr/lib/builtins/popd
 usr/lib/builtins/pushd
 usr/lib/builtins/rehash
 usr/lib/builtins/repeat
 usr/lib/builtins/set

usr/lib/builtins/setenv
 usr/lib/builtins/source
 usr/lib/builtins/stop
 usr/lib/builtins/switch
 usr/lib/builtins/time
 usr/lib/builtins/umask
 usr/lib/builtins/unalias
 usr/lib/builtins/unhash
 usr/lib/builtins/unset
 usr/lib/builtins/unsetenv
 usr/lib/builtins/wait
 usr/lib/builtins/while
 usr/lib/calprog
 usr/lib/lib.b
 usr/lib/unittab

PROG_UTILS

bin/adb
 bin/as
 bin/atrans
 bin/ld
 bin/strip
 lib/crt0.o
 lib/libc.a
 lib/libm.a

lib/mcrt0.o
 usr/bin/lex
 usr/bin/yacc
 usr/lib/lex/ncform
 usr/lib/lex/nrform
 usr/lib/libl.a
 usr/lib/liby.a
 usr/lib/yaccpar

PASCAL

bin/pc
 lib/libpc.a
 usr/lib/escerrs
 usr/lib/ioerrs
 usr/lib/libheap2.a

usr/lib/libhp.a
 usr/lib/pascomp
 usr/lib/paserrs
 usr/lib/syserrs

FORTRAN

bin/asa
 lib/fl
 lib/frt0.o
 lib/mfrt0.o
 usr/bin/fc
 usr/bin/f77
 usr/bin/ratfor
 usr/lib/f77pass1

usr/lib/libF77.a
 usr/lib/libI77.a

C

```

bin/cc
lib/ccom
lib/cpp
usr/bin/cb
usr/bin/lint
usr/include/a.exec.h
usr/include/a.out.h
usr/include/alarm.h
usr/include/ar.h
usr/include/assert.h
usr/include/core.h
usr/include/ctype.h
usr/include/curses.h
usr/include/dumprestor.h
usr/include/errno.h
usr/include/fatal.h
usr/include/fcntl.h
usr/include/globaldefs.h
usr/include/graphics.h
usr/include/grp.h
usr/include/local/port.h
usr/include/local/uparm.h
usr/include/macros.h
usr/include/magic.h
usr/include/math.h
usr/include/memory.h
usr/include/misc.h
usr/include/mnttab.h
usr/include/model.h
usr/include/ndir.h
usr/include/nlist.h
usr/include/oldfatal.h
usr/include/oldmacros.h
usr/include/port.h
usr/include/pwd.h
usr/include/ranlib.h
usr/include/regex.h
usr/include/setjmp.h
usr/include/sgtty.h
usr/include/signal.h
usr/include/stand.h
usr/include/stdio.h
usr/include/string.h
usr/include/symbol.h
usr/include/sys/acct.h
usr/include/sys/amigo.h
usr/include/sys/bootrom.h
usr/include/sys/buf.h
usr/include/sys/clock.h
usr/include/sys/conf.h
usr/include/sys/cons.h
usr/include/sys/cs80.h
usr/include/sys/devinfo.h
usr/include/sys/dir.h
usr/include/sys/disc.cons.h
usr/include/sys/dma.h
usr/include/sys/elog.h
usr/include/sys/erec.h
usr/include/sys/err.h
usr/include/sys/errno.h
usr/include/sys/fblk.h
usr/include/sys/file.h
usr/include/sys/filesys.h
usr/include/sys/graf.h
usr/include/sys/hpibio.h
usr/include/sys/inc.h
usr/include/sys/inode.h
usr/include/sys/intrpt.h
usr/include/sys/iobuf.h
usr/include/sys/ioctl.h
usr/include/sys/ipc.h
usr/include/sys/ite.h
usr/include/sys/lp.h
usr/include/sys/m68.h
usr/include/sys/map.h
usr/include/sys/mem.h
usr/include/sys/mknod.h
usr/include/sys/mount.h
usr/include/sys/mtio.cons.h
usr/include/sys/mtio.h
usr/include/sys/page.h
usr/include/sys/param.h
usr/include/sys/pdi.h
usr/include/sys/proc.h
usr/include/sys/ps.h
usr/include/sys/pt.h
usr/include/sys/reg.h
usr/include/sys/shm.h
usr/include/sys/space.h
usr/include/sys/stat.h
usr/include/sys/stats.h
usr/include/sys/sysinfo.h
usr/include/sys/syswm.h

```

```

usr/include/sys/text.h
usr/include/sys/ti9914.h
usr/include/sys/timeout.h
usr/include/sys/times.h
usr/include/sys/trap.h
usr/include/sys/ttold.h
usr/include/sys/tty.h
usr/include/sys/types.h
usr/include/sys/user.h
usr/include/sys/utname.h
usr/include/sys/var.h
usr/include/tcio.h
usr/include/termio.h
usr/include/time.h
usr/include/tp_defs.h
usr/include/tryrec.h
usr/include/ustat.h
usr/include/utmp.h
usr/include/values.h

```

```

usr/include/varargs.h
usr/include/volhdr.h
usr/lib/cref/align
usr/lib/cref/atab
usr/lib/cref/cign
usr/lib/cref/crpost
usr/lib/cref/ctab
usr/lib/cref/eign
usr/lib/cref/etab
usr/lib/cref/upost
usr/lib/libPW.a
usr/lib/lint1
usr/lib/lint2
usr/lib/llib-1c
usr/lib/llib-1c.ln
usr/lib/llib-port
usr/lib/llib-port.ln

```

EDITORS

```

bin/e
bin/edit
bin/vi
bin/view

```

```

etc/d.exrc
usr/bin/ctags
usr/bin/ex
usr/lib/exrecovery

```

TEXT_TOOLS

```

bin/hyphen
usr/bin/deroff
usr/bin/diffmk
usr/bin/greek
usr/bin/hp
usr/bin/mm
usr/bin/mmchek
usr/bin/mmt
usr/bin/mvt
usr/bin/neqn
usr/bin/nroff
usr/bin/osdd
usr/bin/ptx
usr/bin/spell
usr/bin/tbl
usr/bin/ul

```

```

usr/lib/macros/an
usr/lib/macros/an6
usr/lib/macros/cmp.n.d.an
usr/lib/macros/cmp.n.d.m
usr/lib/macros/cmp.n.t.an
usr/lib/macros/cmp.n.t.m
usr/lib/macros/mmn
usr/lib/macros/osdd
usr/lib/macros/ucmp.n.an
usr/lib/macros/ucmp.n.m
usr/lib/macros/vmca
usr/lib/spell/compress
usr/lib/spell/hlista
usr/lib/spell/hlistb
usr/lib/spell/hstop
usr/lib/spell/spellhist
usr/lib/spell/spellin

```

usr/lib/spell/spellout
usr/lib/spell/spellprog
usr/lib/suftab
usr/lib/tmac/tmac.an
usr/lib/tmac/tmac.an6

usr/lib/tmac/tmac.m
usr/lib/tmac/tmac.osd
usr/lib/tmac/tmac.v

MANUALS1

etc/catman
usr/bin/man
usr/bin/mancvt
usr/bin/whereis
usr/lib/eign
usr/lib/getNAME
usr/lib/mkwhatls
usr/lib/whatis
usr/man/cat1
usr/man/cat2
usr/man/cat3
usr/man/cat4
usr/man/cat5
usr/man/cat6
usr/man/cat7
usr/man/cat8
usr/man/man1/adb.1
usr/man/man1/admin.1
usr/man/man1/ar.1
usr/man/man1/as.1
usr/man/man1/asa.1
usr/man/man1/at.1
usr/man/man1/atrans.1
usr/man/man1/awk.1
usr/man/man1/banner.1
usr/man/man1/basename.1
usr/man/man1/bc.1
usr/man/man1/bdiff.1
usr/man/man1/bs.1
usr/man/man1/cal.1
usr/man/man1/calendar.1
usr/man/man1/cat.1
usr/man/man1/cb.1
usr/man/man1/cc.1
usr/man/man1/cd.1
usr/man/man1/cdc.1
usr/man/man1/chmod.1
usr/man/man1/chown.1
usr/man/man1/chroot.1
usr/man/man1/chsh.1

usr/man/man1/cmp.1
usr/man/man1/col.1
usr/man/man1/comm.1
usr/man/man1/cp.1
usr/man/man1/cpio.1
usr/man/man1/cpp.1
usr/man/man1/crypt.1
usr/man/man1/csh.1
usr/man/man1/ctags.1
usr/man/man1/cu.1c
usr/man/man1/cut.1
usr/man/man1/date.1
usr/man/man1/dc.1
usr/man/man1/dd.1
usr/man/man1/delta.1
usr/man/man1/deroff.1
usr/man/man1/df.1
usr/man/man1/diff.1
usr/man/man1/diffmk.1
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Installation Overview/Checklist

Here is a checklist of the steps necessary for the complete installation of the HP-UX Operating System. Use this list to check off tasks as you complete them.

- Install and test the Model 217 computer and monitor.
- Install the HP 9133D (SS/80 protocol) hard disc.
- Confirm proper operation of the computer using the boot ROM.
- Execute the Media Initialization utility shipped with your system.
- Initialize the HP 9133D hard disc and other SS/80 media.
- Execute the System Image Copy utility shipped with your system.
- Copy a miniature HP-UX system to the HP 9133D disc drive.
- Load the miniature HP-UX system and log in as the `root` user.
- Execute the `/etc/sysinstall` shell script.
- Re-boot the system when `/etc/sysinstall` is finished.
- Run the `/etc/sysload` script to install mandatory partitions.
- Install other, non-mandatory partitions.
- Follow the “After Installing HP-UX” guidelines.
- Install/configure optional hardware/peripherals (see Chapter 4).
- Customize certain configuration files (see Chapter 5).

Manual Comment Card

If you have any comments or questions regarding this manual, write them on this comment card and place it in the mail. Include page numbers with your comments wherever possible. Enter the last date from the Printing History page on the line above your name. Also include a return address so that we can respond as soon as possible.

Setting Up HP-UX

for the HP 9000 Series 200 Model 217

98670-90015

October 1984

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