HP-UX

Installing Peripherals

HP 9000 Series 300/400

HP Part No. B1864-90011
Printed in USA August 1992

First Edition

Legal Notices

The information in this document is subject to change without notice.

Hewlett-Packard makes no warranty of any kind with regard to this manual, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be held liable for errors contained herein or direct, indirect, special, incidental or consequential damages in connection with the furnishing, performance, or use of this material.

Warranty. A copy of the specific warranty terms applicable to your Hewlett-Packard product and replacement parts can be obtained from your local Sales and Service Office.

©copyright 1983-92 Hewlett-Packard Company

This document contains information which is protected by copyright. All rights are reserved. Reproduction, adaptation, or translation without prior written permission is prohibited, except as allowed under the copyright laws.

Restricted Rights Legend. Use, duplication or disclosure by the U.S. Government is subject to restrictions as set forth in subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013 for DOD agencies, and subparagraphs (c) (1) and (c) (2) of the Commercial Computer Software Restricted Rights clause at FAR 52.227-19 for other agencies.

HEWLETT-PACKARD COMPANY
3000 Hanover Street
Palo Alto, California 94304 U.S.A.

Use of this manual and flexible disk(s) or tape cartridge(s) supplied for this pack is restricted to this product only. Additional copies of the programs may be made for security and back-up purposes only. Resale of the programs in their present form or with alterations, is expressly prohibited.

©copyright 1980, 1984, 1986 AT&T Technologies, Inc.
UNIX is a registered trademark of Unix System Laboratories Inc. in the USA and other countries.

©copyright 1979, 1980, 1983, 1985-90 Regents of the University of California
This software is based in part on the Fourth Berkeley Software Distribution under license from the Regents of the University of California.

©copyright 1979 Regents of the University of Colorado, A Body Corporate.
This document has been reproduced and modified with the permission of the regents of the University of Colorado, a body corporate.

©copyright 1986, 1987, 1988 Sun Microsystems, Inc.
©copyright 1986 Digital Equipment Corporation.

©copyright 1985-86, 1988 Massachusetts Institute of Technology.
X Window System is a trademark of the Massachusetts Institute of Technology.

MS-DOS and Microsoft are U.S. registered trademarks of Microsoft Corporation.

OSF/Motif is a trademark of the Open Software Foundation, Inc. in the U.S. and other countries. Certification for conformance with OSF/Motif user environment pending.

All rights reserved.

Printing History

The manual printing date and part number indicate its current edition. The printing date will change when a new edition is printed. Minor changes may be made at reprint without changing the printing date. The manual part number will change when extensive changes are made.

Manual updates may be issued between editions to correct errors or document product changes. To ensure that you receive the updated or new editions, you should subscribe to the appropriate product support service. See your HP sales representative for details.

August 1992 ... Edition 1.

Contents

B. Series 400 Support Matrix

Figures

Tables

1

Introduction

Overview

This manual is intended for System Administrators. It supplies the information you will need to enable peripheral devices to communicate with the HP-UX operating system. It *does not* provide information on built-in devices. Refer to the *Owner's Guide* for the specific computer model you own for configuration information on built-in devices.

Peripheral installation on your S300/400 system is comprised of two parts:

- Connecting the device to your computer, and
- Configuring your HP-UX operating system to communicate with the device.

Note The information in this manual was accurate at time of printing. However, support status for peripheral devices changes rapidly. For up-to-date support status on peripheral devices, contact your customer support engineer or HP sales and service representative.

Manual Organization

The *Installing Peripherals* manual has a "paired" chapter organization. For each family of devices you will find:

An "Installing ... " chapter	containing hardware installation guidelines and configuration values,

followed by:

A "Setting-Up ... " chapter	containing HP-UX configuration instructions.

For example, Chapter 7, "Installing Disk and Tape Drives", is followed by Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM".

The "Setting-Up ... " chapters give the necessary procedures to set up your device using SAM (the System Administration Manager). SAM is a menu-driven system administration tool discussed later in this chapter. If SAM is not available, use Chapter 14, "Setting Up Devices Using HP-UX Commands" to learn how to set up HP-UX for devices using commands.

The manual's organization is:

- Chapter 1 "Introduction"
- Chapters 2–13 Device-specific chapters in pairs
- Chapter 14 "Setting Up Devices Using HP-UX Commands"
- Appendix A "E/ISA Configuration"
- Appendix B "Series 400 Support Matrix"
- Index

How to Use this Manual

Before you install a new peripheral device, be sure you are familiar with the information presented in this Introduction.

This chapter:

- Summarizes the steps to follow to install most peripheral devices.
- Introduces the System Administration Manager (SAM), a menu-driven program that can help you install and configure new peripherals.
- Provides generic installation guidelines that apply to specific types of device interfaces.

When you are ready to install your new peripheral, turn to the chapter that discusses the type of device you are installing. For example, if you are installing a disk drive, turn to Chapter 7, "Installing Disk and Tape Drives" and find the specific disk drive you are installing. Follow the installation instructions given for your particular disk drive. Then go to the following chapter for instructions on finishing the installation using SAM.

If you are not using SAM to install your new peripheral device, turn to Chapter 14, "Setting Up Devices Using HP-UX Commands" to finish the installation. Chapter 14 covers the information you will need to set up a device using HP-UX commands.

Other References

The following documents will help you when you install and manage peripheral devices.

- The installation manual for your new device
- *System Administration Tasks* manual, HP part number B1864-90010
- *HP-UX Reference*, HP part number B2355-90033
- *Managing Clusters of HP 9000 Computers*, HP part number B1864-90015, if your system is part of an HP-UX cluster
- *How HP-UX Works: Concepts for the System Administrator*, HP part number B2355-90029, for conceptual information

Overview of Adding a Peripheral

Nine basic steps are required to add peripheral devices to your system. The following generic procedure highlights these steps. Consult the appropriate chapter in this manual for specific information on the peripheral you are connecting.

1. Verify that the device drivers required for this device are included in your currently running kernel configuration file (usually the `/etc/conf/dfile`).

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add the necessary device drivers to the kernel configuration file. To verify that the necessary drivers, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time.

   or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the drivers or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason.

2. Play it safe.

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

      This step is highly recommended for all devices; for SCSI devices and interface cards, it is *required*.

3. Determine the hardware address or location of the peripheral. The best location to connect your peripheral depends on the shared sets of I/O resources and the expected usage. For example, you would not want to connect a plotter to the same HP-IB interface as your root disk. This would substantially degrade your disk performance. A better location for the plotter would be on a separate HP-IB interface with other, slower devices.
4. Ensure that all power switches on the device and on the computer are in the OFF position.
5. Install the peripheral. This can involve two steps:
   a. Installing an interface card (however, the interface card will most often already be installed)
   b. connecting the peripheral to the interface card
6. Connect the power cord and power on the device.
7. Reconnect the power cord to your computer and turn it on. This will cause your system to reboot.
8. Determine how the peripheral is to be accessed: block or character (raw) mode. A device file must exist for each type of access to the peripheral.
9. Create the necessary device files to communicate with the peripheral. Device files are located in the `/dev` directory. If you are using SAM to add your device, SAM will create the device file. If you are not using SAM, use the `mknod` command to create the device file.

Caution If your system is a cluster, you must be logged into the cluster node to which the device is physically connected when you use SAM or HP-UX commands to add the device.

Device Files

The HP-UX operating system requires special files, called **device files**, to perform I/O to peripheral devices. Each peripheral on your system needs a device file associated with it for HP-UX to communicate with the peripheral. Device files are created using the *mknod*(1M) command. If you use SAM, SAM will automatically create device files for you when you add the peripheral to your system. If you do not use SAM, you must create device files by executing the `mknod` command. Adding your peripheral using the *mknod*(1M) command is described in Chapter 14, "Setting Up Devices Using HP-UX Commands". Device files contain the code for the following peripheral attributes:

Select Code	All peripherals connect to an interface card, either built-in or added onto your computer. The interface card has switch settings on it that identify the interface card on the DIO bus. These switch settings are referred to as the **select code**. Each interface card must have a unique select code. Select codes zero through seven are reserved.
Bus Address or Port Number	There are interfaces to which more than one device can connect. For these interfaces (HP-IB, SCSI, RS-232C multiplexers, etc.) the device is assigned a number. This number is the **bus address** for HP-IB and SCSI interfaces and the **port number** for RS-232C interfaces that, like multiplexers, have more than one port.
Device Type	Each device can be classified as a **block** device or a **character** device depending on the method used to transfer data to and from the device.
Device Driver	Each device has a software module, called a **device driver**, that arbitrates communication between HP-UX and the device. The device drivers are listed in the `/etc/master` file. The driver must be included in the kernel configuration file, usually the `/etc/conf/dfile`.
Device Information	Additional information that is device specific is contained in the device file. For example, a tape drive can be instructed to rewind or not rewind after an access.

There are four parameters to the *mknod*(1M) command:

- device filename (absolute or relative)
- file type
- major number
- minor number

Naming conventions for device filenames are given in Chapter 14, "Setting Up Devices Using HP-UX Commands". These naming conventions are recommended for consistency.

The file type parameter specifies a block or character device type.

The major number specifies the driver in numeric form. The driver needed for each specific peripheral is listed in a table in the section covering that peripheral in this book. Another way to find out which drivers are needed for a particular peripheral is to look in the `/etc/master` file for a list of drivers and a product number/driver alias table. Look up your product number in the alias table; you will see the associated driver number. For example, if you look up 9122, you will see that you need a `cs80` driver.

The minor number parameter contains the select code, bus address or port number, and the additional device information encoded in a six-digit hexadecimal number, for example `0x0e0201`. The minor number format varies from device type to device type. The minor number format for each device type is described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Miscellaneous Device Files

The miscellaneous device class includes the device files that the system needs to run properly. Each HP-UX installation must have the device files `/dev/null`, `/dev/console`, `/dev/mem`, `/dev/kmem`, `/dev/swap` `/dev/root`, `dev/rroot` and `/dev/tty`. The device file `/dev/null` is a null file (a "bit bucket") used by many HP-UX commands. The device file `/dev/console` identifies the system console and the device file `/dev/tty` is a synonym for the control terminal associated with a process group.

These miscellaneous device files are copied to your system when HP-UX is installed. *Do not change or modify them.* If one or more of these files is accidentally deleted or otherwise destroyed, you can recreate it with the `mknod`

command using the character/blocked designation, major, and minor numbers given in Table 1-1.

Although there are additional device files created when HP-UX is installed, only the ones listed in Table 1-1 are vital to booting and running HP-UX.

Table 1-1. Default Device Files

Device File	File Type	Major Number	Minor Number	Device Description
`/dev/console`	c	0	`0x000000`	System message port
`/dev/syscon`	c	0	`0x000000`	System console (linked to console)
`/dev/systty`	c	0	`0x000000`	System tty (linked to console)
`/dev/tty`	c	2	`0x000000`	Process group control terminal
`/dev/null`	c	3	`0x000002`	Null file ("bit bucket")
`/dev/mem`	c	3	`0x000000`	Physical memory image
`/dev/kmem`	c	3	`0x000001`	Kernel virtual memory image
`/dev/swap`	c	8	`0x000000`	Swap device
`/dev/root`	b	255	`0xffffff`	Root device
`/dev/rroot`	c	255	`0xffffff`	Root device

The `/dev/root` device file is the block device file that always refers to the current root device. The `/dev/rroot` file is the character device file referring to the root device. The major and minor number for these devices does not refer to a physical device address. However, there will also need to be an entry in the `/dev/dsk` and `/dev/rdsk` directories for the root device that incorporates the bus address of the device.

The `/dev/systty` (which is linked to `/dev/console`), and a `/dev/syscon` (which is linked to some terminal—usually the console) are required. This is explained in *init*(1M).

The System Administration Manager (SAM)

SAM is an acronym for System Administration Manager. It is a tool that allows you to perform many system administration tasks without having to know the specific HP-UX commands that are associated with the task. SAM can also save you time and keystrokes.

You can use SAM to add peripherals. Read this section to learn how to use the SAM interface.

Starting SAM

To start SAM, logged in as superuser, type:

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

In a few moments, SAM's main window will appear. The appearance of this window depends on whether you are running SAM from an X Window System display server or from a text terminal.

Note Navigation in the two interfaces is different. The X Window System interface makes use of the mouse pointing device, while the text-terminal interface uses special keys. Both types of interaction are described in this section.

Inside the window is a box containing a list of **functional areas**. The first of these is **highlighted**.

Using Control Buttons

In the window you will see **control buttons** with these labels:

```
Open
Exit
Options ...
Help
```

Activate these buttons to make SAM carry out different actions.

To activate a control button in the X Window System interface, use the mouse to place the cursor over it and press the left mouse button once.

To activate a control button in the text terminal interface, do one of the following:

- **Highlight** the button by pressing the (Tab) key one or more times. When a button is highlighted, that indicates that is ready for activation.

  Activate the highlighted control button by pressing (Spacebar) or (Return) on the keyboard.

- **Activate** a control button immediately by pressing a *mnemonic* key. For example, notice that the letter H on the (Help) control button is underlined. (On some terminals, it may be highlighted or displayed in an alternate color. Press the (H) key on the keyboard, and the (Help) control button will be highlighted and activated immediately.

Use the (Tab) key to return to "cycle through" all of the control buttons. To cycle through the control buttons in reverse order, hold down the (Shift) key while you press (Tab). Eventually you will return to the list of functional areas.

Using Softkeys in the Text-Terminal Interface

Note This section does *not* apply to the X Window System interface. It applies *only* to the text-terminal interface.

Hewlett-Packard terminals (and some others) display eight **softkey labels** below the window area. The keyboard keys to which these labels correspond are in a row across the top of the terminal's keyboard, and they are usually labeled (f1) through (f8).

The labels may change when a new window appears. Table 1-2 lists the labels which you will see most often.

Note VT-100 (and other ANSI-standard) terminals will not display these function-key labels. However, the keys (PF1) through (PF4) will provide the functions listed in Table 1-2.

Table 1-2 lists the keys or key combinations that give the equivalent result for these terminals.

Table 1-2. Function Keys for SAM's Text-Terminal Interface

Label	Meaning	Keys[1]	
		HP or Wyse	VT-100 or ANSI
`Help on Context`	Get help in understanding an element displayed on the screen	f1	Help or PF 2
`Alt`	Type alternate character	f2	PF 1
`Select`	Highlight an item or open a menu	f3 or Spacebar	Spacebar
`Menubar on/off`	Move cursor to menubar	f4	PF 1, Spacebar or PF 1, =
`Open`	Open the highlighted functional area or subarea	f5	Return
`Previous Level`	Return to the previous level of SAM	f6	(none)
`Shell`	"Escape" (temporarily) to a shell	f7	(none)
`Exit`	Exit the current window	f8	(none)
`Exit SAM`	Exit SAM entirely	f8	(none)

1 Keys are specified by the symbols which appear on their keycaps. The presence of a comma (",") between two keycaps means that the keys should be pressed in sequence.

Getting Help in SAM

SAM provides several different kinds of assistance. Table 1-3 describes the different kinds of help you can get from within SAM and how to request each kind of help.

Table 1-3. Help in SAM

Type of Help	What the Help covers	How to get it
Context Help	Information about elements within any window	Move the cursor to the element you want to know more about, then press the `Help on Context` softkey.
Functional Help	■ the current functional area ■ keyboard navigation within SAM ■ using the SAM help system ■ displaying the version of SAM you are currently running	Choose an item from the "Help" menu on the menubar. (For instructions on using the menubar, see "Using the Menubar".)
Box help	Information about the attributes and tasks presented in the message box or dialog box currently being displayed	Activate the (Help) button in the message/dialog box.

Exiting SAM

To exit SAM:

- Activate any control button labeled (Exit SAM), or
- On a text terminal, press the softkey labeled `Exit SAM`.

The main window (and any other windows that may be open) will close, and the shell prompt will return.

Entering a Functional Area

To use SAM you must first enter a **functional area**. A list of functional areas appears in the large box in the main window. Notice that one of the items is highlighted. This highlighted item is ready to be acted upon by SAM. If you want to enter a functional area other than the one that is highlighted, use the ▲ and ▼ arrow keys to highlight another area.

To enter the functional area:

- If you are using the X Window System interface, move the mouse cursor over the Open control button to the right of the list and press the left mouse button once.
- On a text terminal, press Return.

SAM replaces the main window with one of the following:

- A **subarea window** containing a list of particular work areas which apply the functional area. Highlight and activate one of these to enter the functional area.

  The presence of "->" at the end of the functional area name indicates that you will choose a functional area from a list in a subarea window.

- A **functional area window**.

  Functional area list items that do *not* end in "->" lead directly to a functional area window.

The Object List

When the functional area window appears, it will contain a list within a large box. This is the **object list** of computer system elements (**objects**) you can control by using SAM. Different kinds of things can appear in an object list: files, peripheral devices, user accounts, and so forth.

If the box is empty, it means that there are no objects defined for that functional area. As you add objects to (or delete them from) the system, they will appear on (or disappear from) the object list of the appropriate functional areas.

To modify an object, first select it:

- In the X Window System interface, move the mouse cursor over the line that describes the object and press the left mouse button once to highlight it.
- On a text terminal, move the cursor to the line, using the ▲ and ▼ keys, and press Spacebar to highlight it.

Then choose an operation from the menubar "Actions" list, described in the next section.

Using the Menubar

In each functional area window there is a **menubar** near the top of the screen. It contains the titles "List", "View", "Options", "Actions," and (at the far right of the screen) "Help."

To move the cursor to the menubar:

- If you are using the X Window System interface, place the mouse cursor over the title in the menu item.
- On a text terminal:
  - Press f4 (the `Menubar On/Off` softkey) on HP or Wyse terminals
  - Press PF 1, then Spacebar on VT100 or ANSI terminals.

Menus

The menubar always contains the same five menus. Table 1-4 lists the kinds of items you can expect to see within each menu.

Table 1-4. Menus and Menu Items

Menu	Types of Menu Items
List	■ Alternate views of the functional area (chosen by means of **radio buttons**). See "Radio Buttons". ■ `Exit`
View	Menu items for changing the content and appearance of the object list: ■ Arranging columns ■ Filtering to display only certain objects ■ Sorting objects to change the order of the list ■ Saving a particular "view" for future use
Options	Special actions (like refreshing the display) that apply to the entire window.
Actions	Menu items for adding, modifying, or deleting objects.
Help	Assistance for using SAM.

Opening a Menu

To see the menu items within a particular menu:

- If you are using the X Window System interface, place the mouse cursor over the menu. Press down and hold the left mouse button.
- On a text terminal, make sure that the cursor is on the menubar, then do one of the following:
  - Use the ◀ and ▶ keys to highlight the menu you wish to see, then press Spacebar, or
  - Type the mnemonic (the underlined character) for the menu.

Choosing a Menu Item

To **choose** a menu item:

- If you are using the X Window System interface, drag the mouse cursor through the menu until it highlights the desired item. Then release the mouse button.
- On a text terminal, do either of the following:
  - **Highlight** the menu item of your choice by using the ▲ and ▼ keys. The highlight moves in response. When a menu item is highlighted, that indicates that is ready for choosing. Notice that if you press either of the arrow keys many times, the highlight "cycles through" the menu over and over again.

    Choose the highlighted menu item by pressing the Spacebar on the keyboard.
  - If the menu item contains an underlined character, you can **choose** it immediately by pressing a *mnemonic* key. For example, the last item in every "List" menu is `Exit`. The "E" on the `Exit` menu item is underlined. (On some terminals, it may be highlighted or displayed in an alternate color.) Press the E key on the keyboard, and the `Exit` menu item will be highlighted and activated immediately.

Using Buttons and Checkboxes

There are several features in SAM that have a special appearance and which exhibit special behavior.

Menu Buttons

Some screen buttons present a range of settings from which you must choose. These **menu buttons** differ in appearance from ordinary buttons by the presence of "->" after the button label. Menu buttons look like this in the text-terminal interface:

```
[ label  ->]
```

To "open" a menu button:

- In the X Window System interface, move the mouse cursor over it and hold down the left mouse button.
- On a text terminal, highlight the button and press Spacebar.

When "opened", a menu button expands into a small menu. To select one of the menu items:

- In the X Window System interface, drag the cursor to highlight the item you wish, them release the mouse button.
- On a text terminal, press the ▲ and ▼ keys to move the highlight to your choice, then press Spacebar.

The choice will be displayed on the menu button.

Radio Buttons

Within the "List" menu, you may find two or more views of a functional area. Access to these alternate views is controlled by a **radio button** which may be turned "on" or "off". Radio buttons differ in appearance from ordinary buttons by the presence of a diamond shape to the left of the button label. On a text terminal, a radio button looks like this when it is turned "on":

<*> *view_name*

On a text terminal, a radio button looks like this when it is turned "off":

< > *view_name*

In the X Window System interface, the diamond shape appears "down" when the button is on and "up" when the button is off.

To turn a radio button on or off:

- In the X Window System interface, place the mouse cursor over the diamond shape and press the left mouse button.
- On a text terminal, highlight the radio button with the ▲ or ▼ arrow keys and press Spacebar. The screen will change to another functional area.

Radio buttons are *mutually exclusive*: within a "List" menu, only one button at a time may be turned on.

Checkboxes

A **checkbox** is an object which can be turned "on" or "off." Checkboxes differ in appearance from ordinary buttons by the presence of a square shape to the left of the button label. On a text terminal, a checkbox looks like this when it is turned "on":

`[x]` *label*

On a text terminal, a checkbox looks like this when it is turned "off":

`[ ]` *label*

In the X Window System interface, the square shape appears "down" when the button is on and "up" when the button is off.

To turn a checkbox "on" or "off":

- In the X Window System interface, place the mouse cursor over the square shape and press the left mouse button.
- On a text terminal, use the Tab to move the highlight over the checkbox, then press Spacebar. If it was "on," the `x` in the checkbox disappears. If it was "off," an `x` appears in the checkbox.

Checkboxes are *not* mutually exclusive. You may turn "on" or "off" as many as you need.

Navigating with Keys and Key Combinations in the Text-Terminal Interface

Note This section does *not* apply to the X Window System interface. It applies *only* to the text-terminal interface.

You must use particular keys and combinations of keys to navigate and perform particular tasks in SAM. Table 1-5 lists the special meanings of the keys you must use to navigate within the windows in SAM's text-terminal interface.

Table 1-5. Meanings of Selected Keys

Action	Keys[1]	
	HP or Wyse	VT-100 or ANSI
Move the cursor one space to the right	▶	▶
Move the cursor one space to the left	◀	◀
Move the cursor up one line	▲	▲
Move the cursor down one line	▼	▼
Move the cursor to the next field	Tab	Tab
Move the cursor to the menubar	f4	PF 3

1 Keys are specified by the symbols which appear on their keycaps. The presence of a comma (",") between two keycaps means that the keys should be pressed in sequence. The presence of a hyphen ("-") between two keycaps indicates that the keys should be pressed simultaneously.

Table 1-5. Meanings of Selected Keys (continued)

Action	Keys[1]	
	HP or Wyse	**VT-100 or ANSI**
Scroll a list up one page	Shift-▲	(none)
Scroll a list down one page	Shift-▼	(none)
Scroll a list up one line	f2, ▲	PF1, ▲
Scroll a list down one line	f2, ▼	PF1, ▼
Scroll a list left one page	Prev	(none)
Scroll a list right one page	Next	(none)
Scroll a list left one character	f2, ◀	(none)
Scroll a list right one character	f2, ▶	(none)
Highlight one item	f3 or Spacebar	Spacebar
Highlight all items in a list	f2, /	PF 1, /
Highlight a range of items	1. f2, f3 on first item 2. Move cursor 3. f2, f3 on last item	1. PF 1, . on first item 2. Move cursor 3. PF 1, . on last item or 1. Find on first item 2. Move cursor 3. Find on last item
Dehighlight one item	f3 or Spacebar	Spacebar
Dehighlight all items in a list	f2, \	PF 1, \
Open a menu on the menubar by using a **mnemonic** (first letter of menu)	f2, *mnemonic* key	PF 1, *mnemonic* key
Close a menu	f4 or Spacebar	PF 3 or Spacebar

HP-IB Device Guidelines

Devices using an HP-IB interface can be connected directly to an interface adapter on the back of your computer, or they can be connected to other HP-IB devices in a daisy-chained arrangement.

If the HP-IB interface on your computer already has one or more devices connected to it, connect the cable from your new peripheral device to the last device on the chain as shown in Figure 1-1. A close-up of the piggy-backed HP-IB connectors on the last device on the chain is provided in Figure 1-2.

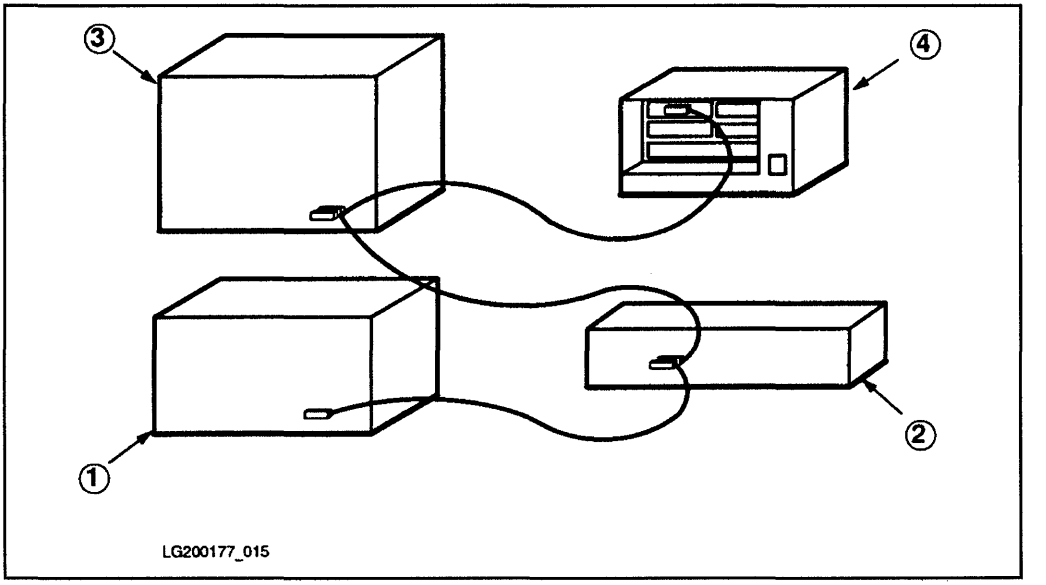


Figure 1-1. Daisy-Chained HP-IB Devices

①	Computer system.
②	First peripheral device.
③	Second peripheral device.
④	Last peripheral device in chain.

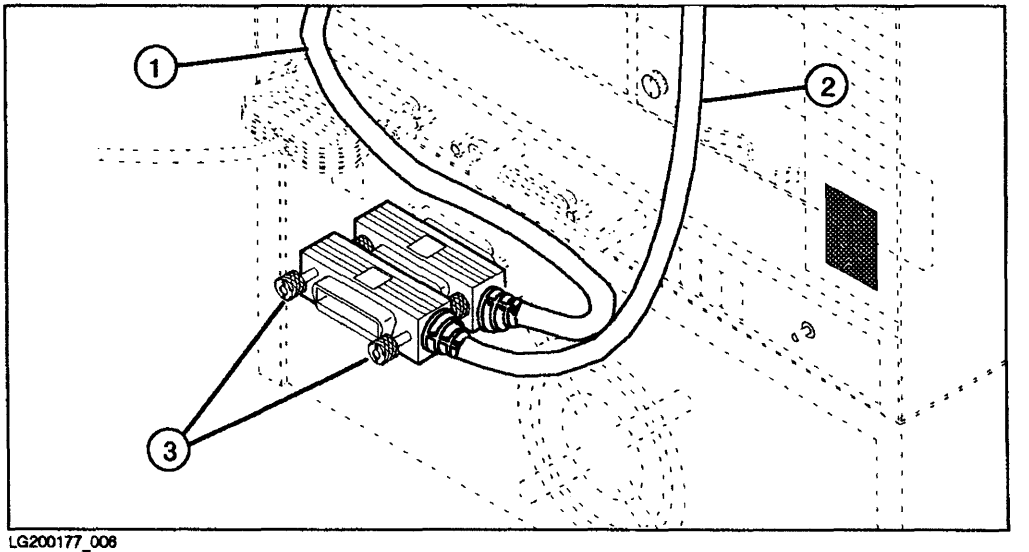


Figure 1-2. Piggy-Backed HP-IB Connectors

①	Cable to the interface or previous device.
②	Cable to the new peripheral device.
③	Thumb screws to be tightened.

The following list provides some guidelines for using HP-IB devices.

- DO NOT connect or disconnect an HP-IB device while the system is running, or turn power on or off to an HP-IB device while it is connected to a powered-up system. This could result in bad data on the HP-IB bus.

- If you should need to change the bus address switch settings on an HP-IB device, be sure to perform the task in the following sequence:

  1. Shut down and halt the system using the `/etc/shutdown -h` command. If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.
  2. TURN OFF the computer and unplug the power cord.
  3. Turn off and unplug the device.
  4. Change the switch settings on the device.
  5. Plug in and turn on the device.
  6. Plug in and turn on your system.

- The system root device (hard disk) is usually located at select code 14, bus address 0 on a (high-speed) HP 98625A, HP 98625B, HP 98262A high-speed disk interface card, or SCSI interface card (HP 98265A).
- The built-in (internal) HP-IB is always at select code 7.

Note With a 98625A high-speed HP-IB disk interface case or the "optional" secondary high-speed HP-IB interface, be sure that *no* SCSI bus interface is installed.

- The system printer must not be on the same interface as the system root device. This is not a supported configuration. Place the system printer on a low-speed, HP-IB interface, separate from the system root device. A bus address of 1 is typical.
- An HP 7971 9-track tape must be placed on a low speed HP-IB. A bus address of 3 is typical.
- An HP 7974 or 7978 9-track tape drive should be placed on a high-speed disk HP-IB, if possible. A bus address of 3 is typical.
- Avoid putting flexible disk drives, cartridge tape drives, or 9-track tape drives on the same interface as the root device.
- Plotters and the HP 9111 graphics tablet should be placed on separate low-speed HP-IB interfaces when possible. Typical bus addresses are 5 and 6 for plotters and graphics tablets, respectively.

- When only standard speed devices are used, the total HP-IB cabling on a standard speed interface is limited to two meters per standard device load or 20 meters total, whichever is less.
- When only high speed devices are used, the total HP-IB cabling on a standard high interface is limited to one meter per standard device load or 10 meters total, whichever is less.
- *Do not* hook up your HP-IB devices in a star configuration. The recommended configuration for HP-IB cabling is a single run of multi-drop (daisy-chained) segments.
- The HP 37204A or HP 37201A HP-IB extenders can be used to exceed the total cable limit on standard speed HP-IB connections. These units translate all local bus traffic and, with high data integrity, exchange it with one or more remote busses served by another extender. Each adds one external device load to the local bus.

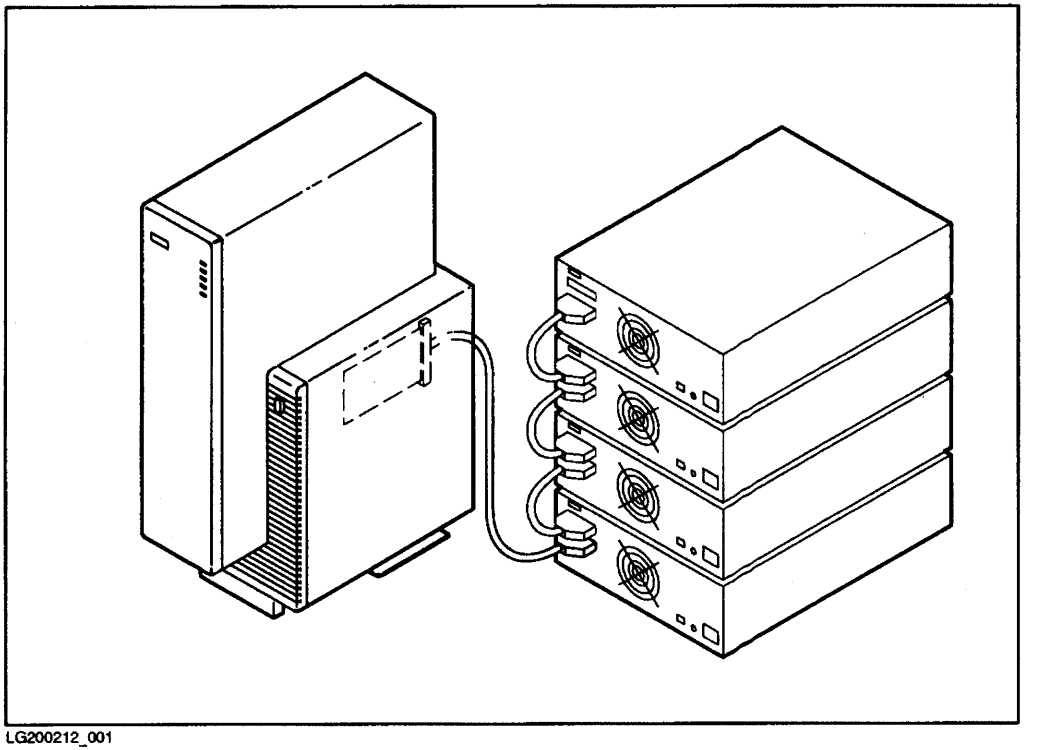
HP-IB Cabling Information

If you need to replace you HP-IB cable for any reason, consult the following list of available HP-IB cables and their lengths:

HP 10833A 1.0 meter HP-IB cable
HP 10833B 2.0 meter HP-IB cable
HP 10833C 4.0 meter HP-IB cable
HP 10833D 0.5 meter HP-IB cable

SCSI Device Guidelines

A device using the Small Computer System Interface (SCSI) bus can be connected directly to your computer, or to another SCSI device in a daisy-chained arrangement.



LG200212_001

Figure 1-3. SCSI Connections

If the SCSI interface on your computer already has a device connected to it, you can connect the cable from your new peripheral device to the last device on the chain as in Figure 1-4.

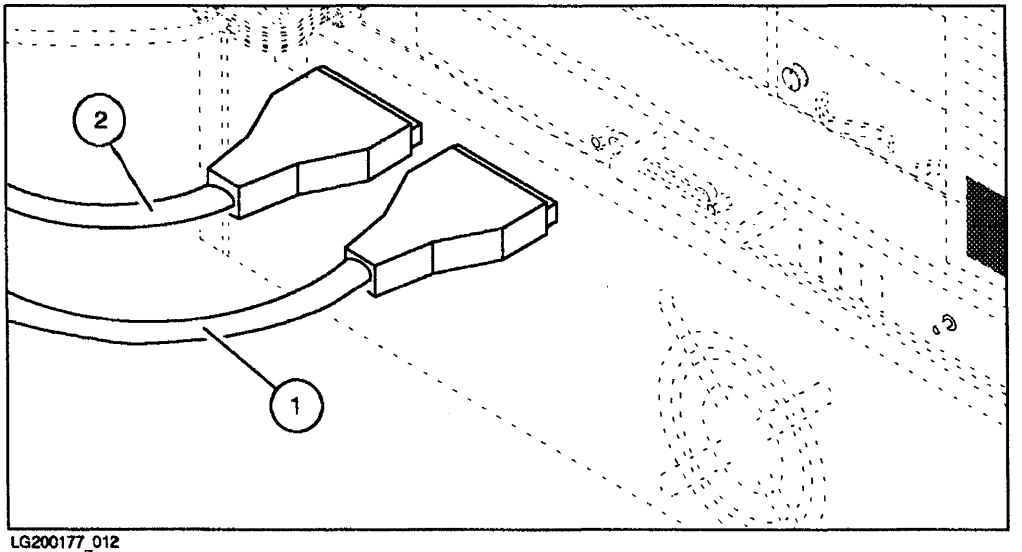


Figure 1-4. SCSI Connectors

① Cable to the interface or previous device.

② Cable to the new peripheral device.

The following list provides some guidelines for SCSI devices.

- The last SCSI device in the chain, even if it is the only one, *must have* a terminator installed to its second connector. This terminator provides matching impedance on the bus circuits. Without the terminator, the bus will not work.

- Make sure there are no unterminated cables (that is, make sure that all cables are attached to a device at both ends). Both the 400S and 400T must have a high-density terminator installed on the back panel if no external devices are in use.

Caution Only the two ends of a SCSI bus should be terminated. Excessive or improper termination may overload the SCSI port's termination power ("TERMPWR") circuitry. This may result in blowing the TERMPWR fuse on the adapter, or damaging transceivers on any attached device (including the adapter).

Refer to device manuals to ensure they operate properly on the SCSI bus.

- Use of non-Hewlett-Packard peripherals is at user's risk, and is unsupported by Hewlett-Packard's standard support process.
- Because SCSI cable impedance and construction can have a significant effect on signal quality, only HP cables are recommended.
- *Do not* connect or disconnect any SCSI device while the system is running, or turn power on or off to any SCSI device while it is connected to a powered-up system. Doing so could result in data corruption or a system panic, which in turn could lead to corruption of the file system.
- Keep all devices powered on during and after system boot-up.
- *Do not* add or remove SCSI devices while the system is powered on.

- If you should need to change the bus ID on a SCSI device, perform the task in the following sequence:

  1. Shut down and halt the system using the `/etc/shutdown -h` command.

     If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

  2. TURN OFF the computer and unplug the power cord.
  3. Turn off the device.
  4. Change the bus ID on the device.
  5. Turn on the device.

     Power on all SCSI peripherals and make sure they have time to complete their selftest before powering on the SPU (System Processor Unit).

  6. Turn on your system.

- The first SCSI interface is usually located at select code 14. Multiple SCSI interfaces can be added, using select codes 15, 16, and so on.
- The SCSI interface can support multiple SCSI disks, optical devices and DAT tape drives simultaneously.
- All devices should have a unique bus address between 0 and 6. Note that some devices require more than one bus address. For example, the C1700A, Magneto Optical Disk Autochanger, requires 3 (three) SCSI addresses (one for the autochanger and one for each of its two drives).
- The Series 300 BootROM searches from bus address 0 to 6. Your root disk should have a lower bus address than any other device on the bus. It is recommended that SCSI bus address 0 contain your root/system disk.

Note The SCSI DAT DDS Format Drive must be at a higher address than the root/system disk on the Series 300.

- The Series 400 BootROM searches from bus address 6 to 0. Your root disk should have a higher bus address than any other device on the bus. It is recommended that SCSI bus address 6 contain your root/system disk.

- The interrupt level for SCSI devices must be 4.
- SCSI bus address 7 is reserved for the SCSI interface.
- Ensure that the total cable length (including external and internal cables) does not exceed six meters. The length of the SCSI bus should be kept as short as possible. However, do not use cables less than 0.5 meters in length. Refer to the documentation that came with your device for internal cable lengths.

Calculating SCSI Cable Length Example

Table 1-6 demonstrates how to calculate SCSI bus cable lengths for a typical installation. The SCSI 0.5 m cable (HP 92222A) used in the example is available through your HP Sales and Support Office. Other lengths are also available.

Table 1-6. Example of SCSI Cable Length Calculation

Starting Point Device	Cable to Next Device		Internal Cable	Cumulative Cable Length
SCSI host adapter	5062-3383	1.0m	0.1m	1.1m
HP device #1	HP 92222A	0.5m	0.2m	1.8m
HP device #2	HP 92222A	0.5m	0.4m	2.7m
HP device #3	HP 92222A	0.5m	0.3m	3.5m
HP device #4	none		0.4m	3.9m
Total		2.5m	1.4m	3.9m

- Because SCSI cable impedance and construction can have a significant effect on signal quality, only HP cables are recommended. The following cables can be used with either a single-ended or differential SCSI bus:

  - K2296 cable with 0.9 meter length
  - K2297 cable with 1.5 meter length

  If you are connecting SCSI devices together in a daisy-chain, use the following cables:

  - 92222A cable with 0.5 meter length
  - 92222B cable with 1.0 meter length
  - 92222C cable with 2.0 meter length

- Terminator resistors are always installed in the host adapter. This terminator provides matching impedance on the bus circuits. Without the terminator, the bus will not work. HP SCSI host adapter is shipped with the proper terminator.

- All devices should be powered by the same electrical circuit. The system ground must be isolated from other electrical devices such as copying machines, arc welders and air conditioners. HP-supplied cables have correct grounding.

RS-232-C Cabling Guidelines

Terminology and Background

The type of connect that a device (SPU or peripheral) provides is usually one of, or a variant of:

DCE	Data Communications Equipment
DTE	Data Terminal Equipment
DQE	Nominally wired DCE, but with DTE hidden on pins unused by EIA.

Historically, DCEs were modems, and DTEs were whatever "terminated" the data path, typically an actual terminal at one end, and the computer at the other. A pair of DCEs were always assumed to be in the link, and they used something other than RS-232-C to communicate with each other. The generalized circuit was:

```
Computer[DTE]---{ DCE~~phone lines~~DCE }---[DTE] terminal
```

The connectors and pin-outs at the DCE ("-{" above) are specified. The cable termination at the DTE itself is not, and in the early days, the cable was hard-wired right into the device (typically an ASR-33 TTY).

When the EIA created RS-232-C, it failed to adequately describe the case of direct computer-peripheral connection. This is the now-common configuration of DTEs connecting directly to other DTEs, with no DCEs in sight. This may be what you are trying to do, and why you are reading this document. Today's devices, and their serial connectors, often do not clearly fall under DTE or DCE, and they provide an assortment of connector genders, styles and pin counts.

Although nominally a 25-pin connection, HP systems typically provide a maximum of nine pins, sometimes seven, and all that is really required for a device-device direct connection is three pins.

Despite this potential confusion, the terms DTE and DCE still have their uses.

For our purposes, when normalized to 25 pins:

DCE:
Transmits on pin 3
Receives on pin 2
Monitors pins 4 (RTS), 20 (DTR), if present
Asserts pins 5 (CTS), 6 (DSR), 8 (CD), 22 (RI), if present

DTE:
Transmits on pin 2
Receives on pin 3
Asserts pins 4 (RTS), 20 (DTR), if present
Monitors pins 5 (CTS), 6 (DSR), 8 (CD), 22 (RI), if present

DQE: Wired for DCE-25F, but convertable to DTE-25M with 92219Q cable.

Pin 7 is signal ground for both DCE and DTE.

Pin Counts

When there are fewer than 25 pins (especially 9-pin), the actual pin numbers vary. The type of connector implied by the counts are:

50	Amp "blue ribbon" D-style
25	DB-25 subminiature D-style
9	DB-9 subminiature D-style
4	USOC RJ-11C (same as on contemporary consumer telephones)

Connector Gender

Actual DCEs, such as modems, are still usually 25-pin female. No particular connector gender is common to DTEs. The abbreviations used in this guide are:

M	Male
F	Female

The following tables are intended to be a quick-reference to the selection of RS-232-C cables for connecting serial devices directly to an HP 9000 Series 300/400 workstation. They do not cover RS-422. They do not cover the case of direct CPU-CPU connections, as LAN has replaced RS-232-C in this application.

Table 1-7. RS-232-C Interconnections

Host Type	Device Type	Cable Suggested
TE-4F	DCE-25F	Not recommended for actual DCEs. Use 92219T + 17255=D otherwise.
TE-4F	DTE-25F	92219T
TE-4F	DTE-25M	92219T plus 92224F adaptor
TE-9F	DCE-25F	92221M, or 98561-61604 plus 40242M
TE-9F	DTE-25F	92221P, or 98561-61604 plus 40242G
TE-9F	DTE-25M	98561-61604 plus 40242C
TE-9M	DCE-25F	24542M, or 98574-61606 plus 92221M, or 98574-61606 + 98561-61604 + 40242M
TE-9M	DTE-25F	24542G, or 98574-61606 plus 92221P, or 98574-61606 + 98561-61604 + 40242G
TE-9M	DTE-25M	24542H, or 98574-61606 + 98561-61604 + 40242C
CE-25F	DCE-25F	40242G
CE-25F	DTE-25F	40242M, or 92224M adaptor, if cables present
CE-25F	DTE-25M	40242C, or simply directly interconnect, if cables present
QE-25F	DCE-25F	92219Q
TE-25F	DCE-25F	40242M, or 92224M adaptor, if cables present
TE-25F	DTE-25F	40242G
TE-25F	DTE-25M	17255D
TE-50F	DCE-25F	5061-4215
TE-50F	DTE-25F	5061-4216 plus 92224M
TE-50F	DTE-25M	5061-4216

Table 1-8. RS-232-C Host Connector Types

Host	Type of Connector	Cable Included
Model 310 built-in	DTE-25F	*none*
Model 318 built-in	DTE-25F	*none*
Model 319 built-in	DTE-25F	*none*
Model 320 built-in	see 98561-6653x	–
Model 330 built-in	see 98562-6653x	–
Model 332 built-in	DTE-25F	*none*
Model R/332 built-in	DTE-25F	*none*
Model 340 built-in	DTE-25F	*none*
Model 345 built-in	DTE-25F	*none*
Model 350 built-in	see 98562-6653x	–
Model 360 built-in	see 98562-6653x	–
Model V/360 built-in	DTE-9F	*none*
Model 370 built-in	see 98562-6653x	–
Model 375, 380 built-in without 98574-61606 with 98574-61606 w/98574-61606 + 98561-61604	– DTE-9M DTE-9F DTE-25F	– – 0.3m 0.3m
Model 400 built-in without K2292 with K2292	– DTE-25F 3x DTE-25F	– *none* 0.3m
98561-6653x without 98561-61604 with 98561-61604	– DTE-9F DTE-25F	– – 0.3m
98562-6653x without 98561-61604 with 98561-61604	– DTE-9F DTE-25F	– – 0.3m

Table 1-8. RS-232-C Host Connector Types (continued)

Host	Type of Connector	Cable Included
98626A with #001 (5061-4215) with #002 (5061-4216)	DTE-50F DTE-25M DCE-25F	*none* 4.9m 4.9m
98628A with #001 (5061-4215) with #002 (5061-4216)	DTE-50F DTE-25M DCE-25F	*none* 4.9m 4.9m
98638A (standard) or may be considered	8x DCE-25F 8x DQE-25F	*none* *none*
98642A, port 0 with 92219S cable	DTE-25F DTE-25M	*none* 15m
98642A, port 1 with 92219T cable	DTE-4F DCE-25M	*none* 15m

Table 1-9. Peripheral Types

Type	HP Peripheral Products
DCE-25F	These devices are all modems, and require that the host provide at least a 9-pin DTE connection: 37212A/B, 39301A, 50759A, 92203A, 92205A/B K1489, K1492, K1494, K1498,
DTE-25F	2225D, 2227A, 2228A, 2235, 2276A, 2277A, 2382A, 2390-series, 2560-series (#049), 2601A, 2602A, 2603A, 2620-series (port 2), 2631B, 2684A (w/26843A), 2686, 2687A, 2930-series, 3082A/B, 33440A, 33447A, 33449A, 33459A, 33471A, 3630A#001, 41063A, 45810, 45850, 7440A#001, 7475A#001, 7570A, 7575A, 7576A, 7580, 7585, 7586B, 7595, 7596A, 7599A, 9666A 9807 C1001, C1002, C1003, C1006, C1010, C1200A, C1202A#1A9, C1600A, C1601A, C1602A#1AX, C1620A, C1625A, C1627A, C1629A, C1631A, C2106A, HP150,
DTE-25M	C1004, C1007, C1017, 7510A, 7550A
unknown	7550B

2

Installing Interface and Accessory Cards

Introduction

This chapter contains installation guidelines and configuration information for the following interface and accessory cards:

- HP 98546A Display Compatibility Interface
- HP 98622A GPIO (General Purpose I/O) Interface
- HP 98624A Standard-Speed HP-IB Interface
- HP 98265A Small Computer Systems Interface (SCSI)
- HP 98625A High-Speed HP-IB Disk Interface
- HP 98625B High-Speed HP-IB Disk Interface
- HP 98626A RS-232-C Interface
- HP 98628A Datacomm Interface
- HP 98629A/50961A SRM Interfaces
- HP 98642A 4-Channel Multiplexer Interface
- HP 98638A 8-Channel Multiplexer Interface
- HP 98643A Local Area Network (LAN) Interface
- HP 98644A Asynchronous Serial Interface
- HP 98562-66530 Human (System) Interface Board
- HP 98248A Floating-Point Accelerator Accessory Card
- HP 98248B Floating-Point Accelerator Accessory Card
- HP 98635A Floating Point Math Accessory Card
- HP 98620B DMA Controller Accessory Card

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

These cards require the following device drivers.

Table 2-1. Device Drivers for Interface and Accessory Cards

Interface or Accessory Card	Driver Name
98546A	`ite`
98622A	`gpio`
98624A	`98624`
98265A	`98265`
98625A	`98625`
98625B	`98625`
98626A	`98626`
98628A	`98628`
98629A	`srm`
98638A	`98642`
98642A	`98642`
98643A	`lla`
98644A	`98626`
98562-66530	not needed
98248A	not needed
98248B	not needed
98635A	not needed
98620B	not needed

The `ite` driver for the HP 98546 Display Compatibility Interface is part of the HP-UX kernel by default.

The HP 98265A SCSI interface driver `98265`, is automatically added when you add your first SCSI device using SAM.

Note

The installation instructions for the following graphic device interface cards are documented in Chapter 11, "Installing Plotters and Graphics Devices":

- HP 98627A Color Output Interface
- HP 98556A 2D Graphics Accelerator Accessory Card
- HP 98548/49/50A High Resolution Graphics Interfaces
- HP A1416A High Resolution Color Graphics Interface
- HP 98287A Graphics Display Controller Interface
- HP 98724A/98725A Local Graphics Bus Interface
- HP 98726A Local Graphics Bus Interface
- HP 98702A Graphics Address and Data Bus Interface
- HP 98735-66580 Physical DMA Interface
- HP 98735-66581 Virtual DMA Interface

HP 98546A Display Compatibility Interface

The HP 98546A Display Compatibility Interface converts digital display data from Series 300 computers into a composite video signal which is compatible with HP 35721, HP 35731, and HP 35741 monitors. It requires two adjacent slots in the backplane and the lower slot must be an I/O card (that is, even-numbered) slot.

The interface consists of two cards: a video card with an attached front panel and a graphics card that connects to the video card through a short ribbon cable.

Note The display connected to the HP 98546 Interface must be the only display in the system.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

Installing the HP 98546A Display Compatibility Interface

The following summary supplements the procedures outlined in your installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this interface card, and any peripheral device you intend to install at this time, is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary driver(s), listed in Table 2-1, is (are) part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing, and reconfigure the kernel for you at this time. See Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM", and then go on to step 2.

     or

   - Look in your `dfile` for the driver(s). If the drivers are in your kernel configuration file, go on to step 2 now.

     If the driver(s) is (are) not in the `/etc/conf/dfile`, or is (are) commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*
   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove the Display Compatibility Interface from its envelope, being careful to handle the card only by its edges and front panel. The card can be easily damaged by electrostatic discharge (static zap).

   d. Place the card on the envelope.

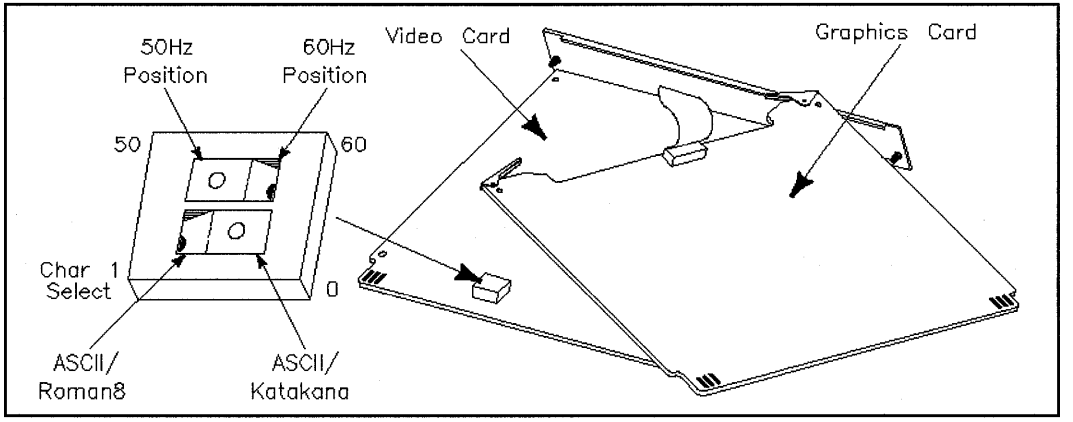


Figure 2-1.
Display Compatibility Interface switches

3. *Set the following values according to the instructions provided in the documentation that came with your interface card.*

   a. The power frequency.

Note This switch is preset to 60 Hz. If your power frequency is 60 Hz, or if you don't know your power frequency, you can skip this step. If you later notice a problem with your screen, come back and change the Hz setting.

   b. Set the character select switch.

Note The character select switch is preset to ASCII/Roman 8; skip to step 4 if this the desired character set.

4. *Insert the interface.*

   Follow the instructions given in the documentation that came with the interface card to insert this interface card.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

HP 98622A GPIO (General Purpose I/O) Interface

The HP 98622A General Purpose Input/Output (GPIO) Interface card is used for a wide variety of peripheral requirements. It supports 16-bit bi-directional data exchange. Extended control and status lines are available for applications that require more than one signal from the computer. Several handshake modes are also available to permit interfacing to a variety of equipment.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

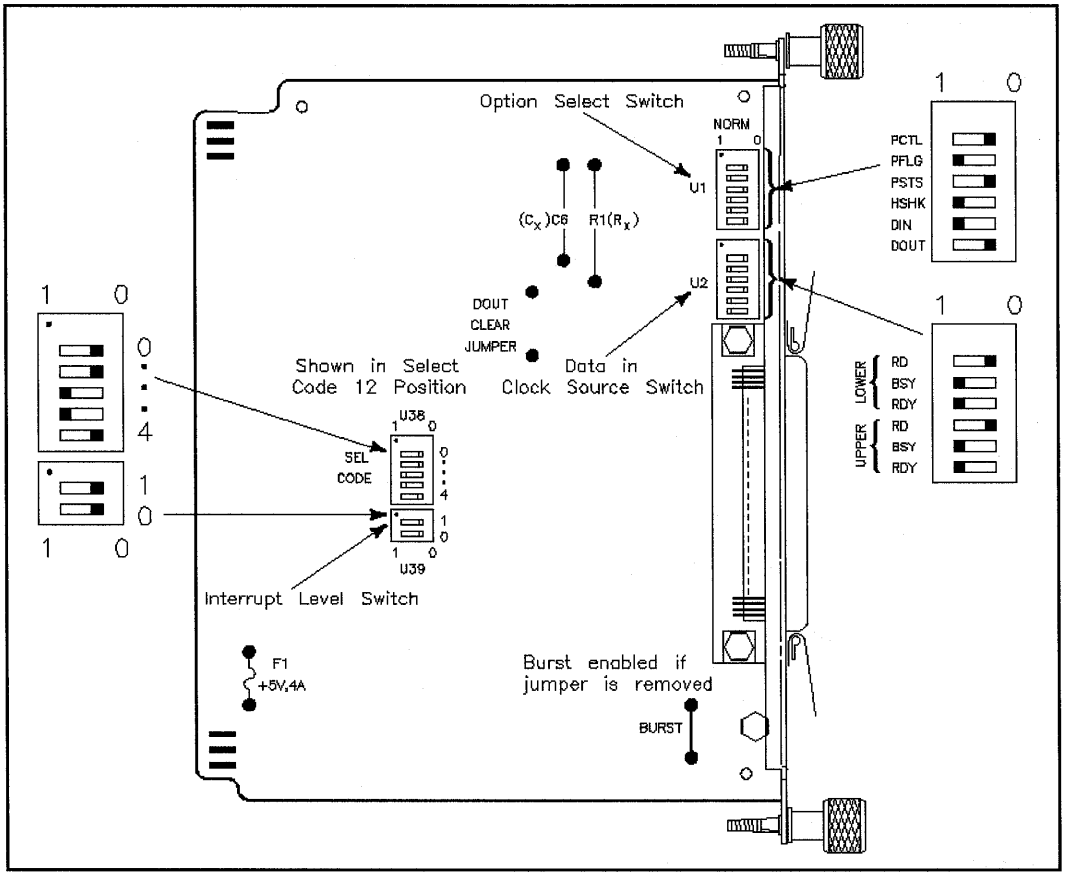


Figure 2-2.
HP 98622A GPIO Switches and Jumpers

Installing the HP 98622A GPIO Interface

The GPIO Interface can be configured in any number of ways, depending on the requirements of your application. Abbreviated instructions are provided here. Refer to the installation manual that came with the interface for more detailed information.

The following summary supplements the procedures outlined in your installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this interface card, and any peripheral device you intend to install at this time, is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary driver(s), listed in Table 2-1, is (are) part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing, and reconfigure the kernel for you at this time. See Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM", and then go on to step 2.

     or

   - Look in your `dfile` for the driver(s). If the drivers are in your kernel configuration file, go on to step 2 now.

     If the driver(s) is (are) not in the `/etc/conf/dfile`, or is (are) commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove the GPIO Interface from its envelope, being careful to handle the card only by its edges and front panel. The card can be easily damaged by electrostatic discharge (static zap).

   d. Place the card on the envelope.

3. *Set the following values according to the instructions provided in the documentation that came with your interface card.*

   a. Set the select code of the interface card to a unique value and make a note of it.

      If you need to change the select code of this card from its **preset value of 12**, do so by setting the select code switches. Check the documentation that came with the card for specific procedures.

Note Select codes zero through seven (0-7) are reserved for built-in interface cards and cannot be used.

If you need to change the select code of a built-in interface card, you might be able to do so by entering Configuration Mode during the Boot ROM sequence. For more information about interacting with the Boot ROM Configuration sequence on a model 362 or 382 computer, consult the *Hardware Configuration Guide* for your computer model. For information about interacting with the Boot ROM Configuration sequence of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

---

   b. Set the interrupt level switch.

   c. Set the data-in clock source switches.

   d. Set the option Select switches.

4. *Install or remove the jumpers on your HP 98622A card(s) as required by your peripheral.*
5. *Insert the interface according to the instructions provided in the documentation that came with the card.*
6. *Verify installation.*
   a. Plug in the power cord and turn on your computer. Watch for the word "Keyboard" to appear, then press the space bar once.
   b. Check the list of components displayed on the left-hand side of the screen. If the message:

      ```
      HP98622 at 12
      ```

      appears in the list, you have correctly installed the GPIO Interface.

      If the message above does not appear, repeat the installation procedure, making sure there are no select code conflicts and that the card is firmly seated in an even-numbered slot. If the message still does not appear, call your HP Service Representative for assistance.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

HP 98624A Standard-Speed HP-IB Interface

The HP 98624A HP-IB Interface card implements the IEEE 488-1978 Standard Digital Interface for Programmable Instrumentation. The interface can communicate with as many as 14 HP-IB compatible instruments, connected with a maximum of 20 meters (65.6 ft.) of cable between them. It has interrupt capabilities and can carry out DMA transfers via the optional DMA Controller card.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

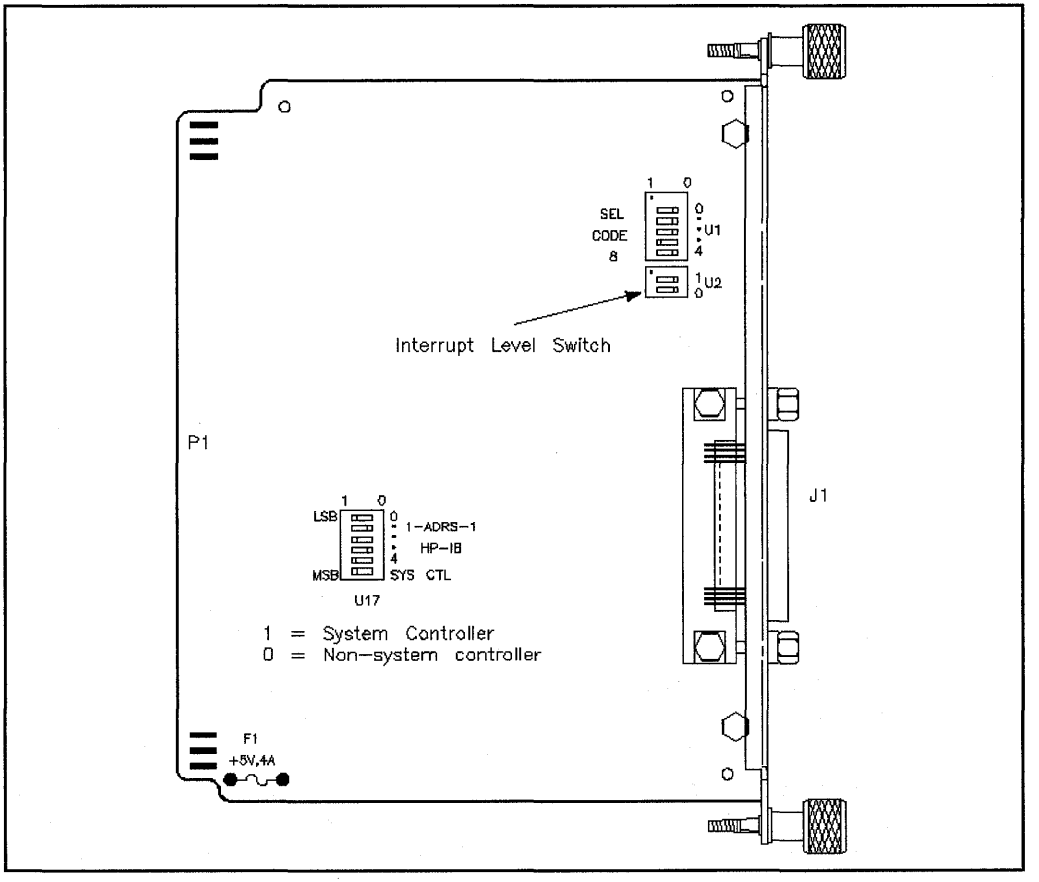


Figure 2-3.
HP 98624A HP-IB Interface Switches

Installing the HP 98624A HP-IB Interface

The following summary supplements the procedures outlined in your installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this interface card, and any peripheral device you intend to install at this time, is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary driver(s), listed in Table 2-1, is (are) part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing, and reconfigure the kernel for you at this time. See Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM", and then go on to step 2.

     or

   - Look in your `dfile` for the driver(s). If the drivers are in your kernel configuration file, go on to step 2 now.

     If the driver(s) is (are) not in the `/etc/conf/dfile`, or is (are) commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove the HP-IB Interface from its envelope, being careful to handle the card only by its edges and front panel. The card can be easily damaged by electrostatic discharge (static zap).

   d. Place the card on the envelope.

3. *Set the following values according to the instructions provided in the documentation that came with your interface card.*

   a. Set the select code of the interface card to a unique value and make note of it.

      If you need to change the select code of this card from its **preset value of 8**, do so by setting the select code switches. Check the documentation that came with the card for specific procedures.

Note Select codes zero through seven (0-7) are reserved for built-in interface cards and cannot be used.

If you need to change the select code of a built-in interface card, you might be able to do so by entering Configuration Mode during the Boot ROM sequence. For more information about interacting with the Boot ROM Configuration sequence on a model 362 or 382 computer, consult the *Hardware Configuration Guide* for your computer model. For information about interacting with the Boot ROM Configuration sequence of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

---

b. Set the interrupt level.

The interface is preset to interrupt level 3. Unless you are certain that interrupt level 3 is inappropriate for your application, do not adjust the interrupt level and skip to step 4.

c. Set the address and system controller switches.

- If you do not intend to connect two computers together with this interface, skip to step 4. The interface is configured to be system controller at address 21 and need not be changed.
- If you will be connecting a disk drive, printer, plotter or other peripheral to this interface, *and* you will be using an HP Series 200/300 operating system, *do not* set this switch to non-system controller.

4. *Insert the interface according to the instructions provided in the documentation that came with the card.*

5. *Verify installation.*

a. Plug in the power cord and turn on your computer. Watch for the word "Keyboard" to appear, then press the space bar once.

b. Check the list of components displayed on the left-hand side of the screen. If the message:

```
HP98624 at 8
```

appears in the list, you have correctly installed the HP-IB Interface.

If the message above does not appear, repeat the installation procedure, making sure there are no select code conflicts and that the card is firmly seated in an even-numbered slot. If the message still does not appear, call your HP Service Representative for assistance.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

HP 98265A Small Computer Systems Interface (SCSI)

The HP 98265A SCSI Interface is a **daughter** board which allows you to connect SCSI devices (normally disk and/or tape drives) to your system. Daughter boards are boards that connect to a DIO System card or a DIO-II card to provide additional RAM on a processor or RAM board, an additional interface on the system interface board, an accelerator on a video board, or other augmentation of system capabilities.

Caution The HP 98265A SCSI Interface is not supported on the same system containing an HP 98625A HP-IB Interface. Only one of these interfaces is supported per system. If your system contains an HP 98625A HP-IB interface card, you must remove it before installing your HP 98265A SCSI Interface card.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

Installing the HP 98265A Small Computer Systems Interface (SCSI)

The following summary supplements the procedures outlined in your installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this interface card, and any peripheral device you intend to install at this time, is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary driver(s), listed in Table 2-1, is (are) part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing, and reconfigure the kernel for you at this time. See Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM", and then go on to step 2.

     or

   - Look in your `dfile` for the driver(s). If the drivers are in your kernel configuration file, go on to step 2 now.

     If the driver(s) is (are) not in the `/etc/conf/dfile`, or is (are) commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove the SCSI Interface from its envelope, being careful to handle the card only by its edges and front panel. The card can be easily damaged by electrostatic discharge (static zap).

   d. Place the card on its envelope.

3. *Set the select code of the interface card to a unique value and make note of it.*

   If you need to change the select code setting of your SCSI interface card from its **preset value of 14**, do so by setting the select code switches found on the Human (System) Interface Board; see Figure 2-12.

Note Both the SCSI and the HP 98625B interface are preset to select code 14. If you have both SCSI and HP 98625B interfaces, change the select code of the HP 98625B Interface to an unused value.

Note Select codes zero through seven (0-7) are reserved for built-in interface cards and cannot be used.

If you need to change the select code of a built-in interface card, you might be able to do so by entering Configuration Mode during the Boot ROM sequence. For more information about interacting with the Boot ROM Configuration sequence on a model 362 or 382 computer, consult the *Hardware Configuration Guide* for your computer model. For information about interacting with the Boot ROM Configuration sequence of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

---

4. *Install the SCSI interface card according to the instructions provided in the documentation that came with the card.*

   This will require:

   a. Locating the Human (System) Interface Board (HP part number 98562-66530).
   b. Loosening the screws on the Human (System) Interface Board and sliding it out far enough to expose the large connector.
   c. Removing any existing interface card.

Note If the Human (System) Interface Board does not have an interface currently mounted on it, skip to step 6.

   Wrap the interface card in static-free material and set it and the cable aside. The envelope that interface cards are shipped in is made of static-free material.

   d. Inserting the SCSI card and attaching the cable.
   e. Sliding the Human (System) Interface Board into the computer and tightening the two screws.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

HP 98625A High-Speed HP-IB Disk Interface

Note There is a difference between the HP 98625A and the HP 98625B disk interfaces. If you have an HP 98625*A* Disk Interface you are in the correct section. If you have an HP 98625*B* Disk Interface, you need refer to HP 98625B Disk Interface section of this chapter.

The HP 98625A HP-IB Disk Interface provides a high-speed HP-IB interface to Command Set 80 (CS/80) disks. The Disk Interface is capable of handling up to four disks on one interface card.

Only one HP 98625A HP-IB Disk Interface is supported per system. If an HP 98625A HP-IB Disk Interface is used in a system with one or more HP 98625B HP-IB Disk Interfaces, an interrupt level adjustment must be made.

Caution The HP 98625A HP-IB Interface is not supported on the same system containing an HP 98265A SCSI Interface. Only one of these interfaces is supported per system. If your system contains an HP 98265A SCSI Interface card, you must remove it before installing your HP 98625A HP-IB Interface card.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

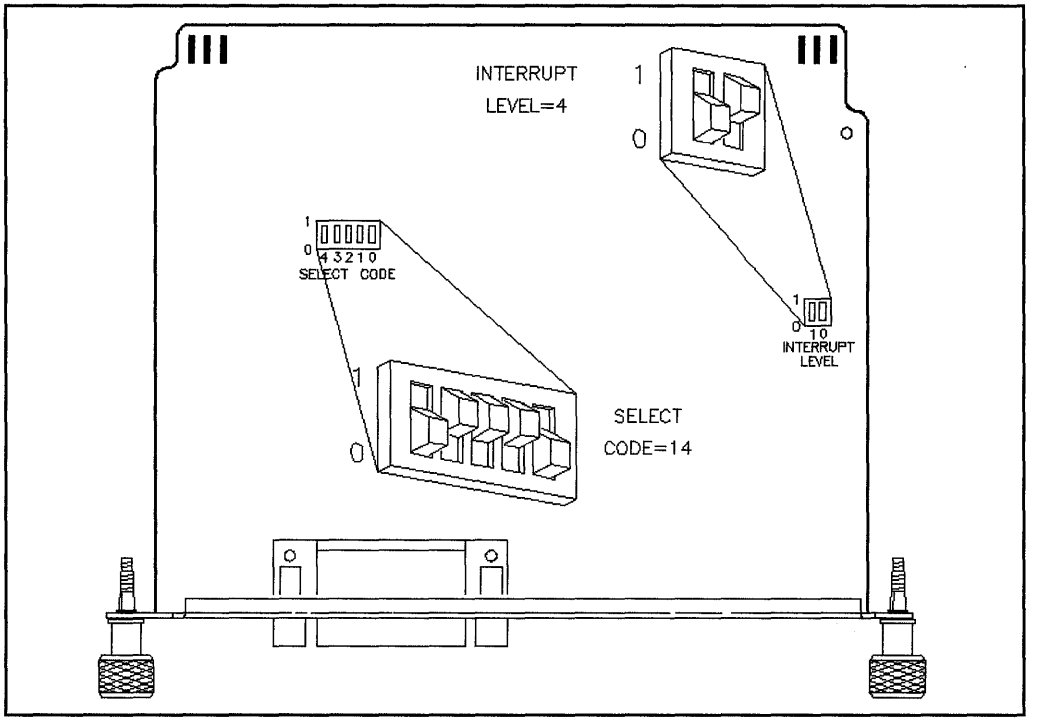


Figure 2-4.
HP 98625A Disk Interface switches

2

Installing the HP 98625A HP-IB Disk Interface

Note The HP 98625A Disk Interface cannot be installed in the HP 9888A bus expander. However, it can be installed in the HP 98568A Backplane Expander.

The following summary supplements the procedures outlined in your installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this interface card, and any peripheral device you intend to install at this time, is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary driver(s), listed in Table 2-1, is (are) part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing, and reconfigure the kernel for you at this time. See Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM", and then go on to step 2.

     or

   - Look in your `dfile` for the driver(s). If the drivers are in your kernel configuration file, go on to step 2 now.

     If the driver(s) is (are) not in the `/etc/conf/dfile`, or is (are) commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove the Disk Interface from its envelope, being careful to handle the card only by its edges and front panel. The card can be easily damaged by electrostatic discharge (static zap).

   d. Place the card on the envelope.

3. *Set the select code of the interface card to a unique value and make note of it.*

   If you need to change the select code setting of your HP-IB interface card from its **preset value of 14**, do so by setting the select code switches. Refer to the documentation that came with the card for instructions on changing the preset select code value.

Note Select codes zero through seven (0-7) are reserved for built-in interface cards and cannot be used.

If you need to change the select code of a built-in interface card, you might be able to do so by entering Configuration Mode during the Boot ROM sequence. For more information about interacting with the Boot ROM Configuration sequence on a model 362 or 382 computer, consult the *Hardware Configuration Guide* for your computer model. For information about interacting with the Boot ROM Configuration sequence of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

---

4. *Set the interrupt level.*

   If an HP 98625A HP-IB Disk Interface is used in a system with one or more HP 98625B HP-IB Disk Interfaces, the HP 98625A must be set to interrupt level 4 and the HP 98625B HP-IB Disk Interface(s) must be set to interrupt level 3.

Note Do not set any other interface to interrupt level 4.

---

5. *Insert the interface according to the instructions provided in the documentation that came with the card.*
6. *Verify installation.*
   a. Plug in the power cord and turn on your computer. Watch for the word "Keyboard" to appear, then press the space bar once.
   b. Check the list of components displayed on the left-hand side of the screen. If the message:

      ```
      HP98625 at 14
      ```

      appears in the list, you have correctly installed the Disk Interface.

      This message should also appear when verifying the installation of the 98562-66530 Human (System) Interface Board.

      If the message above does not appear, repeat the installation procedure, making sure there are no select code conflicts and that the card is firmly seated in an even-numbered slot. If the message still does not appear, call your HP Service Representative for assistance.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

HP 98625B High-Speed HP-IB Disk Interface

Note There is a difference between the HP 98625A and the HP 98625B disk interfaces. If you have an HP 98625*B* Disk Interface, you are in the correct section. If you have an HP 98625*A* Disk Interface, you need to refer to the proper section in this chapter.

The HP 98625B HP-IB Disk Interface provides a high-speed HP-IB interface to Command Set 80 (CS/80) disks. The Disk Interface is capable of handling up to four disks on one interface card. A DMA Controller card is required for the Disk Interface to achieve optimum performance.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

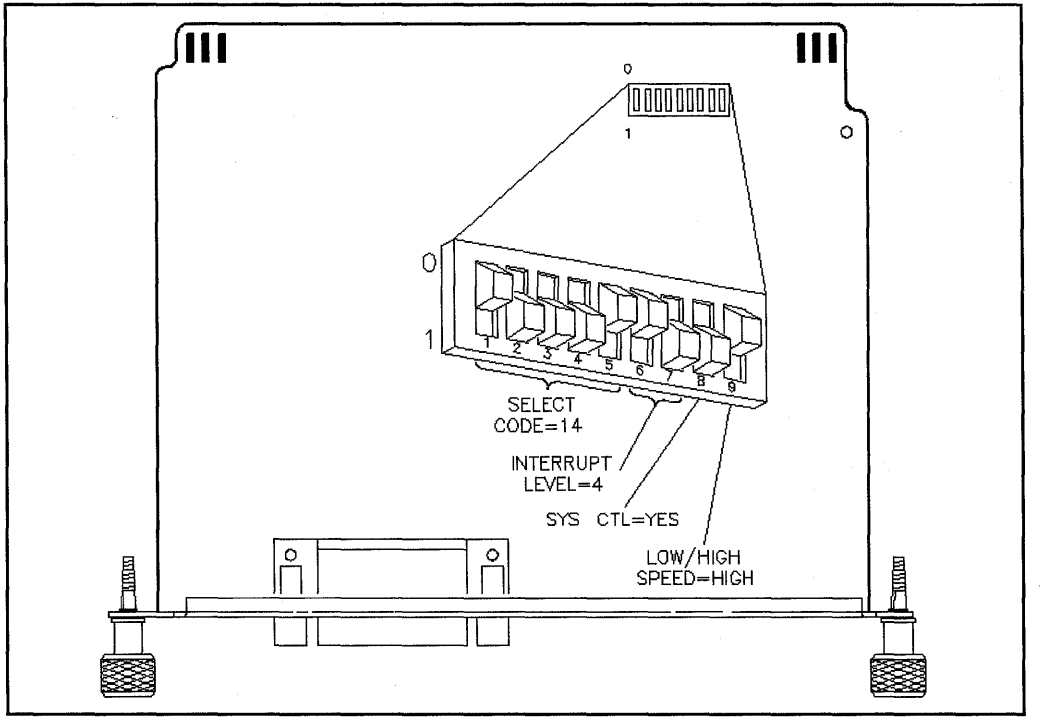


Figure 2-5.
HP 98625B Disk Interface Switches

Installing the HP 98625B HP-IB Disk Interface

Note The HP 98625B Disk Interface cannot be installed in the HP 9888A bus expander. However, it can be installed in the HP 98568A Backplane Expander.

The following summary supplements the procedures outlined in your installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this interface card, and any peripheral device you intend to install at this time, is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary driver(s), listed in Table 2-1, is (are) part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing, and reconfigure the kernel for you at this time. See Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM", and then go on to step 2.

     or

   - Look in your `dfile` for the driver(s). If the drivers are in your kernel configuration file, go on to step 2 now.

     If the driver(s) is (are) not in the `/etc/conf/dfile`, or is (are) commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove the Disk Interface from its envelope, being careful to handle the card only by its edges and front panel. The card can be easily damaged by electrostatic discharge (static zap).

   d. Place the card on the envelope.

3. *Set the following values according to the instructions provided in the documentation that came with your interface card.*

   a. Set the select code of the interface card to a unique value and make note of it.

      If you need to change the select code of this card from its **preset value of 14**, do so by setting the select code switches. Check the documentation that came with the card for specific procedures.

Note *The HP 98265A SCSI card is also preset to Select Code 14.* If your system has both of these cards, you will need to change the select code on your HP 98625B Interface.

Note Select codes zero through seven (0-7) are reserved for built-in interface cards and cannot be used.

If you need to change the select code of a built-in interface card, you might be able to do so by entering Configuration Mode during the Boot ROM sequence. For more information about interacting with the Boot ROM Configuration sequence on a model 362 or 382 computer, consult the *Hardware Configuration Guide* for your computer model. For information about interacting with the Boot ROM Configuration sequence of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

---

b. Set the interrupt level. Default interrupt level set at 4.

   If an HP 98625A HP-IB Disk Interface is used in a system with one or more HP 98625B HP-IB Disk Interfaces, the HP 98625A must be set to interrupt level 4 and the HP 98625B HP-IB Disk Interface(s) must be set to interrupt level 3.

Note Do not set any other interface (except for the HP 98629A SRM Interface) to interrupt level 4.

---

c. Set the system controller switch.

   The interface is configured to be system controller and may not need to be changed. If you are connecting two computers together via HP-IB, only one of them can be set to system controller. Therefore, you will need to change this setting on one of the computers.

d. Set the low/high speed switch.

   The Low/High Speed switch is preset to 0, "high speed". This setting is appropriate for most applications.

4. *Insert the interface according to the instructions provided in the documentation that came with the card.*

5. *Verify installation.*

   a. Plug in the power cord and turn on your computer. Watch for the word "Keyboard" to appear, then press the space bar once.

   b. Check the list of components displayed on the left-hand side of the screen. If the message:

      ```
      HP98625 at 14
      ```

      appears in the list, you have correctly installed the Disk Interface.

      If the message above does not appear, repeat the installation procedure, making sure there are no select code conflicts and that the card is firmly seated in an even-numbered slot. If the message still does not appear, call your HP Service Representative for assistance.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

HP 98626A RS-232-C Interface

The HP 98626A RS-232-C Interface is connected to a terminal, modem, serial peripheral, or computer and supports the RS-232-C standard. One interface is required for each device, and each interface must be set to a unique select code.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

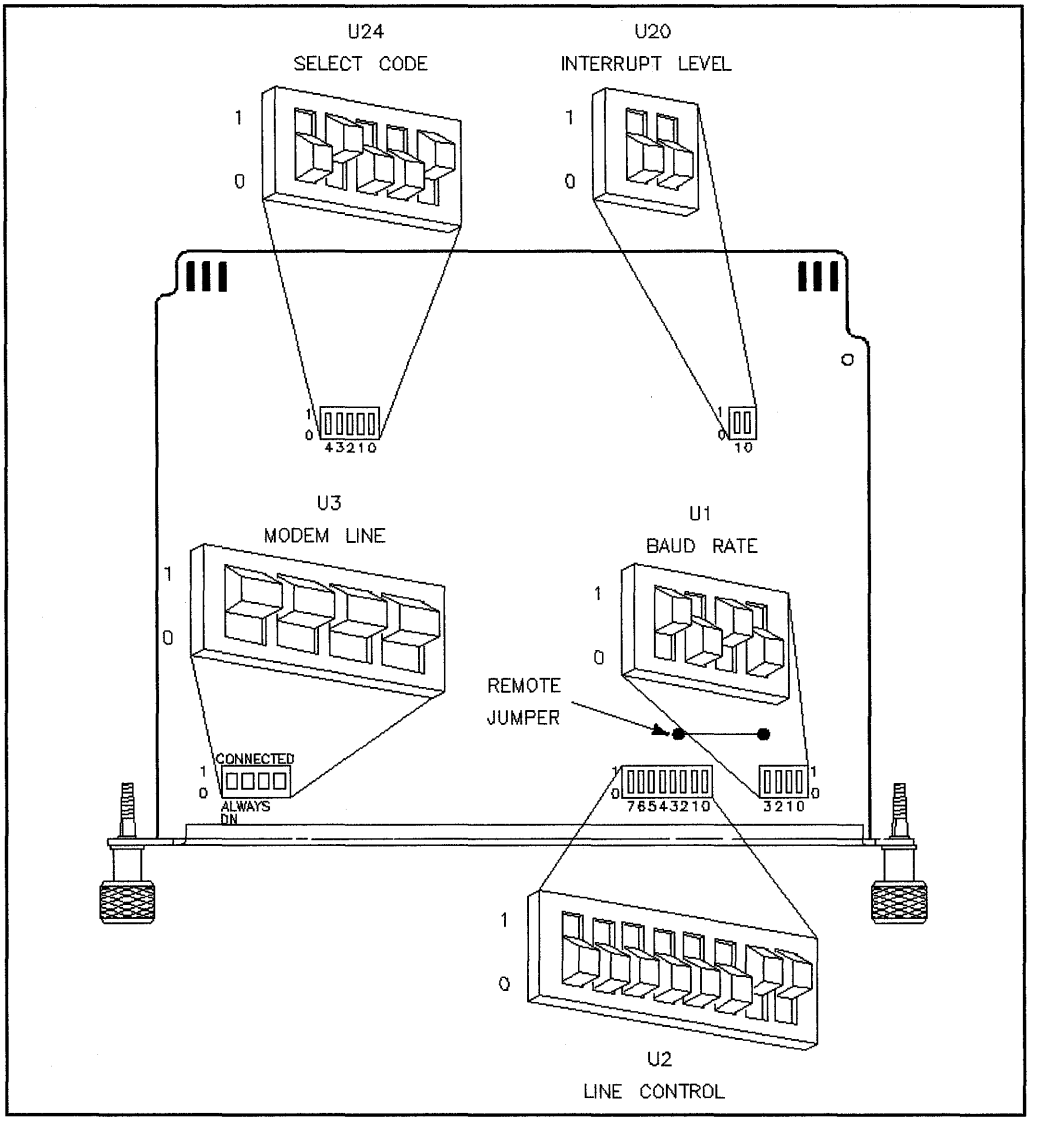


Figure 2-6.
HP 98626A RS-232-C Serial Interface Switches

Installing the HP 98626A RS-232-C Interface

The following summary supplements the procedures outlined in your installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this interface card, and any peripheral device you intend to install at this time, is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary driver(s), listed in Table 2-1, is (are) part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing, and reconfigure the kernel for you at this time. See Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM", and then go on to step 2.

     or

   - Look in your `dfile` for the driver(s). If the drivers are in your kernel configuration file, go on to step 2 now.

     If the driver(s) is (are) not in the `/etc/conf/dfile`, or is (are) commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove the RS-232-C Interface from its envelope, being careful to handle the card only by its edges and front panel. The card can be easily damaged by electrostatic discharge (static zap).

   d. Place the card on the envelope.

3. *Set the following values according to the instructions provided in the documentation that came with your interface card.*

   a. Set the select code of the interface card to a unique value and make note of it.

      If you need to change the select code of this card from its **preset value of 9**, do so by setting the select code switches. Check the documentation that came with the card for specific procedures.

      If select code 9 is being used by the RS-232-C interface on the HP 98562-66530 Human Interface Board, choose a select code that is not already assigned.

Note

Select codes zero through seven (0-7) are reserved for built-in interface cards and cannot be used.

If you need to change the select code of a built-in interface card, you might be able to do so by entering Configuration Mode during the Boot ROM sequence. For more information about interacting with the Boot ROM Configuration sequence on a model 362 or 382 computer, consult the *Hardware Configuration Guide* for your computer model. For information about interacting with the Boot ROM Configuration sequence of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

---

b. Set the character length.

   The interface's character length is preset to 8 bits/character. If you are certain that this character length is inappropriate for your application, change this setting.

c. Set the number of stop bits.

Note The interface is preset to 1 stop bit. If you are certain that 1 stop bit is inappropriate for your application, change this setting.

---

d. Set the parity enable switch.

   Set the parity enable switch as follows:

   - If connecting a terminal or an HP 2686 LaserJet printer to this interface, set this switch to "parity disabled."
   - If connecting an HP 39800/01A bar code reader or an HP 92205A/C Hayes Smartmodem 1200 to this interface, set this switch to "parity enabled."
   - If connecting any other device to this interface, set this switch to match that of the connected device.

e. Set the parity type.

   Set the parity type switches as follows:

   - If you are connecting a terminal, an HP 2601A printer or an HP 2686 LaserJet printer to this interface, the parity type does not matter since parity was disabled in step 7.
   - If you are connecting an HP 39800/01A bar code reader to this interface, set this switch to "parity is 0."
   - If connecting an HP 92205A/C Hayes Smartmodem 1200 to this interface, set the parity type to match the setting on the computer or terminal you are communicating with.

f. Set the handshake type.

   Set the handshake type switches to XON/XOFF.

g. Set the modem line switches.

   Set these switches as follows:

   - If connecting a modem, HP 2686A LaserJet printer, or uucp to this interface, set these switches to the "Connected" position.
   - If connecting a terminal or bar code reader, set these switches to the "Always on" position.

h. Set the remote jumper if you want to connect your system console terminal to this interface.

4. *Insert the interface according to the instructions provided in the documentation that came with the card.*

5. *Verify installation.*

   a. Plug in the power cord and turn on your computer. Watch for the word "Keyboard" to appear, then press the space bar once.

   b. Check the list of components displayed on the left-hand side of the screen. If the message:

      ```
      HP98626 at 9
      ```

      appears in the list, you have correctly installed the HP 98626A RS-232-C Interface.

      If the message above does not appear, repeat the installation procedure, making sure there are no select code conflicts and that the card is firmly seated in an even-numbered slot. If the message still does not appear, call your HP Service Representative for assistance.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

HP 98628A Datacomm Interface

The HP 98628A Datacomm Interface connects to a serial peripheral, terminal, modem or computer and supports the RS-232-C datacomm standard. One interface is required for each terminal, and each interface must be set to a unique select code.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

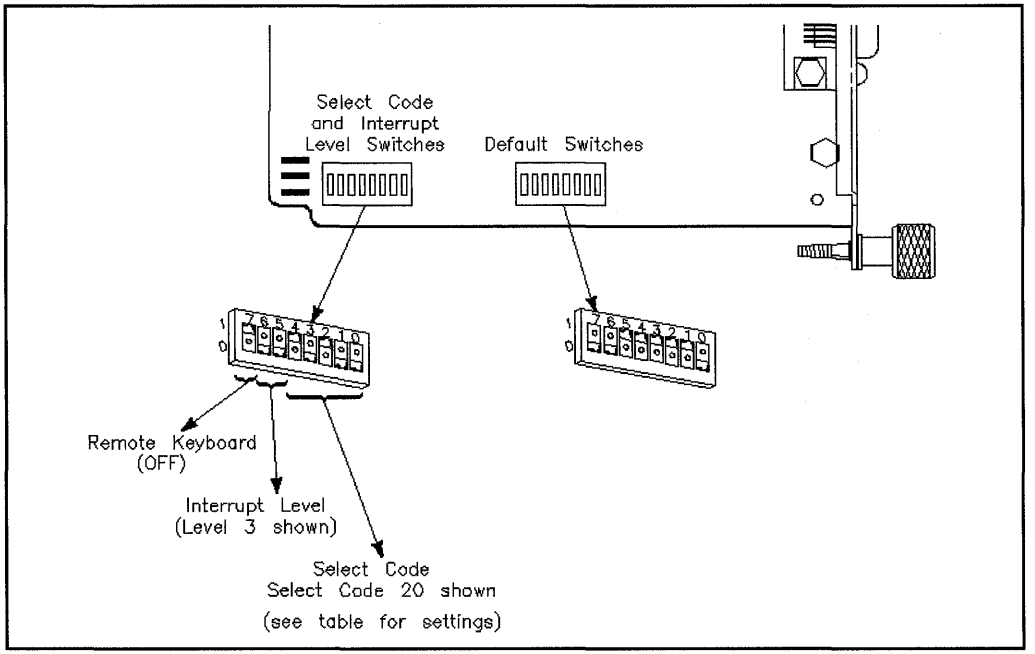


Figure 2-7. 98628A Datacomm Interface Switches

Installing the HP 98628A Datacomm Interface

The following summary supplements the procedures outlined in your installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this interface card, and any peripheral device you intend to install at this time, is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary driver(s), listed in Table 2-1, is (are) part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing, and reconfigure the kernel for you at this time. See Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM", and then go on to step 2.

     or

   - Look in your `dfile` for the driver(s). If the drivers are in your kernel configuration file, go on to step 2 now.

     If the driver(s) is (are) not in the `/etc/conf/dfile`, or is (are) commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove the Datacomm Interface from its envelope, being careful to handle the card only by its edges and front panel. The card can be easily damaged by electrostatic discharge (static zap).

   d. Place the card on the envelope.

3. *Set the following values according to the instructions provided in the documentation that came with your interface card.*

   a. Set the select code of the interface card to a unique value and make note of it.

      If you need to change the select code of this card from its **preset value of 20**, do so by setting the select code switches. Check the documentation that came with the card for specific procedures.

Note Select codes zero through seven (0-7) are reserved for built-in interface cards and cannot be used.

If you need to change the select code of a built-in interface card, you might be able to do so by entering Configuration Mode during the Boot ROM sequence. For more information about interacting with the Boot ROM Configuration sequence on a model 362 or 382 computer, consult the *Hardware Configuration Guide* for your computer model. For information about interacting with the Boot ROM Configuration sequence of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

---

   b. Set the interrupt level.

      The interface is preset to interrupt level 3. If you are certain that interrupt level 3 is inappropriate for your application, change this value.

c. Set the remote switch.

The Remote switch is preset to "OFF," which does *not* configure the interface to be the system console. If you are connecting your system console to this interface, you must change this value.

If you are connecting a terminal to this interface and want the terminal to be the system console, set the Remote switch to 0 (remote).

Caution The boot ROM will not recognize this terminal as the system console, even though HP-UX will. No boot ROM messages will appear on the associated terminal; therefore, do not use the HP 98628A for a system console until after HP-UX is installed.

---

4. *Insert the interface according to the instructions provided in the documentation that came with the card.*
5. *Verify installation*

a. Plug in the power cord and turn on your computer. Watch for the word "Keyboard" to appear, then press the space bar once.

b. Check the list of components displayed on the left-hand side of the screen. If the message:

```
HP98628 at 20
```

appears in the list, you have correctly installed the Datacomm Interface.

If the message above does not appear, repeat the installation procedure, making sure there are no select code conflicts and that the card is firmly seated in an even-numbered slot. If the message still does not appear, call your HP Service Representative for assistance.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

HP 98629A/50961A SRM Interfaces

The HP 98629A Shared Resource Management (SRM) Interface and the HP 50961A SRM Coax Interface provide both protocol management and electrical levels for communication between the computer and the Shared Resource Management (SRM) system. The SRM system allows the computer to share common disks, printers and plotters.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

Installing the HP 98629A (or 50961A) SRM Interface

The following summary supplements the procedures outlined in your installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this interface card, and any peripheral device you intend to install at this time, is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary driver(s), listed in Table 2-1, is (are) part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing, and reconfigure the kernel for you at this time. See Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM", and then go on to step 2.

     or

   - Look in your `dfile` for the driver(s). If the drivers are in your kernel configuration file, go on to step 2 now.

     If the driver(s) is (are) not in the `/etc/conf/dfile`, or is (are) commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Refer to the documentation shipped with your SRM system for information about installation.*

4. *Set the select code of the interface card to a unique value and make note of it.*

   If you need to change the select code of this card from its **preset value of 21**, do so by setting the select code switches. Check the documentation that came with the card for specific procedures.

Note Both the SRM and LAN interfaces are preset to select code 21. If you have both SRM and LAN interfaces, change the setting of the SRM Interface select code.

Note Select codes zero through seven (0-7) are reserved for built-in interface cards and cannot be used.

If you need to change the select code of a built-in interface card, you might be able to do so by entering Configuration Mode during the Boot ROM sequence. For more information about interacting with the Boot ROM Configuration sequence on a model 362 or 382 computer, consult the *Hardware Configuration Guide* for your computer model. For information about interacting with the Boot ROM Configuration sequence of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

---

5. *Verify installation.*

   a. Plug in the power cord and turn on your computer. Watch for the word "Keyboard" to appear, then press the space bar once.

   b. Check the list of components displayed on the left-hand side of the screen. For example, if the message:

      ```
      HP98629 at 21
      ```

      appears in the list, you have correctly installed the HP 98629 SRM Interface.

      If the message above does not appear, repeat the installation procedure, making sure there are no select code conflicts and that the card is firmly seated in an even-numbered slot. If the message still does not appear, call your HP Service Representative for assistance.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

HP 98642A 4-Channel Multiplexer Interface

The HP 98642A 4-Channel Multiplexer Interface has three direct-connect ports and one port with full modem control. The buffering of this interface makes it suitable for nearly all applications, including graphics terminals.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

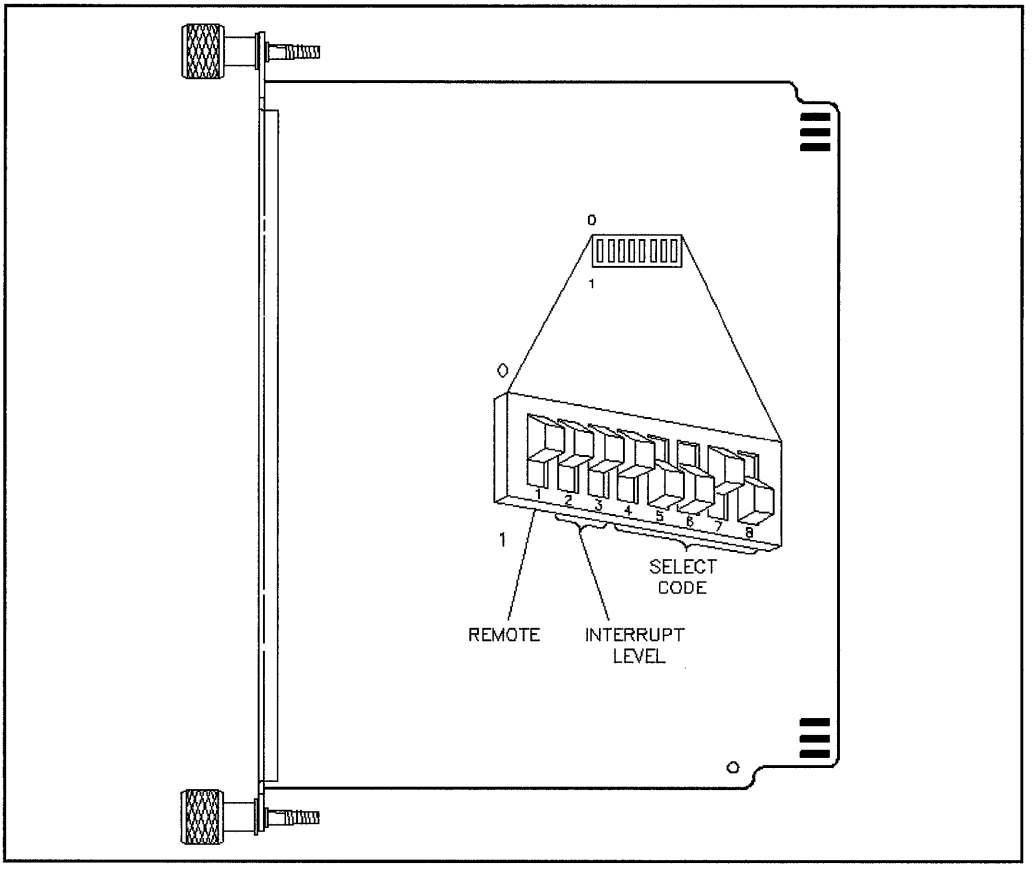


Figure 2-8.
HP 98642A 4-Channel Multiplexer Interface Switches

Installing the HP 98642A 4-Channel Multiplexer Interface

The following summary supplements the procedures outlined in your installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this interface card, and any peripheral device you intend to install at this time, is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary driver(s), listed in Table 2-1, is (are) part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing, and reconfigure the kernel for you at this time. See Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM", and then go on to step 2.

     or

   - Look in your `dfile` for the driver(s). If the drivers are in your kernel configuration file, go on to step 2 now.

     If the driver(s) is (are) not in the `/etc/conf/dfile`, or is (are) commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove the 4-Channel Multiplexer Interface from its envelope, being careful to handle the card only by its edges and front panel. The card can be easily damaged by electrostatic discharge (static zap). Do NOT touch any of the card's components or exposed solder pins.

   d. Place the card on the envelope.

3. *Set the following values according to the instructions provided in the documentation that came with your interface card.*

   a. Set the select code of the interface card to a unique value and make note of it.

      If you need to change the select code of this card from its **preset value of 13**, do so by setting the select code switches. Check the documentation that came with the card for specific procedures.

Note Select codes zero through seven (0-7) are reserved for built-in interface cards and cannot be used.

If you need to change the select code of a built-in interface card, you might be able to do so by entering Configuration Mode during the Boot ROM sequence. For more information about interacting with the Boot ROM Configuration sequence on a model 362 or 382 computer, consult the *Hardware Configuration Guide* for your computer model. For information about interacting with the Boot ROM Configuration sequence of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

---

b. Set the interrupt level.

   The interface is preset to interrupt level 3. If interrupt level 3 is inappropriate for your application, change this value.

c. Set the remote switch. The Remote switch is preset to "local," which does *not* configure port 1 to be the system console. If you are connecting your system console to port 1 of this interface, set switch 1 to 1 (remote).

4. *Insert the interface according to the instructions provided in the documentation that came with the card.*

5. *Verify installation*

   a. Plug in the power cord and turn on your computer. Watch for the word "Keyboard" to appear, then press the space bar once.

   b. Check the list of components displayed on the left-hand side of the screen. If the message:

      ```
      HP98642 at 13
      ```

      appears in the list, you have correctly installed the HP 98642A 4-Channel Multiplexer Interface.

      If the message does not appear, repeat the installation procedure, making sure there are no select code conflicts and that the card is firmly seated in an even-numbered slot. If the message still does not appear, call your HP Service Representative for assistance.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

HP 98638A 8-Channel Multiplexer Interface

The HP 98638A 8-Channel Multiplexer Interface provides a means of connecting up to eight asynchronous devices such as terminals, printers, plotters and modems to the HP 9000 computers. This interface is a DIO System card and fits into the DIO System slot or a DIO II slot. There are two versions of the HP 96838A available:

1. The HP 96838A supports devices that use the RS-232 interface standard.
2. The HP 96838A Option 1C8 supports devices that use the RS-422 interface standard.

The RS-232-C ADP (Active Distribution Panel) supports both modem and direct connects to terminals, printers, and plotters. The RS-422 supports direct connections only.

For product description and detailed specifications, refer to the *HP 98638A Eight Port Asynchronous Multiplexer Installation and Reference Manual* HP part number 98638-90001.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information. Figure 2-9 provides a diagram of the HP 98638A product.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

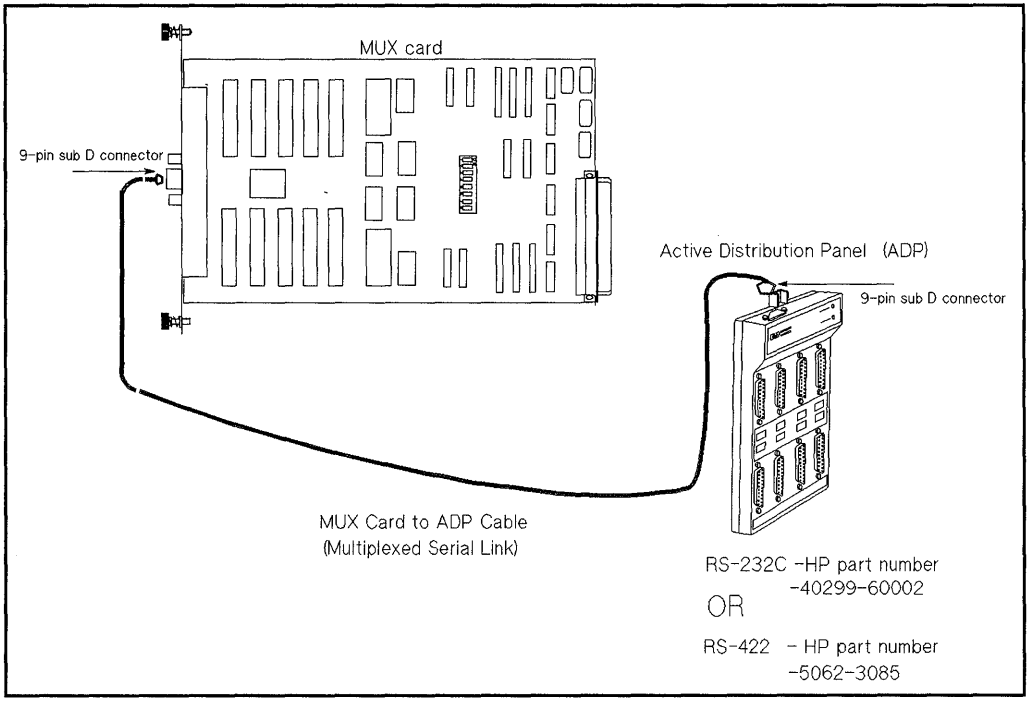


Figure 2-9. HP 98638A 8-Channel Multiplexer Interface Assemblies

Supported Modems

Table 2-2 contains modems supported from an RS-232-C modem port to another terminal or serial printer. A pair of modems is needed for each connection: one to connect the modem port of the telecommunications line, and the other to connect the terminal or serial printer to the other end of the telecommunications line. Asynchronous modem connections on the HP 98638A can support full duplex modems only.

Table 2-2. HP 98638A Supported Modems

Modem	Baud Rate
Bell 212A	300, 1200
RacalMilog MPS 1222	300, 1200
Hayes Smart Modem	1200
HP 37212B	300, 1200, 2400-V.22
HP 50759A	300, 1200, 2400
Telebit Trailblazer Plus	1200, 2400, fast (9600, 19200, 38400)

Note Only modems which have BS 6301 approval are recommended by Hewlett-Packard.

Supported Plotters, Printers, and Terminals

Table 2-3 contains the plotters, printers, and terminals that are supported on the HP 98638A 8-Channel Multiplexer.

Table 2-3.
HP 98638A Supported Plotters, Printers, and Terminals

Plotters	Printers	Terminals
7550A	2993A	2392
	2934A	2393
	2562A	2394
	2563B	2397
	2686D	700/43
	33447A	700/22
	2684D/P	700/32
		700/92
		700/94
		2625A
		2627A
		2628A

2

Installing the HP 98638A 8-Channel Multiplexer Interface

The following summary supplements the procedures outlined in your installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this interface card, and any peripheral device you intend to install at this time, is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary driver(s), listed in Table 2-1, is (are) part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing, and reconfigure the kernel for you at this time. See Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM", and then go on to step 2.

     or

   - Look in your `dfile` for the driver(s). If the drivers are in your kernel configuration file, go on to step 2 now.

     If the driver(s) is (are) not in the `/etc/conf/dfile`, or is (are) commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove the 4-Channel Multiplexer Interface from its envelope, being careful to handle the card only by its edges and front panel. The card can be easily damaged by electrostatic discharge (static zap). Do NOT touch any of the card's components or exposed solder pins.

   d. Place the card on the envelope.

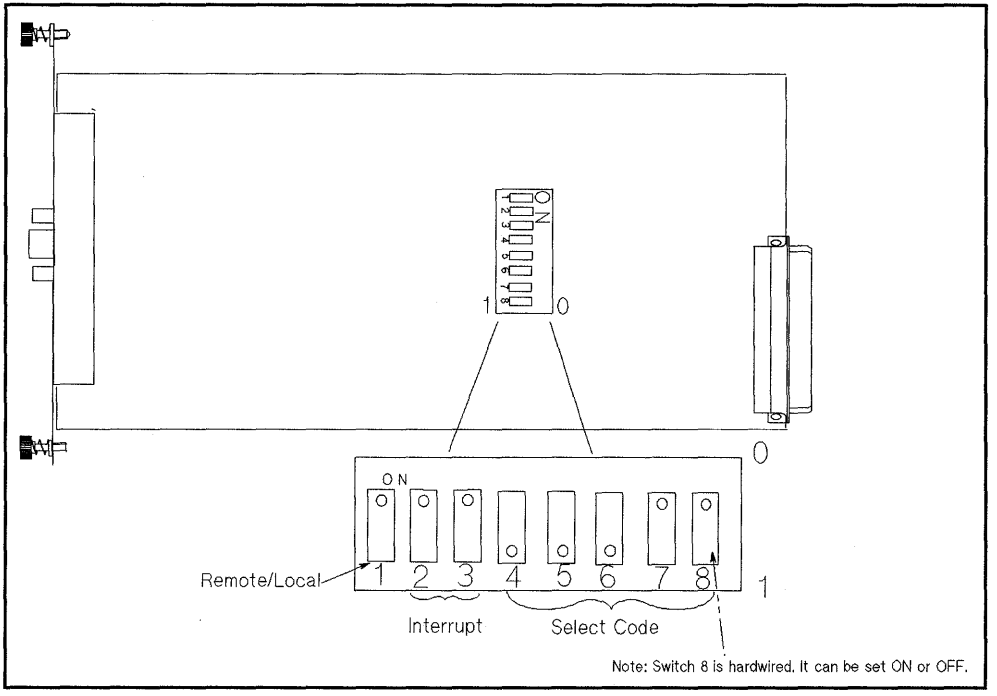


Figure 2-10.
HP 98638A 8-Channel Multiplexer Interface Switches

3. *Set the following values according to the instructions provided in the documentation that came with your interface card.*

   a. Set the select code of the interface card to a unique value and make note of it.

      If you need to change the select codes on this card from the **preset values of 28 and 29**, do so by setting the select code switches. Check the documentation that came with the card for specific procedures.

Note Two consecutive select codes, starting on an even number, are needed for the HP 98638A because two identical four-channel multiplexers are implemented on the card.

Note Select codes zero through seven (0-7) are reserved for built-in interface cards and cannot be used.

If you need to change the select code of a built-in interface card, you might be able to do so by entering Configuration Mode during the Boot ROM sequence. For more information about interacting with the Boot ROM Configuration sequence on a model 362 or 382 computer, consult the *Hardware Configuration Guide* for your computer model. For information about interacting with the Boot ROM Configuration sequence of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

---

   b. Set the interrupt level.

      The interface is preset to interrupt level 3. If you are certain that interrupt level 3 is inappropriate for your application, change this value.

   c. Set the remote switch.

      The Remote switch is preset to "local," which does *not* configure port 1 to be the system console. If you are connecting your system console to port 1 of this interface, set switch 1 to 1 (remote).

4. *Insert the interface according to the instructions provided in the documentation that came with the card.*
5. *Verify installation.*
   a. Plug in the power cord and turn on your computer. Watch for the word "Keyboard" to appear, then press the space bar once.
   b. Check the list of components displayed on the left-hand side of the screen. If the message:

      ```
      HP98642A (RS-232-C MUX) at 28
      HP98642A (RS-232-C MUX) at 29
      ```

      appears in the list, you have correctly installed the HP 98638A 8-Channel Multiplexer Interface. This will be the display even if an RS-422 ADP can be connected to the interface card.

      If the message does not appear, repeat the installation procedure, making sure there are no select code conflicts and that the card is firmly seated in an even-numbered slot. If the message still does not appear, call your HP Service Representative for assistance.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

HP 98643A Local Area Network (LAN) Interface

The HP 98643A Local Area Network (LAN) Interface is used to connect a computer to a local area network.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

Installing the HP 98643A Local Area Network (LAN) Interface

The following summary supplements the procedures outlined in your installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this interface card, and any peripheral device you intend to install at this time, is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary driver(s), listed in Table 2-1, is (are) part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing, and reconfigure the kernel for you at this time. See Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM", and then go on to step 2.

     or

   - Look in your `dfile` for the driver(s). If the drivers are in your kernel configuration file, go on to step 2 now.

     If the driver(s) is (are) not in the `/etc/conf/dfile`, or is (are) commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Set the following values according to the instructions provided in your LAN system documentation.*

   a. Set the select code of the interface card to a unique value and make note of it.

      If you need to change the select code of this card from its **preset value of 21**, do so by setting the select code switches. Check the documentation that came with the card for specific procedures.

Note Both the LAN and SRM interfaces are preset to select code 21. If you have both LAN and SRM interfaces, change this setting.

Also, the HP 98562-66530 Human (System) Interface Board contains a LAN interface that is preset to select code 21. Change the select code of the HP 98643A card if you have an HP 98562-66530 Human (System) Interface Board.

Note Select codes zero through seven (0-7) are reserved for built-in interface cards and cannot be used.

If you need to change the select code of a built-in interface card, you might be able to do so by entering Configuration Mode during the Boot ROM sequence. For more information about interacting with the Boot ROM Configuration sequence on a model 362 or 382 computer, consult the *Hardware Configuration Guide* for your computer model. For information about interacting with the Boot ROM Configuration sequence of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

---

   b. Set the interrupt level.

      The interrupt priority level must be set to five. The LAN card is shipped from the factory with interrupt level 5.

4. *Insert the interface according to the instructions provided in the documentation that came with the card.*
5. *Verify installation.*
   a. Plug in the power cord and turn on your computer. Watch for the word "Keyboard" to appear, then press the space bar once.
   b. Check the list of components displayed on the left-hand side of the screen. If the message:

      ```
      HP98643 at 21
      ```

      appears in the list, you have correctly installed the HP 98643A LAN Interface.

      The message "HP98643 at 21" is also generated by the internal LAN circuit on the 98562-66530 Human (System) Interface Board.

      If the message does not appear, repeat the installation procedure, making sure there are no select code conflicts and that the card is firmly seated in an even-numbered slot. If the message still does not appear, call your HP Service Representative for assistance.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

HP 98644A Asynchronous Serial Interface

The HP 98644A Asynchronous Serial Interface connects to a terminal, modem, serial peripheral, or computer and supports the RS-232-C standard. One interface is required for each device, and each interface must be set to a unique select code.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

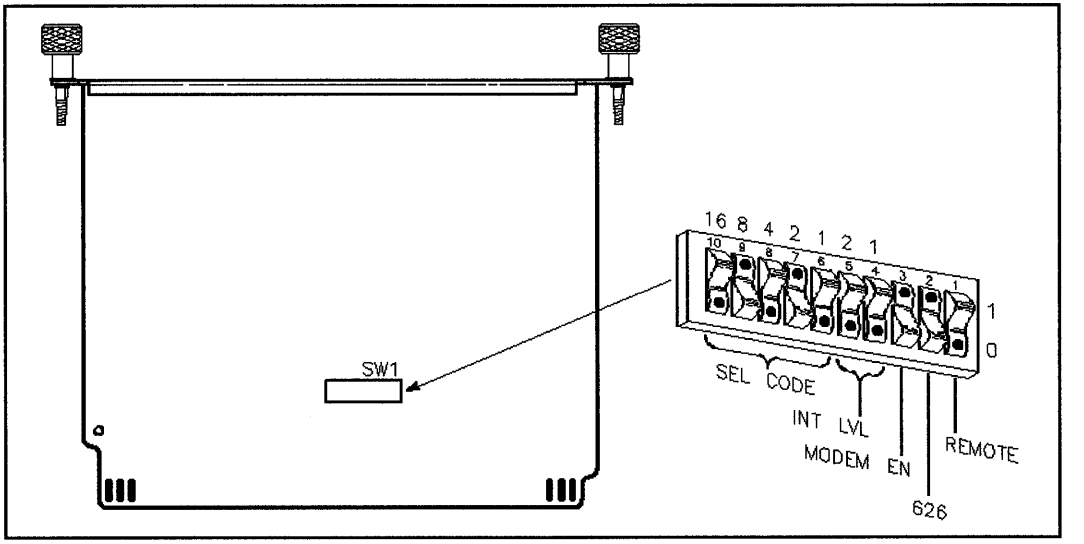


Figure 2-11.
HP 98644A Asynchronous Serial Interface Switches

Installing the HP 98644A Asynchronous Serial Interface

The following summary supplements the procedures outlined in your installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this interface card, and any peripheral device you intend to install at this time, is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary driver(s), listed in Table 2-1, is (are) part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing, and reconfigure the kernel for you at this time. See Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM", and then go on to step 2.

     or

   - Look in your `dfile` for the driver(s). If the drivers are in your kernel configuration file, go on to step 2 now.

     If the driver(s) is (are) not in the `/etc/conf/dfile`, or is (are) commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove the Asynchronous Serial Interface from its envelope, being careful to handle the card only by its edges and front panel. The card can be easily damaged by electrostatic discharge (static zap).

   d. Place the card on the envelope.

3. *Set the following values according to the instructions provided in the documentation that came with your interface card.*

   a. Set the select code of the interface card to a unique value and make note of it.

      If you need to change the select code from its **preset value of 9**, do so by setting the select code switches. Check the documentation that came with the card for specific procedures.

Note Both the Asynchronous Serial Interface and the RS-232-C Interface are preset to select code 9. If you have both Asynchronous Serial Interface and the RS-232-C Interface, change the setting of the Asynchronous Serial Interface select code.

Note

Select codes zero through seven (0-7) are reserved for built-in interface cards and cannot be used.

If you need to change the select code of a built-in interface card, you might be able to do so by entering Configuration Mode during the Boot ROM sequence. For more information about interacting with the Boot ROM Configuration sequence on a model 362 or 382 computer, consult the *Hardware Configuration Guide* for your computer model. For information about interacting with the Boot ROM Configuration sequence of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

b. Set the interrupt level.

   The interface is preset to interrupt level 3. If you are certain that interrupt level 3 is inappropriate for your application, change this value.

c. Set the MODEM ENable switch.

   Set the MODEM ENable switch as follows:

   - If you intend to connect an HP 2686A LaserJet printer, an HP 92205A/C Hayes Smartmodem, or a `uucp`, set this switch to 1.
   - If you intend to connect a terminal or the HP 39800/01A bar code reader, set this switch to 0.

d. Set the 626 switch to 1.

e. Set the REMOTE switch.

   Set the Remote switch as follows:

   - If you are connecting a terminal to this interface and want this terminal to be the system console, set this switch to 1.
   - If you are connecting a terminal to this interface but *do not* want this terminal to be the system console, or if you are connecting any other device, set this switch to 0.

4. *Insert the interface according to the instructions provided in the documentation that came with the card.*
5. *Verify installation.*
   a. Plug in the power cord and turn on your computer. Watch for the word "Keyboard" to appear, then press the space bar once.
   b. Check the list of components displayed on the left-hand side of the screen. If you have boot ROM 4.0 or later, the message:

      ```
      HP98644 at 9
      ```

      should appear in the list. If it does, you have correctly installed the HP 98644A Asynchronous Serial Interface.

      This message should also appear when verifying the installation of the 98562-66530 Human (System) Interface Board.

Note If you have boot ROM 3.0, no message will appear, as boot ROM 3.0 does not identify the HP 98644A Asynchronous Serial Interface. Assume installation is correct.

If no message appears (and you do not have Boot ROM Rev 3.0), repeat the installation procedure, making sure there are no select code conflicts and that the card is firmly seated in an even-numbered slot. If the message still does not appear, call your HP Service Representative for assistance.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

HP 98562-66530 Human (System) Interface Board

The HP 98562-66530 Human Interface board (also called the System Interface board) includes an RS-232-C Serial interface, an HP-HIL interface, a standard-speed HP-IB interface, a DMA controller, and a Local Area Network (LAN) interface. You can also get an optional interface (such as an optional disk interface or SCSI) in addition to those mentioned above.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

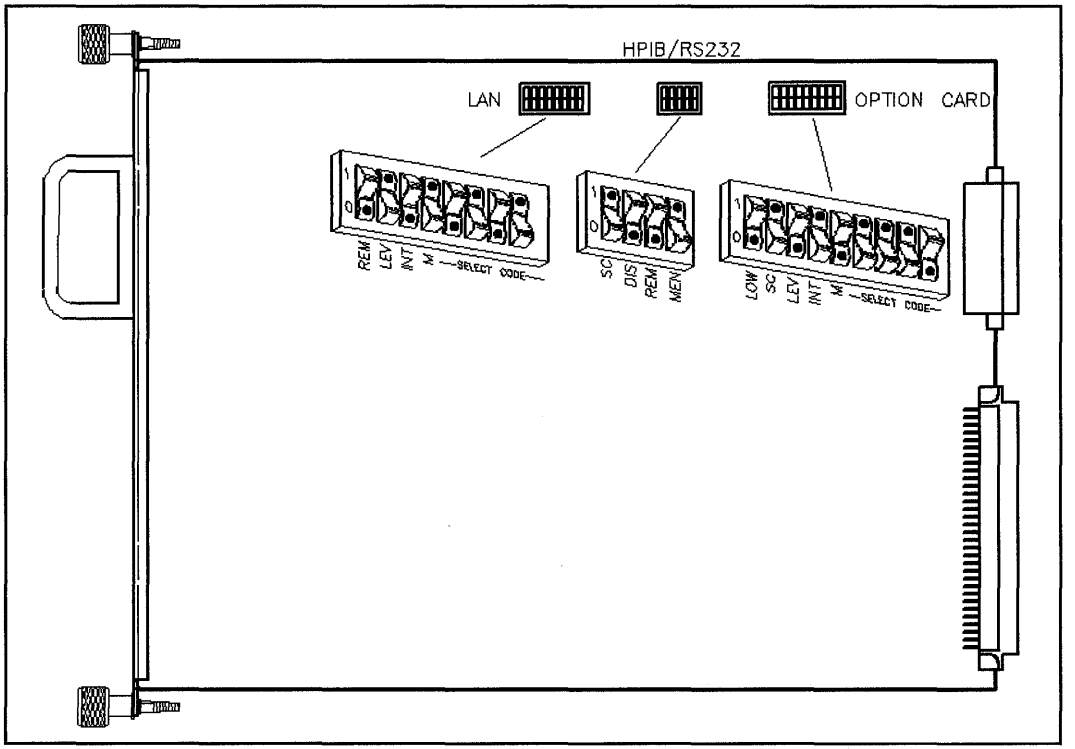


Figure 2-12.
Human (System) Interface Board Switches

2

Installing the HP 98562-66530 Human (System) Interface Board

The following summary supplements the procedures outlined in your installation documentation for this device. Read through this summary before proceding with the installation.

1. *No device driver is required for this interface card. However, verify that the necessary drivers are in place for any peripheral device you intend to install at this time. These should be included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary driver(s), listed in pertinent peripheral device section, is (are) part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing, and reconfigure the kernel for you at this time. See Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM", and then go on to step 2.

     or

   - Look in your `dfile` for the driver(s). If the drivers are in your kernel configuration file, go on to step 2 now.

     If the driver(s) is (are) not in the `/etc/conf/dfile`, or is (are) commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove the Human (System) Interface board from the back of your computer by loosening the two thumb screws and pulling on the handle. Be careful to handle the card only by its edges and front panel, as the card can be easily damaged by electrostatic discharge (static zap).

   d. Place the card on a static-free surface.

   e. *Do not* disconnect the option card or its cable.

3. *Set the following values according to the instructions provided in the documentation that came with your interface card.*

   a. Set the HP-IB system controller switch.

      The interface is configured to be system controller and may not need changing.

      If you are connecting two computers together via HP-IB, only one of them can be set to system controller. To change this interface to non-system controller, move the System Controller switch to the 0 position.

      Alternatively, you can set the HP-IB system controller switch during the HP-UX boot sequence. Refer to the *Hardware Configuration Guide* for the specific computer model if your computer is a Model 362 or 382. For information about interacting with the Boot ROM Configuration sequence of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

Note If you will be connecting a disk drive, printer, plotter or other device to this interface, *do not* set this switch to 0 non-system controller.

---

b. Set the RS-232-C disable switch.

The interface is shipped from the factory with the RS-232-C Serial interface *enabled* (meaning you can use the interface). If you intend to disable this interface (meaning you do not want to use the interface), change this setting. If you do not intend to use this RS-232-C interface, you can use select code 9 for another interface. Once disabled, this interface will not be recognized by the boot ROM and will not occupy select code 9.

To disable the RS-232-C Serial interface, move the *DIS* switch to the 1 position.

If you later want to enable the RS-232-C Serial interface, move the switch back to the 0 position.

c. Set the RS-232-C remote terminal enable switch.

The interface is shipped from the factory with the remote terminal enable switch set to local mode. If you intend to connect a terminal to the RS-232-C interface, and want this terminal to be the system console, you will need to change this setting.

You can set the RS-232-C remote terminal enable switch during the HP-UX boot sequence. Refer to the *Hardware Configuration Guide* specific to your model computer for an explanation of the boot ROM configuration mode on a model 362 or 382 computer. Refer to the *Service Manual* for your specific model computer for an explanation of the boot ROM configuration mode for any other S300 or S400 computers.

Find the group of four switches labeled "HPIB/RS232". The switch labeled "REM" in this group is the Remote Terminal Enable switch.

Set the "REM" switch as follows:

- If you are connecting a terminal to this interface and want this terminal to be the system console, set this switch to 1.
- If you are connecting a terminal to this interface but *do not* want this terminal to be the system console, or if you are connecting any other device, set this switch to 0.

d. Set the modem lines enable switch.

You can set the modem lines enable switch during the HP-UX boot sequence. Refer to the *Hardware Configuration Guide* specific to your model computer for an explanation of the boot ROM configuration mode on a model 362 or 382 computer. Refer to the *Service Manual* for your specific model computer for an explanation of the boot ROM configuration mode for any other S300 or S400 computers.

Find the group of four switches labeled "HPIB/RS232". The switch labeled "MEN" in this group is the Modem Lines Enable switch.

Set the "MEN" switch as follows:

- If you intend to connect an HP 2601A printer, an HP 2686A LaserJet printer, an HP 92205A/C Hayes SmartModem, or a uucp, set this switch to 1.
- If you intend to connect a terminal or the HP 39800/01A bar code reader, set this switch to 0.

e. Set the select code and make note of it.

The LAN select code is preset to 21. If you also have an SRM interface installed in your computer (at select code 21), you must change the select code of the LAN interface to an unused value.

You can set the LAN select code during the HP-UX boot sequence. Refer to the *Hardware Configuration Guide* specific to your model computer for an explanation of the boot ROM configuration mode on a model 362 or 382 computer. Refer to the *Service Manual* for your specific model computer for an explanation of the boot ROM configuration mode for any other S300 or S400 computers.

f. Set the interrupt level.

The LAN interface is preset to interrupt level 5, the setting required by HP-UX. If you are certain that interrupt level 5 is inappropriate for your application, you will need to change this value.

You can set the LAN interrupt level during the HP-UX boot sequence. Refer to the *Hardware Configuration Guide* specific to your model computer for an explanation of the boot ROM configuration mode on a model 362 or 382 computer. Refer to the *Service Manual* for your specific model computer for an explanation of the boot ROM configuration mode for any other S300 or S400 computers.

g. Set the local/remote switch.

The interface is shipped from the factory with the remote/local switch set to local mode (0). We recommend that you do not alter this value.

h. Set the optional interface select code.

Both the Optional interface and the HP 98625A/B disk interfaces are preset to select code 14. If you have both the Optional and HP 98625A/B interfaces, change the select code of Optional interface.

If select code 14 is already assigned, choose an unassigned select code.

Note Select codes zero through seven (0-7) are reserved for built-in interface cards and cannot be used.

If you need to change the select code of a built-in interface card, you might be able to do so by entering Configuration Mode during the Boot ROM sequence. For more information about interacting with the Boot ROM Configuration sequence on a model 362 or 382 computer, consult the *Hardware Configuration Guide* for your computer model. For information about interacting with the Boot ROM Configuration sequence of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

---

i. Set the optional interface interrupt level.

The interrupt level is preset to 4. *Do not* set any other interface (except for the HP 98629A SRM interface) to interrupt level 4.

j. Set the optional interface system controller switch.

The interface is configured to be system controller and need not be changed. If you intend to connect two computers, only one of them can be set to system controller. To change this interface to non-system controller, change the System Controller switch to 0.

Note If you will be connecting a disk drive or other device to this interface, *do not* set this switch to non-system controller.

---

k. Set the optional interface low/high speed switch.

The Low/High Speed switch is preset to 0, "high speed". This setting is appropriate for most applications.

To change the low/high speed switch setting, find the set of nine switches labeled "OPTION CARD". The switch labeled "LOW" in this group is the Low/High Speed switch. Set this switch as follows:

- To set this switch to low speed, set the "LOW" switch to 1.
- To set this switch to high speed, set the "LOW" switch to 0.

4. *Insert the interface according to the instructions provided in the documentation that came with the card.*

Re-insert the Human (System) Interface board into the slot you removed it, and tighten the thumb screws to secure it.

5. *Record the select codes.*

   The following list assumes the default select code settings were retained.

7	The built-in, standard-speed HP-IB interface
9	The built-in RS-232-C Serial interface (unless you disabled the interface)
14	The optional interface (unless you changed the select code or did not purchase this option)
21	The built-in LAN interface (unless you changed the select code

Note

Select codes zero through seven (0-7) are reserved for built-in interface cards and cannot be used.

If you need to change the select code of a built-in interface card, you might be able to do so by entering Configuration Mode during the Boot ROM sequence. For more information about interacting with the Boot ROM Configuration sequence on a model 362 or 382 computer, consult the *Hardware Configuration Guide* for your computer model. For information about interacting with the Boot ROM Configuration sequence of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

Note

- If you entered the configuration mode during the boot sequence and altered the select codes, record the newly assigned select codes instead of the above listed default select codes.
- Do not record the RS-232-C Serial Interface select code if it is disabled. Do not record the Optional interface if you did not purchase it.

6. *Verify installation.*

   a. Plug in the power cord and turn on your computer. Watch for the word "Keyboard" to appear, then press the space bar once.

   b. Check the list of components displayed on the left-hand side of the screen. If the messages:

```
HPIB
HP98644 at 9
HP98643 at 21
HP98625 at 14
```

   appear you have correctly installed the built-in standard-speed HP-IB interface, the built-in RS-232-C Serial interface, the built-in LAN interface, and the Optional interface respectively.

Note Select codes for the HP98643 and 98625 can be different from the default setting if you changed the select codes to avoid a conflict.

If any of these messages do not appear, make sure there are no select code conflicts and that the board is firmly seated in the slot. If you still have problems, call your HP Service Representative for assistance.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

HP 98248A Floating-Point Accelerator Accessory Card

The HP 98248A Floating-Point Math board set provides HP Series 300 DIO-II 32-bit computers with high-speed floating-point hardware.

Note There is a difference between the HP 98248A and the HP 98248B Floating-Point accessory cards. If you have an HP 98248*A* Floating-Point Accelerator you are in the correct section. If you have an HP 98248*B* Floating-Point Accelerator, you need to refer to the HP 98248B Floating-Point Accelerator section in this chapter.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

Installing the HP 98248A Floating-Point Accelerator

Note

Installing the Floating-Point Accelerator involves two tasks:

- preparing the operating system for the new hardware
- physically installing the hardware

This procedure describes how to install the hardware *only*. For instructions on preparing the operating system to use the hardware, refer to the installation note that came with the Floating-Point Accelerator.

You will need an expander if either of these statements is true:

1. You have no empty system slots in your computer.
2. Your video output board consists of two printed circuit boards.

If either of these conditions is true, you will need an expander, and the video board must be placed in it. If you do not know whether your video board contains two printed-circuit boards, check it by loosening the two screws securing it and sliding it out of the computer.

The hardware installation process can take either of two paths, depending upon whether your computer has a system bus. An installation procedure for each is presented here. Go to the correct procedure. For example, the Model 350 has a system bus, the Model 330 does not.

If you do not know whether your computer has a System Bus, look at the rear panel of the computer. The System Bus is a metal plate covering two or more slots. If your computer has such a plate, refer to the procedure titled, "With a System Bus". Otherwise, refer to the procedure titled, "Without a System Bus".

HP 98248A Floating-Point Accelerator

With a System Bus

1. Make sure that the computer and expander are turned off and the power cords removed.

Caution In the following steps, handle the circuit boards as little as possible. Handle them by the edges or backplate only.

---

2. Locate an empty system slot in the computer, either by moving the video board to the expander or by removing the cover plate from an empty slot.
3. Check that the empty slot is next to the System Bus. If it is not, rearrange the boards so that it is.
4. Remove the Floating-Point Accelerator board set from the packaging material and slide it into the empty slot. Slide the two-connector end in first, with the board with the connectors on the bottom.
5. Loosen the screws holding the System Bus and remove it.
6. Locate the new, larger System Bus packaged with the Floating-Point Accelerator and install it onto the Accelerator, processor board and RAM board(s).

Note You *must* reinstall the System Bus to ensure system performance, provide needed air cooling, and meet statutory requirements for fire safety and radiated emissions.

---

7. Reinstall the power cords and turn the computer and expander on.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

Refer to the installation note that came with the HP 98248A Floating Point Accelerator for software configuration instructions.

Without a System Bus

1. Make sure that the computer and expander are turned off and the power cords removed.

Caution In the following steps, handle the circuit boards as little as possible. Handle them by the edges or backplate only.

---

2. Locate an empty system slot in the computer, either by moving the video board to the expander or by removing the cover plate from an empty slot.
3. Remove the Floating-Point Accelerator board set from the packaging material and slide it into the empty slot. Slide the two-connector end in first, with the board with the connectors on the bottom.
4. Reinstall the slot cover plate removed in step 2.

Note You *must* install the slot cover plate to provide needed air cooling and meet statutory requirements for fire safety and radiated emissions.

---

5. Reinstall the power cords and turn the computer and expander on.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

Refer to the installation note that came with the HP 98248A Floating Point Accelerator for software configuration instructions.

HP 98248B Floating-Point Accelerator Accessory Card

The HP 98248B Floating-Point Math board set provides HP Series 300 32-bit computers with high-speed floating-point hardware.

Note There is a difference between the HP 98248A and the HP 98248B Floating-Point accessory cards. If you have an HP 98248*B* Floating-Point Accelerator you are in the correct section. If you have an HP 98248*A* Floating-Point Accelerator you need to refer to the proper section in this chapter.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

Installing the HP 98248B Floating-Point Accelerator

Note

Installing the Floating-Point Accelerator involves two tasks:

- preparing the operating system for the new hardware
- physically installing the hardware.

This procedure describes how to install the hardware *only*. For instructions on preparing the operating system to use the hardware, refer to the installation note that came with the Floating-Point Accelerator.

You will need an expander if either of these statements is true:

1. You have no empty system slots in your computer.
2. Your video output board consists of two printed circuit boards.

If either of these conditions is true, you will need an expander, and the video board must be placed in it. If you do not know whether your video board contains two printed-circuit boards, check it by loosening the two screws securing it and sliding it out of the computer.

The hardware installation process can take either of two paths, depending upon which computer you are installing the Accelerator in. An installation procedure is presented here for the Models 330, 360, and 370. The HP 98248B Accelerator is not supported in the Model 350.

HP 98248B Floating-Point Accelerator

In Models 330 and 360

1. *Play it safe.*
   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. TURN OFF the expander and unplug the power cord.

   d. In the following steps, handle the circuit boards as little as possible. Handle them by the edges or backplate only.

   e. Remove the Floating-Point Accelerator board set from the packaging material and place it on the envelope it was shipped in.

Note If you need to install an expander, do so at this point.

---

2. *Insert the Floating-Point Accelerator.*
   a. Check to see whether the bottom slot in the computer is empty. If it is, remove the slot cover plate. If it is occupied, remove the board and place it elsewhere in the computer or expander.

   b. With the two-connector end in first, slide the Floating-Point Accelerator board into the bottom slot.

   c. Reinstall a slot cover plate over the Floating-Point Accelerator board.

3. *Ensure that all power switches are in the OFF position.*
4. *Reconnect the power cords.*
5. *Turn on the expander.*
6. *Turn on the computer.*

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

In Model 370

1. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. TURN OFF the expander and unplug the power cord.

   d. In the following steps, handle the circuit boards as little as possible. Handle them by the edges or backplate only.

   e. Remove the Floating-Point Accelerator board set from the packaging material and place it on the envelope it was shipped in.

2. *Remove the System Bus.*

   Loosen the screws holding the system bus and remove it.

3. *Check the bottom slot of the computer.*

   Check to see whether the bottom slot in the computer is empty. If it is, remove the slot cover plate. It it is occupied, remove the board and place it elsewhere in the computer or expander. If it is the processor board, place it in the slot next to the bottom.

   Rearrange the other boards in the backplane so that the processor board is directly above the Accelerator and the RAM board(s) are directly above the processor board.

4. *Insert the Floating-Point Accelerator.* Refer to the installation documentation that came with the Floating-Point Accelerator for specific instructions on how to do the following:

   a. Connect the Floating-Point Accelerator Bus Cable.

Note The cable may already be installed on the Accelerator. If so, skip to the next step.

---

b. *Insert the Floating-Point Accelerator.*

c. *Connect the Floating-Point Accelerator Bus Cable to the processor board.*

d. *Insert the new System Bus.*

Note You *must* install the system bus to ensure system performance, provide needed air cooling and meet statutory requirements for fire safety and radiated emissions.

---

5. *Ensure that all power switches are in the OFF position.*
6. *Reconnect the power cords.*
7. *Turn on the expander.*
8. *Turn on the computer.*

Installation Complete!

HP 98635A Floating Point Math Accessory Card

The HP 98635A Floating Point Math Card enhances the performance of your computer and supports the proposed IEEE standard for binary floating point numbers. With this card, computational performance can be increased up to three times. Actual performance is highly dependent on the application, language, and operating system.

Note Use this Math card only with the model 320.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

Installing the HP 98635A Floating Point Math Card

Note The Floating Point Math Card can be installed in the HP 9888A Bus Expander, but with reduced performance. Installation in an HP 98568A Backplane Expander will not reduce performance.

1. *Play it safe.*
   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.
2. *Find a slot for the Floating Point Math Card.*
   a. Remove the *painted* cover plates from the back of your computer until you find an empty slot. Do not remove the silver cover plates on the bottom of a Series 300 computer.

   b. If one is available, select an empty, odd-numbered slot for the Floating Point Math card; otherwise, use an even-numbered slot. (Slots are numbered from the top down, so the top-most slot is number 1, the next slot down is number 2, etc.)
3. *Insert the Floating Point Math Card.*

   Insert the Floating Point Math Card into the slot with the component side up. Using your thumbs, push on the extractor levers until the card is firmly seated in the backplane.

Note If you have additional cards to install in the backplane, leave the cover plates off; otherwise, replace the cover plates.

4. *Verify installation.*

   a. Plug in the power cord and turn on your computer. Watch for the word "Keyboard" to appear, then press the space bar once.

   b. Check the list of components displayed on the left-hand side of the screen. If the message,

      ```
      HP98635
      ```

      appears in the list, you have correctly installed the Floating Point Math Card.

      If the message above does not appear, repeat the installation procedure. If the message still does not appear, call your HP Service Representative for assistance.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

HP 98620B DMA Controller Accessory Card

The HP 98620B Direct Memory Access (DMA) Controller Card provides two DMA channels for I/O transfer. This high speed I/O capability works with GPIO, HP-IB and Disk interfaces to increase the maximum data exchange rate between the computer and its peripherals.

Note Do *not* use this DMA card with models other than the 320. Another DMA card, the 98620C, is built into 32-bit models like the 330, 350, and 360.

Refer to Appendix B, "Series 400 Support Matrix", for hardware and software support information.

Before Installing This Device

Before you install this interface card:

- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- If you have not added this type of device before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

Installing the HP 98620B DMA Controller Card

Note The DMA Controller Card *cannot* be installed in an HP 9888A Backplane Expander. It *can* be installed in an HP 98568A Backplane Expander.

1. *Play it safe.*
   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.
2. *Find a slot for the HP 98620B DMA Controller Card.*
   a. Remove the *painted* cover plates from the back of your computer until you find an empty slot. Do not remove the silver cover plates on the bottom of a Series 300 computer.

   b. If one is available, select an empty, odd-numbered slot for the DMA Controller Card; otherwise, use an even-numbered slot. (Slots are numbered from the top down, so the top-most slot is number 1, the next slot down is number 2, etc.)
3. *Insert the DMA Controller Card.*

   Insert the DMA Controller Card into the slot with the component side up. Using your thumbs, push on the extractor levers until the card is firmly seated in the backplane.

Note If you have additional cards to install in the backplane, leave the cover plates off; otherwise, replace the cover plates.

4. *Verify installation.*

   a. Plug in the power cord and turn on your computer. Watch for the word "Keyboard" to appear, then press the space bar once.

   b. Check the list of components displayed on the left-hand side of the screen. If the message, `HP98620B`, appears in the list, you have correctly installed the DMA Controller Card.

      If the message above does not appear, repeat the installation procedure. If the message still does not appear, call your HP Service Representative for assistance.

Installation complete! Proceed with the installation and configuration of the new peripheral device that requires this new interface card.

3

Setting Up HP-UX for Interface and Accessory Cards

Adding Interface and Accessory Drivers

When you start your computer, HP-UX automatically detects any new I/O cards which may have been added when it was turned off. However, the software drivers necessary to operate any new cards may not be loaded and configured into the kernel.

SAM can help you determine the presence or absence of these drivers. If a needed driver is absent, SAM can help you add it.

To check the drivers that are in your kernel:

1. Log on as `root`.
2. Run SAM:

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

3. Highlight `Kernel Configuration->` and activate [Open].
4. Highlight `Drivers` and activate [Open].
5. If you are presented with a window entitled "Kernel Configuration," go on to the next step.

   If you are presented with a window entitled "Select New Template File," activate [Template path name...]. A window entitled "Template Files on the System" appears. Choose `/hp-ux` from the list in this window and activate [OK].

6. Look in the upper-left corner of the "Kernel Configuration" window. If you see a line that reads `Template file: /hp-ux`, continue. If not, choose `Select New Template File...` from the "Actions" menu and go to the previous step.

Examine the list of drivers in the "Kernel Configuration" window. (You may have to scroll through the list to see them all.) When you find the driver your card needs (the drivers are listed in Chapter 2, Table 2-1) examine its entry in the column labeled `Current State`. If it is `Out`, add it with the next procedure. If it is `In`, exit the "Kernel Configuration" window, then exit SAM.

To configure HP-UX to include a driver for your interface card:

1. If you are not currently logged onto the system, log on as `root`.
2. Run SAM:

   `/usr/bin/sam`

3. Highlight `Kernel Configuration->` and activate (Open).
4. Highlight `Drivers` and activate (Open).
5. Highlight the driver you wish to add. (You may have to scroll through the list to find it.)

Note If you wish to add more than one driver, you may do so by highlighting several of them.

---

6. From the "Actions" menu, choose `Add Driver to Kernel`.

Note You may receive a message that the driver cannot be added because certain software is not loaded on you system. If so, exit SAM and use the `update` program to load the needed software before trying again.

If your selection is successful, the entry under the column labeled `Pending State` will change from `Out` to `In`.

7. From the "Actions" menu, choose `Create a New Kernel`.

Note Creation of a new kernel requires that the system be rebooted.

---

8. You will be presented with a confirmation message. Take one of the following actions:

   - If you want to create a new kernel now, activate (Yes). After the new kernel is built the system will reboot. You will be given an opportunity to take one of three actions:

     - Move the new kernel into place and reboot the system.
     - Move the new kernel into place *without* rebooting the system.
     - Exit without moving the new kernel into place.

     Turn on the radio button for the action you wish to take and activate (OK). If you chose the option to reboot, the system will reboot itself.

   - If you do *not* want to create a new kernel now, activate (No). You may create the new kernel at any time. Exit the "Kernel Configuration" window. You will be given an opportunity to take one of three actions:

     - Create a new kernel.
     - Defer creation of a new kernel.
     - Cancel the kernel modifications you have specified.

     Turn on the radio button for the action you wish to take and activate (OK).

9. Exit SAM by returning to the "System Administration Manager" window and activating (Exit SAM).

4

Installing Memory

Introduction

This chapter contains information on adding memory and backplane expanders to your system.

Adding Memory to Your System

RAM cards add additional program memory to your computer. Table 4-1 and Table 4-2 show you the possible combinations of computer model, maximum RAM, and HP-UX supported RAM cards.

If all of the backplane slots in your computer are full, and your system does not already include a backplane expander, you will need to install and configure one before adding memory to your system. See section "Expanders".

If you have a Model 350 computer, you will need an expander if either of the following statements is true:

- Your video output board consists of two printed-circuit boards
- You have a total of more than four large boards.

Adding Memory to Your System

If you do not know whether your video board contains two printed-circuit boards, (make sure that your operating system is shut down and the computer turned off, first) check it by loosening the two screws securing it and sliding it out of the computer.

Refer to Appendix B, "Series 400 Support Matrix" for support information on your Series 400 computer.

Table 4-1. Maximum Installable RAM

Model	Mbytes RAM
320	7 1/2
330	8
350	32[1] 48[2] 48[3]
370	48
375/380/385	32 (1M Bit Parts) 128 (4M Bit Parts)

1 Parity RAM

2 ECC RAM

3 Combined ECC and parity RAM

Table 4-2. Series 300/400 RAM Card Support on HP-UX

RAM Card	Model
HP 98256A HP 98257A	320
HP98258A	330 350
HP 98258B/C	350
HP 98264A/B	350 370
HP 98229A	345
HP 98229B	375 380 385 425T 425S
HP 98229C	400T 425T
HP 98229D	425T 425S
HP 98229E	375 400S 425S

Installing Memory Boards in a Model 320 Computer

This procedure describes how to install RAM cards in your model 320 computer. If you have a model 330 or 350 computer, refer to the sections that follow this one.

In this procedure, you will set the switches on each of your RAM cards to a unique setting. No two RAM cards may have their switches set the same way.

1. Follow the directions on the *Series 300 Memory Configuration Wheel* to set the switches on your RAM cards. If you need help, refer to the "Help with the Memory Configuration Wheel" section of this chapter.
2. Once you have completed all instructions on the Memory Configuration Wheel, turn the computer on and check the number of bytes displayed on the screen. This number should be approximately equal to the total number of bytes of RAM you have installed in your computer. Count:
   - 1 048 000 bytes for each 1-Mbyte card you installed
   - 256 000 bytes for each 256-Kbyte card you installed
   - 64 000 bytes for each 64-Kbyte card you installed
3. If the number of bytes shown on the screen is:
   - *More than you expected*: Do not be concerned—your computer probably contains some built-in RAM.
   - *Slightly less than you expected*: Do not be concerned—your computer consumes a few hundred bytes of RAM as overhead.
   - *Significantly less than you expected*: Repeat this procedure, and check for an increase in bytes after each card is installed.
4. Replace all cover plates on the back of your computer.

Hardware Installation Complete!

Help with the Memory Configuration Wheel

This section provides help in using the Memory Configuration Wheel. If you have trouble following a step, look up the step in this section and read the explanation.

Step 2-b

Unscrew and remove the cover plates from the back of your computer. If your computer also has an interface card installed (that is, a painted cover plate with a circuit board attached), remove this also—it may be covering a RAM card. Do not unscrew the *unpainted*, silver cover plates at the bottom of a Series 300 computer.

Once the cover plates are off, you may see some cards inside. Decide which of these cards are RAM cards by looking at the colors of their plastic extractor levers:

Green and *violet* extractor levers identify a 1-Mbyte RAM card.

Red and *yellow* extractor lever identify a 256-Kbyte RAM card.

Two red extractor levers identify a 64-Kbyte RAM card.

Remove all 1-Mbyte, 256-Kbyte and 64-Kbyte RAM cards by pulling their extractor levers toward you and sliding them out. RAM cards may be damaged by static discharge, so be careful not to touch the electrical components on the cards, and don't place them on a charged surface such as a carpet or cloth.

Step 2-d

If your screen remains blank, write down *0* and go on to Step 3.

Step 2-e

The Bytes window is immediately below Step 2 on the wheel. Turn the wheel until the number shown in the Bytes window approximates the number you wrote down in Step 2-d.

Step 3

Repeat this step for each 1-Mbyte RAM card you have. Do not go on to Step 4 until you have set the switches on all of your 1-Mbyte RAM cards.

Step 3-c — Turn the wheel until the next set of switches comes into view.

Whenever you are told to turn the wheel, always turn the wheel to the next set of switches; never use a set of switches that is already in view.

For example, if you come to this step and a set of switches already appears in the window, you should turn the wheel past this set of switches and on to the next one. If you come to this step and an arrow appears in the window or the window is blank, you should turn the wheel until a set of switches comes into view.

Step 3-d — Set the switches on the RAM card to match those shown in the window.

Step 3-e — If you have additional 1-Mbyte RAM cards, begin again at Step 3-b to set the switches on the next 1-Mbyte RAM card. Remember to turn the wheel to the next set of switches when you repeat Step 3-c.

If you have set the switches on all of your 1-Mbyte RAM cards, make sure your computer is turned off and re-insert all 1-Mbyte RAM cards into your computer. You may insert them into any slot, but be sure you do not use a slot which was previously occupied by an interface card (if you have one).

Step 4-b — Check that the number of bytes now shown on the screen has increased over the number you wrote down in Step 2-d.

Step 4-c — Turn the wheel clockwise until the number in the Bytes window approximates the number of bytes you see on the screen. If the number in the Bytes window is already set correctly, you do not have to turn the wheel.

Step 5-c (Series 300) — See the advice for Step 3-c. Be sure you turn the wheel counter clockwise as indicated by the arrows on the edge of the wheel.

Some Common Mistakes

If something goes wrong, watch out for these common mistakes:

- Whenever you are told to turn the wheel, be sure to turn it, even if a set of switches already appears in the window. Never use a set of switches unless you have just turned the wheel to bring it into view. Remember, no two RAM cards can have the same switch setting.
- When you use the back side of the wheel, don't forget to turn it counter clockwise, rather than clockwise.

Installing Memory Boards in a Model 330 Computer

This procedure describes how to install an HP 98258A RAM board in your model 330 computer. If you have a model 320 computer, refer to the preceding section. If you have a model 350 computer, see the next section.

Caution RAM boards can be easily damaged by static electricity. Be careful to handle them only by their edges and make sure you place them on the anti-static envelope they were shipped in.

4

1. Carefully unpack your new RAM board.
2. Place your new RAM board, component-side up, on the static-free envelope it was shipped in.
3. Set the switches on your new RAM board as shown in Figure 4-1.

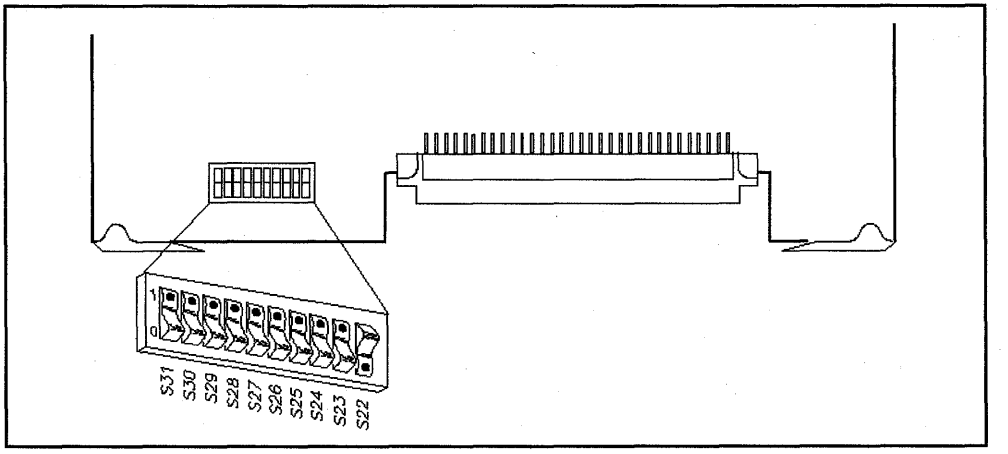


Figure 4-1. Setting Switches on the New HP 98258A RAM board

4. Remove the cover plates on the back of your computer until you find a vacant slot.
5. Insert the new RAM board, component side up, into the vacant slot. Place the grey and green extractor levers against the board and push firmly until the board is securely seated in the backplane.

6. Replace the cover plates on the back of your computer.
7. Turn your computer on and hold down the space bar a few seconds. Check the display to make sure the amount of RAM in your computer has increased to *approximately* 8 Mbytes (8 338 608 bytes). See Figure 4-2. If the memory reported is significantly less, check that the switches for your built-in RAM are set as shown in Figure 4-3. Then double-check that your new RAM board's switches are set as shown in Figure 4-1.


```
Copyright 1985,
Hewlett-Packard Company.
All Rights Reserved.

  BOOTROM Rev. A2
  MC68020 Processor
  MC68881 Coprocessor
  Bit Mapped Display
  Keyboard
  HP-IB
  DMA-CO
  HP98644 at 9
  HP98625 at 14
  HP98643 at 20
  8338633 Bytes
```

Figure 4-2. Display Showing Amount of RAM Installed

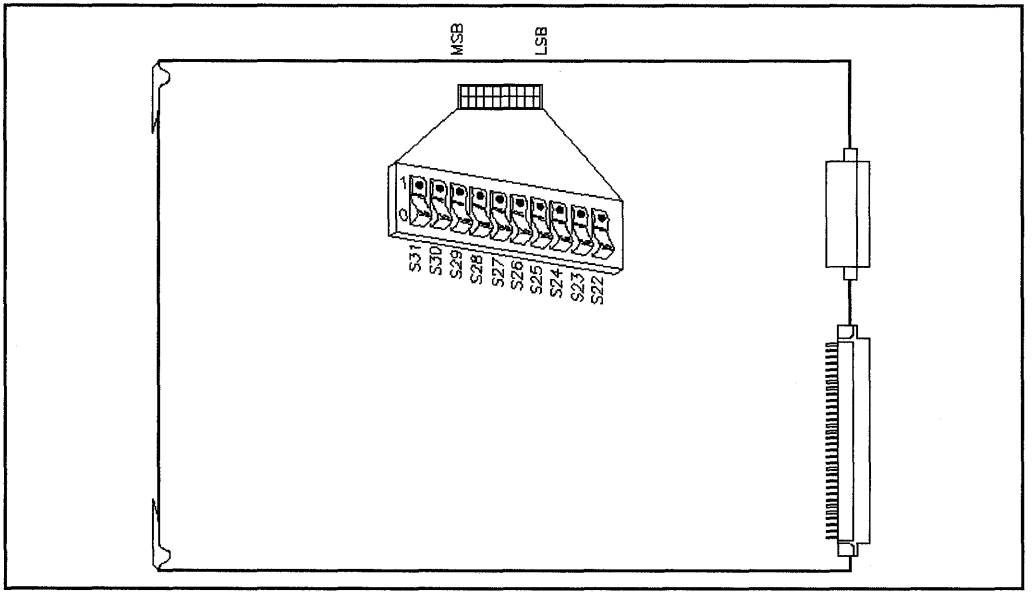


Figure 4-3. Built-in RAM Switch Settings

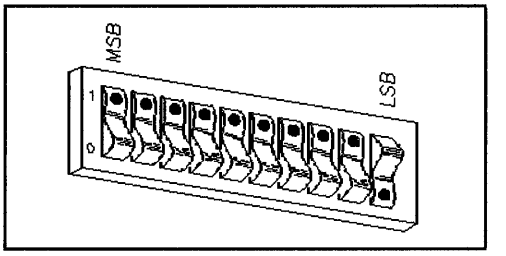
Optimizing Model 330 Performance

The BASIC, Pascal and HP-UX operating systems occupy different areas of memory. Because programs occupying built-in RAM run faster than programs occupying add-on RAM, you may want to rearrange memory so that your most important programs occupy the fast, built-in RAM.

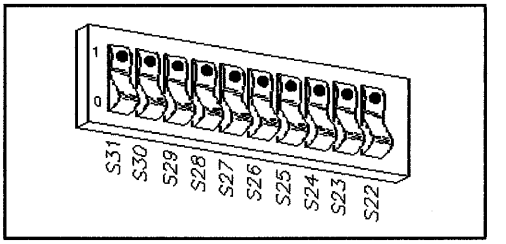
Here's what to do:

1. Select a program to use as a benchmark, or choose a commonly-used operating system function.
2. Run and time the benchmark program several times to determine its average execution time under the current RAM configuration.
3. *Turn your computer off.*

4. Remove the HP 98258A add-on RAM board. Reverse the switch settings of your add-on RAM board and your built-in RAM. When done, your built-in RAM should be set to:



and your add-on RAM board should be set to:



5. Re-insert your add-on RAM board into the computer.
6. Turn your computer on and hold down the space bar a few seconds. Verify that you still have 8 Mbytes of RAM installed by looking at the amount of RAM shown on the display.
7. Run your benchmark program several times to determine its average execute time.
8. Compare the program's performance under each RAM configuration and choose the fastest one.

Hardware Installation Complete!

Installing Memory Boards in a Model 350 Computer

This procedure describes how to install HP 98258A/B/C and 98264A/B boards in your model 350 computer. If you have a model 310, 320, or 330, refer to the preceeding sections.

Play it safe.

- Shut down and halt the system using the `/etc/shutdown -h` command.

  If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

- TURN OFF the computer.
- TURN ON the computer.

```
Copyright 1985,
Hewlett-Packard Company.
All Rights Reserved.

  BOOTROM Rev. A2
  Bit Mapped Display
  MC68020 Processor
  MC68881 Coprocessor
  Keyboard
  HP-IB
  HP98620 DMA-CO
  HP98644 at 9
  HP98625 at 14
  HP98643 at 21
  XXXXXXX Bytes
```

Power-up Display

Write down the amount of RAM listed: _____ bytes. You will use this figure later to check that the new RAM board is correctly installed.

Now, shut down the operating system following normal HP-UX procedures (refer to your *System Administrator Manual* if you need more information).

Although installing RAM boards in the Model 350 is an easy task, it is broken down into three short pieces for your convenience:

1. Identifying which RAM boards are already in the computer.
2. Assigning the RAM board addresses.
3. Physically installing the new RAM board in the computer.

If you already know which RAM boards your computer contains, skip the section on "Identifying Existing RAM Boards" and go to the section on "Assigning the Addresses".

If you know that your computer contains about 16 Mbytes of RAM (from the power-up display), go directly to the section titled, "Installing the RAM Board". It includes all the information you will need to add the RAM board.

Identifying Existing RAM Boards

In order to properly address a new board, you need to know the sizes of the boards already in the computer. If you already know what size boards are in the computer, put their quantities in Table 4-3 and skip down to the section titled, "Assigning the Addresses".

Table 4-3. RAM Board Inventory Table

Board Size	Quantity
16-Mbyte boards	
8-Mbyte boards	
4-Mbyte boards	

If you do not know what sizes the RAM boards in your computer are, the easiest way to determine this information is to look at the amount of RAM in the power-up display (the figure you wrote down near the beginning of this section) and compare it to the number of boards in the backplane.

Now remove the system bus interface board and look for boards fitting the descriptions in Table 4-4:

Table 4-4. RAM Board Identification

Extractor Colors (Left-Right)	Configuration	Memory Size
Grey-Green	Single board Two-board pair	4 Mbytes 8 or 16 Mbytes
Blue-Yellow	Two-board pair	8 or 16 Mbytes

If you have a large number of boards and cannot determine what board sizes you have, match the part numbers of the boards to the memory size shown in Table 4-5.

Carefully remove each board from the computer and locate the part number. It is located on the underside of the top board, immediately above the address switches on the bottom board.

Table 4-5. RAM Board Identification

Extractor Colors Left-Right	Part Number	Memory Size
Grey-Green	none (Single board) 98258-66521 98258-66522	4 Mbytes 8 Mbytes 16 Mbytes
Blue-Yellow	98264-66521 98264-66522	8 Mbytes 16 Mbytes

When you put boards back into the computer, you may want to label them with their size.

You are now ready to assign addresses to the boards. If your system contains approximately 16 Mbytes in any combination, go directly to the section titled, "Installing the RAM Board". Otherwise, continue with the next section.

Assigning the Addresses

The general rule to follow when addressing RAM is:

- A board with higher capacity must be assigned a higher address than any board with less capacity.
- A board with less capacity must be assigned a lower address than any board with greater capacity.
- Address a new RAM board lower than any existing RAM of the same size. In this way you can avoid having to readdress existing RAM boards of the same or larger size. You will have to readdress any smaller RAM boards.

Note An exception to the addressing rules above is when you have a 16-Mbyte system, made up of 4- and 8-Mbyte boards, they can be treated as one 16-Mbyte board. The board being added can be addressed as if it were being placed below an existing 16-Mbyte board.

1. Copy the numbers from the RAM Board Inventory Table (Table 4-3) to Table 4-6.

Table 4-6. RAM Board Inventory Table

Board Size	Quantity
16-Mbyte boards	
8-Mbyte boards	
4-Mbyte boards	

2. For each 16-Mbyte board already installed in the computer, cross off four of the 4-Mbyte blocks in Figure 4-4. Start with the first block and work down.

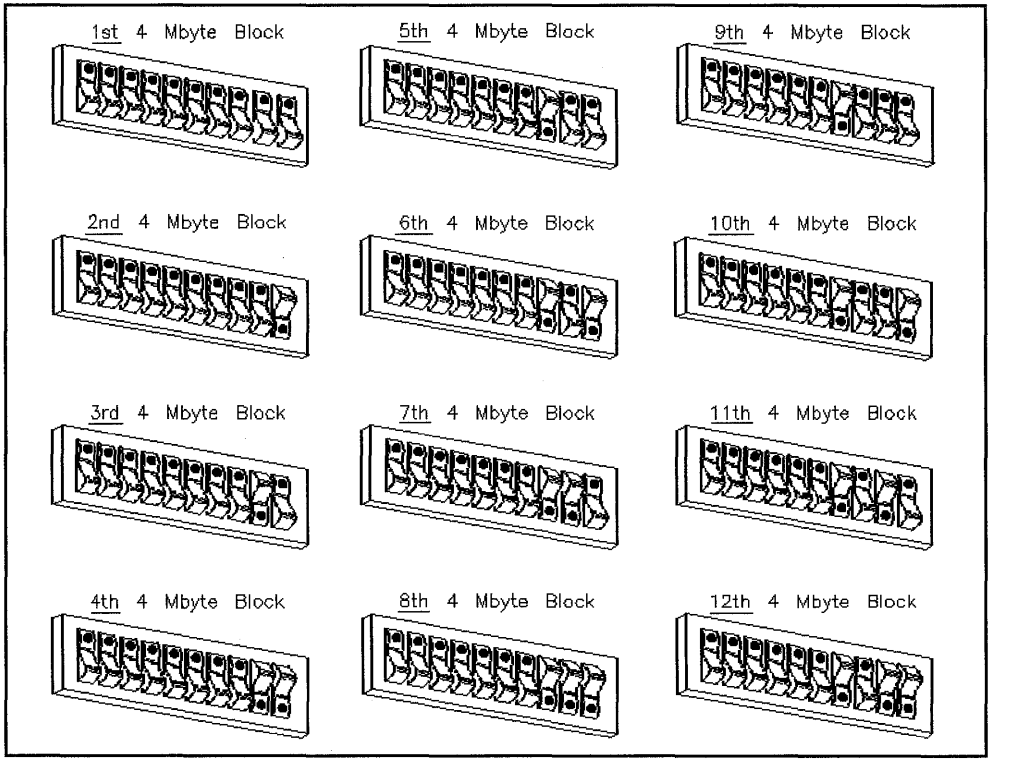


Figure 4-4. Address Worksheet

3. If you are installing a 16-Mbyte RAM board, write the word "NEW" beside the next *UNUSED* block, and cross off the following *three* blocks.
4. For each 8-Mbyte board in the computer, write the number "8" beside the next *UNUSED* block and cross off the following *one* block.
5. If you are installing an 8-Mbyte RAM board, write the word "NEW" beside the next *UNUSED* block, and cross off the following *one* block.
6. For each 4-Mbyte board in the computer, write the number "4" beside the next *UNUSED* block.
7. If you are installing a 4-Mbyte RAM board, write the word "NEW" beside the next *UNUSED* block.

An Example

If you would like to try out the addressing procedure before actually tackling your situation, run through the following example.

The Situation: You are adding a 16-Mbyte board to a computer already containing a 16-Mbyte board, an 8-Mbyte board and a 4-Mbyte board.

Figure 4-5 shows how the 4-Mbyte block chart in Step 2 will look when you are finished:

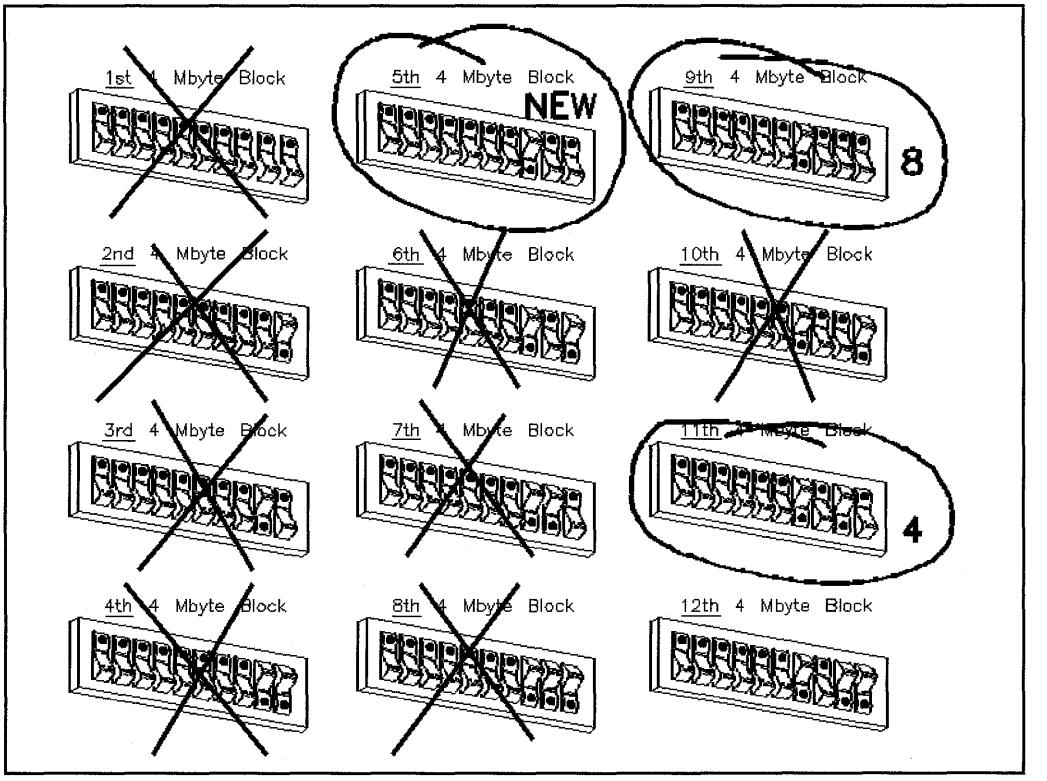


Figure 4-5. Completed Address Worksheet

- In Step 2, blocks 1 through 4 were crossed out.

- In Step 3, the word "NEW" was written by block 5 and blocks 6 through 8 were crossed out.
- In Step 4, the number "8" was written by block 9 and block 10 was crossed out.
- In Step 6, the number "4" was written by block 11.

Installing the RAM Board

4

If you will be installing an expander, go ahead and do so, using the instructions packaged with the expander.

Configuration Restraints on Computers with a System Bus

Both parity and ECC RAM are normally installed in the computer chassis, on computers containing a system bus. This is because it is recommended that RAM boards be connected to the processor board by the system bus for maximum performance. However, both RAM types may be installed in the expander if the resulting performance loss is acceptable to you.

The 4-Mbyte parity RAM board may be installed in any slot. *Do not* install the other RAM boards in any of these slots:

- The top slot of either the computer or expander.
- If your computer or expander contains DIO accessory slots (these are narrow slots toward the top of the chassis), they cannot go in the slot immediately under the DIO slots.

Note You may have to temporarily loosen or remove the board or slot cover immediately above the empty slot in order to install the new RAM board. Make sure to retighten this board after installing the new board.

The processor board, the RAM boards and the Floating-Point Accelerator (if installed) should be clustered together in the computer to take advantage of the faster speed of the system bus.

Your video output board should go in the expander if it consists of two printed circuit boards. If your computer is full, a good general rule is to move the video board to the expander.

The Procedure

Follow these procedures when installing a new RAM board in your computer:

1. Have the documentation that came with the RAM board handy. You will need to refer to it during this procedure.
2. Plan ahead.

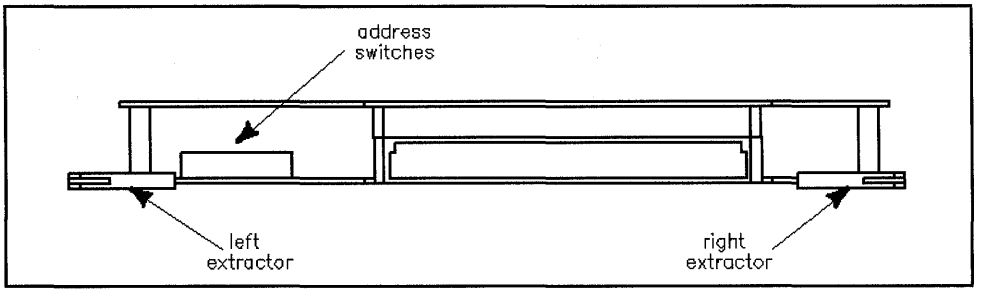
   Installing additional RAM on your computer requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.
3. Play it safe.
   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.
   b. TURN OFF the computer and unplug the power cord.
   c. TURN OFF the expander and unplug the power cord.

Caution When installing the RAM board, handle the circuit boards as little as possible. Handle them by the edges or backplate only.

---

4. Locate an empty system slot in the computer (or in the expander if you have chosen to put the new RAM there) and remove the cover plate from it.
5. If the empty slot is in the computer, check that it is immediately above or below the system bus connector board. If not, rearrange the boards so that it is.
6. Remove the new RAM board from its packaging material and place it on a static-free surface, such as the bag it was shipped in.
7. Locate the RAM address switches.



4 **Figure 4-6. RAM Board Address Switch Location**

8. If your system contains 16-Mbytes in any combination, set the address switches on the new board according to Figure 4-7 and then skip down to step 10:

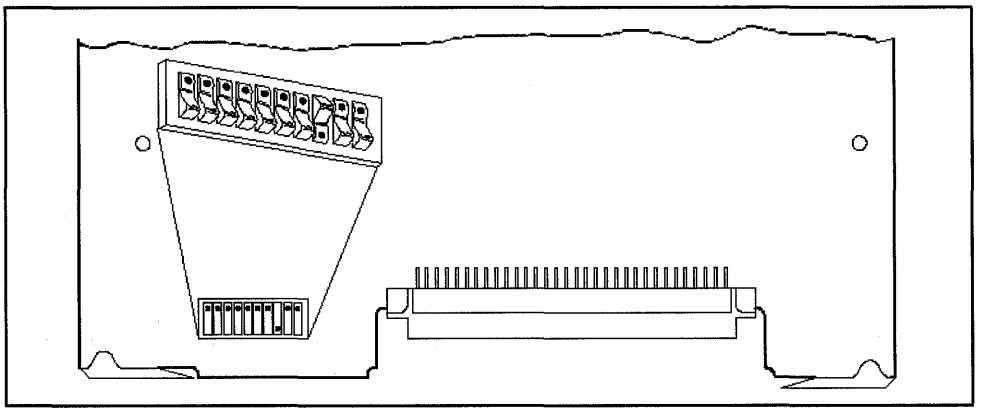


Figure 4-7. 16-Mbyte Address Setting

9. If your system contains other than 16 Mbytes, set the address switches on the new RAM board to match the block labeled "NEW".
10. Now change the address switches on all *SMALLER* boards to the ones numbered in the chart. "Smaller" refers to memory size rather than physical size. Note that boards the same size as, or larger than, the new board need not be changed.

11. Pick up the new RAM board by the edges and slide it into the empty slot. Slide the two-connector end in first, with the board with the connectors on the bottom.
12. If you installed the new RAM board in the expander, reinstall the cover plate over the slot and reinstall the system bus connector board removed in step 2. Then skip down to step 13.
13. Locate the new, larger system bus connector board packaged with the new RAM board and *carefully* install it onto the processor board and RAM board(s), and Floating-point Accelerator if installed.

Note You MUST reinstall the system bus connector board to ensure system performance, provide needed air cooling and meet statutory requirements for fire safety and radiated emissions.

---

14. Reinstall the power cords and turn the computer and expander on.

15. Now check the power-up display for the amount of RAM installed.

```
Copyright 1985,
Hewlett-Packard Company.
All Rights Reserved.

  BOOTROM Rev. A2
  Bit Mapped Display
  MC68020 Processor
  MC68881 Coprocessor
  Keyboard
  HP-IB
  HP98620 DMA-C0
  HP98644 at 9
  HP98625 at 14
  HP98643 at 21
  XXXXXXX Bytes
```

Figure 4-8. Power-up Display

Write the amount here: _____ bytes.

16. If the amount of RAM in step 14 has not increased by approximately the amount of RAM you added, go to the section titled "In Case of Trouble".
17. Boot your HP-UX operating system as usual.

Installation Complete!

In Case of Trouble

If you do not obtain the correct amount of available memory, first turn the computer off and verify that the cards are plugged in correctly. Then turn it back on and see if the amount of memory is correct. If it still is not, turn the computer off and check the card addressing. If it is correct, set a card aside and continue the process with the remaining cards.

If you still have trouble, verify that you have assigned the addresses correctly. If you have, and no arrangement of cards will increase the amount of memory, put the computer into use with the maximum amount of memory you can obtain. Then replace all the unused cards in their anti-static bags and call your HP Sales and Service office for assistance.

Expanders

The following expanders are available for your HP Series 300 computer.

Table 4-7. Expanders Available

Product Numbers	Additional Slots
HP 98568A	Adds eight additional I/O and Accessory slots.
HP 98570A	Adds two wide system slots and four narrow I/O slots (except option 004 which adds four wide system slots and no I/0 slots)
HP 98577A VMEbus Expander[1]	Holds any four of about 3000 types of VME boards.

1 The HP 98577A requires that the VME driver is installed on your system.

HP 98568A and 98570A Backplane Expanders

The HP 98568A Backplane Expander adds eight additional I/0 and Accessory slots to your Series 300 computer.

The HP 98570A Backplane Expander adds two wide system slots and four narrow I/O slots (except option 004 which adds four wide system slots and no I/0 slots) to your Series 300 computer.

Follow standard computer safety procedures and "shut down" and power off your system prior to installing either of these expanders. Consult the documentation that came with your expander for specific installation instructions.

HP 98577A VMEbus Expander

The HP 98577A Series 300 VMEbus Expander is a VME backplane which conforms to the VITA C.1 specifications for bus protocol and physical format. It consists of a chassis plus some code segments in HP-UX and a Driver Development Manual so you can write a custom driver for your application. It holds any four of about 3000 types of VME boards.

Follow standard computer safety procedures and "shut down" and power off your system prior to installing of this expander. Consult the documentation that came with your expander for specific installation instructions.

The VMEbus Expander adheres to the specifications established by the VMEbus International Trade Association (VITA), revision C.1. VMEbus accessories which do not adhere to the VITA C.1 specification are not guaranteed to operate properly, if at all, in the VMEbus Expander.

Refer to the installation information that came with your VMEbus cards to properly install them in the VMEbus Expander.

5

Installing Terminals and Modems

Introduction

This chapter contains the installation instructions for the following terminals:

HP 2392A, 2393A and 2397A Terminals
HP 45610A/B HP Touchscreen PC (HP 150)
HP 45850A/B HP Touchscreen-II PC (HP 150-II)
HP 45710A HP The Portable PC (HP 110)
HP 45711A HP The Portable Plus PC (HP 110-Plus)
HP 9807A Integral PC (HP 9807)
HP 13279B Color Monitor
HP C1004A/G/W 700/22 ANSI DEC VT220 Compatible Terminal
HP C1003A/G 700/41 Display Entry-Level Terminal
HP C1006A/G/W 700/43 ASCII Terminal
HP C1007A 700/44 Display Terminal
HP C1001A/G/W 700/92 Block-Mode Display Terminal
HP C1002A/G/W 700/94 Alphanumeric Display Terminal
HP 37212B 1200/2400 Baud Modem
HP 92205A/C Hayes Smartmodem 1200

HP Terminals

This section describes the generic installation procedures for all HP terminals. HP Terminals connect to any supported RS-232C interface.

The HP 98628A Datacomm, the HP 98642A 4-Channel Multiplexer, or the HP 98638A 8-Channel Mulitplexer interfaces are required for graphics terminals, unless their graphics capability will not be used.

Before Connecting This Device

Before you install this device:

- Have the documentation shipped with your terminal handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It gives interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

What You're Going To Do

The following table contains detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 6, "Setting Up HP-UX for Terminals and Modems Using SAM" for set up instructions.

If you use commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once the hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Note The HP 98642A or the HP 98628A serial interface card is recommended if you use an application that sends data faster than 2400 baud (average). Such applications include graphics from graphics terminals, softkeys, and reading terminal status.

Table 5-1. HP Terminals Connected to RS-232-C Interfaces

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number
HP Terminal	/dev/tty02	c	1	98626	9[2]	0x090004
HP Terminal	/dev/tty02	c	1	98628	20[3]	0x140004
HP Terminal port 0	/dev/tty02	c	1	98642	13[4]	0x0d0004
HP Terminal port 1	/dev/tty02	c	1	98642	13[4]	0x0d0104
HP Terminal port 2	/dev/tty02	c	1	98642	13[4]	0x0d0204
HP Terminal port 3	/dev/tty02	c	1	98642	13[4]	0x0d0304
HP Terminal port 0	/dev/tty02	c	1	98642	28[5]	0x1c0004
HP Terminal port 1	/dev/tty02	c	1	98642	28[5]	0x1c0104
HP Terminal port 2	/dev/tty02	c	1	98642	28[5]	0x1c0204
HP Terminal port 3	/dev/tty02	c	1	98642	28[5]	0x1c0304
HP Terminal port 4	/dev/tty02	c	1	98642	28[5]	0x1c0404
HP Terminal port 5	/dev/tty02	c	1	98642	28[5]	0x1c0504
HP Terminal port 6	/dev/tty02	c	1	98642	28[5]	0x1c0604
HP Terminal port 7	/dev/tty02	c	1	98642	28[5]	0x1c0704

1 The path name given here assumes this is the second terminal you are connecting (**tty02**). If not, change the path name accordingly (for example, **/dev/tty03** for the third terminal).

2 Built-in RS-232-C Interface and HP 98626A RS-232-C Interface.

3 HP 98628A Datacomm Interface.

4 HP 98642A 4-Channel Multiplexer Interface

5 HP 98638A 8-Channel Multiplexer Interface

Connecting the Terminal to an RS-232-C Interface

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver(s) required for this device is (are) included in your current kernel configuration file, usually* `/etc/conf/dfile`.

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add the necessary device driver(s) to the kernel configuration file. To verify that the necessary driver(s), listed in the tables in the previous section, is (are) part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on Setting Up HP-UX using SAM that follows this chapter; then go on to step two.

     or

   - Look in your `dfile` for the driver(s). If the drivers are in your kernel configuration file, go on to step 2 now.

     If the driver(s) is (are) not in the `/etc/conf/dfile`, or is (are) commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   The following RS-232-C interfaces can be used:

   - The built-in RS-232-C interface.
   - HP 98626A RS-232-C Interface.
   - HP 98628A Datacomm Interface.
   - HP 98642A 4-Channel Multiplexer Interface
   - HP 98638A 8-Channel Multiplexer Interface
   - HP 98644A RS-232-C Serial Interface.

Note If you have more than one serial port, you need to know the address of your port for testing communications and for configuring your software.

5

Caution Many computer systems have both parallel and RS-232-C ports. These ports frequently appear identical. The built-in parallel interface should be labeled PARALLEL. Make sure you plug your cable into the RS-232-C port or you could damage your device.

4. *Ensure all power switches on the device and on the computer are in the OFF position.*

5. *Connect the terminal to your computer.*

   Connect the terminal to your computer following the instructions provided in the hardware installation manual for the device.

6. *Connect the terminal's power cord.*

7. *Plug in and power on the computer.*

8. *Turn on the terminal.*

9. *Configure the terminal.*

   Set up the terminal's communication's protocols by entering the datacomm configuration menu on the terminal. Refer to the manuals that came with the terminal for specific instructions on setting these values.

   Table 5-2 shows recommended values for configuring your terminal. Not all of the characteristics listed in the table will apply to your terminal.

What To Do Next

If you are using SAM to complete the software set up portion of this procedure, refer to Chapter 6, "Setting Up HP-UX for Terminals and Modems Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 5-2. Recommended Terminal Characteristics

Characteristic	Setting	Comments
Alternate Set	Line(B)	Suggested
ASCII 8 Bits	No	YES required for NLS support
Asterisk	Off	Suggested
AUTO LF	Off	Required
Auto Terminator	No	Suggested
Baud Rate	9600	HP-UX Std.
Bell	On	Suggested
BLOCK MODE	Off	Required
Block Terminator	RS	Suggested
Break Time	200ms	Suggested
BufSiz	128	Suggested
Caps Lock	Off	May change after login
Carrier Detect	Open	Suggested
Check Parity	No	Required
Circuit Assurance	Closed	Cabling may require
Clear Terminator	No	Suggested
Clock	INT	Required
CPU Break	Open	Suggested
CS(CB)Xmit	No	Cabling may require
Cursor Type	Line	Your choice

Table 5-2. Recommended Terminal Characteristics (continued)

Characteristic	Setting	Comments
Data Bits	8	Required for NLS support
Data Bits	7	If no NLS support required
Data Speed Select	Open	Suggested
Datacomm Handshake	XonXoff	Required
DISPLAY FUNCTIONS	Off	Suggested
Display Off After	15 min.	Your choice
DM(CC)Xmit	No	Cabling may require
EnqAck	No	EnqAck not supported
Esc Xfer	Yes	Suggested
Fast Binary Read	Closed	Suggested
Field Separator	US	Suggested
GraphCompat		Your choice
Inh DC2	Yes	Required
InhDcTest	Yes	Suggested
InhEolWrp	No (Closed)	Required
InhHndShk	Yes	Required
InhSkfTst	No	Suggested
Insert & delete sense	Closed	Suggested
Inverse Background		Your choice

Table 5-2. Recommended Terminal Characteristics (continued)

Characteristic	Setting	Comments
Keyboard		Should match your keyboard
LINE MODIFY	Off	Suggested
Line/Page	Line	Required
Local Echo	Off	Suggested
Main Channel	Closed	Should have no effect
MEMORY LOCK	Off	Suggested
MODIFY ALL	Off	Suggested
Parity	None (Open)	Required for NLS support
Parity	0	If no NLS support required
Power On	Terminal	Suggested
Printer Code 4		Your choice
Printer Nulls		Your choice
RecvPace	XonXoff (Open)	Required
Remote/Serial Dev	PORT1/PORT2	If using terminal's port 1
	PORT2/PORT1	If using terminal's port 2
Remote	On	Required
Resolution	512x390	Required
RETURN Def	CR	Required
RETURN=ENTER	No	Required
RR(CF)Recv	No	Cabling may require

Table 5-2. Recommended Terminal Characteristics (continued)

Characteristic	Setting	Comments
SPOW	No (Closed)	Strongly suggested
SR(CH)	Lo	Modem use may require
SRRInvert	No	Cabling may require
SRRXmit	No	Cabling may require
Start Column	1	Suggested
Stop Bits	1	HP-UX
STOP Function	XonXoff	Suggested
StripNulDel	No	Suggested
Tab=Spaces	No	Required
Terminal Id	2622A	Suggested for 2392A
	2623A	Required for DGL on HP150 and 2393A
Terminal Mode	HP	Required by default terminfo
Transmit	All Fields	Suggested
Transmit indicator	Closed	Suggested
TR(CD)	Hi	Modem use may require
XmitFnctn	No (Closed)	vi changes as needed
XmitPace	XonXoff	Suggested

HP Modems

This section describes the generic installation procedures for all HP modems. HP modems connect to any supported RS-232C interface.

Before Connecting This Device

Before you install this modem:

- Refer to the documentation that shipped with your modem for information on unpacking and preparing your modem for installation. Keep this documentation handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It gives interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

What You're Going To Do

The following table contains detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 6, "Setting Up HP-UX for Terminals and Modems Using SAM" for set up instructions.

If you use commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once the hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

HP Modems

Table 5-3. HP Modems

Device Name[1]	Path Name[2]	File Type	Major Number	Driver Name	Minor Number
HP Modem on select code 9[3]	/dev/ttyd02	c	1	98626	0x090000
HP Modem on select code 9[3]	/dev/cua02	c	1	98626	0x090001
HP Modem on select code 9[3]	/dev/cul02	c	1	98626	0x090001
HP Modem on select code 13	/dev/ttyd02	c	1	98642	0x0d0000
HP Modem on select code 13	/dev/cua02	c	1	98642	0x0d0001
HP Modem on select code 13	/dev/cul02	c	1	98642	0x0d0001
HP Modem on select code 20	/dev/ttyd02	c	1	98628	0x140000
HP Modem on select code 20	/dev/cua02	c	1	98628	0x140001
HP Modem on select code 20	/dev/cul02	c	1	98628	0x140001
HP Modem on select code 28	/dev/ttyd02	c	1	98642	0x1c0*n*00[4]
HP Modem on select code 28	/dev/cua02	c	1	98642	0x1c0*n*01[4]
HP Modem on select code 28	/dev/cul02	c	1	98642	0x1c0*n*01[4]

1 Modems require the dial-in modems device file `ttyd`*xx* and the dial-out ports device file `cul`*xx*. If you are using a non-HoneyDanBear `uucp`, you will need a third modem device file, `cua`*xx* with the same minor number as the `cul`*xx* device file.

2 The path name given here assumes this is the second modem you are connecting (`ttyd02`). If not, change the path name accordingly (for example, `/dev/ttyd03` for the third modem).

3 The built-in interface.

4 When connected to the HP 98638A or 98642 interface. The variable *n* in the minor number should be replaced with the port number on the interface.

Connecting the Modem to an RS-232-C Interface

The following summary supplements the procedures outlined in your hardware installation documentation for this modem. Read through this summary before proceding with the installation.

1. *Determine your interface.*

   The following RS-232-C interfaces can be used:

   - The built-in RS-232-C interface.
   - HP 98626A RS-232-C Interface.
   - HP 98628A Datacomm Interface.
   - HP 98642A 4-Channel Multiplexer Interface
   - HP 98638A 8-Channel Multiplexer Interface
   - HP 98644A RS-232-C Serial Interface.

Note If you have more than one serial port, you need to know the address of your port for testing communications and for configuring your software.

Caution Many computer systems have both parallel and RS-232-C ports. These ports frequently appear identical. The built-in parallel interface should be labeled PARALLEL. Make sure you plug your cable into the RS-232-C port or you could damage your device.

2. *Verify that the driver associated with the serial interface you are using is included in your current kernel configuration file, usually* `/etc/conf/dfile`.

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add the necessary device driver(s) to the kernel configuration file. To verify that the necessary driver is part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on Setting Up HP-UX using SAM that follows this chapter; then go on to step two.

     or

   - Look in your `dfile` for the driver (see Chapter 14, "Setting Up Devices Using HP-UX Commands" for a complete listing of the RS-232 driver names). If the driver is in your kernel configuration file, go on to step 2 now.

     If the driver is not in the `/etc/conf/dfile`, or is commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

3. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

4. *Ensure all power switches on the device and on the computer are in the OFF position.*
5. *Set modem configuration values.*

   Before you connect your modem, consider the following:

   - Is the DTR (Data Terminal Ready) line forced high? If so, set it to follow the line or do not force it high.
   - Is the CD (Carrier Detect) line forced high? If so, set it to follow the line or do not force it high.
   - Is the modem a Hayes compatable? If so, the SO register needs to be set to one or greater. If you are going to use `cu` or `uucp` then the number should not be greater than three or the connection will fail.

   You will need a cable with the following pins:

Table 5-4.

Computer	Modem
1	1
2	2
3	3
7	7
8	8
20	20

Note The 9 pin port will work if the 9 pin to 25 pin adaptor that ships with the system is used with this cable.

6. *Connect the modem to your telephone cable and to your computer.*

   Connect the modem to your telephone cable and to your computer following the instructions provided in the hardware installation manual for the modem. Be sure to set any special modem configuration values as instructed in the installation manual for the modem.

7. *Connect the modem's power cord.*
8. *Turn on the modem.*
9. *Plug in and power on the computer.*

What To Do Next

If you are using SAM to complete the software set up portion of this procedure, refer to Chapter 6, "Setting Up HP-UX for Terminals and Modems Using SAM". If you are using the commands method to install this modem, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

6

Setting Up HP-UX for Terminals and Modems Using SAM

Introduction

This chapter discusses setting up HP-UX to communicate with your terminal or modem. Setting up HP-UX for a terminal or modem consists of:

- creating the device file, or verifying that the correct device file already exists, for communication with the device.
- creating an entry in the `/etc/inittab` file for the device.

The SAM method of setting up HP-UX for terminals and modems is discussed here. Refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for a description of the HP-UX commands method if you are not using SAM to add this device.

SAM will create the device file needed to communicate with the terminal or modem and add the necessary getty entry to the `/etc/inittab` file.

Adding a Terminal or Modem to Your System

Make sure that the terminal or modem is physically connected to a port on your computer's serial interface before continuing.

To configure HP-UX for a new terminal:

1. Log on as `root`.
2. Run SAM:

   `/usr/bin/sam`

3. Highlight `Peripheral Devices->` and activate [Open].
4. Highlight `Terminals and Modems->` and activate [Open].
5. From the "Actions" menu in the "Terminals and Modems" window, choose `Add Terminal...`.
6. In the "Add Terminal" window, set or select the following parameters:
   - The hardware path to the serial interface to be used by this terminal.
   - The port number to be used by this terminal.
   - The speed (baud rate) to be used by this terminal.
   - Whether or not this will be a UUCP connection.

   When you finish setting the parameters, activate [OK].
7. You will receive a series of messages indicating the progress of the task.

Note You will receive a message advising you of the necessity to connect the terminal.

6

When you receive the message `Task completed`, activate [OK].

8. Exit SAM by returning to the "System Administration Manager" window and activating [Exit SAM].

To configure HP-UX for a new modem:

1. Log on as `root`.
2. Run SAM:

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

3. Highlight `Peripheral Devices->` and activate [Open].
4. Highlight `Terminals and Modems->` and activate [Open].
5. From the "Actions" menu in the "Terminals and Modems" window, choose `Add Modem...`.

6. In the "Add Modem" window, set or select the following parameters:
   - The hardware path to the serial interface to be used by this modem.
   - The port number to be used by this modem.
   - The speed (baud rate) to be used by this modem.
   - Whether of not this modem will be used for calling out from your system.
   - Whether or not this modem will receive incoming calls.
   - Whether of not this is a CCITT (international protocol) modem.
   - Whether or not this will be a UUCP connection. If you specify that this will be a UUCP connection, a list of modem types will appear from which to select.

   When you finish setting the parameters, activate [OK].
7. You will receive a series of messages indicating the progress of the task.

Note You will receive a message advising you of the necessity to connect the modem.

When you receive the message `Task completed`, activate [OK].

8. Exit SAM by returning to the "System Administration Manager" window and activating [Exit SAM].

7

Installing Disk and Tape Drives

Introduction

This chapter contains installation and configuration information for the following disk and tape drives:

HP C1707A Series 6100 Model 600/A HP-IB CD-ROM Drive
HP A1999A Series 6100 Model 700/S CD-ROM Drive
HP Optical Disk Library Systems
HP C1701A Series 6300 Model 650/A Optical Disk Drive
HP 7907A Disk Drive
HP 7911P/R, 7912P/R, and 7914P/R/CT Disk and Tape Drives
HP 7933H/35H/36H/37H Disk Drives
HP 7941A, 7942A, 7945A, 7946A Disk and Disk/Tape Drives
HP 7957A/B,7958A/B, and 7959B/62B/63B Disk Drives
HP 7957/58/59S SCSI Disk Drives
HP 9121D/S and HP 9122D/S/C Flexible Disk Drives
HP 9125S Flexible Disk Drive
HP 9127A Flexible Disk Drive
HP 9133D/H/L and 9134D/H/L Disk Drives
HP 9153A/B and 9154A/B Disk Drives
HP C2200/03A Disk Drives
HP Mass Storage Systems
HP 9144A/45A Tape Drive
HP 7974A Tape Drive
HP 7978A/B Tape Drive
HP 7979A/7980A/7980XC Tape Drives
HP C1511A Series 6400 Model 1300H HP-IB DDS-Format Tape Drive
HP C1512A Series 6400 Model 1300S SCSI DDS-Format Tape Drive
HP C1520A/21A Sequential Access Tape Drives

HP C1707A Series 6100 Model 600/A HP-IB CD-ROM Drive

The Model 600/A is a Command Set 80 (CS/80) Compact Disk-Read Only Memory (CD-ROM) Drive. It supports the ISO-9660 (or High Sierra Group) data format and connects to your computer via the built-in, high-speed HP-IB interface or the high-speed HP-IB disk interface card.

The *HP Series 6100 Model 600/A HP-IB CD-ROM User's Guide*, HP part number C1707-90000, provides detailed information about this device. For references to further information on CD-ROM technology, and details on the CD-ROM File System, see *How HP-UX Works: Concepts for the System Administrator*.

Note Appendix B, "Series 400 Support Matrix" gives Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have your *HP Series 6100 Model 600/A HP-IB CD-ROM User's Guide*, part number C1707-90000, handy. You will need to refer to it during this procedure.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

The following table contains detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions using SAM.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-1. HP C1707A Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
C1707A CD-ROM	/dev/dsk/#s0	b	0	cs80	0x0e0*n*00	1	14
C1707A CD-ROM	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*00	1	14
C1707A CD-ROM	/dev/dsk/#s0	b	0	cs80	0x070*n*00	1	7
C1707A CD-ROM	/dev/rdsk/#s0	c	4	cs80	0x070*n*00	1	7

1 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. SAM uses a longer naming convention that maps more closely to the hardware address of your device. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for details.

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the Model 600/A HP-IB CD-ROM Drive

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

Caution CDFS (CD-ROM) file systems must reside on a drive attached to the cluster root server.

You must, however, configure the CDFS software "driver" into *every* cluster node's kernel. See Chapter 11, "Reconfiguring the Kernel for a Cluster Node".

If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

- Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

  or

- Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

  If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the `*` sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface type.*

   The following high-speed HP-IB interfaces can be used. They are listed in order of preference for optimum disk performance:

   - HP 98262A high-speed HP-IB daughter board
     or
     HP 98625B high-speed HP-IB disk interface card
   - HP 98625A high-speed HP-IB disk interface card
   - Built-in "optional" secondary high-speed HP-IB interface.

Note With a 98625A high-speed HP-IB disk interface card, be sure that *no* SCSI bus interface is installed.

---

4. *Set the HP-IB bus address.*

Note Familiarize yourself with the HP-IB addresses that are currently in use on your system. Determine the available HP-IB addresses. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

---

   a. Choose an available HP-IB bus address and make note of it.

   b. Follow the procedures in the hardware installation documentation that came with the device for setting the HP-IB bus address.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*
6. *Connect the Model 600/A to your computer.*

   Connect your Model 600/A to your computer following the instructions in the User's Guide for the device.
7. *Connect the power cord to your device.*
8. *Turn on the CD-ROM drive.*
9. *Plug in and power on the computer.*

Hardware installation complete! If you are using SAM, complete the software set up portion of this procedures by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

HP A1999A Series 6100 Model 700/S SCSI CD-ROM Drive

The HP A1999A Series 6100 Model 700/S SCSI CD-ROM drive is a half-height device.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have your *HP Series 6100 Model 700/S User's Guide* handy. You will need to refer to it during this procedure.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

The following table contains detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions using SAM.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-2.
HP A1999A Model 700/S CD-ROM Drive Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Drivers	Select Code	Minor Number[2]
Model 700/S CD-ROM	`/dev/dsk/#s0`	b	7	`scsi, cdfs`	14	`0x0e0`*n*`00`
Model 700/S CD-ROM	`/dev/rdsk/#s0`	c	47	`scsi, cdfs`	14	`0x0e0`*n*`00`

1 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. SAM uses a longer naming convention that maps more closely to the hardware address of your device. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for details.

2 *n* is a number that identifies the bus address. Replace *n* with 2 if the bus address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the HP Series 6100 Model 700/S CD-ROM Drive

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

Caution CDFS (CD-ROM) file systems must reside on a drive attached to the cluster root server.

You must, however, configure the CDFS software "driver" into *every* cluster node's kernel. See Chapter 11, "Reconfiguring the Kernel for a Cluster Node".

If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

- Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

  or

- Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

  If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   - Built-in SCSI interface
   - HP 98658A SCSI interface card
   - HP 98265A SCSI interface daughter card

4. *Set the SCSI bus address on your device.*

Note Familiarize yourself with the SCSI addresses that are currently in use on your system. Determine the SCSI address(es) that are available. Use the worksheet at the end of this book to note already-used addresses.

You are limited to seven devices per SCSI interface, bus addresses 0 through 6. Address 7 is reserved for the system's SCSI controller.

Refer to your *HP Series 6100 Model 700/S User's Guide* for specific instructions on how to set the SCSI bus address on your device.

5. *Set the Parity, Arbitration, and Test switches on your device.*

   Parity and Arbitration switches should be set to 1 (up) and the Test switch should be set to 0 (down). Refer to your User's Guide for specific instructions on how to set these switches.

6. *Ensure all power switches on the device and on the computer are in the OFF position.*
7. *Connect the CD-ROM drive to your computer.*

   Connect your Model 700/S to your computer following the instructions in your *HP Series 6100 Model 700/S User's Guide.*

   The HP Series 6100 Model 700/S CD-ROM drive has an internal bus length of 0.3 meters.

   The SCSI bus length is limited to a maximum of six meters. This length includes the cable length between devices and the internal bus length for each device on the bus. Available SCSI cables and terminators are included in the "SCSI Device Guidelines" section of Chapter 1.
8. *Connect the power cord to your device.*
9. *Plug in and power on the computer.*

   Hardware installation complete! If you are using SAM, complete the software set up portion of this procedure by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

Optical Disk Library Systems

The Deskside and Rackmount Optical Disk Library Systems are direct access secondary storage (DASS) peripherals that allow multiple rewritable optical disks to be shared between one, two or four optical disk drives.

- The Model 20 Optical Disk Library System can hold as many as 32 disks. Each disk can store 325 Mbytes of data per side providing a total of 20.8 Gbytes of storage.
- The Model 60 Optical Disk Library System can hold as many as 88 disks. Each disk can store 325 Mbytes of data per side providing a total of 57.2 Gbytes of storage.
- The Model 100 Optical Disk Library System can hold as many as 144 disks. Each disk can store 325 Mbytes of data per side providing a total of 93.6 Gbytes of storage.

The Optical Disk Library Systems connect to your computer with a SCSI interface and can be accessed as a conventional magnetic disk drive.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Note Optical Disk Library Systems should be installed by an HP Customer Engineer. The installation cost is included in the purchase price of the device. Your HP Customer Engineer will set up and install your Optical Disk Library System for you. For these details, please refer to the unpacking and installation procedures that came with the device.

Before having this device installed:

- Arrange to have your Hewlett-Packard Customer Engineer install your device.
- Have the documentation that came with your device handy.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

The SCSI bus length is limited to a maximum of six meters. This length includes the cable length between devices and the internal bus length for each device on the bus. Available SCSI cables and terminators are included in the "SCSI Device Guidelines" section of Chapter 1.

Check the documentation that came with your model Optical Disk Library System for information on internal SCSI cabling lengths.

What You're Going To Do

Have your Hewlett-Packard Customer Engineer install and set up your Optical Disk Library System.

Note that there are one, two or four optical disk drive devices for read/write data transfer (depending on which library model you have) inside the autochanger. Each optical disk drive device and the autochanger are assigned a unique SCSI address.

The device drivers required for this device are `autox` and `autoch`. Device files reside in `/dev/ac` and `/dev/rac`.

Table 7-3.
HP Optical Disk Library Autochanger Configuration Information

Device Name	Path Name[1]	File Type	Major Number	Device Drivers	Select Code	Minor Number[2]
The mechanical autochanger	`/dev/rac/ioctl`	c	55	`autox, autoch, scsi`	14	`0x201`*n*`0`
Optical disk 1, block, side a and b	`/dev/ac/cEd#_1a`	b	10	`autox, autoch, scsi`	14	`0x201`*n*`1`
	`/dev/ac/cEd#_1b`	b	10	`autox, autoch, scsi`	14	`0x201`*n*`1`
Optical disk 1, character, side a and b	`/dev/rac/cEd#_1a`	c	55	`autox, autoch, scsi`	14	`0x201`*n*`1`
	`/dev/rac/cEd#_1b`	c	55	`autox, autoch, scsi`	14	`0x201`*n*`1`

1 See Chapter 14, "Setting Up Devices Using HP-UX Commands" for device file naming conventions for Optical Disk Libraries.

2 *n* is the bus address multiplied by two.

Note The device file names and minor number formats shown in the table above are shown as examples only. You will need two device files for each optical disk surface. For example, in a library that contains 32 disks there are 64 optical disk surfaces, each requiring a block and character mode device file, totalling 129 device files. Therefore, use the script files that came with your Optical Disk Library or SAM to complete the configuration of your library.

Connecting the Optical Disk Library Systems

The following summary supplements the procedures outlined in the hardware installation documentation that came with this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   Your Customer Engineer will run a script that installs the appropriate drivers and creates the necessary device files for your Optical Disk Library system.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Ensure all power switches on the device and on the computer are in the OFF position.*

4. *Complete the hardware installation.* Complete hardware installation as outlined in the Optical Disk Library Systems Setup Guide for the optical disk library model you have purchased.

5. *Complete the software set up task.* After the hardware is installed, use SAM to create the necessary device files for section 2 (or the whole disk). If you do not have SAM available on your system, follow the steps outlined in the *Configuring and Using the Optical Disk Library System* manual for your system type.

Note If you do not have pre-initialized media, you will need to initialize each optical disk surface.

HP C1701A/C Model 650GB Optical Disk Drives

The HP C1701A and C1701C are stand-alone 5.25-inch Rewritable Optical disk drives. The removable Magneto-Optical (MO) disk can store 650 Mbytes of data (325 Mbytes per side) and complies with the Continuous-Composite format. These disk drives connect to your computer with a SCSI interface and can be accessed as conventional magnetic disk drives.

The HP C1701A and C1701C optical disk drives are supported as mass storage devices or as boot devices, although they are not recommended for use as boot devices.

Note Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Have the hardware installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

The following table contains detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in this section. Once hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-4. HP C1701A/C Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
C1701A/C Model 650	`/dev/dsk/#s0`	b	7	`scsi`	`0x0e0`*n*`00`	1	14
C1701A/C Model 650	`/dev/rdsk/#s0`	c	47	`scsi`	`0x0e0`*n*`00`	1	14

1 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. SAM uses a longer naming convention that maps more closely to the hardware address of your device. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for details.

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the Models 650 Optical Disk Drives

The following summary supplements the procedures outlined in your installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*
   - Built-in SCSI interface
   - HP 98658A SCSI interface card
   - HP 98265A SCSI interface daughter card
4. *Set the SCSI bus address on your device.*

Note Familiarize yourself with the SCSI addresses that are currently in use on your system. Determine the SCSI address(es) that are available. Use the worksheet at the end of this book to note already-used addresses.

You are limited to seven devices per SCSI interface, bus addresses 0 through 6. Address 7 is reserved for the system's SCSI controller.

---

   a. Choose an available SCSI bus address and make note of it.
   b. Follow the procedures in the hardware installation documentation that came with the device for setting the SCSI bus address.
5. *Ensure all power switches on the device and on the computer are in the OFF position.*
6. *Connect the disk drive to your computer.*

   Connect your device to your computer following the instructions in the installation documentation for the device.

   The SCSI bus length is limited to a maximum of six meters. This length includes the cable length between devices and the internal bus length for each device on the bus. Available SCSI cables and terminators are included in the "SCSI Device Guidelines" section of Chapter 1.

   The HP C1701A/C optical disk drive has an internal bus length of 0.3 meters.

7. *Connect the power cord to your device.*
8. *Turn on the disk drive.*

   Do NOT turn on the power to the computer before the disk drive.

Caution If you are using the Model 650 as a boot device, insert the optical disk *before* the system is powered up and do not remove it until after the system is powered down.

---

9. *Plug in and power on the computer.*

   Hardware installation complete! If you are using SAM, complete the software set up portion of this procedures by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

Note Since optical media is removable, do not use the media as part of your automatically-mounted file systems (that is, do not add this disk drive to `/etc/checklist`).

HP 7907A Disk Drive

The HP 7907A is a Command Set 80 (CS/80) device containing a 20.5-Mbyte fixed disk and a 20.5-Mbyte removable cartridge disk. It connects to your computer via the "optional" built-in high-speed HP-IB interface or a high-speed HP-IB disk interface card.

Note The HP 7907A disk drive is not supported as a system disk and can only be used for secondary "mounted volumes" *or* LIF utility volumes.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Have the installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

The following table contains detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions using SAM.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-5. HP 7907A Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
HP 7907A - Fixed Disk	/dev/dsk/#s0	b	0	cs80	0x0e0*n*00	1	14
HP 7907A - Fixed Disk	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*00	1	14
HP 7907A - Removable Disk	/dev/dsk/#s0	b	0	cs80	0x0e0*n*10	1	14
HP 7907A - Removable Disk	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*10	1	14
HP 7907A - Fixed Disk	/dev/dsk/#s0	b	0	cs80	0x070*n*00	1	7
HP 7907A - Fixed Disk	/dev/rdsk/#s0	c	4	cs80	0x070*n*00	1	7
HP 7907A - Removable Disk	/dev/dsk/#s0	b	0	cs80	0x070*n*10	1	7
HP 7907A - Removable Disk	/dev/rdsk/#s0	c	4	cs80	0x070*n*10	1	7

1 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. SAM uses a longer naming convention that maps more closely to the hardware address of your device. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for details.

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the HP 7907A Disk Drive

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the `*` sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   The following high-speed HP-IB interfaces can be used. They are listed in order of preference for optimum disk performance:

   - HP 98262A high-speed HP-IB daughter board
     or
     HP 98625B high-speed HP-IB disk interface card
   - HP 98625A high-speed HP-IB disk interface card
   - Built-in "optional" secondary high-speed HP-IB interface.

Note With a 98625A high-speed HP-IB disk interface card, be sure that *no* SCSI bus interface is installed.

---

4. *Set the HP-IB bus address.*

Note Familiarize yourself with the HP-IB addresses that are currently in use on your system. Determine the available HP-IB addresses. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

---

   a. Choose an available HP-IB bus address and make note of it.
   b. Set the HP-IB bus address according to the instructions given in the hardware installation documentation provided with the device.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*

6. *Connect the disk drive to your computer.*

   Connect your HP 7907A to your computer following the instructions in the hardware installation documentation provided with the device.

7. *Connect the power cord to your device.*
8. *Turn on the device.*
9. *Plug in and power on the computer.*

Hardware installation complete! If you are using SAM, complete the software set up portion of this procedures by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

HP 7911P/R, 7912P/R, and 7914P/R/CT Disk and Tape Drives

These disk and tape drives are Command Set 80 (CS/80) devices. They connect to your computer via the "optional" built-in, high-speed HP-IB interface or the high-speed HP-IB disk interface card.

- The HP7911P/R is a 28.1-Mbyte disk with cartridge tape drive.
- The 7912P/R is a 65.6-Mbyte disk with cartridge tape drive.
- The 7914P/R is a 132-Mbyte disk with cartridge tape drive.
- The 7914CT is a 7914R disk drive and a 9144A cartridge tape drive in a 92211R cabinet.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Note The HP 7911P/R disk with tape drive is not supported as a system disk and can only be used for secondary "mounted volumes" *or* LIF utility volumes.

Before Installing This Device

Before you install this device:

- Have the installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

Caution Do not attempt to operate the unit until it is moved to the installation site and the spindle and actuator are unlocked. Do not apply any sudden mechanical shocks to the unit.

The following table contains detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once the hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-6. HP 7911/12/14 Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
HP 7911/12/14 - Disk	`/dev/dsk/#s0`	b	0	cs80	0x0e0*n*00	1	14
HP 7911/12/14 - Disk	`/dev/rdsk/#s0`	c	4	cs80	0x0e0*n*00	1	14
HP 7911/12/14 - Tape[3]	`/dev/ct/#s0`	b	0	cs80	0x0e0*n*10	1	14
HP 7911/12/14 - Tape[3]	`/dev/rct/#s0`	c	4	cs80	0x0e0*n*10	1	14
HP 7911/12/14 - Disk	`/dev/dsk/#s0`	b	0	cs80	0x070*n*00	1	7
HP 7911/12/14 - Disk	`/dev/rdsk/#s0`	c	4	cs80	0x070*n*00	1	7
HP 7911/12/14 - Tape[3]	`/dev/ct/#s0`	b	0	cs80	0x070*n*10	1	7
HP 7911/12/14 - Tape[3]	`/dev/rct/#s0`	c	4	cs80	0x070*n*10	1	7
HP 7911/12/14 - Tape[4]	`/dev/ct/#s0`	b	0	cs80	0x070*n*00	1	7
HP 7911/12/14 - Tape[4]	`/dev/rct/#s0`	c	4	cs80	0x070*n*00	1	7
HP 7911/12/14 - Tape[4]	`/dev/ct/#s0`	b	0	cs80	0x080*n*00	1	8
HP 7911/12/14 - Tape[4]	`/dev/rct/#s0`	c	4	cs80	0x080*n*00	1	8

1 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. SAM uses a longer naming convention that maps more closely to the hardware address of your device. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for details.

2 *n* is a number that identifies the address (set in step 4 or step 8 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

3 Single tape controller

4 Dual tape controller

Connecting the HP 7911/7912/7914 Disk/Tape Drives

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your disk interface.*

   The following high-speed HP-IB interfaces can be used. They are listed in order of preference for optimum disk performance:

   - HP 98262A high-speed HP-IB daughter board
     or
     HP 98625B high-speed HP-IB disk interface card
   - HP 98625A high-speed HP-IB disk interface card
   - Built-in "optional" secondary high-speed HP-IB interface.

Note With a 98625A high-speed HP-IB disk interface card, be sure that *no* SCSI bus interface is installed.

---

4. *Set the disk HP-IB bus address.*

Note Familiarize yourself with the HP-IB addresses that are currently in use on your system. Determine the available HP-IB addresses. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

If you have a dual controller you must allocate two HP-IB addresses. One for the disk drive and one for the tape drive. If you do not have a dual controller, the tape is accessed through the same HP-IB connector as the disk.

a. Choose an available HP-IB bus address and make note of it.
b. Set the HP-IB bus address according to the instructions provided in the installation documentation for the device.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*

6. *Connect the disk to your computer.*

   Connect the disk to your computer following the instructions in the hardware installation manual provided with the device.

Note Complete steps 7, 8, and 9 only if you have a dual controller. If you do not have a dual controller, skip to step 10.

---

7. *Determine the tape interface. (Dual Controller Only).*

Note Do not install HP-IB tape drives on the same interface as the root device (main disk drive). Doing so can degrade your disk drive's performance

---

- If you selected the HP 98625A/B HP-IB Disk Interface for your disk, use the built-in HP-IB Interface for your tape.
- If you selected the built-in HP-IB interface for your disk, use an HP 98624A HP-IB Interface for your tape (if available).
- Otherwise, use your built-in HP-IB interface for both disk and tape.

8. *Set the tape HP-IB bus address (Dual Controller Only).*

   a. Choose an available HP-IB bus address and make note of it.

Note Make sure to select a different bus address than the one you selected in the previous step for the disk drive.

---

   b. Set the tape HP-IB bus address according to the instructions provided in the installation documentation for the device.

9. *Connect the tape to your computer (Dual Controller Only).*

   Connect the tape to your computer following the instructions in the hardware installation manual provided with the device.

10. *Connect the power cord.*

11. *Turn on the device.*

12. *Plug in and power on the computer.*

Hardware installation complete! If you are using SAM, complete the software set up portion of this procedures by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

HP 7933H/35H/36H/37H Disk Drives

These disk drives are Command Set 80 (CS/80) devices. They connect to your computer via the built-in, high-speed HP-IB interface or the high-speed HP-IB disk interface card.

The HP 7933H is a 404-Mbyte fixed disk.
The HP 7935H is a 404-Mbyte removable disk.
The HP 7936H is a 308-Mbyte fixed disk.
The HP 7937H is a 571-Mbyte fixed disk.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Have the hardware installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

Caution Do not attempt to operate the unit until it is moved to the installation site and the spindle and actuator are unlocked.

Do not apply any sudden mechanical shocks to the unit.

The following table contains detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-7. HP 7933/35/36/37H Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
HP 7933/35/36/37	/dev/dsk/#s0	b	0	cs80	0x0e0*n*00	1	14
HP 7933/35/36/37	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*00	1	14
HP 7933/35	/dev/dsk/#s0	b	0	cs80	0x070*n*00	1	7
HP 7933/35	/dev/rdsk/#s0	c	4	cs80	0x070*n*00	1	7

1 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. SAM uses a longer naming convention that maps more closely to the hardware address of your device. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for details.

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the HP 7933/35/36/37H Disk Drives

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   The following high-speed HP-IB interfaces can be used. They are listed in order of preference for optimum disk performance:

   - HP 98262A high-speed HP-IB daughter board
     or
     HP 98625B high-speed HP-IB disk interface card
   - HP 98625A high-speed HP-IB disk interface card
   - Built-in "optional" secondary high-speed HP-IB interface.

Note With a 98625A high-speed HP-IB disk interface card, be sure that *no* SCSI bus interface is installed.

---

4. *Set the HP-IB bus address.*

Note Familiarize yourself with the HP-IB addresses that are currently in use on your system. Determine the available HP-IB addresses. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

7

a. Choose an available HP-IB bus address and make note of it.
b. Set the HP-IB bus address according to the instructions in the installation documentation provided with the device.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*
6. *Connect the disk to your computer.*

   Connect the disk to your computer following the instructions provided in the hardware installation manual for the device.
7. *Connect the power cord.*
8. *Turn on the device.*
9. *Plug in and power on the computer.*

Hardware installation complete! If you are using SAM, complete the software set up portion of this procedures by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

HP 7941A, 7942A, 7945A, 7946A Disk and Disk/Tape Drives

The HP 7941A and HP 7945A are Command Set 80 (CS/80) disks. These disk drives connect to your computer via the built-in high-speed HP-IB or the high-speed HP-IB disk interface card.

- The HP 7941 is a 23.8-Mbyte disk.
- The HP 7945A is a 55.5-Mbyte disk.
- The HP 7942A and HP 7946A products contain a 9144A cartridge tape drive in addition to the HP 7941A and HP 7945A disk drives respectively.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Note The HP 7941A and 7942A disk drives are not supported as system disks and can only be used for secondary "mounted volumes" *or* LIF utility volumes.

Before Installing This Device

Before you install this device:

- Have the hardware installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

The following table contains detailed HP-UX software set up information. If you use SAM to install a disk or tape drive, you will not need this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for software set up instructions using SAM.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in this section. Once the hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-8.
HP 7941A/42A/45A/46A Disk and Disk/Tape Drive Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
HP 7941/42/45/46 - Disk	/dev/dsk/#s0	b	0	cs80	0x0e0*n*00	1	14
HP 7941/42/45/46 - Disk	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*00	1	14
HP 7942/46 - Tape	/dev/ct/#s0	b	0	cs80	0x0e0*n*10	1	14
HP 7942/46 - Tape	/dev/rct/#s0	c	4	cs80	0x0e0*n*10	1	14
HP 7941/42/45/46 - Disk	/dev/dsk/#s0	b	0	cs80	0x070*n*00	1	7
HP 7941/42/45/46 - Disk	/dev/rdsk/#s0	c	4	cs80	0x070*n*00	1	7
HP 7942/46 - Tape	/dev/ct/#s0	b	0	cs80	0x070*n*10	1	7
HP 7942/46 - Tape	/dev/rct/#s0	c	4	cs80	0x070*n*10	1	7

1 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. SAM uses a longer naming convention that maps more closely to the hardware address of your device. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for details.

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the HP 7941A/42A/45A/46A Disk and Disk/Tape Drives

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   The following high-speed HP-IB interfaces can be used. They are listed in order of preference for optimum disk performance:

   - HP 98262A high-speed HP-IB daughter board
     or
     HP 98625B high-speed HP-IB disk interface card
   - HP 98625A high-speed HP-IB disk interface card
   - Built-in "optional" secondary high-speed HP-IB interface.

Note With a 98625A high-speed HP-IB disk interface card, be sure that *no* SCSI bus interface is installed.

---

4. *Set the HP-IB bus address.*

Note Familiarize yourself with the HP-IB addresses that are currently in use on your system. Determine the available HP-IB addresses. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

---

   a. Choose an available HP-IB bus address and make note of it.
   b. Set the HP-IB bus address according to the instructions in the hardware installation documentation provided with the device.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*
6. *Connect the disk drive to your computer.*

   Connect the device to your computer following the instructions in the hardware installation manual provided with the device.
7. *Connect the power cord to your device.*
8. *Turn on the device.*
9. *Plug in and power on the computer.*

Hardware installation complete! If you are using SAM, complete the software set up portion of this procedures by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

HP 7957A/57B/58A/58B and 7959B/62B/63B Disk Drives

These disk drives are Command Set (CS/80) devices. They connect to your computer via the built-in, high-speed HP-IB interface or the high-speed HP-IB disk interface card and have the following storage capacities:

HP 7957A/B	80 Mbytes storage capacity.
HP 7958A	131 Mbytes storage capacity.
HP 7958B/62B	152 Mbytes storage capacity.
HP 7959B/63B	304 Mbytes storage capacity.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Have the hardware installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

The following tables contain detailed HP-UX software set up information. If you use SAM to install any of these devices, you will not need this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions using SAM.

If you are using commands to set up HP-UX to communicate with any of these devices, complete the hardware installation as outlined in this section. Once the hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-9.
HP 7957A/57B/58A/58B and HP 7959B/62B/63B Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
HP 7957A/7958A	/dev/dsk/#s0	b	0	cs80	0x0e0*n*00	1	14
HP 7957A/7958A	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*00	1	14
HP 7957A/7958A	/dev/dsk/#s0	b	0	cs80	0x070*n*00	1	7
HP 7957A/7958A	/dev/rdsk/#s0	c	4	cs80	0x070*n*00	1	7
HP 7957/58/59B or HP 7962/63B	/dev/dsk/#s0	b	0	cs80	0x0e0*n*00	1	14
HP 7957/58/59B or HP 7962/63B	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*00	1	14
HP 7957/58/59B or HP 7962/63B	/dev/dsk/#s0	b	0	cs80	0x070*n*00	1	7
HP 7957/58/59B or HP 7962/63B	/dev/rdsk/#s0	c	4	cs80	0x070*n*00	1	7

1 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. SAM uses a longer naming convention that maps more closely to the hardware address of your device. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for details.

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the HP 7957A/57B/58A/58B and 7959B/62B/63B Disk Drives

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   The following high-speed HP-IB interfaces can be used. They are listed in order of preference for optimum disk performance:

   - HP 98262A high-speed HP-IB daughter board
     or
     HP 98625B high-speed HP-IB disk interface card
   - HP 98625A high-speed HP-IB disk interface card
   - Built-in "optional" secondary high-speed HP-IB interface.

Note With a 98625A high-speed HP-IB disk interface card, be sure that *no* SCSI bus interface is installed.

4. *Set the HP-IB bus address.*

Note Familiarize yourself with the HP-IB addresses that are currently in use on your system. Determine the available HP-IB addresses. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

   a. Choose an available HP-IB bus address and make note of it.

Caution Do not use address positions 8 and 9. On the HP 7957B/58B/59B/62B/63B disk drives, positions 8 and 9 on the ADDRESS wheel are for use by service personnel only. If the drive is powered on with 8 or 9 selected, loss of data can occur.

   b. Set the HP-IB bus address according to the instructions in the hardware installation documentation provided with the device.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*
6. *Connect the disk drive to your computer.*

   Connect the device to your computer following the instructions provided in the hardware installation manual for the device.
7. *Connect the power cord to your device.*
8. *Turn on the device.*
9. *Plug in and power on the computer.*

   Hardware installation complete! If you are using SAM, complete the software set up portion of this procedures by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

HP 7957/58/59S SCSI Disk Drives

These disk drives are Small Computer Systems Interface (SCSI) devices. They connect to your computer via the built-in SCSI interface or SCSI interface card and have the following storage capacities:

HP 7957S	107 Mbytes storage capacity.
HP 7958S	161 Mbytes storage capacity.
HP 7959S	323 Mbytes storage capacity.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Have the hardware installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

The following table contains detailed HP-UX software set up information. If you use SAM to install any of these devices, you will not need this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions using SAM.

If you are using commands to set up HP-UX to communicate with any of these devices, complete the hardware installation as outlined in this section. Once the hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-10. HP 7957S/58S/59S Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
HP 7957/58/59S	`/dev/dsk/#s0`	b	7	`scsi`	`0x0e0`*n*`00`	1	14
HP 7957/58/59S	`/dev/rdsk/#s0`	c	47	`scsi`	`0x0e0`*n*`00`	1	14

1 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. SAM uses a longer naming convention that maps more closely to the hardware address of your device. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for details.

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the HP 7957/58/59S SCSI Disk Drives

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*
   - Built-in SCSI interface
   - HP 98658A SCSI interface card
   - HP 98265A SCSI interface daughter card
4. *Set the SCSI bus address on your device.*

Note Familiarize yourself with the SCSI addresses that are currently in use on your system. Determine the SCSI address(es) that are available. Use the worksheet at the end of this book to note already-used addresses.

You are limited to seven devices per SCSI interface, bus addresses 0 through 6. Address 7 is reserved for the system's SCSI controller.

---

   a. Choose and available SCSI bus address and make note of it.
   b. Set the SCSI bus address according to the instructions in the hardware installation documentation provided with the device.

Note Setting the SCSI bus address to 8 or 9 selects the bus addresses 0 or 1 respectively.

---

5. *Ensure all power switches on the device and on the computer are in the OFF position.*

6. *Connect the disk drive to your computer.*

   Connect your device to your computer following the instructions in the hardware installation manual provided with the device.

   The HP 7957/58/59S SCSI disk drives have internal bus lengths of 0.3 meters.

   The SCSI bus length is limited to a maximum of six meters. This length includes the cable length between devices and the internal bus length for each device on the bus. Available SCSI cables and terminators are included in the "SCSI Device Guidelines" section of Chapter 1.

7. *Connect the power cord to your device.*
8. *Turn on the device.*

   DO NOT turn on the power to the computer before the disk drive.
9. *Plug in and power on the computer.*

   Hardware installation complete! If you are using SAM, complete the software set up portion of this procedures by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

Flexible Disk Drives

HP 9121D/S Flexible Disk Drives

The HP 9121D/S records 270 Kbytes of data on a single-sided (low density) 3.5-inch disk. The HP 9121S has a single disk drive, while the HP 9121D has two disk drives in the unit. The HP 9121 uses the amigo protocol.

HP 9122D/S/C Flexible Disk Drives

HP 9122D/S records 630 Kbytes of data on double-sided (high density) or 315 Kbytes of data on single-sided (low density) 3.5-inch disks. The 9122S has a single disk drive, while the HP 9122D has two disk drives in the unit.

The HP 9122C records 2 Mbytes of data unformatted and 1.4 Mbytes formatted on double-sided (high density) 3.5-inch disks. The HP 9122C unit is available with one or two disk drives per unit.

The HP 9122 uses the Command Set 80 (CS-80) protocol.

HP 9125S Flexible Disk Drive

The HP 9125S is a single 5.25-inch flexible disk drive and has a capacity of 270 Kbytes.

7

HP 9127A Flexible Disk Drive

The 9127A is single 5.25-inch flexible disk drive and has a capacity of 270 Kbytes.

These flexible disk drives connect to your computer via the built-in, standard-speed HP-IB interface or the standard-speed HP-IB disk interface card.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Note

- These HP flexible disk drives are not supported as system disks and can only be used for secondary "mounted volumes" *or* LIF utility volumes.
- SAM does not support installation of flexible disk drives.

Before Installing This Device

Before you install this device:

- Have the hardware installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution

If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

The following table contains detailed HP-UX software set up information. SAM *does not* support flexible disk drive set up. You will need to refer to this table and Chapter 14, "Setting Up Devices Using HP-UX Commands" to use commands to set up these devices. to communicate with HP-UX.

The device file naming conventions, file type specifications, major numbers, minor number format, and device file creation examples are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-11. HP 9121 and HP 9121D Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
HP 9121 - Left	`/dev/dsk/#s0`	b	2	amigo	0x070*n*00	2	7
HP 9121 - Left	`/dev/rdsk/#s0`	c	11	amigo	0x070*n*00	2	7
HP 9121D - Right	`/dev/dsk/#s0`	b	2	amigo	0x070*n*10	2	7
HP 9121D - Right	`/dev/rdsk/#s0`	c	11	amigo	0x070*n*10	2	7
HP 9121 - Left	`/dev/dsk/#s0`	b	2	amigo	0x080*n*00	2	8
HP 9121 - Left	`/dev/rdsk/#s0`	c	11	amigo	0x080*n*00	2	8
HP 9121D - Right	`/dev/dsk/#s0`	b	2	amigo	0x080*n*10	2	8
HP 9121D - Right	`/dev/rdsk/#s0`	c	11	amigo	0x080*n*10	2	8

1 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. SAM uses a longer naming convention that maps more closely to the hardware address of your device. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for details.

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Table 7-12. HP 9122 and HP 9122D Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
HP 9122 - Left	/dev/dsk/#s0	b	0	cs80	0x070*n*00	2	7
HP 9122 - Left	/dev/rdsk/#s0	c	4	cs80	0x070*n*00	2	7
HP 9122D - Right	/dev/dsk/#s0	b	0	cs80	0x070*n*10	2	7
HP 9122D - Right	/dev/rdsk/#s0	c	4	cs80	0x070*n*10	2	7
HP 9122 - Left	/dev/dsk/#s0	b	0	cs80	0x080*n*00	2	8
HP 9122 - Left	/dev/rdsk/#s0	c	4	cs80	0x080*n*00	2	8
HP 9122D - Right	/dev/dsk/#s0	b	0	cs80	0x080*n*10	2	8
HP 9122D - Right	/dev/rdsk/#s0	c	4	cs80	0x080*n*10	2	8

1 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. SAM uses a longer naming convention that maps more closely to the hardware address of your device. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for details.

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Table 7-13. HP 9125S Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
HP 9125S	/dev/dsk/#s0	b	0	cs80	0x070*n*00	2	7
HP 9125S	/dev/rdsk/#s0	c	4	cs80	0x070*n*00	2	7
HP 9125S	/dev/dsk/#s0	b	0	cs80	0x080*n*00	2	8
HP 9125S	/dev/rdsk/#s0	c	4	cs80	0x080*n*00	2	8

1 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. SAM uses a longer naming convention that maps more closely to the hardware address of your device. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for details.

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Table 7-14. HP 9127A Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
HP 9127A	/dev/dsk/#s0	b	0	cs80	0x070*n*00	2	7
HP 9127A	/dev/rdsk/#s0	c	4	cs80	0x070*n*00	2	7
HP 9127A	/dev/dsk/#s0	b	0	cs80	0x080*n*00	2	8
HP 9127A	/dev/rdsk/#s0	c	4	cs80	0x080*n*00	2	8

1 Replace the # with any unique number, using the same number in both the `/dev/dsk` and `/dev/rdsk`. SAM uses a longer naming convention that maps more closely to the hardware address of your device. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for details.

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the Flexible Disk Drives

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.* If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do

this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   - HP 98624A standard-speed HP-IB interface card
   - Built-in standard-speed HP-IB interface

4. *Set the HP-IB bus address.*

Note Familiarize yourself with the HP-IB addresses that are currently in use on your system. Determine the available HP-IB addresses. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

---

   a. Choose an available HP-IB bus address and make note of it.
   b. Set the HP-IB bus address according to the instructions in the hardware installation documentation provided with the device.

5. *Ensure that all power switches on the device and on the computer are in the OFF position.*

6. *Connect the disk drive to your computer.*

   Connect your device to your computer following the instructions in the hardware installation manual for the device.

7. *Connect the power cord to your device.*

8. *Plug in and power on the computer.*

Hardware installation complete! Refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" to complete the sofware set up using commands.

HP 9133D/H/L and 9134D/H/L Disk Drives

The HP 9133D/H/L contain an HP 9122A 3.5-inch double-sided flexible disk drive, and a 9134D, 9134H, and 9134L Winchester (hard) disk drive respectively. The HP 9134D/H/L contain only the Winchester (hard) disk drive.

These disk drives connect to your computer via the built-in, high-speed HP-IB, disk interface card, or the standard-speed HP-IB disk interface card.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Have the hardware installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

Note SAM does not support 9133D/H/L and 9134D/H/L disk drive set up.

The following tables contain detailed HP-UX software set up information. You *cannot* use SAM to set up HP-UX to communicate with any of these devices. Complete the hardware installation as outlined in the following section, then use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-15. HP 9133/34 (select code 14) Setup Information

Device Name[1]	Path Name[2]	File Type	Major Number	Device Driver	Minor Number[3]	Interleave Factor	Select Code
HP 9133/34 - Hard, 1st vol.	/dev/dsk/#s0	b	0	cs80	0x0e0*n*00	3	14
HP 9133/34 - Hard, 1st vol.	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*00	3	14
HP 9133/34 - Hard, 2nd vol.	/dev/dsk/#s0	b	0	cs80	0x0e0*n*01	3	14
HP 9133/34 - Hard, 2nd vol.	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*01	3	14
HP 9133/34 - Hard, 3rd vol.	/dev/dsk/#s0	b	0	cs80	0x0e0*n*02	3	14
HP 9133/34 - Hard, 3rd vol.	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*02	3	14
HP 9133/34 - Hard, 4th vol.	/dev/dsk/#s0	b	0	cs80	0x0e0*n*03	3	14
HP 9133/34 - Hard, 4th vol.	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*03	3	14
HP 9133/34 - Hard, 5th vol.	/dev/dsk/#s0	b	0	cs80	0x0e0*n*04	3	14
HP 9133/34 - Hard, 5th vol.	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*04	3	14
HP 9133/34 - Hard, 6th vol.	/dev/dsk/#s0	b	0	cs80	0x0e0*n*05	3	14
HP 9133/34 - Hard, 6th vol.	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*05	3	14
HP 9133/34 - Hard, 7th vol.	/dev/dsk/#s0	b	0	cs80	0x0e0*n*06	3	14
HP 9133/34 - Hard, 7th vol.	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*06	3	14
HP 9133/34 - Hard, 8th vol.	/dev/dsk/#s0	b	0	cs80	0x0e0*n*07	3	14
HP 9133/34 - Hard, 8th vol.	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*07	3	14
HP 9133 - Flexible	/dev/dsk/#s0	b	0	cs80	0x0e0*n*10	2	14
HP 9133 - Flexible	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*10	2	14

1 Refer only to the entries for the number of volumes you selected. If you have one volume (default configuration), only the "1st vol" entry applies to your disk.

2 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. A longer naming convention that maps more closely to the hardware address of your device is described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

3 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Table 7-16. HP 9133/34 (select code 7) Setup Information

Device Name[1]	Path Name[2]	File Type	Major Number	Device Driver	Minor Number[3]	Interleave Factor	Select Code
HP 9133/34 - Hard, 1st vol.	/dev/rdsk/#s0	c	4	cs80	0x070*n*00	7	7
HP 9133/34 - Hard, 2nd vol.	/dev/dsk/#s0	b	0	cs80	0x070*n*01	7	7
HP 9133/34 - Hard, 2nd vol.	/dev/rdsk/#s0	c	4	cs80	0x070*n*01	7	7
HP 9133/34 - Hard, 3rd vol.	/dev/dsk/#s0	b	0	cs80	0x070*n*02	7	7
HP 9133/34 - Hard, 3rd vol.	/dev/rdsk/#s0	c	4	cs80	0x070*n*02	7	7
HP 9133/34 - Hard, 4th vol.	/dev/dsk/#s0	b	0	cs80	0x070*n*03	7	7
HP 9133/34 - Hard, 4th vol.	/dev/rdsk/#s0	c	4	cs80	0x070*n*03	7	7
HP 9133/34 - Hard, 5th vol.	/dev/dsk/#s0	b	0	cs80	0x070*n*04	7	7
HP 9133/34 - Hard, 5th vol.	/dev/rdsk/#s0	c	4	cs80	0x070*n*04	7	7
HP 9133/34 - Hard, 6th vol.	/dev/dsk/#s0	b	0	cs80	0x070*n*05	7	7
HP 9133/34 - Hard, 6th vol.	/dev/rdsk/#s0	c	4	cs80	0x070*n*05	7	7
HP 9133/34 - Hard, 7th vol.	/dev/dsk/#s0	b	0	cs80	0x070*n*06	7	7
HP 9133/34 - Hard, 7th vol.	/dev/rdsk/#s0	c	4	cs80	0x070*n*06	7	7
HP 9133/34 - Hard, 8th vol.	/dev/dsk/#s0	b	0	cs80	0x070*n*07	7	7
HP 9133/34 - Hard, 8th vol.	/dev/rdsk/#s0	c	4	cs80	0x070*n*07	7	7
HP 9133 - Flexible	/dev/dsk/#s0	b	0	cs80	0x070*n*10	2	7
HP 9133 - Flexible	/dev/rdsk/#s0	c	4	cs80	0x070*n*10	2	7

1 Refer only to the entries for the number of volumes you selected. If you have one volume (default configuration), only the "1st vol" entry applies to your disk.

2 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. A longer naming convention that maps more closely to the hardware address of your device is described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

3 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Table 7-17. HP 9133/34 (select code 8) Setup Information

Device Name[1]	Path Name[2]	File Type	Major Number	Device Driver	Minor Number[3]	Interleave Factor	Select Code
HP 9133/34 - Hard, 1st vol.	/dev/dsk/#s0	b	0	cs80	0x080*n*00	7	8
HP 9133/34 - Hard, 1st vol.	/dev/rdsk/#s0	c	4	cs80	0x080*n*00	7	8
HP 9133/34 - Hard, 2nd vol.	/dev/dsk/#s0	b	0	cs80	0x080*n*01	7	8
HP 9133/34 - Hard, 2nd vol.	/dev/rdsk/#s0	c	4	cs80	0x080*n*01	7	8
HP 9133/34 - Hard, 3rd vol.	/dev/dsk/#s0	b	0	cs80	0x080*n*02	7	8
HP 9133/34 - Hard, 3rd vol.	/dev/rdsk/#s0	c	4	cs80	0x080*n*02	7	8
HP 9133/34 - Hard, 4th vol.	/dev/dsk/#s0	b	0	cs80	0x080*n*03	7	8
HP 9133/34 - Hard, 4th vol.	/dev/rdsk/#s0	c	4	cs80	0x080*n*03	7	8
HP 9133/34 - Hard, 5th vol.	/dev/dsk/#s0	b	0	cs80	0x080*n*04	7	8
HP 9133/34 - Hard, 5th vol.	/dev/rdsk/#s0	c	4	cs80	0x080*n*04	7	8
HP 9133/34 - Hard, 6th vol.	/dev/dsk/#s0	b	0	cs80	0x080*n*05	7	8
HP 9133/34 - Hard, 6th vol.	/dev/rdsk/#s0	c	4	cs80	0x080*n*05	7	8
HP 9133/34 - Hard, 7th vol.	/dev/dsk/#s0	b	0	cs80	0x080*n*06	7	8
HP 9133/34 - Hard, 7th vol.	/dev/rdsk/#s0	c	4	cs80	0x080*n*06	7	8
HP 9133/34 - Hard, 8th vol.	/dev/dsk/#s0	b	0	cs80	0x080*n*07	7	8
HP 9133/34 - Hard, 8th vol.	/dev/rdsk/#s0	c	4	cs80	0x080*n*07	7	8
HP 9133 - Flexible	/dev/dsk/#s0	b	0	cs80	0x080*n*10	2	8
HP 9133 - Flexible	/dev/rdsk/#s0	c	4	cs80	0x080010	2	8

1 Refer only to the entries for the number of volumes you selected. If you have one volume (default configuration), only the "1st vol" entry applies to your disk.

2 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. A longer naming convention that maps more closely to the hardware address of your device is described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

3 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the HP 9133D/H/L and 9134D/H/L Disk Drives

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file.

   To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

   If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   The following high-speed HP-IB interfaces can be used. They are listed in order of preference for optimum disk performance:

   - HP 98262A high-speed HP-IB daughter board
     or
     HP 98625B high-speed HP-IB disk interface card
   - HP 98625A high-speed HP-IB disk interface card
   - Built-in "optional" secondary high-speed HP-IB interface.

Note With a 98625A high-speed HP-IB disk interface card, be sure that *no* SCSI bus interface is installed.

---

4. *Set the HP-IB bus address.*

Note Familiarize yourself with the HP-IB addresses that are currently in use on your system. Determine the available HP-IB addresses. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

---

   a. Choose an available HP-IB bus address and make note of it.

   b. Set the HP-IB bus address according to the instructions in the hardware installation documentation provided with the device.

5. *Set the configuration switch.*

   The configuration switch partitions the disk into multiple volumes, making the disk act like several smaller disk drives. The switch is preset for a single volume. If you want multiple volumes on your disk, follow the procedures outlined in the installation documentation that came with your disk drive. If you are satisfied with one volume (as is usually the case with HP-UX), carry on with this procedure.

Caution Files can be lost if you change the configuration switch after initializing the disk. Only change the configuration switch immediately before you initialize, or re-initialize, the disk.

---

6. *Ensure all power switches on the device and on the computer are in the OFF position.*
7. *Connect the disk drive to your computer.*

   Connect the device to your computer following the instructions in the hardware installation manual provided with the device.

8. *Connect the power cord to your device.*
9. *Plug in and power on the computer.*

Hardware installation complete! Refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" to complete the sofware set up using commands.

HP 9153A/B and 9154A/B Disk Drives

The HP 9153A contains an HP 9154A 10-Mbyte Winchester (hard) disk drive and an HP 9122S 3.5-inch double-sided flexible disk drive. The HP 9153B contains an HP 9154B 20-Mbyte Winchester (hard) disk drive and an HP 9122S 3.5-inch double-sided flexible disk drive. The HP 9154A and HP 9154B contain the Winchester (hard) disk drive only.

These disk drives connect to your computer via the built-in, high-speed HP-IB disk interface card, or the standard-speed HP-IB disk interface card.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Additional information about the HP 9153 and 9154A/B can be found in the installation and user documentation that came with device.

Note The HP 9153A/B and 9154A/B disk drives are not supported as system disks and can only be used for secondary "mounted volumes" *or* LIF utility volumes.

Before Installing This Device

Before you install this device:

- Have the hardware installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

Note SAM does not support 9153A/B disk drive set up.

The following tables contain detailed HP-UX software set up information. You *cannot* use use SAM to set up HP-UX to communicate with these devices. Complete the hardware installation as outlined in the following section, then use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-18.
HP 9153 and 9154A/B/ (select code 14) Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
HP 9153/54 - Hard, 1st vol.	/dev/dsk/#s0	b	0	cs80	0x0e0*n*00	1	14
HP 9153/54 - Hard, 1st vol.	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*00	1	14
HP 9153/54 - Hard, 2nd vol.	/dev/dsk/#s0	b	0	cs80	0x0e0*n*01	1	14
HP 9153/54 - Hard, 2nd vol.	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*01	1	14
HP 9153/54 - Hard, 3rd vol.	/dev/dsk/#s0	b	0	cs80	0x0e0*n*02	1	14
HP 9153/54 - Hard, 3rd vol.	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*02	1	14
HP 9153/54 - Hard, 4th vol.	/dev/dsk/#s0	b	0	cs80	0x0e0*n*03	1	14
HP 9153/54 - Hard, 4th vol.	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*03	1	14
HP 9153/54 - Hard, 5th vol.	/dev/dsk/#s0	b	0	cs80	0x0e0*n*04	1	14
HP 9153/54 - Hard, 5th vol.	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*04	1	14
HP 9153/54 - Hard, 6th vol.	/dev/dsk/#s0	b	0	cs80	0x0e0*n*05	1	14
HP 9153/54 - Hard, 6th vol.	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*05	1	14
HP 9153/54 - Hard, 7th vol.	/dev/dsk/#s0	b	0	cs80	0x0e0*n*06	1	14
HP 9153/54 - Hard, 7th vol.	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*06	1	14
HP 9153/54 - Hard, 8th vol.	/dev/dsk/#s0	b	0	cs80	0x0e0*n*07	1	14
HP 9153/54 - Hard, 8th vol.	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*07	1	14
HP 9153 - Flexible	/dev/dsk/#s0	b	0	cs80	0x0e0*n*10	2	14
HP 9153 - Flexible	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*10	2	14

7

1 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. A longer naming convention that maps more closely to the hardware address of your device is described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Table 7-19. HP 9153A/54A (select code 7) Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
HP 9153/54 - Hard, 1st vol.	/dev/dsk/#s0	b	0	cs80	0x070*n*00	3	7
HP 9153/54 - Hard, 1st vol.	/dev/rdsk/#s0	c	4	cs80	0x070*n*00	3	7
HP 9153/54 - Hard, 2nd vol.	/dev/dsk/#s0	b	0	cs80	0x070*n*01	3	7
HP 9153/54 - Hard, 2nd vol.	/dev/rdsk/#s0	c	4	cs80	0x070*n*01	3	7
HP 9153/54 - Hard, 3rd vol.	/dev/dsk/#s0	b	0	cs80	0x070*n*02	3	7
HP 9153/54 - Hard, 3rd vol.	/dev/rdsk/#s0	c	4	cs80	0x070*n*02	3	7
HP 9153/54 - Hard, 4th vol.	/dev/dsk/#s0	b	0	cs80	0x070*n*03	3	7
HP 9153/54 - Hard, 4th vol.	/dev/rdsk/#s0	c	4	cs80	0x070*n*03	3	7
HP 9153/54 - Hard, 5th vol.	/dev/dsk/#s0	b	0	cs80	0x070*n*04	3	7
HP 9153/54 - Hard, 5th vol.	/dev/rdsk/#s0	c	4	cs80	0x070*n*04	3	7
HP 9153/54 - Hard, 6th vol.	/dev/dsk/#s0	b	0	cs80	0x070*n*05	3	7
HP 9153/54 - Hard, 6th vol.	/dev/rdsk/#s0	c	4	cs80	0x070*n*05	3	7
HP 9153/54 - Hard, 7th vol.	/dev/dsk/#s0	b	0	cs80	0x070*n*06	3	7
HP 9153/54 - Hard, 7th vol.	/dev/rdsk/#s0	c	4	cs80	0x070*n*06	3	7
HP 9153/54 - Hard, 8th vol.	/dev/dsk/#s0	b	0	cs80	0x070*n*07	3	7
HP 9153/54 - Hard, 8th vol.	/dev/rdsk/#s0	c	4	cs80	0x070*n*07	3	7
HP 9153 - Flexible	/dev/dsk/#s0	b	0	cs80	0x070*n*10	2	7
HP 9153 - Flexible	/dev/rdsk/#s0	c	4	cs80	0x070*n*10	2	7

1 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. A longer naming convention that maps more closely to the hardware address of your device is described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the HP 9153 and 9154A/B Disk Drives

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file.

   To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

   If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

   If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   The following high-speed HP-IB interfaces can be used. They are listed in order of preference for optimum disk performance:

   - HP 98262A high-speed HP-IB daughter board
     or
     HP 98625B high-speed HP-IB disk interface card
   - HP 98625A high-speed HP-IB disk interface card
   - Built-in "optional" secondary high-speed HP-IB interface.

Note With a 98625A high-speed HP-IB disk interface card, be sure that *no* SCSI bus interface is installed.

---

4. *Set the HP-IB bus address.*

Note Familiarize yourself with the HP-IB addresses that are currently in use on your system. Determine the available HP-IB addresses. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

---

   a. Choose an available HP-IB bus address and make note of it.

   b. Set the HP-IB bus address according to the instructions in the hardware installation documentation provided with the device.

5. *Set the configuration switch.*

   The configuration switch partitions the disk into multiple volumes, making the disk act like several smaller disk drives. The switch is preset for a single volume. If you want multiple volumes on your disk, follow the steps outlined in the the hardware installation documentation that came with this device. If you are satisfied with one volume (as is usually the case with HP-UX), continue with this procedure.

Caution Files can be lost if you change the configuration switch after initializing the disk. Only change the configuration switch immediately before you initialize, or re-initialize, the disk.

---

6. *Ensure all power switches on the device and on the computer are in the OFF position.*
7. *Connect the disk drive to your computer.*

   Connect the device to your computer following the instructions in the hardware installation manual provided with the device.

8. *Connect the power cord to the device.*
9. *Plug in and power on the computer.*

Hardware installation complete! Refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" to complete the sofware set up using commands.

HP C220A/03A HP-IB Disk Drives

The HP C220A/03A 5.25-inch disk drives are HP-IB interface devices. The HP C2200A (Model 335H) has a capacity of 335 Mbytes and the HP C2203A (Model 670H) has a capacity of 670 Mbytes.

These disk drives connect to your computer via the built-in, high-speed HP-IB interface, high-speed HP-IB disk interface card, or the standard-speed HP-IB disk interface card.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Have the hardware installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

Note

You can install the HP C220A/03A disks yourself if you deleted the installation option when you purchased the units. If you deleted the installation support, refer to the *HP Series 6000 Disk Storage Systems Installation Guide Models 335H, 670H, and 670XP* shipped with your units for installation details.

The HP C220A/03A disks can be installed by an HP Customer Engineer. The installation cost is included in the purchase price of the unit if you did not select the "delete installation" option. Your HP Customer Engineer will unpack and install your disk for you. For these details, please refer to the unpacking and installation procedures that came with the disk drive.

The following table contains detailed HP-UX software set up information. If you use SAM to install this disk drive, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

7

Table 7-20. HP 2200/03 Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
HP 2200/03	/dev/dsk/#s0	b	0	cs80	0x0e0*n*00	1	14
HP 2200/03	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*00	1	14
HP 2200/03	/dev/dsk/#s0	b	0	cs80	0x0e0*n*10	1	14
HP 2200/03	/dev/rdsk/#s0	c	4	cs80	0x0e0*n*10	1	14
HP 2200/03	/dev/dsk/#s0	b	0	cs80	0x070*n*00	1	7
HP 2200/03	/dev/rdsk/#s0	c	4	cs80	0x070*n*00	1	7
HP 2200/03	/dev/dsk/#s0	b	0	cs80	0x070*n*10	1	7
HP 2200/03	/dev/rdsk/#s0	c	4	cs80	0x070*n*10	1	7

1 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. SAM uses a longer naming convention that maps more closely to the hardware address of your device. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for details.

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the C220A/03A Disk Drives

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the `*` sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   The following HP-IB interfaces can be used. They are listed in order of preference for optimum disk performance:

   - HP 98262A high-speed HP-IB daughter board
     or
     HP 98625B high-speed HP-IB disk interface card
   - HP 98625A high-speed HP-IB disk interface card
   - Built-in "optional" secondary high-speed HP-IB interface.
   - HP 98624A standard-speed HP-IB interface card
   - Built-in standard-speed HP-IB interface

Note With a 98625A high-speed HP-IB disk interface card, be sure that *no* SCSI bus interface is installed.

4. *Set the HP-IB bus address.*

Note Familiarize yourself with the HP-IB addresses that are currently in use on your system. Determine the available HP-IB addresses. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

   a. Choose an available HP-IB bus address and make note of it.

   b. Set the HP-IB bus address according to the instructions in the hardware installation documentation provided with the device.

Caution Positions 8 and 9 on the ADDRESS wheel are for use by service personnel only. If the drive is powered on with 8 or 9 selected, loss of data can occur.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*
6. *Connect the disk drive to your computer.*

   Connect the device to your computer following the instructions provided in the hardware installation manual for the device.
7. *Select the Line Voltage.*

   Refer to the *HP Series 6000 Disk Storage Systems Installation Guide Models 335H, 670H, and 670XP* that was shipped with your disk drive to set the proper setting for the voltage select switch.
8. *Connect the power cord to the device.*
9. *Turn on the device.*
10. *Plug in and power on the computer.*

Hardware installation complete! If you are using SAM, complete the software set up portion of this procedures by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands".

Mass Storage Systems

The following Series 6000 Mass Storage Systems are covered in this section:

HP C2213A HP C2214B HP C2216T HP C2217T

The Series 6000 Mass Storage Systems are available with various combinations of SCSI devices as factory installed options or field upgrade kits. Refer to the *HP Series 6000 Mass Storage System Configuration Quick Reference Card* that came with your device for complete information on the options and upgrade kits available for your device.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

C2213A and C2216T Mass Storage Systems

The HP C2213A and C2216T Mass Storage System contain a power supply, 5.25-inch hard disk drive, two open slots within the cabinet to install additional SCSI (Small Computer System Interface) devices and a 664-Mbyte disk. (The HP C2213A is also referred to as a Series 6000 Model 660S. Text in this section will refer to this product as the HP C2213A. The HP C2216T is also referred to as a Series 6000 Model 670SE. Text in this section will refer to this product as the HP C2216T.)

This Mass Storage System is shipped in a cabinet with two additional 5.25-inch slots available for additional SCSI devices.

HP C2214B and C2217T Mass Storage Systems

The HP C2214B Mass Storage System contains a power supply, 5.25-inch hard disk drive, three full-height slots within the cabinet to install additional SCSI (Small Computer System Interface) devices, and a 1300-Mbyte disk drive. (The HP C2214B is also referred to as a Series 6000 Models 1350SE. Text in this section will refer to this product as the HP C2214B.)

The HP C2217T Mass Storage System is the same as the C2214B, except in a floor-standing tower model.

Before Installing This Device

Before you install this device:

- Have the hardware installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

The following tables contain detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once the hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-21. HP Mass Storage Systems Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Interleave Factor	Select Code	Minor Number[2]
disk drive	`/dev/dsk/#s0`	b	7	`scsi`	1	14	`0x0e0`*n*`00`
disk drive	`/dev/rdsk/#s0`	c	47	`scsi`	1	14	`0x0e0`*n*`00`

1 Replace the # with any unique number, using the same number in both the `/dev/dsk` and `/dev/rdsk`. SAM uses a longer naming convention that maps more closely to the hardware address of your device. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for details.

2 *n* is a number that identifies the bus address. Replace *n* with 2 if the bus address is set to 2, use 3 if the address is set to 3, and so on.

Table 7-22.
Examples of SCSI Devices Used with Mass Storage Systems

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Interleave Factor	Select Code	Minor Number[2]
optical disk	`/dev/dsk/#s0`	b	7	`scsi`	-	14	`0x0e0`*n*`00`
optical disk	`/dev/rdsk/#s0`	c	47	`scsi`	-	14	`0x0e0`*n*`00`
DDS-format drive, no rewind	`/dev/rmt/#mn`	c	54	`scsitape`	-	14	`0x0e0`*n*`03`
CD-ROM	`/dev/dsk/#s0`	b	7	`scsi`	0	14	`0x0e0`*n*`00`
CD-ROM	`/dev/rdsk/#s0`	c	47	`scsi`	0	14	`0x0e0`*n*`00`

1 Replace the # with any unique number, using the same number in both the **/dev/dsk** and **/dev/rdsk**. SAM uses a longer naming convention that maps more closely to the hardware address of your device. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for details.

2 *n* is a number that identifies the bus address. Replace *n* with 2 if the bus address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the Mass Storage Systems

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the `*` sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*
   - Built-in SCSI interface
   - HP 98658A SCSI interface card
   - HP 98265A SCSI interface daughter card
4. *Set the SCSI bus addresses on your devices.*

   Familiarize yourself with the SCSI addresses that are currently in use on your system. Determine the SCSI addresses that are available. Use the worksheet at the end of this book to note already-used addresses.

   You are limited to seven devices per SCSI interface, bus addresses 0 through 6. Address 7 is reserved for the system's SCSI controller.

   a. Set the hard disk SCSI bus addresses.
      - Choose an available SCSI bus address and make note of it.
      - Set the SCSI bus address according to the instructions in the hardware installation documentation provided with the device.

Note For optimum disk performance, your system disk should be set to SCSI address 6. The SCSI interface gives highest priority to the highest address (6) and priority decreases as you work back towards zero (0).

---

   b. Set the SCSI bus addresses of any additional SCSI devices that are part of your Mass Storage system. For example, the CD-ROM, DDS-format tape drive, and/or the optical disk drive. Setting the SCSI address of other devices supported in the Mass Storage System is described in the installation manual specific to your model of Mass Storage System.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*
6. *Connect the Mass Storage System to your computer.*

   Connect the mass storage device to your computer following the instructions outlined in the hardware installation manual provided with the device.

   The SCSI bus length is limited to a maximum of six meters. This length includes the cable length between devices and the internal bus length for each device on the bus. Available SCSI cables and terminators are included in the "SCSI Device Guidelines" section of Chapter 1.

   Check your hardware installation documentation for internal SCSI cable lengths on each device.
7. *Connect the power cord to the device.*
8. *Turn on the power to the Mass Storage System.*

   Do NOT turn on the power to the computer before you power on the Mass Storage System.

Note Apparent disk drive self test failure will occur when only computer power is off. When computer power is added, the self test failure should clear. If you are concerned about the apparent self test failure, disconnect both SCSI connectors from the Mass Storage System and observe the self test completion.

---

9. *Plug in and power on the computer.*

Hardware installation complete! If you are using SAM, complete the software set up portion of this procedures by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

HP 9144A/45A Tape Drive

The HP 9144A/45A Tape Drives use 1/4-inch tape cartridges. Two formatted storage capacities are available using the 88140SC (a package of 5, 150 ft. cartridge tapes, each 16.7 megabyte) or the 88140LC (a package of 5, 600 ft. cartridge tapes, each 67.0 megabyte) cartridges. The HP 9144A tape drive can read and write to 16 track tape only. The HP 9145A tape drive reads 16 track tape and can read and write to 32 track tape. The tape drives are compatible with existing 1/4-inch cartridges built into other HP mass storage devices.

The HP 9144A/45A tape drives connect to your computer via the built-in, standard-speed HP-IB or the standard-speed HP-IB disk interface cards.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Have the hardware installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

The following table contains detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-23. HP 9144A/45A Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
HP 9144A/45A	/dev/ct/#s0	b	0	cs80	0x070*n*00	-	7
HP 9144A/45A	/dev/rct/#s0	c	4	cs80	0x070*n*00	-	7
HP 9144A/45A	/dev/ct/#s0	b	0	cs80	0x080*n*00	-	8
HP 9144A/45A	/dev/rct/#s0	c	4	cs80	0x080*n*00	-	8

1 # is a number that identifies the device (for example, 1 for the first tape device installed). Replace # with any unique number.

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the HP 9144A/45A Tape Drive

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the `*` sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*
   - HP 98624A standard-speed HP-IB interface card
   - Built-in standard-speed HP-IB interface

Note Do not install HP-IB tape drives on the same interface as the root device (main disk drive). Doing so can degrade your disk drive's performance

4. *Set the HP-IB bus address.*

Note Familiarize yourself with the HP-IB addresses that are currently in use on your system. Determine the available HP-IB addresses. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

   a. Choose and available HP-IB bus address and make note of it.
   b. Set the HP-IB bus address according to the instructions in the hardware installation documentation provided with the device.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*

6. *Connect the tape drive to your computer.* Connect the device to your computer following the instructions given in the hardware installation manual for the device.

7. *Connect the power cord.*
8. *Turn on the device.*
9. *Plug in and power on the computer.*

Hardware installation complete! If you are using SAM, complete the software set up portion of this procedure by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

HP 7974A Tape Drive

The HP 7974A is a 100/50-ips, 1/2-inch, 9-track, open-reel tape drive supplied in an upright cabinet. It supports 1600-cpi Phase Encoded (PE) format and optionally 800-cpi NRZI format. The HP 7974A operates in either start/stop (50 ips) or streaming (100 ips) mode depending on whether data is available on the bus.

This tape drive connects to your computer via the built-in, high-speed HP-IB interface or the high-speed HP-IB disk interface card.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Have the hardware installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

The following table contains detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-24. HP 7974 Setup Information

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
HP 7974A, 800 cpi, Berkeley, no rewind	/dev/rmt/#ln	c	9	stape	0x0e0*n*03	-	14
HP 7974A, 800 cpi, Berkeley, autorewind	/dev/rmt/#l	c	9	stape	0x0e0*n*02	-	14
HP 7974A, 800 cpi, AT&T, no rewind	/dev/rmt/#ln	c	9	stape	0x0e0*n*01	-	14
HP 7974A, 800 cpi, AT&T, autorewind	/dev/rmt/#l	c	9	stape	0x0e0*n*00	-	14
HP 7974A, 1600 cpi, Berkeley, no rewind	/dev/rmt/#mn	c	9	stape	0x0e0*n*43	-	14
HP 7974A, 1600 cpi, Berkeley, autorewind	/dev/rmt/#m	c	9	stape	0x0e0*n*42	-	14
HP 7974A, 1600 cpi, AT&T, no rewind	/dev/rmt/#mn	c	9	stape	0x0e0*n*41	-	14
HP 7974A, 1600 cpi, AT&T, autorewind	/dev/rmt/#m	c	9	stape	0x0e0*n*40	-	14
HP 7974A, 800 cpi, Berkeley, no rewind	/dev/rmt/#ln	c	9	stape	0x070*n*03	-	7
HP 7974A, 800 cpi, Berkeley, autorewind	/dev/rmt/#l	c	9	stape	0x070*n*02	-	7
HP 7974A, 800 cpi, AT&T, no rewind	/dev/rmt/#ln	c	9	stape	0x070*n*01	-	7
HP 7974A, 800 cpi, AT&T, autorewind	/dev/rmt/#l	c	9	stape	0x070*n*00	-	7
HP 7974A, 1600 cpi, Berkeley, no rewind	/dev/rmt/#mn	c	9	stape	0x070*n*43	-	7
HP 7974A, 1600 cpi, Berkeley, autorewind	/dev/rmt/#m	c	9	stape	0x070*n*42	-	7
HP 7974A, 1600 cpi, AT&T, no rewind	/dev/rmt/#mn	c	9	stape	0x070*n*41	-	7
HP 7974A, 1600 cpi, AT&T, autorewind	/dev/rmt/#m	c	9	stape	0x070*n*40	-	7

1 # is a number that identifies the tape drive. Replace # with any unique number (for example, /dev/rmt/0h for the first tape drive).

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the HP 7974A Tape Drive

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *TURN ON your HP 7974A Tape Drive.*

4. *Determine your interface.*

   The following high-speed HP-IB interfaces can be used. They are listed in order of preference for optimum disk performance:

   - HP 98262A high-speed HP-IB daughter board
     or
     HP 98625B high-speed HP-IB disk interface card
   - HP 98625A high-speed HP-IB disk interface card
   - Built-in "optional" secondary high-speed HP-IB interface.

Note With a 98625A high-speed HP-IB disk interface card, be sure that *no* SCSI bus interface is installed.

Note Do not install HP-IB tape drives on the same interface as the root device (main disk drive). Doing so can degrade your disk drive's performance

5. *Set the HP-IB bus address.*

Note Familiarize yourself with the HP-IB addresses that are currently in use on your system. Determine the available HP-IB addresses. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

   a. Choose an available HP-IB bus address and make note of it.

   b. Set the HP-IB bus address according to the instructions in the hardware installation documentation provided with the device.

6. *Connect the tape drive to your computer.*

   Connect the device to your computer following the instructions in the hardware installation manual for the device.

7. *Plug in and power on the computer.*

Hardware installation complete! If you are using SAM, complete the software set up portion of this procedures by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

HP 7978A/B Tape Drives

The HP 7978A/B are 75-ips, 1/2-inch, 9-track, open-reel tape drives supplied in an upright cabinet. They support 1600-cpi Phase Encoded (PE) format and 6250-cpi Group Code Recording (GCR) format. The HP 7978A/B operates only in streaming mode.

These tape drives connect to your computer via the built-in, high-speed HP-IB or the high-speed HP-IB disk interface card.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Note Arrange to have your HP Customer Engineer install the HP 7978A/B Tape drive. The installation cost is included in the purchase price of the unit.

Before having this device installed:

- Have the hardware installation documentation that came with the device handy.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

The following table contains detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-25.
HP 7978A/B Tape Drive
Connected to Built-in HP-IB Interface (Select Code 7)

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]
HP 7978A/B, 6250 cpi, Berkeley, no rewind	/dev/rmt/#hn	c	9	stape	0x070*n*83
HP 7978A/B, 6250 cpi, Berkeley, autorewind	/dev/rmt/#h	c	9	stape	0x070*n*82
HP 7978A/B, 6250 cpi, AT&T, no rewind	/dev/rmt/#hn	c	9	stape	0x070*n*81
HP 7978A/B, 6250 cpi, AT&T, autorewind	/dev/rmt/#h	c	9	stape	0x070*n*80
HP 7978A/B, 1600 cpi, Berkeley, no rewind	/dev/rmt/#mn	c	9	stape	0x070*n*43
HP 7978A/B, 1600 cpi, Berkeley, autorewind	/dev/rmt/#m	c	9	stape	0x070*n*42
HP 7978A/B, 1600 cpi, AT&T, no rewind	/dev/rmt/#mn	c	9	stape	0x070*n*41
HP 7978A/B, 1600 cpi, AT&T, autorewind	/dev/rmt/#m	c	9	stape	0x070*n*40

1 # is a number that identifies the tape drive. Replace # with any unique number (for example, /dev/rmt/0h for the first tape drive).

2 *n* is a number that identifies the address. Replace *n* with a 0 if the address is set to 0, use 2 if the address is set to 2, and so on.

Connecting the HP 7978A/B Tape Drives

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the `*` sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   The following high-speed HP-IB interfaces can be used. They are listed in order of preference for optimum disk performance:

   - HP 98262A high-speed HP-IB daughter board
     or
     HP 98625B high-speed HP-IB disk interface card
   - HP 98625A high-speed HP-IB disk interface card
   - Built-in "optional" secondary high-speed HP-IB interface.

Note With a 98625A high-speed HP-IB disk interface card, be sure that *no* SCSI bus interface is installed.

---

4. *Ensure that the power switch is in the OFF position.*
5. *Connect the power cord to the device.*
6. *Turn ON the tape drive.*
7. *Set the HP-IB bus address.*

Note Find out which HP-IB addresses are currently in use on this system. Determine the available HP-IB addresses. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

---

   a. Choose an available HP-IB bus address and make note of it.

   b. Set the HP-IB bus address according to the instructions in the hardware installation documentation provided with the device.

8. *Ensure all power switches on the device and on the computer are in the OFF position.*
9. *Connect the Tape Drive to the Computer.*

   Connect the device to the computer following the instructions provided in the hardware installation documentation for the device.
10. *Plug in and power on the computer.*

Hardware installation complete! If you are using SAM, complete the software set up portion of this procedures by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

HP 7979A/7980A/7980XC Tape Drives

The HP 7979A is an HP-IB 125-ips 1/2-inch 9-track open-reel tape drive supplied in an upright cabinet. It supports 1600-cpi Phase Encoded (PE) format (can be upgraded to 6250 cpi). The HP 7980A is an HP-IB 125-ips 1/2-inch 9-track open-reel tape drive which supports 1600-cpi Phase Encoded (PE) format and 6250-cpi Group Coded Recording (GCR) format. The HP 7980XC is the same as the 7980A, with the added feature of being able to read and write in compressed format.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Note Arrange to have your HP Customer Engineer install your tape drive. The installation cost is included in the purchase price of the unit.

Before you have this device installed:

- Have the installation documentation that came with the device handy.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

Your HP Customer Engineer will unpack and install your tape drive, following these general procedures.

Caution Do not attempt to operate the unit until your HP Customer Engineer has installed the unit for you.

The following tables contain detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Have the hardware installation completed as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions using SAM.

If you are using commands to set up HP-UX to communicate with your device, have the hardware installation completed as outlined in the following section. Once the hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-26.
HP 7979/80A Tape Drive
Connected to HP 98625 Disk Interface (Select Code 14)

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]
HP 7979/80A, 6250 cpi, Berkeley, no rewind	/dev/rmt/#hn	c	9	stape	0x0e0*n*83
HP 7979/80A, 6250 cpi, Berkeley, autorewind	/dev/rmt/#h	c	9	stape	0x0e0*n*82
HP 7979/80A, 6250 cpi, AT&T, no rewind	/dev/rmt/#hn	c	9	stape	0x0e0*n*81
HP 7979/80A, 6250 cpi, AT&T, autorewind	/dev/rmt/#h	c	9	stape	0x0e0*n*80
HP 7979/80A, 1600 cpi, Berkeley, no rewind	/dev/rmt/#mn	c	9	stape	0x0e0*n*43
HP 7979/80A, 1600 cpi, Berkeley, autorewind	/dev/rmt/#m	c	9	stape	0x0e0*n*42
HP 7979/80A, 1600 cpi, AT&T, no rewind	/dev/rmt/#mn	c	9	stape	0x0e0*n*41
HP 7979/80A, 1600 cpi, AT&T, autorewind	/dev/rmt/#m	c	9	stape	0x0e0*n*40

1 # is a number that identifies the tape drive. Replace # with any unique number (for example, /dev/rmt/0mn for the first tape drive).

2 *n* is a number that identifies the address (set in step 3 of the Installation Procedure). Replace *n* with a 0 if the address is set to 0, use 2 if the address is set to 2, and so on.

Table 7-27.
HP 7979/80A Tape Drive
Connected to Built-in HP-IB Interface (Select Code 7)

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]
HP 7979/80A, 6250 cpi, Berkeley, no rewind	/dev/rmt/#hn	c	9	stape	0x070*n*83
HP 7979/80A, 6250 cpi, Berkeley, autorewind	/dev/rmt/#h	c	9	stape	0x070*n*82
HP 7979/80A, 6250 cpi, AT&T, no rewind	/dev/rmt/#hn	c	9	stape	0x070*n*81
HP 7979/80A, 6250 cpi, AT&T, autorewind	/dev/rmt/#h	c	9	stape	0x070*n*80
HP 7979/80A, 1600 cpi, Berkeley, no rewind	/dev/rmt/#mn	c	9	stape	0x070*n*43
HP 7979/80A, 1600 cpi, Berkeley, autorewind	/dev/rmt/#m	c	9	stape	0x070*n*42
HP 7979/80A, 1600 cpi, AT&T, no rewind	/dev/rmt/#mn	c	9	stape	0x070*n*41
HP 7979/80A, 1600 cpi, AT&T, autorewind	/dev/rmt/#m	c	9	stape	0x070*n*40

7

1 # is a number that identifies the tape drive. Replace # with any unique number (for example, /dev/rmt/0m for the first tape drive).

2 *n* is a number that identifies the address. Replace *n* with a 0 if the address is set to 0, use 2 if the address is set to 2, and so on.

Table 7-28.
HP 7980XC Tape Drive
Connected to HP 98625 Disk Interface (Select Code 14)

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]
HP 7980XC, 6250 cpi, Berkeley, no rewind, compressed	/dev/rmt/#hn	c	9	stape	0x0e0*n*c3
HP 7980XC, 6250 cpi, Berkeley, autorewind, compressed	/dev/rmt/#h	c	9	stape	0x0e0*n*c2
HP 7980XC, 6250 cpi, AT&T, no rewind, compressed	/dev/rmt/#hn	c	9	stape	0x0e0*n*c1
HP 7980XC, 6250 cpi, AT&T, autorewind, compressed	/dev/rmt/#h	c	9	stape	0x0e0*n*c0

1 # is a number that identifies the tape drive. Replace # with any unique number (for example, /dev/rmt/0hn for the first tape drive).

2 *n* is a number that identifies the address (set in step 3 of the Installation Procedure). Replace *n* with a 0 if the address is set to 0, use 2 if the address is set to 2, and so on.

Table 7-29.
HP 7980XC Tape Drive
Connected to Built-in HP-IB Interface (Select Code 7)

Device Name	Path Name[1]	File Type	Major Number	Device File	Minor Number[2]
HP 7980XC, 6250 cpi, Berkeley, no rewind, compressed	`/dev/rmt/#hn`	c	9	`stape`	`0x070`*n*`c3`
HP 7980XC, 6250 cpi, Berkeley, autorewind, compressed	`/dev/rmt/#h`	c	9	`stape`	`0x070`*n*`c2`
HP 7980XC, 6250 cpi, AT&T, no rewind, compressed	`/dev/rmt/#hn`	c	9	`stape`	`0x070`*n*`c1`
HP 7980XC, 6250 cpi, AT&T, autorewind, compressed	`/dev/rmt/#h`	c	9	`stape`	`0x070`*n*`c0`

1 # is a number that identifies the tape drive. Replace # with any unique number (for example, /dev/rmt/0mn for the first tape drive).

2 *n* is a number that identifies the address (set in step 3 of the Installation Procedure). Replace *n* with a 0 if the address is set to 0, use 2 if the address is set to 2, and so on.

Connecting the HP 7979A/7980A/7980XC Tape Drives

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   The following high-speed HP-IB interfaces can be used. They are listed in order of preference for optimum disk performance:

   - HP 98262A high-speed HP-IB daughter board
     or
     HP 98625B high-speed HP-IB disk interface card
   - HP 98625A high-speed HP-IB disk interface card
   - Built-in "optional" secondary high-speed HP-IB interface.

Note With a 98625A high-speed HP-IB disk interface card, be sure that *no* SCSI bus interface is installed.

---

4. *Ensure that the power switch is in the OFF position.*
5. *Connect the power cord to the device.*
6. *Turn ON the tape drive.*
7. *Set the HP-IB bus address.*

Note Find out which HP-IB addresses are currently in use on this system. Determine the available HP-IB addresses. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

---

   a. Choose an available HP-IB bus address and make note of it.

   b. Set the HP-IB bus address according to the instructions in the hardware installation documentation provided with the device.

8. *Ensure all power switches on the device and on the computer are in the OFF position.*

9. *Connect the tape drive to the computer.*

   Connect the device to the computer following the instructions provided in the hardware installation documentation for the device.

10. *Plug in and power on the computer.*

Hardware installation complete! If you are using SAM, complete the software set up portion of this procedures by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

HP C1511A Series 6400 Model 1300H HP-IB DDS-Format Drive

The HP Series 6400 Model 1300H is a streaming tape drive that stores data in a format called Digital Data Storage (DDS) on cassettes that can each hold up to 1.3 gigabytes (1300 megabytes) of data. It is a standalone drive and uses a high-speed HP-IB interface.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Note Use only HP labeled DDS-format tapes in HP DDS-format tape drives. HP 92283A contains five (60m) HP labeled DDS-format tapes. Use only 60 meter tapes on this drive.

Before Installing This Device

Before you install this device:

- Have the hardware installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

The following table contains detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once the hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-30. HP C1511A HP-IB DDS-Format Drive

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]	Interleave Factor	Select Code
HP C1511A HP-IB DDS	/dev/rmt/#s0	c	9	stape	0x0e0*n*00	-	14
HP C1511A HP-IB DDS	/dev/rmt/#s0	c	9	stape	0x070*n*00	-	7

1 # is a number that identifies the tape drive. Replace # with any unique number (for example, /dev/rmt/0s0 for the first tape drive).

2 *n* is a number that identifies the address (set in step 4 of this installation procedure). Replace *n* with 2 if the address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the HP C1511A Tape Drive

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   The following high-speed HP-IB interfaces can be used. They are listed in order of preference for optimum disk performance:

   - HP 98262A high-speed HP-IB daughter board
     or
     HP 98625B high-speed HP-IB disk interface card
   - HP 98625A high-speed HP-IB disk interface card
   - Built-in "optional" secondary high-speed HP-IB interface.

Note With a 98625A high-speed HP-IB disk interface card, be sure that *no* SCSI bus interface is installed.

---

4. *Set the HP-IB bus address*

Note Familiarize yourself with the HP-IB addresses that are currently in use on your system. Determine the available HP-IB addresses. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

---

   a. Choose an available HP-IB bus address and make note of it.

   b. Set the HP-IB bus address according to the instructions in the hardware installation documentation provided with the device.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*
6. *Connect the tape drive to your computer.*

   Connect your device to your computer following the instructions in the hardware installation manual for the device.
7. *Turn on the drive.*
8. *Insert tape.*

Note You must insert the tape *before* turning on the computer. If the DDS-format drive is found on the bus before the root disk during the automatic boot sequence, and no tape is inserted, the system will wait for you to insert a tape.

---

9. *Plug in and power on the computer.*

Hardware installation complete! If you are using SAM, complete the software set up portion of this procedures by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

HP C1512A HP Series 6400 Model 1300S SCSI DDS-Format Drive

The HP Series 6400 Model 1300S is a streaming tape drive that stores data in a format called Digital Data Storage (DDS) on cassettes that can each hold up to 1.3 gigabytes (1300 megabytes) of data. It is a standalone drive and uses a SCSI (Small Computer System Interface) interface.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Note Use only HP labeled DDS-format tapes in HP DDS-format tape drives. HP 92283A contains five (60m) HP labeled DDS-format tapes. Use only 60 meter tapes on this drive.

Before Installing This Device

Before you install this device:

- Have the hardware installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

What You're Going To Do

The following table contains detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions using SAM.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-31. C1512A SCSI DDS-Format Drive

Device Name	Path Name[1]	File Type	Major Number	Device Drivers	Select Code	Minor Number[2,3]
HP C1512A SCSI DDS, autorewind, AT&T	/dev/rmt/#m	c	54	scsitape, scsi	14	0x0e0*n*00
HP C1512A SCSI DDS, autorewind, Berkeley	/dev/rmt/#m	c	54	scsitape, scsi	14	0x0e0*n*02
HP C1512A SCSI DDS, no rewind, Berkeley	/dev/rmt/#mn	c	54	scsitape, scsi	14	0x0e0*n*03

1 # is a number that identifies the tape drive. Replace # with any unique number (for example, /dev/rmt/0m for the first tape drive).

2 *n* is a number that identifies the bus address. Replace *n* with 2 if the bus address is set to 2, use 3 if the address is set to 3, and so on.

3 Select partition 1 of the tape by adding 0x000010 to the minor number.

Connecting the HP C1512A SCSI DDS-Format Tape Drive

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*
   - Built-in SCSI interface
   - HP 98658A SCSI interface card
   - HP 98265A SCSI interface daughter card
4. *Set the SCSI bus address on your device.*

Note Familiarize yourself with the SCSI addresses that are currently in use on your system. Determine the SCSI address(es) that are available. Use the worksheet at the end of this book to note already-used addresses.

You are limited to seven devices per SCSI interface, bus addresses 0 through 6. Address 7 is reserved for the system's SCSI controller.

---

   a. Choose an available SCSI bus address and make note of it.
   b. Set the SCSI bus address according to the instructions in the hardware installation documentation provided with the device.
5. *Set the Parity* (P) *jumper to one (shorted).*
6. *Set the Termpower* (T) *jumper to one (shorted).*
7. *Ensure all power switches on the device and on the computer are in the OFF position.*
8. *Connect the tape drive to your computer.*

   Connect your device to your computer following the instructions in the hardware installation manual for the device.

   The HP C1512A DDS-Format drive has an internal bus length of .55 meters.

   The SCSI bus length is limited to a maximum of six meters. This length includes the cable length between devices and the internal bus length for each device on the bus. Available SCSI cables and terminators are included in the "SCSI Device Guidelines" section of Chapter 1.

9. *Turn on the drive.*
10. *Insert tape.*

Note On a Series 300 only, you must insert the tape *before* turning on the computer. If the DDS-format drive is found on the bus before the root disk during the automatic boot sequence, and no tape is inserted, the system will wait for you to insert a tape.

---

11. *Plug in and power on the computer.*

Hardware installation complete! If you are using SAM, complete the software set up portion of this procedures by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

HP C1520B/C1521B HP Series 6400 SCSI DDS-Format Tape Drives

The HP C1520B Digital Audio Tape (DAT) drive is a streaming tape drive that stores data in a format called Digital Data Storage (DDS). It is a high-capacity, medium transfer-rate standalone tape drive that uses a SCSI (Small Computer System Interface) interface. The C1520B has a fast search capability and can read data compressed tapes.

The HP C1521B is the same as the HP C1520B except that it can both read and store data in a data compressed DDS format.

A sixty meter (60m) DDS cassettes can hold up to 1.3 gigabytes (1300 megabytes) of uncompressed data. In compressed mode, a 60m DDS cassette can hold approximately 5.2 gigabytes (5200 megabytes) of data. A ninety meter (90m) DDS cassettes can hold up to 2.0 gigabytes (2000 megabytes) of uncompressed data. In compressed mode, a 90m DDS cassette can hold approximately 8.0 gigabytes (8000 megabytes) of data.

Note

- Data storage rate and capacity, especially in compressed mode, is dependent upon the computer's capacity to keep up with the device and the type of data being stored.
- Use only HP labeled DDS-format tapes in HP DDS-format tape drives. HP 92283A contains five (60m) HP labeled DDS-format tapes; and HP 92283B contains five (90m) HP labeled DDS-format tapes.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Have the hardware installation documentation that came with the device handy. You will need to refer to it during this procedure.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If your system is configured as an HP-UX cluster, refer to Chapter 12, "Adding Peripherals to a Cluster" in *Managing Clusters of HP 9000 Computers before* adding this device to your system.

Disk and tape drives can be added in a cluster environment to your client or server.

Refer to the User's Guides that came with your device for information on setting up, using, and maintaining this tape drive.

What You're Going To Do

The following table contains detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM" for set up instructions using SAM.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 7-32. C1520B SCSI DDS-Format Drive

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Select Code	Minor Number[2]
HP C1520B SCSI DDS, uncompressed, partition 0, Berkeley close, autorewind	`/dev/rmt/#mn`	c	54	`scsitape`	14	`0x0e0`*n*42
HP C1520B SCSI DDS, uncompressed, partition 0 Berkely close, no rewind	`/dev/rmt/#mn`	c	54	`scsitape`	14	`0x0e0`*n*43

1 # is a number that identifies the tape drive. Replace # with any unique number (for example, /dev/rmt/0m for the first tape drive).

2 *n* is a number that identifies the bus address. Replace *n* with 2 if the bus address is set to 2, use 3 if the address is set to 3, and so on.

Table 7-33. C1521B SCSI DDS-Format Drive

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Select Code	Minor Number[2]
HP C1521B SCSI DDS, uncompressed, partition 1 Berkeley close, autorewind	/dev/rmt/#mn	c	54	scsitape	14	0x0e0*n*52
HP C1521B SCSI DDS, uncompressed, partition 1 Berkeley close, no rewind	/dev/rmt/#mn	c	54	scsitape	14	0x0e0*n*53
HP C1521B SCSI DDS, compressed, partition 1, Berkeley close, autorewind	/dev/rmt/#h	c	54	scsitape	14	0x0e0*n*D2
HP C1521B SCSI DDS, compressed, partition 1, Berkeley close, no rewind	/dev/rmt/#hn	c	54	scsitape	14	0x0e0*n*D3
HP C1521B SCSI DDS, uncompressed, partition 0 AT&T close, no rewind	/dev/rmt/#mn	c	54	scsitape	14	0x0e0*n*41
HP C1521B SCSI DDS, uncompressed, partition 1 AT&T close, no rewind	/dev/rmt/#mn	c	54	scsitape	14	0x0e0*n*51
HP C1521B SCSI DDS, compressed, partition 0 AT&T close, no rewind	/dev/rmt/#hn	c	54	scsitape	14	0x0e0*n*C1
HP C1521B SCSI DDS, compressed, partition 1 AT&T close, no rewind	/dev/rmt/#hn	c	54	scsitape	14	0x0e0*n*D1

1 # is a number that identifies the tape drive. Replace # with any unique number (for example, /dev/rmt/0m for the first tape drive).

2 *n* is a number that identifies the bus address. Replace *n* with 2 if the bus address is set to 2, use 3 if the address is set to 3, and so on.

Connecting the HP C1520A/C1521A SCSI DDS-Format Tape Drives

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the `*` sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*
   - Built-in SCSI interface
   - HP 98658A SCSI interface card
   - HP 98265A SCSI interface daughter card
4. *Set the SCSI bus address on your device.*

Note Familiarize yourself with the SCSI addresses that are currently in use on your system. Determine the SCSI address(es) that are available. Use the worksheet at the end of this book to note already-used addresses.

You are limited to seven devices per SCSI interface, bus addresses 0 through 6. Address 7 is reserved for the system's SCSI controller.

---

   a. Choose an available SCSI bus address and make note of it.
   b. Set the SCSI bus address according to the instructions in the hardware installation documentation provided with the device.
5. *Enable computer control of data compression on writes.*

   Set the switches on the bottom of the mechanism to enable computer control of data compression on writes. Compressed data is automatically decompressed during a read.

Table 7-34. C1520/21B Switch Settings

Switch Number	Setting
1	off
2	on
3	on
4	on
5	on
6	on
7	on
8	on

6. *Ensure all power switches on the device and on the computer are in the OFF position.*
7. *Connect the tape drive to your computer.*

   Connect your device to your computer following the instructions in the hardware installation manual for the device.

   Consult the documentation that came with your tape drive for internal bus length information.

   The SCSI bus length is limited to a maximum of six meters. This length includes the cable length between devices and the internal bus length for each device on the bus. Available SCSI cables and terminators are included in the "SCSI Device Guidelines" section of Chapter 1.
8. *Turn on the drive.*
9. *Insert tape.*

Note You must insert the tape *before* turning on the computer. If the DDS-format drive is found on the bus before the root disk during the automatic boot sequence, and no tape is inserted, the system will wait for you to insert a tape.

---

10. *Plug in and power on the computer.*

Hardware installation complete! If you are using SAM, complete the software set up portion of this procedures by following the instructions in Chapter 8, "Setting Up HP-UX for Disk and Tape Drives Using SAM". If you are using the commands method to install this device, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands"

8

Setting Up HP-UX for Disk and Tape Drives Using SAM

Introduction

This chapter discusses setting up HP-UX to communicate with your disk drive. Setting up HP-UX for a disk drive consists of:

- creating the device file or verifying the correct device file already exists for communication with the device.
- ensuring the appropriate HP-UX device driver is part of the current kernel configuration.

There are two methods for setting up HP-UX:

- SAM method
- HP-UX Commands method

This chapter focuses on the SAM method to set up HP-UX for disk and tape drives. Refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for a description of the HP-UX commands method of setting up devices if you do not have SAM on your system.

Setting Up HP-UX for a Disk Drive

Before you begin:

Make sure that you know how you intend to use this disk:

- For file storage only
- For swap space only
- For both file storage and swap space

Also, make a note of the disk drive model and its hardware address (select code and bus address).

To set up HP-UX for your disk drive:

1. Log on as `root`.
2. Run SAM:

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

3. Highlight `Disks and File Systems->` and activate [Open].
4. Highlight `CD-ROM, Floppy, and Hard Disks` or `Magneto-optical Disks` and activate [Open].
5. From the "Actions" menubar title in the "Disk and File System Manager" window, highlight and choose `Add a Hard Disk Drive...`
6. Within the "Add a Hard Disk Drive" window, highlight and choose `Select disk to add`.
7. Within the "Select disk to add" window, highlight the disk you wish to add. You can identify it by its model number, select code and bus address. Activate [OK].
8. Within the "Add a Hard Disk Drive" window, highlight and choose `Set disk usage and options`.

9. Within the "Set disk usage and options" window:
   a. Activate the highlighted menu button. Highlight and choose the disk usage you prefer (`File System`, `Swap`, or `File System and Swap`).
   b. In the "Mount Directory;" field, type in the name of the directory that will be the mount point for the file system on this disk. Press (Return).
   c. You may receive an advisory message at this point. Read any such message carefully before activating `Yes` or `No`.

      If you choose `No`, repeat the previous step by typing in a different directory name.
   d. Turn on the checkbox labeled "Create a new file system."
   e. Several checkbox options appear below "Create a new file system." Turn on or off any of these checkbox options as required by your new filesystem.
   f. Activate (OK).
10. You may need to change certain options, such as when to mount the disk and how its access permissions are set. If so, within the "Add a Hard Disk Drive" window, highlight and activate `Modify Defaults`, then within the dialog box, turn on the checkboxes that apply.
11. Within the "Add a Hard Disk Drive" window, highlight and activate (OK).
12. A "Messages" Box appears, reporting the progress of the task. When the task if finished, activate (OK).
13. Exit SAM by returning to the "System Administration Manager" window and activating (Exit SAM).

Setting Up HP-UX for a Tape Drive

Before you begin:

Make a note of the tape drive model and its hardware address (select code and bus address).

To set up HP-UX for your tape drive:

1. Log on as `root`.
2. Run SAM:

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

3. Highlight `Peripheral Devices->` and activate [Open].
4. Highlight `Tape Drives` and activate [Open].
5. From the "Actions" menubar title in the "Tape Drive Manager" window, highlight and choose `Add...`
6. Within the "Add a Tape Drive" window, read the instructions, then activate [OK].
7. SAM may detect that your HP-UX kernel lacks the drivers necessary to make use of the tape drive. If so, within the "Device Driver Check" window, read the messages and choose the appropriate action.

   If `Build a new kernel and shut down the system immediately.` is your choice, SAM will create the kernel you need and reboot your computer. The rebooted system will be able to use the tape drive.
8. If you had to shutdown your system in order to physically connect the tape drive, re-enter SAM and repeat steps 3 through 6 above.
9. Highlight the new tape drive. You can identify it by its model number, select code and bus address.
10. From the "Actions" menubar, highlight and choosee `Create Device Files`.
11. Activate [OK] and exit SAM.

9

Installing Printers

Introduction

This chapter contains the installation and configuration procedures for the following printers:

HP 2225A ThinkJet Printer
HP 2227A/B QuietJet Plus Printer
HP 2228A/B QuietJet Printer
HP 2563B, 2564B, and 2566B Printers
HP 2684A/D/P LaserJet 2000 Printer
HP 2686A/D LaserJet Printer
HP 33440A LaserJet-II Printer
HP 33447A LaserJet-IID Printer
HP 33449A LaserJet Series III Printer
HP 33459A LaserJet Series IIID Printer
HP 33491A LaserJet Series IIIsi Printer
HP 2932A and 2934A Printers
HP 3630A PaintJet Printer
HP C1602A PaintJet XL Printer
HP 2563/64/66/67C Impact Printers

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

HP 2225A ThinkJet Printer

The HP 2225A ThinkJet printer connects to the computer through an HP-IB interface.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Refer to your printer's manuals for instructions on unpacking and preparing the printer for installation.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation shipped with your device handy. You will need to refer to it during this procedure.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system, you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

What You're Going To Do

The following tables contain detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 10, "Setting Up HP-UX for Printers Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once the hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 9-1.
HP 2225A ThinkJet
Connected to an HP-IB Interface

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Select Code	Minor Number[2]
HP 2225A ThinkJet	/dev/lp2225	c	7	printer	7[3]	0x070*n*00
HP 2225A ThinkJet	/dev/rlp2225	c	21	hpib	7[3]	0x070*n*00
HP 2225A ThinkJet	/dev/lp2225	c	7	printer	8[4]	0x080*n*00
HP 2225A ThinkJet	/dev/rlp2225	c	21	hpib	8[4]	0x080*n*00

1 Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 *n* represents the HP-IB bus address. Replace *n* with a 1 if the bus address was set to 1, use 4 if the bus address was set to 4, and so on.

3 Built-in HP-IB interface.

4 HP 98624 HP-IB Interface.

Connecting the Printer

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see the *System Administration Tasks* manual Chapter 3, "Starting and Stopping HP-UX" for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   The following standard-speed HP-IB interfaces can be used:

   - HP 98624A standard-speed HP-IB interface card
   - Built-in standard-speed HP-IB interface

Note Avoid placing the printer on the same interface used by your disk or tape drives. A dedicated HP-IB interface is recommended. Placing a printer on the same standard-speed HP-IB interface as your disk or tape drive could substantially affect the performance of your disk or tape drive.

---

4. *Set the HP-IB bus address.*

Note Determine which HP-IB addresses are in use by other devices on this HP-IB card. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

---

   a. Choose an available HP-IB bus address and make note of it.
   b. Set the HP-IB bus address according to the instructions in the installation documentation provided with the device.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*
6. *Connect the printer to your computer.*

   Connect the printer to your computer following the instructions provided in the hardware installation manual for the device.
7. *Connect the power cord.*
8. *Turn on the device.*
9. *Plug in and power on the computer.*

Hardware installation complete! You can now proceed to the set up procedures in Chapter 10, "Setting Up HP-UX for Printers Using SAM" if you are using SAM. If you are not using SAM, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for instructions on how to configure your system using commands.

HP 2227A/B QuietJet Plus and HP 2228A/B QuietJet Printers

The HP 2227A QuietJet Plus and 2228A QuietJet printers connect to the computer via an RS-232-C interface. The HP 2227B QuietJet Plus and 2228B QuietJet printers connect to the computer via an HP-IB interface.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Refer to the manuals that came with your printer for instructions on unpacking and preparing the printer for installation. Keep these manuals handy, you will need them during the installation.

Note Your printer might be preconfigured at the factory to operate in parallel mode. If you intend to connect the printer to a serial interface, you will need to reconfigure the printer for serial operation mode. See your printer's documentation for details.

- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system, you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

What You're Going To Do

The device driver you will need for this printer depends on the type of interface you are using. The following tables outline this information and contain additional detailed HP-UX software set up information. If you use SAM to install this device, you will not need this detailed information. Complete the hardware installation as outlined in this section, then refer to Chapter 10, "Setting Up HP-UX for Printers Using SAM" for set up instructions using SAM.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in this section. Once the hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 9-2.
HP 2227A/28A
Connected to RS-232-C Interfaces

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Select Code	Minor Number
HP 2227A/28A	/dev/lp2227a	c	1	98626	9[2]	0x090004
HP 2227A/28A	/dev/lp2227a	c	1	98626	9[3]	0x090004
HP 2227A/28A	/dev/lp2227a	c	1	98628	20[4]	0x140004
HP 2227A/28A, port 0	/dev/lp2227a	c	1	98642	13[5]	0x0d0004
HP 2227A/28A, port 1	/dev/lp2227a	c	1	98642	13[5]	0x0d0104
HP 2227A/28A, port 2	/dev/lp2227a	c	1	98642	13[5]	0x0d0204
HP 2227A/28A, port 3	/dev/lp2227a	c	1	98642	13[5]	0x0d0304
HP 2227A/28A, port 0	/dev/lp2227a	c	1	98642	28[6]	0x1c0004
HP 2227A/28A, port 1	/dev/lp2227a	c	1	98642	28[6]	0x1c0104
HP 2227A/28A, port 2	/dev/lp2227a	c	1	98642	28[6]	0x1c0204
HP 2227A/28A, port 3	/dev/lp2227a	c	1	98642	28[6]	0x1c0304
HP 2227A/28A, port 4	/dev/lp2227a	c	1	98642	28[6]	0x1c0404
HP 2227A/28A, port 5	/dev/lp2227a	c	1	98642	28[6]	0x1c0504
HP 2227A/28A, port 6	/dev/lp2227a	c	1	98642	28[6]	0x1c0604
HP 2227A/28A, port 7	/dev/lp2227a	c	1	98642	28[6]	0x1c0704

1 Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 Built-in RS-232-C port.

3 HP 98626A RS-232-C Interface.

4 HP 98628A Datacomm Interface.

5 HP 98642A 4-Channel Multiplexer Interface.

6 HP 98638A 8-Channel Multiplexer Interface

Table 9-3.
HP 2227B/28B
Connected to HP-IB Interfaces

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Select Code	Minor Number[2]
HP 2227B & 2228B	`/dev/lp2227b`[3]	c	7	`printer`	7[4]	`0x070`*n*`00`
HP 2227B & 2228B	`/dev/rlp2227b`[3]	c	21	`hpib`	7[4]	`0x070`*n*`00`
HP 2227B & 2228B	`/dev/lp2227b`[3]	c	7	`printer`	8[5]	`0x080`*n*`00`
HP 2227B & 2228B	`/dev/rlp2227b`[3]	c	21	`hpib`	8[5]	`0x080`*n*`00`

1 Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 *n* represents the HP-IB bus address. Replace *n* with a 1 is the bus address was set to 1, use 4 if the bus address was set to 4, and so on.

3 Substitute 2228b for 2227b in path name if applicable.

4 Built-in HP-IB Interface.

5 HP 98624A Standard-Speed HP-IB Interface.

Connecting the Printer

The following summary supplements the procedures outlined in your hardware installation documentation for this printer. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this printer are included in your* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

or

- Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

  If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

Table 9-4. Interface Options

Serial Interfaces[1]	HP-IB Interfaces[2]
Built-in RS-232-C	Built-in standard-speed HP-IB
HP 98626A RS-232-C	HP 98624A standard-speed HP-IB
HP 98628A Datacomm	
HP 98642A 4-Channel Muliplexer	
HP 98638A 8-Channel Mulitplexer	
HP 98644A RS-232-C	

1 If you have more than one serial port, make note of the address of the serial port you are using. You will need this information for testing and configuring your device.

2 Avoid placing the printer on the same HP-IB interface used by a disk or tape drive. A dedicated HP-IB interface is recommended.

Caution Many computer systems have both parallel and RS-232-C ports. These ports frequently appear identical. Make sure you plug your cable into the correct port or you could damage your device.

Note Your printer may be preconfigured at the factory to operate in parallel mode. If you intend to connect the printer to a different type of interface, you will need to reconfigure the printer for operation mode. See your printer's documentation for details.

4. *If you are using a standard HP-IB interface, set the HP-IB bus address now. If not, skip this step.*

Note Determine which HP-IB addresses are in use by other devices on this HP-IB card. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

   a. Choose an available HP-IB bus address and make note of it.
   b. Set the HP-IB bus address according to the instructions in the installation documentation provided with the device.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*

6. *Connect the printer to your computer.*

   Connect the printer to your computer following the instructions provided in the hardware installation manual for the device.

   If you are connected to an RS-232-C interface, the following data transmission values should be checked:

   - baud rate
   - parity
   - data length
   - handshake
   - symbol set (character set)

7. *Connect the power cord.*
8. *Turn on the device.*
9. *If you have any other devices to connect, do so now.*
10. *Plug in and power on the computer.*

Hardware installation complete! You may now proceed to the set up procedures in Chapter 10, "Setting Up HP-UX for Printers Using SAM" if you are using SAM. If you are not using SAM, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for instructions on how to configure your system using commands.

HP 2563B, 2564B, and 2566B Printers

The HP 2563B, 2564B, and 2566B are dot-matrix impact printers. They connect to your computer system via the HP-IB or RS-232-C interfaces.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Note These printers are installed by an HP Customer Engineer. Make arrangements for installation with your nearest HP Sales and Service office.

Before Installing This Device

Before you have this printer installed:

- Refer to the manuals that came with your printer for instructions on unpacking and preparing your printer for installation. Keep these manuals handy. You will need to refer to them during this procedure.

Note Your printer might be preconfigured at the factory to operate in serial mode. If you intend to connect the printer to an HP-IB interface, you will need to reconfigure the printer for this operation mode. See your printer's documentation for details.

- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system, you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

What You're Going To Do

The following tables contain detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 10, "Setting Up HP-UX for Printers Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once the hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 9-5.
HP 2563/64/66B
Connected to Built-in HP-IB Interface (Select Code 7)

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]
HP 2563/64/66B Opt. 200 non-CIPER	`/dev/lp2563`	c	7	`printer`	`0x070`*n*`00`
HP 2563/64/66B Opt. 200 non-CIPER	`/dev/rlp2563`	c	7	`printer`	`0x070`*n*`01`
HP 2563/64/66B Opt. 850 CIPER	`/dev/lp2563`	c	26	`ciper`	`0x070`*n*`00`
HP 2563/64/66B Opt. 850 CIPER	`/dev/rlp2563`	c	26	`ciper`	`0x070`*n*`01`

1 If you have an HP 2564B or HP 2566B, substitute 2564 or 2566 for 2563 in the path name. Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 *n* represents the HP-IB bus address. Replace *n* with a 1 if the address was set to 1, use 4 if the address was set to 4, and so on.

Table 9-6.
HP 2563/64/66B
Connected to HP 98624 HP-IB Interface (Select Code 8)

Device Name	Path Name[1]	File Type	Major Number	Device Driver	Minor Number[2]
HP 2563/64/66B Opt. 200 non-CIPER	`/dev/lp2563`	c	7	`printer`	`0x080`*n*`00`
HP 2563/64/66B Opt. 200 non-CIPER	`/dev/rlp2563`	c	7	`printer`	`0x080`*n*`01`
HP 2563/64/66B Opt. 850 CIPER	`/dev/lp2563`	c	26	`ciper`	`0x080`*n*`00`
HP 2563/64/66B Opt. 850 CIPER	`/dev/rlp2563`	c	26	`ciper`	`0x080`*n*`01`

1 If you have an HP 2564B or HP 2566B, substitute 2564 or 2566 for 2563 in the path name. Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 *n* represents the HP-IB bus address. Replace *n* with a 1 if the address was set to 1, use 4 if the address was set to 4, and so on.

Connecting the Printer

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

Table 9-7. Interface Options

Serial Interfaces[1]	HP-IB Interfaces[2]
Built-in RS-232-C	Built-in standard-speed HP-IB
HP 98626A RS-232-C	HP 98624A standard-speed HP-IB
HP 98628A Datacomm	
HP 98642A 4-Channel Muliplexer	
HP 98638A 8-Channel Mulitplexer	
HP 98644A RS-232-C	

1 If you have more than one serial port, make note of the address of the serial port you are using. You will need this information for testing and configuring your device.

2 Avoid placing the printer on the same HP-IB interface used by a disk or tape drive. A dedicated HP-IB interface is recommended.

Caution Many computer systems have both parallel and RS-232-C ports. These ports frequently appear identical. The built-in parallel interface should be labeled PARALLEL. Make sure you plug your cable into the correct port or you could damage your device.

Note Your printer might be preconfigured at the factory to operate in serial mode. If you intend to connect the printer to an HP-IB interface, you might need to reconfigure the printer for serial operation mode. See your printer's documentation for details.

4. *If you are using a standard HP-IB interface, set the HP-IB bus address now. If not, skip this step.*

Note Determine which HP-IB addresses are in use by other devices on this HP-IB card. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

---

   a. Choose an available HP-IB bus address and make note of it.
   b. Set the HP-IB bus address according to the instructions in the installation documentation provided with the device.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*

6. *Connect the printer to your computer.*

   Connect the printer to your computer following the instructions provided in the hardware installation manual for the device.

   If you connect your printer to an RS-232-C interface, check the following data transmission values:

   - baud rate
   - parity
   - data length
   - handshake
   - symbol set (character set)

7. *Connect the power cord.*

8. *Turn on the device.*

9. *Plug in and power on the computer.*

Hardware installation complete! You can now proceed to the set up procedures in Chapter 10, "Setting Up HP-UX for Printers Using SAM" if you are using SAM. If you are not using SAM, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for instructions on how to configure your system using commands.

HP 2684A/D/P LaserJet 2000 Printer

The HP 2684A/D/P connects to the computer via an RS-232/422 or parallel interface.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Note Your authorized dealer or HP Service Representative will assist in the initial set-up and configuration of your printer.

Before Installing This Device

Before having this device installed:

- Refer to the manuals that came with your printer for instructions on unpacking and preparing your printer for installation. Keep these manuals handy. You will need to refer to them during this procedure.
- Chapter 1, "Introduction" of this manual gives interface and cabling guidelines to follow when adding devices to your system. If you have not added this type of device to your system before, read the material in Chapter 1.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system, you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

What You're Going To Do

The following tables contain detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 10, "Setting Up HP-UX for Printers Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once the hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 9-8.
HP 2684A/D
Connected to RS-232-C Interfaces

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number
HP 2684A/D/P	/dev/lp2684	c	1	98626	9[2]	0x090004
HP 2684A/D/P	/dev/lp2684	c	1	98628	20[3]	0x140004
HP 2684A/D, port 0	/dev/lp2684	c	1	98642	13[4]	0x0d0004
HP 2684A/D, port 1	/dev/lp2684	c	1	98642	13[4]	0x0d0104
HP 2684A/D, port 2	/dev/lp2684	c	1	98642	13[4]	0x0d0204
HP 2684A/D, port 3	/dev/lp2684	c	1	98642	13[4]	0x0d0304
HP 2684A/D, port 0	/dev/lp2684	c	1	98642	28[5]	0x1c0004
HP 2684A/D, port 1	/dev/lp2684	c	1	98642	28[5]	0x1c0104
HP 2684A/D, port 2	/dev/lp2684	c	1	98642	28[5]	0x1c0204
HP 2684A/D, port 3	/dev/lp2684	c	1	98642	28[5]	0x1c0304
HP 2684A/D, port 4	/dev/lp2684	c	1	98642	28[5]	0x1c0404
HP 2684A/D, port 5	/dev/lp2684	c	1	98642	28[5]	0x1c0504
HP 2684A/D, port 6	/dev/lp2684	c	1	98642	28[5]	0x1c0604
HP 2684A/D, port 7	/dev/lp2684	c	1	98642	28[5]	0x1c0704

1 Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 Built-in RS-232-C Interface and HP 98626A RS-232-C Interface.

3 HP 98628A Datacomm Interface.

4 HP 98642A 4-Channel Multiplexer Interface

5 HP 98638A 8-Channel Multiplexer Interface

Table 9-9.
HP 2684A/D
Connected to a Parallel Interface

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number
HP 2684A/D	/dev/lp2684	c	21	parallel[2]	23[3]	0x170000

1 Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 The parallel driver requires the "hpib" driver to be part of the kernel configuration.

3 Built-in Parallel Interface.

Connecting the Printer

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

Table 9-10. Interface Options

Serial Interfaces[1]	Parallel Interfaces
Built-in RS-232-C	Built-in PARALLEL
HP 98626A RS-232-C	
HP 98628A Datacomm	
HP 98642A 4-Channel Muliplexer	
HP 98638A 8-Channel Mulitplexer	
HP 98644A RS-232-C	

1 If you have more than one serial port, make note of the address of the serial port you are using. You will need this information for testing and configuring your device.

Caution Many computer systems have both parallel and RS-232-C ports. These ports frequently appear identical. The built-in parallel interface should be labeled PARALLEL. Make sure you plug your cable into the correct port or you could damage your device.

4. *Set the printer's switches.*

   Refer to the *LaserJet 2000 Technical Reference Manual* for the appropriate configuration settings.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*

6. *Connect the printer to your computer.*

   Connect the printer to your computer following the instructions provided in the hardware installation manual for the device.

   If you are connected to an RS-232-C interface, the following data transmission values should be checked:

   - baud rate
   - parity
   - data length
   - handshake
   - symbol set (character set)

7. *Connect the power cord.*
8. *Turn on the device.*
9. *Plug in and power on the computer.*

Hardware installation complete! You can now proceed to the set up procedures in Chapter 10, "Setting Up HP-UX for Printers Using SAM" if you are using SAM. If you are not using SAM, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for instructions on how to configure your system using commands.

HP 2686A/D LaserJet, HP 33440A LaserJet-II, and HP 33447A LaserJet-IID Printer

The HP 2686A/D LaserJet, HP 33440A LaserJet-II, and HP 33447A LaserJet-IID printers connect to the computer via an RS-232-C or parallel interface.

The LaserJet-II and LaserJet-IID printers support network based printing via a LAN interface card installed in the printer. Detailed installation instructions are provided with the interface card.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Refer to the manuals that came with your printer for instruction on unpacking and preparing your printer for installation.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation shipped with your device handy. You will need to refer to it during this procedure.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system, you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

What You're Going To Do

The following tables contain detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 10, "Setting Up HP-UX for Printers Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once the hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 9-11.
HP 2686A/D, 33440A, or 33447A
Connected to RS-232-C Interfaces

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number
HP 2686A/D and 33440A/47A	/dev/lp2686	c	1	98626	9[2]	0x090004
HP 2686A/D and 33440A/47A	/dev/lp2686	c	1	98628	20[3]	0x140004
HP 2686A/D and 33440A/47A, port 0	/dev/lp2684	c	1	98642	13[4]	0x0d0004
HP 2686A/D and 33440A/47A, port 1	/dev/lp2684	c	1	98642	13[4]	0x0d0104
HP 2686A/D and 33440A/47A, port 2	/dev/lp2684	c	1	98642	13[4]	0x0d0204
HP 2686A/D and 33440A/47A, port 3	/dev/lp2684	c	1	98642	13[4]	0x0d0304
HP 2686A/D and 33440A/47A, port 0	/dev/lp2684	c	1	98642	28[5]	0x1c0004
HP 2686A/D and 33440A/47A, port 1	/dev/lp2684	c	1	98642	28[5]	0x1c0104
HP 2686A/D and 33440A/47A, port 2	/dev/lp2684	c	1	98642	28[5]	0x1c0204
HP 2686A/D and 33440A/47A, port 3	/dev/lp2684	c	1	98642	28[5]	0x1c0304
HP 2686A/D and 33440A/47A, port 4	/dev/lp2684	c	1	98642	28[5]	0x1c0404
HP 2686A/D and 33440A/47A, port 5	/dev/lp2684	c	1	98642	28[5]	0x1c0504
HP 2686A/D and 33440A/47A, port 6	/dev/lp2684	c	1	98642	28[5]	0x1c0604
HP 2686A/D and 33440A/47A, port 7	/dev/lp2684	c	1	98642	28[5]	0x1c0704

1 Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 Built-in RS-232-C Interface and HP 98626A RS-232-C Interface.

3 HP 98628A Datacomm Interface.

4 HP 98642A 4-Channel Multiplexer Interface

5 HP 98638A 8-Channel Multiplexer Interface

Connecting the Printer

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

Table 9-12. Interface Options

Serial Interfaces[1]	Parallel Interfaces
Built-in RS-232-C	Built-in PARALLEL
HP 98626A RS-232-C	
HP 98628A Datacomm	
HP 98642A 4-Channel Muliplexer	
HP 98638A 8-Channel Mulitplexer	
HP 98644A RS-232-C	

1 If you have more than one serial port, make note of the address of the serial port you are using. You will need this information for testing and configuring your device.

Caution Many computer systems have both parallel and RS-232-C ports. These ports frequently appear identical. The built-in parallel interface should be labeled PARALLEL. Make sure you plug your cable into the correct port or you could damage your device.

4. *Ensure all power switches on the device and on the computer are in the OFF position.*
5. *Configure and connect the printer to your computer.*

   Refer to the documentation shipped with your printer to configure the printer for either the RS-232-C serial interface or the parallel interface. Connect the printer to your computer following the instructions provided in the hardware installation manual for the device.

6. *Connect the power cord.*
7. *Turn on the device.*
8. *Plug in and power on the computer.*

Hardware installation complete! You can now proceed to the set up procedures in Chapter 10, "Setting Up HP-UX for Printers Using SAM" if you are using SAM. If you intend to use your printer as a network-based printer, use the procedure entitled "Adding a Network-Based Printer Using SAM" in the next chapter. If you are not using SAM, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for instructions on how to configure your system using commands.

HP 33449A LaserJet III, HP 33459A LaserJet IIID, and HP 33491A LaserJet IIIsi Printers

The HP 33449A LaserJet III, 33459A LaserJet IIID and 33491A LaserJet IIIsi printers can connect to your system via an RS-232-C (serial) or parallel interface.

The LaserJet III, IIID, and IIIsi printers also support network based printing via a LAN interface card installed in the printer. Detailed installation instructions are provided with the interface card.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Refer to your printer manuals for instructions on unpacking and preparing your printer for installation.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation shipped with your device handy. You will need to refer to it during this procedure.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system, you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

HP 33449A LaserJet III,
HP 33459A LaserJet IIID, and
HP 33491A LaserJet IIIsi Printers

What You're Going To Do

The following tables contain detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 10, "Setting Up HP-UX for Printers Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once the hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 9-13.
HP LaserJet III, IIID or IIIsi Printer
Connected to a Parallel Interface

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number
HP 33449A LaserJet III	`/dev/lp33449a`[2]	c	21	`parallel`[3]	23[4]	`0x170000`

1 Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 Substitute 33459 and 33491 for those models.

3 The parallel driver requires the "hpib" driver to be part of the kernel configuration.

4 Built in parallel interface.

Table 9-14.
HP LaserJet III, IIID or IIIsi Printer
Connected to RS-232-C Interfaces

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number
HP 33449A LaserJet III	/dev/lp33449A	c	1	98626	9[2]	0x090004
HP 33449A LaserJet III	/dev/lp33449A	c	1	98628	20[3]	0x140004
HP 33449A LaserJet III port 0	/dev/lp33449A	c	1	98642	13[4]	0x0d0004
HP 33449A LaserJet III, port 1	/dev/lp33449A	c	1	98642	13[4]	0x0d0104
HP 33449A LaserJet III, port 2	/dev/lp33449A	c	1	98642	13[4]	0x0d0204
HP 33449A LaserJet III, port 3	/dev/lp33449A	c	1	98642	13[4]	0x0d0304
HP 33449A LaserJet III, port 0	/dev/lp33449A	c	1	98642	28[5]	0x1c0004
HP 33449A LaserJet III, port 1	/dev/lp33449A	c	1	98642	28[5]	0x1c0104
HP 33449A LaserJet III, port 2	/dev/lp33449A	c	1	98642	28[5]	0x1c0204
HP 33449A LaserJet III, port 3	/dev/lp33449A	c	1	98642	28[5]	0x1c0304
HP 33449A LaserJet III, port 4	/dev/lp33449A	c	1	98642	28[5]	0x1c0404
HP 33449A LaserJet III, port 5	/dev/lp33449A	c	1	98642	28[5]	0x1c0504
HP 33449A LaserJet III, port 6	/dev/lp33449A	c	1	98642	28[5]	0x1c0604
HP 33449A LaserJet III, port 7	/dev/lp33449A	c	1	98642	28[5]	0x1c0704

1 Substitute 33459 and 33491 for those models. Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 Built-in RS-232-C Interface and HP 98626A RS-232-C Interface.

3 HP 98628A Datacomm Interface.

4 HP 98642A 4-Channel Multiplexer Interface

5 HP 98638A 8-Channel Multiplexer Interface

Connecting the Printer

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

Table 9-15. Interface Options

Serial Interfaces[1]	Parallel Interfaces
Built-in RS-232-C	Built-in PARALLEL
HP 98626A RS-232-C	
HP 98628A Datacomm	
HP 98642A 4-Channel Muliplexer	
HP 98638A 8-Channel Mulitplexer	
HP 98644A RS-232-C	

1 If you have more than one serial port, make note of the address of the serial port you are using. You will need this information for testing and configuring your device.

Caution Many computer systems have both parallel and RS-232-C ports. These ports frequently appear identical. The built-in parallel interface should be labeled PARALLEL. Make sure you plug your cable into the correct port or you could damage your device.

4. *Ensure all power switches on the device and on the computer are in the OFF position.*
5. *Connect the printer to your computer.*

   Connect the printer to your computer following the instructions provided in the hardware installation manual for the device.

   If you are connected to an RS-232-C interface, the following data transmission values should be checked:

   - baud rate
   - parity
   - data length
   - handshake
   - symbol set (character set)

6. *Connect the power cord.*
7. *Turn on the device.*
8. *Plug in and power on the computer.*

Hardware installation complete! You can now proceed to the set up procedures in Chapter 10, "Setting Up HP-UX for Printers Using SAM" if you are using SAM. If you intend to use your printer as a network-based printer, use the procedure entitled "Adding a Network-Based Printer Using SAM", in the next chapter. If you are not using SAM, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for instructions on how to configure your system using commands.

HP 2932A and HP 2934A Printers

The HP 2930 Series of printers provide features for several levels of printer categories. However, installation for all printers in the series is common. These printers connect to your system via the HP-IB interface.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Refer to the manuals that came with your printer for instructions on unpacking and preparing the printer for installation.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation shipped with your device handy. You will need to refer to it during this procedure.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system, you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

What You're Going To Do

The following tables contain detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 10, "Setting Up HP-UX for Printers Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once the hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 9-16.
HP 2932/34A
Connected to HP-IB Interfaces

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number[2]
HP 2932/34A	/dev/lp2932	c	7	printer	7[3]	0x070*n*00[4]
HP 2932/34A	/dev/rlp2932	c	7	printer	7[3]	0x070*n*01[5]
HP 2932/34A	/dev/lp2932	c	7	printer	8[6]	0x080*n*00[4]
HP 2932/34A	/dev/rlp2932	c	7	printer	8[6]	0x080*n*01[5]

1 If you have an HP 2934A, substitute 2934 for 2932 in the path name. Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 *n* represents the HP-IB bus address. Replace *n* with a 1 if the bus address was set to 1, use 4 if the bus address was set to 4, and so on.

3 Built-in HP-IB Interface.

4 Amigo HP-IB protocol—minor number bit 0 not set.

5 Non-protocol—minor number bit 0 set.

6 HP 98624 HP-IB Interface

Connecting the Printer

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see the *System Administration Tasks* manual Chapter 3, "Starting and Stopping HP-UX" for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   The following standard-speed HP-IB interfaces can be used:

   - HP 98624A standard-speed HP-IB interface card
   - Built-in standard-speed HP-IB interface

Note Avoid placing the printer on the same HP-IB interface used by a disk or tape drive. A dedicated HP-IB interface is recommended.

---

4. *Set the HP-IB bus address.*

Note Determine which HP-IB addresses are in use by other devices on this HP-IB card. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

---

   a. Choose an available HP-IB bus address and make note of it.
   b. Set the HP-IB bus address according to the instructions in the installation documentation provided with the device.

5. *Enable the AMIGO Protocol.*

   Follow the procedure in your printer's installation material to enable the AMIGO protocol. This allows HP-UX to pace the printer (time-share the bus with other devices on the interface) if the printer's address is in the range 0 to 7.

6. *Ensure all power switches on the device and on the computer are in the OFF position.*

7. *Connect the printer to your computer, or to the last device on the chain of HP-IB devices.*

   Connect the printer to your computer following the instructions provided in the hardware installation manual for the device.

8. *Connect the power cord.*
9. *Turn on the device.*
10. *Plug in and power on the computer.*

Hardware installation complete! You can now proceed to the set up procedures in Chapter 10, "Setting Up HP-UX for Printers Using SAM" if you are using SAM. If you are not using SAM, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for instructions on how to configure your system using commands.

HP 3630A PaintJet Printer

The HP 3630A PaintJet printer connects to your computer through an HP-IB or RS-232-C interface.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Refer to the manuals that came with your printer for instructions on unpacking and preparing your printer for installation.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation shipped with your device handy. You will need to refer to it during this procedure.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system, you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

What You're Going To Do

The following tables contain detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 10, "Setting Up HP-UX for Printers Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once the hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 9-17.
HP 3630A PaintJet
Connected to HP-IB Interfaces

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number[2]
HP 3630A PaintJet	/dev/lp3630	c	7	printer	7[3]	0x070*n*00
HP 3630A PaintJet	/dev/rlp3630	c	21	hpib	7[3]	0x070*n*00
HP 3630A PaintJet	/dev/lp3630	c	7	printer	8[4]	0x080*n*00
HP 3630A PaintJet	/dev/rlp3630	c	21	hpib	8[4]	0x080*n*00

1 Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 *n* representes the HP-IB bus address. Replace *n* with a 1 if the bus address was set to 1, use 4 if the bus address was set to 4, and so on.

3 Built-in HP-IB Interface.

4 HP 98624 HP-IB Interface.

Table 9-18.
HP 3630A PaintJet Printer
Connected to RS-232-C Interfaces

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number
HP 3630A PaintJet	/dev/lp3630A	c	1	98626	9[2]	0x090004
HP 3630A PaintJet	/dev/lp3630A	c	1	98628	20[3]	0x140004
HP 3630A PaintJet port 0	/dev/lp3630A	c	1	98642	13[4]	0x0d0004
HP 3630A PaintJet port 1	/dev/lp3630A	c	1	98642	13[4]	0x0d0104
HP 3630A PaintJet port 2	/dev/lp3630A	c	1	98642	13[4]	0x0d0204
HP 3630A PaintJet port 3	/dev/lp3630A	c	1	98642	13[4]	0x0d0304
HP 3630A PaintJet port 0	/dev/lp3630A	c	1	98642	28[5]	0x1c0004
HP 3630A PaintJet port 1	/dev/lp3630A	c	1	98642	28[5]	0x1c0104
HP 3630A PaintJet port 2	/dev/lp3630A	c	1	98642	28[5]	0x1c0204
HP 3630A PaintJet port 3	/dev/lp3630A	c	1	98642	28[5]	0x1c0304
HP 3630A PaintJet port 4	/dev/lp3630A	c	1	98642	28[5]	0x1c0404
HP 3630A PaintJet port 5	/dev/lp3630A	c	1	98642	28[5]	0x1c0504
HP 3630A PaintJet port 6	/dev/lp3630A	c	1	98642	28[5]	0x1c0604
HP 3630A PaintJet port 7	/dev/lp3630A	c	1	98642	28[5]	0x1c0704

1 Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 Built-in RS-232-C Interface and HP 98626A RS-232-C Interface.

3 HP 98628A Datacomm Interface.

4 HP 98642A 4-Channel Multiplexer Interface

5 HP 98638A 8-Channel Multiplexer Interface

Connecting the Printer

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the `*` sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

Table 9-19. Interface Options

Serial Interfaces[1]	HP-IB Interfaces[2]
Built-in RS-232-C	Built-in standard-speed HP-IB
HP 98626A RS-232-C	HP 98624A standard-speed HP-IB
HP 98628A Datacomm	
HP 98642A 4-Channel Muliplexer	
HP 98638A 8-Channel Mulitplexer	
HP 98644A RS-232-C	

1 If you have more than one serial port, make note of the address of the serial port you are using. You will need this information for testing and configuring your device.

2 Avoid placing the printer on the same HP-IB interface used by a disk or tape drive. A dedicated HP-IB interface is recommended.

Caution Many computer systems have both parallel and RS-232-C ports. These ports frequently appear identical. Make sure you plug your cable into the correct port or you could damage your device.

4. *If you are using a standard HP-IB interface, set the HP-IB bus address now. If not, skip this step.*

Note Determine which HP-IB addresses are in use by other devices on this HP-IB card. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

a. Choose an available HP-IB bus address and make note of it.
b. Set the HP-IB bus address according to the instructions in the installation documentation provided with the device.

5. *Enable the AMIGO Protocol.*

   Follow the procedure in your printer's installation material to enable the AMIGO protocol. This allows HP-UX to pace the printer (time-share the bus with other devices on the interface) if the printer's address is in the range 0 to 7.

6. *Ensure all power switches on the device and on the computer are in the OFF position.*

7. *Connect the printer to your computer.*

   Connect the printer to your computer following the instructions provided in the hardware installation manual for the device.

   If you are connected to an RS-232-C interface, the following data transmission values should be checked:

   - baud rate
   - parity
   - data length
   - handshake
   - symbol set (character set)

8. *Connect the power cord.*

9. *Turn on the device.*

10. *Plug in and power on the computer.*

Hardware installation complete! You can now proceed to the set up procedures in Chapter 10, "Setting Up HP-UX for Printers Using SAM" if you are using SAM. If you are not using SAM, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for instructions on how to configure your system using commands.

HP C1602A PaintJet XL Printer

The HP C1602A PaintJet XL printer is a high-speed color printer suited for a shared, high-volume user environment. Some of the features offered by the HP C1602A are:

- Presentation mode for highest quality graphics on paper; transparency mode for top-quality printing on overhead transparency film.
- Eight primary colors with many shades and hues available.
- Unattended, fast print speed (167 characters per second at 10 pitch) operation.
- Large standard buffer for downloadable fonts.
- Automatic sheet feed for standard paper and transparency sizes; manual feed capability for non-standard media sizes.
- RS-232-C, Centronics parallel and HP-IB interfaces available.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

If you use graphics software, check your software documentation (or software supplier) for specific computer hardware and memory requirements. When you install your software, you might have to **configure** the graphics software.

Before Installing This Device

Before you install this device:

- Refer to the documentation that came with your printer for instructions on unpacking and preparing your printer for installation.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation shipped with your device handy. You will need to refer to it during this procedure.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system, you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

What You're Going To Do

The following tables contain detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Complete the hardware installation as outlined in the following section, then refer to Chapter 10, "Setting Up HP-UX for Printers Using SAM" for set up instructions.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once the hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 9-20.
HP C1602A PaintJet XL Printer
Connected to HP-IB Interfaces

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number[2]
HP C1602A Printer	`/dev/lp1602A`	c	21	`hpib`	7[3]	`0x070`*n*`00`
HP C1602A Printer	`/dev/lp1602A`	c	21	`hpib`	8[4]	`0x080`*n*`00`

1 Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 *n* is a number that identifies the bus address. Replace *n* with a 5 if the address was set to 5, use 7 if the address was set to 7, and so on.

3 Built-in standard-speed HP-IB interface.

4 HP 98624A standard-speed HP-IB interface.

Table 9-21.
HP C1602A PaintJet XL Printer
Connected to a Parallel Interface

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number
HP C1602A Printer	/dev/ptrxxxx	c	21	parallel[2]	23[3]	0x170000

1 Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 The parallel driver requires the "hpib" driver to be part of the kernel configuration.

3 Built in parallel interface.

Table 9-22.
HP C1602A PaintJet XL Printer
Connected to RS-232-C Interfaces

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number
HP C1602A Printer	/dev/lp1602A	c	1	98626	9[2]	0x090004
HP C1602A Printer	/dev/lp1602A	c	1	98628	20[3]	0x140004
HP C1602A Printer port 0	/dev/lp1602A	c	1	98642	13[4]	0x0d0004
HP C1602A Printer port 1	/dev/lp1602A	c	1	98642	13[4]	0x0d0104
HP C1602A Printer port 2	/dev/lp1602A	c	1	98642	13[4]	0x0d0204
HP C1602A Printer port 3	/dev/lp1602A	c	1	98642	13[4]	0x0d0304

1 Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 Built-in RS-232-C Interface and HP 98626A RS-232-C Interface.

3 HP 98628A Datacomm Interface.

4 HP 98642A 4-Channel Multiplexer Interface

Table 9-22.
HP C1602A PaintJet XL Printer
Connected to RS-232-C Interfaces (continued)

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number
HP C1602A Printer port 0	/dev/lp1602A	c	1	98642	28[1]	0x1c0004
HP C1602A Printer port 1	/dev/lp1602A	c	1	98642	28[1]	0x1c0104
HP C1602A Printer port 2	/dev/lp1602A	c	1	98642	28[1]	0x1c0204
HP C1602A Printer port 3	/dev/lp1602A	c	1	98642	28[1]	0x1c0304
HP C1602A Printer port 4	/dev/lp1602A	c	1	98642	28[1]	0x1c0404
HP C1602A Printer port 5	/dev/lp1602A	c	1	98642	28[1]	0x1c0504
HP C1602A Printer port 6	/dev/lp1602A	c	1	98642	28[1]	0x1c0604
HP C1602A Printer port 7	/dev/lp1602A	c	1	98642	28[1]	0x1c0704

1 HP 98638A 8-Channel Multiplexer Interface

Connecting the Printer

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

Table 9-23. Interface Options

Serial Interfaces[1]	HP-IB Interfaces[2]	Parallel Interfaces
Built-in RS-232-C	Built-in standard-speed HP-IB	Built-in PARALLEL
HP 98626A RS-232-C	HP 98624A standard-speed HP-IB	
HP 98628A Datacomm		
HP 98642A 4-Channel Muliplexer		
HP 98638A 8-Channel Mulitplexer		
HP 98644A RS-232-C		

1 If you have more than one serial port, make note of the address of the serial port you are using. You will need this information for testing and configuring your device.

2 Avoid placing the printer on the same HP-IB interface used by a disk or tape drive. A dedicated HP-IB interface is recommended.

Caution Many computer systems have both parallel and RS-232-C ports. These ports frequently appear identical. The built-in parallel interface should be labeled PARALLEL. Make sure you plug your cable into the correct port or you could damage your device.

4. *If you are using a standard HP-IB interface, set the HP-IB bus address now. If not, skip this step.*

Note Determine which HP-IB addresses are in use by other devices on this HP-IB card. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

a. Choose an available HP-IB bus address and make note of it.
b. Set the HP-IB bus address according to the instructions in the installation documentation provided with the device.

5. *If you are connected to an RS-232-C interface, the following data transmission values should be set.*

   - baud rate
   - parity
   - media size
   - handshake
   - symbol set (character set)

   Refer to your printer's documentation for instructions on setting these values.

Note Do not reset these values unless you change your computer/printer system set up.

---

6. *Ensure all power switches on the device and on the computer are in the OFF position.*
7. *Connect the printer to your computer.*

   Connect the printer to your computer following the instructions provided in the hardware installation manual for the device.

8. *Connect the power cord.*
9. *Turn on the device.*
10. *Plug in and power on the computer.*

Hardware installation complete! You can now proceed to the set up procedures in Chapter 10, "Setting Up HP-UX for Printers Using SAM" if you are using SAM. If you are not using SAM, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for instructions on how to configure your system using commands.

HP 2563/64/66/67C Impact Printers

The high-speed, impact line printers discussed in this section replace the previous models with the same model numbers and a "B" suffix. They are used in situations requiring high-volume system printing applications.

The HP 2563C prints at a rate of 420 lines per minute.
The HP 2564C prints at a rate of 840 lines per minute.
The HP 2566C prints at a rate of 1200 lines per minute.
The HP 2567C prints at a rate of 1600 lines per minute.

These printers support the following interfaces:

- HP-IB
- RS-232-C
- Parallel

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before having this device installed:

- Refer to your printer's documentation for instructions on unpacking and preparing your printer for installation.
- Chapter 1, "Introduction" of this manual gives interface and cabling guidelines to follow when adding devices to your system. If you have not added this type of device to your system before, read the material in Chapter 1.
- Have the documentation shipped with your device handy. You will need to refer to it during this procedure.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system, you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

What You're Going To Do

The following tables contain detailed HP-UX software set up information. If you use SAM to install this device, you will not need all this detailed information. Have the hardware installation completed as outlined in the following section, then refer to Chapter 10, "Setting Up HP-UX for Printers Using SAM" for set up instructions using SAM.

If you are using commands to set up HP-UX to communicate with your device, have the hardware installation completed as outlined in the following section. Once the hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 9-24.
HP 2563/64/66/67C Impact Printers
Connected to HP-IB Interfaces

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number[2]
HP 256*x*C Printers	`/dev/lp256xC`	c	21	`hpib`	7[3]	`0x070n00`
HP 256*x*C Printers	`/dev/lp256xC`	c	21	`hpib`	8[4]	`0x080n00`

1 Replace the *x* in the device file with the correct number depending on which printer you are installing. Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 *n* is a number that identifies the bus address. Replace *n* with a 5 if the address was set to 5, use 7 if the address was set to 7, and so on.

3 Built-in standard-speed HP-IB interface.

4 HP 98624A standard-speed HP-IB interface.

Table 9-25.
HP 2563/64/66/67C Impact Printers
Connected to a Parallel Interface

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number
HP 256xC Printers	`/dev/ptr256xC`	c	21	`parallel`[2]	23[3]	`0x170000`

1 Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 The parallel driver requires the "hpib" driver to be part of the kernel configuration.

3 Built in parallel interface.

Table 9-26.
HP 2563/64/66/67C Impact Printers
Connected to RS-232-C Interfaces

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number
HP 256xC Printers	/dev/lp256xC	c	1	98626	9[2]	0x090004
HP 256xC Printers	/dev/lp256xC	c	1	98628	20[3]	0x140004
HP 256xC Printers port 0	/dev/lp256xC	c	1	98642	13[4]	0x0d0004
HP 256xC Printers port 1	/dev/lp256xC	c	1	98642	13[4]	0x0d0104
HP 256xC Printers port 2	/dev/lp256xC	c	1	98642	13[4]	0x0d0204
HP 256xC Printers port 3	/dev/lp256xC	c	1	98642	13[4]	0x0d0304
HP 256xC Printers port 0	/dev/lp256xC	c	1	98642	28[5]	0x1c0004
HP 256xC Printers port 1	/dev/lp256xC	c	1	98642	28[5]	0x1c0104
HP 256xC Printers port 2	/dev/lp256xC	c	1	98642	28[5]	0x1c0204
HP 256xC Printers port 3	/dev/lp256xC	c	1	98642	28[5]	0x1c0304
HP 256xC Printers port 4	/dev/lp256xC	c	1	98642	28[5]	0x1c0404
HP 256xC Printers port 5	/dev/lp256xC	c	1	98642	28[5]	0x1c0504
HP 256xC Printers port 6	/dev/lp256xC	c	1	98642	28[5]	0x1c0604
HP 256xC Printers port 7	/dev/lp256xC	c	1	98642	28[5]	0x1c0704

1 Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 Built-in RS-232-C Interface and HP 98626A RS-232-C Interface.

3 HP 98628A Datacomm Interface.

4 HP 98642A 4-Channel Multiplexer Interface

5 HP 98638A 8-Channel Multiplexer Interface

Connecting the Printer

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your* `/etc/conf/dfile` *file.*

   If you are adding a device that utilizes an interface type that is new on your system, you may have to add one or more necessary device drivers to the kernel configuration file. To verify that the necessary drivers, listed in the tables in the previous section, are part of your current kernel configuration file, you can:

   - Use SAM for the whole procedure. SAM will check your `dfile` for the necessary device drivers, add any that are missing, and reconfigure the kernel for you at this time. See the chapter on setting up HP-UX using SAM that follows this chapter; then go on to step 2.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. Use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine the interface.*

Table 9-27. Interface Options

Serial Interfaces[1]	HP-IB Interfaces[2]	Parallel Interfaces
Built-in RS-232-C	Built-in standard-speed HP-IB	Built-in parallel
HP 98626A RS-232-C	HP 98624A standard-speed HP-IB	
HP 98628A Datacomm		
HP 98642A 4-Channel Muliplexer		
HP 98638A 8-Channel Mulitplexer		
HP 98644A RS-232-C		

1 If you have more than one serial port, make note of the address of the serial port you are using. You will need this information for testing and configuring your device.

2 Avoid placing the printer on the same HP-IB interface used by a disk or tape drive. A dedicated HP-IB interface is recommended.

Caution Many computer systems have both parallel and RS-232-C ports. These ports frequently appear identical. The built-in parallel interface should be labeled PARALLEL. Make sure you plug your cable into the correct port or you could damage your device.

4. *If you are using a standard HP-IB interface, set the HP-IB bus address now. If not, skip this step.*

Note Determine which HP-IB addresses are in use by other devices on this HP-IB card. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

9

a. Choose an available HP-IB bus address and make note of it.
b. Set the HP-IB bus address according to the instructions in the installation documentation provided with the device.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*
6. *Connect the printer to your computer.*

   Connect the printer to your computer following the instructions provided in the hardware installation manual for the device.

   If you are connected to an RS-232-C interface, the following data transmission values should be checked:

   - baud rate
   - parity
   - data length
   - handshake
   - symbol set (character set)
7. *Connect the power cord.*
8. *Turn on the device.*
9. *If you have any other devices to connect, do so now.*
10. *Plug in and power on the computer.*

Hardware installation complete! You can now proceed to the set up procedures in Chapter 10, "Setting Up HP-UX for Printers Using SAM" if you are using SAM. If you are not using SAM, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for instructions on how to configure your system using commands.

10

Setting Up HP-UX for Printers Using SAM

This chapter describes how to use SAM to set up HP-UX to communicate with your printer.

Gather the necessary information:

- The name you are giving to this printer.
- The model or interface that the printer will use.
- The name of the device file that the printer will use.
- The priority for this printer.
- The class to which the printer will be added (optional).
- Whether or not you wish to make this device your system's default printer.

If you are adding a remote printer, be sure to have this additional information on hand:

- The name of the remote system to which the printer is attached.
- The name of the remote printer.
- The "cancel" model on the remote system (optional).
- The "status" model on the remote system (optional).
- Whether or not you wish to allow any user to cancel any printing request.
- Whether or not the remote printer is on a system using BSD (Berkeley Software Distibution) UNIX.

If you are adding a network-based printer, make a note of the link-level address used by the printer's network interface.

Adding a Local Printer

To configure your printer:

1. Log on as `root`.
2. Run SAM:

   `/usr/bin/sam`

3. Highlight `Peripheral Devices->` and activate [Open].
4. Highlight `Printers and Plotters->` and activate [Open].
5. Highlight `Printers/Plotters` and activate [Open].
6. From the "Actions" menu title in the "Printer/Plotter Manager" window, highlight and choose the appropriate one of the following menu items:
   - `Add a printer/plotter ->`
   - `Add a remote printer/plotter...`
   - `Add a network based printer`
7. If you are adding a local printer, SAM will search for any interfaces to which the printer might be connected. This information appears in an object list within a "Printer/plotter hardware location" window. Highlight and choose the appropriate hardware path.

   An "Add printer" dialog box appears. The titling and appearance of the dialog box will vary according to the type of connection you are using.
8. Type the required information into the fields displayed.

Note Some of the field names in the dialog box may be buttons ([Printer class], for example). Activate these for information about available choices for entering in the fields.

9. When you have entered all the information into the dialog box, activate [OK].

SAM will create the device file needed to communicate with the printer. SAM uses the device file naming convention `lp_`*xxxx*, where *xxxx* is the name of your printer.

Adding a Network-Based Printer Using SAM

To add a network-based printer or plotter using SAM:

Gather the necessary information:

- The name you are giving to this printer or plotter.
- The printer node name.
- The model or interface that the printer will use.
- The link-level address of the network card installed in the printer.
- The TCP-IP protocol printer requires an Internet Protocol (IP) address.
- The priority for this printer.
- The class to which the printer or plotter will be added (optional).

1. Ensure that the printer is connected to the network according to the installation instructions shipped with the network-based printer or the network interface card for the printer.
2. Run SAM; type:

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

   See Chapter 1, "Introduction to System Administration" for additional information about using SAM.
3. Highlight `Peripheral Devices` and activate the Open control button.
4. Highlight `Printers and Plotters` and activate the Open control button.
5. Highlight `Printers/Plotters` and activate the Open control button.
6. Choose `Add a network-based printer` then `Add TCP-IP protocol printer...` from the "Actions" menu.

7. Fill in the printer interface dialog box fields and turn on and off check box values.

   Activating the Help button from a dialog or message box gives you information about the attributes and tasks you can perform from the currently displayed window.

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

8. Activate the OK control button.

SAM provides an on line help system to assist you when you need additional information.

Activating the Help button from the SAM main window, a dialog box, or message box gives you information about the attributes and tasks you can perform from the currently displayed window.

From within a functional area, choosing an item from the "Help" menu gives you information about:

- the current functional area
- keyboard navigation within SAM
- using the SAM help system
- displaying the version of SAM you are currently running

From a dialog box (a window displaying fields to be filled in), pressing the f1 key gives you context-sensitive information for the object at the location of the cursor.

The software SAM needs to configure your network-based printer is shipped separately. Follow the instruction shipped with your printer to load the software.

In an HP-UX cluster, you can run SAM from a cluster client or the cluster server to add a network-based printer, in either case the printer will be available to all computers in the cluster.

11

Installing Plotters and Graphic Devices

Introduction

This chapter contains the installation instructions for the following plotters and graphic devices:

- HP Plotters
  - HP 7550B Plus Plotter
  - HP 7575/76A DraftPro DXL/EXL Plotters
  - HP C1600A/01A 7600 Series Models 240D and 240E Plotters
  - HP C1620A Series 7600 Model 355 Electrostatic Plotter
  - HP C1625A/27A Series 7600 Models 250 and 255 Plotters
- HP 13279B Color Monitor
- HP 45911A/C Graphics Tablet
- HP 46087/88A Digitizers and HP 46089A Cursor
- HP 9111A Graphics Tablet
- HP 98287A Graphics Display Controller Interface
- HP 98548/49/50A High Resolution Graphics Interface
- HP 98556A 2D Integer Based Graphics Accelerator Accessory Card
- HP 98627A Color Output Interface
- HP 98700 CX Graphics Display Controller
- HP 98702A Graphics Address and Data Bus Interface
- HP 98705A/B/C Graphics Display Controllers
- HP 98720A SRX Graphics Display Controller
- HP 98724A/25A Local Graphics Bus Interface
- HP 98726A Local Graphics Bus Interface
- HP 98730A TurboSRX Graphics Display Controller
- HP 98735-66580 Physical DMA Interface
- HP 98735-66581 Virtual DMA Interface
- HP 98735A/36A/36B Graphics Display Controllers
- HP A1416A High Resolution Color Graphics Interface

HP Plotters

HP plotters can connect to your computer using a variety of interface types. The following table shows the plotters described in this chapter and the interface types they support.

Table 11-1. Plotter Models and Supported Interface Types

HP Plotter Product No.	HP-IB	Parallel	RS-232 (serial)
7550B	Yes	Yes	Yes
1600A/01A	Yes	Yes	Yes
1620A	Yes	Yes	Yes
1625A/27A	Yes	Yes	Yes
7575/76A	Yes	No	Yes

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

If the plotter you are connecting is one of the models listed in the preceding table, find and read the description of the plotter in the following sections. Note that some plotters *are not* customer installable and attempting to install them could invalidate your warranty. This will be noted in the descriptive section that follows, and in the documentation that came with your plotter.

If you are connecting a plotter that is not specifically mentioned in the following section, find the procedure that outlines plotter connection for the interface type you are using in the "Installing Your Plotter" section. These generic procedures will apply to most plotters. Always consult the documentation that came with the plotter for specific exceptions and configuration information for that model.

HP 7550B Plus Plotter

The HP 7550B Plus plotter is a desktop color plotter, that is compatible with the HP-GL and HP-GL/2 languages. An additional 1- or 2-megabyte board option allows you to download plot files to the plotter and regain control of computer.

The HP 7550B Plus plotter has two back panel configuration options:

- RS-232-C and parallel option

  This option of the HP 7550B Plus plotter has a parallel and an RS-232-C (serial) interface. For optimum data transmission speed, use the parallel instead of the RS-232-C interface.

- RS-232-C and HP-IB option

  This option of the HP 7550B Plus plotter has an HP-IB and two RS-232-C (serial) interfaces.

HP C1600A/01A 7600 Series Models 240D and 240E Plotters

The HP C1600A/01A are monochrome electrostatic plotters compatible with the HP-GL and HP-GL/2 languages. They are intended for use in a computer-aided design (CAD) environment. A built-in 40 megabyte hard disk automatically stores the current drawing. The plotters support RS-232-C, parallel and HP-IB interfaces.

Pen plotters are vector devices. Vectors are straight line segments that form images such as squares, circles, or other polygons. Electrostatic plotters are raster devices. A raster device creates an image using an array of dots to form an image. Most graphics software programs send data in vector formats. Your electrostatic plotter has a vector-to-raster converter (VRC) to convert your design from the vector data to raster data.

Caution Do not install the VRC or set up the plotter yourself. Defects that result from customer setup invalidate the plotter's warranty.

Call your local HP Sales and Support Office for a certified representative to install the vector-to-raster converter (VRC) and set up your plotter. The installer will install the VRC, load toner and media, and ensure the plotter is operating properly.

A list of worldwide HP offices was included in your accessories box that accompanies the plotter.

HP C1620A Series 7600 Model 355 Electrostatic Plotter

The HP C1620A is a color electrostatic plotter that is compatible with HP-GL/2 and PCL-based raster graphics input. A rasterizer and built-in 40 megabyte hard disk provide simultaneous rasterization and printing. This plotter supports RS-232-C, parallel and HP-IB interfaces.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Pen plotters are vector devices. Vectors are straight line segments that form images such as squares, circles, or other polygons. Electrostatic plotters are raster devices. A raster device creates an image using an array of dots to form an image. Most graphics software programs send data in vector formats. Your electrostatic plotter has a vector-to-raster converter (VRC) to convert your design from the vector data to raster data.

Caution Do not install the VRC or set up the plotter yourself. Defects that result from customer setup invalidate the plotter's warranty.

Call your local HP Sales and Support Office for a certified representative to install the vector-to-raster converter (VRC) and set up your plotter. The installer will install the VRC, load toner and media, and ensure the plotter is operating properly.

A list of worldwide HP offices was included in your accessories box that accompanies the plotter.

SAM uses the naming convention `lp_xxxx` for device files. If you wish to use the device files shipped with your system (`plt_parallel`) you may specify the shipped device file name on the SAM screen for adding a plotter.

HP C1625A/27A Series 7600 Models 250 and 255 Plotters

The HP C1625A/27A are monochrome electrostatic plotters and is compatible with HP-GL/2 and PCL-based raster graphics input. These plotters have a rasterizer and built-in 40 megabyte hard disk for simultaneous rasterization and printing. They supports RS-232-C, Centronics and HP-IB interfaces.

Pen plotters are vector devices. Vectors are straight line segments that form images such as squares, circles, or other polygons. Electrostatic plotters are raster devices. A raster device creates an image using an array of dots to form an image. Most graphics software programs send data in vector formats. Your electrostatic plotter has a vector-to-raster converter (VRC) to convert your design from the vector data to raster data.

Caution Do not install the VRC or set up the plotter yourself. Defects that result from customer setup invalidate the plotter's warranty.

Call your local HP Sales and Support Office for a certified representative to install the vector-to-raster converter (VRC) and set up your plotter. The installer will install the VRC, load toner and media, and ensure the plotter is operating properly.

A list of worldwide HP offices was included in your accessories box that accompanies the plotter.

HP 7575/76A DraftPro DXL/EXL Plotters

The DraftPro plotters support the standard HP-GL language and have a one- or two-megabyte buffer option which will allow you to download an entire plot, freeing your computer. The HP7575/76A support HP-IB, HP-IB Secondary Command Support, and RS-232-C interfaces.

What You're Going To Do

The following tables contain detailed HP-UX software set up information. If you use SAM to install this device, you will not need this detailed information. Complete the hardware installation as outlined in the following sections, then refer to Chapter 12, "Setting Up HP-UX for Plotters Using SAM" for set up instructions using SAM.

If you are using commands to set up HP-UX to communicate with your device, complete the hardware installation as outlined in the following section. Once the hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 11-2.
HP Plotters
Connected to HP-IB Interfaces

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number[2]
Plotter	/dev/lp*xxxx*	c	21	hpib	7[3]	0x070*n*00
Plotter	/dev/lp*xxxx*	c	21	hpib	8[4]	0x080*n*00

1 Replace *xxxx* with the model number of the plotter. For example, /dev/lp7550

2 *n* is a number that identifies the bus address. Replace *n* with a 5 if the address was set to 5, use 7 if the address was set to 7, and so on.

3 Built-in standard-speed HP-IB interface.

4 HP 98624A standard-speed HP-IB interface.

Table 11-3.
HP Plotters
Connected to a Parallel Interface

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number
HP Plotter	/dev/lp*xxxx*	c	21	parallel[2]	23[3]	0x

1 Replace *xxxx* with the model number of the plotter.

2 The parallel driver requires the "hpib" driver to be part of the kernel configuration.

3 Built in parallel interface.

Table 11-4.
HP Plotters
Connected to an RS-232-C Interface

Device Name	Path Name[1]	File Type	Major Number	Driver Name	Select Code	Minor Number
HP Plotters	/dev/lp*xxxx*	c	1	98626	9[2]	0x090004
HP 7550B, 7575/76A Plotters	/dev/lp*xxxx*	c	1	98628	20[3]	0x140004

1 Replace *xxxx* with the model number of the plotter.

2 Built in RS-232-C interface and HP 98626A RS-232-C Interface.

3 HP 98628A Datacomm Interface

Installing Your Plotter

Before you Install This Device

- Refer to your plotter's manuals for instructions on unpacking and preparing the plotter for installation.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation shipped with your device handy. You will need to refer to it during this procedure.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

Connecting Your Plotter to an HP-IB Interface

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this plotter is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary drivers, listed in the set up tables at the beginning of this chapter, are part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing and reconfigure the kernel for you at this time. See Chapter 12, "Setting Up HP-UX for Plotters Using SAM", and then go on to step two.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your HP-IB interface.*

   The following standard-speed HP-IB interfaces can be used:

   - HP 98624A standard-speed HP-IB interface card
   - Built-in standard-speed HP-IB interface

Note Avoid placing the plotter on the same interface used by your disk or tape drives. A dedicated HP-IB interface is recommended. Placing a plotter on the same standard-speed HP-IB interface as your disk or tape drive could substantially affect the performance of your disk or tape drive.

---

4. *Set the HP-IB bus address.*

Note Determine which HP-IB addresses are in use by other devices on this HP-IB card. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

---

   a. Check the plotters documentation for information on preset bus addresses. If the preset address is available, make note of it and go on to the next step.
   b. If the preset bus address is already in use, choose an available HP-IB bus address and make note of it.

   Set the HP-IB bus address according to the instructions in the installation documentation provided with the device.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*
6. *Connect the plotter to your computer.*

   Connect the plotter to your computer using a stand-speed HP-IB cable. Follow the instructions provided in the plotter's installation manual.
7. *Connect the power cord to the plotter.*
8. *Turn on the plotter.*
9. *Plug in and power on the computer.*

Hardware installation complete! You may now proceed to the set up procedures in Chapter 12, "Setting Up HP-UX for Plotters Using SAM". If you are not using SAM, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for instructions on how to configure your system using commands.

Connecting Your Plotter to a Parallel Interface

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this plotter is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary drivers, listed in the set up tables at the beginning of this chapter, are part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing and reconfigure the kernel for you at this time. See Chapter 12, "Setting Up HP-UX for Plotters Using SAM", and then go on to step two.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   Locate the built-in parallel interface on the back of the computer. It should be labeled PARALLEL.

4. *Ensure all power switches on the plotter and on the computer are in the OFF position.*

5. *Connect the plotter to your computer.*

Caution Many computer systems have both parallel and RS-232-C ports. These ports frequently appear identical. The built-in parallel interface should be labeled PARALLEL. Make sure you plug your parallel cable into the parallel port or you could damage your plotter.

   Connect the plotter to your computer following the instructions provided in the installation manual for the device.

6. *Connect the power cord to your device.*

7. *Turn on the device.*

8. *Plug in and power on the computer.*

Hardware installation complete! You may now proceed to the set up procedures in Chapter 12, "Setting Up HP-UX for Plotters Using SAM". If you are not using SAM, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for instructions on how to configure your system using commands.

Connecting Your Plotter to an RS-232 Interface

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this plotter is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary drivers, listed in the set up tables at the beginning of this chapter, are part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the necessary drivers, add any that are missing and reconfigure the kernel for you at this time. See Chapter 12, "Setting Up HP-UX for Plotters Using SAM", and then go on to step two.

     or

   - Look in your `dfile` for the drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the `*` sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   The following Serial Interfaces are supported:

   - Built-in RS-232-C
   - HP 98626A RS-232-C
   - HP 98628A Datacomm
   - HP 98642A 4-Channel Muliplexer
   - HP 98638A 8-Channel Mulitplexer
   - HP 98644A RS-232-C

Note If you have more than one serial port, make note of the address of the serial port you are using. You will need this information for testing and configuring your device.

Caution Many computer systems have both parallel and RS-232-C ports. These ports frequently appear identical. The built-in parallel interface should be labeled PARALLEL. Make sure you plug your cable into the correct port or you could damage your device.

4. *Determine the type of connection.*

   - standalone
   - eavesdrop
   - local
   - remote

   Refer to the plotter's documentation to determine the appropriate configuration settings.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*
6. *Connect the plotter to your computer.*

   Connect the plotter to your computer following the instructions provided in the installation manual for the plotter.
7. *Connect the power cord.*
8. *Turn on the device.*

   Configure the following RS-232-C data transmission values.

baud rate	Set to match your computer's baud rate.
parity	Set to match your computer's parity setting.
data length	
handshake	
symbol set	
(character set)	

9. *Plug in and power on the computer.*

Hardware installation complete! You may now proceed to the set up procedures in Chapter 12, "Setting Up HP-UX for Plotters Using SAM" if you are using SAM. If you are not using SAM, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for instructions on how to configure your system using commands.

HP 9111A Graphics Tablet

The HP 9111A Graphics Tablet connects to your computer via the standard-speed HP-IB interface.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this device:

- Refer to your graphics device manuals for instructions on unpacking and preparing the device for installation.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation shipped with your graphics device handy. You will need to refer to it during this procedure.
- Plan ahead. Installing new peripherals on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

What You're Going To Do

The following table contains detailed HP-UX software set up information. Complete the hardware installation as outlined in this section. Once hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 11-5.
HP 9111A
Connected to Built-in HP-IB Interface

Device Name	Path Name	File Type	Major Number	Select Code	Minor Number[1]
HP 9111A	/dev/dig9111	c	21	7	0x070*n*00
HP 9111A	/dev/dig9111	c	21	8	0x080*n*00

1 *n* is a number that identifies the bus address (set in step 4 of the installation procedure). Replace *n* with a 6 if the address was set to 6, use 7 if the address was set to 7, and so on.

Connecting the HP 9111A Graphics Tablet

The following summary supplements the procedures outlined in your hardware installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the drivers required for this device are included in your* `/etc/conf/dfile` *file.*

   To verify that the necessary drivers are part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the drivers, add it (them) if necessary and reconfigure the kernel for you at this time. See Chapter 12, "Setting Up HP-UX for Plotters Using SAM", and then go on to step two.

     or

   - Look in your `dfile` for the drivers. If the necessary drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the drivers or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Determine your interface.*

   The following standard-speed HP-IB interfaces may be used:

   - HP 98624A standard-speed HP-IB interface card
   - Built-in standard-speed HP-IB interface

Note Avoid placing the tablet on the same interface used by your disk or tape drives. A dedicated HP 98624A HP-IB Interface is recommended. Placing a tablet on the same HP-IB interface as your disk or tape drive could substantially affect the performance of your disk or tape drive.

---

4. *Set the HP-IB Address.*

Note Familiarize yourself with the HP-IB addresses that are currently in use on your system. Determine the available HP-IB addresses. Use the worksheet at the end of this book to note already-used addresses.

You are limited to eight devices per HP-IB card, addresses 0 through 7.

---

   a. Choose an available HP-IB bus address and make note of it.
   b. Set the HP-IB bus address according to the instructions in the installation documentation provided with the device.

5. *Ensure all power switches on the device and on the computer are in the OFF position.*

6. *Connect the HP 9111A to the computer, or to the last device on the chain of HP-IB devices.*

   Connect the graphics device to your computer following the instructions provided in the installation manual that came with the device.

7. *Connect the power cord to the graphics tablet.*

8. *Turn on the graphics tablet.*

9. *Plug in and power on the computer.*

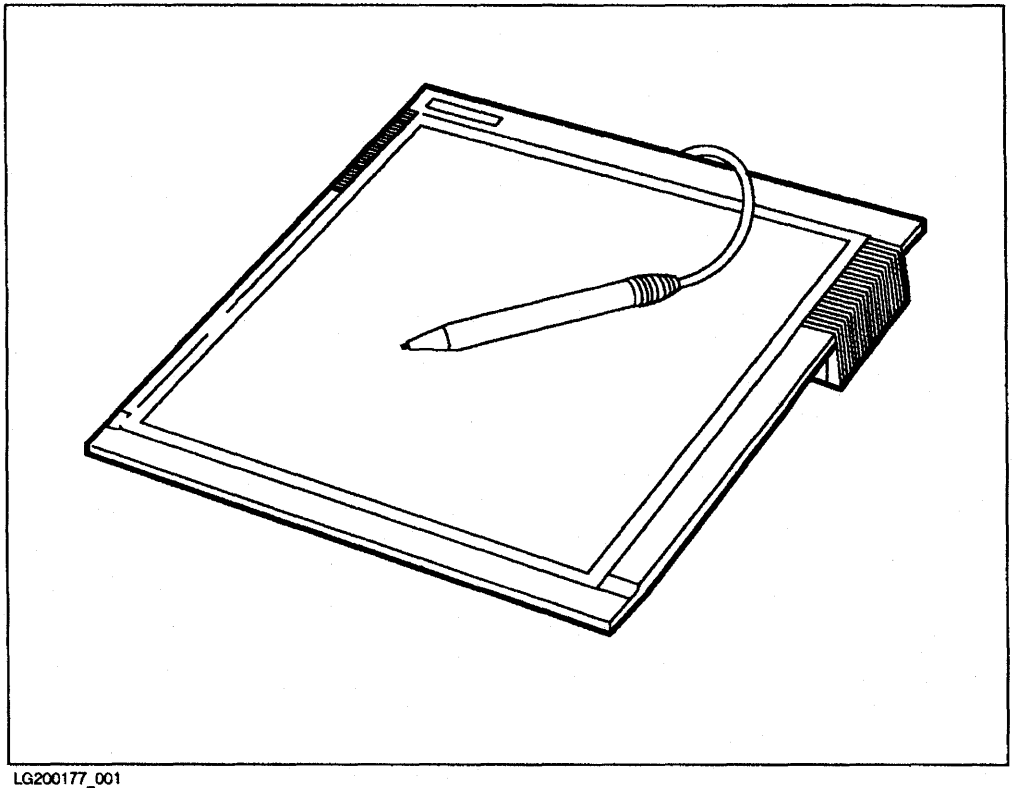
Hardware installation complete! You may now proceed to the set up procedures in Chapter 14, "Setting Up Devices Using HP-UX Commands" for instructions on how to configure your system.

Note SAM does not support configuration of graphics devices.

HP 45911A/C Graphics Tablet

The HP 45911A/C Graphics Tablet is installed as an HP-HIL device. See Chapter 13, "Installing HP-HIL Accessories" for installation and configuration details.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.



LG200177_001

Figure 11-1. HP 45911C Graphics Tablet

HP 46087/88A Digitizers and HP 46089A Cursor

The HP 46087A and 46088A are low-cost, high-resolution digitizers suitable for menu/object picking, free-hand graphics entry and digitizing. The HP 46087A is ANSI A/ISO A4 size. The HP 46088A is ANSI B/ISO A3. Both digitizers include a stylus with tip switch and a platen overlay. Both digitizers connect to your computer via the HP-HIL interface. See Chapter 13, "Installing HP-HIL Accessories" for installation and configuration details.

The HP 46089A four-button, cross-hair cursor is available separately or as digitizer Option 001. The cursor is recommended for digitizing existing drawings, artwork or other hard-copy images. It uses no additional power and occupies no HP-HIL addresses.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

HP 98627A Color Video Output Interface

The HP 98627A Color Output Interface allows you to connect an external color monitor to your computer.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

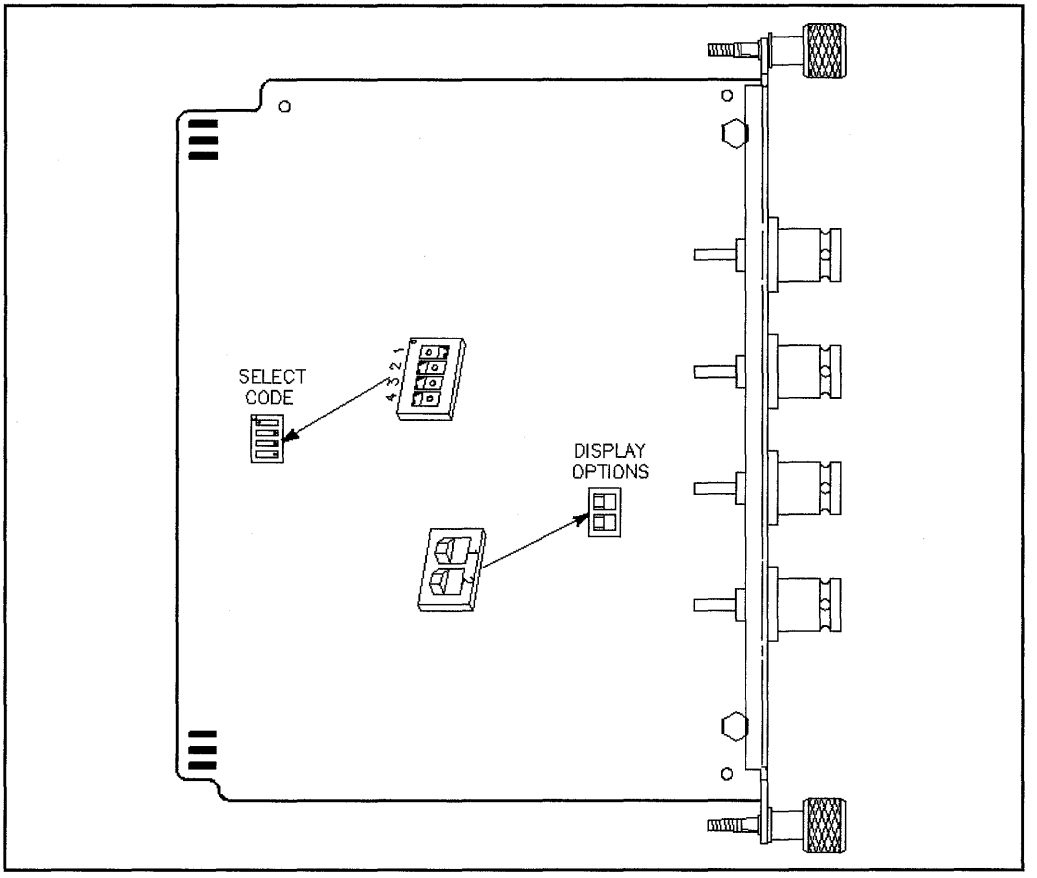


Figure 11-2.
HP 98627A Color Video Output Interface Switches

Before Installing This Device

Before you install this device:

- Refer to the documentation that came with your interface card for instructions on unpacking and preparing to install the card.
- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Keep the documentation that came with the card handy. You will need to refer to it during this procedure.
- Plan ahead. Installing a new interface card on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

What You're Going To Do

The following table contains HP-UX configuration information for this interface card. Interface cards do not need device files associated with them. Only the device connected to the interface card requires device files.

For interface cards, ensure that the necessary device driver is part of your kernel configuration file and install the card as outlined in this section.

Note Each interface card must have a unique select code setting. Record the select code(s) used for this interface card. Select codes zero through seven (0-7) are reserved for internal interface cards.

If you need to change the select code of an internal interface card for any reason, do so by entering Configuration Mode during the Boot ROM sequence. For instructions on interacting with the Boot ROM Configuration Mode on a model 362 or 382 computer, consult the *Hardware Configuration Guide*. To interact with the Boot ROM Configuration Mode of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

Table 11-6.
HP 98627 Color Output Interface HP-UX Set Up Values

Device Name	File Type	Major Number	Driver Name	Select Code	Minor Number
HP 98627	c	12	graphics	28	0x1c0200

Installing the HP 98627A Color Output Interface

The following summary supplements the procedures outlined in your installation documentation for this interface card. Read through this summary before proceding with the installation.

1. *Verify that the* `graphics` *driver required for this interface card, is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the `graphics` driver is part of your current kernel configuration, you can:

   - You can use SAM to check your `dfile` for the `graphics` driver, add it and reconfigure the kernel for you at this time. Refer to Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM" for complete instructions on how to do this, and then go on to step two.

     or

   - Look in your `dfile` for the `graphics` driver. If the `graphics` driver is in your kernel configuration file, go on to step 2 now.

     If the `graphics` driver is not in the `/etc/conf/dfile`, or is commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove the Color Output Interface from its envelope, being careful to handle the card only by its edges and metal end plate. The card may be easily damaged by electrostatic discharge (static zap).

   d. Place the card on the envelope.

3. *Set the select code and make note of it.*

   Use the documentation that came with this interface card to set the select code. Each interface must have a unique select code setting.

   Select codes zero through seven (0-7) are reserved for internal interface cards.

Note The Color Output Interface is preset to use select codes 28 and 29.

The Multiprogrammer Interface is also preset to select code 29 If you have both of these interfaces, change the select code of the Multiprogrammer Interface to an unused select code.

---

4. *Set Display Option Switch 1 and Switch 2.*

   Set the display option switches according to the instructions provided in the documentation that came with this interface card.

Note If you intend to connect an HP 13279B Color Monitor to this interface, you can skip to step 4. Display option switch 1 is preset for a combined green and sync signal and need not be changed. Display option switch 2 is preset to a 24.8 kHz horizontal scan and need not be changed.

---

5. *Insert the interface.*

   You must insert the interface card in an empty *even-numbered* slot. Refer to the installation document that came with your interface cards form complete instructions.

6. *Verify installation.*

   a. Plug in the power cord, turn on your computer, and hold down the space bar for a few seconds.

   b. Check the list of components displayed on the left-hand side of the screen. If the message:

      ```
      HP 98627 at 28
      ```

      appears you have correctly installed the Color Output Interface.

      If this message does not appear, make sure there are no select code conflicts and that the board is seated in an even numbered slot. If you still have problems, call your HP Service Representative for assistence.

Installation Complete!

HP 13279B Color Monitor

The HP 13279B Color Monitor connects to the HP 98627A Interface.

Note This monitor should be installed by an HP Customer Engineer. Installation and adjustment is included in the price of the monitor.

Before Installing This Device

Before you install this monitor:

- Contact your Hewlett-Packard Sales and Service Office to arrange for installation of your monitor. Installation and adjustment are included in the price of the unit.
- Have the documentation that came with the monitor handy during the procedure.
- Plan ahead. Installing this monitor on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

HP-UX Set Up Information

The following table contains detailed HP-UX software set up information. Once the monitor is installed by your Hewlett-Packard representative, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 11-7. HP 13279B Color Monitor

Device Name	File Type	Major Number	Minor Number[1]
HP 13279B, select code 28	c	12	0x1c0200

1 If you changed the select code of the HP 98627A Color Output Interface, write in the new select code (in hexadecimal) instead of 1c in the minor number.

Connecting the HP 13279B Color Monitor

1. *Play It Safe.*
   a. Turn your computer off and remove the power cord.
   b. Have your Hewlett-Packard customer engineer install your monitor and adjust the scan rate. Installation and adjustment are included in the price of the unit.
2. Plug in and power on the monitor.
3. Plug in and power on the computer.

HP 98548/49/50A High Resolution Graphics Interface

The HP 98548/49/50A High Resolution Graphics Interface outputs video from the host computer to the following set of HP High Resolution Monitors:

- The HP 98548A board is for use with High Resolution (1024×768 pixel) Monochrome Monitors.
- The HP 98549A board is for High Resolution (1024×768 pixel) Color Monitors. It has 6-color planes that can be soft-configured as four image planes and two overlay planes.
- The HP 98550A board is also for High Resolution (1280×1024 pixel) Color Monitors. It has 8-color planes for 256 colors, plus two full-time overlay planes.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this interface card:

- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- Plan ahead.

  Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

What You're Going To Do

The following table contains detailed HP-UX software set up information. Complete the hardware installation as outlined in the following section. Once hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Note SAM does not support the installation of graphics devices.

Detailed information needed for completing the `mknod` commands is provided in tables Table 11-9.

Table 11-8.
HP 98548/49/50A High Resolution Graphic Interface HP-UX Set Up Values

Device Name	Device File[1]	File Type	Major Number	Select Code	Minor Number
HP 98548A	/dev/crt	c	12	internal	0x000000
HP 98548A	/dev/crt	c	12	255	0xFF0200
HP 98549A/50A	/dev/crt	c	12	internal	0x000000
HP 98548A/50A	/dev/ocrt	c	12	internal	0x000001
HP 98548A/50A	/dev/icrt	c	12	internal	0x000002
HP 98548A/50A	/dev/crt	c	12	249	0xF90200
HP 98548A/50A	/dev/ocrt	c	12	249	0xF90201
HP 98548A/50A	/dev/icrt	c	12	249	0xF90202

1 Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

The HP 98549A color display is supported by the `hp98550` and `hp98556` device drivers.

Connecting the HP 98548/49/50A High Resolution Graphic Interface

The following summary supplements the procedures outlined in your installation documentation for these interface cards. Read through this summary before proceding with the installation.

1. *Verify that the driver required for this interface card, and any peripheral device you intend to install at this time, is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the `graphics` driver is part of your current kernel configuration, you can:

   - You can use SAM to check your `dfile` for the `graphics` driver, add it and reconfigure the kernel for you at this time. Refer to Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM" for complete instructions, then go on to step two.

     or

   - Look in your `dfile` for the necessary drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the necessary drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. If you have a monitor connected to your computer, turn it off, unplug the monitor's power cord, and disconnect the video cables from the computer and monitor.

   d. Remove the High Resolution Graphic Interface from its envelope, being careful to handle the card only by its edges. The card may be easily damaged by electrostatic discharge (static zap).

   e. Place the card on the envelope.

3. *Move the processor board.*

   If you are upgrading a computer which has video furnished by a combination processor/video board, you must move the processor board. Refer to the documentation that came with the interface card for these procedures. Otherwise, skip to step 4.

4. *Remove existing video board (if you have one).*

   Remove the existing video board or empty slot cover plate from the bottom wide slot on the back of the computer (see Figure 11-3). You may need a Pozidriv screwdriver to loosen it.

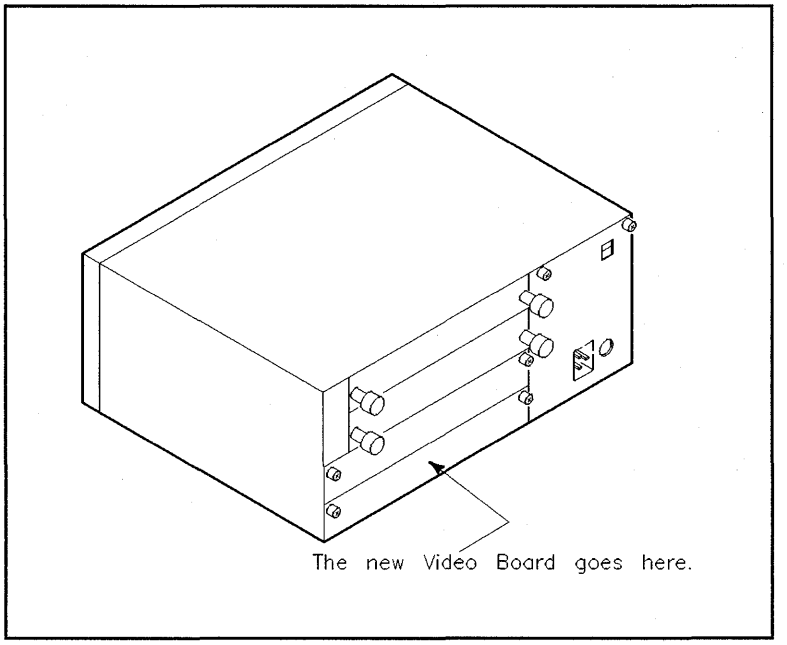


Figure 11-3. Graphics Interface Placement

5. *Set the select code configuration switches on the board. Make note of the setting.*

   Set the interface card's select code configuration switches. See the documentation that came with the card for instructions and default settings. Be sure to make note of the setting you used. You will need it to complete your HP-UX configuration.

   Select code settings zero through seven (0-7) are reserved.

6. *Insert the High Resolution Graphics interface card.*
7. *Ensure all power switches on the monitor and on the computer are in the OFF position.*
8. *Connect the video cable or cable set to the new video board and to the new monitor.*
9. *Plug in the and power on the monitor.*
10. *Plug in and power on the computer.*

Hardware Installation Complete!

Select Code Settings and Minor Numbers

The following tables provide the minor number information you will need to use with the `mknod` command to create device files. Locate the select code setting(s) you chose in step five above and you will find the corresponding minor number information.

Table 11-9.
HP 98548/49/50A High Resolution Graphic Interface
HP-UX Setup Values

DIO-II Select Code	Switch MSB-LSB	mknod Minor Number	DIO-II Select Code	Switch MSB-LSB	mknod Minor Number	DIO-II Select Code	Switch MSB-LSB	mknod Minor Number
internal	0000 0001	0x000000	152	1001 1000	0x980200	173	1010 1101	0xAD0200
132	1000 0100	0x840200	153	1001 1001	0x990200	174	1010 1110	0xAE0200
133	1000 0101	0x850200	154	1001 1010	0x9A0200	175	1010 1111	0xAF0200
134	1000 0110	0x860200	155	1001 1011	0x9B0200	176	1011 0000	0xB00200
135	1000 0111	0x870200	156	1001 1100	0x9C0200	177	1011 0001	0xB10200
136	1000 1000	0x880200	157	1001 1101	0x9D0200	178	1011 0010	0xB20200
137	1000 1001	0x890200	158	1001 1110	0x9E0200	179	1011 0011	0xB30200
138	1000 1010	0x8A0200	159	1001 1111	0x9F0200	180	1011 0100	0xB40200
139	1000 1011	0x8B0200	160	1010 0000	0xA00200	181	1011 0101	0xB50200
140	1000 1100	0x8C0200	161	1010 0001	0xA10200	182	1011 0110	0xB60200
141	1000 1101	0x8D0200	162	1010 0010	0xA20200	183	1011 0111	0xB70200
142	1000 1110	0x8E0200	163	1010 0011	0xA30200	184	1011 1000	0xB80200
143	1000 1111	0x8F0200	164	1010 0100	0xA40200	185	1011 1001	0xB90200
144	1001 0000	0x900200	165	1010 0101	0xA50200	186	1011 1010	0xBA0200
145	1001 0001	0x910200	166	1010 0110	0xA60200	187	1011 1011	0xBB0200
146	1001 0010	0x920200	167	1010 0111	0xA70200	188	1011 1100	0xBC0200
147	1001 0011	0x930200	168	1010 1000	0xA80200	189	1011 1101	0xBD0200
148	1001 0100	0x940200	169	1010 1001	0xA90200	190	1011 1110	0xBE0200
149	1001 0101	0x950200	170	1010 1010	0xAA0200	191	1011 1111	0xBF0200
150	1001 0110	0x960200	171	1010 1011	0xAB0200	192	1100 0000	0xC00200
151	1001 0111	0x970200	172	1010 1100	0xAC0200	193	1100 0001	0xC10200

Table 11-9.
HP 98548/49/50A High Resolution Graphic Interface
HP-UX Setup Values (continued)

DIO-II Select Code	Switch MSB-LSB	mknod Minor Number
194	1100 0010	0xC20200
195	1100 0011	0xC30200
196	1100 0100	0xC40200
197	1100 0101	0xC50200
198	1100 0110	0xC60200
199	1100 0111	0xC70200
200	1100 1000	0xC80200
201	1100 1001	0xC90200
202	1100 1010	0xCA0200
203	1100 1011	0xCB0200
204	1100 1100	0xCC0200
205	1100 1101	0xCD0200
206	1100 1110	0xCE0200
207	1100 1111	0xCF0200
208	1101 0000	0xD00200
209	1101 0001	0xD10200
210	1101 0010	0xD20200
211	1101 0011	0xD30200
212	1101 0100	0xD40200
213	1101 0101	0xD50200
214	1101 0011	0xD60200
215	1101 0111	0xD70200
216	1101 1000	0xD80200
217	1101 1001	0xD90200
218	1101 1010	0xDA0200
219	1101 1011	0xDB0200
220	1101 1100	0xDC0200
221	1101 1101	0xDD0200
222	1101 1110	0xDE0200
223	1101 1111	0xDF0200
224	1110 0000	0xE00200
225	1110 0001	0xE10200
226	1110 0010	0xE20200
227	1110 0011	0xE30200
228	1110 0100	0xE40200
229	1110 0101	0xE50200
230	1110 0110	0xE60200
231	1110 0111	0xE70200
232	1110 1000	0xE80200
233	1110 1001	0xE90200
234	1110 1010	0xEA0200
235	1110 1011	0xEB0200
236	1110 1100	0xEC0200
237	1110 1101	0xED0200
238	1110 1110	0xEE0200
239	1110 1111	0xEF0200
240	1111 0000	0xF00200
241	1111 0001	0xF10200
242	1111 0010	0xF20200
243	1111 0011	0xF30200
244	1111 0100	0xF40200
245	1111 0101	0xF50200
246	1111 0110	0xF60200
247	1111 0111	0xF70200
248	1111 1000	0xF80200
249	1111 1001	0xF90200
250	1111 1010	0xFA0200
251	1111 1011	0xFB0200
252	1111 1100	0xFC0200
253	1111 1101	0xFD0200
254	1111 1110	0xFE0200
255	1111 1111	0xFF0200

HP 98556A 2D Integer Based Graphics Accelerator Accessory Card

The HP 98556A 2D Graphics Accelerator is an add-on option for the HP 98549A and HP 98550A Color Graphic Interfaces. The Graphics Accelerator Accessory Card connects directly to the Color Graphic Interface Card "piggy-back" style. The board pair fits into one slot in the computer or Direct-Connect I/O Expander.

Note If you have an HP 98264A/B ECC RAM card or an HP 98248A Floating-Point Accelerator card mounted in your computer, the HP 98556A 2D Graphics Accelerator card *must* be mounted in the Direct-Connect I/O Expander.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

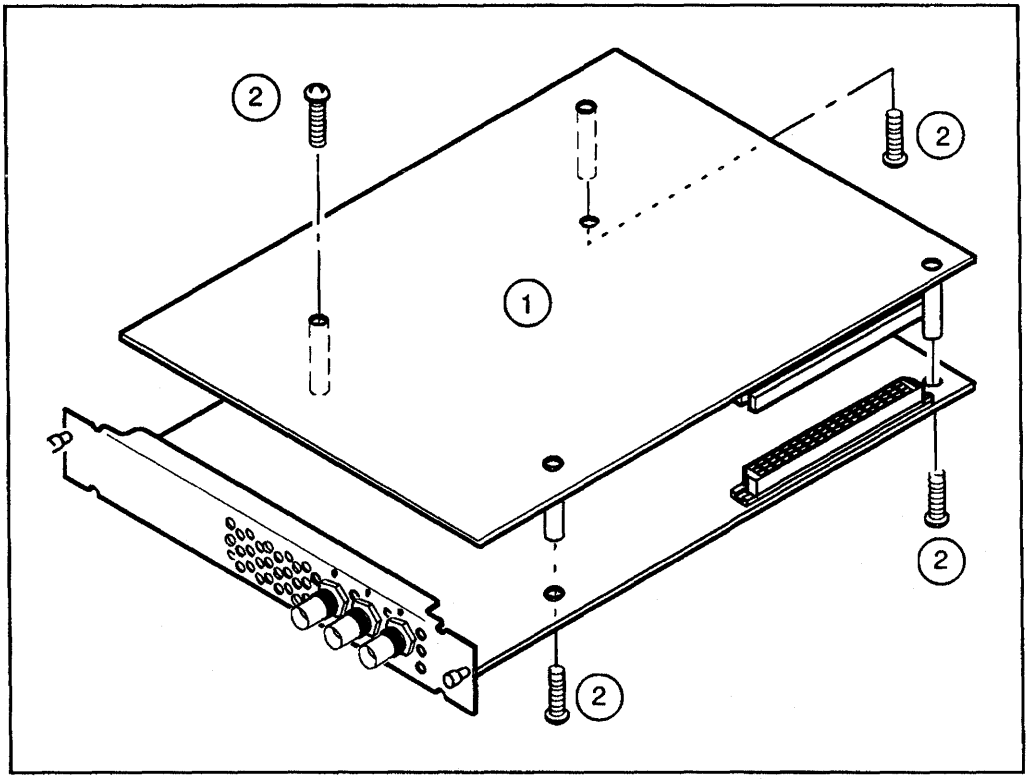


Figure 11-4. Graphics Interface and HP 98556A Accelerator

① Circuit side of HP 98556A Accelerator.

② four mounting screws.

Installing the HP 98556A 2D Graphics Accelerator

1. *Play it safe.*
   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see the *System Administration Tasks* manual Chapter 3, "Starting and Stopping HP-UX" for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.
   c. Remove the Graphics Accelerator from its envelope, being careful to handle the card only by its non-connector edges. The card may be easily damaged by electrostatic discharge (static zap).
   d. Place the card on its envelope, or use a static-free workstation, HP part number 9300-0933.
2. *Disconnect the RGB (Red Green Blue) video cable from the video board.*
3. *Remove the video board from the computer and place it on a static-free surface.*
4. *Insert the Graphics Accelerator into the connector on the video board.*
   a. Make sure it is firmly seated.
   b. Turn the board pair so that the video board is facing up and the Graphics Accelerator is facing down.
   c. Insert and tighten the three screws that correspond with stand-offs on the Graphics Accelerator.
   d. Turn the assembly over and insert and tighten the fourth screw in the hole corresponding with the stand-off on the video board.
5. *Install the board pair into the I/O expander or computer.*

   Make sure it is firmly seated into the connector.
6. *Reconnect the RGB video cable to the video board.*
7. *Ensure all power switches are in the OFF position.*

8. *Connect the power cord to the computer.*
9. *Turn on the monitor.*
10. *Turn on the computer.*

Hardware Installation Complete!

HP A1416A High Resolution Color Graphics Interface

The HP A1416A Graphics Interface board is a graphics processor that connects to the computer's DIO-II bus and outputs color video to a high resolution (1280 by 1024 pixel) color monitor.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this interface board:

- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation that came with the interface board handy. You will need to refer to it during this procedure.
- Plan ahead.

  Installing interface boards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding a device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to the *Managing Clusters of HP 9000 Computers.*

What You're Going To Do

The following table contains detailed HP-UX software set up information. Complete the hardware installation as outlined in the following section. Once hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Note SAM does not support the installation of graphics devices.

Detailed information needed for completing the `mknod` commands is provided in tables Table 11-9.

Table 11-10.
HP A1416A High Resolution Color Graphics Interface
HP-UX Setup Values

Device Name	Device File[1]	File Type	Major Number	Select Code[2]	Minor Number
HP 1416A	`/dev/crt`	c	12	132	`0x840000`

1 Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

2 The example shown here uses select code setting 132. This is the default select code setting of the board as it comes from the factory. See Table 11-11 for alternate settings.

This interface uses the `graphics` device driver.

Caution The A1416A Graphics Interface contains circuits that are easily damaged by electrostatic discharge. Use a static-free workstation (HP part number 9300-0933) or lay the Graphics Interface on the protective bag it was shipped in.

Installing the HP A1416A High Resolution Color Graphics Interface Card

The following summary supplements the procedures outlined in the installation documentation that came with this interface board. Read through this summary before proceding with the installation.

1. *Verify that the* `graphics` *driver required for this interface board is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the `graphics` driver is part of your current kernel configuration, you can:

   - You can use SAM to check your `dfile` for the `graphics` driver, add it and reconfigure the kernel for you at this time. Refer to Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM" for complete instructions, then go on to step two.

     or

   - Look in your `dfile` for the `graphics` driver. If the `graphics` driver is in your kernel configuration file, go on to step 2 now.

     If the `graphics` driver is not in the `/etc/conf/dfile`, or is commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it Safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Keep the Graphics Interface board in its protective plastic bag until you are ready to install it.

   d. Do not touch the connector. Handle the board by its non-connector edges only.

3. *Remove an empty DIO-II slot cover plate.*

   You may need a Pozidriv or a slotted screwdriver to loosen the fasteners.

4. *Unpackage the interface card.*

   Place the interface card on a static-free surface such as the plastic shipping bag it arrived in.

5. *Set the select code configuration switches and make note of the settings.*

   Refer to the documentation that came with the interface board for instructions on setting the select code. Remember that each device connected to your system must have a unique select code.

   Select code settings zero through seven (0-7) are reserved.

6. *Insert the HP A1416A Graphics Interface.*

7. *Connect the RGB video cable.*

8. *Ensure all power switches are in the OFF position.*

9. *Connect the power cord to the monitor.*

10. *Turn on the monitor.*

11. *Plug in and power on the computer.*

Hardware Installation Complete!

Select Code Settings and Minor Numbers

The following tables contain select code settings and their associated minor number to be used with the `mknod` command. Use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 11-11.
HP 1416A High Resolution Color Graphics Interface
HP-UX Setup Values

DIO-II Select Code	Switch MSB-LSB	mknod Minor Number	DIO-II Select Code	Switch MSB-LSB	mknod Minor Number	DIO-II Select Code	Switch MSB-LSB	mknod Minor Number
			152	1001 1000	0x980000	173	1010 1101	0xAD0000
132	1000 0100	0x840000	153	1001 1001	0x990000	174	1010 1110	0xAE0000
133	1000 0101	0x850000	154	1001 1010	0x9A0000	175	1010 1111	0xAF0000
134	1000 0110	0x860000	155	1001 1011	0x9B0000	176	1011 0000	0xB00000
135	1000 0111	0x870000	156	1001 1100	0x9C0000	177	1011 0001	0xB10000
136	1000 1000	0x880000	157	1001 1101	0x9D0000	178	1011 0010	0xB20000
137	1000 1001	0x890000	158	1001 1110	0x9E0000	179	1011 0011	0xB30000
138	1000 1010	0x8A0000	159	1001 1111	0x9F0000	180	1011 0100	0xB40000
139	1000 1011	0x8B0000	160	1010 0000	0xA00000	181	1011 0101	0xB50000
140	1000 1100	0x8C0000	161	1010 0001	0xA10000	182	1011 0110	0xB60000
141	1000 1101	0x8D0000	162	1010 0010	0xA20000	183	1011 0111	0xB70000
142	1000 1110	0x8E0000	163	1010 0011	0xA30000	184	1011 1000	0xB80000
143	1000 1111	0x8F0000	164	1010 0100	0xA40000	185	1011 1001	0xB90000
144	1001 0000	0x900000	165	1010 0101	0xA50000	186	1011 1010	0xBA0000
145	1001 0001	0x910000	166	1010 0110	0xA60000	187	1011 1011	0xBB0000
146	1001 0010	0x920000	167	1010 0111	0xA70000	188	1011 1100	0xBC0000
147	1001 0011	0x930000	168	1010 1000	0xA80000	189	1011 1101	0xBD0000
148	1001 0100	0x940000	169	1010 1001	0xA90000	190	1011 1110	0xBE0000
149	1001 0101	0x950000	170	1010 1010	0xAA0000	191	1011 1111	0xBF0000
150	1001 0110	0x960000	171	1010 1011	0xAB0000	192	1100 0000	0xC00000
151	1001 0111	0x970000	172	1010 1100	0xAC0000	193	1100 0001	0xC10000

Table 11-11.
HP 1416A High Resolution Color Graphics Interface
HP-UX Setup Values (continued)

DIO-II Select Code	Switch MSB-LSB	mknod Minor Number	DIO-II Select Code	Switch MSB-LSB	mknod Minor Number	DIO-II Select Code	Switch MSB-LSB	mknod Minor Number
194	1100 0010	0xC20000	215	1101 0111	0xD70000	236	1110 1100	0xEC0000
195	1100 0011	0xC30000	216	1101 1000	0xD80000	237	1110 1101	0xED0000
196	1100 0100	0xC40000	217	1101 1001	0xD90000	238	1110 1110	0xEE0000
197	1100 0101	0xC50000	218	1101 1010	0xDA0000	239	1110 1111	0xEF0000
198	1100 0110	0xC60000	219	1101 1011	0xDB0000	240	1111 0000	0xF00000
199	1100 0111	0xC70000	220	1101 1100	0xDC0000	241	1111 0001	0xF10000
200	1100 1000	0xC80000	221	1101 1101	0xDD0000	242	1111 0010	0xF20000
201	1100 1001	0xC90000	222	1101 1110	0xDE0000	243	1111 0011	0xF30000
202	1100 1010	0xCA0000	223	1101 1111	0xDF0000	244	1111 0100	0xF40000
203	1100 1011	0xCB0000	224	1110 0000	0xE00000	245	1111 0101	0xF50000
204	1100 1100	0xCC0000	225	1110 0001	0xE10000	246	1111 0110	0xF60000
205	1100 1101	0xCD0000	226	1110 0010	0xE20000	247	1111 0111	0xF70000
206	1100 1110	0xCE0000	227	1110 0011	0xE30000	248	1111 1000	0xF80000
207	1100 1111	0xCF0000	228	1110 0100	0xE40000	249	1111 1001	0xF90000
208	1101 0000	0xD00000	229	1110 0101	0xE50000	250	1111 1010	0xFA0000
209	1101 0001	0xD10000	230	1110 0110	0xE60000	251	1111 1011	0xFB0000
210	1101 0010	0xD20000	231	1110 0111	0xE70000	252	1111 1100	0xFC0000
211	1101 0011	0xD30000	232	1110 1000	0xE80000	253	1111 1101	0xFD0000
212	1101 0100	0xD40000	233	1110 1001	0xE90000	254	1111 1110	0xFE0000
213	1101 0101	0xD50000	234	1110 1010	0xEA0000	255	1111 1111	0xFF0000
214	1101 0011	0xD60000	235	1110 1011	0xEB0000			

HP 98700 CX Graphics Display Controller and The HP 98287A Graphics Display Controller Interface

The HP 98700 Graphics Display Controller connects to the HP 98287A Graphics Display Controller Interface. The following procedure describes how to install the HP 98287A interface, the HP 98700 Display Controller, the optional HP 98710A Graphics Accelerator upgrade system, and the HP 98782A Color Monitor. Installation of the HP 46081A Speaker Module is described in Chapter 13, "Installing HP-HIL Accessories" .

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install:

- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation that came with the devices handy. You will need to refer to it during this procedure.
- Plan ahead.

  Installing peripheral devices on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers.*

What You're Going To Do

The following tables contain detailed HP-UX software set up information. Complete the hardware installation as outlined in this section. Once the hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

The driver required for this device is the `graphics` driver.

Table 11-12.
98700 Graphics Display Controller
Set to External Addressing Mode

Device Name	File Type	Major Number	Select Code	Minor Number
HP 98700	c	12	23	0x170200
HP 98700	c	12	24	0x180200
HP 98700	c	12	25	0x190200
HP 98700	c	12	26	0x1a0200
HP 98700	c	12	30	0x1e0200

Table 11-13.
98700 Graphics Display Controller
Set to Internal Addressing Mode

Device Name	File Type	Major Number	Minor Number
HP 98700, with S300 video[1]	c	12	0x000100
HP 98700, no S300 video[1]	c	12	0x000000

1 The first entry in the table applies to systems that have an enabled Series 300 built-in video interface. The second entry applies to systems without a built-in video interface

Installing the HP 98700 Graphics Display Controller

The following summary supplements the procedures outlined in your installation documentation for this device. Read through this summary before proceding with the installation.

1. *Verify that the* `graphics` *driver required for this device is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the `graphics` driver is part of your current kernel configuration, you can:

   - You can use SAM to check your `dfile` for the `graphics` driver, add it if necessary and reconfigure the kernel for you at this time. Refer to Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM" for complete instructions, and then go on to step two.

     or

   - Look in your `dfile` for the `graphics` driver. If the `graphics` driver is in your kernel configuration file, go on to step 2 now.

     If the `graphics` driver is not in the `/etc/conf/dfile`, or is commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

3. *Ensure all power switches on the devices and on the computer are in the OFF position.*

4. *Install the HP 98287A Graphics Display Controller Interface card, if necessary.*

   The HP 98700 Graphics Display Controller connects to the HP 98287A Graphics Display Controller Interface card. If you have already installed this card, skip to the next step. If you need to install this card follow these instructions:

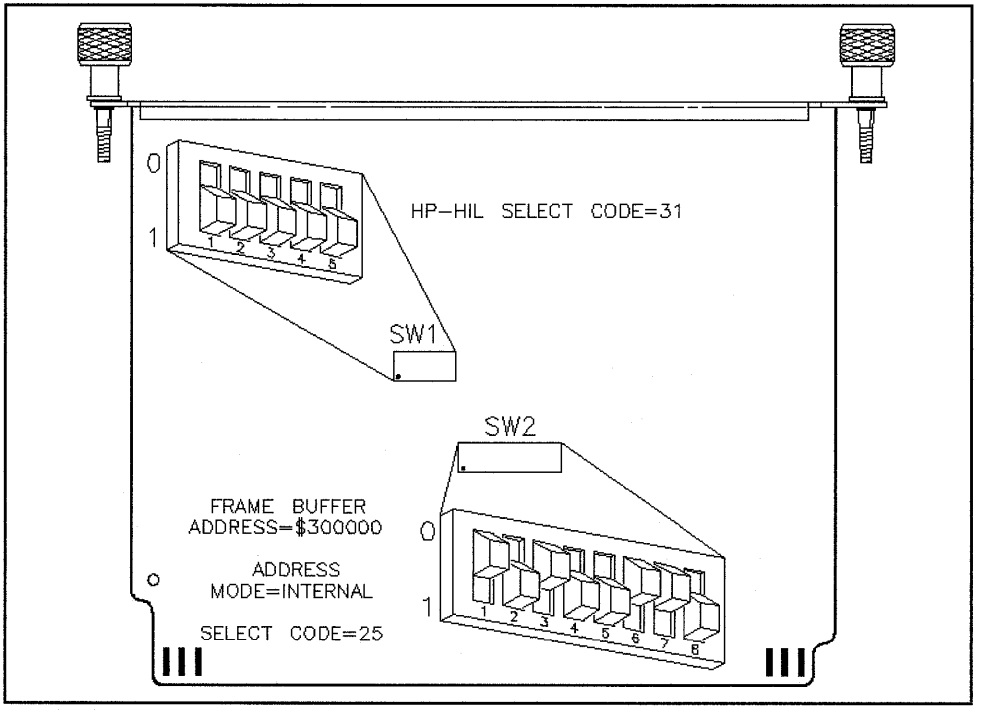


Figure 11-5.
Graphics Display Controller Interface switches

   a. Remove the Graphics Display Controller Interface from its envelope, being careful to handle the card only by its edges and metal end plate. The card may be easily damaged by electrostatic discharge (static zap).

b. Place the card on the envelope.

c. Check the HP-HIL select code.

The HP-HIL select code switches (SW1), should be set to 31, as shown in Figure 11-5.

d. Set the Frame Buffer Address and the Addressing Mode.

Refer to the instructions that came with the interface card for information on the default settings of these values and for instructions on how to change these settings.

Keep in mind the following restrictions:

- If you have both a Graphics Display Controller *and* a Series 300 bit-mapped display, *do not* use the frame buffer address $200000.
- If you have a Model 320 computer, *do not* use frame buffer address $800000 or $900000.
- Only one graphics display controller can be set to internal addressing mode (the mode used for the system console).
- If you use internal addressing mode, you cannot also use a Series 300 bit-mapped display connected to an HP 98542/43/44/45A video card. (You *can* use a monitor connected to an HP 98546A Display Compatibility Interface, however.) You *must* remove your HP 98542/43/44/45A video card. See your *Installation Reference* manual for details.
- To use both a Graphics Display Controller and a Series 300 bit-mapped display, you must use external addressing mode.

To use the Graphics Display Controller as a graphics output device *only*, set addressing mode to the **external address** (or select code) setting.

e. Set the Graphics Display Controller select code and make note of it.

Refer to the Graphics Display Controller interface documentation for the default setting of the select code value. If this default has already been used on your system, change the select code setting to an unused value following the instructions given.

Note All devices on your system must have a unique select code setting.

---

f. Remove the *painted* cover plates from the back of your computer until you find an empty *even-numbered* slot. (Slots are numbered from top to bottom, starting with number one (1) for the top-most slot.) *Do not* remove the silver cover plates from the bottom of the computer.

g. Insert the Graphics Display Controller Interface, component side up, into an empty, even-numbered slot. Refer to the installation note that came with the interface card for complete instructions.

h. If you changed the select code of the Graphics Display Controller Interface, find this number in the set of select code labels supplied with the interface. Affix this label to the metal end plate.

i. If you have other interface or accessory cards to install, leave the cover plates off; otherwise, replace them.

Note If you have the HP 98710A Graphics Accelerator, complete step 4, otherwise skip to step 5.

---

5. *Install the 98710A Graphics Accelerator (optional).*

a. Ensure that the HP 98700 is disconnected from its power source.

b. Install the 98710A Graphics Accelerator on to the HP 98700 Graphics Display Controller. Follow the instructions that came with the controller.

6. *Place the HP 98700/98710 between the computer and the HP 98782A Color Monitor.*

   Ensure that you place the units in a location that provides adequate circulation for cooling. Do not place the monitor on any surface (rugs, blankets, etc.) that will restrict air flow, or near curtains or draperies that could block the ventilation holes. Do not install near heat sources (radiators, or hot air ducts), or in direct sunlight. Avoid areas with excessive dust, mechanical vibration, or shock.

7. *Connect the HP 98700 Controller to the HP 98782 Color Monitor.*

   a. Connect the RGB (Red Green Blue) cables to the monitor, observing the color coding of the cables: red to red, blue to blue and green to green.

   b. Connect the other end of the cables to the HP 98700 in the same manner.

8. *Connect the interconnect cable.*

   a. Connect the interconnect cable (HP part number 98700-61601) to the HP 98287A Graphics Display Controller Interface.

   b. Connect the other end of the interconnect cable to the HP 98700.

9. *Connect all power cords.*

10. *Turn on the monitor.*

11. *Turn on the HP 98700.*

12. *Turn on the computer.*

Hardware installation complete! To complete the software set up portion of this procedures, follow the instructions in Chapter 14, "Setting Up Devices Using HP-UX Commands".

HP 98724A/25A Local Graphics Bus Interface

The HP 98724A/25A Local Graphics Bus (LGB) interface cards provide a connection between the HP 98720 SRX Graphics Display Controller and the computer. The HP 98724A is a DIO-I interface card and the HP 98725A is a DIO-System interface card.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this interface card:

- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- Plan ahead.

  Installing interface cards on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

Installing the HP 98724A/98725A Local Graphics Bus Interface

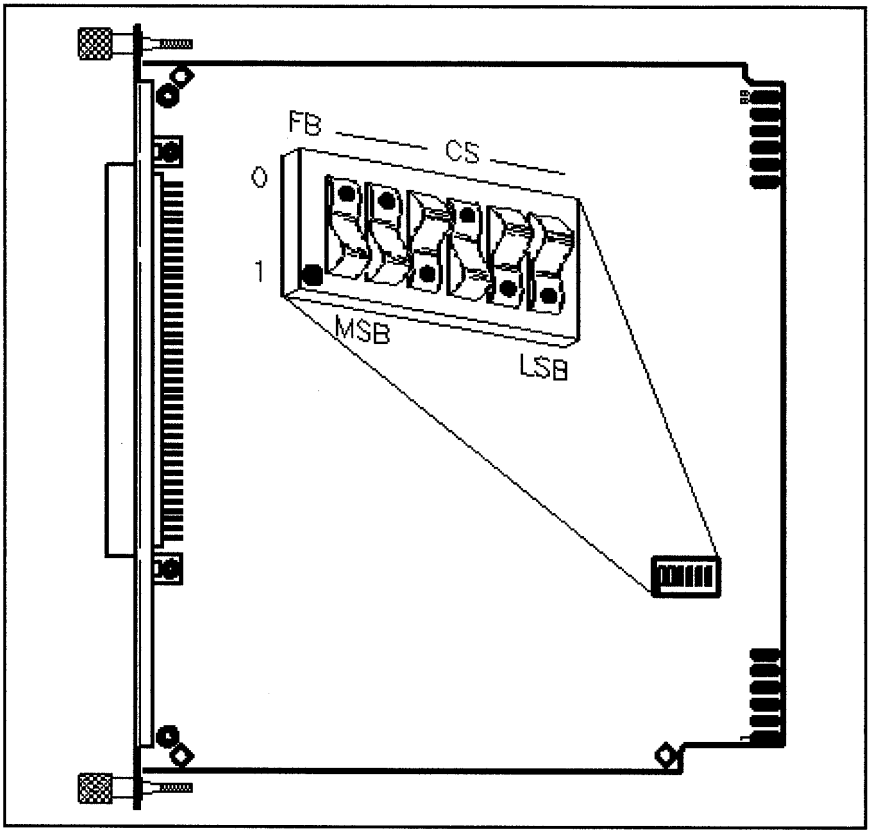


Figure 11-6.
HP 98724A LGB Interface Switches

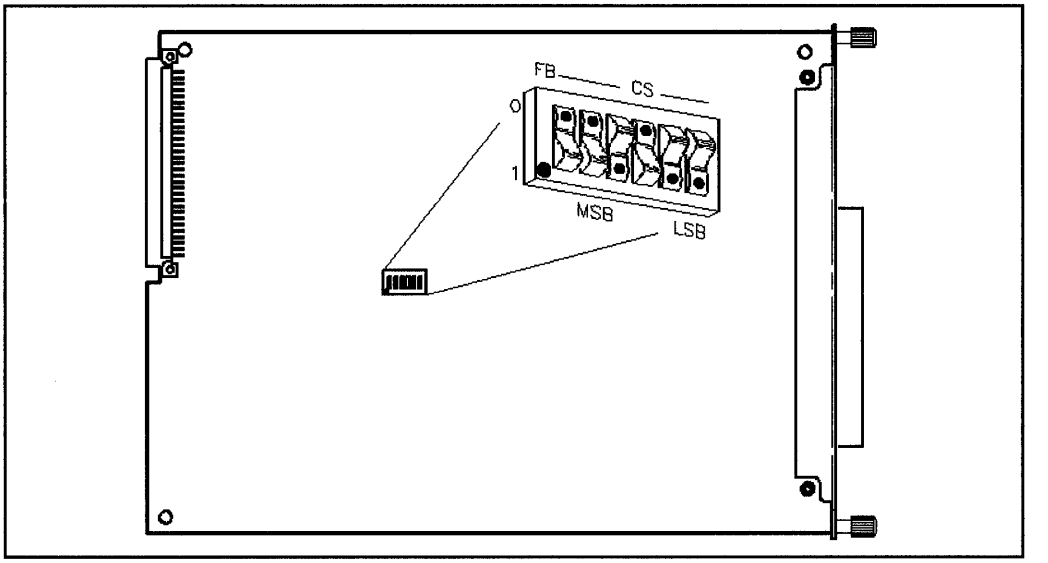


Figure 11-7.
HP 98725A LGB Interface Switches

HP 98724A/98725A Local Graphics Bus Interface

11

The following summary supplements the procedures outlined in your installation documentation for this interface card. Read through this summary before proceding with the installation.

1. *Verify that the* `graphics` *driver required for this interface card is included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the `graphics` driver is part of your current kernel configuration, you can:

   - Use SAM to check your `dfile` for the `graphics` driver, add it and reconfigure the kernel for you at this time. See Chapter 12, "Setting Up HP-UX for Plotters Using SAM", and then go on to step two.

     or

   - Look in your `dfile` for the `graphics` driver. If the `graphics` driver is in your kernel configuration file, go on to step 2 now.

     If the `graphics` driver is not in the `/etc/conf/dfile`, or is commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove the HP 98724A/25A from its envelope, being careful to handle the card by its edges and metal end plate. The card may be easily damaged by electrostatic discharge (static zap).

   d. Place the card on the envelope.

3. *Set the Frame Buffer Address and select code.*

Note

Your LGB interface card has been preset to an internal addressing mode (as shown in Figure 11-6 and Figure 11-7). If this is the first (or only) LGB card you are installing, and you want to use the Graphics Display Controller as the system console, skip to step 3 now.

If you have two Graphics Display Controllers, only one can be set to internal addressing mode. You will have to change the setting of the second LGB card.

Follow the directions in the installation material provided with this interface card to change the Frame Buffer Address to an external addressing mode if this is the second LGB card you are installing, or if you do not intend to use the Graphics Display Controller as the system console.

Then, use the installation material provided with the card to set the select code settings. This interface requires *two* sequential select code values. Use either 26 and 27, 28 and 29, or 30 and 31 if possible.

4. *Insert the LGB Interface Card.*

   a. Insert the HP 98724A/25A, component side up, into an empty I/O slot in your computer. Tighten the thumb screws on the metal end plate until the end plate is flush with the back of the computer.

   b. If you have other interface or accessory cards to install, leave the cover plates off; otherwise replace them.

5. *Record the select code.*

   Make a note of the select code settings you chose. These settings are no longer available for use on the system.

Note

Remember, each interface card must have a unique select code. Select codes zero through seven (0-7) are reserved for internal interface cards and cannot be used for new interface cards.

If you need to change the select code of an internal interface card for any reason, do so by entering Configuration Mode during the Boot ROM sequence. To interact with the Boot ROM Configuration Mode on a model 362 or 382 computer, consult the *Hardware Configuration Guide* for instructions. To interact with the Boot ROM Configuration Mode of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

Installation Complete!

Refer to the "HP 98720A SRX Graphics Display Controller" section of this chapter for instructions to connect the HP 98720A SRX Graphics Display Controller to the HP 98724A/25A Local Graphics Bus Interface.

HP 98720A SRX Graphics Display Controller

The HP 98720A SRX Graphics Display Controller connects to the HP 98724A, 98725A Local Graphics Bus Interface, or built in Model 319 interface, depending on which Series 300 model computer you are using.

Caution Electronic assemblies in the HP 98720A such as the HP 98721A, 98722A, and the 98723A are very susceptible to handling damage. They are installed by HP qualified personnel. Damage caused by users may not be covered under warranty.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install:

- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation that came with the controller handy. You will need to refer to it during this procedure.
- Plan ahead.

  Installing new devices on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

What You're Going To Do

The following tables contain detailed HP-UX software set up information. Complete the hardware installation as outlined in this section. Once hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Note SAM does not support the installation of graphics devices.

Device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 11-14.
HP 98720A
Set to Internal Addressing Mode

Device Name	Path Name	File Type	Major Number	Minor Number
HP 98720A, image planes	`/dev/crt`	c	12	`0x000000`
HP 98720A, overlay planes	`/dev/ocrt`	c	12	`0x000001`

Table 11-15.
HP 98720A
Set to External Addressing Mode (Select Code 26-27, 28-29, 30-31)

Device Name	Path Name	File Type	Major Number	Minor Number
HP 98720A, select code 26-27, image planes	/dev/crt	c	12	0x1a0200
HP 98720A, select code 26-27, overlay planes	/dev/ocrt	c	12	0x1a0201
HP 98720A, select code 28-29, image planes	/dev/crt	c	12	0x1c0200
HP 98720A, select code 28-29, overlay planes	/dev/ocrt	c	12	0x1c0201
HP 98720A, select code 30-31, image planes	/dev/crt	c	12	0x1e0200
HP 98720A, select code 30-31, overlay planes	/dev/ocrt	c	12	0x1e0201

Installing the HP 98720A SRX Graphics Display Controller

Make sure that the correct interface is installed in your computer. Installation of the HP 98724A and 98725A interface cards are covered in the previous section of this chapter.

- If you have a Model 320 computer, you should have an HP 98724A Local Graphics Bus (LGB) interface card.
- If you have a Model 330 or 350 computer, you need an HP 98725A Local Graphics Bus (LGB) interface card.

The following summary supplements the procedures outlined in your installation documentation for this interface card. Read through this summary before proceding with the installation.

1. *Verify that the device drivers required for this controller are included in your current kernel configuration file, usually the* `/etc/conf/dfile` *file.*

   To verify that the necessary drivers are part of your current kernel configuration, you can:

   - You can use SAM to check your `dfile` for the drivers, add them if necessary and reconfigure the kernel for you at this time. Refer to Chapter 3, "Adding Drivers for Interface and Accessory Cards Using SAM" for complete instructions, then go on to step two.

     or

   - Look in your `dfile` for the necessary drivers. If the drivers are in your kernel configuration file, go on to step 2 now.

     If the drivers are not in the `/etc/conf/dfile`, or are commented out with a comment symbol (such as the * sign), edit the `dfile` to either add the driver or remove the comment marks. You must reconfigure the kernel if you edit the `dfile` for any reason. You can use the `/etc/config` program to do this. See Chapter 14, "Setting Up Devices Using HP-UX Commands" for detailed information on this procedure.

2. *Play it safe.*
   a. Shut down and halt the system using the `/etc/shutdown -h` command.
   b. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.
   c. TURN OFF the computer and unplug the power cord.
   d. Unpack the display station and check the voltage setting according to the documentation.
3. *Locate the Graphics Display Controller near the computer and the monitor.*
4. *Connect the RGB cable.*
5. *Connect the LGB cable to the HP 98724A/25A interface connector.*
6. *Connect the other end of the LGB cable to the HP 98720A.*
7. *Ensure all power switches are in the OFF position.*
8. *Connect all power cords.*

   If your HP 98720A contains two power supplies, connect both power cords.
9. *Turn on the monitor.*
10. *Turn on the HP 98720A.*
11. *Turn on the computer.*

Hardware Installation Complete!

Refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for software configuration instructions.

HP 98726A Local Graphics Bus Interface

The HP 98726A interface card provides a connection between a Series 300 SPU-backplane DIO-II bus and the 32-bit multiplexed address/data Local Graphics Bus (LGB). The interface acts as a slave on the DIO bus and as a master controller on the LGB for the HP 98730A TurboSRX Display Controller.

The interface supports byte and word transfers in accordance with DIO-I specifications as well as longword and unaligned transfers specified in DIO-II.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install:

- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- Plan ahead.

  Installing new devices on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

Installing the HP 98726A Local Graphics Bus Interface

Complete the hardware installation as outlined in below:

1. *Play it safe.*
   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove the HP 98726A from its envelope, being careful to handle the card by its edges and metal end plate. The card may be easily damaged by electrostatic discharge (static zap).

   d. Place the card on the envelope.

2. *Set the following values according to the instructions provided in the installation document that came with the interface.*
   a. Set address mode and select code.

Note Make note of the select codes used for this interface card. Remember, each interface card must have a unique select code. Select codes zero through seven (0-7) are reserved for internal interface cards.

If you need to change the select code of an internal interface card for any reason, do so by entering Configuration Mode during the Boot ROM sequence. To interact with the Boot ROM Configuration Mode on a model 362 or 382 computer consult the *Hardware Configuration Guide* for instructions. To interact with the Boot ROM Configuration Mode of any other S300 or S400 computer, refer to the *Service Manual* for the specific model computer.

---

b. Set the interface control space.

The card's control space can be at $200000 (default and recommended) or at $800000.

Caution When using memory location $800000 ensure that there is no other use of this area of memory. Unpredictable results will occur if other software/hardware attempt to use memory location $800000.

3. *Configure the interface for system console or peripheral device.*

CONSOLE CONFIGURATION

a. A **System Console Terminal** is an RS-232 terminal that has the **remote bit** set on the RS-232 interface card by altering the hardware switch or altering the switch value at boot-up with boot ROM rev. D or rev. 400. The RS-232 interface card may also configure the remote bit set by a resistor being removed. Any Console Terminal connected to your system is the system console, no matter what other terminals or displays are connected to the system.
b. As a second choice, any bit-mapped display attached to an interface addressed to $560000 is the system console. This is the default DIO-I internal addressing configuration shipped. *This is the recommended choice for the HP 98726A / HP 98730A subsystem used as a system console.*
c. For a third choice, the first bit-mapped display found in DIO-I space is recognized as the console. The search is from lowest to highest memory location (select code) in DIO-I space.
d. For a fourth choice, the first bit-mapped display found in DIO-II space is recognized as the console. The search is from lowest to highest memory location (select code) in DIO-II space.

PERIPHERAL CONFIGURATION

a. When a Console Terminal is the system console, the HP 98726A can be placed at any legal location and is treated as a peripheral.
b. When a bit-mapped display is the system console at $560000, then the HP 98726A must be placed at any legal address that is not $560000 and jumper JP1 must be placed in the $800000 position. *See previous CAUTION note.*
c. If a bit-mapped display is the system console and located in DIO-II space, the HP 98726A must be addressed at a higher memory location in DIO-II space. The jumper JP1 setting is ignored in DIO-II space.

4. *Install the interface card in your computer or expander.*

a. Insert the card, component side up, into an empty I/O slot in your computer. Tighten the thumb screws on the metal end plate until the end plate is flush with the back of the computer.
b. If you have other interface or accessory cards to install, leave the cover plates off; otherwise replace them.

Installation Complete!

Refer to the "HP 98730A TurboSRX Graphics Display Controller" section of this chapter for instructions to connect the HP 98730A TurboSRX Graphics Display Controller to the HP 98726A Local Graphics Bus Interface.

HP 98730A TurboSRX Graphics Display Controller

The HP 98730A TurboSRX Graphics Display Controller connects to your system via the HP 98726A Local Graphics Bus Interface.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install this controller:

- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation that came with the controller handy. You will need to refer to it during this procedure.
- Plan ahead.

  Installing new devices on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

HP-UX Set Up Information

The settings in Table 11-16 are DIO-I settings on the 98726A interface card. This setting requires the jumper JP1 to be in the $200000 position on the interface card. This is the recommended choice for the HP 98726A and HP 98730A subsystem used as a system console. The DIO-I external address settings in Table 11-16 require the jumper JP1 to be in the $800000 position on the interface card.

Table 11-16.
HP 98726A/98730A
DIO-I Settings

Switch Setting MSB ... LSB[1]	CTL_BASE (hex)	Select Code	File Type	Major No.	Minor No.
0101 0110[2]	$560000	internal	c	12	0x000000
0110 1010	$6A0000	10-11	c	12	0x0A0200
0110 1100	$6C0000	12-13	c	12	0x0C0200
0110 1110	$6E0000	14-15	c	12	0x0E0200
0111 0000	$700000	16-17	c	12	0x100200
0111 0010	$720000	18-19	c	12	0x120200
0111 0100	$7400000	20-21	c	12	0x140200
0111 0110	$760000	22-23	c	12	0x160200
0111 1000	$780000	24-25	c	12	0x180200
0111 1010	$7A0000	26-27	c	12	0x1A0200
0111 1100	$7C0000	28-29	c	12	0x1C0200
0111 1110	$7E0000	30-31	c	12	0x1E0200

1 Additional settings can be found by referring to the tables listed in the Installation Note for this interface card.

2 default setting

The settings in Table 11-17 reflect DIO-II settings for all possible select codes. The jumper JP1 is ignored for DIO-II.

Table 11-17. HP 98726/98730A DIO-II Settings

Switch Setting MSB ... LSB[1]	CTL_BASE (hex)	Select Code	File Type	Major No.	Minor No.
1000 0101	$01400000	133	c	12	0X850200
1000 1001	$02400000	137	c	12	0X890200
1000 1101	$03400000	141	c	12	0X8D0200
1001 0001	$04400000	145	c	12	0X910200
1001 0101	$05400000	149	c	12	0X950200
1001 1001	$06400000	153	c	12	0X990200
1001 1101	$07400000	157	c	12	0X9D0200
1010 0001	$08400000	161	c	12	0XA10200
1010 0101	$09400000	165	c	12	0XA50200
1010 1001	$0A400000	169	c	12	0XA90200
1010 1101	$0B400000	173	c	12	0XAD0200
1011 0001	$0C400000	177	c	12	0XB10200
1011 0101	$0D400000	181	c	12	0XB50200
1011 1001	$0E400000	185	c	12	0XB90200
1011 1101	$0F400000	189	c	12	0XBD0200
1100 0001	$10400000	193	c	12	0XC10200
1100 0101	$11400000	197	c	12	0XC50200
1100 1001	$12400000	201	c	12	0XC90200
1100 1101	$13400000	205	c	12	0XCD0200
1101 0001	$14400000	209	c	12	0XD10200
1101 0101	$15400000	213	c	12	0XD50200
1101 1001	$16400000	217	c	12	0XD90200
1101 1101	$17400000	221	c	12	0XDD0200
1110 0001	$18400000	225	c	12	0XE10200
1110 0101	$19400000	229	c	12	0XE50200
1110 1001	$A4000000	233	c	12	0XE90200
1110 1101	$B4000000	237	c	12	0XED0200
1111 0001	$1C400000	241	c	12	0XF50200
1111 0101	$1D400000	245	c	12	0XF50200
1111 1001	$1E400000	249	c	12	0XFD0200
1111 1101	$1F400000	253	c	12	0XFD0200

1 Additional settings can be found by referring to the tables listed in the Installation Note for this interface card.

Connecting the HP 98730A TurboSRX Graphics Display Controller

Refer to the documentation that came with the 98730A to:

- Unpack the HP 98730A.
- Check the voltage setting.

Make sure that the HP 98726A interface is installed in your computer. Installation of this interface card is covered in a separate section of this chapter.

1. *Play it safe.*
   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove system power cords from the power outlets.
2. *Locate the Graphics Display Controller near the computer and the monitor.*
3. *Connect the LGB cable.*
   a. Connect the LGB cable to the HP 98726A LGB interface connector.

      The cable connector key projects outward near the top from each end of the connector shell. Ensure that this is UP when connecting it to the interface or the HP 98730A.

   b. Connect the other end of the LGB cable to the HP 98730A.

4. *Connect the RGB cable.*
   a. Connect the RGB (Red Green Blue) cable to the monitor: red to red, green to green, and blue to blue connectors.
   b. Connect the other end of the RGB cable to the HP 98730A in the same manner.
5. *Ensure the power switches are in the OFF position.*
6. *Connect all power cords.*

   If your HP 98730A contains two power supplies, connect both power cords.
7. *Turn on the monitor.*
8. *Turn on the HP 98730A.*
9. *Turn on the computer.*

Installation Complete! Refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for software configuration instructions.

HP 98702A Graphics Address and Data Bus Interface

The 98702A Graphics Address and Data Bus Interface provides the connection between your computer and an HP 98705A, B, or C Graphics Display Controller.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install:

- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- Plan ahead.

  Installing new devices on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

Installing the HP 98702A Graphics Address and Data Bus Interface

The following summary supplements the procedures outlined in your installation documentation for this interface card. Read through this summary before proceding with the installation.

1. *Play it safe.*
   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

   c. Remove the HP 98702A from its envelope, being careful to handle the card by its edges and metal end plate. The card may be easily damaged by electrostatic discharge (static zap).

   d. Place the card on its envelope.

2. *Set the select code and make note of the settings.*

   The select code is preset to 133-135.

Note Select codes zero through seven (0-7) are reserved.

If your system has a conflict with the interface's select code address, you can change the address. If a second interface is installed with the same select code, one of them will have to be given a new select code switch setting.

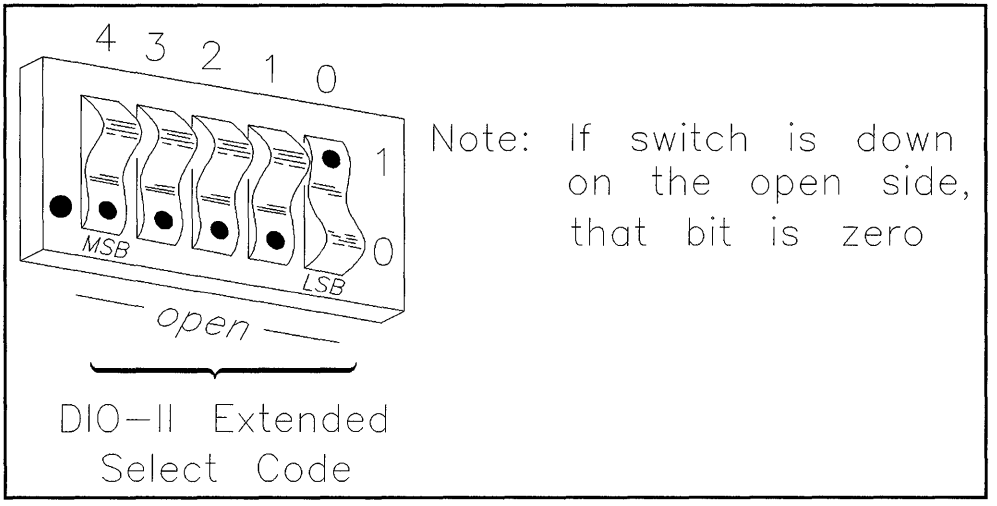


Figure 11-8. HP 98702A Interface Default Address Switch Setting

The switch configuration shown in Figure 11-8 is the default configuration on the card as shipped. It is configured for DIO-II select code 133-135.

The interface occupies three consecutive select codes in uncached address space. The first select code provides 4 Mbytes of address space for control. The second two select codes allocate 8 Mbytes of address space for full pixel addressing to the frame buffer.

Each switch position corresponds to four DIO-II select codes. The first select code is not used and is available for use with other than the Graphics Processor. The second select code is used for the Graphics Processor's control space, and the last two are used for the Graphics Processor's frame buffer space. Table Table 11-18 shows the translation between the interface's address switch settings, the DIO-II select code, and the mknod minor number.

Table 11-18.
HP 98702 Graphics Interface
HP-UX Setup Values

DIO-II Select Code	Switch MSB-LSB	DIO-II Select Code	Switch MSB-LSB
133-135	00001	205-207	10011
137-139	00010	209-211	10100
141-143	00011	213-215	10101
145-147	00100	217-219	10110
149-151	00101	221-223	10111
153-155	00110	225-227	11000
157-159	00111	229-231	11001
161-163	01000	233-235	11010
185-187	01110	237-239	11011
189-191	01111	241-243	11100
193-195	10000	245-247	11101
197-199	10001	249-251	11110
201-203	10010	253-255	11111

Note

a. A switch setting of 00000 is not a valid address code. The result will be a failure of the IODC test code to load and run at power-up (all LEDs on the interface will stay ON).

b. The Frame Buffer addresses are always 4 Mbytes (0x400000) above the CTL_BASE address.

3. *Insert the interface card in your computer or expander.*

   a. Insert the card, component side up, into an empty I/O slot. Tighten the thumb screws on the metal end plate until the end plate is flush with the back of the computer or expander.

   b. If you have other interface or accessory cards to install, leave the cover plates off; otherwise replace them.

Installation Complete

Refer to the "HP 98705A/B/C Graphics Display Controllers" section of this chapter for instructions to connect the HP 98705A/B/C Graphics Display Controller to the HP 98702A Graphics Address and Data Bus Interface.

HP 98705A/B/C Graphics Display Controllers

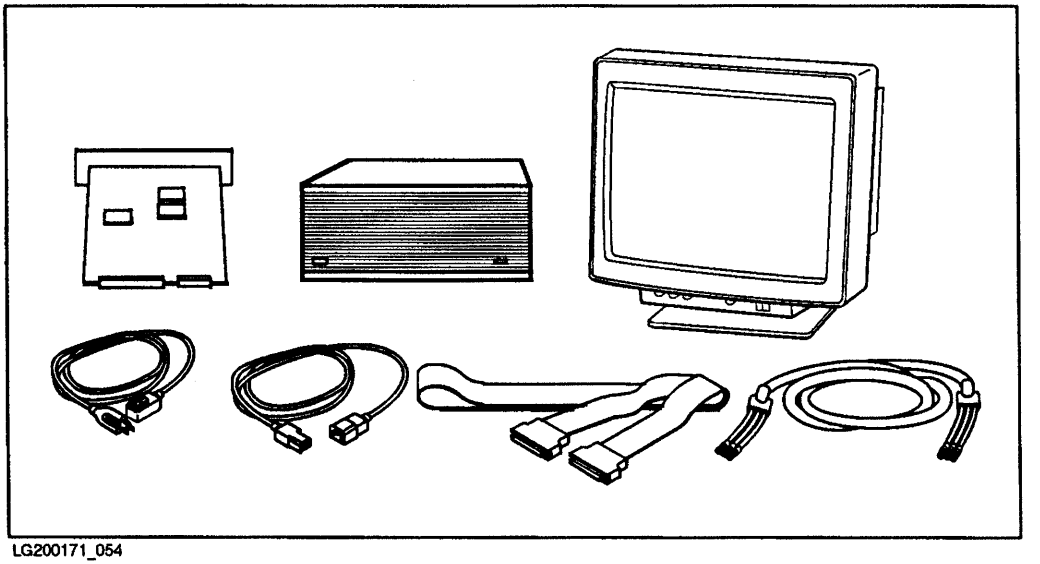
The HP 98705A/B/C Graphics Display Controller connects to your system via the HP 98702A Graphics Address and Data Bus Interface.

The HP 98705A Graphic Display Controller consists of eight image planes and four overlays.

The HP98705B Graphic Display Controller consists of 16 image planes, four overlays, and a 16-bit Z buffer.

The 98705C Graphic Display Controller mirrors the HP 98705A configuration with slower performance.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.



LG200171_054

Figure 11-9. HP 98705A/B/C Inventory

Before Installing This Device

Before you install:

- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation that came with the controller handy. You will need to refer to it during this procedure.
- Plan ahead.

  Installing new devices on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

HP-UX Set Up Information

The following table contains detailed HP-UX software set up information. Complete the hardware installation as outlined in this section. Once the hardware installation is complete, use the information provided in this table to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

The device file naming conventions are described in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 11-19.
HP 98702 Graphics Interface
HP-UX Setup Values

DIO-II Select Code	Switch MSB-LSB	mknod Minor Number	CTL_BASE (hex)	DIO-II Select Code	Switch MSB-LSB	mknod Minor Number	CTL_BASE (hex)
133-135	00001	0x850200	0x01400000	205-207	10011	0xcd0200	0x13400000
137-139	00010	0x890200	0x02400000	209-211	10100	0xd10200	0x14400000
141-143	00011	0x8d0200	0x03400000	213-215	10101	0xd50200	0x15400000
145-147	00100	0x910200	0x04400000	217-219	10110	0xd90200	0x16400000
149-151	00101	0x950200	0x05400000	221-223	10111	0xdd0200	0x17400000
153-155	00110	0x990200	0x06400000	225-227	11000	0xe10200	0x18400000
157-159	00111	0x9d0200	0x07400000	229-231	11001	0xe50200	0x19400000
161-163	01000	0xa10200	0x08400000	233-235	11010	0xe90200	0x1A400000
185-187	01110	0xb90200	0x0E400000	237-239	11011	0xed0200	0x1B400000
189-191	01111	0xbd0200	0x0F400000	241-243	11100	0xf10200	0x1C400000
193-195	10000	0xc10200	0x10400000	245-247	11101	0xf50200	0x1D400000
197-199	10001	0xc50200	0x11400000	249-251	11110	0xf90200	0x1E400000
201-203	10010	0xc90200	0x12400000	253-255	11111	0xfd0200	0x1F400000

"

Installing the HP 98705A/B/C Graphics Display Controllers

Refer to the documentation that came with the 98705A/B/C to:

- Unpack the HP 98705A/B/C.
- Check the voltage setting.

Make sure that the HP 98702A interface is installed in your computer. Installation of this interface card is covered in the previous section of this chapter.

1. *Play it safe.*
   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.
2. *Locate the Graphics Display Controller near the computer and the monitor.*

   Ensure air flow is not restricted at the front or rear of the Graphics Processor.
3. *Connect the Graphics Address and Data (GAD) bus cable.*
   a. Connect the GAD bus cable to the HP 98702A GAD bus interface connector.
   b. Connect the other end of the GAD bus cable to the HP 98705A/B/C. Ensure that the connector locks into position.

4. *Connect the RGB cable.*
   a. Connect the RGB (Red Green Blue) cable to the monitor: red to red, green to green, and blue to blue connectors.
   b. Connect the other end of the RGB cable to the HP 98705A/B/C in the same manner.
5. *Ensure that the power switches are in the OFF position.*
6. *Connect all power cords.*
7. *Turn on the monitor.*
8. *Turn on the HP 98705A/B/C.*
9. *Turn on the computer.*

Note If you purchased an add-on HP 98705 for either the HP A1421 or HP A1630 SPU, two attachment kits were included in the package. HP part number 98705-87904 is used with the HP A1630. HP part number 98705-87905 is used with the HP A14121.

10. *Verify installation.*

    Compare the console screen to Figure 11-10.

Note This screen represents a Model 375 and an HP 98705B installed as the console. Other configurations may have different screen messages.

```
Copyright 1989,
Hewlett-Packard Company.
All Rights Reserved.

  BOOTROM Rev. D
  MC68030 Processor
  MC68882 Coprocessor
  HIL Keyboard
  HP-IB
  DMA-C0
  RAM 16776992 Bytes
  HP98644 (RS-232) at 9
  HP98625 (HS HP-IB at 15
  HP98643 (LAN) at 21, 080009AAAAAA
  Centronics at 23
  Bit Mapped Video at 133



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

Figure 11-10. Display Showing Boot Up Sequence with HP 98705B as Console

Installation Complete! Refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for software configuration instructions.

HP 98735-66580 Physical DMA Interface

The HP 98735-66580 is a DIO-II physical DMA interface for the HP 98735A Graphics Display Controller.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

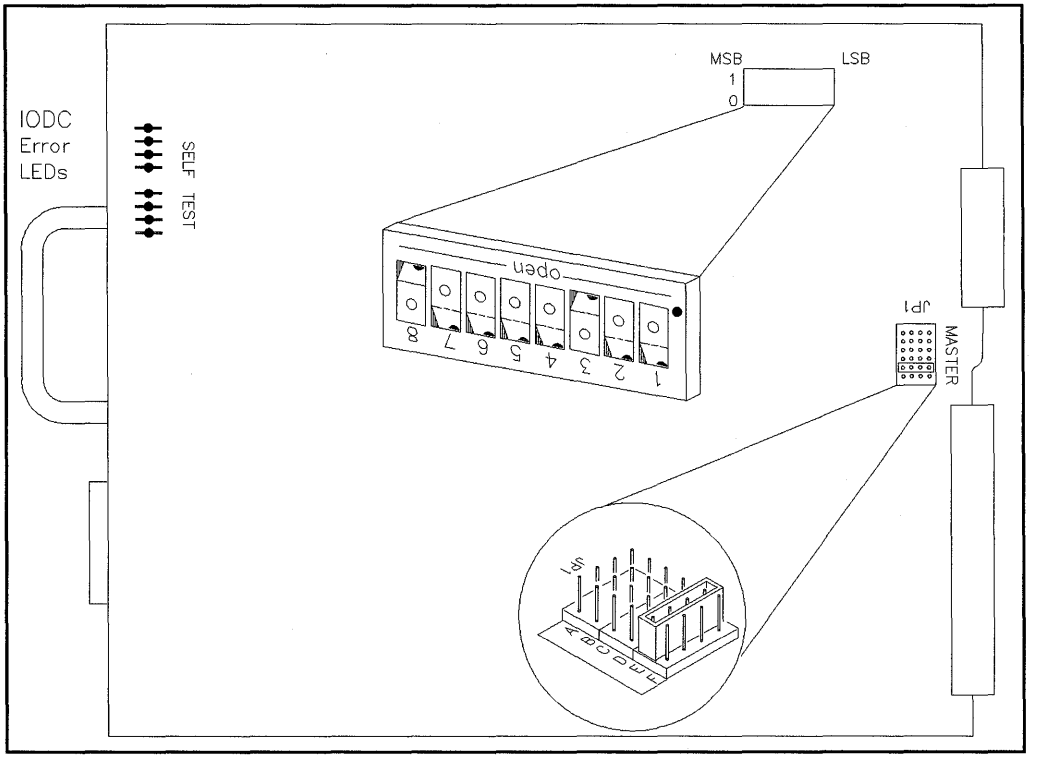


Figure 11-11. Physical DMA Interface

Before Installing This Device

Before you install:

- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- Plan ahead.

  Installing new devices on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

Installing the HP 98735-66580 Physical DMA Interface

The following summary supplements the procedures outlined in your installation documentation for this interface card. Read through this summary before proceding with the installation.

1. *Play it safe.*
   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.
2. *Set the select code and make note of it.*

   The select code is preset to 132.

Note Select codes zero through 7 (0-7) are reserved for use by internal interface cards.

An eight segment DIP switch is used to set the select codes. These eight switches indicate the binary coding in Table 11-20. the most significant bit (MSB) switch is always a one (open position) and the two least significant bit (LSB) switch are always zero (closed position).

Caution

- If you have "Instant Ignition" (or if you depend on /dev/crt to automatically select the console) do not use a select code above 140.
- A switch setting of switches 2 through 6 all set to zeros (closed position) must never be used. The interface card will interfere with proper system operation and may prevent the system from booting.

The interface occupies 16 Mbytes of address space corresponding to four consecutive select codes. You should never install another DIO-II card with a select code equal to the four select codes taken up by the interface board (for example, if the interface has a select code of 144, no other cards may have select codes of 144, 145, 146, or 147). Failure to observe this limitation will result in bus contention, with neither card operating properly.

Table 11-20.
HP 98735-66580 Physical DMA Interface
HP-UX Setup Values

DIO-II Select Code	Switch MSB-LSB	DIO-II Select Code	Switch MSB-LSB	DIO-II Select Code	Switch MSB-LSB
132-135	1000 0100	176-179	1011 0000	220-223	1101 1100
136-139	1000 1000	180-183	1011 0100	224-227	1110 0000
140-143	1000 1100	184-187	1011 1000	228-231	1110 0100
144-147	1001 0000	188-191	1011 1100	232-235	1110 1000
148-151	1001 0100	192-195	1100 0000	236-239	1110 1100
152-155	1001 1000	196-199	1100 0100	240-243	1111 0000
156-159	1001 1100	200-203	1100 1000	244-247	1111 0100
160-163	1010 0000	204-207	1100 1100	248-251	1111 1000
164-167	1010 0100	208-211	1101 0000	252-255	1111 1100
168-171	1010 1000	212-215	1101 0100		
172-175	1010 1100	216-219	1101 1000		

3. *Set the Bus Master Daisy Chain Jumpers.*

   Refer to the documentation that came with the interface card for the correct procedure and settings.

Caution Incorrect setting of the Bus Master Daisy Chain configuration could cause the following situations:

- The System will "hang" in boot ROM.
- The HP-UX system will boot correctly, but "hangs" when DMA is attempted.

The only remedy to "hanging" your system is to power off the CPU and change the jumpers. This could cause an `fsck` and loss of data.

Rules for determining the jumper position:

a. The daisy chain MUST start with the CPU and continue in order to the last board in the chain. There can be no open (unoccupied) positions.

b. The CPU board can start the chain in any of four locations: MC, A, B, C. All supported DIO-II CPU boards have an eight-pin jumper array.

   On Series 300, the jumper array is located between the DIO-II connectors. The position nearest the small connector is position MC. The position nearest the large connector is C.

   On the Model 400S the jumper is labelled "XBG3" at the MC position and "BG0" at the C position.

c. The DMA on an HP 9000 Series 375, and Model 400S are hard wired to D. Therefore, the CPU may have to start at a position other than MC in order to keep from leaving open positions in the chain.

d. The HP 98735A/36A/36B Graphics Display Controller interfaces can be set to position A through F.

Once the position of each board in the chain has been determined, all configurable boards need to have their jumpers checked or set to conform with the rules for determining the jumper position. See Figure 11-11 for location of the jumper on the interface card.

4. *Insert the PDMA Interface into a DIO-II slot.*
5. *Record the select code.*

   Make a note that the select code you have assigned to the interface has been used and is no longer available. Use the foldout worksheet at the end of this book for this purpose.

Installation Complete!

Refer to the "HP 98735A/36A/36B Graphics Display Controllers" section of this chapter for instructions to connect the HP 98735A Graphics Display Controller to the HP 98735-66580 Physical DMA Interface.

HP 98735-66581 Virtual DMA Interface

The HP 98735-66581 is a DIO-II virtual DMA interface for the HP 98736A and HP 98736B Graphics Display Controllers.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

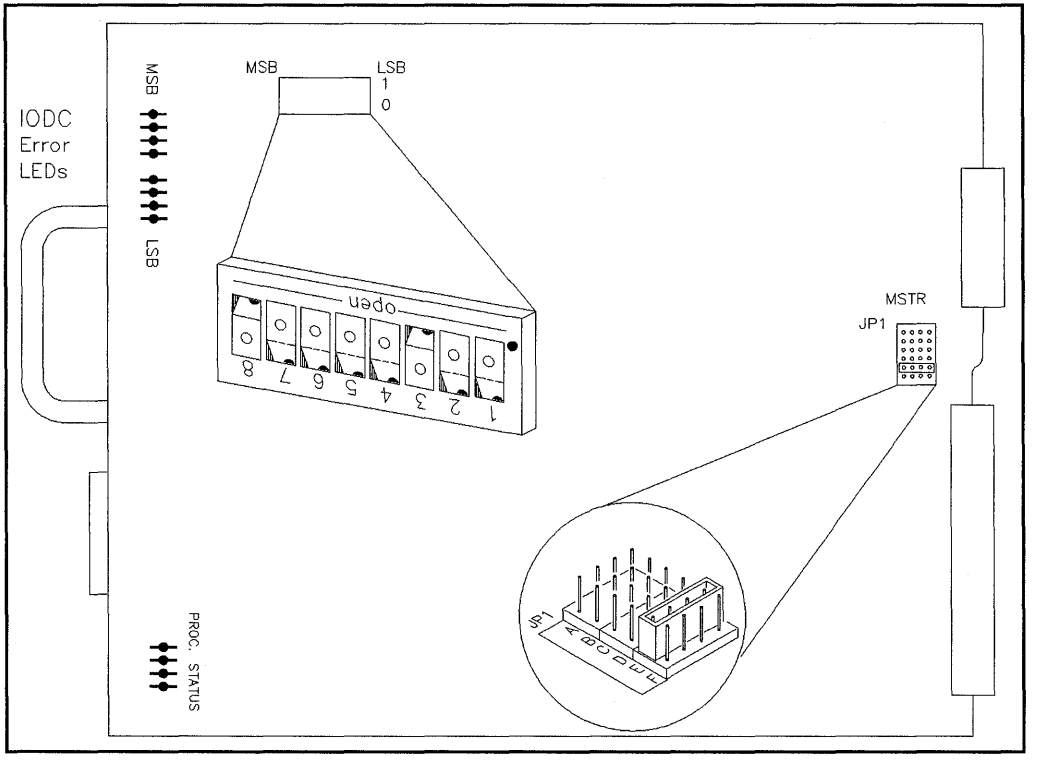


Figure 11-12. Virtural DMA Interface

Before Installing This Device

Before you install:

- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation that came with the interface card handy. You will need to refer to it during this procedure.
- Plan ahead.

  Installing new devices on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

Installing the HP 98735-66581 Virtual DMA Interface

1. *Play it safe.*

   a. Shut down and halt the system using the `/etc/shutdown -h` command.

   If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.

2. *Set the select code and make note of it.*

   The select code is **preset to 132.**

Note Select codes zero through seven (0-7) are reserved for internal interface cards.

An eight segment DIP switch is used to set the select codes. These eight switches indicate the binary coding in Table 11-21. the most significant bit (MSB) switch is always a one (open position) and the two least significant bit (LSB) switch are always zero (closed position).

Caution

- If you have "Instant Ignition" (or if you depend on /dev/crt to automatically select the console) do not use a select code above 140.
- A switch setting of switches 2 through 6 all set to zeros (closed position) must never be used. The interface card will interfere with proper system operation and may prevent the system from booting.

The interface occupies 16 Mbytes of address space corresponding to four consecutive select codes. You should never install another DIO-II card with a select code equal to the four select codes taken up by the interface board (for example: if the interface has a select code of 144, no other cards may have select codes of 144, 145, 146, or 147). Failure to observe this limitation will result in bus contention, with neither card operating properly.

Table 11-21.
HP 98735-66581 Virtual DMA Interface
HP-UX Setup Values

DIO-II Select Code	Switch MSB-LSB	DIO-II Select Code	Switch MSB-LSB	DIO-II Select Code	Switch MSB-LSB
132-135	1000 0100	176-179	1011 0000	220-223	1101 1100
136-139	1000 1000	180-183	1011 0100	224-227	1110 0000
140-143	1000 1100	184-187	1011 1000	228-231	1110 0100
144-147	1001 0000	188-191	1011 1100	232-235	1110 1000
148-151	1001 0100	192-195	1100 0000	236-239	1110 1100
152-155	1001 1000	196-199	1100 0100	240-243	1111 0000
156-159	1001 1100	200-203	1100 1000	244-247	1111 0100
160-163	1010 0000	204-207	1100 1100	248-251	1111 1000
164-167	1010 0100	208-211	1101 0000	252-255	1111 1100
168-171	1010 1000	212-215	1101 0100		
172-175	1010 1100	216-219	1101 1000		

3. *Set the Bus Master Daisy Chain Jumpers.*

   For the system to perform DMA transfers correctly, the Bus Master Daisy Chain must be set to the appropriate configuration. The card location in the chassis is independent of the card's position in the daisy chain. Jumpers on the interface card determine the location in the daisy chain. The Physical DMA Interface (PDMA), Virtual DMA Interface (VDMA), and CPU cards each have to be configured to daisy chain operation (as well as any other interface cards).

Caution Incorrect setting of the Bus Master Daisy Chain configuration could cause:

- System to "hang" in boot ROM.
- HP-UX system to boot correctly, but "hangs" when DMA is attempted.

The only remedy to "hanging" your system is to power off the CPU and change the jumpers. This could cause an `fsck` and loss of data.

Available daisy chain positions are: MC, and A through F. MC is the highest position and F is the lowest position. (There is also a G position for the special case of BOTH F and G being DIO-I cards.)

MC can only be used by the CPU. Therefore, it may not be shown on other cards.

Normally, the default jumper position on the cards can be used without causing interference. However, if you have a DOS coprocessor, a VME expander, or more that one HP 98735A/36A/36B Graphics Display Controller interface, the daisy chain jumpers must be checked.

The CPU Bus Master Daisy Chain default is position C.

The DMA controller chip on the HP 9000 Model 375 and Model 400S are hard wired at a fixed location (D) in the daisy chain. The rest of the CPU is dependent on the jumper for Bus Master position.

Figure 11-12 shows the location of the jumpers on the PDMA Interface card and the default jumper position E.

The VME expander has a default position E.

The DOS coprocessor may be either E or F and is set through a software configuration file.

Rules for determining the jumper position:

a. The daisy chain MUST start with the CPU and continue in order to the last board in the chain. There can be no open (unoccupied) positions.

b. The CPU board can start the chain in any of four locations: MC, A, B, C. All supported DIO-II CPU boards have an eight-pin jumper array.

   On Series 300, the jumper array is located between the DIO-II connectors. The position nearest the small connector is position MC. The position nearest the large connector is C.

   On the Model 400S the jumper is labelled "XBG3" at the MC position and "BG0" at the C position.

c. The DMA on an HP 9000 Series 375, and Model 400S are hard wired to D. Therefore, the CPU may have to start at a position other than MC in order to keep from leaving open positions in the chain.

d. The HP 98735A/36A/36B Graphics Display Controller interfaces can be set to position A through F.

Once the position of each board in the chain has been determined, all configurable boards need to have their jumpers checked or set to conform with the rules for determining the jumper position. See Figure 11-12 for location of the jumper on the interface card.

4. *Insert the VDMA Interface into a DIO-II slot.*

Installation Complete!

Refer to the "HP 98735A/36A/36B Graphics Display Controllers" section of this chapter for instructions to connect the HP 98736A/36B Graphics Display Controller to the HP 98735-66581 Virtual DMA Interface.

HP 98735A/36A/36B Graphics Display Controllers

The HP 98735A is a low cost 3D graphics peripheral that connects to your system via the 98735-66580 Physical DMA Interface. The HP 98736A is a mid-range controller and the HP 98736B is a high-range controller, that connect to your system via the 98735-66581 Virtural DMA Interface.

Refer to the documentation that came with your controller for more information.

Refer to Appendix B, "Series 400 Support Matrix" for Series 400 hardware and software support information.

Before Installing This Device

Before you install:

- If you have not added this type of device to your system before, read the material in Chapter 1, "Introduction". It provides interface and cabling guidelines to follow when adding devices to your system.
- Have the documentation that came with the controller handy. You will need to refer to it during this procedure.
- Plan ahead.

  Installing new devices on your system requires that you shut down and power off the system. On a multiuser or clustered system you will want to warn users and cluster clients in advance that the system (server) will be coming down. Use the `wall` or `cwall` command to do this.

Caution If you are adding this device to a cluster-node, you must be logged into that node to do HP-UX configuration tasks.

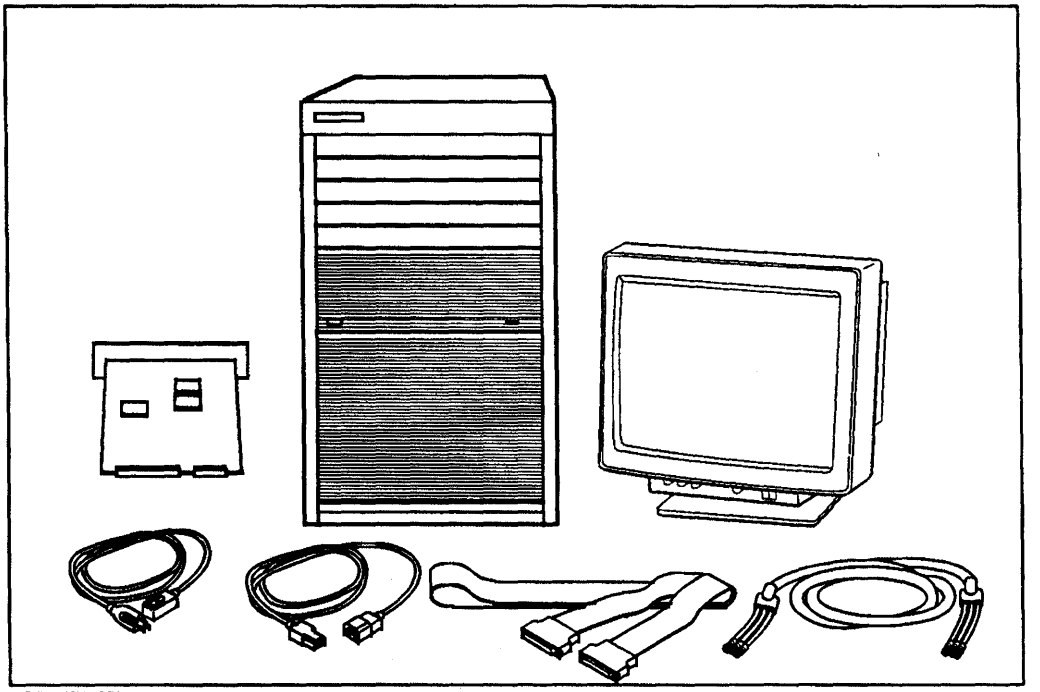
For more information about adding devices to a system configured as an HP-UX cluster, refer to *Managing Clusters of HP 9000 Computers*, Chapter 12, "Adding Peripherals to a Cluster".

HP-UX Set Up Information

The following tables contain detailed HP-UX software set up information. Complete the hardware installation as outlined in this section. Once hardware installation is complete, use the information provided in these tables to complete the software set up as outlined in Chapter 14, "Setting Up Devices Using HP-UX Commands".

Table 11-22.
HP 98735-66580 Physical and Virtual DMA Interface
HP-UX Setup Values

DIO-II Select Code	Switch MSB-LSB	mknod Minor Number	DIO-II Select Code	Switch MSB-LSB	mknod Minor Number
132-135	1000 0100	0x840200	196-199	1100 0100	0xC40200
136-139	1000 1000	0x880200	200-203	1100 1000	0xC80200
140-143	1000 1100	0x8C0200	204-207	1100 1100	0xCC0200
144-147	1001 0000	0x900200	208-211	1101 0000	0xD00200
148-151	1001 0100	0x940200	212-215	1101 0100	0xD40200
152-155	1001 1000	0x980200	216-219	1101 1000	0xD80200
156-159	1001 1100	0x9C0200	220-223	1101 1100	0xDC0200
160-163	1010 0000	0xA00200	224-227	1110 0000	0xE00200
164-167	1010 0100	0xA40200	228-231	1110 0100	0xE40200
168-171	1010 1000	0xA80200	232-235	1110 1000	0xE80200
172-175	1010 1100	0xAC0200	236-239	1110 1100	0xEC0200
176-179	1011 0000	0xB00200	240-243	1111 0000	0xF00200
180-183	1011 0100	0xB40200	244-247	1111 0100	0xF40200
184-187	1011 1000	0xB80200	248-251	1111 1000	0xF80200
188-191	1011 1100	0xBC0200	252-255	1111 1100	0xFC0200
192-195	1100 0000	0xC00200			



LG200171_050

Figure 11-13. HP 98735A/36A/36B Inventory

Installing the HP 98735A/36A/36B Graphics Display Controllers

Refer to the documentation that came with the 98735A/36A/37A to unpack the Graphics Display Controller.

Make sure that the 98735-66580 Physical DMA Interface or the 98735-66581 Virtual DMA Interface is installed in your computer. Installation of these interface cards is covered in separate sections of this chapter.

1. *Play it safe.*
   a. Shut down and halt the system using the `/etc/shutdown -h` command.

      If you are operating in a diskless cluster, see *Managing Clusters of HP 9000 Computers* for additional information on shutting down the system.

   b. TURN OFF the computer and unplug the power cord.
2. *Locate the Graphics Display Controller near the computer and the monitor.*
3. *Connect the GBUS cable.*
   a. Connect one end of the GBUS cable to the interface card in the computer.
   b. Connect the other end of the GBUS cable to the Graphics Display Controller.
   c. Ensure that the connector locks into position.

   Refer to the installation documentation that came with the controller for specific installation information.
4. *Connect the RGB cable.*
   a. Connect the RGB (Red Green Blue) cable to the monitor: red to red, green to green, and blue to blue connectors.
   b. Connect the other end of the RGB cable to the HP 98735A/36A/36B in the same manner.
5. *Ensure that the power switches are in the OFF position.*
6. *Connect all power cords.*

Ensure that the proper power cord is used for the Graphic Display Controller. This cord has heavier wiring and a distinct slot in the controller connector end.

a. Connect the power cord to your Graphic Display Controller.

b. Connect the other end of the power cord to the power outlet.

c. *Turn on the monitor.*

d. *Turn on the HP 98735A/36A/36B.*

e. *Turn on the computer.*

7. *Verify installation.*

Compare the console screen to Figure 11-14.

Note This screen is represents a Model 375 and an HP 98735B installed as the console. Other configurations may have different screen messages.

```
Copyright 1989,
Hewlett-Packard Company.
All Rights Reserved.

  BOOTROM Rev. D
  MC68030 Processor
  MC68882 Coprocessor
  HIL Keyboard
  HP-IB
  DMA-CO
  RAM 16776992 Bytes
  HP98644 (RS-232) at 9
  HP98625 (HS HP-IB at 15
  HP98643 (LAN) at 21, 080009AAAAAA
  Centronics at 23
  Bit Mapped Video at 132 (console)



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

Figure 11-14. Display Showing Boot Up Sequence with HP 98735B as Console

Installation Complete! Refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for software configuration instructions.

12

Setting Up HP-UX for Plotters Using SAM

This chapter describes how to use SAM to set up HP-UX to communicate with your plotter only.

SAM *does not* support the following graphics products:

- HP-HIL devices
- Graphics interface cards and associated displays
  - HP 13279B Color Monitor
  - HP 98548A/49A/50A High Resolution Graphics Interfaces
  - HP 98556A 2D Graphics Accelerator Accessory Card
  - HP 98627A Color Output Interface
  - HP A1416A High Resolution Color Graphics Interface
- Graphics interface cards, controllers, and associated displays
  - HP 98287A Graphics Display Controller Interface
  - HP 98700 CX Graphics Display Controller
  - HP 98702A Graphics Address and Data Bus Interface
  - HP 98705A/B/C Graphics Display Controllers
  - HP 98720A SRX Graphics Display Controller
  - HP 98724A/98725A Local Graphics Bus Interface
  - HP 98726A Local Graphics Bus Interface
  - HP 98730A TurboSRX Graphics Display Controller
  - HP 98735-66580 Physical DMA Interface
  - HP 98735-66581 Virtual DMA Interface
  - HP 98735A/36A/36B Graphics Display Controllers

To set up HP-UX to communicate with the above-listed graphics products, refer to Chapter 14, "Setting Up Devices Using HP-UX Commands".

Gather the necessary information:

- The name you are giving to this plotter.
- The model or interface that the plotter will use.
- The name of the device file that the plotter will use.
- The priority for this plotter.
- The class to which the plotter will be added (optional).
- Whether or not you wish to make this device your system's default plotter.

If you are adding a remote plotter, be sure to have this additional information on hand:

- The name of the remote system to which the plotter is attached.
- The name of the remote plotter.
- The "cancel" model on the remote system (optional).
- The "status" model on the remote system (optional).
- Whether or not you wish to allow any user to cancel any plotting request.
- Whether or not the remote plotter is on a system using BSD (Berkeley Software Distibution) UNIX.

If you are adding a network-based plotter, make a note of the link-level address used by the plotter's network interface.

To configure your plotter:

1. Log on as `root`.
2. Run SAM:

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

3. Highlight `Peripheral Devices->` and activate [Open].
4. Highlight `Printers and Plotters->` and activate [Open].
5. Highlight `Printers/Plotters` and activate [Open].
6. From the "Actions" menu title in the "Printer/Plotter Manager" window, highlight and choose the appropriate one of the following menu items:
   - `Add a printer/plotter ->`
   - `Add a remote printer/plotter...`
   - `Add a network based printer`
7. If you are adding a local plotter, SAM will search for any interfaces to which the plotter might be connected. This information appears in an object list within a "Printer/plotter hardware location" window. Highlight and choose the appropriate hardware path.

   An "Add plotter" dialog box appears. The titling and appearance of the dialog box will vary according to the type of connection you are using.
8. Type the required information into the fields displayed.

Note Some of the field names in the dialog box may be buttons ([Plotter class], for example). Activate these for information about available choices for entering in the fields.

---

9. When you have entered all the information into the dialog box, activate [OK].

SAM will create the device file needed to communicate with the plotter. SAM uses the device file naming convention `lp_`*xxxx*, where *xxxx* is the name of your plotter.

13

Installing HP-HIL Accessories

This chapter contains the installation and configuration procedures for the following HP-HIL peripherals:

- HP 35723A Touch Bezel
- HP 45911A/C Graphics Tablet
- HP 46020/21 Keyboard
- HP 46060A/B Two/Three-Button Mouse
- HP 46080A Extension Module
- HP 46081A Extension/Speaker Module
- HP 46082A/B Remote Extension Module
- HP 46083A Rotary Control Knob
- HP 46084A ID Module
- HP 46085A Control Dials Module
- HP 46086A Button Box
- HP 46087A/88A Digitizer
- HP 46089A Cursor
- HP 46094A Quadrature Port
- HP 92916A Bar Code Reader

Introduction

HP-HIL, the Hewlett-Packard Human Interface Link, is the HP standard bus for interfacing a personal computer, terminal, or workstation to its input devices. The bus is controlled by the `hil`(7) device driver, which is an integrated part of the HP-UX operating system kernel.

On request from the HP-UX operating system or an application program, `hil` queries the HP-HIL bus, identifies each connected device, and dynamically associates each device it finds with a device file, in the order it is found on the bus.

Refer to Appendix B, "Series 400 Support Matrix" for hardware and software support information for HP-HIL devices on Series 400 systems.

HP-HIL Device Constraints

Keep the following limitations in mind when you revise HP-HIL devices on your system.

- The HP-HIL devices connected to your computer can use no more than seven device addresses, corresponding to the seven device files with major number 24. The number of files used by each device is shown in Table 13-1. Some devices use no addresses, most use one, and one uses three.
- The power requirements of all connected HIL devices must not exceed 750 milliamps (mA). To make sure you do not exceed this requirement, total up the typical power required by each of your HP-HIL devices as shown in Table 13-1. If the total exceeds 750 mA, you must remove one or more devices.
- HP-HIL devices can be added to or removed from the HP-HIL interface while the system is running without necessarily affecting the HP-UX operating system or some application programs, since the `hil` driver can identify modifications dynamically.

  However, if your running application uses a particular device, and you remove the device from the link (even temporarily), or insert another device in front of it, your application may fail to recognize the change and may not work as expected.

  When possible, reboot your computer or restart the application program after you modify the HP-HIL devices on the link.

Hardware Overview

HP-HIL devices can be added to or removed from the HP-HIL interface without affecting the HP-UX operating system. However, it is preferable to reboot the computer whenever any hardware change is made on the HP-HIL bus.

HP-HIL devices are connected in a daisy-chain fashion from the HP-HIL bus connector on the Human Interface Board on the back panel of the computer. This socket is marked with two dots (••) and can also be labeled HP-HIL, KYBD, or KEYBOARD.

Cables of various lengths with HP-HIL plugs and marked at one end with one dot (•) and at the other with two dots (••) plug into sockets with the same number of dots on the devices and interface. The cable ends are not interchangeable. A plug with two dots must be inserted only in a socket with two dots. A plug with one dot must be inserted only in a socket with one dot.

Caution To avoid damage to your computer or peripheral hardware:

- DO NOT insert the one-dot end of an HP-HIL cable into a two-dot socket.
- DO NOT insert the two-dot end of an HP-HIL cable into a one-dot socket.
- DO NOT connect any HP-HIL cable plug or socket to a telephone system.

Further restrictions are described below in "HP-HIL Device Constraints".

For installation details, consult the hardware installation documentation for the specific device.

Software Installation

Up to eight device files are needed to run the driver and communicate with HP-HIL devices:

- One device file for the driver with major device number 23 and minor device number 0x000000.
- Up to seven device files for the HP-HIL devices with major number 24 and minor numbers 0x000010 to 0x000070.

These eight files should already exist on your system in the `/dev` directory. Type the following:


```
ll /dev | grep -E ' 23 | 24 '
```

to show directory entries like these:

```
crw-rw-rw-   1 root     other     24 0x000010 May  8 16:55 hil1
crw-rw-rw-   1 root     other     24 0x000020 May  8 16:55 hil2
crw-rw-rw-   1 root     other     24 0x000030 May  8 16:55 hil3
crw-rw-rw-   1 root     other     24 0x000040 May  8 16:55 hil4
crw-rw-rw-   1 root     other     24 0x000050 May  8 16:55 hil5
crw-rw-rw-   1 root     other     24 0x000060 May  8 16:55 hil6
crw-rw-rw-   1 root     other     24 0x000070 May  8 16:55 hil7
crw-rw-rw-   1 root     other     23 0x000000 May  8 16:55 rhil
```

The device type and permissions (crw-rw-rw-) and the major (23, 24) and minor (0x0000*n*0) device numbers should all be as shown. The file names can be arbitrarily different.

If any entry is missing or in error, you can replace it (as superuser) by executing the corresponding `mknod`(1M) command from the following group.

```
mknod rhil c 23 0x000000
mknod hil1 c 24 0x000010
mknod hil2 c 24 0x000020
mknod hil3 c 24 0x000030
mknod hil4 c 24 0x000040
mknod hil5 c 24 0x000050
mknod hil6 c 24 0x000060
mknod hil7 c 24 0x000070
```

HP-HIL Device Constraints

Table 13-1. HP-HIL Device Requirements

Device Name	Connection Restrictions	Files Used[1]	Power Used[2]
HP 35723A Touch Bezel	None.	1	133 mA
HP 45911A/C Graphics Tablet	None.	1	200 mA + 12 v.
HP 46020/21 Keyboard	None.	1	67 mA
HP 46060A/B Two/Three-Button Mouse	Must be connected after all other devices.	1	133 mA
HP 46080A Extension Module	None.	0	17 mA
HP 46081A Extension/Speaker Module	Must be connected directly to HP-HIL (KYBD) socket on computer chassis.	0	17 mA
HP 46082A/B Remote Extension Module	Must be connected directly to HP-HIL (KYBD) socket on computer chassis.	0	33 mA
HP 46083A Rotary Control Knob	None.	1	73 mA
HP 46084A ID Module	None.	1	40 mA
HP 46085A Control Dials Module	None.	3	213 mA

1 The total device files (addresses) used by all HP-HIL devices on a link cannot exceed seven.

2 The total power used by all HP-HIL devices on a link must not exceed 750 mA.

Table 13-1. HP-HIL Device Requirements (continued)

Device Name	Connection Restrictions	Files Used[1]	Power Used[2]
HP 46086A Button Box	None.	1	53 mA
HP 46087A/88A Digitizer	None.	1	133 mA
HP 46089A Cursor	Connects to HP 46087A/88A Digitizer.	0	0 mA
HP 46094A Quadrature Port	None.	1	125 mA
HP 92916A Bar Code Reader	Must be connected after HP 46020/21 Keyboard, if any.	1	133 mA

Refer to Chapter 14, "Setting Up Devices Using HP-UX Commands" for additional software configuration information for HP-HIL devices.

Summary of HP-HIL Devices

HP 35723A HP-HIL Touch Bezel

The HP 35723A Touch Bezel is a user-installable bezel which adds touchscreen capability to the HP 35731 and 35741 12-inch video monitors.

HP 45911A/C HP-HIL Graphics Tablet

The HP 45911A/C Graphics Tablet is designed for use with many different software applications. It includes a stylus and a protective overlay.

HP 46020/21 HP-HIL Keyboard

The HP 46020/21 Keyboards are offered in 17 languages.

HP 46060A/B HP-HIL Two/Three-Button Mouse

The HP 46060A Mouse has two buttons; the HP 46060B Mouse has three buttons. If installed, the mouse must be the last in the HP-HIL device sequence.

HP 46080A HP-HIL Extension Module

The HP 46080A Extension Module extends the distance between HP-HIL devices.

HP 46081A HP-HIL Extension/Speaker Module

The HP 46081A Extension/Speaker Module extends the distance between HP-HIL devices and includes an audio speaker on a separate circuit, with a 2.4m audio cable. It must be the first in the sequence of devices connected to the HP-HIL interface.

HP 46082A/B HP-HIL Remote Extension Module

The HP 46082A/B Remote Extension Modules extend the distance between HP-HIL devices and between monitors and their video interfaces. It must be the first in the sequence of devices connected to the HP-HIL interface.

HP 46083A HP-HIL Rotary Control Knob

The HP 46083A Rotary Control Knob provides two-axis relative cursor positioning via a rotary knob and a two-axis toggle button. It is best suited for text editing and spreadsheet applications.

HP 46084A HP-HIL ID Module

The HP 46084A ID Module contains a unique, machine-readable serial number that is required by software that uses the HP Codeword Delivery security scheme or software that is customized to an HP 46084A.

HP 46085A HP-HIL Control Dials Module

The HP 46085A Control Dials Module provides nine graphics positioning devices, implemented as three 3-axis devices. The control dials module is commonly used in graphics display applications to provide 3-axis attitude, 3-axis translation, scaling, and other attribute functions. It uses three HP-HIL device files.

HP 46086A HP-HIL Button Box

The HP 46086A Button Box provides 32 user-definable buttons for menu selection, and one user-programmable LED. Buttons can be labeled with defined functions, freeing the display for other uses. It includes one pre-printed and two blank overlays.

HP 46087A/88A Digitizer and HP 46089A Cursor

The HP 46087A and 46088A Digitizers are low-cost, high-resolution digitizers suitable for menu/object picking, free-hand graphics entry, and digitizing. The HP 46087A is ANSI A/ISO A4 size. The HP 46088A is ANSI B/ISO A3. Both digitizers include a stylus with tip switch and a platen overlay.

The HP 46089A four-button, cross-hair cursor is available separately or as a digitizer option. The cursor is recommended for digitizing existing drawings, artwork, or other hardcopy images. It connects to the digitizer in place of the stylus.

HP 46094A HP-HIL Quadrature Port

The HP 46094A Quadrature Port is used to connect a serial (non-HP) three-button mouse or other compatible device to the HP-HIL interface.

HP 92916A HP-HIL Bar Code Reader

The HP 92916A Bar Code Reader is a general-purpose bar code reader. It must be connected after the HP 46020/21 keyboard (if any) in the sequence of HP-HIL devices.

14

Setting Up Devices Using HP-UX Commands

Introduction

If you are not using SAM to install your new peripheral device, you must use commands to set up HP-UX to communicate with your newly connected device. Setting up HP-UX to communicate with devices consists of two steps:

- Ensuring that the appropriate HP-UX device driver is part of the current kernel configuration.
- Creating the device file or verifying that the correct device file already exists for communication with the device.

Ensuring the Device Driver is Part of the Kernel

The `/etc/conf/dfile` is typically used as input to generate a kernel. Look in `/etc/conf/dfile` to see if your kernel includes the appropriate kernel driver for the peripheral you want to add to your system.

Caution Your `/etc/conf/dfile` reflects the current kernel configuration if it was used to generate your current kernel. It is possible that the currently executing kernel was generated from a template other than `/etc/conf/dfile`. In this case, `/etc/conf/dfile` may not reflect the configuration found in the currently executing kernel.

If the `dfile` does not contain the driver you need to operate your peripheral, you must add the driver to `/etc/conf/dfile` and remake the kernel (this involves a reboot of the system). Regenerating the kernel is discussed in the following sections.

The following table lists the drivers that must be present for specific peripheral types.

Table 14-1. Device Drivers

Driver Name	Used For:
cs80	most mass storage devices (included in all sample configuration files)
scsi	SCSI direct access storage devices
amigo	Amigo mass storage devices
ciper	Ciper printers
printer	Non-ciper printers
hpib	Plotters; also needed for Device I/O Library (DIL)
tape	9-Track magnetic tape drives
stape	9-Track streaming tape drives
scsitape	SCSI tape drives
autoch autox	Optical autochanger drivers (require scsi driver)
apci	Advanced Serial driver for Series 400
dos	HP 98686 DOS Coprocessor driver
vme	HP 98646 VME card
vme2	HP 98577A VME expander
98624	Internal Standard-speed HP-IB disk controller (always included—other drivers depend on it)
parallel	Parallel interface for plotters and printers.
98625	High-speed HPIB disk controller
98626	HP 98626, HP 98644 RS-232 serial interface, or Series S300 RS-232-C built-in interface.
98628	HP 98628A RS-232 datacomm card
98642	HP 98624 RS-232 4-channel and HP 98638A 8-channel MUX card
98265	HP 98265 SCSI interface card
gpio	GPIO card; also include for Device I/O Library (DIL)
srm	Shared Resource Manager (SRM)
rje	Remote Job Execution (RJE)
ptymas ptyslv	pseudo terminal drivers (required for HP Windows/9000, Xwindows, and other software). Included in all sample configuration files.

Adding Device Drivers to the Kernel Using HP-UX Commands

If you have checked you kernel configuration file, usually the `/etc/conf/dfile`, and found that the device driver you need for your new peripheral or interface is missing, or it is commented out with comment marks (usually *) you will have to edit your kernel configuration file and regenerate the kernel. If you do not intend to use SAM to do this, follow the instructions in the next section. If the driver you need is present in the kernel and you do not have to edit the kernel configuration file, proceed to the "Creating Device Files" section of this chapter to learn how to create device files for your new peripheral device using HP-UX commands.

In the context of the following instructions, the term "standalone machine" refers to a machine that is *not* part of an HP-UX cluster. Adding new drivers to your kernel requires that you reconfigure the kernel. Instructions differ when reconfiguring a standalone machine, cluster server, or cluster client kernel.

Before You Begin

Adding a device driver and reconfiguring the kernel requires that you reboot your system. Note, however, the impact on other users *before* you shut down and reboot your system, especially the following:

- If others are logged into your system, rebooting it interrupts their work. If you have a small number of users or clients on your system, it is best to notify your users in person of the impending system shutdown. It is possible that users can be using an application and not be aware of the message sent by the `shutdown` command.
- If your system is a cluster server, or a swap server for other clients in a cluster, rebooting your system brings down the associated clients. See *Managing Clusters of HP 9000 Computers* for details.
- If your system is a file server in a cluster, rebooting it makes any file systems mounted to the file server unavailable to clients. Again, see *Managing Clusters of HP 9000 Computers* for details.
- If your system is an Internet Protocol router, rebooting it affects any IP traffic routed through your system.

The Procedure

To add HP drivers using HP-UX commands:

1. Ensure that you have superuser capabilities.
2. In an HP-UX cluster, ensure you are logged onto the machine for which a new kernel is being generated, client or server. This sets the correct context for creating the `/hp-ux` context-dependent file and editing the `/etc/conf/dfile` context-dependent kernel configuration file. You can log in at the cluster node console or remotely log in to the cluster node from another location by using the `rlogin` command. See the *Managing Clusters of HP 9000 Computers* manual for additional cluster information.
3. Change your directory to `/etc/conf`:

   ```
   cd /etc/conf
   ```


Caution You *must* get out of the root directory because you will be creating a new kernel. Otherwise, you will overwrite the currently executing kernel.

4. Make a backup copy of your current configuration description file (which is most commonly the `/etc/conf/dfile`).

   Enter the following command for a standalone machine:

   ```
   cp /etc/conf/dfile /etc/conf/dfile.old
   ```

   Enter the following command for an HP-UX cluster server or client:

   ```
   cp /etc/conf/dfile /etc/conf/dfile.cluster_node_name
   ```

   where *cluster_node_name* is the name displayed by the `getcontext` command or an abbreviated name to represent the hostname.

   We highly recommend the use of `/etc/conf/dfile` as the kernel configuration file so it remains up to date with the executing kernel, `hp-ux`. Some system software depends on `/etc/conf/dfile` representing the currently executing kernel.

14

Note In a cluster, `/etc/conf/dfile` is a CDF and should be used to recreate the kernel. See Chapter 11, "Reconfiguring the Kernel for a Cluster Node", in *Managing Clusters of HP 9000 Computers* for more information.

---

5. Edit `/etc/conf/dfile` to add the peripheral device driver:

   a. Find the line containing `* DEVICE DRIVERS`.

   b. Below this line, add the peripheral device driver. If an asterisk ("*") appears before the driver name, remove the asterisk.

6. Make a copy of the existing kernel.

Caution

- *DO NOT* perform this step if your system is booted from the `/SYSBCKUP` backup kernel. If you do, you could overwrite the only bootable kernel for your system.
- If you are creating a new cluster client kernel, do not copy `/hp-ux` to `/SYSBCKUP`. If you do, you will overwrite the cluster server's backup kernel.

If your system is a standalone or an HP-UX cluster server, enter:

```
cp /hp-ux /SYSBCKUP
```

If your system is an HP-UX cluster client, enter:

```
cp /hp-ux /SYSBCKUP.cluster_node_name
```

where *cluster_node_name* is the client nodename displayed by the `getcontext` command.

Write down the filename of the backup kernel.

7. Run `config` on the configuration description file you edited:

```
/etc/config config_file
```

where:

config_file is the configuration description file, for example, `/etc/conf/dfile`.

Executing `config` creates the files `conf.c` and `config.mk`. Be sure you have the correct version of these files by typing `ll` (that is "el, el") from the `/etc/conf` directory and verifying the last modified date and time.

Refer to *config*(1M) in *HP-UX Reference* for additional information.

8. Create the new HP-UX kernel (the file `hp-ux`) in the current directory (`/etc/conf`):

   ```
   make -f config.mk
   ```

   As it is executing, `config.mk` displays the following two lines:

   ```
   Compiling conf.c ...
   Loading hp-ux ...
   ```

9. Bring the system into single-user mode using the `shutdown` command:

   ```
   cd /
   shutdown grace_period
   ```

   See *shutdown*(1M) in *HP-UX Reference*.

   where *grace_period* is the number of seconds the system will wait before shutting down. Specifying a grace period is optional; the default is 60 seconds. The `shutdown` command sends all users currently logged into the system a warning message that the system is shutting down. You can rely on the system default message, or you can customize the message.

Caution Shutting down a cluster server causes all clients of the server to reboot.

10. Wait for the system to tell you it is in single-user mode.
11. Copy the new kernel to the / (root) directory:

    ```
    cd /etc/conf
    cp hp-ux /hp-ux
    ```

12. Halt the system:

    ```
    reboot -h
    ```

13. Turn off the computer. Install interface cards or peripheral devices. Refer to the documents shipped with the products being installed and the appropriate chapters of this manual for specific instructions.

Warning **Be sure to follow the ESD (Electrostatic Discharge) precautions when handling cards and devices. ESD precautions are described in the hardware installation and configuration guides.**

14. Turn on the power. The system will boot from the new kernel.

If the new kernel fails to boot, boot the system from the backup kernel and repeat the process of creating a new kernel. See "Booting the Standalone or Cluster Server Backup Kernel Using the Boot ROM".

You can boot a cluster client backup kernel by restoring the backup kernel to `/hp-ux`. See the "Restoring the Cluster Client Backup Kernel" section for details.

Once you have successfully reconfigured and booted your system, and connected your new peripheral device, you need to create device files for your new peripheral. Proceed to the "Creating Device Files" section for detailed information.

Booting the Standalone or Cluster Server Backup Kernel Using the Boot ROM

To boot a standalone machine or cluster server backup kernel, select the backup kernal using the boot ROM.

1. Turn the computer off and then on (cycling power).
2. Hold down the space bar during bootup to enter the boot ROM **attended mode**. This halts the automatic boot mechanism and allows you to manually select the operating system to load.
3. Type in the two-character code associated with the backup kernel `SYSBCKUP`.

The backup kernel will begin to boot. When it displays the login prompt, log in again and try to reconfigure the kernel again.

Caution If you reconfigure the kernel for a second time using the steps described previously, *DO NOT* create a backup of the current kernel. Since you are currently booted from the backup kernel, copying `/hp-ux` to a backup kernel could overwrite the only bootable kernel on your system!

If your computer still fails to boot, there is something wrong with either the file system or the hardware. Refer to your owner's guide for information on boot failure.

Restoring the Cluster Client Backup Kernel

If your system is a cluster client and the new kernel fails to boot:

1. Log into the cluster server from another client or the server console.
2. Ensure that you have superuser capabilities.
3. Move the client's backup kernel to the `/hp-ux` context-dependent file. For example:

   `mv /SYSBCKUP.`*`cluster_node_name`* `/hp-ux+/`*`c_node_name`*

   where:

cluster_node_name	is the client's full hostname as displayed by the `getcontext` command

4. Reboot the cluster client by cycling the power.

The client's backup kernel will begin to boot. When you are given the login prompt, log in again and try to reconfigure the kernel again.

Caution If you reconfigure the kernel for the second time using the steps described previously, *DO NOT* create a backup of the current kernel. Since you are currently booted from the backup kernel, copying `/hp-ux` to a backup kernel could overwrite the only bootable kernel on your system!

Creating Device Files

Device files (special files) are needed for every device connected to your system. Interface cards are an exception. The interface card itself does not require a device file, but the device that is connected to the interface card does need a device file. For interface cards you only need to ensure that the device driver for the interface card is part of the kernel configuration. See the section entitled "Ensuring the Device Driver is Part of the Kernel" at the beginning of this chapter for more information.

For more information about device files see Chapter 1, "Introduction". Also, refer to the *How HP-UX Works: Concepts for the System Administrator* manual for an indepth discussion of device files, system architecture and kernel configuration.

14 This section contains the following information:

- The *mknod*(1M) command syntax and examples.
- Viewing device file characteristics.
- Disk drive information and examples.
- Tape drive information and examples.
- Terminal and modem information and examples.
- Psuedo terminal information and examples.
- Plotter information and examples.
- Printer information and examples.
- Graphics device information and examples.
- HP-HIL device information and examples.
- GPIO device information and examples.

Permissions for Device Files

You must have restricted access permission on all device files that are associated with mountable file systems, giving read/write permission to the owner (`root`) only. This prevents someone from mounting unauthorized media on your system, and prevents everyone on the system from accidentally overwriting a file system residing on the device associated with this device file.

For example:

```
chown root /dev/dsk/cEd1s0 /dev/rdsk/cEd1s0
chmod 600 /dev/dsk/cEd1s0
chmod 600 /dev/rdsk/cEd1s0
```

Using the mknod Command

The *mknod*(1M) command is used to create device files. The *mknod*(1M) command has the following syntax:

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

where:

path_name Is the pathname of the device file to be created. Select a name for the device file that identifies the associated peripheral. The following sections describe the naming conventions for device files. Use these naming conventions for consistency on your system. Put all device files into the `/dev` directory (or the appropriate subdirectory); many commands expect to find device files in `/dev` and will fail if the required device file is not there.

file_type File type is represented by a single character: `b` (block), `c` (character), `n` (network) or `p` (pipe). Refer to the *mknod*(1M) man page for information on networking and pipe file types. Disks need both block and character device file entries. Any cartridge tape or flexible disk drives that will have mounted file systems need entries for both block and character device files. All other devices should have character device file entries only. Character mode of device access is also referred to as raw mode.

major The major number is an index to the kernel device driver used to communicate with the peripheral. For devices needing both a character and a block device file, there are different device drivers and therefore different major numbers for block and character device files for the same peripheral. Major numbers are listed in the `/etc/master` file.

minor The minor number specifies the hardware address (location on the I/O bus) and device specific characteristics. It is made up of the select code, bus address or port number, and other driver specific information. It is a 24-bit value represented in hexadecimal on the command line.

The following examples show the **mknod** command.

```
% mknod /dev/rmt/0mn c 54 0x0e0103 <-- SCSI DDS-format tape drive
% mknod /dev/ac/cEd1_1a   b 10 0x0e3001 <-- SCSI optical autochanger
% mknod /dev/crt     c 12 0x000001 <-- Graphics System Console
```

If you make a mistake while creating a device file, delete the device file you want to change and re-create it with **mknod**.

Viewing the Device File Characteristics

To see device file characteristics, execute an `ll` command from the directory containing your device file. For example, typing:

```
ll console
```

from the **/dev** directory will give you output similar to this:

```
crw--w--w-   1 root      other      0 0x000000 May 20 09:30 console
```

where the first character in the entry tells you that the device file is a character (`c`) device and the next series of characters represent the file's access permissions. The major and minor numbers are located in the fifth and sixth fields, respectively (where the size is displayed for a regular file). In this case, the major number is 0 and the minor number is 0x000000.

Disk Drives

There are three kinds of disk drives:

- Hard Disks
- Flexible Disks
- Optical Disks

You can use your hard disk as part of your swap space, part of the HP-UX file system, or both.

You can use your flexible disk as part of the file system or as miscellaneous storage space (for example, for backups). Flexible (floppy) disks come in two sizes: 5.25 inch and 3.5 inch. The 3.5 inch flexible disks are more common with an HP-UX system than the 5.25, but they are treated in the same manner.

You can use your optical disk, standalone or autochanger, as part of the file system or as secondary storage (for example, backups, archives). Additionally, the standalone optical disk drive can be used as part of your swap space.

This section contains the following information about disk drives:

- Device file location and naming conventions.
- Block and character device file requirements and recommendations.
- Major number.
- Minor number format.
- Other information.
- Examples of creating device file for the following devices:
  - CS80-type Hard Disk Drive
  - Amigo-type Hard Disk Drive
  - 650/A Optical Disk Drive
  - Optical Library System

Table 14-2 lists the supported disk drive types, their kernel device driver name, block major number, and character major number.

Table 14-2. Kernel Driver & Major Numbers for Disk Drives

Product Type	Kernel Driver	Block Major Number	Character Major Number
Disk drives using Command Set 80 and an HP-IB interface	cs80	0	4
Disk drives using Amigo protocol and an HP-IB interface	amigo	2	11
Disk drives using SCSI interface	scsi	7	47
Optical disk libraries	autoch, autox	10	55

Device File Naming Conventions for Disk Drives

Device files for disk drives must reside in the `/dev` directory. Disk drives require both character and block device files. Disks use the `/dev/rdsk` directory for the character device files and the `/dev/dsk` directory for the block device files. SAM uses the following device file naming convention.

Disk device file names are in the following format:

```
/dev/[r]dsk/[r]c#d#[l#]s#
```

where:

`r` — the first `r` indicates a raw (character) interface to the disk; the second `r` is reserved for future use and should not be used.

`c#d` — specifies the controller number. The `#` should be replaced with a capitalized hexadecimal representation of the select code.

`#[l#]` — The first `#` specifies the bus (target) address. The `l` stands for `lun` and is followed by the (`#`) `lun` number. This is used to identify specific units in integrated devices.

Optical disk libraries are named somewhat differently. Device files for optical disks are placed in the `/dev/rac` or `/dev/ac` directories. The first `#` (above) is followed by an underscore and a number that designates the disk, followed by an `a` for side `a`, or a `b` for side `b`. For example, `/dev/rac/cEd1_1a` is a device file for disk one, side `a`.

`s#` — The `s#` stands for section number. The `#` here is typically zero, except when using software disk striping. Refer to the *System Administration Tasks* manual for information on software disk striping.

Additional information about disks can be found in `disk(7)` in the *HP-UX Reference*.

Note Label each disk drive with the device file path name.

Minor Number Format for Disk Drives

The minor number format for disk drives is as follows:

```
0xScBaUV
```

where:

`0x`	This prefix indicates the number is hexadecimal.
`Sc`	This is a two-digit hexadecimal representation of the select code. The select code is determined by switch settings on the disk drives interface card (8 bit value).
`Ba`	This is a two-digit hexadecimal representation of the device bus address (4 bit value).
`U`	specifies the unit number for integrated devices.
`V`	specifies the volume number (0 for single file systems).

mknod Examples for Disk Drives

CS80-type Hard Disk Drive

If you have a CS80-type hard disk drive at select code 14 using bus address 2, use the following `mknod` command lines:

```
mknod /dev/dsk/cEd2s0  b 0 0x0e0200
mknod /dev/rdsk/cEd2s0 c 4 0x0e0200
```

If this is an integrated device (hard disk drive with either a flexible disk drive or a cartridge tape drive), you would also create device files for the other drive. For example, if you were adding an integrated hard disk and cartridge tape drive, you would type, in addition to the above, the following two lines (notice the last two digits are `10` instead of `00` because it is unit 1):

```
mknod /dev/rct/cEd2l1s0 c 4 0x0e0210
```

Amigo-type Hard Disk Drive

If you have an Amigo -type hard disk drive at select code 14 using bus address 2, use the following **mknod** command lines:

```
mknod /dev/dsk/cEd2s0      b 2 0x0e0200
mknod /dev/rdsk/cEd2s0     c 11 0x0e0200
```

SCSI-type Hard Disk Drive

If you have an SCSI-type hard disk drive at select code 14 using device (bus) target address 2, use the following **mknod** command lines:

```
mknod /dev/dsk/cEd2s0      b 7 0x0e0200
mknod /dev/rdsk/cEd2s0     c 47 0x0e0200
```

14

650/A Optical Drive

If you have an optical disk drive, at select code 14, using bus address 1, use the following **mknod** command lines:

```
mknod /dev/dsk/cEd1s0 b 7 0x0e0100
mknod /dev/rdsk/cEd1s0 c 47 0x0e0100
```

Optical Library System

For the Optical Library System, the minor number format changes to address the many surfaces available for data storage. The minor number for the Optical Library System has the following format:

```
0xScBISur
```

where:

`0x`	specifies format is in hexadecimal.
`Sc`	specifies the select code of the interface (8 bit value).
`B`	specifies the SCSI device (bus) target address (4 bit value).
`Sur`	specifies the surface (16 bit value).

If you have a SCSI optical autochanger at select code 14 and address 3, you need one device file for the autochanger and 129 device files for the disks and surfaces. The autochanger device file will follow this format:


```
mknod /dev/ract/ioctl c 55 0x0e3000
```

The format for the **mknod** command lines for one disk, both sides would be as follows:

```
mknod /dev/ac/cEd3_1a   b 10 0x0e3001  <-- Side 1a/disk surface 1 - block
mknod /dev/rac/cEd3_1a  c 55 0x0e3001  <-- Side 1a/disk surface 1 - character
mknod /dev/ac/cEd3_1b   b 10 0x0e3002  <-- Side 1b/disk surface 2 - block
mknod /dev/rac/cEd3_1b  c 55 0x0e3002  <-- Side 1b/disk surface 2 - character
```

You would then have to continue with the **mknod** commands until you are done. For thirty-two disks, the **mknod** command for the thirty-second disk, both sides, would be:

```
mknod /dev/ac/cEd3_32a  b 10 0x0e303f  <-- Side 32a/disk 32 surface 63 - block
mknod /dev/rac/cEd3_32a c 55 0x0e303f  <-- Side 32a/disk 32 surface 63 - character
mknod /dev/ac/cEd3_32b  b 10 0x0e3040  <-- Side 32b/disk 32 surface 64 - block
mknod /dev/rac/cEd3_32b c 55 0x0e3040  <-- Side 32b/disk 32 surface 64 - character
```

The command method for creating device files for optical disk libraries is impractical, since, as shown in the example above, there are 129 **mknod** commands to execute (32 disks, 64 surfaces, 2 device files per surface, and 1 ioctl setup). Therefore, use SAM to create the necessary device files for your optical disk library. If you do not have SAM on your system, use the scripts that came with your Optical Disk Library to set up your device.

Tape Drives

There are three kinds of tape drives:

- 9-track Magnetic Tape
- Cartridge Tape
- DDS-Format Tape (DAT)

This section contains the following information:

- Device file location and naming conventions.
- Block and character device file requirements and recommendations.
- Major number.
- Minor number format.
- Other information.
- Examples of creating device file for the following devices:
  - 9-track Magnetic Tape
  - Cartridge Tape
  - DDS-Format Tape (DAT)

14

DDS-format drives and 9-track magnetic tape drives are logically very similar. Both belong to the family of streaming tape drives. Most HP-UX commands that are associated with 9-track tapes, such as backups, can be used without modification with DDS drives.

9-track magnetic tapes are 1/2 -inch tapes on reels. You can use your magnetic tape for miscellaneous storage space (for example, backups).

Cartridge tapes, such as HP 9144 and HP 9145, are the 1/4 -inch tapes in plastic cartridges. Do not confuse this family of devices with DDS drives; they are quite different. HP-IB cartridge tape drives use the CS80 kernel disk driver. You can use your cartridge tape for miscellaneous storage space (for example, for backups).

DDS-Format tapes are based on Digital Audio Tape (DAT) technology. DAT uses an advanced form of helical scan recording to store data on a DDS cassette, approximately the size of a credit card. The tape drive provides for high-capacity, unattended backups. Some DDS tape drives can read and/or write in compressed mode.

A sixty meter (60m) DDS cassettes can hold up to 1.3 gigabytes (1300 megabytes) of uncompressed data. In compressed mode, a 60m DDS cassette can hold approximately 5.2 gigabytes (5200 megabytes) of data. A ninety meter (90m) DDS cassettes can hold up to 2.0 gigabytes (2000 megabytes) of uncompressed data. In compressed mode, a 90m DDS cassette can hold approximately 8.0 gigabytes (8000 megabytes) of data.

Note

- Data storage rate and capacity, especially in compressed mode, is dependent upon the computer's capacity to keep up with the device and the type of data being stored.
- Use only HP labeled DDS-format tapes in HP DDS-format tape drives. HP 92283A contains five (60m) HP labeled DDS-format tapes; and HP 92283B contains five (90m) HP labeled DDS-format tapes.

Device files for DDS-Format and the 9-track Magnetic tape drives should reside in the `/dev/rmt` directory. Device files for cartridge tape drives should reside in the `/dev/rct` directory.

The following sections (magnetic tape, cartridge tape, and DDS-format tape), contain the device file naming conventions for each type of tape drive.

All tape drives require only character device files.

Table 14-3 lists the supported tape drives types, their kernel device driver name, and character major number.

Table 14-3. Kernel Driver and Major Numbers for Tape Drive

Product Type	Kernel Driver	Character Major Number
1/4-inch cartridge tapes using and HP-IB interface.	cs80	4
1/2-inch 9-track open-reel tapes using and HP-IB interface.	stape	9
1/2-inch 9-track open-reel tapes using a SCSI interface.	scsitape	54
DDS tapes using an HP-IB interface.	stape	9
DDS tapes using a SCSI interface.	scsitape	54

Device File Naming Conventions and Minor Number Format for Tape Drives

9-Track Magnetic Tape Drive Device File Naming Convention

The following naming convention is recommended for magnetic tape devices because it connects most of the mode flags with the device name:

```
/dev/[r]mt/[c#d]#[hml][c][n]
```

where:

`r`	indicates a raw (character) device
`c#d`	indicates the controller number (optionally specified by the system administrator)
`#`	is the device number
`hml`	indicates the density: ■ h (high) for 6250 bpi ■ m (medium) for 1600 bpi ■ l (low) for 800 bpi
`c`	indicates data compression
`n`	indicates no rewind on close

For example, `/dev/rmt/2mn` is raw device 2 at 1600 bpi with no rewind and no compression.

Additional information about 9-track magnetic tape is available in *mt(7)* of the *HP-UX Reference*.

Note Label each tape drive with the device file path name.

9-Track Magnetic Tape Drive Minor Number Format

For the 9-track magnetic tape drives, the minor number format changes to address the different recording densities: 800 bpi, 1600 bpi, 6250 bpi, and compressed 6250 bpi. The minor number format for the 9-track magnetic tape is as follows:

```
0xScBaUV
```

`0x` This prefix indicates the number is hexadecimal.

`Sc` This field is a two-digit hexadecimal representation of the select code. The select code is determined from the switch settings on the tape drive's interface card.

`Ba` This field is a two-digit hexadecimal representation of the bus address. It is determined from the switch settings on the tape drive.

14

`U` The single hexadecimal unit number (`U`) represents a four-bit binary value. Setting and clearing the bits of this binary value affect the manner in which the tape drive operates, as indicated in Table 14-4.

`V` The volume number (`V`) field of the minor number also has special meaning when creating device files for magnetic tape drives. The single hexadecimal volume number represents a four-bit binary value. Setting and clearing the bits of this binary value affect the manner in which the tape drive operates, as indicated in Table 14-5 .

Table 14-4 indicates the special meanings of each bit in the unit number portion of the magnetic tape minor number. Bits 6 and 7 select the tape density, while bits 4 and 5 represent the unit number, and "x"s represent "don't care":

Table 14-4. Tape Density and Unit Number Bit Settings

Hex Value	7	6	5	4	Selects
c	1	1	x	x	Density = 6250 bpi compressed (HP 7980XC and HP 7980SX)
8	1	0	x	x	Density = 6250 bpi (HP 7978, HP 7980A and HP 7980S)
4	0	1	x	x	Density = 1600 bpi (All mag tapes)
0	0	0	x	x	Density = 800 bpi (HP 7974, opt 800 only)
0	x	x	0	0	Select Unit 0
1	x	x	0	1	Select Unit 1, etc.

Table 14-5 indicates the special meaning each bit has in the volume number of the magnetic tape minor number:

Table 14-5. Magnetic Tape Operation Bit Settings

Bit Order	When Clear (0)	When Set (1)
3	Industry Standard mode	HP-UX 2.0 compatibility mode
2	Immediate report on (ignored by HP 7970/7971)	Immediate report off
1	AT&T-style compatibility mode	Berkeley-style compatibility mode
0	Rewind on close	No rewind on close

If you connected an HP 7978 tape drive to select code 14, HP-IB bus address to 3, use the following **mknod** commands:

```
mknod /dev/rmt/0mn c 9 0x0e0343
mknod /dev/rmt/0h c 9 0x0e0382
```

You could access the same drive as a 6250 bpi device using the "0h" device and as a 1600 bpi device using the "0mn" name. You could also use the "mt" command to do various positioning operations on the tape without having to provide a device name because **mt** uses the default device **/dev/rmt/0mn**. Since **tar** defaults to **/dev/rmt/0m**, you may also want to create this file.

Cartridge Tape Drive Device File Naming Convention

Cartridge tape device file names have the following format:

```
/dev/[r]ct/[r]c#d#[l#][s#]
```

where:

`r`	the first `r` indicates a raw interface to the cartridge tape; the second `r` is reserved to indicate that this cartridge tape is on a remote system.
`c#d`	specifies the controller number. The `#` should be replaced with a capitalized hexadecimal representation of the select code.
`#[l#]`	The first `#` specifies the bus (target) address. The `l` stands for `lun` and is followed by the (`#`) `lun` number. This is used to identify specific units in integrated devices.
`s#`	optionally indicates a section number. This is always zero.

Additional information about cartridge tapes is in *ct(7)* of the *HP-UX Reference*.

Cartridge Tape Drive Minor Number Format

The minor number format for cartridge tape drives is as follows:

```
0xScBaUV
```

where:

`0x`	specifies format is in hexadecimal.
`Sc`	specifies the select code of the interface (8 bit value).
`Ba`	specifies the bus address (4 bit value).
`U`	specifies the unit number.
`V`	specifies the volume number (0 for single file systems).

If you have a CS80 cartridge tape drive at select code 14, HP-IB bus address 1, your **mknod** command line would be:

```
mknod /dev/rct/cEd1s0 c 4 0x0e0100
```

If this is an integrated device (both hard disk and cartridge tape drive in the same unit), the hard disk drive is unit `0` and the cartridge tape drive is unit `1`. You would create three device files: one block device file for the hard disk, and one character device file for each unit. For example, if you have a CS80 drive at select code 14, bus address 1, your **mknod** command lines would be:

```
mknod /dev/dsk/cEd1l0s0 b 0 0x0e0100
mknod /dev/rdsk/cEd101s0 c 4 0x0e0100
mknod /dev/rct/cEd1l1s0 c 4 0x0e0110
```

DDS-Format Tape Drive (DAT) Device File Naming Convention

The following naming convention is recommended for DDS-format tape drives:

```
/dev/rmt/[c#d]#[mc][n]
```

where:

`c#d`	optionally specifies the controller number. The `#` should be replaced with the hexadecimal representation (capitalized) of the select code.
`#`	specifies the device number.
`m|c`	indicate density. The `m` is standard DDS format density. Use `c` to indicate compressed mode.
`n`	indicates no rewind on close

Additional information about magnetic tape can be found in *mt(7)* of the *HP-UX Reference*.

DDS-Format Tape Drive (DAT) Minor Number Format

Encoded in the minor number of the DDS-Format Tape Drive (DAT) are its various modes of operation. The minor number for the DDS-Format Drive has the following format:

```
0xScBaD0
```

where:

`0x`	specifies format is in hexadecimal.
`Sc`	specifies the select code of the interface (8 bit value).
`Ba`	specifies the bus address (8 bit value).
`D`	specifies density and partition for SCSI tape drives as shown below (4 bit value). `D` is always `4` on HP-IB drives. HP-IB drives do not support data compression.

On SCSI DDS tape drives, bits 7 and 6 are set to specify compressed mode; standard DDS density is specified with bit 7 unset and bit 6 set. Bit 5 is reserved and bit 4 selects partition 1 when set, otherwise partition 0 is selected.

DDS Tape Bits 4 - 7 on SCSI Devices

Value being Set	Bit 7	Bit 6	Bit 5	Bit 4	Result	Hex. Equivalent
Uncompressed\Select Partition 0	0	1	0	0	0100	4
Uncompressed\Select Partition 1	0	1	0	1	0101	5
Compressed\Select Partition 0	1	1	0	0	1100	C
Compressed\Select Partition 1	1	1	0	1	1101	D

0 specifies additional operation characteristics as shown in the following table (4 bit value).

Table 14-6. DDS Tape Operation Bits 0 - 3

Bit	Clear(0)	Set(1)
3	Disable fixed length records	Enable fixed length records
2	Immediate Report on	Immediate Report off
1	AT&T-style close	Berkeley-style close
0(lsb)	Rewind on close	No rewind on close

Table 14-7. EXAMPLES of Possible Settings

For Example:	Result	Hex. Equiv.
Fix record length enabled, immediate reporting on, Berkeley style close, autorewind	1010	A
Fix record length disabled, immediate reporting on, Berkeley style close, autorewind	0011	2
Fix record length disabled, immediate reporting off, AT&T-style close, no rewind	0101	5

Some example **mknod** commands for SCSI tapes are:

```
mknod /dev/rmt/0hc c 54 0x0e03C3      IR on, Berkeley-close, no rewind
mknod /dev/rmt/0hc c 54 0x0e03C2      IR on, Berkeley-close, autorewind
mknod /dev/rmt/0mn c 54 0x0e0343      IR on, Berkeley-close, no rewind
mknod /dev/rmt/0m c 54 0x0e0342       IR on, Berkeley-close, autorewind
```

The **mknod** examples above show a SCSI DDS-format drive, at select code **14**, with the tape drive's bus address at 3. The density bits are set to compressed in the first two examples and uncompressed in the second two examples.

Some example **mknod** commands for HP-IB tapes are:

```
mknod /dev/rmt/0mn c 9 0x0e0343       IR on, Berkeley-close, no rewind
mknod /dev/rmt/0m c 9 0x0e0342        IR on, Berkeley-close, autorewind
```

The **mknod** examples above show a HP-IB DDS-format drive, at select code **14**, with the tape drive's bus address at 3.

Note To help your users (and yourself) remember the names of the drive, you should label the drive with the device file path name.

Terminals and Modems

This section contains the following terminal and modem information:

- Process overview for setting up HP-UX to communicate with terminals and modems.
- Device file location and naming conventions.
- Block and character device file requirements and recommendations.
- Major number
- Minor number format.
- Examples of creating device files.
- Other information.

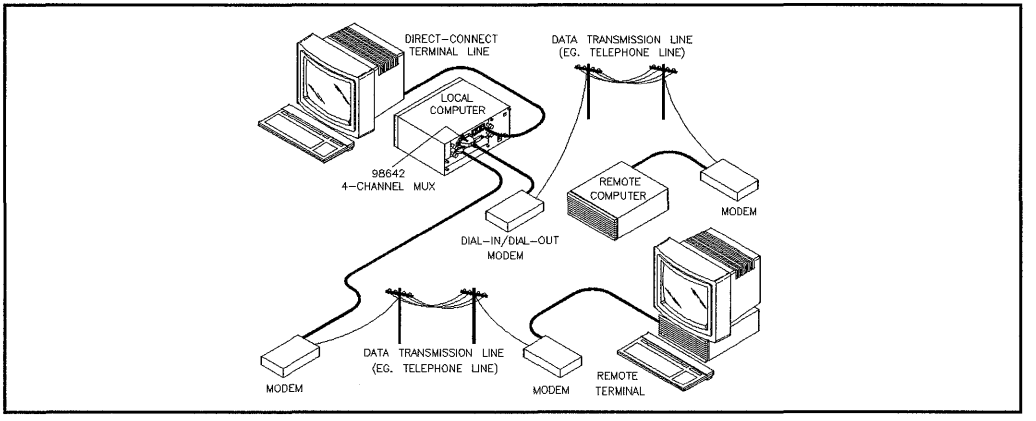


Figure 14-1. Terminal and Modem Connections

You should already have the terminal and modem physically connected to your system as in Figure 14-1. If you do not have the terminal and/or modem connected to your system, refer to Chapter 5, "Installing Terminals and Modems".

Summary of Steps to Set Up a Terminal or Modem

Use the following procedure to set up a terminal or a modem.

1. Create the device files required. If the terminal uses both dial-in and dial-out access, you will need three files.
2. Add the necessary `getty` entries to the `/etc/inittab` file.
3. Add the necessary entries to the `/etc/ttytype` file.
4. When using the terminal, set the TERM environment variable and execute the `tset` command.

Note If you are on an HP-UX cluster, `/dev` is a context-dependent file. This means you must create the device file from the cnode where the terminal is located.

Device File Naming Conventions

Communication ports (user terminals as well as modems) need to be identified by one or more device file, depending on the intended use of the port. Device file naming conventions vary, depending on the device's use. Terminal (`tty`) files are required for terminals (hard-wired ports). Ports that receive incoming signals ("dial in" modems) require a special naming convention, `ttyd`, for device files. Ports that transmit signals ("dial out") require both `cua` and `cul` device files.

The following list contains RS-232-C driver names associated with several types of serial connections. The drivers listed must be included in the `dfile` for the specified serial connection type.

Device Driver	Connection Type
`98626`	Series 300 Built-in RS-232-C port and HP 98626A RS-232-C Interface
`98628`	HP 98628A Datacomm Interface
`98644`	HP 98644A Asynchronous Serial Interface
`apci`	Series 400 Built-in RS-232-C port
`98642`	HP 98642A 4-Channel Multiplexer Interface or HP 98638A 8-Channel Multiplexer Interface

All serial drivers require a major number of 1.

Minor Number Format for Terminals and Modems

The minor number format for terminals and modems is as follows:

```
0xScPaCX
```

where:

`0x` This indicates the number is hexadecimal.

`Sc` This is the select code, which is a two-digit hexadecimal number determined by switches set on the terminal or modem's interface card.

`Pa` This is the port address for each port.

This two-digit hexadecimal number is set by switches on the device. If your terminal (or modem) is connected to an HP 98626 or HP 98644 interface card, the port address is always `00`. If you terminal is connected to an HP 98642 interface card, the port address is 00, 01, 02, or 03. If your terminal (or modem) is connected to an HP 98638 interface card, the port address is `00` to `07` for the lower select code or `00` to `03` for each of its two select codes.

`C` specifies FIFO control. The range is 0x0 to 0xf. This bit specifies the trigger level for receive FIFO and transmit limit for transmit FIFO. See the *termio*(7) manpage for details.

`X` This is a hexadecimal representation that specifies the hardware flow control state and access type as shown in the table that follows.

Bit	Value
3	RTS/CTS hardware flow control. `0` = OFF, `1` = ON.
2	1=direct connect, 0=modem
1	1=CCITT protocol (Europe), 0=Simple protocol (U.S.)
O	1=dialout modem, 0=dial-in modem

Table 14-8 shows a general `mknod` template for ports where *xx* is a two-digit line identifier in the device file name:

Table 14-8. General Template for Ports

Device	Notes
`tty`*xx*	hardwired ports (terminals)
`ttyd`*xx*	dial-in modems
`cua`*xx*	autodial-out ports
`cul`*xx*	dial-out ports

Modems require two device files and possibly three. The "dial-in modems" device file `ttydxx` and the "dial-out ports" device file `culxx` are required. If you are using a non-HoneyDanBear `uucp`, the system dials its connection using `/usr/lib/dialit.c`, which requires you to create a third modem device file `cuaxx` with the same minor number as the `culxx` device file.

Assume that you want to create device files for a modem at select code 20 (decimal 20 = hexadecimal 14), using an HP 98626 card, and associate it with line 20 (that is, `/dev/ttyd20`). Because the modem will be used as a dial-in and dial-out port, the `X` term of the minor number on the `cul` file must be 1, and on the `ttyd` file must be 0. The following `mknod` command lines are needed:

```
mknod  /dev/cul20   c   1 0x140001
mknod  /dev/cua20   c   1 0x140001
mknod  /dev/ttyd20  c   1 0x140000
```

There are now three device files associated with the dial-in and dial-out modem at select code 20. Similarly, the **mknod** command lines for an HP 98642 four port mux with port 0 attached to a modem and terminals attached to ports 1 to 3 are:

```
mknod /dev/ttyd01 c 1 0x0d0004
mknod /dev/cul01 c 1 0x0d0001
mknod /dev/cua01 c 1 0x0d0001
mknod /dev/tty02 c 1 0x0d0100
mknod /dev/tty03 c 1 0x0d0200
mknod /dev/tty04 c 1 0x0d0300
```

The following example will set up a direct-connect port for an HP 98642 on line 13 at select code 13 (13 decimal = hexadecimal d). The minor number ends with a four since this is a direct-connect port:

14

```
mknod  /dev/tty13 c 1 0x0d0004
```

When a terminal is added to the system, you must add entries to the `/etc/ttytype` and `/etc/inittab` files. This allows a user to login from the terminal.

Adding an Entry to the /etc/ttytype File

The `/etc/ttytype` file is a data base that contains the terminal type of the terminal associated with each port on the system. It is used by the `tset` and `login` commands. Based on the information in this file, `tset` will perform terminal-dependent processing, such as setting erase and kill characters, setting or resetting delays, and sending sequences needed to properly initialize the terminal. `login` uses this file to set the TERM variable.

The `/etc/ttytype` entries have the form:

model_number location

where:

model_number is the product number of the terminal or computer (as defined in `/usr/lib/terminfo`). For more information on the model number to use here, refer to the *terminfo(4)* entry in the *HP-UX Reference*

location is the device file associated with the terminal/computer and contained in the `/dev` directory (not the full path name, just the file name).

Here is a sample `/etc/ttytype` file:

```
300h    console     # Administrator's system console
2622    tty00       # Terry's terminal
2622    tty01       # Susan's terminal
2623    tty02       # Mary's terminal
dialup  ttyd03      # Don's dialup modem
```

If the entry is for a dialup port, the *model_number* should be `dialup`. This causes `tset` to request the proper terminal type during the login sequence.

Note If you are on an HP-UX cluster, this file is a context-dependent file. There must be one subfile for each cluster node.

Adding an Entry to the /etc/inittab File

The `/etc/inittab` file is described in Chapter 3, section "System Startup Functions". For terminals, `/etc/inittab` entries contain the `/etc/getty` command. This section discusses entries specific to terminals.

Most `/etc/inittab` entries for terminals have the form:

```
id:rstate:respawn:/etc/getty -t xxx device_file_name N # comment field
```

where:

`id`	is a unique two-character string. The value of the two-character string is arbitrary but must be unique for each entry. It is used to refer to the same entry/process in other states.
`rstate`	indicates the `getty` run-levels. This field typically equals two, meaning the terminal can be used in run-level two only.
`respawn`	Specifies that the command in the command field (such as `getty`) is re-invoked once the process terminates (typically, when a user logs off the system).
`/etc/getty`	This is the command to execute. The fields of the `/etc/getty` command are described below.

The fourth field, the `process` field, must contain the `/etc/getty` command; it is immediately followed by three parameters for a `getty` command, as follows:

`-t xxx`	is the optional time-out option for use with modems.
`device_file_name`	is the file name (`tty04`)—not the complete path name (`/dev/tty04`)—of the terminal's or modem's character device file. The named file must reside in the `/dev` directory.
`N`	specifies a speed indicator for `getty`. A value of H is common for "hardwired" (9600 baud terminal) lines; a value of three is common for dial-up (300/1200 baud modem) lines.

For more information, refer to the `getty(1M)` and `gettydef(4)` entries in the *HP-UX Reference*.

On a multi-user system, each terminal connected to the system must have an entry in `/etc/inittab`. For example, to add a terminal on `/dev/tty04` for run-level 2 the `/etc/inittab` is the following:

```
04:2:respawn:/etc/getty tty04 H #terminal at rob's desk
```

Note that the `id` field `04` corresponds to the last two digits of the terminal's device file (`tty04`). This convention is often used with "continuous" (respawn) `getty` processes that get killed in the single-user run-level but is *not* required syntax: any two-character string will suffice. After a user logs out, `getty` is "respawned", and the "login:" prompt is redisplayed. Refer to Chapter 3 in this manual, and to the `getty(1M)`, `gettydef(4)`, and `inittab(4)` entries in the *HP-UX Reference* for further details.

If you are on an HP-UX cluster, this file is a context-dependent file. There must be one subfile for each cluster node.

You must configure your kernel to support the terminal or modem's interface card. The interface card kernel drivers to choose from are: `98628`, `98642`, or `98626`. The HP 98644 interface card requires the `98626` kernel device driver. For example, if your terminal is connected to an HP 98642 Mux Card, you need kernel driver `98642`.

If you haven't reconfigured your kernel to include the new interface card, you will receive a message on your console similar to:

```
Unable to access ttyxx
```

If you don't know what interface your terminal or modem is connected to, or can't decide which interface to connect it to, read the information for your peripheral in *Installing Peripherals* Chapter 5, "Installing Terminals and Modems".

Removing A Terminal

If you remove a remote terminal from your system, you must clean up your system by performing the following steps:

1. Find the system's name for the terminal. If you have been receiving messages on your console that are similar to:

   ```
   Unable to access ttyxx
   ```

   the system's name for the terminal is the `ttyxx` name.

   If you do not receive the message, determine the name of the remote terminal by the following method:

   a. type `cd /dev`

   b. type `ls -l tty*`

   You will see lines similar to:

   ```
   crw--w--w-   1  ryk      axe       1 0x090004 1991     /dev/ttyp1
   ```

   If you have only one `tty` file, that is the terminal you are removing. If you have several, determine which one to remove by using the information you used to set up the terminal. Refer to the section "Minor Number for Ports".

2. Edit the file `/etc/inittab`.

   Delete the line that has a field with the words:

   `id:rstate:respawn:/etc/getty` *ttyxx*

   where *ttyxx* is the port you identified in Step 1.

3. Notify the `init` process that `/etc/inittab` has changed by typing:

   ```
   telinit q
   ```

4. Remove the device file associated with the terminal you removed.

Pseudo Terminals

This section contains the following information:

- Process overview for setting up HP-UX to communicate with pseudo terminals.
- Device file location and naming conventions.
- Block and character device file requirements and recommendations.
- Major number.
- Minor number format.
- Other information.
- Examples of creating device files.

Some applications need a form of software support that enables them to act as though they are connected to a terminal. This implementation is called a **pseudo terminal**. A pseudo terminal is a pair of character devices: a **master** device and a **slave** device.

The pseudo terminal is structured so that output from either process acts as input to the other. The slave device interacts with the application process. It provides processes (in this case, user applications) and an interface identical to that described in *termio(7)* of the *HP-UX Reference*. The master device interacts with the server process controlling the application process. It interacts through the device as though it were a hardware terminal interface.

The difference between an HP-UX pseudo terminal and the interface described in `termio` is that the latter always has a hardware device behind it—like an HP 2623 terminal. A slave device has another process manipulating it through the master half of the pseudo terminal. Anything written on the master device is given to the slave device as input, and anything written on the slave device is presented as input on the master device.

According to HP-UX naming conventions, all pseudo terminal devices are located in the directories `/dev/pty` (slaves), and `/dev/ptym` (masters). The master device file should be called `/dev/ptym/ptyXX`, and the slave side `/dev/pty/ttyXX`, where *XX* is an identifying letter from p to w, and a hexadecimal digit. *Do not change these naming conventions because some programs depend on them.*

For example, `/dev/ptym/ptyp0` (master) and `/dev/pty/ttyp0` (slave) would be the lowest numbered pseudo terminal pair; `/dev/ptym/ptywf` and `/dev/pty/ttywf` would be the highest ordered pair.

All pseudo terminals must be character device files.

The master pseudo terminal device driver must have a major number of 16. The slave pseudo terminal device driver must have a major number of 17.

The minor number for both master and slave pseudo terminal device files is:

0x00*YYYY*

where *YYYY* is a unique hexadecimal value, in the range of 0 to `npty-1`, where `npty` is a configurable system parameter. (Refer to "Configuring Operating System Parameters" in Chapter 6 and to Appendix D in Volume 2 of this manual if you want to read about this parameter.) This value is used to identify the relationship between master and slave.

14

Using the lowest numbered pair, a sample `mknod` command would be:

```
mknod /dev/ptym/ptyp0 c 16 0x000000
mknod /dev/pty/ttyp0  c 17 0x000000
```

These commands would create a master and slave pair called `ptyp0` and `ttyp0`. The minor numbers, shown above as zeros, must be in the range of 0 to `npty -1` where `npty` is a configurable system parameter.

Your application's documentation will tell you how many pseudo terminals you need. For example, HP Windows/9000 needs three master/slave pairs per window.

For more information on pseudo terminals, refer to both the *termio(5)* and *pty(5)* sections of the *HP-UX Reference*.

Plotters and Digitizers

This section contains the following plotter and digitizer information:

- Device file location and naming convention.
- Block and character device file requirements and recommendations.
- Major number.
- Minor number format.
- Other information.
- Examples of creating device files.

Device File Naming Convention for Plotters and Digitizers

Plotter and digitizer device files should be located in the `/dev` directory. Device file naming conventions use `plt` followed by the product number for plotters and `dig` followed by the product number for digitizers. 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 7580 plotters, name the first one `plt7580.1` and the second `plt7580.2`. You can also use the ".#" prefix to distinguish plotters and digitizers based on their HP-IB bus address.

The file type for plotters and digitizers is always character.

Note For HP-HIL plotter and digitizers, refer to the "HP-HIL Devices" section of this chapter for configuration information.

The device driver required for HP-IB and parallel plotters and digitizers is `hpib` (major number 21). For parallel plotters the `parallel` driver is also required.

Note The `parallel` requires the `hpib` driver. Both of these drivers must be part of the kernel configuration for the parallel driver to operate.

The following list contains RS-232-C driver names associated with several types of serial connections. The drivers listed must be included in the `dfile` for the specified serial connection type.

Device Driver	Connection Type
`98626`	Series 300 Built-in RS-232-C port and HP 98626A RS-232-C Interface
`98628`	HP 98628A Datacomm Interface
`98644`	HP 98644A Asynchronous Serial Interface
`apci`	Series 400 Built-in RS-232-C port
`98642`	HP 98642A 4-Channel Multiplexer Interface or HP 98638A 8-Channel Multiplexer Interface

14 All serial drivers require a major number of 1.

Refer to the `/etc/master` file to determine which driver you need for your plotter. There is a section in this file with the heading:

```
* field 1: product #        field 2: driver name.
```

Look for your plotter model in the first column; the associated driver is listed in the second column.

Minor Number Format for HP-IB Plotters and Digitizers

The minor number for HP-IB plotters and digitizers has the following format:

```
0xScBa00
```

where:

`0x`	specifies format is in hexadecimal.
`Sc`	specifies the select code of the interface (8 bit value).
`Ba`	specifies the HP-IB bus address (4 bit value).
`00`	indicates last two hexadecimal digits are both zero (0).

For example, several HP 7580 plotters attached at HP-IB bus addresses 3, 4, and 5 to the same interface at select code 7 would require the following command lines to create the device files:

```
mknod /dev/plt7580.1 c 21 0x070300
mknod /dev/plt7580.2 c 21 0x070400
mknod /dev/plt7580.3 c 21 0x070500
```

Minor Number Format for RS-232-C Plotters

The minor number for RS-232-C plotters has the following format:

```
0xScPaCX
```

where:

`0x`	This indicates the number is hexadecimal.
`Sc`	This is the select code, which is a two-digit hexadecimal number determined by switches set on the terminal or modem's interface card.
`Pa`	This is the port address for each port. This two-digit hexadecimal number is set by switches on the device. If your plotter (or digitizer) is connected to an HP 98626 or HP 98644 interface card, the port address is always `00`. If you plotter is connected to an HP 98642 interface card, the port address is 00, 01, 02, or 03. If your plotter (or digitizer) is connected to an HP 98638 interface card, the port address is `00` to `07` for the lower select code or `00` to `03` for each of its two select codes.
`C`	specifies FIFO control. The range is 0x0 to 0xf. This bit specifies the trigger level for receive FIFO and transmit limit for transmit FIFO. See the *termio*(7) manpage for details.

`X` This is a hexadecimal representation that specifies the hardware flow control state and access type as shown in the table that follows.

Bit	Value
3	RTS/CTS hardware flow control. `0` = OFF, `1` = ON.
2	1=direct connect, 0=modem
1	1=CCITT protocol (Europe), 0=Simple protocol (U.S.)
O	1=dialout modem, 0=dial-in modem

For example, consider an HP 7550A plotter attached at the built-in RS-232-C port and an another HP 7550A plotter connected an HP 98628A Datacomm Interface at select code 20. Use the following command lines to create the device files for the two plotters:


```
mknod /dev/plt7580.1 c 1 0x090004
mknod /dev/plt7580.2 c 1 0x140004
```

Printers

This section contains the following printer information:

- Device file location and naming convention.
- Block and character device file requirements and recommendations.
- Major number.
- Minor number format.
- Other information.
- Examples of creating device files.

Device File Naming Conventions for Printers

14

Printer device files should be located in the `/dev` directory Device file naming conventions use `ptr` followed by the product number. 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 2567C printers, name the first one `ptr2567C.1` and the second `ptr2567C.2`. You can also use the ".#" prefix to distiquish printers based on their HP-IB bus address.

The file type for printers is always character.

There are three HP-IB device drivers, one parallel, and five RS-232-C drivers for printers. The following list contains the device driver name and the associated major number for HP-IB and parallel devices:

Major Number	Driver Name
21	`hpib` (HP-IB)
26	`ciper` (HP-IB)
7	`printer` (HP-IB)
21	`parallel`

Note The `parallel` requires the `hpib` driver. Both of these drivers must be part of the kernel configuration for the parallel driver to operate.

The following list contains RS-232-C driver names associated with several types of serial connections. The drivers listed must be included in the `dfile` for the specified serial connection type.

Device Driver	Connection Type
98626	Series 300 Built-in RS-232-C port and HP 98626A RS-232-C Interface
98628	HP 98628A Datacomm Interface
98644	HP 98644A Asynchronous Serial Interface
apci	Series 400 Built-in RS-232-C port
98642	HP 98642A 4-Channel Multiplexer Interface or HP 98638A 8-Channel Multiplexer Interface

All serial drivers require a major number of 1.

Refer to the `/etc/master` file to determine which driver you need for your printer. There is a section in this file with the heading:

```
* field 1: product #        field 2: driver name.
```

Look for your printer model in the first column; the associated driver is listed in the second column.

Minor Number Format for HP-IB Printers

The HP-IB minor number for HP-IB printers has the following format:

```
0xScBa0M
```

where:

`0x`	specifies format is in hexadecimal.
`Sc`	specifies the select code of the interface (8 bit value).
`Ba`	specifies the HP-IB bus address (4 bit value).
`0`	indicates 1 hexadecimal digit with value zero (4 bit value).
`M`	indicates mode of operation with the following settings:

`Printer` Driver Bits

Bit	Value
3 Auto FF	1=NO-EJECT
2 Case Fold	1=Upper
1 Overprint	1=NOCR
0 Cooked/Raw	1=non-protocol (raw), 0= Amigo (cooked) protocol

`Ciper` Driver Bits

Bit	Value
3 Auto FF	1=NO-EJECT
2 Case Fold	0=Upper
1 Overprint	0=NOCR
0 Cooked/Raw	1=non-protocol (raw),

For example, several HP 2563B printers attached at HP-IB bus addresses 3, 4, and 5 to the same interface at select code 7 would require the following command lines to create the device files:

```
mknod /dev/ptr2563B.1 c 7 0x070300
mknod /dev/ptr2563B.2 c 7 0x070400
mknod /dev/ptr2563b.3 c 7 0x070500
```

Minor Number Format for RS-232-C Printers

The RS-232-C minor number for RS-232-C printers has the following format:

```
0xScPaCX
```

where:

`0x` This indicates the number is hexadecimal.

`Sc` This is the select code, which is a two-digit hexadecimal number determined by switches set on the terminal or modem's interface card.

`Pa` This is the port address for each port.

This two-digit hexadecimal number is set by switches on the device. If your printer is connected to an HP 98626 or HP 98644 interface card, the port address is always `00`. If you printer is connected to an HP 98642 interface card, the port address is 00, 01, 02, or 03. If your printer is connected to an HP 98638 interface card, the port address is `00` to `07` for the lower select code or `00` to `03` for each of its two select codes.

`C` specifies FIFO control. The range is 0x0 to 0xf. This bit specifies the trigger level for receive FIFO and transmit limit for transmit FIFO. See the *termio*(7) manpage for details.

X This is a hexadecimal representation that specifies the hardware flow control state and access type as shown in the table that follows.

Bit	Value
3	RTS/CTS hardware flow control. 0 = OFF, 1 = ON.
2	1=direct connect, 0=modem
1	1=CCITT protocol (Europe), 0=Simple protocol (U.S.)
O	1=dialout modem, 0=dial-in modem

For example, consider an HP 2567C printer attached at the built-in RS-232-C port and another HP 2567C printer connected an HP 98628A Datacomm Interface at select code 20. Use the following command lines to create the device files for the two plotters:

```
mknod /dev/ptr2567C.1 c 1 0x090004
mknod /dev/ptr2567C.2 c 1 0x140004
```

The parallel minor number for parallel printers has the following format:

```
0xScPo0A
```

where:

0x	specifies format is in hexadecimal.
Sc	specifies the select code of the interface (8 bit value).
Po	specifies the RS-232-C port number, values 0 - 3 (8 bit value).
000	indicates value of zero (12 bit value).

An HP 2567C printer, parallel interface, is connected to your system at select code 23. The `mknod` command line to create the device file would be:

```
mknod /dev/ptr2567C c 21 0x170000
```

Graphics Display Devices

This section contains the following graphic display device information:

- Device file location and naming convention.
- Block and character device file requirements and recommendations.
- Major Number.
- Minor number format.
- Other information.
- Examples of creating device files.

The device files for graphics displays should be located in the `/dev` directory. Device file naming conventions use `/dev/graphics` or `/dev/crt` for graphic displays. To address graphic display overlay planes, use the naming convention of prepending the device file name with the letter "o", for example, `/dev/graphics` and `/dev/ographics` and `/dev/crt` and `/dev/ocrt`. If your graphic display is to be your system console, the naming convention is `/dev/console`.

The file type for graphic display devices is always character.

The major number is 12 for graphic display devices.

The minor number for graphic devices has the following format:

```
0xSTXXXX
```

where:

`0x` specifies hexadecimal format.

`S` specifies select code (4 bit value).

`T` specifies the following values (4 bit value) :

- 0 Configures automatically to one of the following:
  - Low-resolution graphics device at physical address 0x520000 (if present).
  - High-resolution graphics device at physical address 0x560000 if low resolution device at 0x520000 not present.
- 1 High-resolution graphics device at physical address 0x560000 (unless there is no low resolution device at 0x520000, in which case type 1 is invalid).
- 2 High- or low-resolution graphics device at the select code specified by the select code field in the minor number.

`XXXX` is zero or contains device-specific information as defined in the appropriate Starbase Device Drivers Library.

Additional information about graphics can be found in *graphics(7)* of the *HP-UX Reference*.

HP-HIL Devices

HP-HIL devices include the HP Touch Bezel, keyboards, mouse, digitizers, and control knobs.

To set up HP-HIL devices, there must be one device file with a major number 23 and for each HP-HIL device a device file with major number 24.

The minor number format is as follows:

```
0x0000B0
```

where:

`0x`	specifies hexadecimal format.
`0000`	specifies 16 bit value of 0.
`B`	specifies position on the HP-HIL bus (4 bit value).
`0`	specifies 4 bit value of 0.

The following **mknod** commands create the necessary device file with major number 23 and 24 HP-HIL device files for devices.

```
mknod /dev/raw_8042 c 23 0x000000
mknod /dev/hil1 c 24 0x000010
mknod /dev/hil2 c 24 0x000020
```

The HP-HIL kernel driver is not an optional kernel driver so you never need to configure it into your kernel.

Additional information about the HP-HIL interface can be found in *hil(7)* of the *HP-UX Reference*.

GPIO Devices

GPIO devices include HP 98622. This is a protocol used mostly for instruments.

The gpio driver only operates in character mode.

The major number for gpio is 22.

The minor number format is as follows:

```
0xSc0000
```

where:

`0x`	specifies hexadecimal format.
`Sc`	specifies the select code (8 bit value).
`0000`	specifies a 16 bit value of zero.

Assuming you have an HP 98622A GPIO interface card at select code 12, default select code for interface card, the **mknod** command to access a device connected to the device is as follows:

```
mknod /dev/gpio c 22 0x0C0000
```

You also must verify that your kernel contains the **gpio** kernel driver, and configure it if it does not.

A

E/ISA Configuration

Introduction to E/ISA Board Configuration

This appendix explains how to configure EISA and ISA I/O boards on Hewlett-Packard Series 400 workstations containing EISA backplanes. ISA stands for Industry Standard Architecture. EISA stands for Extended Industry Standard Architecture. E/ISA stands for both architectures.

E/ISA boards cannot be used until they have been configured with the `eisa_config` program. `eisa_config` has two modes: **automatic mode**, which executes automatically each time you reboot the system, and **interactive mode**, which you can execute from the command line.

- If you are adding, moving, or removing EISA boards, the automatic mode of `eisa_config` can usually configure the boards without any user intervention.
- If you are adding, moving, or removing ISA boards, you must run `eisa_config` in interactive mode. ISA boards do not have readable ID registers and thus cannot be automatically detected by `eisa_config`.

How to Use this Appendix

This appendix contains the following sections:

- "Introduction to E/ISA Board Configuration" provides a conceptual overview of the two modes of `eisa_config`. Use this section to understand the use of `eisa_config`. It covers the following topics:
  - Introduction.
  - How `eisa_config` works.

- "Configuring EISA Boards Using Automatic Mode" explains how to use the automatic mode of `eisa_config`. Use this section to configure HP and non-HP EISA boards. It covers the following topics:
  - Adding an EISA board using SAM (recommended).
  - Adding an EISA board using HP-UX commands.
    - Adding an HP EISA board
    - Adding a non-HP EISA board
  - Moving an EISA board.
  - Removing an EISA board.
  - Using `eisa_config` in automatic mode.
- "Configuring E/ISA Boards Using Interactive Mode", explains how to use the interactive mode of `eisa_config`, and provides step-by-step instructions for specific tasks using interactive mode. Use this section to configure ISA boards, and to change choices for board functions. It covers the following topics:
  - Using `eisa_config` in interactive mode.
  - Adding an E/ISA board.
  - Moving an E/ISA board.
  - Removing an E/ISA board.
  - Changing choices for board functions.
  - Example interactive `eisa_config` session.
- "Troubleshooting E/ISA Board Configuration", explains how to troubleshoot E/ISA board configuration problems.

A

Note This appendix does not explain how to write a device driver. If you are writing your own device driver, refer to *HP-UX Driver Development Guide*.

Introduction

Both the automatic and interactive modes of the `eisa_config` program help you create a conflict-free configuration for E/ISA boards.

Each E/ISA board in a backplane can use one or more system resources, such as direct memory access channels, interrupt lines, register addresses, and memory. However, a given board may be able to use only some of the choices available for a resource. For example, 11 interrupt lines are available, but a board may be able to use only lines 3, 5, and 6. Hence, there needs to be a way to tell the board which resources to use. The `eisa_config` program can suggest resource assignments for ISA boards and automatically assign resources for EISA boards.

ISA Boards

For ISA boards, a set of physical **switches** or **jumpers** on the board determines which resources the board will use, to what address range the board will respond, and other board-specific options and modes. The board manufacturer tells you how to set these switches and jumpers. Unfortunately, there are few conventions for switch and jumper usage among ISA boards, and it is easy to inadvertently assign the same resource to two different boards by setting a switch incorrectly. Symptoms of such conflicts vary depending on the type of board and conflict, and are often difficult to diagnose.

EISA Boards

EISA boards usually do not have physical switches or jumpers for resource assignment. Instead, each EISA board has a configuration file (`cfg` file) that describes how the board can be used and which resources it needs. The `eisa_config` program then uses these `cfg` files to develop a conflict-free configuration.

cfg Files

All EISA boards have corresponding `cfg` files. ISA boards used in HP-UX workstations must also have corresponding `cfg` files. Using the `cfg` file, `eisa_config` can automatically configure an EISA board. Although it cannot automatically configure an ISA board, it can tell you how to set the switches or jumpers on the board so that no resource conflicts occur. However, you should be aware that some configurations are simply not possible; for instance, two boards from different manufacturers may both require the same resource. If this happens, only one of the boards can be used.

The following list describes `cfg` file considerations:

- Each E/ISA board that will be connected to the workstation must have a `cfg` file in the `/etc/eisa` directory.
- Do not remove the `cfg` files after `eisa_config` has been run. These files are needed every time you reboot the system.
- Do not change the file names of these files.

  `cfg` file names have the following format:

  A *rXXXnnnn*`.cfg`

  where:

r	is usually `!` (or a hex digit).
XXX	is a three-letter abbreviation for the board manufacturer's name.
nnnn	is four digits. The first three digits represent the product ID and the fourth is the revision level.

  The `eisa_config` program relies on this file name format to automatically match a board with its `cfg` file.

The `cfg` files use a specific grammar that describes the following attributes for each board:

- Board-level information. This includes board ID, manufacturer, ASCII text that describes the board's capabilities, information on what type of slot the board can go in, and other attributes.

  Each board can also contain lists of board-wide resources, such as I/O registers, switches, and jumpers, and information on how they should be initialized.

- Function-level information. A board is made up of a set of one or more **functions**, each of which represents one possible use of the board. For example, a board may have a serial port and a parallel printer port. Each function has a separate block in the `cfg` file that specifies the function's name, type, and the set of choices for how it can be configured.

- Choice-level information. Each function has a set of **choices**. Each choice block has a name and a set of attributes. These attributes specify which resources the choice will use and whether the function is enabled or disabled with this choice. Each choice also specifies any initialization requirements, such as high-speed for HP-IB.

  When `eisa_config` adds a board, it selects a choice for each function. Generally, the first choice for each function is selected (the default). If the default choice for a function would create a conflict with another board, `eisa_config` automatically selects another choice. If the default function needs to be changed, refer to "Changing Choices for Board Functions Using Interactive Mode" for selecting a board function.

How eisa_config Works

The `eisa_config` program has two modes:

- Automatic mode, which runs automatically each time you boot the system.
- Interactive mode, which you run from the command line.

In either mode, after a conflict-free board configuration has been built, the configuration is saved in EISA **non-volatile memory** (NVM). (Non-volatile memory is located on the system board and is not erased if the computer's power supply is turned off.) When `eisa_config` saves a configuration in NVM, it also writes that configuration to the **system configuration information** (`sci`) file, `/etc/eisa/system.sci`, so that the `sci` file and NVM are identical.

`eisa_config` can initialize a configuration from the `sci` file. You can copy one configuration to many machines. For details, refer to "Saving the Configuration and Exiting Using Interactive Mode".

Automatic Mode

A

Each time you boot the system, `eisa_config` executes automatically from `/etc/bcheckrc` after the root file system has been mounted, but before any other file systems or swap areas are in use.

`eisa_config` compares the current board configuration to the configuration recorded in NVM. If the current configuration and the NVM configuration do not match, `eisa_config` compares the current configuration to the configuration recorded in `/etc/eisa/system.sci`. In most cases, the current configuration and one of the recorded configurations match, and the boot process continues. Refer to "Configuring EISA Boards Using Automatic Mode".

If the actual and recorded configurations do not match, `eisa_config` attempts to generate a new configuration. If it cannot, you still may be able to generate a correct configuration by using `eisa_config` interactively. Refer to "Configuring E/ISA Boards Using Interactive Mode".

Interactive Mode

The interactive mode of `eisa_config` allows you to add, move, and remove ISA boards. It also allows you to view information about E/ISA boards in the configuration and to change currently selected choices for functions.

You must use the interactive mode of `eisa_config` in three cases:

- You need to add, move, or remove an ISA board.
- Automatic mode was unable to generate an error-free board configuration. Fixing the error may require adding an EISA board interactively or changing a function choice. The error message will explain how to fix the error.
- You want to change the choice that `eisa_config` automatically selected for a given board function (for instance, you may want to specify low-speed for HP-IB).

Refer to "Configuring E/ISA Boards Using Interactive Mode".

Adding Device Drivers to the Kernel

The E/ISA board device driver must be part of the kernel before you can run `eisa_config`. HP supports both HP and non-HP E/ISA boards. The manufacturer of the non-HP board must provide a driver and additional information to create device files. The `eisa` driver is required for all (HP and non-HP) E/ISA boards. Additionally, peripheral device drivers must be part of the kernel before you can access them. Peripheral device drivers and the board driver can be added at the same time. This saves time by regenerating the kernel and rebooting your system only once. This section describes the following tasks:

- Adding HP Drivers to the kernel using SAM
- Adding HP Drivers to the kernel using HP-UX Commands
- Adding Non-HP Drivers to the kernel using HP-UX Commands

Adding HP Drivers to the Kernel Using SAM

To add HP drivers using SAM:

A

1. Ensure that you have superuser capabilities.
2. Ensure you are logged onto the machine to which the EISA board will physically reside, client or server. See *Managing Clusters of HP 9000 Computers* for additional cluster information. You can log in either physically on the correct cluster node or remotely by using the `rlogin` command.
3. Warn all users to get off the system. Use `cwall` in a cluster environment and `wall` in a standalone environment.

   ```
   /etc/cwall  or  /etc/wall
   Shutdown for configuration changes in one minute.
   Please log off now.
   ^C
   ```

   See *cwall*(1) and *wall*(1) in *HP-UX Reference*.

4. Shut down the system and switch to single-user mode with the **shutdown** command:

   ```
   shutdown
   ```

   See *shutdown*(1M) in *HP-UX Reference*.

   Wait for the system to switch to single-user mode (you will see a shell prompt).

5. To add the **eisa** and peripheral drivers to the kernel using SAM, enter:

   ```
   sam
   ```

   For information on using SAM, refer to the *System Administration Tasks* manual.

6. Highlight `Kernel Configuration` and activate the [Open] control button.

7. Highlight `Drivers` and activate the [OK] control button.

   A list of drivers, their current status, and their pending status appears. *Current status* shows whether a driver is in or out of (not in) the currently executing kernel. *Pending status* shows whether a driver will be added (in) or removed (out) when you next regenerate the kernel.

   While you are adding the **eisa** driver, you can also add any drivers required by the peripherals at the same time. The peripheral drivers are specified elsewhere in this manual.

8. For each driver you wish to add, highlight the driver name and choose `Add Driver to Kernel` from the "Actions" menu.

   The "Pending State" column entry for the driver changes to "In".

   You must recreate the kernel and install it to implement the change.

9. Choose `Create a New Kernel...` from the "Actions" menu.

10. Activate the (Yes) control button to confirm that you want to reconfigure the kernel now.

11. Choose one of the following:

    - `Create a new kernel now`

      This requires a reboot of your system. SAM prompts you to continue.

    - `Defer kernel creation until later`

      SAM preserves the request to reconfigure the kernel. If you attempt to exit SAM before you have reconfigured the kernel, SAM prompts you to reconfigure the kernel or cancel your reconfiguration request.

    - `Cancel all kernel modifications`

12. Follow the prompts to regenerate and reinstall the new kernel. After SAM generates a new kernel, choose one of the following actions and activate the (OK) control button:

    - `Move the kernel into place and reboot the system now`
    - `Move the kernel into place but do not reboot the system`
    - `Exit without moving the kernel into place`

    There is an option to enable or disable overwriting the kernel configuration file `/etc/conf/dfile`.

    If you *enable* overwriting the kernel configuration file, SAM moves `/etc/conf/dfile.SAM` to `/etc/conf/dfile`, and you will lose any comments you have added to `dfile`.

    If you *disable* overwriting the kernel configuration file, `/etc/conf/dfile` will not represent your current kernel (`/hp-ux`) when you reboot your system, but `/etc/conf/dfile.SAM` will.

    We highly recommend the use of `/etc/conf/dfile` for the kernel configuration file so that it remains up to date with the executing kernel, `/hp-ux`. Some system software depends on `/etc/conf/dfile` representing the currently executing kernel.

If you do not want SAM to overwrite `/etc/conf/dfile`, because of comments you want to retain, do the following:

a. Choose the SAM option to disable overwriting the kernel configuration file.

b. Move the kernel into place (optionally rebooting the system).

c. Copy your comments from `/etc/conf/dfile` to `/etc/conf/dfile.SAM`. Be careful to add only your comments to the file. At this stage, you want `/etc/conf/dfile.SAM` to reflect your current kernel configuration.

d. Copy or save `/etc/conf/dfile.SAM` to `/etc/conf/dfile`.

The kernel configuration file `/etc/conf/dfile` now represents the current `/hp-ux` kernel.

13. Exit SAM. Follow the prompts to regenerate and reinstall the kernel. SAM will prompt you to reboot the system. Answer YES to reboot the system.

Adding HP Drivers to the Kernel Using HP-UX Commands

The driver you need to add to your kernel configuration file to configure devices on your E/ISA board is the `eisa` device driver. Follow the instructions given in Chapter 14, "Setting Up Devices Using HP-UX Commands" for adding a driver to your kernel using commands.

Where you are instructed to edit the `/etc/conf/dfile` to add the necessary device drivers:

- Find the line containing `* DEVICE DRIVERS`.
- Below this line, add the `eisa` driver and the peripheral device driver. If an asterisk ("*") appears before the driver name, remove the asterisk.

Adding Non-HP Drivers to the Kernel Using HP-UX Commands

1. Ensure that you have superuser capabilities.
2. Ensure that you are logged onto the machine where the EISA board will physically reside, client or server. This sets the correct context for creating the `/hp-ux` context-dependent file and editing the `/etc/conf/dfile` context-dependent kernel configuration file. You can log in at the cluster node console or remotely log in to the cluster node from another location by using the `rlogin` command. See *Managing Clusters of HP 9000 Computers*, for additional cluster information.
3. Load the board's drivers into the `/etc/conf` directory.
4. If you have the object code for the non-HP board driver, skip this step. If you have only the source code for the non-HP board driver, you need to compile it with the following steps:

   a. Type the following commands. If provided, use the compilation command supplied by the board manufacturer. *non-HP-driver* stands for the name of the driver as supplied by the board manufacturer.

      ```
      cd /etc/conf
      cc -c +M +01 -DKERNEL -D_KERNEL -Dhp9000s800 -D_WSIO \
      -I/etc/conf/h -I/etc/conf/machine -I/usr/include/sys \
      non-HP-driver.c
      ```

      This command tells the compiler to look for include files in `/etc/conf/h`, `/etc/conf/machine`, and `/usr/include/sys`. The `+M` option prevents inline floating point code, which will cause a panic in kernel mode. The `+01` option performs level 1 (local) code optimization; the `0` is the letter `O`, not a zero. You can also check `/etc/config.mk` for the compile flags that were used to build your kernel.

   b. If the compilation succeeds, `/etc/conf` should contain a file named *non-HP-driver*`.o`. If the compilation fails, remove the `+01` option and try to compile the source code again.

5. Add the non-HP drivers to the HP-UX kernel by copying them into a standard library:

```
cd /etc/conf
ar -r libusrdrv.a non-HP-driver.o
```

6. Make a backup copy of the `/etc/master` file:

```
cp /etc/master /etc/master.old
```

   The `/etc/master` file lists all the device drivers.

7. Edit `/etc/master` to include the drivers. Note that you may need to make more than one entry for the board driver and device drivers. Find the lines shown below. The first line indicates the six information fields that must be supplied for your drivers.

```
*name    handle    type    mask    blk    char
*
```

   where:

`name`	is the name of this driver in the `dfile`.
`handle`	is the name prefixed to the name of the driver entry points.
`type`	is a bit mask indicating whether the device is character, block, or both.
`mask`	is a bit mask specifying the functions performed by the device.
`blk`	is the major number if it is a block device.
`char`	is the major number if it is a character device.

   Add a line containing these six fields for each driver. The board manufacturer should supply the lines you need to add. Refer to *master*(4) in the *HP-UX Reference* manual.

Configuring EISA Boards Using Automatic Mode

This section explains how to add, move, or remove an EISA board using the automatic mode of `eisa_config`. If you need to add, move, or remove an ISA board, refer to "Configuring E/ISA Boards Using Interactive Mode".

This section includes the following information:

- Using `eisa_config` in automatic mode.
- Setting switches and jumpers.
- Adding an EISA board using SAM (recommended).
- Adding an EISA board using HP-UX commands.
  - Adding an HP EISA board
  - Adding a non-HP EISA board
- Moving an EISA board.
- Removing an EISA board.

Using eisa_config in Automatic Mode

After you have added, moved, or removed an EISA board and booted your system, `eisa_config` executes automatically. It compares the current board configuration to the configuration recorded in NVM.

1. If the current configuration matches the configuration recorded in NVM, `eisa_config` exits without messages, and the boot process continues.
2. If the current configuration does *not* match the configuration recorded in NVM, `eisa_config` checks to see if it matches the configuration saved in `/etc/eisa/system.sci`.

   a. If the current configuration matches the configuration saved in `/etc/eisa/system.sci`, `eisa_config` initializes from `system.sci`. NVM is updated to match the current configuration and `/etc/eisa/system.sci`.

      Because `eisa_config` can initialize a configuration from the `sci` file, you can copy one configuration to many machines. For details, refer to "Saving the Configuration and Exiting Using Interactive Mode".

b. If the current configuration does *not* match neither NVM nor `/etc/eisa/system.sci`, `eisa_config` tries to generate a new configuration with all of the boards currently in the backplane.

   i. If a new configuration can be generated, a message is displayed and the boot process continues. If necessary, `eisa_config` automatically reboots the system. NVM and `/etc/eisa/system.sci` are updated to reflect the new configuration.

      For new boards, `eisa_config` automatically selects choices for board functions. However, it will not change an existing board's choices. After the boot process finishes, check `/etc/eisa/config.log` to see what choices were selected. If any are unacceptable, refer to "Changing Choices for Board Functions Using Interactive Mode".

   ii. If a new configuration *cannot* be generated, an error message is displayed and also logged to the file `/etc/eisa/config.err`.

      When the system has finished booting, you can fix the error. Fixing the error may require one or more of the following:

      1) Adding the `eisa` driver to the kernel.
      2) Putting the required `cfg` file into `/etc/eisa`.
      3) Running `eisa_config` interactively to add a board that had a resource conflict or to change a choice for a new board. Refer to "Configuring E/ISA Boards Using Interactive Mode".
      4) Replacing hardware (if NVM is broken).

A

For more information about `eisa_config` configuration problems, refer to "Troubleshooting E/ISA Board Configuration".

If the system cannot proceed because switches may need to be set, `eisa_config` will show you what the switches should look like and ask you if the switches on the boards are correct. If they are not, `eisa_config` will halt the system so that you can set the switches if necessary.

Setting Switches and Jumpers Using Automatic Mode

If you need to set switches or jumpers:

1. Be sure to record the required switch settings (displayed on your screen).
2. After `eisa_config` halts the system, turn off the power.
3. Set the switches or jumpers.
4. Turn on the power and boot the system.

The following example shows a typical display for required switch settings. The picture represents the actual switches and jumpers on the board and their labels (if any).

```
Slot 2
XYZ Networking Board
Switch Name:  I/O Base Address

Switches 1 through 3 select the I/O Base Address,
switch 4 is not applicable.
NOTE: 'off' in the diagram below corresponds to 'OPEN' on board
switches.

Default setting
       1   0   0   1
Required setting
       1   0   0   1
     +-x-+---+---+-x-+on
     |   |   |   |   |
     +---+-x-+-x-+---+off
       1   2   3   4
```

`Default setting` indicates the manufacturer's default setting, if one exists.

`Required setting` indicates the setting required for a conflict-free configuration. `1` means "on" and `0` means "off."

A

Adding an EISA Board Using SAM and Automatic Mode

Use this section to add HP-supplied EISA boards. To add a non-HP-supplied EISA board to your system refer to "Adding an EISA Board Using HP-UX Commands and Automatic Mode".

To use E/ISA boards, you must have the `eisa` driver configured into the kernel. This driver is a part of the default HP-UX kernel configuration. To add an HP EISA board using SAM:

1. Ensure that you have superuser capabilities.
2. Ensure you are logged onto the client or server machine where the EISA board will physically reside. See *Managing Clusters of HP 9000 Computers*, for additional cluster information. You can log in either physically on the correct cluster node or remotely by using the `rlogin` command.
3. Ensure that the board's `cfg` file is in the `/etc/eisa` directory. If the `cfg` file is provided on media with the card, load the board's `cfg` file from the supplied media into the `/etc/eisa` directory.
4. Ensure that the `eisa` and peripherals device drivers are configured into your kernel. See "Adding HP Drivers to the Kernel Using SAM".

5. Warn all users to get off the system. Use `cwall` in a cluster environment and `wall` in a standalone environment.

   ```
   /etc/cwall  or  /etc/wall
   Shutdown for hardware changes in one minute.
   Please log off now.
   ^C
   ```

   See *cwall*(1) and *wall*(1) in *HP-UX Reference*.

6. Halt the system with the `shutdown` command:

   ```
   shutdown -h
   ```

   See *shutdown*(1M) in *HP-UX Reference*.

7. Once the system is halted, turn off the power.

8. Install the EISA boards. If you are connecting a peripheral device to this board, connect the device as described elsewhere in this manual and turn it on.
9. Turn on the computer. The HP-UX kernel boots and `eisa_config` runs automatically attempting to create a new configuration.

Adding an EISA Board Using HP-UX Commands and Automatic Mode

This section describes two ways to add an EISA board to your system. To add a non-HP-supplied EISA board, use "Adding a Non-HP EISA Board Using HP-UX Commands and Automatic Mode" below. To add an HP-supplied EISA board without using SAM for kernel configuration, use "Adding an HP EISA Board Using HP-UX Commands and Automatic Mode" below.

To use E/ISA boards, you must have the `eisa` driver configured into the kernel. This driver is a part of the default kernel configuration.

Adding an HP EISA Board Using HP-UX Commands and Automatic Mode

To add an HP EISA board:

1. Ensure that you have superuser capabilities.
2. Ensure you are logged onto the client or server machine where the EISA board will physically reside. See *Managing Clusters of HP 9000 Computers*, for additional cluster information. You can log in either physically on the correct cluster node or remotely by using the `rlogin` command.
3. Ensure that the board's `cfg` file is in the `/etc/eisa` directory. If the `cfg` file is provided on media with the card, load the board's `cfg` file into the `/etc/eisa` directory. See "cfg Files" for `cfg` file naming conventions.
4. Ensure that the `eisa` and peripherals drivers are part of the kernel. See "Adding HP Drivers to the Kernel Using HP-UX Commands".
5. Create the device files for the board and the peripherals with the `mknod` command. Refer to *mknod*(1M) in *HP-UX Reference* and to Chapter 14, "Setting Up Devices Using HP-UX Commands".

6. Warn all users to get off the system. Use `cwall` in a cluster environment and `wall` in a standalone environment.

```
/etc/cwall  or  /etc/wall
Shutdown for hardware changes in one minute.
Please log off now.
^C
```

   See *cwall*(1) and *wall*(1) in *HP-UX Reference*.

7. Halt the system with the `shutdown` command:

```
shutdown -h
```

   See *shutdown*(1M) in *HP-UX Reference*.

8. Once the system is shut down, turn off the power.
9. Physically install the EISA boards.
10. Turn on the computer. The HP-UX kernel boots and `eisa_config` runs automatically attempting to create a new configuration. Refer to "Using eisa"config in Automatic Mode".

A

Note If you are moving a network board, you need to boot the computer again. Enter:

```
shutdown -r
```

Adding a Non-HP EISA Board Using HP-UX Commands and Automatic Mode

For non-HP-supplied boards, the `cfg` files and drivers will be shipped on separate media with the board.

1. Ensure you are logged onto the machine to which the EISA board is physically residing, client or server. See *Managing Clusters of HP 9000 Computers*, for additional cluster information. You can log in either physically on the cluster node in question or remotely by using the `rlogin` command.
2. Ensure that you have superuser capabilities.
3. Load the board's `cfg` file into the `/etc/eisa` directory. `cfg` files should never be removed from this directory. See "cfg Files" for `cfg` file naming conventions.
4. Ensure that the `eisa` and peripherals drivers are part of the kernel, see "Adding HP Drivers to the Kernel Using HP-UX Commands".
5. Create the device files for the board and the peripherals with the `mknod` command. Refer to *mknod*(1M) in *HP-UX Reference* and to Chapter 14, "Setting Up Devices Using HP-UX Commands".
6. Warn all users to get off the system. Use `cwall` in a cluster environment and `wall` in a standalone environment.

   ```
   /etc/cwall  or  /etc/wall
   Shutdown for hardware changes in one minute.
   Please log off now.
   ^C
   ```

   See *cwall*(1) and *wall*(1) in *HP-UX Reference*.
7. Halt the system with the `shutdown` command:

   ```
   shutdown -h
   ```

   See *shutdown*(1M) in *HP-UX Reference*.
8. Once the system is shut down, turn off the power.
9. Physically install the EISA boards.

10. Turn on the computer. The HP-UX kernel boots and `eisa_config` runs automatically attempting to create a new configuration. Refer to "Using eisa"'config in Automatic Mode".

Note If you are moving a network board, you need to boot the computer again. Enter:

```
shutdown -r
```

A

Moving an EISA Board Using Automatic Mode

Follow the steps in this section to move an EISA board from one slot to another.

1. Ensure that you have superuser capabilities.
2. Remove the old device files for the board with the `rm` command.
3. Use the `mknod` command to create a new device file using the new slot number. Refer to *mknod*(1M) in *HP-UX Reference* and to Chapter 14, "Setting Up Devices Using HP-UX Commands".

   For non-HP-supplied boards and peripherals, the board manufacturer should provide the major number block or character type definition and any driver-specific minor number information you need to create the device files.
4. Warn all users to get off the system. Use `cwall` in a cluster environment and `wall` in a standalone environment.

   ```
   /etc/cwall  or  /etc/wall
   Shutdown for hardware changes in one minute.
   Please log off now.
   ^C
   ```

   See *cwall*(1) and *wall*(1) in *HP-UX Reference*.
5. Halt the system with the `shutdown` command:

   ```
   shutdown -h
   ```

   See *shutdown*(1M) in *HP-UX Reference*.
6. Once the system is shut down, turn off the power.
7. Physically move the EISA boards.
8. Turn on the computer. The HP-UX kernel boots and `eisa_config` runs automatically attempting to create a new configuration. Refer to "Using eisa"config in Automatic Mode".

Note If you are moving a network board, you need to boot the computer again. Enter:

```
shutdown -r
```

Removing an EISA Board Using Automatic Mode

Use the steps in this section to remove an EISA board.

1. Ensure that you have superuser capabilities.
2. Warn all users to get off the system. Use `cwall` in a cluster environment and `wall` in a standalone environment.

   ```
   /etc/cwall  or  /etc/wall
   Shutdown for hardware changes in one minute.
   Please log off now.
   ^C
   ```

   See *cwall*(1) and *wall*(1) in *HP-UX Reference*.

A 3. Halt the system with the `shutdown` command:

   ```
   shutdown -h
   ```

   See *shutdown*(1M) in *HP-UX Reference*.
4. Once the system is shut down, turn off the power.
5. Physically remove the EISA boards.
6. Turn on the computer. The HP-UX kernel boot and `eisa_config` runs automatically attempting to create a new configuration. Refer to "Using eisa"'config in Automatic Mode".

If your system no longer has any EISA or ISA boards, the kernel can be reconfigured to remove the `eisa` driver.

Configuring E/ISA Boards Using Interactive Mode

This section explains how to use the `eisa_config` program interactively. Use `eisa_config` interactively only if you meet one or more of the following conditions:

- You need to add, remove, or move an ISA board. ISA boards do not have readable ID registers and thus are not automatically recognized by `eisa_config`.
- `eisa_config` exited from automatic mode with an error message requiring you to change the choice for a function. See "Changing Choices for Board Functions Using Interactive Mode".
- You want to change the choice that `eisa_config` automatically selected for a function. See "Using eisa"config in Interactive Mode".
- `eisa_config` exited from automatic mode with an error message requiring you to add a board interactively. See "Using eisa"config in Interactive Mode" and "Adding an E/ISA Board Using Interactive Mode".

This section includes the following information:

- Using `eisa_config` in interactive mode.
- Adding an E/ISA board interactively.
- Moving an E/ISA board interactively.
- Removing an E/ISA board interactively.
- Changing choices for board functions interactively.
- Example interactive `eisa_config` session.

Using eisa_config in Interactive Mode

`eisa_config` must be run interactively when you need to change the ISA board configuration in any way, or when you need to change the choice for a board function.

`eisa_config` requires the `eisa` driver for NVM. This driver is a part of the default HP-UX kernel configuration. If you have removed this driver, you must add it again when you add other required drivers. Refer to "Adding Device Drivers to the Kernel".

Always run `eisa_config` interactively *before* physically changing the configuration.

This section explains how to do the following tasks:

- Starting `eisa_config` interactively.
- Getting online help.
- Viewing board information.
- Displaying board configuration.
- Initializing the configuration.
- Saving the configuration and exiting.

A

Starting in Interactive Mode

You must be superuser to use `eisa_config` interactively.

To start the `eisa_config` program, type the following command:

`/etc/eisa_config` [`-c` *cfgfile*][`-n` *scifile*]

Normally you will use the above command without options. However, two options are available:

- The `-c` option allows you to check the specified `cfg` file for correctness. It verifies that the file follows the correct grammar and that `eisa_config` will be able to use it. This option is useful only for diagnosing errors in a particular `cfg` file. You cannot change the configuration with this option.
- The `-n` option allows you to initialize the E/ISA configuration from a particular `sci` file instead of from NVM.

`sci` files are useful if your site has several identically configured workstations. You can run `eisa_config` on one workstation to build an optimal configuration, use the `save` command to save it to a new `sci` file, and copy the file to the other workstations (as `/etc/eisa/system.sci`).

When you boot the other workstations, `eisa_config` will run automatically and initialize the configuration from `/etc/eisa/system.sci` (if the contents of NVM do not already match the current configuration).

Otherwise, you can run `eisa_config` interactively on each workstation with the `-n` option and specify the new `sci` file. After starting `eisa_config` with the `-n` option, you must use the `save` command to write the configuration to NVM, then reboot so that each workstation will have the new configuration. When you start `eisa_config`, you will see a display similar to that in Figure A-1. The display shows the boards currently configured in each slot, followed by the `EISA:` prompt.

```
HP-UX E/ISA CONFIGURATION UTILITY

    Type q or quit to leave eisa_config.
    Type ? or help for help.


 Slot       CFG File       Contents

 0          !HWPC010       HP Series 400 EISA System Board
 1          !XYZ1401       XYZ SCSI Controller
 2                         ** EMPTY **
 3          !XYZ1702       XYZ Centronics Interface
 4                         ** EMPTY **


EISA:
```

Figure A-1. eisa_config Display

Table A-1 lists the basic `eisa_config` commands. The following sections provide more detail on these commands and their options.

Table A-1. Basic Commands

Command	Description
`add` *cfgfile slotnum*	Adds the specified board to the specified slot.
`cfgfiles`	Lists the `cfg` files currently in `/etc/eisa`.
`cfgtypes`	Lists and explains the types of boards that have `cfg` files in `/etc/eisa`. For example, `NET` is a network board.
`change` *slotnum functionnum choicenum*	Changes the choice used for a given board function.
`comment`	Displays any comments or help supplied by a board manufacturer in the `cfg` file.
`help` or `?`	Lists and explains `eisa_config` commands.
`init` [*filename*]	Deletes all changes in this session of `eisa_config` by initializing the configuration.
`move` *curslotnum newslotnum*	Moves a board from one slot to another.
`quit` or `q`	Exits `eisa_config`.
`remove` *slotnum*	Removes a board from the specifed slot.
`save` [*filename*]	Saves the current configuration.
`show`	Displays working configuration. Shows a list of all slots and whether they are empty or occupied by a particular board.

A

Getting Online Help Using Interactive Mode

Online help is available that lists and explains the `eisa_config` interactive commands.

Table A-2 describes the available `help` commands.

Table A-2. Help Commands

Command Syntax	Description
`help` or `?`	Displays help for all valid `eisa_config` commands.
`help` *command*	Displays help for a particular `eisa_config` command. For instance, to see help for the `add` command, type `help add`.

Viewing Board Information Using Interactive Mode

You can use `comment` commands to display any available help and comments about the E/ISA board itself. This help is provided by the board manufacturer in the `cfg` file. If the manufacturer did not provide help or comments, you will get a message saying "No help or comments were supplied."

Note that all of the `comment` command parameters (except the type of comment requested) are optional. If you do not specify a particular `cfg` file or slot number, you will see any comments available for that type for all of the boards in the working configuration.

The following list gives examples:

- `comment board` displays any help and comments available for all of the currently configured boards.
- `comment board 1` displays any help and comments available for the board currently configured in slot 1.
- `comment board !XYZ1401` displays any help and comments available for the board corresponding to the `!XYZ1401.cfg` file, even if the board is not part of the current board configuration.

Table A-3 describes the available `comment` commands.

Table A-3. Comment Commands

Command Syntax	Description
`comment board` [*cfgfile* | *slotnum*]	Displays board level help and comments that describe what the board can be used for.
`comment function` [*cfgfile* | *slotnum*]	Displays function level help and comments.
`comment choice` [*cfgfile* | *slotnum*]	Displays choice level help and comments.
`comment switch` [*cfgfile* | *slotnum*]	Displays help and comments for switches and jumpers.

Displaying Board Configuration Using Interactive Mode

You can display information on your working E/ISA configuration and on the `cfg` files.

Table A-4 describes the available display commands.

Table A-4. Display Commands

Command Syntax	Description
`show`	Shows a list of all the slots and whether they are empty or occupied by a particular board.
`show slots` *cfgfile*	Shows a list of the slots that can accept the board corresponding to the `cfg` file.
`show board` [*cfgfile* | *slotnum*]	Shows a list of basic attributes for the selected boards, including all functions and choices. If the board is part of the working configuration, this command also indicates the currently selected choice for each function. If you do not specify either a `cfg` file name or a slot number, information is displayed for all of the boards in the system.
`show switch` [`changed`] [*slotnum*]	Shows any switch and jumper settings (both default and required) for the boards in the configuration. If you use the keyword `changed`, only those switches and jumpers that have changed since `eisa_config` was invoked are displayed. If you specify a slot number, only switches and jumpers on the board in that slot are displayed. Note that you can use all combinations of the `changed` and *slotnum* parameters. This command displays a graphical representation of the switches and jumpers on the board, and indicates the default and required settings.

Table A-5 explains the available `cfg` file commands.

Table A-5. cfg File Commands

Command Syntax	Description
`cfgtypes`	Lists the types of boards that have `cfg` files in the `/etc/eisa` directory. For each board type, also lists the number of associated `cfg` files in `/etc/eisa`.
`cfgfiles` [*type*]	Lists the `cfg` files currently in the `/etc/eisa` directory. If you specify a board type such as `NET`, only `cfg` files of that type will be displayed.

Initializing the Configuration Using Interactive Mode

If you have made changes in the configuration that are incorrect, you can delete all changes in this session of `eisa_config` and return to the original configuration by using the `init` command.

Type the following command:

`init` [*filename*]

If you specify an `sci` file name, the initial configuration is retrieved from that file. Otherwise, it is retrieved from NVM.

Saving the Configuration and Exiting Using Interactive Mode

To exit `eisa_config`, type `quit` or `q`. If the configuration has changed since the last time it was saved to NVM, you will be asked if you want to save the configuration.

When the configuration is saved to NVM, the file `/etc/eisa/config.log` is created. This file describes the new configuration and is overwritten each time you save the configuration by exiting `eisa_config` or using the `save` command. The log file contains information on the boards currently configured in each slot, the attributes of each board, the currently selected choice for each

function, and any required switch and jumper settings. You can print this file for reference.

`eisa_config` also displays the switch and jumper settings that have changed in this session before exiting. You must ensure that all switches and jumpers match what `eisa_config` has specified before you reboot the system.

You can save the current configuration without exiting by using the `save` [*filename*] command.

This command writes the new configuration to NVM and to `/etc/eisa/system.sci`. If the current configuration is not conflict free, `eisa_config` notifies you and does not save the configuration.

If you specify a file name, `eisa_config` does not write the configuration to NVM. Instead, it creates a new `sci` file. This is useful if your site has several identically configured workstations. You can run `eisa_config` on one workstation to build an optimal configuration, use the `save` command to save it to a new `sci` file, and then copy the file to each of the other workstations (as `/etc/eisa/system.sci`).

When you boot the other workstations, `eisa_config` will run automatically and initialize the configuration from `/etc/eisa/system.sci` (if the contents of NVM do not already match the current configuration).

Otherwise, you can run `eisa_config` on each workstation with the `-n` option and specify the new `sci` file.

Setting Switches and Jumpers Using Interactive Mode

When you exit `eisa_config` or use the `show switch changed` command, you see a graphical representation of the switch and jumper settings that have changed in this session of `eisa_config`. The file `/etc/eisa/config.log` also shows all required switch and jumper settings for each board in your working configuration.

After you have shut down your system and turned it off, you must set these switches and jumpers to their required settings. Then reboot the system. The following example shows a typical display for required switch settings.

`Default setting` indicates the manufacturer's default setting, if one exists.

`Required` indicates the setting required for a conflict-free configuration. `1` means "on" and `0` means "off." The picture represents the actual switches and jumpers on the board and their labels (if any).

```
Slot 2
XYZ Networking Board
Switch Name:  I/O Base Address

Switches 1 through 3 select the I/O Base Address,
switch 4 is not applicable.
NOTE: 'off' in the diagram below corresponds to 'OPEN' on board
switches.

Default setting
        1   0   0   1
Required setting
        1   0   0   1
      +-x-+---+---+-x-+on
      |   |   |   |   |
      +---+-x-+-x-+---+off
        1   2   3   4
```

Adding an E/ISA Board Using Interactive Mode

To add an E/ISA board to your system interactively, follow the steps in this section.

1. Ensure that you have superuser capabilities.
2. Ensure that the board's `cfg` file is in the `/etc/eisa` directory. If the `cfg` file is provided on media with the card, load the board's `cfg` file into the `/etc/eisa` directory. See "cfg Files" for `cfg` file naming conventions.
3. Use the `mknod` command to create the necessary device files for the board's driver and the peripherals that will be connected to the board. The device file supplies information about the major device type (the device driver number) and device location. The slot number in which you plan to add a board will be a component of the device file. The manufacturer should provide the specific information you need to create the device files. Refer to *mknod*(1M) in the *HP-UX Reference* manual.
4. Ensure that the `eisa` and peripherals drivers are part of the kernel, see "Adding HP Drivers to the Kernel Using HP-UX Commands".
5. Type the following command:

   `/etc/eisa_config`

   The current board configuration will be displayed. Board slots are numbered from top to bottom starting with "1". Slot "0" is reserved for the system board.
6. At the `EISA:` prompt, type the following command:

   `add` *cfgfile slotnum*

   where:

   cfgfile is the name of the `cfg` file corresponding to the board you want to add.

   slotnum is the number of the slot in which you want to add the board.

   To see the `cfg` file name corresponding to each board, use the `cfgfiles` command. `cfg` file names have the following format:

rXXXnnnn`.cfg`

where:

r	is usually `!` (or a hex digit).
XXX	is a three-letter abbreviation for the board manufacturer's name.
nnnn	is four digits. The first three digits of *nnnn* represent the product ID and the fourth is the revision level.

You need to type only the *rXXXnnnn* portion of the name.

7. After adding all desired boards within `eisa_config`, exit the enter `q` to exit the program.

   Before it exits, the program will display the switch and jumper settings (if any) that have changed during this session of `eisa_config`. Settings may have changed on existing boards as well. Refer to the file `/etc/eisa/config.log` for a summary of the new configuration, including the required settings.

8. Warn all users to get off the system. Use `cwall` in a cluster environment and `wall` in a standalone environment.

   ```
   /etc/cwall  or  /etc/wall
   Shutdown for hardware changes in one minute.
   Please log off now.
   ^C
   ```

   See *cwall*(1) and *wall*(1) in *HP-UX Reference*.

9. Halt the system with the `shutdown` command:

   ```
   shutdown -h
   ```

   See *shutdown*(1M) in *HP-UX Reference*.

10. Once the system is shut down, turn off the power.

11. Set any physical switches and jumpers according to `eisa_config` requirements. Refer to "Setting Switches and Jumpers Using Interactive Mode".

12. Physically add the board. If you are also installing a peripheral device with this board, connect the device and turn it on.
13. Turn the power on and boot the system. When it boots, the contents of NVM will match the E/ISA boards that are present and you will be able to use the boards.

Moving an E/ISA Board Using Interactive Mode

To move a currently configured E/ISA board, follow the steps in this section.

1. Ensure that you have superuser capabilities.
2. Type the following command:

   ```
   /etc/eisa_config
   ```

3. At the `EISA:` prompt, type the following command:

   `move` *curslotnum newslotnum*

   where:

   curslotnum is the number of the slot in which the board is currently installed.

   newslotnum is the number of the slot to which the board is to be moved.

4. After moving all desired boards within `eisa_config`, enter `q` to exit the program.

   Before it exits, the program will display the switch and jumper settings (if any) that have changed during this session of `eisa_config`. Refer to the `/etc/eisa/config.log` file for a summary of the new configuration, including the required settings.

5. Remove the old device file for the board with the `rm` command.
6. As superuser, use the `mknod` command to create a new device file using the new slot number for the board.

   a. For HP-supplied boards, look up instructions on creating device files for the board in the appropriate interface section of this manual.

   b. For non-HP-supplied boards, the board manufacturer should provide the specific information you need to create the device files.

7. Warn all users to get off the system. Use `cwall` in a cluster environment and `wall` in a standalone environment.

   ```
   /etc/cwall  or  /etc/wall
   Shutdown for hardware changes in one minute.
   Please log off now.
   ^C
   ```

   See *cwall*(1) and *wall*(1) in *HP-UX Reference*.

8. Halt the system with the `shutdown` command:

   ```
   shutdown -h
   ```

   See *shutdown*(1M) in *HP-UX Reference*.

9. Once the system is shut down, turn off the power.
10. Set any physical switches and jumpers according to `eisa_config` requirements. Refer to "Setting Switches and Jumpers Using Interactive Mode".
11. Physically move the boards.
12. Turn the power on and boot the system. When it boots, the contents of NVM will match the E/ISA boards that are present and you will be able to use the boards.

Removing an E/ISA Board Using Interactive Mode

To remove a currently configured E/ISA board, follow the steps in this section.

1. Ensure that you have superuser capabilities.
2. Type the following command:

   ```
   /etc/eisa_config
   ```

3. At the `EISA:` prompt, type the following command:

   ```
   remove slotnum
   ```

   where:

   slotnum is the number of the slot from which you want to remove a board.

4. After removing all boards desired within `eisa_config`, enter `q` to exit the program.
5. Warn all users to get off the system. Use `cwall` in a cluster environment and `wall` in a standalone environment.

   A

   ```
   /etc/cwall  or  /etc/wall
   Shutdown for hardware changes in one minute.
   Please log off now.
   ^C
   ```

   See *cwall*(1) and *wall*(1) in *HP-UX Reference*.

6. Halt the system with the `shutdown` command:

   ```
   shutdown -h
   ```

   See *shutdown*(1M) in *HP-UX Reference*.

7. Once the system is shut down, turn off the power.
8. Physically remove the boards.
9. Turn the power on and boot the system. When it boots, the contents of NVM will match the E/ISA boards that are present and you will be able to use the boards.

Changing Choices for Board Functions Using Interactive Mode

You can use the `change` command to specify which choice is used for a particular function on a board (for instance, if `eisa_config` cannot automatically generate a new configuration with the currently selected choices). Note that a board must already be part of the configuration before you can use the `change` command on it. When you use the `change` command to specify a choice for a particular function, `eisa_config` will always use that choice. It will not select a different choice, even to resolve a conflict.

To change which choice is used for a given function, follow these steps.

1. Ensure that you have superuser capabilities.
2. Type the following command:

   ```
   /etc/eisa_config
   ```

3. At the `EISA:` prompt, type the following command:

   `change` *slotnum functionnum choicenum*

   You must specify the slot number, the function number, and the new choice number for that function. To see function and choice numbers, use the `show board` *slotnum* command. Function numbers have the format `F`*num* and choice numbers have the format `CH`*num*.

4. After making all desired changes within `eisa_config`, enter `q` to exit the program.

   Before it exits, the program will display the switch and jumper settings (if any) that have changed during this session of `eisa_config`. Refer to the `/etc/eisa/config.log` file for a summary of the new configuration, including the required settings.

5. Warn all users to get off the system. Use `cwall` in a cluster environment and `wall` in a standalone environment.

   ```
   /etc/cwall  or  /etc/wall
   Shutdown for hardware changes in one minute.
   Please log off now.
   ^C
   ```

   See *cwall*(1) and *wall*(1) in *HP-UX Reference*.

6. Halt the system with the **shutdown** command:

   ```
   shutdown -h
   ```

   See *shutdown*(1M) in *HP-UX Reference*.

7. Once the system is shut down, turn off the power.
8. Set any physical switches and jumpers according to **eisa_config** requirements. Refer to "Setting Switches and Jumpers Using Interactive Mode".
9. Turn the power on and boot the system. When it boots, the contents of NVM will match the E/ISA boards that are present and you will be able to use the boards.

Sample Interactive Session

The following example shows a sample `eisa_config` interactive session.

Starting eisa_config

The user invokes `eisa_config`. `eisa_config` begins by displaying the current board configuration.

```
/etc/eisa_config

HP-UX E/ISA CONFIGURATION UTILITY

    Type q or quit to leave eisa_config.
    Type ? or help for help on eisa_config commands.


 Slot      CFG File      Contents

 0         !HWPC010      HP Series 400 EISA System Board
 1         !XYZ1401      XYZ SCSI Controller
 2                       ** EMPTY **
 3         !XYZ1702      XYZ Centronics Interface
 4                       ** EMPTY **
```

Displaying cfg Files

The user types the `cfgfiles` command, which displays the `cfg` files currently in the `/etc/eisa` directory. Note that the `cfgtypes` command lists and explains each board type. For instance, `NET` is a network board.

```
EISA: cfgfiles

 Filename    Board Type   Board Name

 !HWPC010      SYS        HP Series 400 EISA System Board
 !XYZ1401      MSD        XYZ SCSI Controller
 !XYZ1702      PAR        XYZ Centronics Interface
 !XYZ1802      NET        XYZ Networking Board
 !XYZ2276      VID        XYZ Video Board
```

Adding a Board

The user types a `show slot` command to see in which slots the `!XYZ1802` board can be installed. The user then types the `add` command to add the board to slot 2. `eisa_config` displays the new configuration.


```
EISA: show slot !XYZ1802

    Valid slots for this board: 2  4

EISA: add !XYZ1802 2

 Added board:  XYZ Networking Board
 Comments:     The XYZ Networking board is an IEEE 802.3 local area networking
               board for use with twisted-pair cabling.


 Slot      CFG File      Contents

 0         !HWPC010      HP Series 400 EISA System Board
 1         !XYZ1401      XYZ SCSI Controller
 2         !XYZ1802      XYZ Networking Board
 3         !XYZ1702      XYZ Centronics Interface
 4                       ** EMPTY **
```

Displaying Board Information

The user types a **show** command to ask for information on the board in slot 2. **eisa_config** displays the board's basic attributes and indicates the currently selected choice for each function.

```
EISA: show board 2

 XYZ Networking Board
 CFG file: !XYZ1802.cfg
 Slot 2

   The XYZ Networking board is an IEEE 802.3 local area networking board for
   use with twisted-pair cabling.

   Manufacturer ................. XYZ Computer Corp.
   ID ........................... XYZ1802
   Board type ................... NET (Network Board)
   Board slot type .............. ISA 8 Bit
   Readable ID .................. No
   Skirt ........................ No
   Length ....................... 330 millimeters

   Function names and possible choices:
     StarLAN 10 PC LAN Adapter
       F1: I/O Base Address
           CH1: 300h [** current **]
           CH2: 340h
           CH3: 240h
       F2: Loopback Mode
           CH1: Normal operation [** current **]
           CH2: Test mode
       F3: Interrupt Channel (IRQ)
           CH1: 3
           CH2: 4
           CH3: 5 [** current **]
           CH4: 7
```

Exiting eisa_config

The user exits `eisa_config`. The configuration has changed, so `eisa_config` prompts the user to save the changes and exit, exit without saving changes, or abort the exit. The user types `s` to save the changes. `eisa_config` displays a reminder about necessary steps after exiting.

```
EISA: quit

A description of the configuration was saved in /etc/eisa/config.log.

If eisa_config was run per the instructions of a specific product
installation manual, refer to that manual for specifics on device file
creation and I/O drivers.
Step 4 may apply if other cards were affected.

Otherwise, the following is a list of generally required steps:

    (1)  Make any necessary device files.  If you have moved a board you
         may also need to make new device files.
    (2)  Ensure that all appropriate software I/O drivers are present
         in the kernel.
    (3)  Shut down the system with the "/etc/shutdown -h" command.
    (4)  Once the system is shut down, turn the power off.  Then set any
         physical switches and jumpers correctly.  The switches and jumpers
         that have changed since eisa_config was invoked are listed below.
         The file /etc/eisa/config.log contains a summary of the new
         configuration, including required switch and jumper settings.
    (5)  Physically add, move, or remove boards as needed.
    (6)  Turn the power on and boot the system.

Refer to the "E/ISA Configuration Documentation" for specific instructions.
```

Displaying Switch and Jumper Settings

After the user presses the q key to quit, `eisa_config` displays the switch and jumper settings that have changed since the program was invoked. The file `/etc/eisa/config.log` also contains this information, along with a summary of the new configuration. After exiting, the user is returned to the HP-UX prompt.

```
Slot 2
XYZ Networking Board
Switch Name:  I/O Base Address

Switches 1 through 3 select the I/O Base Address,
switch 4 is not applicable.
NOTE: 'off' in the diagram below corresponds to 'OPEN' on board
switches.

Default setting
        1   0   0   1
Required setting
        1   0   0   1
      +-x-+---+---+-x-+on
      |   |   |   |   |
      +---+-x-+-x-+---+off
        1   2   3   4


Slot 2
XYZ Networking Board
Switch Name:  Loopback Mode

    Default          Required     on   off
                                   +---+
       0                0         |   x        4
                                   +---+
       0                0         |   x        3
                                   +---+
       0                0         |   x        2
                                   +---+
       0                0         |   x        1
                                   +---+

Exiting eisa_config.

$
```

A

Troubleshooting E/ISA Board Configuration

This section explains how to diagnose and fix common E/ISA board configuration errors.

As a general rule, look at the system messages using the `dmesg` command. The E/ISA powerup-specific messages are displayed after the line "`EISA Expander Initialized`". The E/ISA initialization messages are displayed after the line "`EISA Initialization`". These messages, causes, and recommended actions are described in "E/ISA Board Power Up Messages".

Added Board Does Not Work

If you added a board and the board does not work, check the following in order:

1. If you added the board interactively, did you save the new configuration before exiting `eisa_config`? If not, you must run `eisa_config` again, add the board again, and then save the configuration. See "Saving the Configuration and Exiting Using Interactive Mode".

A

2. Did you add the required drivers to the HP-UX kernel? If not, do one of the following:
   a. For HP-supplied boards, see "Adding HP Drivers to the Kernel Using SAM" or "Adding HP Drivers to the Kernel Using HP-UX Commands".
   b. For non-HP-supplied boards, see "Adding Non-HP Drivers to the Kernel Using HP-UX Commands".
3. Did you create the necessary device files correctly? If not, do one of the following:
   a. For HP-supplied boards, refer to the appropriate section of this manual.
   b. For non-HP-supplied boards, refer to the documentation shipped with your board as well as the appropriate section of this manual.
4. Did you reboot the system after changing the configuration interactively? If not, reboot the system.

5. Warn all users to get off the system. Use `cwall` in a cluster environment and `wall` in a standalone environment.

```
/etc/cwall  or  /etc/wall
Reboot for configuration changes in one minute.
Please log off now.
^C
```

   See *cwall*(1) and *wall*(1) in *HP-UX Reference*.

6. Shut down the system and automatically reboot with the `shutdown` command:

```
shutdown -r
```

   See *shutdown*(1M) in *HP-UX Reference*.

7. If you added the board using automatic mode, check `/etc/eisa/config.err` for error messages.

8. Ensure that switch and jumper settings match the settings specified in `/etc/eisa/config.log`.

Moved Board Does Not Work

If you moved a board and the board does not work, check the following in order:

1. Did you save the new configuration before exiting interactive `eisa_config`? If not, you must run `eisa_config` again and then save the configuration. See "Saving the Configuration and Exiting Using Interactive Mode".
2. Did you create the necessary device files correctly? If not, refer to "Moving an EISA Board Using Automatic Mode" and "Moving an E/ISA Board Using Interactive Mode".
3. Did you reboot the system after changing the configuration interactively? If not, reboot the system.
4. Warn all users to get off the system. Use `cwall` in a cluster environment and `wall` in a standalone environment.

   ```
   /etc/cwall  or  /etc/wall
   Reboot for configuration changes in one minute.
   Please log off now.
   ^C
   ```

   See *cwall*(1) and *wall*(1) in *HP-UX Reference*.
5. Shut down the system and automatically reboot with the `shutdown` command:

   ```
   shutdown -r
   ```

   See *shutdown*(1M) in *HP-UX Reference*.
6. If you moved the board using automatic mode, check `/etc/eisa/config.err` for error messages.
7. Ensure that switch and jumper settings match the settings specified in `/etc/eisa/config.log`.

A

Board Stops Working

If a board that was working suddenly stops working, the kernel may have been recently modified either manually or with SAM. If so, you will need to relink the E/ISA board drivers to the kernel.

- For HP-supplied boards, see "Adding HP Drivers to the Kernel Using SAM" or "Adding HP Drivers to the Kernel Using HP-UX Commands".
- For non-HP-supplied boards, see "Adding Non-HP Drivers to the Kernel Using HP-UX Commands".

Board Configuration Conflicts

E/ISA boards use four types of resources: interrupt lines, DMA channels, register addresses, and memory. If the automatic mode of `eisa_config` cannot configure a board due to resource conflicts, you may still be able to use `eisa_config` interactively to add a board that had a conflict or to change choices for a new board. Refer to "Using eisa"config in Interactive Mode".

If your desired board configuration still causes conflicts, you may not be able to use certain boards together. Some configurations are simply not possible; for instance, two boards from different manufacturers may both require the same resource. If this happens, only one of the boards can be used.

No NVM Driver

If you attempt to use `eisa_config` and get a message saying that the NVM driver cannot be used, ensure that the `eisa` driver has not been removed from the kernel. If it has been removed, do one of the following:

- For HP-supplied boards, see "Adding HP Drivers to the Kernel Using SAM" or "Adding HP Drivers to the Kernel Using HP-UX Commands".
- For non-HP-supplied boards, see "Adding Non-HP Drivers to the Kernel Using HP-UX Commands".

Two cfg Files Have the Same Name

If you want to load a `cfg` file into the `/etc/eisa` directory that has the same name as a file in that directory, follow these steps:

1. Load the new `cfg` file from media into a temporary directory.
2. Rename the `cfg` file. `cfg` file names have the following format:

   rXXXnnnn`.cfg`

   where:

r	is usually `!` (or a hex digit).
XXX	is a three-letter abbreviation for the board manufacturer's name.
nnnn	is four digits. The first three digits of *nnnn* represent the product ID and the fourth is the revision level.

   The first character in the `cfg` file's old name was probably `!`. The first character in the new name can be any hex digit (1 to F). The rest of the name should remain the same.

A

   In the temporary directory, type the following command:

   `mv` *oldname newname*

3. Move the renamed `cfg` file to the `/etc/eisa` directory. Type the following command:

   `mv -i` *newname* `/etc/eisa`

Boards that have duplicate `cfg` file names must be added using `eisa_config` interactively.

E/ISA Board Power Up Messages

This section contains a listing of E/ISA board power up messages, their potential cause, and action you can take to correct the problem. There are several messages displayed that are information only. They indicate a successful operation completed.

Message: `No EEPROM Data -> EISA Card ID:` *eisa_id*

Cause: For this particular slot, an EISA card IDed itself, but there is no configuration data in NVM.

Action: Run `eisa_config` to update NVM.

Message: `Cannot read EISA card ID`

Cause: Have NVM information saying card exists, but cannot read its ID.

Action: If a card is present, then there is a hardware problem. Replace the card. If a card is not present, ignore the message.

Message: `Board ID:` *eisa_id* `inconsistent with NVM ID:` *eisa_id*

Cause: The ID read from the card does match the card ID information stored in NVM.

Action: If board has been moved, run `eisa_config` in automatic mode. If board has been removed, ignore the message. If this message persists after running `eisa_config` and updating NVM, replace the board.

Message: `Bad eeprom data for board` *eisa_id*

Cause: An attempt to read the NVM configuration information failed. This represents a system problem.

Action: Call your HP representative.

Message: `Error initializing board` *eisa_id*

Cause: An attempt to initialize the card with the stored NVM initialization data failed.

Action: Check `cfg` file for inaccuracies. Suspect a hardware problem.

Message: `EISA Board ID:`*eisa_id* `ignored`
`Board not present or driver not configured into kernel.`

Cause: One of the following two situations have occured:

1. An ISA card is present, but not its driver
2. The driver is present, but the card is not.

Since ISA cards do not ID, only the cards driver can verify its existence. The ID displayed was obtained from NVM, not the card.

Action: Ensure the card in installed and verify that the driver is configured into the kernel.

Message: `EISA Board ID:` *eisa_id* `ignored, driver not configured into kernel`

Cause: A driver could not be found which would accept this card, but since it is an EISA card, the system found it.

Action: Ensure that the driver is configured into the kernel.

Message: `EISA Board ID:` *eisa_id* `ignored, error initializing board`

Cause: A driver accepted this card, but then indicated a failure to initialize it correctly.

Action: This is probably a defective card.

Message: `EISA: eisa_last_attach not called, bad driver in kernel.`

Cause: If a driver does return correctly from its attach routine, this will panic the kernel. Assuming that the drivers installed are working, this message should never appear.

Action: If you are using a non-HP card and driver, remove both the card and driver and try again. If error does not recur, the non-HP driver is bad. If the error recurs, call your HP representative.

Message: `EISA WARNING: mapping in system board failed`

Cause: Indicates system problem in creating virtual to physical mappings of the EISA system board registers. If this message appears, EISA cards will not be recognized although the system will boot up (assuming you are not booting from EISA SCSI, in which case system will not come up).

Action: Call your HP representative.

Message: `EISA WARNING: mapping in I/O map entries failed`

Cause: A system board resource could not be initialized. If this message appears, EISA cards will not be recognized although the system will boot up (assuming you are not booting from EISA SCSI, in which case system will not come up).

Action: Call your HP representative.

Message: *slot_num* `Slot EISA Expander Initialized:` *eisa_id*

Cause: This is the message which indicates that the system board (that is, the bus adapter that sits between the EISA bus and the host system bus) was initialized properly. It also indicates how many slots the kernel is configured to recognize.

Action: None.

Message: `EISA SLOT` *slot_num*

Cause: This is a header indicating which slot is currently attempting to be initialized. If successfully iniatalized, the individual drivers generally print out their own initialization message. For example:

`EISA SLOT 1:` *driver_specific_message*

Action: None.

Message: `Successfully Initialized EISA Boot Device`

Cause: This message indicates that the system recognized a special case.

If the system boots from EISA SCSI *before* EISA SCSI configuration information is stored in NVM, then the PDC uses "default" configuration data that can conflict with other EISA cards in the system. To handle this, the system ignores all cards except the boot EISA SCSI during the first power up and continues a limited boot.

If `eisa_config` (run in `/etc/bcheckrc`) can create a safe configuration, the new configuration is recorded in NVM and the `system.sci` file, and the system is automatically rebooted. If a safe configuration cannot be created, `eisa_config` issues an appropriate message, the system comes up with the other cards unusable, and you can run `eisa_config` interactively to fix the configuration and to reboot manually.

Action: None.

A

Message: `-- Skipping`

Cause: Indicates that either the slot is empty both physically and indicated so by NVM (or has an ISA card, but no EEPROM data), or was skipped because of one of the reasons above and is preceded by one of the above messages.

Action: None.

Message: `EISA card id` *eisa_id* `in slot` *slot_num* `had fatal error`

Cause: This message indicates that an EISA card asserted the IOCHK line indicating a fatal error. An expansion card might do this if there was a parity error on a memory card. (Not all cards assert IOCHK.)

Action: Replace the card.

Messages:

```
EISA_WARNING: unable to allocate eeprom_geninfo
EISA_WARNING: unable to allocate eeprom_slot_info for slot 0
EISA_WARNING: unable to allocate eeprom_slot_info
EISA WARNING: unable to allocate: func_data
EISA_WARNING: unable to allocate eeprom_cfg_header
EISA WARNING: unable to allocate eeprom
WARNING: unable to map eeprom registers
EISA WARNING: unable to map eeprom
```

Cause: All of these indicate a system problem when attempting to allocate resources necessary for EISA initialization. EISA will not be initialized, but the system should come up (with the exception of a boot from an EISA device).

Action: Call your HP representative.

Message: `WARNING: invalid hardware, eeprom missing`

Cause: The NVM is not responding to an attempt to read it.

Action: Call your HP representative.

Messages:

```
Checkserror in EISA section of eeprom:
Clearing the EISA section and continuing.
```

Cause: A checksum was performed on NVM at power up and it failed. The only safe course of action is to erase its contents. As EISA comes up, it will complain that NVM data is missing for cards which ID themselves. When `eisa_config` runs from `/etc/bcheckrc`, it will automatically generate data for and reconfigure the EISA cards that are present. ISA cards will need to be reconfigured using `eisa_config` in interactive mode.

Action: Follow instructions for adding ISA cards.

B

Series 400 Support Matrix

Introduction

This document summarizes the compatibility of the optional products available for the Series 400. For detailed support information, consult the *HP Apollo 9000 Series 400 Workstation Configuration Guide.*

To be supported, a device must be *qualified* on the computer model being considered *and* have *software support* on the operating system being considered. This means the device must appear in the appropriate column under "Hardware Support" and "Earliest Operating System Version". For software support, the tables show the earliest system version available for the Series 400. All later versions of the operating system also support the device, until that device exits its own support life.

The status of configurations "planned" and "under investigation" may change within 30 days. Contact your HP Sales Representative for current peripheral support information.

Series 400 System Processors

The following table lists several characteristics generic to all variants of each Series 400 processor Model. The mimimum operating system supported on each processor type. All later revisions are supported unless a range (e.g. 4.0 ⇒ 6.5) is shown. Not all external card slots listed are standard on all Models. Some slot capabilities may be optional at extra cost. On SPUs with EISA slots, those slots are individually useable with ISA cards.

Overall Processor Attributes

SPU Model	Operating System	Earliest Stand-alone	Earliest Diskless		Slot Types			
			Server	Client	DIO-II	EISA	ISA	VME
400*dl*	DOMAIN	10.2+	n.a.	10.2+	None[1]	None	None	None
400*dl*	HP-UX	7.03	n.a.	7.03	None[1]	None	None	None
400*s*	DOMAIN	10.2+	10.2+	10.2+	2 Std.[2]	4 Opt.	4 Opt.	None
400*s*	HP-UX	7.0	7.0	7.0	2 Std.,[2] 3 Opt.	4 Opt.	4 Opt.	None
400*t*	DOMAIN	10.2+	10.2+	10.2+	None[1]	None	1	None
400*t*	HP-UX	7.0	7.0	7.0	None[1]	None	1	None
425*e*	DOMAIN	10.3+	10.3+	10.3+	None	None	None	None
425*e*	HP-UX	7.05	n.a.	7.05	None	None	None	None
425*s*	DOMAIN	10.3+	10.3+	10.3+	2 Std.[2]	4 Opt.	4 Opt.	None
425*s*	HP-UX	7.05	7.05	7.05	2 Std.,[2] 3 Opt.	4 Opt.	4 Opt.	8 Opt.
425*t*	DOMAIN	10.3+	10.3+	10.3+	None[1]	None	1	None
425*t*	HP-UX	7.05	7.05	7.05	None[1]	None	1	None
433*s*	DOMAIN	10.3+	10.3+	10.3+	2 Std.[2]	4 Opt.	4 Opt.	None
433*s*	HP-UX	7.05	7.05	7.05	2 Std.,[2] 3 Opt.	4 Opt.	4 Opt.	8 Opt.

1 The sole DIO-II slot is always consumed by the bit-mapped video interface board.

2 One slot consumed in most Models having bit-mapped video boards. Both slots available in Server configurations. Only DIO-II and DIO-System cards supported in top two slots. A1401A DIO-II →DIO-I/O downconverter not officially supported due to RFI considerations.

Unlisted Options are either transparent to software (e.g. localization) or are supported by all software (e.g. RAM).

System Processor Support

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Earliest Operating System Supported		
				DOMAIN	HP-UX	*SoftPC*
A1421A°	Model 400*s*, base SPU	68030	1.0	10.2+	7.03	2.0c
A1421B	Model 425*s*, base SPU	68040	2.0	10.3+	7.05	T.B.A.
T.B.A.	Model 433*s*, base SPU	68040	T.B.A.	T.B.A.	T.B.A.	T.B.A.
A1630A°	Model 400*t*, base SPU	68030	1.0	10.2+	7.03	2.0c
A1630B°	Model 400*dl*, Mono VRX	68030	1.0	10.2+	7.03	2.0c
A1630E	Model 425*t*, base SPU	68040	2.0	10.3+	7.05	T.B.A.
A2000A	Model 400*t* Mono VRX	HP-UX	1.0	Unsup.	7.03	2.0c
A2001A	Model 400*t* Color VRX	HP-UX	1.0	Unsup.	7.0	2.0c
A2002A	Model 400*t* Personal VRX P2	HP-UX	1.0	Unsup.	7.03	2.0cχ
A2010A	Model 400*t* Mono VRX	Domain	1.0	10.2+	Unsup.	Unsup.
A2011A	Model 400*t* Color VRX	Domain	1.0	10.2+	Unsup.	Unsup.
A2012A	Model 400*t* Personal VRX P2	Domain	1.0	10.2+	Unsup.	Unsup.
A2020A	Model 400*s*, Mono VRX	HP-UX	1.0	Unsup.	7.03	2.0c
A2021A	Model 400*s*, Color VRX	HP-UX	1.0	Unsup.	7.0	2.0c
A2022A	Model 400*s*, Personal VRX P3	HP-UX	1.0	Unsup.	7.03	2.0cχ
A2023A	Model 400*s*, Turbo VRX T2	HP-UX	1.0	Unsup.	7.03	2.0cχ
A2024A	Model 400*s*, Server	HP-UX	1.0	Unsup.	7.03	2.0c
A2030A	Model 400*s*, Mono VRX	Domain	1.0	10.2+	Unsup.	Unsup.
A2031A	Model 400*s*, Color VRX	Domain	1.0	10.2+	Unsup.	Unsup.
A2032A	Model 400*s*, Personal VRX P3	Domain	1.0	10.2+	Unsup.	Unsup.
A2033A	Model 400*s*, Server	Domain	1.0	10.2+	Unsup.	Unsup.
A2040A	Model 425*t* upgrade from 400*t*	68040	3.01	Unsup.	7.05	T.B.A.
A2041A	Model 425*t* upgrade from 400*t*	68040	3.01	10.3+	Unsup.	Unsup.
A2042A	Model 433*s* upgrade from 400*s*	68040	3.01	Unsup.	7.05	T.B.A.
A2043A	Model 433*s* upgrade from 400*s*	68040	3.01	10.3+	Unsup.	Unsup.
A2044A	Model 425*s* upgrade from 400*s*	68040	3.01	Unsup.	7.05	T.B.A.
A2045A	Model 425*s* upgrade from 400*s*	68040	3.01	10.3+	Unsup.	T.B.A.
A2046A	Model 433*s* upgrade from 425*s*	68040	3.01	Unsup.	7.05	T.B.A.
A2047A	Model 433*s* upgrade from 425*s*	68040	3.01	10.3+	Unsup.	Unsup.
A2078A	Model 425*t* CRX upgrade from 400*t* VRX	either	3.01	10.3+	8.0	T.B.A.

System Processor Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Earliest Operating System Supported		
				DOMAIN	HP-UX	*SoftPC*
A2079A	Model 425*t* CRX upgrade from 425*t* VRX	either	3.01	10.3+	8.0	T.B.A.
A2080A	Model 425*t* CRX upgrade from 400*s* VRX	either	3.01	10.3+	8.0	T.B.A.
A2081A	Model 425*t* CRX upgrade from 425*s* VRX	either	3.01	10.3+	8.0	T.B.A.
A2100A	Model 425*t* Mono VRX, diskless	HP-UX	2.0	Unsup.	7.05	T.B.A.
A2101A	Model 425*t* Mono VRX, 200 Mb	HP-UX	2.0	Unsup.	7.05	T.B.A.
A2102A	Model 425*t* Color VRX, 16-in., diskless	HP-UX	2.0	Unsup.	7.05	T.B.A.
A2103A	Model 425*t* Color VRX, 19-in., diskless	HP-UX	2.0	Unsup.	7.05	T.B.A.
A2104A	Model 425*t* Color VRX, 16-in., 200 Mb	HP-UX	2.0	Unsup.	7.05	T.B.A.
A2105A°	Model 425*t* Color VRX, 19-in., 200 Mb	HP-UX	2.0	Unsup.	7.05	T.B.A.
A2106A°	Model 425*t* Personal VRX P3	HP-UX	2.0	Unsup.	7.05	T.B.A.
A2108A	Model 425*t* Mono VRX, diskless	Domain	2.0	10.3+	Unsup.	Unsup.
A2109A°	Model 425*t* Mono VRX, 200 Mb	Domain	2.0	10.3+	Unsup.	Unsup.
A2110A	Model 425*t* Color VRX, 16-in., diskless	Domain	2.0	10.3+	Unsup.	Unsup.
A2111A	Model 425*t* Color VRX, 19-in., diskless	Domain	2.0	10.3+	Unsup.	Unsup.
A2112A°	Model 425*t* Color VRX, 16-in., 200 Mb	Domain	2.0	10.3+	Unsup.	Unsup.
A2113A°	Model 425*t* Color VRX, 19-in., 200 Mb	Domain	2.0	10.3+	Unsup.	Unsup.
A2114A°	Model 425*t* Personal VRX P3	Domain	2.0	10.3+	Unsup.	Unsup.
A2116A	Model 425*s* Mono VRX	HP-UX	2.0	Unsup.	7.05	T.B.A.
A2117A	Model 425*s* Color VRX, 19-in.	HP-UX	2.0	Unsup.	7.05	T.B.A.
A2118A	Model 425*s* Color VRX, 19-in., DIO-II	HP-UX	2.0	Unsup.	7.05	T.B.A.
A2119A	Model 425*s* Personal VRX P3	HP-UX	2.0	Unsup.	7.05	T.B.A.
A2120A	Model 425*s* Turbo VRX T2	HP-UX	2.0	Unsup.	7.05	T.B.A.
A2121A	Model 425*s* Server	HP-UX	2.0	Unsup.	7.05	T.B.A.
A2123A	Model 425*s* Mono VRX	Domain	2.0	10.3+	Unsup.	Unsup.
A2124A	Model 425*s* Color VRX, 19-in.	Domain	2.0	10.3+	Unsup.	Unsup.
A2125A	Model 425*s* Personal VRX P3	Domain	2.0	10.3+	Unsup.	Unsup.
A2126A	Model 425*s* Server	Domain	2.0	10.3+	Unsup.	Unsup.
A2130A	Model 425*e* greyscale EVRX, diskless	HP-UX	3.01	Unsup.	8.0	T.B.A.

System Processor Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Earliest Operating System Supported		
				DOMAIN	HP-UX	*SoftPC*
A2131A	Model 425*e* greyscale EVRX, 210 Mb	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2132A	Model 425*e* greyscale EVRX, 420 Mb	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2134A	Model 425*e* 1024 Color EVRX, diskless	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2135A	Model 425*e* 1024 Color EVRX, 210 Mb	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2136A	Model 425*e* 1024 Color EVRX, 420 Mb	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2139A	Model 425*e* 1280 Color EVRX, diskless	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2140A	Model 425*e* 1280 Color EVRX, 210 Mb	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2141A	Model 425*e* 1280 Color EVRX, 420 Mb	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2145A	Model 425*e* Grayscale EVRX, diskless	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2146A	Model 425*e* Grayscale EVRX, 210 Mb	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2147A	Model 425*e* Grayscale EVRX, 420 Mb	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2149A	Model 425*e* 1024 Color EVRX, diskless	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2150A	Model 425*e* 1024 Color EVRX, 210 Mb	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2151A	Model 425*e* 1024 Color EVRX, 420 Mb	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2154A	Model 425*e* 1280 Color EVRX, diskless	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2155A	Model 425*e* 1280 Color EVRX, 210 Mb	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2156A	Model 425*e* 1280 Color EVRX, 420 Mb	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2160A°	Model 425*t* GRX, 210 Mb	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2161A	Model 425*t* CRX, 210 Mb	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2162A	Model 425*t* GRX, diskless	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2163A	Model 425*t* GRX, 420 Mb	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2164A	Model 425*t* VRX, 420 Mb	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2165A	Model 425*t* CRX, diskless	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2166A	Model 425*t* CRX, 420 Mb	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2167A	Model 425*t* pVRX P3, 420 Mb	HP-UX	3.01	Unsup.	8.0	T.B.A.

System Processor Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Earliest Operating System Supported		
				DOMAIN	HP-UX	*SoftPC*
A2170A°	Model 425 *t* GRX, 210 Mb	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2171A°	Model 425 *t* CRX, 210 Mb	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2172A	Model 425 *t* GRX, diskless	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2173A	Model 425 *t* GRX, 420 Mb	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2174A	Model 425 *t* VRX, 420 Mb	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2175A	Model 425 *t* CRX, diskless	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2176A	Model 425 *t* CRX, 420 Mb	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2177A	Model 425 *t* pVRX P3, 420 Mb	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2180A	Model 425*s* GRX, 660 Mb	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2181A	Model 425*s* GRX, 660 Mb, DIO-II	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2183A	Model 425*s* CRX, 660 Mb	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2184A	Model 425*s* CRX, 660 Mb, DIO-II	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2185A	Model 425*s* CRX, 660 Mb, EISA	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2187A	Model 425*s* pVRX P3, 1.3 Gb, DIO-II	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2189A	Model 425*s* Server, 1.3 Gb, CD, DIO-II	HP-UX	3.01	Unsup.	8.0	T.B.A.
A2190A	Model 425*s* GRX, 660 Mb	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2193A	Model 425*s* CRX, 660 Mb	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2194A	Model 425*s* CRX, 660 Mb, EISA	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2196A	Model 425*s* pVRX P3, 1.3 Gb, EISA	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
A2199A	Model 425*s* Server, 1.3 Gb, EISA	DOMAIN	3.01	10.3+	Unsup.	T.B.A.
T.B.A.	Model 433*s* Mono VRX	HP-UX	T.B.A.	Unsup.	T.B.A.	T.B.A.
T.B.A.	Model 433*s* Color VRX	HP-UX	T.B.A.	Unsup.	T.B.A.	T.B.A.
T.B.A.	Model 433*s* Personal VRX P3	HP-UX	T.B.A.	Unsup.	T.B.A.	T.B.A.
T.B.A.	Model 433*s* Turbo VRX T2	HP-UX	T.B.A.	Unsup.	T.B.A.	T.B.A.
T.B.A.	Model 433*s* Mono VRX	Domain	T.B.A.	T.B.A.	Unsup.	Unsup.
T.B.A.	Model 433*s* Color VRX	Domain	T.B.A.	T.B.A.	Unsup.	Unsup.
T.B.A.	Model 433*s* Personal VRX P3	Domain	T.B.A.	T.B.A.	Unsup.	Unsup.

System Processor Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Earliest Operating System Supported		
				DOMAIN	HP-UX	*SoftPC*
	Series 400 Options					
Option ADAδ	Personal VRX P1 (98705C§)	DIO-II	1.0	10.2+	7.03	2.0cχ
Option ADBδ	Personal VRX P2 (98705A)	DIO-II	1.0	10.2+	7.03	2.0cχ
Option ADCδ	Personal VRX P3 (98705B)	DIO-II	1.0	Unsup.	7.03	2.0cχ
Option ADDδ	Turbo VRX T1 (98735A)	DIO-II	1.0	Unsup.	7.03	2.0cχ
Option ADEδ	Turbo VRX T2 (98736A)	DIO-II	1.0	Unsup.	7.03	2.0cχ
Option ADFδ	Turbo VRX T3 (98736B)	DIO-II	1.0	Unsup.	7.03	2.0cχ
Option ADG	Monitor, 19-inch mono. (98774A)	1280	1.0	10.2+	7.03	2.0c
Option ADHδ	Monitor, 16-inch color (98789A)	1280	1.0	10.2+	7.03	2.0c
Option ADJδ	Monitor, 19-inch color (98754A)	1280	1.0	10.2+	7.03	2.0c
Option ADK	Mono VRX for Server	DIO-II	1.0	10.2+	7.03	Via O.S.
Option ADL	Color VRX for Server	DIO-II	1.0	10.2+	7.0	Via O.S.
Option ADM	Personal VRX P3	DIO-II	1.0	10.2+	Unsup.	Unsup.
Option AD7	Monochrome VRX (A1096A)	DIO-II	1.0	10.2+	7.03	2.0c
Option AD8δ	Color VRX (A1416A)	DIO-II	1.0	10.2+	7.0	2.0c
Option ALE	Add 25525A 8-bit dfSCSI i/f	EISA	1.0	10.2+	7.03	Via.O.S.
Option AL0	Add 3 DIO-II slots	DIO-II	1.0	No	7.03	Via O.S.
Option AL1	Add 4 EISA slots	EISA	1.0	10.2+	8.0	Via O.S.
Option AL3δ	Apollo Token Ring i/f (A-NET-ATR)	ISA	1.0	10.2+	No	No
Option AL4δ	IBM Token Ring i/f (A-NET-ITR)	ISA	1.0	10.2+	No	No
Option AL5δ	IEEE-488 i/f, std. speed	HP-IB	1.0	No	7.03	2.0c
Option AL6	1→3 serial i/f cable (K2292)	RS-232C	1.0	10.2+	7.05	No
Option AL7	ID Module (46084A)	HP-HIL	NOP	No	7.03	Via O.S.
Option AL9	Disable ThinLAN, enable AUI	802.3	1.0	10.2+	7.03	Via O.S.

System Processor Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Earliest Operating System Supported		
				DOMAIN	HP-UX	*SoftPC*
Option AMA	Add 2nd A1444A 660 Mb disk	seSCSI	1.0	10.2+	No	No
Option AMB	Add 3.5-in. flexible disk	seSCSI	3.01	10.3+	8.0	T.B.A.
Option AMP	Subs 1.3Gb for 660Mb	seSCSI	3.01	Unsup.	8.0	T.B.A.
Option AMQ	Subs 1.3Gb for 660Mb	seSCSI	3.01	10.3+	Unsup.	T.B.A.
Option AMT	Add 420 Mb int. disk	seSCSI	3.01	10.3+	8.0	T.B.A.
Option AM0	Add 200/210 Mbyte int. disk	seSCSI	1.0	No	7.03	Via O.S.
Option AM1	Add 200 Mbyte int. disk	seSCSI	1.0	10.2+	No	No
Option AM2	Add 2nd 200/210 Mbyte disk	seSCSI	1.0	10.2+	7.03	Via O.S.
Option AM2	Add 330 Mbyte int. disk	seSCSI	1.0	Unsup.θ	7.0	Via O.S.
Option AM3	Add 330 Mbyte int. disk	seSCSI	1.0	10.2+	No	No
Option AM4	Add 660 Mbyte int. disk	seSCSI	1.0	Unsup.θ	7.0	Via O.S.
Option AM5	Add 660 Mbyte int. disk	seSCSI	1.0	10.2+	No	No
Option AM6	Add 2nd 660 Mb disk	seSCSI	1.0	Unsup.θ	7.0	Via O.S.
Option AM7	Add DDS (4mm DAT) drive	seSCSI	1.0*	10.3+	7.0	Via O.S.
Option AM8	Add CD-ROM drive	seSCSI	1.0*	Unsup.	7.03	Via O.S.
Option AM9	Add QIC-24 ctg. tape	seSCSI	1.0*	10.2+	Inves.	Unsup.
Option ANB	Add 8 Mbytes RAM (16 total)	SIMM	1.0	10.2+	7.0	2.0c
Option ANC	Add 16 Mbytes RAM (32 total)	SIMM	1.0	10.2+	7.0	2.0c
Option ANE	Add 32 Mbytes RAM (64 total)	SIMM	2.0	10.2+	7.05	T.B.A.
Option ANF	Add 8 Mbytes RAM (24 total)	SIMM	3.01	10.3+	8.0	T.B.A.
Option AN1	Subs. 32 Mbytes RAM	SIMM	1.0	10.2+	7.0	2.0c
Option AN2	Add 4 Mbytes ECC RAM	SIMM	1.0	10.2+	7.03	2.0c
Option AN4	Add 8 Mbytes ECC RAM	SIMM	1.0	10.2+	7.03	2.0c
Option AN5	Upgrade 8 Mbytes RAM to 16	SIMM	1.0	10.2+	7.0	2.0c
Option AN6	Add 32 Mbytes RAM	SIMM	1.0	10.2+	7.0	2.0c
Option AN8	Add 16 Mbytes RAM	SIMM	1.0	10.2+	7.0	2.0c
Option AN9	Add 128 Kbytes CPU cache	PGA	1.0	10.2+	7.0	2.0c

Notes:

* Boot ROM support does not imply support by install/update processes or availability of software in this media format.

§ This Option or product listed for reference, and not currently orderable as shown.

δ Not available on Model 400*dl*.

θ The current combination of drive firmware and DOMAIN operating system software does not provide optimum performance. These configurations will be fully supported in a future release.

χ *SoftPC* supported only within an X-window at this time.

Series 400 Disk Drives

The Series 400 presently supports only 8-bit single-ended (seSCSI) SCSI-I/SCSI-II and HP-IB disk drives. Only HP-UX supports HP-IB disks, and then only CS/80 and SS/80 drives. Software driver source is provided for customers desiring to connect unsupported SCSI devices.

HP-IB AMIGO drives are unsupported by HP-UX. Although the AMIGO driver is present, many of these older disks fail to function on Series 400 due to timing problems. No HP-FL interface is available for Series 400.

The `Min. Boot ROM` column indicates the minimum revision of boot code required to boot an operating system from the device.

Series 400 Disk Drive Support

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
A-200EF	200 Mb hard disk & $5\frac{1}{4}$-inch floppy, external	seSCSI	1.0	Models 400*t* & 425*t* only	Unsup.	Unsup.	Unsup.
A-660E	660 Mb external	seSCSI	1.0	All except 400*dl*	10.2+	Unsup.	Unsup.
A-697°	External disk cluster	seSCSI	Uns.	Unsupported	Unsup.	Unsup.	Unsup.
AADDSFLP	1.2Mb $5\frac{1}{4}$-inch flex.	seSCSI	Inves.	All except 400*dl*	10.2+	Unsup.	Unsup.
A1440A°	200/210 Mbyte internal	seSCSI	1.0	400*t*,425*t* only	10.2+	7.0+	Via O.S.
A1442A	330 Mbyte internal	seSCSI	1.0	400*s*,425*s*,433*s* only	10.2+	7.0+	Via O.S.
A1443A	660 Mbyte internal	seSCSI	1.0	400*s*,425*s*,433*s* only	Unsup.θ	7.0+	Via O.S.
A1444A	660 Mbyte internal	seSCSI	1.0	400*s*,425*s*,433*s* only	10.2+	Unsup.	Via O.S.
A1448A	CD-ROM drive, internal	seSCSI	1.0	400*s*,425*s*,433*s* only	10.3+	7.0+	Note ©
A1968A	Model 750 $3\frac{1}{2}$-in. flexible	seSCSI	Uns.	[use A2073A]			
A1980/81	Series 700 210 Mbyte hard	seSCSI	Uns.	[use A1440A, A2071A]			
A1982/83	Series 700 420 Mbyte hard	seSCSI	Uns.	[use A2072A, A2072A]			
A1984A	Model 720/730 $3\frac{1}{2}$-in. flex.	seSCSI	Uns.	[use A2073A]			
A1985A	Model 750 CD-ROM, int.	seSCSI	Uns.	[use A1448A, A2074A]			
A1988A	Model 750 660 Mbyte int.	seSCSI	Uns.	[use A1443/44A]			
A1989A	Model 750 1.3 Gb hard, int.	seSCSI	Uns.	[use A2076A]			
A1999A	CD-ROM drive, external	seSCSI	1.0	All except 400*dl*	10.3+	7.0+	Note ©
A2071A	210 Mbyte hard, internal	seSCSI	3.01	Model 425*e* only	10.3+	8.0	T.B.A.
A2072A	420 Mbyte hard, internal	seSCSI	3.01	Model 425*e* only	10.3+	8.0	T.B.A.
A2073A	$3\frac{1}{2}$-in. flexible disk	seSCSI	3.01	Model 425*e* only	10.3+	8.0	T.B.A.
A2074A	CD-ROM drive, internal	seSCSI	3.01	Model 425*e* only	10.3+	8.0	Note ©
A2075A	420 Mbyte hard, internal	seSCSI	3.01	Model 425*t* only	10.3+	8.0	Via O.S.
A2076A	1.3 Gbyte hard, internal	seSCSI	3.01	Models 425*s*,433*s* only	10.3+	8.0	Via O.S.
A2219A	Model 710 210 Mbyte hard	seSCSI	Unsup.	Mech. incompatible	Unsup.	Unsup.	NA
A2221A	Model 710 420 Mbyte hard	seSCSI	Unsup.	Mech. incompatible	Unsup.	Unsup.	NA

Series 400 Disk Drive Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
A2223A	Model 710 $3\frac{1}{2}$-in. flexible	seSCSI	Unsup.	Mech. incompatible	Unsup.	Unsup.	NA
A2224A	Model 710 CD-ROM	seSCSI	Unsup.	Mech. incompatible	Unsup.	Unsup.	NA
A2257-59A	Series 300 internal	seSCSI	Unsup.	Mech. incompatible	Unsup.	Unsup.	NA
C1700A	Series 6300 Model 20GB/A MO autochanger	seSCSI	Uns.	All except 400*dl* (DOMAIN is 425*s,t* and 433*s* only)	10.4	7.0+	Via O.S.
C1700M	Series 6300 Model 20GB/M multi-function	seSCSI	Uns.	AIMS on Series 800 only	Unsup.	Unsup.	NA
C1701A	Series 6300 Model 650/A ctg. drive	seSCSI	1.0	All except 400*dl*	10.2+	7.0+	Via O.S.
C1703A	Series 6300 Model 10GB/A MO autochanger	seSCSI	Uns.	All except 400*dl*.	Inves.	8.0*δ*	Via O.S.
C1704A	Series 6300 Model 60GB/A MO autochanger	seSCSI	Uns.	All except 400*dl*.	Inves.	8.0*δ*	Via O.S.
C1704M	Series 6300 Model 60GB/M multi-function	seSCSI	Uns.	AIMS on Series 800 only	Unsup.	Unsup.	NA
C1705A	Series 6300 Model 100GB/A MO autochanger	seSCSI	Uns.	All except 400*dl*.	Inves.	8.0*δ*	Via O.S.
C1705M	Series 6300 Model 100GB/M multi-function	seSCSI	Uns.	AIMS on Series 800 only	Unsup.	Unsup.	NA
C1707A°	Series 6100 Model 600/A CD-ROM, stand-alone	CS/80	1.0	All except 400*dl*,425*e*	No	7.0	Note ©
C2200A	Series 6000 Model 335H, 335Mb hard disk	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
C2202A	Series 6000 Model 670XP, 670H+cache	CS/80	Unsup.	Unsupported*	No	Unsup.	Unsup.
C2203A	Series 6000 Model 670H, 670Mb hard disk	CS/80	Unsup.	Unsupported*	No	7.0	Unsup.
C2212A	Series 6000 Model 330/S, 330Mb hard disk	seSCSI	1.0	All except 400*dl*	Unsup.*θ*	7.0+	Via O.S.
C2213A	Series 6000 Model 660/S, 660Mb hard disk	seSCSI	1.0	All except 400*dl*	Unsup.*θ*	7.0+	Via O.S.
Opt.001	[see C2290A]						
Opt.002,022	[see C2291A]						
Opt.003	[see C2292A in **Tapes**]						
Opt.004,024	[see C2293A]						
Opt.005	[see C2294A]						

Series 400 Disk Drive Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
C2212D	Series 6000 Model 330/D 330Mb hard	seSCSI	1.0	All except 400*dl*	10.2+	Unsup.θ	Unsup.
C2213D	Series 6000 Model 660/D 660 Mb hard	seSCSI	1.0	All except 400*dl*	10.2+	Unsup.θ	Unsup.
Opt.A01	[see C2290D]						
Opt.A02	[see C2291D]						
Opt.005	[see C2294A]						
C2214B	Series 6000 Model 1350S (325mm, 1.3 Gbyte hard disk)	seSCSI	1.0	All except 400*dl*	10.3+	8.0	Via O.S.
C2216T	Series 6000 Model 670SE (tower, 670 Mbyte hard disk)	seSCSI	1.0	All except 400*dl*	10.3+	8.0	Via O.S.
C2217T	Series 6000 Model 1350SE (tower, 1.3 Gbyte hard disk)	seSCSI	1.0	All except 400*dl*	10.3+	8.0	Via O.S.
C2220-29A°/B	Upgrades for C2260-69A	seSCSI	Unsup.	Unsupported. Use C2216/17T	Unsup.	Unsup.	NA
C2220-29M	Upgrades for C2269E/M	mcSCSI	Unsup.	Unsupported. Use C2216/17T	Unsup.	Unsup.	NA
C2249M	420Mb Upgrade for C2269E/M	mcSCSI	Unsup.	Unsupported. Use C2216/17T	Unsup.	Unsup.	NA
C2251-54	Storage System	HP-FL	No	NO HP-FL interface on 400	NA	NA	NA
C2260A	PC Storage Tower w/if	seSCSI, EISA	No	Unsupported. Use C2216/17T	Unsup.	Unsup.	NA
C2261A	PC Storage Tower w/if	seSCSI, ISA	No	Unsupported. Use C2216/17T	Unsup.	Unsup.	NA
C2262A	PC Storage Tower w/if	seSCSI, MCA	No	Unsupported. Use C2216/17T	Unsup.	Unsup.	NA
C2269A	PC Storage Tower w/o if	seSCSI	Unsup.	Unsupported. Use C2216/17T	Unsup.	Unsup.	NA

Series 400 Disk Drive Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
C2269E/M	Mac Storage Tower w/if	mcSCSI, MCA	No	Unsupported. Use C2216/17T	Unsup.	Unsup.	NA
C2281,82A	Series 800 internal, hard	CS/80	Unsup.	Mech. incompatible	Unsup.	Unsup.	NA
C2290A	332 Mbyte hard disk upgrade for C2212-14	seSCSI	1.0	All except 400*dl*	Unsup.*θ*	7.0+	Via O.S.
C2290D	332 Mbyte hard disk upgrade for C2212-14	seSCSI	1.0	All except 400*dl*	10.2+	Unsup.*θ*	Unsup.
C2291A	664 Mbyte hard disk upgrade for C2212-14	seSCSI	1.0	All except 400*dl*	Unsup.*θ*	7.0+	Via O.S.
C2291D	664 Mbyte hard disk upgrade for C2212-14	seSCSI	1.0	All except 400*dl*	10.2+	Unsup.*θ*	Unsup.

Series 400 Disk Drive Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
C2293A	CD-ROM upgrade for C2212-14	seSCSI	1.0	All except 400*dl*	10.3+	7.0+	Note ©
C2293T	CD-ROM upgrade for C2216/17T	seSCSI	1.0	All except 400*dl*	10.3+	8.0	Note ©
C2294A	MO upgrade for C2212-14	seSCSI	1.0	All except 400*dl*	10.2+	7.0+	Via O.S.
C2294T	MO upgrade for C2216/17T	seSCSI	1.0	All except 400*dl*	10.3+	8.0	Via O.S.
C2295B	1.3 Gbyte hard upgrade for C2212-14	seSCSI	1.0	All except 400*dl*	10.3+	8.0	Via O.S.
C2425/27JK	420SA & 1350SA disk arrays	dfSCSI	No	No dfSCSI interface on 400	NA	NA	NA
C2451-53M	MacIntosh add-on disks	mcSCSI	No	Unsupported	Unsup.	Unsup.	NA
C2460-63F/R	Series 800/900 subsystems	seSCSI	Unsup.	Unsupported	Unsup.	Unsup.	NA
C2470-74S	Series 800/900 SPU add-ons	seSCSI	Unsup.	Unsupported	Unsup.	Unsup.	NA
C2470-74F/R	C246xF/R add-ons	seSCSI	Unsup.	Unsupported	Unsup.	Unsup.	NA
C2473T	670 Mbyte upgrade for C2216/17T	seSCSI	1.0	All except 400*dl*	10.3+	8.0	Via O.S.
C2474T	1.3 Gbyte upgrade for C2216/17T	seSCSI	1.0	All except 400*dl*	10.3+	8.0	Via O.S.
C2481,82A	Series 6000 Model 670SX,1350SX hard disks	dfSCSI	n.a.	No dfSCSI interface on 400	n.a.	n.a.	n.a.
C2491,92A	C2481/82A add-on disks	dfSCSI	n.a.	No dfSCSI interface on 400	n.a.	n.a.	n.a.
D168xA	Hard disks for *Vectra*	seSCSI	Unsup.	Unsupported.	Unsup.	Unsup.	NA

Series 400 Disk Drive Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
7907A°	20/20 Mb Fxd/Rem ctg	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7908P°	16 Mb Fxd w/ctg tape	CS/80	Unsup.	Unsupported*	No	Unsup.	Unsup.
7911°P/R	28 Mb Fxd w/ctg tape	CS/80	Unsup.	Unsupported*	No	Unsup.	Unsup.
7912°P/R	65 Mb Fxd w/ctg tape	CS/80	Unsup.	Unsupported*	No	Unsup.	Unsup.
7914CT°	132 Mb Fxd w/ctg tape	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7914°P/R	132 Mb Fxd w/ctg tape	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7914TD°	[see 7914R & 7971A]						
7914ST°	[see 7914R & 7974A]						
7933H°	404 Mbyte fixed disk	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7933XP°	404 Mbyte fixed disk	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7935H°	404 Mbyte remv pack	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7935XP°	404 Mbyte remv pack	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7936FL°	308 Mbyte fixed disk	HP-FL	NA	No FL interface on 400	No	No	No
7936H°	308 Mbyte fixed disk	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7936XP°	308 Mbyte fixed disk	CS/80	Unsup.	Unsupported*	No	Unsup.	Unsup.
7937FL°	571 Mbyte fixed disk	HP-FL	NA	No FL interface on 400	No	No	No
7937H°	571 Mbyte fixed disk	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7937XP°	571 Mbyte fixed disk	CS/80	Unsup.	Unsupported*	No	Unsup.	Unsup.
7941°/45°	24/55 Mbyte disk	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7942A°	7941A+9144A pkg.	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7946A°	7945A+9144A pkg.	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7957A°	80 Mbyte disk	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7957B°	80 Mbyte disk	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7957S°	107 Mbyte disk	seSCSI	Uns.	Unsupported	Unsup.	7.0+	Via O.S.
7958A°	131 Mbyte disk	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7958B°	152 Mbyte disk	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7958S°	161 Mbyte disk	seSCSI	Uns.	Unsupported	Unsup.	7.0+	Via O.S.

Series 400 Disk Drive Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
7959B	304 Mbyte disk	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7959S	323 Mbyte disk	seSCSI	Uns.	Unsupported	Unsup.	7.0+	Via O.S.
7962B°	152 Mbyte disk	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
7963B°	304 Mbyte disk	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
97962B°	152 Mbyte add-on	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
97963B°	304 Mbyte add-on	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
9122C°	1.6Mb 3$\frac{1}{2}$-in. flex.	SS/80	Unsup.	All except 400*dl*,425*e*	No	7.0	2.0c
9122°D/S	788Kb 3$\frac{1}{2}$-in. flex.	SS/80	Unsup.	Unsupported*	No	7.0	Unsup.
9125S°	360Kb 5$\frac{1}{4}$-in. flex.	SS/80	Unsup.	Unsupported*	No	Unsup.	Unsup.
9127A°	360Kb 5$\frac{1}{4}$-in. flex.	SS/80	Unsup.	All except 400*dl*,425*e*	No	7.0	2.0c
9133D°	9134D+9122S pkg.	SS/80	Unsup.	Unsupported*	No	Unsup.	Unsup.
9133H°	9134H+9122S pkg.	SS/80	Unsup.	Unsupported*	No	Unsup.	Unsup.
9133L°	9134L+9122S pkg.	SS/80	Unsup.	Unsupported*	No	Unsup.	Unsup.
9134D°	14.8 Mbyte disk	SS/80	Unsup.	Unsupported*	No	Unsup.	Unsup.
9134H°	19.9 Mbyte disk	SS/80	Unsup.	Unsupported*	No	Unsup.	Unsup.
9134L°	39.9 Mbyte disk	SS/80	Unsup.	Unsupported*	No	Unsup.	Unsup.
9153A°	9154A+9122S pkg.	SS/80	Unsup.	Unsupported*	No	Unsup.	Unsup.
9153B°	9154B+9122S pkg.	SS/80	Unsup.	Unsupported*	No	Unsup.	Unsup.
9154°A/B	10/20 Mbyte disk	SS/80	Unsup.	Unsupported*	No	Unsup.	Unsup.
9153°C/M	10-40 Mb Modular	SS/80	Unsup.	Unsupported*	No	7.0	2.0c
9262B°	Secure 7962B	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
9263B°	Secure 7963B	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
97902B°	152 Mbyte add-on	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
97903B°	304 Mbyte add-on	CS/80	Unsup.	Unsupported*	No	7.0	Via O.S.
98433D	Model 345 200 Mb internal	seSCSI	→	Supported only as A1440A	←	←	←

° This symbol is used throughout this document to denote discontinued products listed for reference. Discontinued° devices may still be available as used, refurbished or remanufactured products from HP's Finance and Remarketing Division. Add an "R" to the product number, e.g. 7935HR.

* Cannot be interfaced to Model 425*e*, which has no HP-IB capability.

© DOS programs can access files on a *cdfs*-mounted filesystem, but may fail if the uppercase filenames and ";1" version numbers presently reported by HP-UX are unexpected. A symlink workaround script is available. DOS programs requiring MicroSoft CD-ROM Extensions will fail.

δ Requires software patch from GSD.

θ The current combination of drive firmware and operating system software does not provide optimum performance.

Series 400 Magnetic Tape Drives

The Series 400 presently supports 8-bit single-ended (seSCSI) SCSI, selected GSD78 and CS/80 (HP-IB) tape drives. Software driver source is provided for customers desiring to connect unsupported SCSI devices.

All devices listed as type `CS/80` employ an HP-IB interface. Devices listed as `GSD78` are HP-IB and employ variants of the 7978A command language. No AMIGO (HP-IB) command set devices are supported. Additional information about use of older tape drives on MC680x0 HP-UX may be found in the **Series 300 Hardware Support Summary**.

The `Min. Boot ROM` column indicates the minimum revision of ROM code required to boot an install system from the device. Booting HP-UX from SCSI devices is possible, but HP presently does not deliver software on this media.

Series 400 Tape Drive Support

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
A-6250	$\frac{1}{2}$-in. 9-trk (LMS) 1600/6250 bpi	seSCSI		All Models except 400*dl*, 425*e*	10.2+	No driver	No
AADDESTC	$\frac{1}{4}$-in. 9-trk 60Mb QIC-24 ctg., external	seSCSI	1.0	All except 400*dl*	10.2+	3rd pty.	Unsup.
A-EX-	8mm 2.3Gb External	seSCSI	Unsup.	All except 400*dl*	10.2+θ	Unsup.	Unsup.
A-XT-°	8mm 2.3Gb Internal	seSCSI	Unsup.	Unsupported	Unsup.	Unsup.	Unsup.
A1447A	4mm 1.3Gb DDS (DAT), internal	seSCSI	1.0*	Model 400*s*/433*s* only	10.3+	7.0+	Via O.S.
A1449A	$\frac{1}{4}$-in. 9-trk 60Mb QIC-24 ctg., internal	seSCSI	1.0	Model 400*s*/433*s* only	10.2+	Unsup.Q	Unsup.
A1726A	7980S for Series 800	seSCSI	Unsup.	Unsupported	Unsup.	Unsup.	NA
A1990A	Model 750 4mm DDS, internal	seSCSI	Unsup.	Mech. incompatible	Unsup.	Unsup.	NA
A2274A	2.0Gb DDS (DAT), int.						
Opt.AHP	For Model 425*e*	seSCSI	1.0*	Model 425*e* only.	10.3+	Planned	Via O.S.
Opt.AHQ	For Model 425*s*	seSCSI	1.0*	Model 425*s* only.	10.3+	Planned	Via O.S.
C1511A°	1.3Gb DDS (DAT), ext.	GSD78	NOP	All except 400*dl*,425*e*	No	7.0	Via O.S.
C1512A°	1.3Gb DDS (DAT), ext.	seSCSI	1.0*	All except 400*dl*	10.3+	7.0+	Via O.S.
C1520A	4mm 2.0Gb DDS, stand-alone	seSCSI	1.0*	All except 400*dl* | Unsup.	Unsup.	Unsup.	
C1520B	Series 6400 Model 2000 4mm 2.0Gb DDS, stand-alone	seSCSI	1.0*	All except 400*dl*	10.3+	Planned	Via O.S.
C1521B	Series 6400 Model 2000DC 4mm 2.0Gb DDS, stand-alone	seSCSI	1.0*	All except 400*dl*	Unsup.	Planned	Via O.S.
C1590A°	DDS drive cluster	GSD78	No	Unsupported	Unsup.	Unsup.	NA
C2212/13	Series 6000 325mm enclosure						
#003	[see C2292A]						
#006	[see C2296D]						

B

Series 400 Tape Drive Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
C2224A/M	2.0 Gb DDS for C226xA/E/M	seSCSI	Unsup.	Unsupported. Use C2294T	Unsup.	Unsup.	NA
C2292A	1.3Gb DDS (DAT) for C2212-14	seSCSI	1.0*	All except 400*dl*	10.3+	7.0+	Via O.S.
C2292T	1.3Gb DDS (DAT) for C2216/17T	seSCSI	1.0*	All except 400*dl*	10.3+	8.0	Via O.S.
C2296D°	$\frac{1}{4}$-in. 60Mb QIC-24 ctg.	seSCSI	1.0	All except 400*dl*	10.2+	3rd pty.Q	Unsup.
C2297T	2.0Gb DDS (DAT) for C2216/17T	seSCSI	1.0*	All except 400*dl*	10.3+	Planned	Via O.S.
C2463F/R	DDS for 800/900 tower/rack	seSCSI	Unsup.	Unsupported	Unsup.	Unsup.	NA
C2475F/R	DDS for 800/900 SPUs	seSCSI	Unsup.	Unsupported	Unsup.	Unsup.	NA
D2034A	$\frac{1}{4}$-in QIC-525 for *Vectra*	seSCSI	Unsup.	Unsupported	Unsup.	Unsup.Q	
35401A°	$\frac{1}{4}$-in. 16-trk 536Mbyte autochanger	CS/80	Unsup.	Unsup. No on 425*e*	No	7.0	Via O.S.
	$\frac{1}{2}$-inch 9-track						
7970°E	800/1600 bpi	AMIGO	NOP	Unsup. No on 425*e*	No	Unsup.	Unsup.
7971A°	1600 bpi	AMIGO	NOP	Unsup. No on 425*e*	No	Unsup.	Unsup.
7974A°	1600/800 bpi	GSD78	NOP	Unsup. No on 425*e*	No	Unsup.	Unsup.
7978°A/B	1600/6250 bpi	GSD78	NOP	Unsup. No on 425*e*	No	Unsup.	Unsup.
	$\frac{1}{2}$-inch 9-track						
7979A	1600/800 bpi	GSD78	NOP	All except 400*dl*,425*e*	No	7.0	Via O.S.
7980A[H]	1600/6250 bpi	GSD78	NOP	400*s*/425*s*/433*s* only	No	7.0	Via O.S.
Opt.800	800 bpi NRZI	GSD78	NOP	400*s*/425*s*/433*s* only	No	7.0	Via O.S.
7980XC[H]	7980A w/compression	GSD78	NOP	400*s*/425*s*/433*s* only	No	7.0	Via O.S.

B

Series 400 Tape Drive Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
7979S	1600 cpi PE	seSCSI	1.0*	425*e/s/t*,433*s* only	Inves.	Inves.	-
7980S	6250 cpi GCR	seSCSI	1.0*	425*e/s/t*,433*s* only	10.3+	Inves.	-
7980SX	7890S w/compression	seSCSI	1.0*	425*e/s/t*,433*s* only	Inves.	Inves.	-
	$\frac{1}{4}$-inch cartridge						
9144A°	16-track, 67Mb	CS/80	1.0	All except 400*dl*,425*e*	No	7.0	Via O.S.
9145A°	16/32-track, 134Mb	CS/80	1.0	All except 400*dl*,425*e*	No	7.0	Via O.S.

* Boot ROM functionality does not imply install/update process support, nor availability of software on this media type.

H Requires A1401A and 98625B high-speed HP-IB for 6250 GCR or 6250 compressed operation.

θ Requires *OmniBack*.

Q Series 400-compatible QIC/SCSI drivers and QIC-24, QIC-120, QIC-150, QIC-250 and QIC-525 external drives are available from a third party. Consult your HP Sales Representative.

Series 400 Consoles and Terminals

The Series 400 supports either a bit-map display (w/HP-HIL keyboard) or serial terminal as console, and some Models are available in a "server" configuration that omits the bit-map video interface. X-terminals are not supported as console.

The Series 400 supports only built-in, DIO-II and DIO-System video cards. No DIO-I/O, EISA or SGC video cards are supported as console devices. Serial terminal consoles may use the built-in Select Code 9 port, or any supported RS-232C DIO-I/O or DIO-System card.

The `Min. Boot ROM` column indicates the minimum revision of code supporting that device as system console.

See the **Graphics** section for information on support of console/terminal devices as graphics peripherals.

Series 400 Console and Alpha Terminal Support

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
[none]	EVRX Grayscale	-	3.01	As built-in only	10.3+	8.0	Inves.
[none]	EVRX Color 1024	-	3.01	As built-in only	10.3+	8.0	Inves.
[none]	EVRX Color 1280	-	3.01	As built-in only	10.3+	8.0	Inves.
Vectra PC	w/Advancelink-2392	term0	1.0	All Models	Unsup.	7.0	Unsup.
A1096A	Monochrome VRX	DIO-II	1.0	All Models except 425*e*	10.2+	7.03	2.0c
A1097A/B	Monitor: 19-in., 1280x1024, 72 Hz, for A1659A	RGB	-	{per interface}	←	←	←
A1416A	Color VRX	DIO-II	1.0	All except 400*dl*,425*e*	10.2+	7.0	2.0c
A1497A/B	Monitor: 16-in., 1024x768, 75 Hz, for EVRX-1024	RGB	-	{per interface}	←	←	←
A1659A§	CRX, 1280x1024x8	SGC	3.01	As built-in only	10.3+	8.0	T.B.A.
A1924A§	GRX, 1280x1024	SGC	3.01	As built-in only	10.3+	8.0	T.B.A.
	700 Family Alpha-Numeric Terminals						
C1001°	Model 700/92	term0	1.0	All Models	Unsup.	7.0	2.0c
C1002°	Model 700/94	term0	1.0	All Models	Unsup.	7.0	2.0c
C1003°	Model 700/41	ASCII	1.0*	Unsupported	Unsup.	7.0*	Unsup.
C1004°	Model 700/22	ANSI	1.0*	Unsupported	Unsup.	7.0*	Unsup.
C1006	Model 700/43	ASCII	1.0*	Unsupported	Unsup.	7.0*	Unsup.
C1007	Model 700/44	ANSI/PC	1.0*	All Models	Unsup.	7.0*	2.0c

Series 400 Console and Alpha Terminal Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
	Localized 700/92						
C1010C	Simplified Chinese	term0	1.0	All Models	Unsup.	7.0	Unsup.
C1010J°	Japanese	term0	1.0	All Models	Unsup.	7.0	Unsup.
C1010K	Korean	term0	1.0	All Models	Unsup.	7.0	Unsup.
C1010T°	Traditional Chinese	term0	1.0	All Models	Unsup.	7.0	Unsup.
C1017	Model 700/32	ANSI	1.0*	All Models	Unsup.	7.0*	Unsup.
	HP 700 Family X-terminals						
C2301°A/B	Base unit	X-11	No	All Models	10.2+	7.0	Unsup.
C2302A°	Monochrome, 17-in.	X-11	No	All Models	10.2+	7.0	Unsup.
C2303°A/B	VGA color, 14-in.	X-11	No	All Models	10.2+	7.0	Unsup.
C2304°A/B	Hi-res color, 16-in.	X-11	No	All Models	10.2+	7.0	Unsup.
C2305°A/B	Grey Scale, 19-in.	X-11	No	All Models	10.2+	7.0	Unsup.
C2307B°	Color, Japan, 19-in.	X-11	No	All Models	10.2+	7.0	Unsup.
	HP 700/RX X-stations						
C2701A/B	*Mi* Base unit, monochrome	X-11	No	All Models	10.2+	7.0	Unsup.
C2702B	19*Mi* X Station, monochrome	X-11	No	All Models	10.2+	7.0	Unsup.
C2704A	*Ci* Base unit, 1024 color	X-11	No	All Models	10.2+	7.0	Unsup.
C2705A	14*Ci* X Station, 1024 color	X-11	No	All Models	10.2+	7.0	Unsup.
C2706A	16*Ci* X Station, 1024 color	X-11	No	All Models	10.2+	7.0	Unsup.
C2709A	*Ca* Base unit, 1280 color	X-11	No	All Models	10.2+	7.0	Unsup.
C2710A	16*Ca* X Station, 1280 color	X-11	No	All Models	10.2+	7.0	Unsup.
C2711A	19*Ca* X Station, 1280 color	X-11	No	All Models	10.2+	7.0	Unsup.

Series 400 Console and Alpha Terminal Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
D1187A	19-inch multi-sync monitor	Color	-	Unsupported	Unsup.	Unsup.	←
D1188A	15-inch multi-sync monitor	Color	-	Unsupported	Unsup.	Unsup.	←
2392A°	Alphanumeric terminal	term0	1.0	Unsupported	Unsup.	7.0	2.0c
2393A°	Graphics terminal	term0	1.0	Unsupported	Unsup.	7.0	2.0c
2394A°	Data entry terminal	term0	1.0	Unsupported	Unsup.	7.0	2.0c
2397A°	Color terminal	term0	1.0	Unsupported	Unsup.	7.0	2.0c
3082B°	Industrial terminal	term0	1.0	Unsupported	Unsup.	7.0	Unsup.
35731°A/B	512x400(390) 12-in. monitor, 50/60 Hz for 2393A, 98204B, 98542A and 98546A	Mono.	-	No supported i/f	Unsup.	Unsup.	←
35741°A/B	512x400(390) 12-in. monitor, 50/60 Hz for 2397A, 98543A	Color	-	No supported i/f	Unsup.	Unsup.	←
45711A°	*Portable Plus* (as 2622A)	term0	1.0	Unsupported	Unsup.	7.0	Unsup.
45850°	HP 150-II (as 2623A)	term0	1.0	Unsupported	Unsup.	7.0	Unsup.
9666A°	Ruggedized 2397A	term0	1.0	Unsupported	Unsup.	7.0	2.0c
98287A°	1024x768x8 interface for 98700° "CX";	DIO-I/O, MADbus	Unsup.	Unsupported	No	7.0	No
98542A	512x400x1 video i/f	DIO-Sys.	1.0	Unsupported	No	7.0	No
98543A	512x400x4 video i/f	DIO-Sys.	1.0	Unsupported	No	7.0	No
98544A°	1024x768x1 video i/f	DIO-Sys.	1.0	Unsupported	No	7.0	2.0c
98544B°	1024x768x1 video i/f	DIO-Sys.	1.0	Unsupported	No	7.0	2.0c
98545A°	1024x768x4 video i/f	DIO-Sys.	1.0	Unsupported	No	7.0	2.0c
98546A°	512x390x2 video i/f	DIO-I/O	1.0	Unsupported	No.	7.0	No
98547A	1024x768x6 video i/f	DIO-Sys.	1.0	Unsupported	No	7.0	2.0c

Series 400 Console and Alpha Terminal Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
98548A	"MH" 1280×1024×1 video i/f	DIO-II	1.0	Unsupported	No	7.0	2.0c
98549A	"C+" 1024×768×6 video i/f	DIO-II	1.0	Unsupported	No	7.0	2.0c
98550A	"CH" 1280×1024×8 video i/f	DIO-II	1.0	400*s*/425*s*/433*s* only	No	7.0	2.0c
98556A	"CHX" Accelerator	DIO-II	1.0	400*s*/425*s*/433*s* only	No	7.0	2.0c
98700°	"CX" Controller	MADbus	Unsup.	[see 98287A°]			
98702A§	Personal VRX LGB i/f	DIO-II, LGB	1.0	Supported on Models w/avail. DIO-II slot.	10.2+	7.03	2.0c[X]
98705A	Personal VRX P2	LGB	1.0	[see 98702A]	←	←	←
98705B	Personal VRX P3	LGB	1.0	[see 98702A]	←	←	←
98705C§	Personal VRX P1	LGB	1.0	[see 98702A]	←	←	←
98720A	SRX Processor	LGB	1.0	[see 98724/25A]			
98724A°	LGB Interfaces for 98720A SRX	DIO-I/O	1.0	Unsupported	No	7.0	2.0c
98725A	for 98720A SRX	DIO-Sys.	1.0	Unsupported	No	7.0	2.0c
98726A	for 98730A *Turbo*SRX	DIO-II	1.0	Unsupported	No	7.0	2.0c[X]
98730A	*Turbo*SRX Processor	LGB	1.0	[see 98726A]			
98735A	*Turbo* VRX T1 Processor	G-Bus	1.0	[see 98727/28A]			
98727A§	*Turbo* VRX PDMA interface	DIO-II	1.0	Supported on Models w/avail. DIO-II slot.	Inves.	7.03	2.0c[X]
98728A§	*Turbo* VRX VDMA interface	DIO-II	1.0	Supported on Models w/avail. DIO-II slot.	Inves.	7.03	2.0c[X]
98736A	*Turbo* VRX T2 Processor	G-Bus	1.0	[see 98727/28A]			
98736B	*Turbo* VRX T3 Processor	G-Bus	1.0	[see 98727/28A]			

Series 400 Console and Alpha Terminal Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
98751A°	19-in. monitor 1024×768 60 Hz	Color	-	No supported i/f	Unsup.	Unsup.	←
98752A°	19-in. monitor 1280×1024 60 Hz for 98550/720/30	Color	-	Unsupported	Unsup.	Unsup.	←
98753A	19-in. monitor 1024×768 60 Hz	Color	-	No supported i/f	Unsup.	Unsup.	←
98754A	19-in. monitor 1280×1024 60 Hz for A1416A, 98550, 98705/06, 98720/30, 98735/36	Color	-	All except 400*dl*	[see i/f]	[see i/f]	←
98774A	19-in. monitor 1280×1024 72 Hz for A1096A and A1924A	Mono.	-	All Models	[see i/f>	[see i/f]	←
98785A	16-in. monitor 1024×768 60 Hz	Color	-	No supported i/f	Unsup.	Unsup.	←
98786A	17-in. monitor 1024×768 60 Hz	Mono.	-	No supported i/f	Unsup.	Unsup.	←
98788A	19-in. monitor 1280×1024 60 Hz for 98548	Mono.	-	Unsupported	Unsup.	Unsup.	←
98789A	16-in. monitor 1280×1024 60 Hz for A1416A, 98550, 98705/06, 98720/30, 98735/36	Color	-	All except 400*dl*	[see i/f]	[see i/f]	←

* Although the Boot ROM supports non-HP terminal commands, key system tools such as *install*, *update* and *sam* presently require an HP *term0* console.

§ This component product number is listed for reference and is not separately orderable at present.

χ *SoftPC* supported only within an X-window at this time.

α *SoftPC* support on the 700/44 terminal is limited to alpha-numerics.

¶ Product not supported if purchased separately. Some revisions are incompatible with Series 700.

τ HP-UX 8.0 includes a complete *terminfo* database that allows software written for the *curses*(2) library to function with a wide variety of termtypes. Some HP-UX administrative software requires HP *term0* command set support in the device.

Series 400 Human Interface

The Series 400 directly supports only HP-HIL devices for human interface. Supported serial terminals may locally support additional classes of devices.

The `Min. Boot ROM` column indicates the minimum revision of ROM code supporting that device as boot conbtrol and system console keyboard.

See the **Graphics** section for information on support of human interface devices as graphics peripherals.

Series 400 Human Interface Support

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
A-LPFK-	32-button pad	Serial	No	All Models	10.2+	Unsup.	Unsup.
	Keyboard/local kits						
A1098A	DOMAIN	Serial	1.0	All Models	10.2+	No	No
A1099A/B	HP-UX (46021 ITF)	HP-HIL	1.0	All Models	No	7.0	2.0c
A2205A	C1429A PC-101 keyboard kit						
Opt. ABA	U.S. English	HP-HIL	1.0	All Models	No	8.0†	Inves.
Opt. ABD	German	HP-HIL	1.0	All Models	No	8.0†	Inves.
C1027A	Keyboard, 700/44 AT/2-style (aka C1408A, see 98016A)	MITF-5	1.0	All Models, however only C1027A Option ABA has been tested	No	7.0	Unsup.
C1429A	Keyboard, AT/2-style (see A2205A)	HP-HIL	1.0	All Models	No	8.0†	Unsup.
K1388	8 knob Dial Set	Serial	No	Under investigation	10.2+	Unsup.	Unsup.
K1410	Mouse, 3-button	Quad.	NOP	All Models	10.2+	7.0⊕	2.0
K1422	Spaceball XYZ, 8-button	Serial	No	{see SPTL-2003}			
	Summagraphics tablets						
K1424	*Bit Pad Two*	Serial	No	Vendor supported	10.2+	Unsup.	Unsup.
K1432	B-size tablet	Serial	No	Vendor supported	10.2+	Unsup.	Unsup.
	Trackballs						
K1434	3-button Marconi RB2	Quad.	NOP	Under investigation	10.2+	Unsup.⊕	Unsup.
K1435	3-button Itac	Quad.	NOP	Vendor supported	10.2+	Unsup.⊕	Unsup.
M1309A	3-button	HP-HIL	NOP	All Models	Unsup.	7.0	2.0c
SPTL-2003	Spaceball XYZ, 8-button	Serial	No	Vendor supported	10.2+	8.0	Unsup.

Series 400 Human Interface Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
35723A	12-inch touch bezel	HP-HIL	No	Unsupported	No	7.0	
45911°A/C	11×11-in. tablet	HP-HIL	NOP	All Models	No	7.0	
46021A	Keyboard, "ITF"	HP-HIL	1.0	All Models	No	7.0	2.0c
46060A	Mouse, 2 button	HP-HIL	NOP	All Models	No	7.0	2.0c
46060B	Mouse, 3 button	HP-HIL	NOP	All Models	No	7.0	2.0c
	HP-HIL Extensions						
46080A	2.4m	HP-HIL	NOP	All Models	No	7.0	2.0c
46081A	2.4m with audio	HP-HIL	NOP	All Models	10.2+α	7.0	2.0c
46082A	15m w/RGB & audio	HP-HIL	NOP	All Models	No	7.0	2.0c
46082B	30m w/RGB & audio	HP-HIL	NOP	All Models	No	7.0	2.0c
46083A	1-Knob dial set	HP-HIL	NOP	Unsupported	No	7.0	
46084A	ID Module	HP-HIL	NOP	All Models	No	7.0	2.0c
46085A	9-Knob dials set	HP-HIL	NOP	All Models	No	7.0	2.0c
46086A	32-button pad	HP-HIL	NOP	All Models	No	7.0	2.0c
46087	Digitizer, A-size	HP-HIL	NOP	All Models	No	7.0	
46090C	Digitizer, A-size	HP-HIL	NOP	All Models	No	7.0	
46088	Digitizer, B-size	HP-HIL	NOP	All Models	No	7.0	
46091C	Digitizer, B-size	HP-HIL	NOP	All Models	No	7.0	
46094A	Adaptor, quadrature	HP-HIL	NOP	All Models	No	7.0	2.0c
46095A°	Mouse, 3-button (Replaced by K1410)	Quad.	NOP	All Models	Unsup.	7.0⊕	2.0c

Series 400 Human Interface Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
7060A°	*SketchPro* 11×11 tablet	RS232C	No	Unsupported	Unsup.	Unsup.	Unsup.
	Barcode Readers						
92915A°	For HP 2390-series terminals and HP 150 PCs	MITF-12	→	{support via terminal}			
92916A°	For HP 9000 workstations and HP 150-II PCs	HP-HIL	NOP	All Models	No	7.0	2.0c
92917A	For HP 700 family terminals	MITF-5	→	{support via terminal}			
98016A§	MITF-5 keyboard adaptor	HP-HIL	1.0	All Models	No	7.0	Unsup.
98203C	Large Keyboard	HP-HIL	Unsup.	Unsupported	No	Unsup.	No

Notes:

† Right [Ctrl] key and CapsLock LED not functional on systems prior to 8.0 nor in ITE or in Windex on any systems.

⊕ Requires 46094A HIL/Quadrature adaptor.

α Supported limited to audio port only.

§ "Special"; consult factory for availability.

Series 400 Text Printers

This table refers only to simple text printing capability of the printer. Refer to the **Series 400 Graphics Device Support** table (next) for information on support of vector/raster printing. *SoftPC* applications are usually device-dependent. Also, unless they support HP-PCL, they may require that the printer be switch-configured for IBM/Epson emulation.

The Series 400 officially supports Centronics parallel, RS-232C serial printers and remote network spooling. HP-UX also supports simple and CIPER HP-IB printers. The AMIGO HP-IB driver is present in HP-UX has not been tested on Series 400. Direct LAN printer support is under investigation.

Legend: cps - characters per second, lpm - lines per minute, ppm - pages per minute

Series 400 Text Printer Support

Formal Product Number	Abbreviated Product Description	Type	Hardware Qualification and Support	Earliest Operating System Supported		
				DOMAIN	HP-UX	*SoftPC*
A1904A	*LaserJet* support kit	RS232	Models 400*s*,425*s*,433*s* only	10.3+	No	Per Appl.
A1905A	*LaserJet* support kit (parallel)	ISA	Models 400*s*,425*s*,433*s* only	10.3+	No	Per Appl.
A1904A	*LaserJet* support kit	Par.	Models 400*s*,425*s*,433*s* only	10.3+	No	Per Appl.
C1200A	Asian System Printer	APCL	All Models	Unsup.	7.0	via O.S.
	Serial interface	RS232	All Models	Unsup.	7.0	via O.S.
C1202A	Asian Serial Printer	APCL	All Models	Unsup.	7.0	via O.S.
#1AA	Parallel interface	Par.	Unsupported	Unsup.	Unsup.	Unsup.
#1A8	IEEE-488 interface	HP-IB	All except 400*dl*,425*e*	Unsup.	7.0	via O.S.
#1A9	Serial interface	RS232	All Models	Unsup.	7.0	via O.S.
C1602A	*PaintJet* XL, B-size color inkjet	PCL	-	w/C1608A	7.0	Via O.S.
Opt.1AX	Serial/parallel interface	Par.	All except 400*dl*	SR10.2+	Inves.	Via O.S.
Opt.1AX	Serial/parallel interface	RS232	All except 400*dl*	SR10.2+	7.0	Via O.S.
Opt.1A8	IEEE-488/serial interface	HP-IB	All except 400*dl*,425*e*	No	7.0	Via O.S.
C1608A	HP-GL/2 cartridge	HP-GL/2	All Models	SR10.2+	7.0	Via O.S.
C2007A	*LaserJet* IIP+, 4ppm	PCL4	All Models	10.3+		Via O.S.
	Parallel interface	Par.	All Models	10.3+		Via O.S.
	Serial interface	RS232	All Models	10.3+		Via O.S.
C2071x	Network interfaces for *LaserJet* II, IID and IIID	XIO	Under investigation	Inves.	Inves.	Via O.S.
C2088A	PCL-5 cartridge for *LaserJet* IIP	Font slot	All Models	10.3+	8.0	
C2113A	*DeskWriter*C (QuickDraw)	Apple	No interface	No driver	No driver	NA

Series 400 Text Printer Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Hardware Qualification and Support	Earliest Operating System Supported		
				DOMAIN	HP-UX	*SoftPC*
C2114A	*DeskJet* 500C, 300 dpi, color	PCL3			Per Appl.	
C2753/54A	Model F100 Page Printer	seSCSI	Unsupported	No driver	No driver	NA
C2106A	*DeskJet* 500, 300 dpi, A-size	Serial	All Models		8.0	Via O.S.
		Par.	All except 400*dl*		8.0	Via O.S.
HCD-MMP	(Genicom) impact	RS232	Unsupported	SR10.2+	Unsup.	Unsup.
K1626	"PTR-2106" PostScript, 6ppm	RS232	Vendor Supported	SR10.2+	Unsup.	Unsup.
K1627	"PTR-2115" PostScript, 15ppm	RS232	Vendor Supported	SR10.2+	Unsup.	Unsup.
K2132	Tek *Phasor Ps*	RS232	Vendor supported	SR10.2+	Unsup.	Unsup.
LP26°-SPE	LP/26 PostScript	ISA	Unsupported	SR10.2+	Unsup.	Unsup.
LP26°-S	LP/26 PostScript	RS232	Unsupported	SR10.2+	Unsup.	Unsup.
		Par.	Unsupported	SR10.2+	Unsup.	Unsup.
LP80010	LP 800 PostScript	Par.	Unsupported	SR10.2+	Unsup.	Unsup.
2225A	*ThinkJet*, 150 cps, 6.5-in.	HP-IB	Unsupported	No	7.0	2.0c
2225C/P	*ThinkJet*	Par.	Unsupported	Unsup.	Unsup.	Unsup.
2225D	*ThinkJet*	Serial	Unsupported	Unsup.	Unsup.	Unsup.
2227A	*QuietJet Plus*, 192 cps, 14-in.	Serial	Unsupported	No	7.0	2.0c
		Par.	Unsupported	Unsup.	Unsup.	Unsup.
2227B	QuietJet Plus, 14-in.	HP-IB	Unsupported	No	7.0	2.0c
2228A	*QuietJet*, 8-in.	Serial	Unsupported	No	7.0	2.0c
		Par.	Unsupported	Unsup.	Unsup.	Unsup.
2235A/C	*RuggedWriter*, 480 cps, 14-in.	Serial	Unsupported	No	7.0	2.0c
		Par.	Unsupported	Unsup.	Unsup.	Unsup.

Series 400 Text Printer Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Hardware Qualification and Support	Earliest Operating System Supported		
				DOMAIN	HP-UX	*SoftPC*
2235B/D	*RuggedWriter*	HP-IB	Unsupported	No	7.0	2.0c
		Serial	Unsupported	No	7.0	2.0c
2276A°	*DeskJet*, 300 dpi, A-size	Serial	All Models	Unsup.	7.0	2.0c
		Par.	All except 400*dl*	Unsup.	8.0	2.0c
2277A°	*DeskJet Plus*, 300 dpi, A-size	Serial	All Models	Unsup.	7.0	2.0c
		Par.	All except 400*dl*	Unsup.	8.0	2.0c
2562C	300 lpm impact, 16-in.	PCL	Unsupported	Unsup.	7.0	Via O.S.
2563	300 lpm impact, 16-in.	PCL	Unsupported	Unsup.	7.0	Via O.S.
2564	600 lpm impact, 16-in.	PCL	Unsupported	Unsup.	7.0	Via O.S.
2565A°	600 lpm impact, 18-in.	PCL	All Models	Unsup.	7.0	Via O.S.
2566	900 lpm impact, 18-in.	PCL	All Models	Unsup.	7.0	Via O.S.
2567	1200 lpm impact, 18-in.	PCL	All Models	Unsup.	7.0	Via O.S.
#046	CIPER (aka #290,850)	HP-IB	Unsupported	No	7.0	Via O.S.
#046	Simple (aka #200)	HP-IB	Unsupported	No	7.0	Via O.S.
#049	RS-232C interface	RS232	All Models	Unsup.	7.0	Via O.S.
#050	RS-422 Interface	422	Unsupported	Unsup.	Unsup.	Unsup.
#053	Parallel Interface	Par.	Unsupported	Unsup.	Unsup.	Unsup.
2603A°	45 cps daisywheel	RS232	Unsupported	Unsup.	Unsup.	Unsup.
2684°	*LaserJet*/2000 printer	PCL	Unsupported	Unsup.	7.0	2.0c
26843A	Serial interface	RS232	Unsupported	Unsup.	7.0	2.0c
26843B	Parallel interface	Par.	Unsupported	Unsup.	Unsup.	Unsup.
2686A°	*LaserJet*, 8 ppm	RS232	Unsupported	Unsup.	7.0	2.0c
		Par.	Unsupported	Unsup.	Unsup.	Unsup.
2686D°	*LaserJet 500*	RS232	Unsupported	Unsup.	7.0	2.0c
		Par.	Unsupported	Unsup.	Unsup.	Unsup.
2932A°	200 cps impact	RS232	Unsupported	Unsup.	7.0	2.0c
2933A°	200 cps "Factory Printer"	RS232	Unsupported	Unsup.	7.0	2.0c
2934A°	200 cps "Office Printer"	RS232	Unsupported	Unsup.	7.0	2.0c
#046	HP-IB interface	HP-IB	Unsupported	No	7.0	2.0c

Series 400 Text Printer Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Hardware Qualification and Support	Earliest Operating System Supported		
				DOMAIN	HP-UX	*SoftPC*
33439P°	PostScript cartridge for *LaserJet*-IID, -IIP and -III	Font slot	All Models	SR10.2+	8.0	
33439Q	PostScript cartridge for *LaserJet*-IID, -IIP, -III, -IID and IIIP	Font slot	All Models	SR10.2+	8.0	
33440A°	*LaserJet*-II, 8 ppm single	PCL	All Models	SR10.2+	7.0	2.0c
	Parallel interface	Par.	All except 400*dl*	SR10.2+	8.0	2.0c
	Serial interface	RS232	All Models	SR10.2+	7.0	2.0c
33447A°	*LaserJet*-IID, 8 ppm double	PCL	All Models	SR10.2+	7.0	2.0c
	Parallel interface	Par.	All except 400*dl*	SR10.2+	8.0	2.0c
	Serial interface	RS232	All Models	SR10.2+	7.0	2.0c
33449A	*LaserJet*-III, 8 ppm single	PCL	All Models	SR10.2+	7.0	2.0c
	Parallel interface	Par.	All except 400*dl*	SR10.2+	8.0	2.0c
	Serial interface	RS232	All Models	SR10.2+	7.0	2.0c
33459A	*LaserJet*-IIID, 8 ppm double	PCL	All Models	SR10.2+	8.0	Via O.S.
	Parallel interface	Par.	All except 400*dl*	SR10.2+	8.0	Via O.S.
	Serial interface	RS232	All Models	SR10.2+	8.0	Via O.S.
33471A°	*LaserJet*-IIP, 4 ppm single	PCL-4	All Models	SR10.2+	7.0	2.0c
	Parallel interface	Par.	All except 400*dl*	SR10.2+	8.0	2.0c
	Serial interface	RS232	All Models	SR10.2+	7.0	2.0c
33481A	*LaserJet*-IIIP, 4 ppm single	PCL-5	All Models	Inv.	8.0	Inv.
	Parallel interface	Par.	All Models	Inv.	8.0	Inv.
	Serial interface	RS232	All Models	Inv.	8.0	Inv.

Series 400 Text Printer Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Hardware Qualification and Support	Earliest Operating System Supported		
				DOMAIN	HP-UX	*SoftPC*
33491A	*LaserJet*-III*si*, 17 ppm double					
	HP Printer Command Language	PCL-5	{see below}	A1906A	Planned	Per Appl.
33494B/C	Adobe *PostScript*	Ps	{see below}	A1906A	Planned	Per Appl.
33494B/C	*PostScript* autoswitching	Ps	{see below}	A1906A	Planned	Unsup.
	Parallel interface	Par.	All Models	A1905/6A	Planned	Planned
	Serial interface	RS232	All Models	A1904A	Planned	Planned
C2058x	Network interface	PC-LAN	Under Investigation	Inves.	Inves.	per O.S.
3630A	*PaintJet* color graphics	PCL	All Models			
#001	Serial interface	RS232	All Models	Unsup.	7.0	2.0c
#002	IEEE-488 interface	HP-IB	All except 400*dl*,425*e*	No	7.0	2.0c
#002	Parallel interface	Par.	All except 400*dl*		8.0	2.0c
41063A°	Asian Workstation, PCL	HP-IB	All except 400*dl*,425*e*	No	7.0	Via O.S.
#040	Serial interface	RS232	All Models	No	7.0	Via O.S.
82906A°	160 cps impact	HP-IB	Unsupported	No	7.0	Via O.S.
9876A°	480 lpm thermal	HP-IB	Unsupported	No	7.0	Via O.S.

Notes:

¶ *PostScript* printers (e.g. *LaserJet* with PostScript cartridge) are supported only for printing of PostScript output/files. No plaintext- or PCL-to-PostScript capability is supported yet. See the **Graphics** section for information on support of printers as graphics peripherals.

Series 400 Graphics Devices

In general, the graphics libraries rely on the *Starbase* device handlers for support.

For some devices, separate rows document hardware and software support. This is because software support is principally dependent on command set (device personality) and hardware support is dependent on the physical interface.

For printers, this table refers only to the graphics capability. If a graphics-capable HP printer is not listed here, it is probably not even supported as a text printer. Refer to the **Series 400 Text Printer Support** table (previous) for information on support of text printing.

No *PostScript* device handlers are presently provided for HP-UX. DOS applications are usually device-dependent. Also, unless they support HP-PCL, DOS may require that the printer be switch-configured for IBM/Epson emulation.

Series 400 Graphics Device Support

Formal Product Number	Abbreviated Product Description	Type	Hardware Qualification and Support	Earliest Operating System Supported	
				DOMAIN	HP-UX
{none}	EVRX Grayscale	-	As built-in only	10.3+	8.0
{none}	EVRX Color 1024×768	-	As built-in only	10.3+	8.0
{none}	EVRX Color 1280×1024	-	As built-in only	10.3+	8.0
A-LPFK	32-button pad	Serial	All Models	10.2+,GPR	Unsup.
A1096A	Monochrome VRX board	DIO-II	All Models	10.2+	7.03, X, Starbase
A1097A	Monitor: 19-in., 1280×1024, 72 Hz, for A1659A	Color	{per interface}	←	←
A1416A	Color VRX board	DIO-II	All except 400*dl*	10.2+	7.0, X, Starbase
A1497A/B	Monitor: 16-in., 1280×1024, 72 Hz, for A1659A	Color	{per interface}	←	←
A1659A	CRX 1280×1024×8	SGC	As built-in only	10.3+	8.0
A1924A	GRX 1280×1024	SGC	As built-in only	10.3+	8.0
A2269-72A	Series 700 CRX Upgrades	SGC	Unsupported	Unsup.	Unsup.
CGP	CP300 (Tek 4693DX)	Par.*	All except 400*dl*	10.2+,*cpscr*	No
CGP10AT	CP300 (Tek 4693DX)	ISA	All except 400*dl*	10.2+,*cpscr*	No
CGP9-AT	CP300 (Tek 4693DX)	ISA	All except 400*dl*	10.2+,*cpscr*	No
C1200A	Asian System Printer	APCL	All Models	Unsup.	7.0, *pcltrans*
	Serial interface	RS232	All Models	Unsup.	7.0, *pcltrans*
C1202A	Asian Serial Printer	APCL	All Models	Unsup.	7.0, *pcltrans*
#1AA	Parallel interface	Par.	Unsupported	Unsup.	Unsup.
#1A8	IEEE-488 interface	HP-IB	All HP-IB Models	Unsup.	7.0, *pcltrans*
#1A9	Serial interface	RS232	All Models	Unsup.	7.0, *pcltrans*
C1600A°	7600 Model 240D plotter	HP-GL/2		Unsup.	7.0, Starbase
C1601A	7600 Model 240E plotter	HP-GL/2		Unsup.	7.0, Starbase
	IEEE-488 interface	HP-IB	All HP-IB Models	-	-
	Serial interface	RS232	Unsupported	-	-
	Parallel interface	par.	Unsupported	-	-

Series 400 Graphics Device Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Hardware Qualification and Support	Earliest Operating System Supported	
				DOMAIN	HP-UX
C1602A	*PaintJet* XL, B-size color inkjet	PCL	-	w/C1608A	7.0, *pcltrans*
Opt.1AX	Serial/parallel interface	Par.	All except 400*dl*	10.2+	Inves.
Opt.1AX	Serial/parallel interface	RS232	All Models	10.2+	7.0, *pcltrans*
Opt.1A8	IEEE-488/serial interface	HP-IB	All HP-IB Models	No	7.0, *pcltrans*
C1608A	HP-GL/2 cartridge	HP-GL/2	All Models	10.2+	7.0, Starbase
C1613A	*PaintWriter* (QuickDraw)	Apple	No interface	No driver	No driver
C1620A	Series 7600 Model 355, E-size color electrostatic plotter/printer	HP-GL/2 PCL	-	10.2+	7.0, Starbase, *pcltrans*
	IEEE-488 Interface	HP-IB	All HP-IB Models	No	-
	Serial Interface	RS232	Unsupported	-	-
	Parallel Interface	Par.	All except 400*dl*	10.2+	-
C1625A, C1629A	Series 7600 Model 250, D-size monochrome electrostatic plotter/printer	HP-GL/2, PCL	-	10.2+	7.0, Starbase, *pcltrans*
	IEEE-488 Interface	HP-IB	All HP-IB Models	No	-
	Serial Interface	RS232	Unsupported	-	-
	Parallel Interface	Par.	Unsupported	10.2+	-
C1627A, C1631A	Series 7600 Model 255, E-size monochrome electrostatic plotter/printer	HP-GL/2, PCL	-	10.2+	7.0, Starbase, *pcltrans*
	IEEE-488 Interface	HP-IB	All HP-IB Models	No	-
	Serial Interface	RS232	Unsupported	-	-
	Parallel Interface	Par.	Unsupported	10.2+	-

Series 400 Graphics Device Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Hardware Qualification and Support	Earliest Operating System Supported	
				DOMAIN	HP-UX
C1633A	*DesignJet* inkjet plotter				
	Vector language	HP-GL/2	All Models		
	Raster language	HP-RTL	All Models		
	Serial interface	RS232	All Models		
	Parallel interface	Par.	All Models		
C1642A	HP-IB interface	MIO	All Models		
C2059A	Novell Netware i/f	MIO	Unsupported	Unsup.	Unsup.
C1662A	*PaintWriter* XL (QuickDraw)	Apple	No interface	No driver	No driver
C1742A	*LaserJet* FAX	RS232, Par.	Unsupported	No driver	No driver
C1750A§	*ScanJet* IIC	mcSCSI	Via Third Party	?	3rd Pty
C2007A	*LaserJet* IIP+ printer	PCL4	{per interface}	10.3+	
	Parallel interface	Par.	All Models	10.3+	
	Serial interface	RS232	All Models	10.3+	
C2088A	PCL-5 cartridge for *LaserJet* IIP, includes HP-GL/2	Font slot	All Models		8.0, *cadplt2*
C2106A	*Deskjet* 500, 300 dpi A-size	RS232	All Models	Unsup.	Planned
		Par.	All except 400*dl*	Unsup.	Planned
C2113A	*DeskWriterC* (QuickDraw)	Apple	No interface	No driver	No driver
C2114A	*DeskJet* 500C, 300 dpi, color	PCL3	All Models		
	Parallel interface	Par.	All Models		
	Serial interface	RS232	All Models		

Series 400 Graphics Device Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Hardware Qualification and Support	Earliest Operating System Supported	
				DOMAIN	HP-UX
C2301°A/B	X-terminal base unit	X-11	All Models	Planned	7.0
C2302A°	Monochrome X-terminal, 17-in.	X-11	All Models	Planned	7.0
C2303°A/B	VGA color X-terminal, 14-in.	X-11	All Models	Planned	7.0
C2304°A/B	Hi-res color X-terminal, 16-in.	X-11	All Models	Planned	7.0
C2305°A/B	Grap Scale X-terminal, 19-in.	X-11	All Models	Planned	7.0
C2307B°	Color X-terminal, Japan, 19-in.	X-11	All Models	Planned	7.0
	700/RX X Stations				
C2701A/B	*Mi* base unit, monochrome	X-11	All Models	10.2+	7.0
C2702B	19*Mi* X Station, monochrome	X-11	All Models	10.2+	7.0
C2704A	*Ci* Base unit, med-res color	X-11	All Models	10.2+	7.0
C2705A	14*Ci* X Station, med-res color	X-11	All Models	10.2+	7.0
C2706A	16*Ci* X Station, med-res color	X-11	All Models	10.2+	7.0
C2709A	*Ca* Base unit, hi-res color	X-11	All Models	10.2+	7.0
C2710A	16*Ca* Base unit, hi-res color	X-11	All Models	10.2+	7.0
C2711A	19*Ca* Base unit, hi-res color	X-11	All Models	10.2+	7.0
HCD-MMP	(Genicom) impact	RS232	Unsupported	10.2+,*cpscr*	Unsup.
K1388	8 knob Dial Set	Serial	All Models	10.2+,GPR	Unsup.
K1410	Mouse, 3-button	Quad.	All Models	10.2+,GPR	7.0, X, Starbase
K1422	Spaceball XYZ, 8-button	Serial	{see: SPTL-2003}		
K1424	Summagraphics *Bit Pad Two*	Serial	Vendor supported	10.2+,GPR	Unsup.
K1432	Summagraphics B-tablet	Serial	Vendor supported	10.2+,GPR	Unsup.
K1434	3B Trackball, Marconi RB2	Quad.	All Models	10.2+,GPR	Unsup.
K1435	3B Trackball, Itac	Quad.	Vendor supported	10.2+,GPR	Unsup.

Series 400 Graphics Device Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Hardware Qualification and Support	Earliest Operating System Supported	
				DOMAIN	HP-UX
K1603	Shinko CHC-335, 200 dpi color	Par.	Vendor supported	Vendor sup.	Unsup.
K1604	Shinko CHC-336, 200 dpi color, HP-GL, CGI/CGM	↓	Vendor supported	Vendor sup.	Unsup.
	Parallel interface	Par.	Vendor supported	Vendor sup.	Unsup.
	Serial interface	RS232	Vendor supported	Vendor sup.	Unsup.
K1605	Shinko CHC-345, 300 dpi color	Par.	Vendor supported	Vendor sup.	Unsup.
K1606	Shinko CHC-645B, 300 dpi color	Par.	Vendor supported	Vendor sup.	Unsup.
LP26-SPE	LP/26 PostScript	Par.	Unsupported	10.2+,GPR	Unsup.
LP26-S	LP/26 PostScript	RS232	Unsupported	10.2+,GPR	Unsup.
LP80010	LP 800 PostScript	\(da	Unsupported	10.2+,GPR	Unsup.
	Serial interface	RS232	Unsupported	-	-
	Parallel i/f	Par.	Unsupported		
M1309A	3-button trackball	HP-HIL	All Models	Unsup.	7.0, X, Starbase
SPTL-2003	Spaceball XYZ, 8-button	Serial	Vendor supported	Vendor sup.	Vendor sup.
2225A	*ThinkJet*, 150 cps, 6.5-in.	HP-IB	Unsupported	Unsup.	7.0, *pcltrans*
2225C/P	*ThinkJet*	Par.	Unsupported	Unsup.	Unsup.
2225D	*ThinkJet*	Serial	Unsupported	Unsup.	7.0, *pcltrans*
2227A	*QuietJet Plus*, 192 cps, 14-in.	Serial	Unsupported	Unsup.	7.0, *pcltrans*
		Par.	Unsupported	Unsup.	Unsup.
2227B	QuietJet Plus, 14-in.	HP-IB	Unsupported	Unsup.	7.0, *pcltrans*
2228A	*QuietJet*, 8-in.	Serial	Unsupported	Unsup.	7.0, *pcltrans*
		Par.	Unsupported	Unsup.	Unsup.
2235A/C	*RuggedWriter*, 480 cps, 14-in.	Serial	Unsupported	Unsup.	7.0, *pcltrans*
		Par.	Unsupported	Unsup.	Unsup.
2235B/D	*RuggedWriter*	HP-IB	Unsupported	Unsup.	7.0, *pcltrans*
		Serial	Unsupported	Unsup.	7.0, *pcltrans*
2276A°	*DeskJet*, 300 dpi, A-size	Serial	All Models	Unsup.	7.0, *pcltrans*
		Par.	All except 400*dl*	Unsup.	Planned
2277A°	*DeskJet Plus*, 300 dpi, A-size	Serial	All Models	Unsup.	7.0, *pcltrans*
		Par.	All except 400*dl*	Unsup.	Planned

Series 400 Graphics Device Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Hardware Qualification and Support	Earliest Operating System Supported	
				DOMAIN	HP-UX
2393A°	Graphics terminal, term0	RS232	Unsupported	Unsup.	7.0, Starbase
2397A°	Color terminal, term0	RS232	Unsupported	Unsup.	7.0, Starbase
2562C	300 lpm impact, 16-in.	PCL	Unsupported	Unsup.	7.0, *pcltrans*
2563	300 lpm impact, 16-in.	PCL	Unsupported	Unsup.	7.0, *pcltrans*
2564	600 lpm impact, 16-in.	PCL	Unsupported	Unsup.	7.0, *pcltrans*
2565A°	600 lpm impact, 18-in.	PCL	All Models	Unsup.	7.0, *pcltrans*
2566	900 lpm impact, 18-in.	PCL	All Models	Unsup.	7.0, *pcltrans*
2567	1200 lpm impact, 18-in.	PCL	All Models	Unsup.	7.0, *pcltrans*
#046	CIPER i/f (aka #290,850)	HP-IB	Unsupported	Unsup.	7.0, *pcltrans*
#046	Simple protocol (aka #200)	HP-IB	Unsupported	Unsup.	7.0, *pcltrans*
#049	RS232 interface	RS232	All Models	Unsup.	7.0, *pcltrans*
#050	RS-422 Interface	422	Unsupported	Unsup.	Unsup.
#053	Parallel Interface	Par.	Unsupported	Unsup.	Unsup.
2684°	*LaserJet*/2000 printer	PCL	Unsupported	Unsup.	7.0, *pcltrans*
26843A	Serial interface	RS232	Unsupported	Unsup.	7.0, *pcltrans*
26843B	Parallel interface	Par.	Unsupported		
2686A°	*LaserJet*, 8 ppm	RS232	Unsupported	Unsup.	7.0, *pcltrans*
		Par.	Unsupported		
2686D°	*LaserJet 500*	RS232	Unsupported	Unsup.	7.0, *pcltrans*
		Par.	Unsupported		
2932A°	200 cps impact	RS232	Unsupported	Unsup.	7.0, *pcltrans*
2933A°	200 cps "Factory Printer"	RS232	Unsupported	Unsup.	7.0, *pcltrans*
2934A°	200 cps "Office Printer"	RS232	Unsupported	Unsup.	7.0, *pcltrans*
#046	HP-IB interface	HP-IB	Unsupported	Unsup.	7.0, *pcltrans*

Series 400 Graphics Device Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Hardware Qualification and Support	Earliest Operating System Supported	
				DOMAIN	HP-UX
33439P/Q	PostScript cartridge for *LaserJet*-IID, -IIP and -III	Font slot	All Models	10.2+,GPR	Unsup.
33440A°	*LaserJet*-II, 8 ppm single	PCL	Unsupported	Unsup.	7.0, *pcltrans*
	Parallel interface	Par.	All except 400*dl*	10.2+	8.0 *pcltrans*
	Serial interface	RS232	All Models	10.2+	7.0, *pcltrans*
33447A°	*LaserJet*-IID, 8 ppm double	PCL	All Models	Inves.	7.0, *pcltrans*
	Parallel interface	Par.	All except 400*dl*	10.2+	8.0 *pcltrans*
	Serial interface	RS232	All Models	10.2+	7.0, *pcltrans*
33449A	*LaserJet*-III, 8 ppm single	PCL	All Models	Inves.	7.0, *pcltrans*
	Parallel interface	Par.	All except 400*dl*	10.2+	8.0 *pcltrans*
	Serial interface	RS232	All Models	10.2+	7.0, *pcltrans*
33459A	*LaserJet*-IIID, 8 ppm double	PCL	All Models		8.0 *pcltrans*
	Parallel interface	Par.	All except 400*dl*		8.0 *pcltrans*
	Serial interface	RS232	All Models		8.0 *pcltrans*
33471A°	*LaserJet*-IIP, 4 ppm single	PCL-4	All Models	w/33439P	7.0, *pcltrans*
	Parallel interface	Par.	All except 400*dl*	10.2+	8.0 *pcltrans*
	Serial interface	RS232	All Models	10.2+	7.0, *pcltrans*
33481A	*LaserJet*-IIIP, 4 ppm single	PCL-5	All Models	Inv.	8.0
	Parallel interface	Par.	All Models	Inv.	8.0
	Serial interface	RS232	All Models	Inv.	8.0
33491A	*LaserJet*-III*si*, 17 ppm double				
	HP Printer Command Language	PCL-5	{see below}	10.2+	Planned
	HP-GL/2	HP-GL/2	{see below}	10.2+	Planned
33494B	Adobe *PostScript*	Ps	{see below}	10.2+	Planned
	Parallel interface	Par.	All Models	10.2+	Planned
	Serial interface	RS232	All Models	10.2+	Planned
C2058x	Network interface	PC-LAN	Under Investigation	Inves.	Inves.

Series 400 Graphics Device Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Hardware Qualification and Support	Earliest Operating System Supported	
				DOMAIN	HP-UX
35723A	12-inch touch bezel	HP-HIL	Unsupported		
3630A	*PaintJet* color graphics	PCL	All Models	Unsup.	7.0, *pcltrans*
#001	Serial interface	RS232	All Models	Unsup.	7.0, *pcltrans*
#002	IEEE-488 interface	HP-IB	All HP-IB Models	Unsup.	7.0, *pcltrans*
#002	Parallel interface	Par.	All except 400*dl*	Unsup.	8.0, *pcltrans*
41063A°	Asian Workstation, PCL	HP-IB	All HP-IB Models	Unsup.	7.0, *pcltrans*
#040	Serial interface	RS232	All Models	Unsup.	7.0, *pcltrans*
45850°	HP|150-II term0 terminal	RS232	Unsupported	Unsup.	7.0, Starbase
45911°A/C	11x11-in. tablet	HP-HIL	All Models	Unsup.	7.0, Starbase
46060A	Mouse, 2 button	HP-HIL	All Models	Unsup.	7.0, X, Starbase
46060B	Mouse, 3 button	HP-HIL	All Models	Unsup.	7.0, X, Starbase
46083A	1-Knob dial set	HP-HIL	Unsupported		
46085A	9-Knob dials set	HP-HIL	All Models	Unsup.	7.0, Starbase
46086A	32-button pad	HP-HIL	All Models	Unsup.	7.0, Starbase
46087	Digitizer, A-size	HP-HIL	All Models	Unsup.	7.0, Starbase
46090C	Digitizer, A-size	HP-HIL	All Models	Unsup.	7.0, Starbase
46088	Digitizer, B-size	HP-HIL	All Models	Unsup.	7.0, Starbase
46091C	Digitizer, B-size	HP-HIL	All Models	Unsup.	7.0, Starbase
46094A	Quadrature adaptor	HP-HIL	All Models	Unsup.	7.0, X, Starbase
46095A°	3-button mouse	HP-HIL	{see K1410}		

Series 400 Graphics Device Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Hardware Qualification and Support	Earliest Operating System Supported	
				DOMAIN	HP-UX
7060A°	*SketchPro* 11x11-in. tablet	RS232	Unsupported	Unsup.	Unsup.
7440A	*ColorPro* 8-pen A-size plotter	HP-GL	Per interface	Unsup.	7.0, Starbase
#001	Serial interface	RS232	All Models	Unsup.	7.0, Starbase
#002	IEEE-488 interface	HP-IB	All HP-IB Models	No	7.0, Starbase
7440Bx	*ColorPro* (HP-IB only)	HP-GL	All HP-IB Models	Unsup.	7.0, Starbase
7475A	B-size, 6-pen plotter	HP-GL	Per interface	Unsup.	7.0, Starbase
#001	Serial interface	RS232	All Models	Unsup.	7.0, Starbase
#002	IEEE-488 interface	HP-IB	All HP-IB Models	No	7.0, Starbase
7475Bx	(HP-IB only)	HP-GL	-	Unsup.	7.0, Starbase
7550A°	B-size, 8-pen plotter	HP-GL	-	Unsup.	7.0, Starbase
	Serial interface	RS232	All Models	-	7.0, Starbase
	IEEE-488 interface	HP-IB	All HP-IB Models	No	7.0, Starbase
7550B	B-size, 8-pen plotter	HP-GL	-	Unsup.	Planned
#005	Eavesdrop serial i/f	RS232	All Models	Unsup.	Planned
#005	IEEE-488 interface	HP-IB	All HP-IB Models	No	Planned
#006	Single serial i/f	RS232	Under investigation	No	Inves.
#006	Parallel interface	Par.	Under investigation	No	Inves.
7570A	*DraftPro* C/D-size, 8-pen pltr	HP-GL	All Models	Unsup.	7.0, Starbase
	Serial interface	RS232	All Models	Unsup.	7.0, Starbase
17570A	IEEE-488 Interface	HP-IB	All HP-IB Models	No	7.0, Starbase
7575A	*DraftPro* DXL A..D-size, 8-pen plotter	HP-GL	-	Unsup.	7.0, Starbase
7576A	*DraftPro* EXL A..E-size, 8-pen plotter	HP-GL	-	Unsup.	7.0, Starbase
	Serial interface	RS232	All Models	Unsup.	7.0, Starbase
17570A	IEEE-488 interface	HP-IB	All HP-IB Models	No	7.0, Starbase
7580B	D-size, 8-pen plotter	HP-GL	-	Unsup.	7.0, Starbase
7585B	E-size, 8-pen plotter	HP-GL	-	Unsup.	7.0, Starbase
7586B	E-size, 8-pen, roll-feed	HP-GL	-	Unsup.	7.0, Starbase
	Serial interface	RS232	Unsupported	Unsup.	7.0, Starbase
	IEEE-488 interface	HP-IB	Unsupported	No	7.0, Starbase

Series 400 Graphics Device Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Hardware Qualification and Support	Earliest Operating System Supported	
				DOMAIN	HP-UX
7595A°	*DraftMaster* E-size, 8-pen plotter	HP-GL	-	Unsup.	7.0, Starbase
7596A°	*DraftMaster* E-size, 8-pen, roll-feed	HP-GL	-	Unsup.	7.0, Starbase
	Serial interface	RS232	All Models		7.0, Starbase
	IEEE-488 interface	HP-IB	All HP-IB ModelModels	No	7.0, Starbase
7595B/C	*Draftmaster* SX E-size, 8-pen plotter	HP-GL/2	-	10.2+	7.0, Starbase
7596B/C	*Draftmaster* RX E-size, 8-pen, roll-feed	HP-GL/2	-	10.2+	7.0, Starbase
	Serial interface	RS232	All Models	10.2+	7.0, Starbase
	IEEE-488 interface	HP-IB	All HP-IB Models	No	7.0, Starbase
7599A/B	*DraftMaster* MX E-size, 8-pen, roll-feed, spooled	HP-GL/2	-	10.2+	7.0, Starbase
	Serial interface	RS232	All Models	10.2+	7.0, Starbase
	IEEE-488 interface	HP-IB	All HP-IB Models	No	7.0, Starbase
82906A°	160 cps impact	HP-IB	Unsupported	Unsup.	Unsup.
	Monochrome Scanners				
9190A°	*ScanJet*, SCL	Par.	Unsupported	No	Unsup.
9195A	*ScanJet Plus*, SCL	Par.	All except 400*dl*	Inves.	7.0†5
9666A°	Ruggedized 2397A	RS232	Unsupported	Unsup.	7.0, Starbase
98287A°	1024×768×8 M.A.D.bus	DIO-I/O	Unsupported	No	Unsup.
98542A	512×400×1 video i/f	DIO-Sys.	Unsupported	No	7.0, X, Starbase
98543A	512×400×4 video i/f	DIO-Sys.	Unsupported	No	7.0, X, Starbase
98544A°	1024×768×1 video i/f	DIO-Sys.	Unsupported	No	7.0, X, Starbase
98544B	1024×768×1 video i/f	DIO-Sys.	Unsupported	No	7.0, X, Starbase
98545A°	1024×768×4 video i/f	DIO-Sys.	Unsupported	No	7.0, X, Starbase
98546A	512×390×2 compat. i/f	DIO-I/O	Unsupported	No	Unsup.
98547A	1024×768×6 video i/f	DIO-Sys.	Unsupported	No	7.0, X, Starbase

Series 400 Graphics Device Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Hardware Qualification and Support	Earliest Operating System Supported	
				DOMAIN	HP-UX
98548A	"MH" 1280×1024×1 video i/f	DIO-II	Unsupported	No	7.0, X, Starbase
98549A	"C+" 1024×768×6 video i/f	DIO-II	Unsupported	No	7.0, X, Starbase
98550A	"CH" 1280×1024×8 video i/f	DIO-II	400*s*/425*s*/433*s* only	No	7.0, X, Starbase
98556A	"CHX" Accelerator	DIO-II	400*s*/425*s*/433*s* only	No	7.0, Starbase
98700°	"CX" Controller	M.A.D.	Unsupported	No	Unsup.
98702A§	Personal VRX LGB i/f	DIO-II	All except 400*dl*,425*e*	Inves.	7.03, X, PHIGS, Starbase
98705A	Personal VRX P2 processor	LGB	All except 400*dl*	Inves.	7.03, X, PHIGS, Starbase
98705B	Personal VRX P3 processor	LGB	All except 400*dl*	Inves.	7.03, X, PHIGS, Starbase
98705C§	Personal VRX P1 processor	LGB	All except 400*dl*	Inves.	7.03, X, PHIGS, Starbase
98720A	SRX Processor	LGB	Unsupported	No	7.0, X, Starbase
98724A°	98720A SRX LGB interface	DIO-I/O	Unsupported	No	7.0, X, Starbase
98725A	98720A SRX LGB interface	DIO-Sys.	Unsupported	No	7.0, X, Starbase
98726A	98730A *Turbo*SRX LGB i/f	DIO-II	Unsupported	No	7.0, X, Starbase
98727A§	Turbo VRX PDMA i/f	DIO-II	400*s*/425*s*/433*s* only	Inves.	7.03, X, PHIGS, Starbase
98728A§	Turbo VRX VDMA i/f	DIO-II	400*s*/425*s*/433*s* only	Inves.	7.03, X, PHIGS, Starbase
98730A	*Turbo*SRX Processor	LGB	Unsupported	No	7.0, X, Starbase
98735A	Turbo VRX T1 Processor	G-Bus	400*s*/425*s*/433*s* only	Inves.	7.03, X, PHIGS, Starbase
98736A	Turbo VRX T2 Processor	G-Bus	400*s*/425*s*/433*s* only	Inves.	7.03, X, PHIGS, Starbase
98736B	Turbo VRX T3 Processor	G-Bus	400*s*/425*s*/433*s* only	Inves.	7.03, X, PHIGS, Starbase
9876A°	480 lpm thermal	HP-IB	Unsupported	Unsup.	Unsup.

Notes:

*	The CP-300 (Tektronix 4693DX) is incompatible with the built-in parallel interface. The "KIT-CENT-CP" ISA card is not currently supported.
cadplt2	The *cadplt2* HP-GL/2 device handler emits the correct PCL-5 instruction to place this device in HP-GL/2 mode, but does not place the device back in PCL mode upon completion.
ITE	The device also has graphics support in the ITE (Internal Terminal Emulator, non-window) mode.
No handler	No native device handler (driver) software available for this device (as a graphics device). Basic I/O may be possible under HP-UX. A user-written handler may also be possible.
No path	In this graphics library there is presently no native handler for this device, nor a transparent path to the *Starbase* handler, nor a *Gescape* to such handlers, nor any way to create a *Starbase* bitmap file. Only local X windows are supported (no X-terminals).
pcltrans	Devices supported by *pcltrans* are also supported by *screenpr*. Other than for screen-copies, output to this device requires generating a *Starbase* bitmap file, and then translating that file to HP Printer Command Language with the *pcltrans*(1) command. Both monochrome and color printing are supported. A *Gescape* is required to create a *Starbase* bitmap file from HP-GKS.
§	Product number listed for reference, orderable only as part of supporting graphics processor.
screenpr	Output to this device is limited to capturing a copy of an image appearing on the video screen. Resolution is therefore limited by the CRT. The *screenpr*(1) command line may also appear in the hardcopy output unless clipping options are specified.. Both monochrome and color printing are supported.
Via SBL	I/O operations are transparently supported, and use the *Starbase* library device handler for this device.

Untested	The *Starbase* handler for this device is present in Series 700 HP-UX, but has not been tested and the device is not considered supported. In the case of PCL raster printers, neither *pcltrans* (GKS and *Starbase*) nor *screenpr* have been tested with this device on Series 700 HP-UX.
†	Basic I/O is possible, but no library or application support is provided or planned for the 9195A.

Series 400 Datacomm Devices

This table covers external devices and does not include interface cards, which are covered in the **Series 400 Interface and Plug-In Accessory Support** table, next.

The `Min. Boot ROM` column indicates the minimum revision of boot code required to boot an operating system from or through the device.

`Transp.` means that the device is transparent to software.

Series 400 Datacomm Device Support

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
CODX-3380	Codex Modems	RS232	NOP	Unsupported	Unsup.	Unsup.	NA
K1095	"ETH-RPTR-FIBER" AFR-1 Fiber Optic Repeater; 2 SMA, 1 AUI/f	LAN	Transp.	Vendor supported	10.2+	Unsup.	Via O.S.
K1096	"ETH-RPTR-MR2" MR-2000C Multiport Thinnet repeater; 2 BNC	LAN	Transp.	Vendor supported	10.2+	Unsup.	Via O.S.
K1097	"ETH-RPTR-2C" AMR-9C Multiport repeater; 2 AUI/f	LAN	Transp.	Vendor supported	10.2+	Unsup.	Via O.S.
K1098	"ETH-RPTR-9C" AMR-9C Multiport repeater; 8 BNC, 1 AUI/f	LAN	Transp.	Vendor supported	10.2+	Unsup.	Via O.S.
K1112	"ETH-XCVR-MP8" AMT-8 Multiport MAU; 8 AUI/m, 1 AUI/m?	LAN	Transp.	Vendor supported	10.2+	Unsup.	Via O.S.
K1115	"ETH-XCVR-TMS3" MAU, 10Base2; 1 AUI/m, 1 BNC	AUI/m	Transp.	Vendor supported	10.2+	Unsup.	Via O.S.
K1116	"ETH-XCVR-03DIAG" MAU, 10Base2; 1 AUI/m, 1 BNC	AUI/m	Transp.	Vendor supported	10.2+	Unsup.	Via O.S.
K1117	"ETH-XCVR-02DIAG" MAU, 10Base5; 1 AUI/m, 1 N-type	AUI/m	Transp.	Vendor supported	10.2+	Unsup.	Via O.S.

Series 400 Datacomm Device Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
K1118	"ETH-XCVR-3C" MAU, 10Base5; 1 AUI/m, 1 N-type	AUI/m	Transp.	Vendor supported	10.2+	Unsup.	Via O.S.
	MultiTech modems						
K1489	MT212AH3 1200 bps	RS232,AT	NOP	Vendor supported	10.2+	Unsup.	Via.Appl.
K1492	MT224AH 2400 bps	RS232,AT	NOP	Vendor supported	10.2+	Unsup.	Via.Appl.
K1494	MT224EH (MNP5)	RS232,AT	NOP	Vendor supported	10.2+	Unsup.	Via.Appl.
K1498	MT932EA V.32	RS232,AT	NOP	Vendor supported	10.2+	Unsup.	Via.Appl.
K1769	"RNS-ATR" Rem. Net. Switch	ATR	Transp.	All except 400*dl*, 425*e*	10.2+	Unsup.	Unsup.
TBIT-0T2500	Telebit T2500 modem	RS232,AT	NOP	Vendor supported	Vendor	Vendor	Per Appl.
2334A°	X.25 Cluster controller	RS232	NOP	All Models	Unsup.	7.0	Via O.S.
2335A	X.25 Cluster controller	RS232	NOP	All Models	Unsup.	7.0	Via O.S.
2340A	DTC-16 LAN Terminal Server	LAN	NOP	All Models	Unsup.	7.0*	Via O.S.
2342A°	TS-8 terminal controller	LAN	NOP	All Models	10.2+	7.0	Via O.S.
2345A	DTC LAN Terminal Server	LAN	NOP	All Models	Unsup.	7.0*	Via O.S.
28641A°/B	10Base2 ThinLAN MAU, 1 AUI/m, 1 BNC	802.3	Transp.	All Models	10.2+	7.0	Via O.S.
28645A	Multiport repeater, 1 AUI/f, 3 10Base2/m	802.3	Transp.	All Models	10.2+	7.0	Via O.S.
28648B	LAN Bridge, 2 AUI/f	802.3	Unsup.	All Models	10.2+	7.0	Via O.S.
28649A	IEEE 802.3 LAN to 802.5 Token Ring bridge; 1 AUI/f, 1	LAN	Unsup.				Via O.S.
28663A	StarLAN-10 Hub; 1 AUI/f, 12 RJ-45	802.3	Transp.		Unsup.	7.0	Via O.S.
28664A	StarLAN-10 MAU, 1 AUI/m, 1 RJ-45	802.3	Transp.		Unsup.	7.0	Via O.S.

Series 400 Datacomm Device Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
28673A	EtherTwist 10:10 LAN Bridge, 2 AUI, 1 console	802.3	Unsup.	All Models	10.2+	7.0	Via O.S.
28674A	Remote Bridge, 1 AUI, 1 V.35	802.3	Unsup.	All Models	10.2+	7.0	Via O.S.
28681A	EtherTwist 10:10 LAN Bridge LB, 2 AUI, 1 console	802.3	Unsup.	All Models	10.2+	7.0	Via O.S.
28682A	Fiber Optic Hub Plus, 1 AUI, 8 ST	802.3	Transp.	All Models	10.2+	7.0	Via O.S.
28683A	Fiber Optic Transceiver, 1 AUI/m, 1 ST	802.3	Transp.	All Models	10.2+	7.0	Via O.S.
28684A	EtherTwist Hub; 1 AUI, 12 RJ-45	802.3	Transp.	All Models	10.2+	7.0	Via O.S.
28685A°/B	10BaseT EtherTwist MAU, 1 AUI/m, 1 RJ45	802.3	Transp.	All Models	10.2+	7.0	Via O.S.
28688B	EtherTwist Hub Plus, 1 AUI, 1 25-pair (12 port)	802.3	Transp.	All Models	10.2+	7.0	Via O.S.
28691A	EtherTwist Hub/8, 1 AUI, 1 25-pair (8 port)	802.3	Transp.	All Models	10.2+	7.0	Via O.S.
28699A	EtherTwist Hub/48, 1 AUI, 4 25-pair (48 port)	802.3	Transp.	All Models	10.2+	7.0	Via O.S.
30241A	10Base5 ThickLAN MAU, 1 AUI/m, 1 N-type tap	802.3	Transp.	All Models	10.2+	7.0	Via O.S.
37212A°	1200 baud HP modem	RS232	NOP	Unsupported	Unsup.	7.0	Via O.S.
37212B°	2400 baud HP modem	RS232	NOP	Unsupported	Unsup.	7.0	Via O.S.
39301A°	Optical 8/16-channel repeater	RS232	Transp.	Unsupported	Unsup.	7.0	Via O.S.

Series 400 Datacomm Device Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
50759A	Remote Support modem	RS232,AT	NOP	Under investigation	Unsup.	7.0	Via.Appl.
92178S	ABC switch	RS232	Transp.	Unsupported	Unsup.	Unsup.	Transp.
92203A	Codex 2264 V.32 modem	RS232	NOP	Under investigation		Inves.	Via.Appl.
	Hayes modems						
92205A/C	Smartmodem 1200	RS232,AT	NOP	Unsupported		7.0	Via.Appl.
92205B	Smartmodem 2400	RS232,AT	NOP	Unsupported		Unsup.	Via.Appl.
98028A°	SRM Multiplexer	50-pin	Unsup.	Unsupported	No	7.0	Unsup.
	3rd-party modems						
{none}	Telebit *TrailBlazer*	RS232,AT	NOP	Unsupported		7.0	Via.Appl.
{none}	USR HST/V.32 dual std.	RS232,AT	NOP	Unsupported		7.0	Via.Appl.
{none}	USR *Courier* 2400	RS232,AT	NOP	Unsupported		7.0	Via.Appl.
{none}	USR *Courier* HST	RS232,AT	NOP	Unsupported		7.0	Via.Appl.

* The 2340A and 2345A LAN terminal servers require access to a Series 800 system or DOS PC for execution of their network management software.

£ Booting and diskless operation through bridges, gateways and routers is not supported.

Series 400 Interfaces

The `Min. Boot ROM` column indicates the minimum revision of boot code required to boot an operating system from or through the device, or use that device as console. `Transp.` means that the device is transparent to software.

Series 400 Interface and Plug-In Accessory Support

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
A-ADD-PCC	DOS co-processor	ISA	NOP	400*s*,425*s*,433*s* only	10.2+	No	Via O.S.
A-ADD-SPE	Apollo serial/par i/f	ISA	NOP	400*s*,425*s*,433*s* only	10.2+	Unsup.	No
A-ADD-SWFC	seSCSI controller	ISA	Unsup.	Unsupported	Unsup.	No	No
A-ADD-WFC	ESDI controller	ISA	Unsup.	Unsupported	Unsup.	No	No
APLR-386	386 Co-processor	ISA	NOP	400*s*,425*s*,433*s* only	10.2+	7.05	No
A-NET-ATR	Apollo token ring i/f	ISA	1.0	All except 400*dl*,425*e*	10.2+	No	No
A-NET-ETH	IEEE-802.3 i/f	ISA	Unsup.	Not functional	No	No	No
A-NET-ITR	IBM token ring i/f	ISA	1.0	All except 400*dl*,425*e*	10.2+	No	No
A1085A	IGC 10 video interface	ISA	NOP	Unsupported	No driver	No driver	NA
A1087A	IGC 20 video interface	ISA	NOP	Unsupported	No driver	No driver	NA
A1096A	Monochrome VRX	DIO-II	1.0	All except 425*e*	10.2+	7.03	2.0c
A1401A	DIO-II to DIO-I/O adaptor	DIO-II	1.0	400*s*,425*s*,433*s* only	Inves.	7.0	2.0c
A1416A	Color VRX	DIO-II	1.0	All except 400*dl*,425*e*	10.2+	7.0	2.0c
A1450A	Add std.spd HP-IB	400	1.0	Models 400*t*,425*t* only	No	7.0	2.0c
A1451A	Add std.spd HP-IB	400	1.0	400*s*,425*s*,433*s* only	No	7.0	2.0c

Series 400 Interface and Plug-In Accessory Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
A1460A	{see S1460A}						
A1467A	VME Expander (8 slot)	BPB	NOP	Certain non-#AL0 425*s* and 433*s* Models only.	No	7.05	Unsup.
A1659A	CRX 1280 video interface	SGC	NOP	Unsupported	No driver	No driver	NA
A1905A	*LaserJet* Parallel kit	ISA	NOP	400*s*,425*s*,433*s* only	10.2+	No	Per Appl.
A1924A	EVRX Grayscale	SGC	3.01	Built-in only	10.3+	8.0	T.B.A.
A1940A§	EVRX Color 1024×768	SGC	3.01	Built-in only	10.3+	8.0	T.B.A.
A1956A	EVRX Color 1280×1024	SGC	3.01	Built-in only	10.3+	8.0	T.B.A.
A1978,79A	Series 700 RAM	700RAM	NA	Incompatible	NA	NA	NA
A1986A	Model 720 EISA slot	SGC	NA	Incompatible	NA	NA	NA
A1987A	Series 700 RAM	700RAM	NA	Incompatible	NA	NA	NA
A2200A	4 Mbyte parity RAM pair	SIMM	3.01	Model 425*e* only	10.3+	8.0	T.B.A.
A2201A	8 Mbyte parity RAM pair	SIMM	3.01	Model 425*e* only	10.3+	8.0	T.B.A.
A2202A	16 Mbyte parity RAM pair	SIMM	3.01	Model 425*e* only	10.3+	8.0	T.B.A.
A2216-18A	Series 700 RAM	700RAM	NA	Incompatible	NA	NA	NA
A2269-72A	series 700 CRX upgrades	SGC	No	Unsupported	No	No	NA
A2512-13A	Series 700 RAM	700RAM	NA	Incompatible	NA	NA	NA
D1180A	VGA card w/256 Kb	ISA	NOP	Unsupported	No	No	No
D1677A	ESDI controller	ISA	NOP	Unsupported	No	No	No

Series 400 Interface and Plug-In Accessory Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
D1681A	SCSI host adaptor (PC)	EISA	No	Unsupported	No driver	No driver	NA
D1682A	SCSI host adaptor (PC)	ISA	No	Unsupported	No driver	No driver	NA
D2325A	Super VGA video interface	ISA	No	Unsupported	No driver	No driver	NA
D2382A	Super VGA video interface	ISA	No	Unsupported	No driver	No driver	NA
D2040A	Terminal multiplexer	ISA	No	Unsupported	No driver	No driver	NA
E2070A	HP-IB interface	ISA	No	Unsupported	No driver	No driver	NA
J2102A	ISDN Basic Rate i/f	ISA	No	Unsupported	No driver	No driver	NA
J2156A	FDDI-Single interface	EISA	No	Unsupported	No driver	No driver	NA
J2159A	X.25 interface	EISA	No	Unsupported	No driver	No driver	NA
J2165A	IEEE 802.5 token ring i/f	EISA	No	Unsupported	No driver	No driver	NA
KIT-CENTx	Parallel interface	ISA	NOP	400*s*,425*s*,433*s* only	10.1+	Unsup.	Unsup.
K1015°	Convert 1→3 port	RS232	1.0	All except 425*e*	10.2+	Unsup.	T.B.A.
K1094	"ETH-LINK-II" 3COM i/f	ISA	NOP	Unsupported	Unsup.	No	No
	MultiTech Modems						
K1493°	224PC + MNP5 compr.	ISA	Unsup.	Unsupported	Unsup.	Unsup.	Unsup.
K1496°	2400/1200/300 bps	ISA	Unsup.	Unsupported	Unsup.	Unsup.	Unsup.
K1623	"PTR-PAR-BOARD"	ISA	NOP	Unsupported	Unsup.	Unsup.	Unsup.
K2292	Convert 1→3 port	RS232	1.0	All except 425*e*	10.2+	7.05\&1	T.B.A.
SCAT10N/R-	X.25 interface	ISA	NOP	400*s*,425*s*,433*s* only	10.0+	No	Via O.S.
S1460A§	Add 4 EISA slots	400	1.0	400*s*,425*s*,433*s* only	T.B.A.	T.B.A.	T.B.A.

B

Series 400 Interface and Plug-In Accessory Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
24540B	Serial/parallel i/f	ISA	NOP	Unsupported	Unsup.	No	No
24541B	Dual Serial interface	ISA	NOP	Unsupported	Unsup.	No	No
24550A	1200 bps modem	ISA	NOP	Unsupported	Unsup.	No	No
24551B	2400 bps modem	ISA	NOP	Unsupported	Unsup.	No	No
25525A	dfSCSI-II interface	EISA	NOP	Unsupported	Unsup.	Unsup.	No
25560A	HP-IB interface, high speed	EISA	NOP	Unsupported	Unsup.	Unsup.	No
25567A	LAN, IEEE-802 Thin/AUI	EISA	NOP	Unsupported	Unsup.	Unsup.	No
27209A°	HP-IB (aka 88990A)	ISA	NOP	Unsupported	Unsup.	No	No
27210B	ThinLAN interface	ISA	NOP	Unsupported	No	No	No
27236A	StarLAN 10 interface	ISA	NOP	Unsupported	No	No	No
27245A	EtherTwist interface	ISA	NOP	Unsupported	No	No	No
27248A	EtherTwist interface	EISA	NOP	Unsupported	No	No	No
27250A	ThinLAN interface	ISA	NOP	Unsupported	No	No	No
28643A	seSCSI Extender	seSCSI	Transp.	All except 400*dl*	Inves.	8.0	Via O.S.
28672A	8-channel MUX daughter card	SBX	NOP	400*s*,425*s*,433*s* only	No	7.0	Via O.S.
36592/93A	SNALink (includes 98649A card)	DIO-I/O	ID	400*s*,425*s*,433*s* only	No	7.0	Via O.S.
36941A	X.25/300 Link	DIO-I/O	ID	400*s*,425*s*,433*s* only	No	7.0	Via O.S.
50955A	IBM 3278 Coax i/f	DIO-I/O	Unsup.	Unsupported	No	No	No
50961A°	SRM Coax interface	DIO-I/O	Unsup.	Unsupported. See 50962A	No	Unsup.	No
50962A°	SRM Coax interface	DIO-I/O	Unsup.	400*s*,425*s*,433*s* only	No	Unsup.	No
82300B	BASIC Lang. proc.	ISA	Unsup.	Unsupported	No	No	No

Series 400 Interface and Plug-In Accessory Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
82328A	Intelli. Graphics card	ISA	NOP	Unsupported	Unsup.	No	No
82329A	EGA Emulation card	ISA	NOP	Unsupported	Unsup.	No	No
82335A Opt. 002	HP-IB-II interface	ISA	NOP	Unsupported	Unsup.	No	No
88141A°	*JetScript* i/f for *LaserJet*-II	ISA	NOP	Unsupported	Unsup.	No	No
88295A	*ScanJet* interface	ISA	NOP	Unsupported	Unsup.	No	No
88500A	CS/80 HP-IB interface	ISA	NOP	Unsupported	Unsup.	No	No
98171A	LAN interface	DIO-I/O	1.0	400*s*,425*s*,433*s* only	No.	7.0	Via O.S.
98201A°	Custom Keypad i/f	DIO-I/O	NOP	Unsupported	No	No	No
98204°A/B	Video Output i/f	DIO-I/O	Unsup.	Unsupported	No	Unsup.	No
98229A	4 Mbytes, 1 Mbit ECC RAM pair	Short	-	Physically incompatible w/400	-	-	-
98229B/H	8 Mbytes, 1 Mbit ECC RAM pair	Tall	1.0	All except 425*e*	10.2+	7.0	2.0c
98229C	4 Mbytes, 1 Mbit ECC RAM pair	Tall	1.0	Models 400*t*,425*t* only	10.2+	7.0	2.0c
98229D/M	16 Mbytes, 4 Mbit ECC RAM pair	Tall	1.0	Models 425*s*/425*t* only	10.3+	7.05	2.0c
98229E/P	32 Mbytes, 4 Mbit ECC RAM pair	Tall	1.0	400*s*,425*s*,433*s* only	10.2+	7.0	2.0c
98229S	16 Mbytes, 1 Mbit ECC RAM pair	Short	-	Physically incompatible w/400	-	-	-
98235A	AUI daughter board	340	Unsup.	Incompatible w/S400	No	No	No
98237A	ThinMAU daughter bd.	340	Unsup.	Incompatible w/S400	No	No	No
98248°A/B	Floating Point Accelerator	DIO-II	Unsup.	Unsupported	No	Unsup.	No
98253A	EPROM Programmer interface	DIO-Acc.	Unsup.	Unsupported	No	Unsup.	No
98254A°	64 Kbyte RAM card	DIO-Acc.	No	Incompatible w/S400	No	No	No
98255A	EPROM memory card	DIO-Acc.	Unsup.	Unsupported	No	Unsup.	No

Series 400 Interface and Plug-In Accessory Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
98256A	256 Kbyte RAM card	DIO-Acc.	Unsup.	Incompatible w/S400	No	No	No
98257A	1.0 Mbyte RAM card	DIO-Acc.	Unsup.	Incompatible w/S400	No	No	No
98258A	4 Mbyte DIO-II RAM	DIO-II	Unsup.	Incompatible w/S400	No	No	No
98258B,C	4,12 Mbyte RAM	s300	Unsup.	Incompatible w/S400	No	No	No
98259A	128K Bubble memory	DIO-Acc.	Unsup.	Unsupported	No	No	No
98262A	HP-IB daughter i/f	s300	Unsup.	Incompatible w/S400	No	No	No
98264A	8 Mbyte ECC RAM	DIO-II	Unsup.	Incompatible w/S400	No	No	No
98264B	16 Mbyte ECC RAM	DIO-II	Unsup.	Incompatible w/S400	No	No	No
98265A	seSCSI daughter i/f	s300	Unsup.	Incompatible w/S400	No	No	No
98266	4,8 Mbyte RAM	s300	Unsup.	Incompatible w/S400	No	No	No
98267	4,8,12 Mbyte RAM	s300	Unsup.	Incompatible w/S400	No	No	No
98268A	4 Mbyte RAM	s300	Unsup.	Incompatible w/S400	No	No	No
98269A,B	1,4 Mbyte RAM	s300	Unsup.	Incompatible w/S400	No	No	No
98286	DOS Coprocessor	DIO-Acc.	ID	Unsupported	No	Unsup.	N.A.
98287A°	CX 1024x768x8 M.A.D.bus	DIO-I/O	Unsup.	Malfunction likely	No	Unsup.	No

Series 400 Interface and Plug-In Accessory Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
98297A	RTI/SBX interface	2×DIO-Sys	NOP	400*s*,425*s*,433*s* only	Unsup.	7.0	Via O.S.
98542A	512×400×1 video i/f	DIO-Sys.	1.0	Unsupported	No	7.0	No
98543A	512×400×4 video i/f	DIO-Sys.	1.0	Unsupported	No	7.0	No
98544A°	1024×768×1 video i/f	DIO-Sys.	1.0	Unsupported	No	7.0	2.0c
98544B°	1024×768×1 video i/f	DIO-Sys.	1.0	Unsupported	No	7.0	2.0c
98545A°	1024×768×4 video i/f	DIO-Sys.	1.0	Unsupported	No	7.0	2.0c
98546A	512×390×2 video i/f	DIO-I/O	1.0	Unsupported	No.	7.0	No
98547A	1024×768×6 video i/f	DIO-Sys.	1.0	Unsupported	No	7.0	2.0c
98548A	MH 1280×1024×1 video i/f	DIO-II	1.0	Unsupported	No	7.0	2.0c
98549A	C+ 1024×768×6 video i/f	DIO-II	1.0	Unsupported	No	7.0	2.0c
98550A	CH 1280×1024×8 video i/f	DIO-II	1.0	400*s*,425*s*,433*s* only	No	7.0	2.0c
98556A	CHX Accelerator	DIO-II	1.0	400*s*,425*s*,433*s* only	No	7.0	NOP
98561-6653x	320 Human i/f	DIO-I/O	No	Select code conflicts	No	No	No
98562-6653x	DIO-II System i/f	DIO-II	No	Select code conflicts	No	No	No
98603	BASIC 5.1 ROM	DIO-Acc.	Unsup.	Unsupported	No	Unsup.	Unsup.
98620°A/B	DMA controller	DIO-Acc.	Unsup.	Incompatible w/S400	No	No	No
98622A	GPIO interface	DIO-I/O	Unsup.	400*s*,425*s*,433*s* only	No	7.0	Via O.S.
98623A	BCD interface	DIO-I/O	Unsup.	Unsupported	No	Unsup.	No
98624A	HP-IB interface	DIO-I/O	1.0	400*s*,425*s*,433*s* only	No	7.0	Via O.S.

Series 400 Interface and Plug-In Accessory Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
98625A°	Hi-speed HP-IB i/f	DIO-I/O	Unsup.	Unsupported	No	Unsup.	Unsup.
98625B	Hi-speed HP-IB i/f	DIO-I/O	1.0	400*s*,425*s*,433*s* only	No	7.0	Via O.S.
98626A	RS-232C Serial i/f	DIO-I/O	1.0	400*s*,425*s*,433*s* only	No	7.0	Via O.S.
98627A	512x474x3 RGB	DIO-I/O	Unsup.	Malfunction likely	No	Unsup.	Unsup.
98628A	Datacomm i/f	DIO-I/O	1.0	400*s*,425*s*,433*s* only	No	7.0	Via O.S.
98629A°	SRM interface	DIO-I/O	1.0	Unsupported. See 50962A	No	Unsup.	No
98630A	Breadboard i/f	DIO-I/O	Unsup.	User supported	No	Unsup.	No
98633A	HP|6944A i/f	DIO-I/O	ID	Unsupported	No	Unsup.	No
98635A	Model 310 FPA	DIO-Acc.	ID	Unsupported. Inoperative after HP-UX 7.05	No	Unsup.	No
98638A	8-ch. MUX	DIO-Sys.	1.0	400*s*,425*s*,433*s* only	No	7.0	2.0c
98640A	ADC input i/f	DIO-I/O	ID	Unsupported	No	7.0	Via O.S.
98641A	RJE 2780/3780 i/f	DIO-I/O	ID	400*s*,425*s*,433*s* only	No	7.0	No
98642A	4-port RS-232C Mux	DIO-I/O	1.0	400*s*,425*s*,433*s* only	No	7.0	2.0c
98643A°	LAN interface	DIO-I/O	→	{now 98171A}	←	←	←
98644A	RS-232C Serial i/f	DIO-I/O	Unsup.	400*s*,425*s*,433*s* only	No	7.0	Via O.S.
98646A	VMEbus interface	DIO-I/O	NOP	Qualified	No	7.0	No
98647A°	PC-IB interface	DIO-I/O	Unsup.	Unsupported	No	Unsup.	No
98658A	seSCSI interface	DIO-I/O	1.0	400*s*,425*s*,433*s* only	Unsup.	7.0+	Via O.S.
98659A	High speed Serial i/f	DIO-I/O	ID	400*s*,425*s*,433*s* only	No	Via Appl.	No
98691A	PDI interface	DIO-I/O	ID	User supported	No	Unsup.	No
98695A°	IBM 3270 Coax i/f	DIO-I/O	ID	Unsupported	No	No	No
98702A§	Personal VRX LGB i/f	DIO-II	1.0	All except 400*dl*,425*e*	10.2+	7.03	2.0c[X]

B

Series 400 Interface and Plug-In Accessory Support (continued)

Formal Product Number	Abbreviated Product Description	Type	Min. Boot ROM	Hardware Qualification and Support	Earliest Operating System Supported		
					DOMAIN	HP-UX	*SoftPC*
98724A°	98720A SRX Interface	DIO-I/O	1.0	Unsupported	No	7.0	2.0c
98725A	98720A SRX Interface	DIO-Sys.	1.0	Unsupported	No	7.0	2.0c
98726A	98730A *Turbo*SRX Interface	DIO-II	1.0	Unsupported	No	7.0	2.0c
98727A§	Turbo VRX PDMA i/f	DIO-II	1.0	400*s*,425*s*,433*s* only	Planned	7.03	2.0c$^{\chi}$
98728A§	Turbo VRX VDMA i/f	DIO-II	1.0	400*s*,425*s*,433*s* only	Planned	7.03	2.0c$^{\chi}$
98768A	CRX upgrade	SGC	No	Unsupported	No	No	NA
{none}	DigiChannel C/X 16-ch MUX	EISA	NOP	Qualified on 400*s*,425*s*,433*s*	Unsup.	Contrib.	Via O.S.

* Only Port 1 supported on 7.0 and 7.03. Ports 2 & 3 require 7.05 or later. An unsupported patch is available for 7.0 and 7.03.

χ *SoftPC* supported only within an X-window at this time.

§ Special. Consult factory for ordering information.

† The source code for an unsupported sample driver is provided in the Self-Paced Driver Training kit, HP part number A1421-67901.

Support Status Glossary

(blank) indicates that information was not available at time of publication.

discontinued° The degree° superscript denotes a product which is no longer supplied, and is listed for reference purposes. Discontinued products maintain their system support status during their individual product support life. Discontinued products may be available for purchase from HP's Finance and Remarketing Division or from third-party equipment brokers and re-sellers.

10.30, 7.05 Denotes the earliest version of Series 400 software which might support the device. Note: many devices show software support, but *no* hardware support. This implies that this same software supports the device on a Series 300 system. The software revision is listed as a convenience to those customers who already own the device, and wish to use it at their own risk on the Series 400.

For DOMAIN O.S., an annotation of the form "10.3+" indicates that a Product Support Kit (PSK) is required in addition the base SR 10.3 release.

Inves. or `Under Investigation`: HP desires to support this device or feature, but such support is contingent on resolution of outstanding technical issues.

NA "not applicable".

No or `Does not function`. Indicates that the device is not supported by the mainframe or operating system shown in that column *and does not work*. `Does not function` in a hardware column indicates that the device has no interface or cable. `Does not function` in a software column indicates that the device either has no supporting software or cannot perform all functions required for support.

NOP No Operation. The device is ignored by the boot ROM or driver.

Planned Testing was in progress at time of publication and HP plans to support the configuration indicated by that entry. Contact your HP Sales Representative for current information.

B **Qualified** (under Hardware Support) The peripheral is not formally supported by Hewlett-Packard, but that a representative sample was tested for EMI/RFI and functionality. An entry of `Vendor Qualified` under `Hardware Support` means that the peripheral is supported on the Series 400 by the peripheral vendor. `Qualified` peripherals may be distributed by Hewlett-Packard.

simulated or **simulated**§ Denotes a product number which is listed for reference purposes. Such products are normally supplied only as part of another product (bundle) or are factory "specials".

Supported (under `Hardware Support`) The peripheral complies with at least FCC Class A and at least VDE/FTZ Level A in a system configuration. These classifications refer to the electromagnetic interference (EMI/RFI) properties of the system. It also means that configuration documentation, and a diagnostic or exerciser program exists for that mainframe and HP offers on-site service of a system in this configuration.

T.B.A. To Be Announced

Unsupported `Unsup.` and `Uns.` the device is untested and no testing is planned. They are, however, "not known to not work" (otherwise they would be "No"). These devices should not be purchased for use with the mainframe/operating system under which the `Unsupported` appears.

Vendor Supported Although distributed by HP/Apollo, this product is supported by the original equipment vendor, and not by HP/Apollo.

Via O.S. (Via Operating System, or `Via HP-UX`) The DOS emulation software has no specific code for support of this device. Ordinary operations from DOS may use the device subject to normal DOS/DOMAIN and/or DOS/HP-UX I/O and filesystem mapping.

X only^{X} Feature (typically *SoftPC*) supported only within an X-Window in this configuration.

Copy these work sheets as many times as you need for the devices on your system.

Mass Storage Devices

Device Name	Path Name	File Type	Major Number	Minor Number	Bus Address	Slot Nbr

Printers

Device Name	Path Name	File Type	Major Number	Minor Number	Port #/ Bus Address

Copy these work sheets as many times as you need for the devices on your system.

Plotters

)evice Name	Path Name	File Type	Major Number	Minor Number	Port #/ Bus Address

Terminals and Modems

)evice Name	Path Name	Port Number	Minor Number

HP-HIL Devices

evice Name	Path Name	File Type	Major Number	Minor Number	Power Req.	Bus Address

Copy these work sheets as many times as you need for the devices on your system.

Mass Storage Devices

Device Name	Path Name	File Type	Major Number	Minor Number	Bus Address	Slot Nbr

Printers

Device Name	Path Name	File Type	Major Number	Minor Number	Port #/ Bus Address

Copy these work sheets as many times as you need for the devices on your system.

Plotters

)evice Name	Path Name	File Type	Major Number	Minor Number	Port #/ Bus Address

Terminals and Modems

)evice Name	Path Name	Port Number	Minor Number

HP-HIL Devices

:evice Name	Path Name	File Type	Major Number	Minor Number	Power Req.	Bus Address

Copy these work sheets as many times as you need for the devices on your system.

Mass Storage Devices

Device Name	Path Name	File Type	Major Number	Minor Number	Bus Address	Slot Nbr

Printers

Device Name	Path Name	File Type	Major Number	Minor Number	Port #/ Bus Address

Copy these work sheets as many times as you need for the devices on your system.

Plotters

Device Name	Path Name	File Type	Major Number	Minor Number	Port #/ Bus Address

Terminals and Modems

Device Name	Path Name	Port Number	Minor Number

HP-HIL Devices

Device Name	Path Name	File Type	Major Number	Minor Number	Power Req.	Bus Address

Index

A

B

C

D

E

F

G

H

I

J

K

L

M