Configuring and Using the Optical Disk Library System

on HP 9000 Series 300/400 Computers

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Introduction

Guide For Using This Manual

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Installing a Disk Library System	Chapter 1	Information about this manual, the SCSI interface, and host support
	Chapter 2	Overview of the steps required for configuring the Disk Library System to the host—should only be used by those who have previous experience installing peripherals on Series 300/400 HP-UX systems
	Chapter 3	Detailed steps for configuring the Disk Library System to the host—should be used by those who have no previous experience installing peripherals on Series 300/400 HP-UX systems
	Appendix A	Instructions for those who need to manually configure the Disk Library System to the host—used only if the optical installation disk cannot be used
Administering a Disk Library System	Chapter 4	Information and examples for administering the Disk Library System and optimizing its performance with the host
Troubleshooting a Disk Library System	Appendix B	Information for troubleshooting problems
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Note	This manual is designed to be used with the *Optical Disk Library System User's Guide*, (HP part number C1700-90075 for Models 10 and 20, or HP part number C1715-90099 for Models 60 and 100).

- For information on basic operation of the Disk Library System, magneto-optical disks, an explanation of how the Disk Library System operates, accessing information and error logs, and moving the Disk Library System, see the User's Guide.

- For information about configuring and optimizing the Disk Library System with Series 300/400 HP-UX host systems, refer to this manual.

Host Support

The Disk Library System is supported on HP 9000 Series 300/400 computers with HP-UX version 8.05 or later.

The built-in host system support allows each of the optical disk surfaces to be treated like a hard disk. Each disk surface has these characteristics:

- Holds a file system

- Can be read from and written to like a hard disk

- Has a block and character device file associated with it

- Can be accessed with the same HP-UX commands as a magnetic hard disk

Instructions for configuring the Disk Library System to a Series 300/400 computer using the auto-install program are included in Chapters 2 and 3. Additional information about the Disk Library System and the HP-UX input/output controls are found in the HP-UX online manpage for autochanger.

The SCSI Interface

The Disk Library System connects to the host system through a Small Computer Systems Interface (SCSI). This interface conforms to SCSI standards ANSI X3T9 (2/86 - 109 rev 8).

Each SCSI-connect peripheral usually requires one SCSI address. With the Disk Library System, however, there are from two to five unique SCSI interface addresses. There is one address for each of the following:

- Each optical drive (There can be 1, 2, or 4 optical drives in an Optical Disk Library System.)

- The autochanger controller

The autochanger controller's SCSI interface address is used in creating the character and block device files associated with each surface in the Disk Library System. The autochanger controller and the HP-UX kernel manage the communication through the SCSI bus to each drive's unique SCSI address.

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Quick Start Host Configuration Steps

This chapter gives quick-start instructions for configuring the Disk Library System for operation with Series 300/400 computers. It is intended for use by persons who are familiar with HP-UX and adding peripheral devices to an HP-UX Series 300/400 system.

If you need more detailed instructions, please refer to Chapter 3, "Configuring for Operation with the Host."

Before You Begin

■ Verify that the host kernel is version 6.5 or later.

Note	The Auto-Installation Utility is not supported on version 6.5. If your system has version 6.5, you must use the manual configuration steps in Appendix A.

■ Verify that the Disk Library System addresses have been set and are not conflicting with any other SCSI devices connected to the host system.

■ Verify that the hardware system configuration has been set up appropriately. (See Appendix B.)

■ Verify that the correct fuse is in the fuseholder and that the voltage select switch is set correctly if your Disk Library System rear panel has these components.

- Locate the Optical Installation Disk that was shipped with the Disk Library System.

- Get the following information from the system administrator:

  □ The root password
  □ The name of the kernel from which system is booted

Using the Auto-Install Utility

Note	Do not use SAM to configure the Disk Library System.
	If you encounter a fatal error or any other error that results in the program being aborted, do the following:
	■ Make sure your system information is correct (drive addresses, SCSI interface select code, etc.)
	■ Re-enter the `./acinstall`, `./acinst300.1`, or `./acinst300.2` command to start the program section in which the error was encountered.
	See Appendix C, "Troubleshooting," if you need information about error messages you may receive when using the auto-install utility.

Configuring for operation with the host consists of the following steps:

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Following Up

These steps are to be performed by the system administrator after the HP Customer Engineer has completed the initial setup. In addition, to ensure optimum system performance, the system administrator should read Chapter 4, "Systems Administration Tasks—System Performance Issues."

Note

Instructions for labeling disks and loading them into the Optical Disk Library System are given in the *Optical Disk Library System User's Guide*.

- Label all disks that will be loaded into the Disk Library System.

- Load disks into the Disk Library System and initialize (**mediainit**) each optical disk surface if needed. Information for using **mediainit** is located in Chapter 4. (If you have preformatted optical disks, simply label the disks and load them into the Disk Library System.)

- Create a new file system for each optical disk surface using the **newfs** command.

- If you have HP-UX version 6.5 or 7.0, **mount** only two surfaces at a time as read/write. (If a power fail occurs all optical disks in the Disk Library System that are mounted as read/write will be file system checked.)

  With HP-UX version 8.0, you can **mount** all surfaces as read/write and only optical disks that are in the drives when a power fail occurs will be file system checked.

- Unmount (**umount**) surfaces before removing the disk from the library.

- Make sure all disks have been ejected from the drives before moving the Disk Library System.

- Put the shipping bracket in a safe place for any future moves of the Disk Library System.

3

Configuring for Operation with the Host

This chapter gives detailed instructions for using the Auto-Installation Utility to configure the Disk Library System for operation with Series 300/400 computers.

Note	Instructions for manually configuring the Disk Library System for operation with Series 300/400 computers are given in Appendix A.

Before You Begin

■ Verify that the host kernel is version 6.5 or later.

Note	If your system has HP-UX version 6.5, the Auto-Installation Utility is not supported and you will need to either upgrade to version 7.0 or configure the Disk Library System manually. (Manual configuration steps are given in Appendix A.)

■ Verify that the Disk Library System addresses have been set and are not conflicting with any other SCSI devices connected to the host system.

■ Verify that the hardware system configuration has been set up appropriately. (See Appendix B.)

■ Verify that the correct fuse is in the fuseholder and that the voltage select switch is set correctly if your Disk Library System rear panel has these components.

■ Locate the Optical Installation Disk that was shipped with the Disk Library System.

■ Get the root password from the system administrator.

Using the Auto-Install Utility

Note   Do not use SAM to configure the Disk Library System.

If you encounter a fatal error or any other error that results in the program being aborted, do the following:

■ Make sure your system information is correct (drive addresses, SCSI interface select code, etc.)

■ Re-enter the ./acinstall, ./acinst300.1, or ./acinst300.2 command to start the program section in which the error was encountered.

See Appendix C, "Troubleshooting," if you need information about error messages you may receive when using the auto-install utility.

Also, you will need the following information from the system administrator about the system on which the Disk Library System is being installed:

■ The root password

■ The name of the kernel from which the system is booted

Checking the dfile

1. Login as root.

Caution

The system must be in single-user mode when running the auto-install utility since the system could be rebooted during the installation process.

If you are not sure if the system is in single-user mode, type the following command.

```
who -r
```

If run-level S ... displays, you are in single-user mode. If any other response is received, you must shutdown the system using the shutdown command with no additional parameters and then log back on as root.

```
shutdown
```

---

2. Check the current kernel configuration file (typically **/etc/conf/dfile**) to see if the kernel includes the **scsi** kernel driver for the interface card.

```
fgrep -xn scsi /etc/conf/dfile
```

This entry should *not* be commented out with an *. If it is, perform Steps 3 and 4. If the entry exists and is not commented out, go to the next section, "Creating a Device File and a Mount Directory."

3. Add the scsi entry to the **/etc/conf/dfile** by typing the following lines.

```
cat >> /etc/conf/dfile
scsi
CTRL-d
```

4. Configure the kernel and reboot the system by typing the following commands:

```
cd /etc/conf
/etc/config dfile
make -f config.mk
mv /hp-ux /SYSBCKUP
mv hp-ux /hp-ux
cd /
shutdown
    .
    .
    .
login: root
```

Creating a Device File and a Mount Directory

In order for the host system to read the Auto-Install disk, a device file and mount directory must be created for one of the autochanger's drives.

To create a device file and mount directory, do the following steps.

Note	The minor number (used to create device files) has the form 0xScBa00 where Sc is the select code of the SCSI interface card and Ba is the SCSI address of drive 1 in the Disk Library System. (Drive 1's default address is 4 for Models 10 and 20, and 1 for Models 60 and 100.)
	For example, in the command shown below (Step 1), the minor number is for a SCSI interface card with select code 14 and drive 1 at address 4. The major number is "7" for block devices (note the "b").

1. Create a device file.

   `/etc/mknod /dev/dsk/acdrive b 7 0x0e0400`

2. Create a mount directory.

   `/bin/mkdir /mountpoint`

3. Change the permission mode for the mount directory to give the root user read/write/execute permission.

   `/bin/chmod 777 /mountpoint`

Running the Auto-Install Utility

1. Load the Optical Installation Disk (shipped with the Disk Library System) into Drive 1 in the Disk Library System as follows:

   a. With the Disk Library System switched on and in the READY state, put the disk into the mailslot so that side "A" is facing in the direction shown in Figure 3-2 or Figure 3-3.

   b. Press the (LOAD) key. SLOT 1 displays.

   c. Press (PREV) until DRIVE 1 displays.

   d. Press (ENTER).

2. Run the first part of the install utility by typing the following commands.

   ```
   /etc/mount /dev/dsk/acdrive /mountpoint
   cd /mountpoint/300inst
   ./acinstall
   ```

   This part of the install utility does the following:

   ■ Mounts the disk in Drive 1
   ■ Changes directories to **/mountpoint/300inst**
   ■ Copies the install utility to the **/usr/contrib/acinst** directory.
   ■ Copies the OPUTIL diagnostic to the **/usr/diag/CE.utilities/Oputil** directory.
   ■ Copies the 8.0 SCSI patch files to the **/tmp** directory.

3. Unmount the optical disk and remove the mount directory and device file.

   ```
   cd /usr/contrib/acinst
   /etc/umount /mountpoint
   rmdir /mountpoint
   rm /dev/dsk/acdrive
   ```
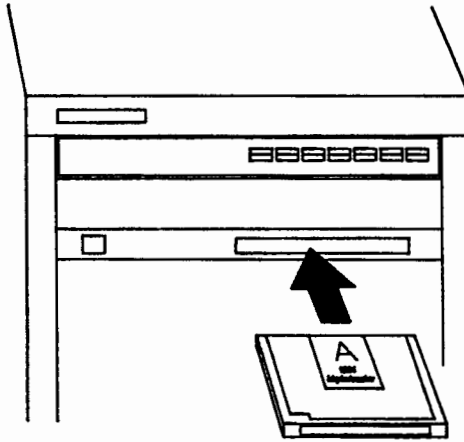
Figure 3-1. Loading the Optical Disk (Side A Up)
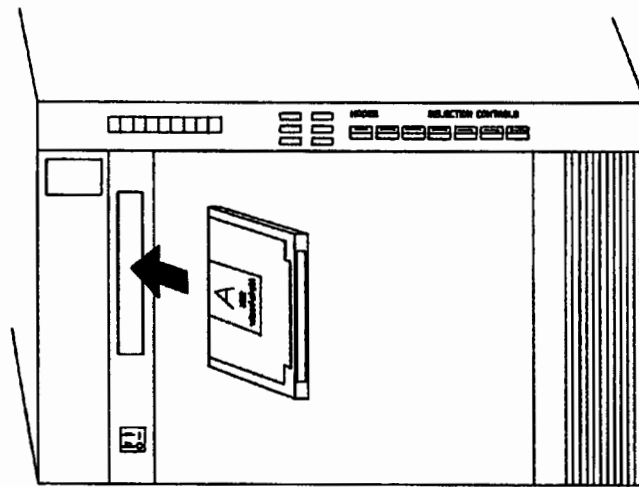
Figure 3-2. Loading the Optical Disk (Side A to the Left)

4. Remove the Optical Installation Disk from the Disk Library System.

   a. Press the (EJECT) key. DRIVE 1 displays.

Note   If there are additional disks in the Disk Library System, DRIVE
             1 might not be displayed. If this is the case, press (PREV) or
             (NEXT) until DRIVE 1 displays.

---

   b. Press (ENTER).
   c. Remove the optical disk from the mailslot.

5. Run the next part of the auto-install utility and answer all prompts.

   ./acinst300.1   *Verifies that all of the needed device driver names are in
                     the dfile, and if not, they are installed into the kernel.*

Note   You must reboot the system after the previous step if the new
             drivers were installed in the dfile. After rebooting the system,
             log back on and change to the **/usr/contrib/acinst** directory.

---

6. Load the Optical Installation Disk into Slot 1 of the Optical Disk Library
   System.

   a. With the Disk Library System switched on and in the READY state, put
      the disk into the mailslot so that side "A" is facing in the direction
      shown in Figure 3-2 or Figure 3-3.
   b. Press the (LOAD) key. SLOT 1 displays.
   c. Press (ENTER).

7. Run the last part of the auto-install utility.

   ./acinst300.2   *Create device files and verify autochanger operation.*

When you are asked by the program whether you want to create the device files or just verify the operation of the autochanger, make your decision using the following guidelines:

`Are default values okay?`

- If there is not already an autochanger installed on the system and the pathname for the device files is acceptable, press return.
- If there is another autochanger installed on the system, you will most likely want to type another pathname for the creation of the device files.

`Do you want to create the device files or just verify autochanger operation?`

- If you have previously run this section of the program or know that the device files already exist for the autochanger, type "n" to run only the verification part of the program.

Note

Device files are created for the maximum number of optical disks that can be placed into the Disk Library System.

When you are prompted for the select code and SCSI address for the minor number used to create device files, enter the bus address for the *autochanger controller*, not drive 1. (The default address for the autochanger controller is 3 for Models 10 and 20, and 5 for Models 60 and 100.)

Note	If your system has HP-UX version 8.0, you will need a library file patch. To determine if the patch has already been installed, logon to the system and type the following command. (A list of all file patches that have been installed will be displayed.)

```
login: root
what /hp-ux
```

The needed patches for 8.0 can be identified by the following entries:

```
PATCH 8.0 scsi.o
PATCH 8.0 autoch.o
PATCH 8.0 autox.o
```

If the PATCH 8.0 scsi.o entry does not exist, go to the next section, "Installing the SCSI Library Patch."

If all of the entries exist, go to the section, "Following Up," at the end of this Chapter.

Installing the SCSI Library Patch

To install the patches included on the Optical Installation Disk, follow these steps.

1. Run the patch installation program by typing the following command.

   /etc/update

2. From the main menu move the highlighted line to "Change Source or Destination ->" and press "return" or "select item."

3. Move the highlighted line to "From Tape Device to Local System ... " and press "return" or "select item."

4. Verify that the "Source" field contains the /tmp/PHKL_0317.updt entry. If the entry does not appear in the Source field, type in the entry.

5. Press "Done."

6. Choose "Select/View Partition and File Sets."

7. Select the "PHKL_0317" partition by typing a "y" in front of this entry.

8. Press the f4 softkey, "Start Loading." (The system will then rebuild the kernel and reboot.)

Note	The program automatically moves the original files that needed to be patched into /system/PHKL_0317/orig. HP recommends that these files be kept in this directory in case they are needed to recover from future problems.

Additionally, for future reference you should also move /tmp/PHKL_0317.text to the /system/PHKL_0317 directory. |

Following Up

These steps are to be performed by the system administrator after the HP Customer Engineer has completed the initial setup. In addition, to ensure optimum system performance, the system administrator should read Chapter 4, "Systems Administration Tasks—System Performance Issues."

Note	Instructions for labeling disks and loading them into the Optical Disk Library System are given in the *Optical Disk Library System User's Guide*.

- Label all disks that will be loaded into the Disk Library System.

- Load disks into the Disk Library System and initialize (**mediainit**) each optical disk surface if needed. Information for using **mediaini** is located in Chapter 4. (If you have preformatted optical disks, simply label the disks and load them into the Disk Library System.)

- Create a new file system for each optical disk surface using the **newfs** command.

- If you have HP-UX version 6.5 or 7.0, **mount** only two surfaces at a time as read/write. (If a power fail occurs all optical disks in the Disk Library System that are mounted as read/write will be file system checked.)

  With HP-UX version 8.0, you can **mount** all surfaces as read/write and only optical disks that are in the drives when a power fail occurs will be file system checked.

- Unmount (**umount**) surfaces before removing the disk from the library.

- Eject disks from the drives before moving the Disk Library System.

- Put the shipping bracket in a safe place for any future moves of the Disk Library System.

4

Systems Administration Tasks

This chapter discusses the system administration tasks for the Disk Library System. Information about HP-UX commands, tasks, and concepts can be found in the HP-UX system documentation.

In this chapter you will learn about the following topics:

- Disk Library System performance overview
- Initializing optical disk surfaces
- Mounting optical disk surfaces
- Putting optical disk surfaces in the search path
- Using the Disk Library System for backing up/restoring
- Controlling optical disk usage
- Transferring and copying files
- Using the Disk Library System as a boot device
- Using the Disk Library System for virtual memory swap space

Performance Overview

Because the Disk Library System can hold many optical disks, random access performance greatly depends on whether or not the appropriate disk is already inserted in a drive. When the needed disk surface is already mounted and in the drive, the data on the disk surface can be accessed in approximately .1 second—somewhat slower than a hard disk but faster than a floppy disk.

If the appropriate disk is not mounted or in one of the drives, data access can take as long as 18 seconds. (See Table 4-1.)

Table 4-1. Data Access Time Analysis

Activity	Models 10/20	Models 60/100
Drive spin-down	2.8 seconds	2.8 seconds
Eject current disk from drive	0.8 seconds	0.8 seconds
Exchange for needed disk	7.0 seconds	8.0 seconds
Load the needed disk into the drive	1.0 second	1.0 seconds
Testing Drive Read/Write	3.0 seconds	3.0 seconds
Drive spin-up	2.4 seconds	2.4 seconds
Total Time	17 seconds	18 seconds

Since the drive itself can add as much as 10 seconds to the full load/unload sequence, Disk Library Systems with disk capacities of over 32 disks provide multiple drives. This improves overall performance because disk exchange and spin-up/spin-down times can overlap. During ideal conditions this overlap can reduce the total exchange time to approximately 10 seconds.

It is important for the system administrator to manage data and user access so as to minimize disk exchanges. Following performance and systems administration guidelines will help to accomplish this goal.

Because the Disk Library System is an autochanging storage device, it should not be used as an online system disk. Appropriate applications for the Disk Library System include the following:

- Online archive
- Unattended backup and restore
- Electronic image (or other large file) management

The input/output controls in the device driver associated with the host system and the Disk Library System have been set for optimum response time based on these appropriate autochanger applications. These input/output controls can be modified. Your HP applications engineer can help you do this or can provide you information for doing this yourself.

Initializing Optical Disk Surfaces

If you do not have preformatted optical disks, each optical disk surface must be initialized (or formatted) before it can be used with the Disk Library System. To determine whether or not you have preformatted disks, look for a label that reads "formatted" on the optical disk's packaging or metal shutter. If you have preformatted disks, go to the section, "Using newfs," in this chapter.

If you have unformatted disks, the disks must be initialized using the **mediainit** command. The main function of **mediainit** is to initialize the optical disk, to verify its integrity, and to check the optical disk surface for defects (areas where information cannot be stored). The **mediainit** command also assigns an interleave factor (default is 1) for the optical disk surface.

Another part of the initialization process is to set up media directory information with the **newfs** command.

Prerequisites

Before using the **mediainit** command:

- Set up and configure the Disk Library System as described in Chapters 2 or 3, or in Appendix A.
- Log in as root.

Caution ✋	Make sure you correctly identify the desired optical disk surface and associated device. Initialization erases all data on the designated optical disk surface.

Using mediainit

Initialize an optical disk surface by typing in the **mediainit** command using the character special device file's **pathname** (for example, use **/dev/rac/1a**).

Note ☝	Each optical disk surface takes 25 minutes to initialize. If you have preformatted disks, you may omit this step.

```
mediainit /dev/rac/1a
mediainit /dev/rac/2a
```

Caution ✋	System errors can occur with HP-UX versions 6.5 or 7.0 if either of the following situations occur. - Disk are initialized simultaneously (a disk in each drive). - Disks are initialized while a file system is mounted.

Using newfs

Create a file system on the optical disk surface by typing the **newfs** command using the character special device file's **pathname** (for example, use **/dev/rac/1a**).

If you do not have preformatted disks, the **mediainit** must be finished before performing the **newfs** command.

Each **newfs** command will take approximately 5 minutes to complete.

Note	The hpS6300.650A entry is the only device driver entry that you will see on HP-UX version 6.5 or 7.0.
	With HP-UX version 8.0, however, you will also see an hpS6300.650_512 entry, which supports the use of 512 bytes/sector optical disks. If you select the hpS6300.650_512 entry, you will be able to use both 1024 bytes/sector disks and 512 bytes/sector disks. If you select the hpS6300.650 entry, however, you will be able to use only 1024 bytes/sector optical disks.
	You should also note that if you use the hpS6300.650_512 entry when creating a new file system on a 1024 bytes/sector optical disk, a smaller file system will be created on the optical disk.
	These device drivers do not allow Disk Library System disk surfaces to be used for virtual memory swap space.

```
newfs -n /dev/rac/1a hpS6300.650A
newfs -n /dev/rac/2a hpS6300.650A
```

Note	The -n option in the above example creates a nonbootable file system. Using an optical disk in the Disk Library System as a boot device is not supported.

Using tunefs

For large file transfers involving optical disk surfaces, the **tunefs** command will help optimize throughput. Perform the following step after the **newfs** command completes.

```
tunefs -d 0 /dev/rac/1a
tunefs -d 0 /dev/rac/2a
```

Mounting Optical Disk Surfaces

You must create a mount directory for each optical disk surface and then mount the associated block device file to that mount directory.

Note	The example mount directories shown in Table 4-2 are structured in a way that will prevent excessive disk swapping when an ls command is issued.

Table 4-2. Optical Disk Device Files and Mount Directories

Optical Disk	Mount Directory	Associated Block/ Device File
Number 1 - Side A	/mountp/1/a	/dev/ac/1a
Number 1 - Side B	/mountp/1/b	/dev/ac/1b
Number 2 - Side A	/mountp/2/a	/dev/ac/2a
Number 2 - Side B	/mountp/2/b	/dev/ac/2b
.		
.		
.		
Number 32 - Side A	/mountp/32/a	/dev/ac/32a
Number 32 - Side B	/mountp/32/b	/dev/ac/32b

Prerequisites

Set up and configure the Disk Library System as described in Chapters 2 or 3, or in Appendix A.

Using mount

Create the mount directory and **mount** the associated block device file to the mount directory.

```
mkdir /mountp/1/a
mount /dev/ac/1a /mountp/1/a
chmod 777 /mountp/1/a
```

Procedures That Impact Performance

Mounting Surfaces in the File System

Although you can mount surfaces anywhere in the file system, for best
performance no more than one surface should be mounted in any branch of the
file tree. Additional disk exchanges will result when traversing these paths.

Don't

Do

```
      /
      |
   Library
   directory
      |
  Optical Disk
      O
   Surface 1a
      |
  Optical Disk
      O
   Surface 2a
```

```
              /
           /     \
  Surface 1a    Surface 2a
  directory     directory
      |              |
  Optical Disk   Optical Disk
      O              O
   Surface 1a    Surface 2a
```
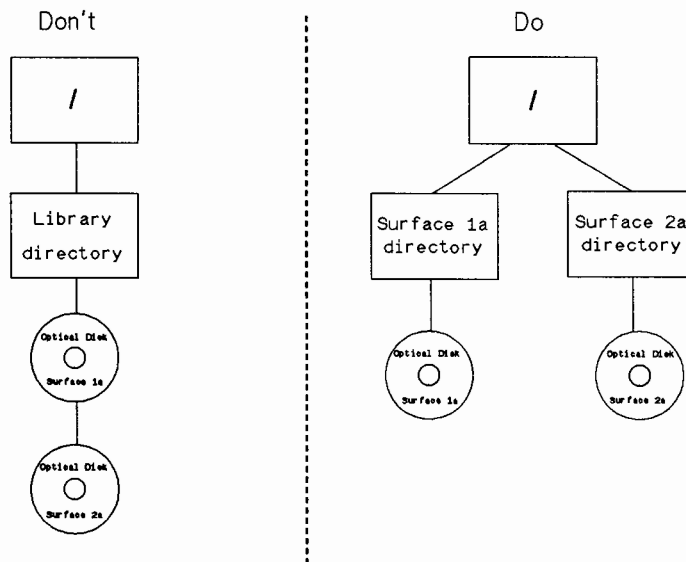
Figure 4-1. Mounting Optical Disk Surfaces

Putting Surfaces in /etc/checklist.

Do not put surfaces in /etc/checklist. This slows the booting process considerably since each surface must be exchanged to be mounted and possibly file system checked. A better strategy is to write a script to mount surfaces after the system is booted. This way, activity on the rest of the system can proceed while the surfaces are being mounted.

Note	If you plan to write a script to automatically mount surfaces after the system is booted, you should make sure you allow time for the Disk Library System to complete its poweron test prior to executing any **mount** commands or the **mount** will not complete properly.

Putting Optical Disk Directories on the Search Path

Do not put directories that are on optical disk surfaces in the search path. This could cause performance delays.

The path environment variable (**$PATH**) can be defined in a local environmental shell script such as **$HOME/.profile** or in an automatically-executed shell script such as **/etc/profile** or **/etc/csh.login**.

Backing Up and Restoring Files

The Disk Library System can accommodate most backup/restore situations with conventional HP-UX commands. The optical disk surface capacity must be equal to or larger than the size of the file system you want to back up.

Use **du**, **df**, and **bdf** to obtain information about the system size and compare the displayed information with the known capacities of the optical disk surfaces. If you have insufficient capacity, use the following techniques:

1. Back up smaller sections of the system (for example, a single directory tree such as **/usr**).

2. Compress the files you back up; and uncompress the files you restore.

3. Develop a program/shell script that takes advantage of the Disk Library System's autochanging capabilities and multi-drive configuration.

Example Backup to an Optical Disk

Note	The following example is just one method of doing a backup to an optical disk. As system administrator, determine a method that works best for your system.

Prerequisites and Conditions

1. The Disk Library System was configured as outlined in Chapters 2 or 3, or in Appendix A.

2. All optical disk surfaces you plan to use in the backup process have been initialized.

3. The system has a file system you want to back up (for example, /**users**); or you may back up the entire root file system (/).

4. You have a directory for the backup file system you intend to mount on the optical disk. This example procedure assumes a backup target directory named **target** that you will mount on the optical disk. Use **mkdir** to create /**target**.

5. To expedite your backup, minimize the number of other users or processes accessing the Disk Library System.

Backup to One Side of an Optical Disk

This procedure assumes a file system you want to back up named **/srce** (for backup source). The procedure assumes you will back up the source file system to a file system named **/target**, which is mounted on the optical disk. If you want to automate the backup process, you could create a script that performs the tasks shown below.

1. As the root user, load an optical disk into the Disk Library System.

2. Mount the **target** directory on the optical disk so it can receive the backup.

   ```
   mount /dev/ac/1a /target
   ```

3. Change to the source directory.

   ```
   cd /srce
   ```

4. Execute the following command to perform the backup. Include the **-hidden** and **-depth** options to back up the CDFs if you have an HP-UX cluster. If you do not have a cluster, you may omit them.

   ```
   find . -hidden -depth -mountstop -print | cpio -pdmuvx /target
   ```

   Wait for the backup to complete (a few seconds to several minutes, depending on the size of the file system).

5. Change to the root directory and unmount the optical disk. Do not eject/remove an optical disk without unmounting it.

   ```
   cd /
   umount /dev/ac/1a
   ```

6. Put the optical disk in its container and store it in a safe place.

Restore from an Optical Disk

1. Assuming the situation described on the previous page, mount the optical disk surface having the files to be restored.

   ```
   mount /dev/ac/1a /target
   ```

2. Change to the **target** file system, the system that received the backup files:

   ```
   cd /target
   ```

   You may want to list the files to verify that they exist in this directory.

3. At this point, you have some options:

   a. You can restore a particular file to the original directory.

   ```
   cp /target/stuff /srce
   ```

   b. You can restore files that fit a specified pattern to the temporary directory.

   ```
   cp /target/*.rpt /tmp
   ```

   Then, you could restore these files to their owners as requested.

   c. You can restore all the files on the backup medium to a specified directory (typically **/tmp**.) Or you could restore these files to the original source directory. (This can cause problems related to overwriting files.) The example assumes you have a reason to restore the backed up files to the original directory.

   ```
   find . -hidden -depth -print | cpio -pdmuvx /srce
   ```

   In short, use conventional methods to restore a file or files.

Controlling Optical Disk Usage

The systems administrator will want to keep track of the amount of available optical disk space and the distribution of free disk space across file systems.

Note	Minimize the number of surfaces mounted prior to performing system accounting. Accounting for 325 megabytes per surface can be a lengthy process and can require too much disk-to-drive swapping activity which can degrade the Disk Library System performance.

There are many ways to perform system accounting. Here are a few techniques to help you evaluate optical disk use and identify future optical disk needs.

■ Execute the **du** command regularly (weekly or bi-weekly) and keep the output in an accessible file for later comparison. This method lets the system administrator spot users or processes which are rapidly increasing their disk usage.

```
du -s /mtpoint1a/*
```

■ To list the directories and files, with the largest first, type:

```
du -a | sort -nr
```

■ Use the **find** command to locate large or inactive files. For example, the following entry records in **aging_files** the names of files neither written nor accessed in the last 90 days.

```
find /mtpoint1a -mtime +90 -atime +90 -print > aging_files
```

The following example lists all files larger than 1/2 Mbyte assuming 512-byte blocks.

```
find /mtpoint1a -size +1000 -print
```

■ Use the **df** command to list the amount of free disk space on a volume.

The **df** command returns the number of free blocks left on the file system available for the ordinary user (not superuser); it does not count the number of blocks reserved by **minfree**. If you wish to see a more detailed report of disk usage, type:

```
df -t
```

An example of output from **df -t** is:

```
/            (/dev/ac/1a   ):
93918 blocks           135875 i-nodes
715904 total blocks   163840 total i-nodes
550394 used blocks      27965 used i-nodes
    10 percent minfree
```

In the example, there are 93918 blocks (512-byte blocks) available to the ordinary user, and 165510 512-byte blocks (715904 - 550394 = 165510) available to the superuser.

Transferring and Copying Files

There are several methods of transferring files to and from optical disk surfaces using HP-UX commands. The HP-UX system documentation gives you details about file transfer and copy commands. These are some of the commands you can use to transfer files:

- cpio

- cp

- dd

- Local Area Network (e.g. NFS)

- uucp

Note	Don't copy files straight from side A to side B of the same disk.
	This procedure requires many exchanges. Rather, copy the file first to the hard disk and then from the hard disk to the other optical surface.

Using the Disk Library System as a Boot Device

Do not use any optical disk surface in the Disk Library System as the boot device. This use is not supported.

When creating file systems on optical disks, you may want to create non-bootable file systems.

Using the Disk Library System for Virtual Memory Swap Space

Do not use optical disk surfaces for virtual memory swap space. This use is not supported.

A

Manually Configuring the Disk Library System

This appendix gives instructions for manually configuring the Disk Library System for operation with Series 300/400 computers. If additional information on HP-UX commands, refer to your HP-UX reference manuals.

Before You Begin

■ Verify that the host kernel is version 6.5 or later.

Note	The auto-install utility is not supported on version 6.5. If your system has version 6.5, you must use the manual configuration steps in this Appendix.

■ Verify that all needed library file patches for HP-UX version 6.5 and 8.0 have been installed on the host system. (These patches are available on the Fort Collins Service Engineering System, "hpfcse.")

■ Verify that the Disk Library System addresses have been set and are not conflicting with any other SCSI devices connected to the host system.

■ Verify that the hardware system configuration has been set up appropriately. (See Appendix B.)

■ Verify that the correct fuse is in the fuseholder and that the voltage select switch is set correctly if your Disk Library System rear panel has these components.

■ Locate the optical disk containing the auto-install utility that was shipped with the Disk Library System.

■ Get the root password from the system administrator.

Configuring for Operation with the Host

Configuring for operation with the host consists of the following steps:

Note	If only one optical disk was ordered with the Disk Library System, complete the following steps for surface "1a" only.

1. Switch on the unit.

2. Perform the following steps to prepare two optical disks for loading into the Disk Library System.

   a. Remove the optical disk from the clear plastic shipping case or sleeve.

   b. Prepare two labels for the magneto-optical disks. (Refer to the *Optical Disk Library System User's Guide* for instructions for labeling disks.)

   c. Apply the labels to side A of each of the disks.

Note	The remaining steps give instructions for preparing side A of two disks. Since these steps can be very time consuming, you will want to encourage the system administrator to complete these steps for the remaining disk surfaces at his or her convenience.

3. Load the optical disks into slots 1 and 2 of the Disk Library System. (See Figure 3-1 or Figure 3-2 for the correct orientation of the disk when inserting it into the mailslot.)

   a. Press the (LOAD) key. SLOT 1 displays.

   b. Press (ENTER).

   c. Put the disk labeled Disk 2 into the mailslot.

   d. Press the (LOAD) key. SLOT 2 displays.

   e. Press (ENTER).

4. Check the **/etc/conf/dfile** to see if your kernel includes the appropriate kernel drivers.

- **scsi** (all HP-UX versions)

- **ac** (HP-UX versions 6.5 and 7.0)

- **autoch** (HP-UX version 8.0)

- **autox** (HP-UX version 8.0)

```
fgrep -xn scsi /etc/conf/dfile
```
Return line number for scsi entry.
```
fgrep -xn ac /etc/conf/dfile
```
Return line number for ac entry.

These lines should not be commented out with an *. If they are, do the following steps:

a. If the kernel driver entries do not exist in the **/etc/conf/dfile** or the entries exist but they are commented out, type the following commands.

```
cat >> /etc/conf/dfile       append the following lines
scsi                         "autoch" and "autox" must be substi-
ac                           tuted for "ac" for HP-UX version 8.0
CTRL-d
```

b. Type these commands to configure the kernel.

```
cd /etc/conf
/etc/config dfile
make -f config.mk
mv /hp-ux /SYSBCKUP
mv hp-ux /hp-ux
shutdown -r
    .
    .
    .
login: root
```

5. Create device files for each optical disk surface.

Note   The **mknod** command is used to create device files. Each optical disk surface requires two device files—one character type and one block type. Therefore, it is recommended that you use the **/etc/newconfig/mkdev** script file for creating the device files. A sample of this script is located at the end of this Appendix.

The **/etc/newconfig/mkdev** script performs the following:

- Creates two subdirectories—**ac** and **rac**.

- Sets access to the subdirectories at **755** which is owner read/write/execute and everybody else read/execute.

- Creates 129 device files.

Even though you are preparing just two disks, it's okay to execute the **/etc/newconfig/mkdev** script. The device files will be ready for the system administrator when he or she has other optical disks to use.

To use the mkdev script, do the following steps.

a. Change to the **/etc/newconfig** directory, save any old copies of the **/etc/newconfig/mkdev** script, and create a new copy of **mkdev** by typing:

```
cd /etc/newconfig
cp mkdev mkdev.old
```

b. Customize the **/etc/newconfig/mkdev** file.

Note   A summary of **vi** commands is located in Appendix D. A sample **/etc/newconfig/mkdev** script is at the end of this Appendix.

```
vi /etc/newconfig/mkdev          edit the mkdev file
/autochanger                     search for "autochanger"
```

Once the autochanger section is found, you will need to do the following:

i. Remove the comment signs (#) from all of the autochanger section lines.

ii. If you have a Model 100 Disk Library System, you need to modify the script to make disk files for 144 optical disks instead of 32 optical disks.

iii. Determine whether the parameters for the minor number need to change. Changes are required if either of these conditions apply:

- Your autochanger controller SCSI ID is not set to 3.

- Your SCSI interface address is not 14.

iv. Move to the beginning of the **/etc/newconfig/mkdev** script and make the necessary edits. There are a few comment lines in the beginning that instruct you to do the following:

- Delete the two lines indicated.

- Remove the comment signs (#) from the **set -x, cd /dev**, and **mknod=/etc/mknod** lines.

v. Save the **/etc/newconfig/mkdev** file by typing:

```
:wq!
```

c. Execute the modified script by typing:

```
/etc/newconfig/mkdev
```

d. Verify successful completion of the **/etc/newconfig/mkdev** script by typing:

```
ll /dev/ac
ll /dev/rac
```

e. Initialize two optical disk surfaces.

Caution

System errors can occur with HP-UX versions 6.5 and 7.0 if either of the following situations occur.

■ Disks are initialized simulaneously (a disk in each drive).

■ A file system is mounted while a disk is being initialized.

Note

Do not re-initialize the side A of disk if you are using the Optical Installation Disk.

Each surface takes 25 minutes to initialize.

```
mediainit /dev/rac/1a
mediainit /dev/rac/2a
```

f. Check the **/etc/disktab** file to see that the **hpS6300.650A** entry exists. (See the note on page 4-6.)

```
grep -n hpS6300.650A /etc/disktab
```

g. If the **hpS6300.650A** entry does not exist in the **/etc/disktab** file, you need to update the **/etc/disktab** file by typing:

```
cp /etc/disktab /etc/disktab.old
cp /etc/newconfig/disktab /etc/disktab
```

h. Create two file systems.

Note

Each **newfs** command will take approximately 5 minutes to complete.

Type these commands:

```
newfs /dev/rac/1a hpS6300.650A
newfs /dev/rac/2a hpS6300.650A
```

i. Create mount directories.

Create the mount directory and give the directory the correct access permissions. Mount directories used by everyone on the system have global read/write/execute permission.

Type these commands to create the mount directories.

```
mkdir /mountpt1a
chmod 777 /mountpt1a
mkdir /mountpt2a
chmod 777 /mountpt2a
```

j. Mount the disk surfaces.

To maintain product performance on HP-UX versions 6.5 and 7.0, you should mount only two surfaces at a time as read/write. All of the other surfaces should be read only. Additionally, none of the surfaces should be permanently mounted; therefore, **do not** include the optical surface file systems in the **/etc/checklist** file.

Type these commands to mount the two surfaces as read/write.

```
mount    /dev/ac/1a    /mountpt1a
mount    /dev/ac/2a    /mountpt2a
```

Verifying Operation

Performing A Copy Test

1. Copy **/hp-ux** to Disk 1 Side A by typing:

   ```
   cp /hp-ux /mountpt1a/hp-ux
   ```

2. Copy **/hp-ux** from Disk 1 Side A to Disk 2 Side A by typing:

   ```
   cp /mountpt1a/hp-ux /mountpt2a/hp-ux
   ```

3. Remove the test files by typing:

   ```
   rm /mountpt1a/hp-ux
   rm /mountpt2a/hp-ux
   ```

Performing An Exerciser Test

From the control panel, run Exerciser Test 16—Drive I/O Test.

1. With the Disk Library System power on and in the READY state, press
   (OPTION). TEST * displays.

2. Press (ENTER). TEST 0 displays.

3. Press (NEXT) until TEST 16 displays.

4. Press (ENTER). ONCE displays.

5. Press (ENTER). RUN 16 displays.

   Once the test completes, PASS 16 displays.

6. Press (OPTION) to return to the READY state.

Unmounting The Surfaces

Type these commands to unmount the two surfaces.

```
umount  /dev/ac/1a
umount  /dev/ac/2a
```

Removing The Disks

Perform these steps to remove the two disks from the Disk Library System.

1. Press the (EJECT) key. SLOT 1 displays.

2. Press (ENTER). Disk 1 is ejected to the mailslot. Remove it from the mailslot.

3. Press the (EJECT) key. SLOT 2 displays.

4. Press (ENTER).

5. Disk 2 is ejected to the mailslot. Remove it from the mailslot.

Following Up

These steps are to be performed by the system administrator after the HP Customer Engineer has completed the initial setup. In addition, to ensure optimum system performance, the system administrator should read Chapter 4, "Systems Administration Tasks—System Performance Issues."

Note	Instructions for labeling disks and loading them into the Optical Disk Library System are given in the *Optical Disk Library System User's Guide*.

- Label all disks that will be loaded into the Disk Library System.

- Load disks into the Disk Library System and initialize (**mediainit**) each optical disk surface if needed. Information for using **mediainit** is located in Chapter 4. (If you have preformatted optical disks, simply label the disks and load them into the Disk Library System.)

- Create a new file system for each optical disk surface using the **newfs** command.

- If you have HP-UX version 6.5 or 7.0, **mount** only two surfaces at a time as read/write. (If a power fail occurs all optical disks in the Disk Library System that are mounted as read/write will be file system checked.)

  With HP-UX version 8.0, you can **mount** surfaces as read/write and only optical disks that are in the drives when a power fail occurs will be file system checked.

- Unmount (**umount**) surfaces before removing the disk from the library.

- Make sure all disks have been ejected from the drives before moving the Disk Library System.

- Put the shipping bracket in a safe place for any future moves of the Disk Library System.

Sample Mkdev Script

```
# THIS SCRIPT IS A WORKING MODEL ONLY!! You must customize it
# and eliminate the next two lines before executing it.
    echo "mkdev: template version -- customize script ..."
    exit 1
# **********************************************************************

#set -x
#cd /dev
#mknod=/etc/mknod
.
.
.
# AUTOCHANGERS:
#       0xScA0Sr where
#               Sc = card select code the mechanical autochanger
#               A  = SCSI address of the mechnical autochanger
#               Sr = surface number

if [ ! -d ac ]
then
        mkdir ac
        chmod 755 ac
fi
if [ ! -d rac ]
then
        mkdir rac
        chmod 755 rac
fi

Sc=0e    # Select code of the mechanical autochanger
A=3      # SCSI address of the mechanical autochanger
dev=rac/ioctl;  $mknod $dev      c       55      0x${Sc}${A}000
```

```
dev=ac/1a;     $mknod $dev   b   10   0x${Sc}${A}001
dev=ac/1b;     $mknod $dev   b   10   0x${Sc}${A}002
dev=ac/2a;     $mknod $dev   b   10   0x${Sc}${A}003
dev=ac/2b;     $mknod $dev   b   10   0x${Sc}${A}004
dev=ac/3a;     $mknod $dev   b   10   0x${Sc}${A}005
dev=ac/3b;     $mknod $dev   b   10   0x${Sc}${A}006
dev=ac/4a;     $mknod $dev   b   10   0x${Sc}${A}007
dev=ac/4b;     $mknod $dev   b   10   0x${Sc}${A}008
dev=ac/5a;     $mknod $dev   b   10   0x${Sc}${A}009
dev=ac/5b;     $mknod $dev   b   10   0x${Sc}${A}00a
dev=ac/6a;     $mknod $dev   b   10   0x${Sc}${A}00b
dev=ac/6b;     $mknod $dev   b   10   0x${Sc}${A}00c
dev=ac/7a;     $mknod $dev   b   10   0x${Sc}${A}00d
dev=ac/7b;     $mknod $dev   b   10   0x${Sc}${A}00e
dev=ac/8a;     $mknod $dev   b   10   0x${Sc}${A}00f
dev=ac/8b;     $mknod $dev   b   10   0x${Sc}${A}010
dev=ac/9a;     $mknod $dev   b   10   0x${Sc}${A}011
dev=ac/9b;     $mknod $dev   b   10   0x${Sc}${A}012
dev=ac/10a;    $mknod $dev   b   10   0x${Sc}${A}013
dev=ac/10b;    $mknod $dev   b   10   0x${Sc}${A}014
dev=ac/11a;    $mknod $dev   b   10   0x${Sc}${A}015
dev=ac/11b;    $mknod $dev   b   10   0x${Sc}${A}016
dev=ac/12a;    $mknod $dev   b   10   0x${Sc}${A}017
dev=ac/12b;    $mknod $dev   b   10   0x${Sc}${A}018
dev=ac/13a;    $mknod $dev   b   10   0x${Sc}${A}019
dev=ac/13b;    $mknod $dev   b   10   0x${Sc}${A}01a
dev=ac/14a;    $mknod $dev   b   10   0x${Sc}${A}01b
dev=ac/14b;    $mknod $dev   b   10   0x${Sc}${A}01c
dev=ac/15a;    $mknod $dev   b   10   0x${Sc}${A}01d
dev=ac/15b;    $mknod $dev   b   10   0x${Sc}${A}01e
dev=ac/16a;    $mknod $dev   b   10   0x${Sc}${A}01f
dev=ac/16b;    $mknod $dev   b   10   0x${Sc}${A}020
dev=ac/17a;    $mknod $dev   b   10   0x${Sc}${A}021
dev=ac/17b;    $mknod $dev   b   10   0x${Sc}${A}022
```

```
dev=ac/18a;      $mknod $dev    b           0   0x${Sc}${A}023
dev=ac/18b;      $mknod $dev    b          10   0x${Sc}${A}024
dev=ac/19a;      $mknod $dev    b          10   0x${Sc}${A}025
dev=ac/19b;      $mknod $dev    b          10   0x${Sc}${A}026
dev=ac/20a;      $mknod $dev    b          10   0x${Sc}${A}027
dev=ac/20b;      $mknod $dev    b          10   0x${Sc}${A}028
dev=ac/21a;      $mknod $dev    b          10   0x${Sc}${A}029
dev=ac/21b;      $mknod $dev    b          10   0x${Sc}${A}02a
dev=ac/22a;      $mknod $dev    b          10   0x${Sc}${A}02b
dev=ac/22b;      $mknod $dev    b          10   0x${Sc}${A}02c
dev=ac/23a;      $mknod $dev    b          10   0x${Sc}${A}02d
dev=ac/23b;      $mknod $dev    b          10   0x${Sc}${A}02e
dev=ac/24a;      $mknod $dev    b          10   0x${Sc}${A}02f
dev=ac/24b;      $mknod $dev    b          10   0x${Sc}${A}030
dev=ac/25a;      $mknod $dev    b          10   0x${Sc}${A}031
dev=ac/25b;      $mknod $dev    b          10   0x${Sc}${A}032
dev=ac/26a;      $mknod $dev    b          10   0x${Sc}${A}033
dev=ac/26b;      $mknod $dev    b          10   0x${Sc}${A}034
dev=ac/27a;      $mknod $dev    b          10   0x${Sc}${A}035
dev=ac/27b;      $mknod $dev    b          10   0x${Sc}${A}036
dev=ac/28a;      $mknod $dev    b          10   0x${Sc}${A}037
dev=ac/28b;      $mknod $dev    b          10   0x${Sc}${A}038
dev=ac/29a;      $mknod $dev    b          10   0x${Sc}${A}039
dev=ac/29b;      $mknod $dev    b          10   0x${Sc}${A}03a
dev=ac/30a;      $mknod $dev    b          10   0x${Sc}${A}03b
dev=ac/30b;      $mknod $dev    b          10   0x${Sc}${A}03c
dev=ac/31a;      $mknod $dev    b          10   0x${Sc}${A}03d
dev=ac/31b;      $mknod $dev    b          10   0x${Sc}${A}03e
dev=ac/32a;      $mknod $dev    b          10   0x${Sc}${A}03f
dev=ac/32b;      $mknod $dev    b          10   0x${Sc}${A}040
```

```
dev=rac/1a;      $mknod $dev   c   55   0x${Sc}${A}001
dev=rac/1b;      $mknod $dev   c   55   0x${Sc}${A}002
dev=rac/2a;      $mknod $dev   c   55   0x${Sc}${A}003
dev=rac/2b;      $mknod $dev   c   55   0x${Sc}${A}004
dev=rac/3a;      $mknod $dev   c   55   0x${Sc}${A}005
dev=rac/3b;      $mknod $dev   c   55   0x${Sc}${A}006
dev=rac/4a;      $mknod $dev   c   55   0x${Sc}${A}007
dev=rac/4b;      $mknod $dev   c   55   0x${Sc}${A}008
dev=rac/5a;      $mknod $dev   c   55   0x${Sc}${A}009
dev=rac/5b;      $mknod $dev   c   55   0x${Sc}${A}00a
dev=rac/6a;      $mknod $dev   c   55   0x${Sc}${A}00b
dev=rac/6b;      $mknod $dev   c   55   0x${Sc}${A}00c
dev=rac/7a;      $mknod $dev   c   55   0x${Sc}${A}00d
dev=rac/7b;      $mknod $dev   c   55   0x${Sc}${A}00e
dev=rac/8a;      $mknod $dev   c   55   0x${Sc}${A}00f
dev=rac/8b;      $mknod $dev   c   55   0x${Sc}${A}055
dev=rac/9a;      $mknod $dev   c   55   0x${Sc}${A}011
dev=rac/9b;      $mknod $dev   c   55   0x${Sc}${A}012
dev=rac/10a;     $mknod $dev   c   55   0x${Sc}${A}013
dev=rac/10b;     $mknod $dev   c   55   0x${Sc}${A}014
dev=rac/11a;     $mknod $dev   c   55   0x${Sc}${A}015
dev=rac/11b;     $mknod $dev   c   55   0x${Sc}${A}016
dev=rac/12a;     $mknod $dev   c   55   0x${Sc}${A}017
dev=rac/12b;     $mknod $dev   c   55   0x${Sc}${A}018
dev=rac/13a;     $mknod $dev   c   55   0x${Sc}${A}019
dev=rac/13b;     $mknod $dev   c   55   0x${Sc}${A}01a
dev=rac/14a;     $mknod $dev   c   55   0x${Sc}${A}01b
dev=rac/14b;     $mknod $dev   c   55   0x${Sc}${A}01c
dev=rac/15a;     $mknod $dev   c   55   0x${Sc}${A}01d
dev=rac/15b;     $mknod $dev   c   55   0x${Sc}${A}01e
dev=rac/16a;     $mknod $dev   c   55   0x${Sc}${A}01f
dev=rac/16b;     $mknod $dev   c   55   0x${Sc}${A}020
dev=rac/17a;     $mknod $dev   c   55   0x${Sc}${A}021
dev=rac/17b;     $mknod $dev   c   55   0x${Sc}${A}022
```

```
dev=rac/18a;        $mknod $dev        c        55        0x${Sc}${A}023
dev=rac/18b;        $mknod $dev        c        55        0x${Sc}${A}024
dev=rac/19a;        $mknod $dev        c        55        0x${Sc}${A}025
dev=rac/19b;        $mknod $dev        c        55        0x${Sc}${A}026
dev=rac/20a;        $mknod $dev        c        55        0x${Sc}${A}027
dev=rac/20b;        $mknod $dev        c        55        0x${Sc}${A}028
dev=rac/21a;        $mknod $dev        c        55        0x${Sc}${A}029
dev=rac/21b;        $mknod $dev        c        55        0x${Sc}${A}02a
dev=rac/22a;        $mknod $dev        c        55        0x${Sc}${A}02b
dev=rac/22b;        $mknod $dev        c        55        0x${Sc}${A}02c
dev=rac/23a;        $mknod $dev        c        55        0x${Sc}${A}02d
dev=rac/23b;        $mknod $dev        c        55        0x${Sc}${A}02e
dev=rac/24a;        $mknod $dev        c        55        0x${Sc}${A}02f
dev=rac/24b;        $mknod $dev        c        55        0x${Sc}${A}030
dev=rac/25a;        $mknod $dev        c        55        0x${Sc}${A}031
dev=rac/25b;        $mknod $dev        c        55        0x${Sc}${A}032
dev=rac/26a;        $mknod $dev        c        55        0x${Sc}${A}033
dev=rac/26b;        $mknod $dev        c        55        0x${Sc}${A}034
dev=rac/27a;        $mknod $dev        c        55        0x${Sc}${A}035
dev=rac/27b;        $mknod $dev        c        55        0x${Sc}${A}036
dev=rac/28a;        $mknod $dev        c        55        0x${Sc}${A}037
dev=rac/28b;        $mknod $dev        c        55        0x${Sc}${A}038
dev=rac/29a;        $mknod $dev        c        55        0x${Sc}${A}039
dev=rac/29b;        $mknod $dev        c        55        0x${Sc}${A}03a
dev=rac/30a;        $mknod $dev        c        55        0x${Sc}${A}03b
dev=rac/30b;        $mknod $dev        c        55        0x${Sc}${A}03c
dev=rac/31a;        $mknod $dev        c        55        0x${Sc}${A}03d
dev=rac/31b;        $mknod $dev        c        55        0x${Sc}${A}03e
dev=rac/32a;        $mknod $dev        c        55        0x${Sc}${A}03f
dev=rac/32b;        $mknod $dev        c        55        0x${Sc}${A}040
```

B

Configuration Notes

The following system connection information can be found in this appendix:

- Using a SCSI Daughterboard
- Using a high-speed HP-IB daughterboard and DIO SCSI
- Using DIO SCSI
- Using DIO SCSI and DIO HP-IB
- Implementing a network archive solution
- Adding a second Disk Library System

System Connection Limitations

- HP-UX versions 6.5 and 7.0 support a total of seven SCSI IDs.
- HP-UX version 8.0 supports a total of seven SCSI IDs per SCSI card.

Note	A maximum of 2 Model 10/20 Disk Library Systems or 1 Model 6/100 Disk Library System can be installed on one host system.

- The total SCSI cable length limit is 6 meters for a single-ended SCSI interface and 12 meters for a differential SCSI interface.

  With Models 10 and 20 and internal SCSI length of 1.1 meters must be calculated into the total SCSI cable length.

  With Models 60 and 100 no internal SCSI lengths need to be calculated into the total SCSI length.

Caution	The problem described below applies only to HP 9000 Series 300 computers. If your are connecting the Disk Library System to any other host computer, this information is not applicable.

Combining a SCSI interface or a high-speed disk interface with an HP 98625A high-speed interface can result in data loss or data corruption to an HP 9000 Series 300 system disk.

To make this combination work, replace the HP 98625A interface card with an HP 98625B interface card.
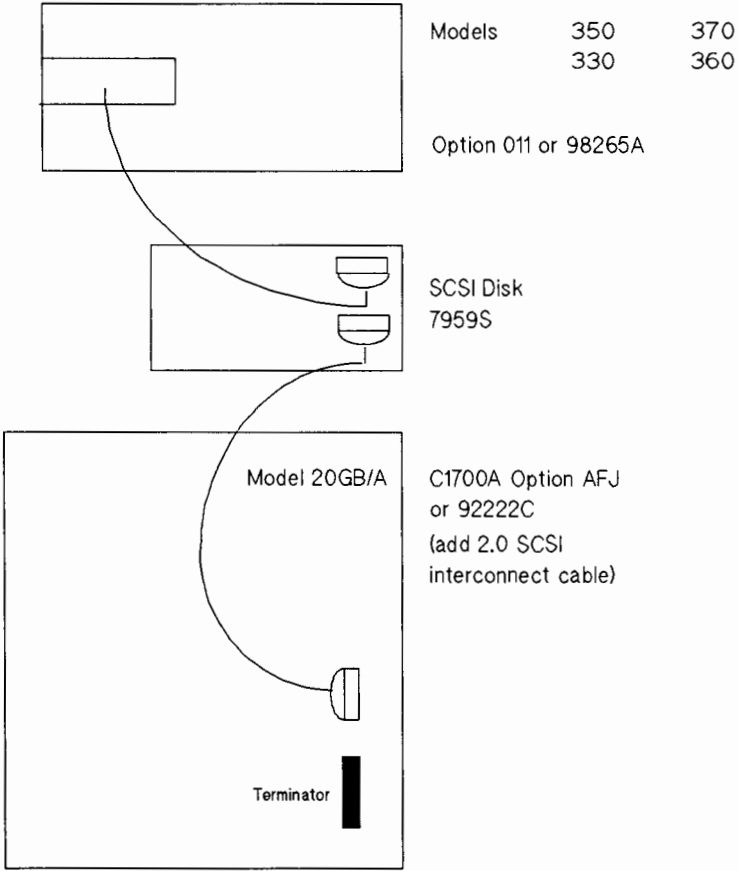
The following interfaces are high-speed disk interfaces:

- HP 98625A Interface Card

- HP 98625B Interface Card

- HP 98626A Daughterboard for Models 330, 350, 360, and 370

- High Speed Disk Interface bundled with the Model 345 or Model 375

The following interfaces are SCSI interfaces:

- HP 98658A Interface Card

- HP 98265A Daughterboard for Models 330, 350, 360, and 370

- Built-in interface for Models 345 and 375

Example 1: SCSI Daughterboard

Models   350   370
          330   360

Option 011 or 98265A

SCSI Disk
7959S

Model 20GB/A   C1700A Option AFJ
or 92222C
(add 2.0 SCSI
interconnect cable)

Terminator

This is a good solution for
building a new system based on
HP Series 300 Models 350/370 or
330/360.

Example 2: High-speed HP-IB Daughterboard and DIO SCSI

95560 or 98570A Expander

Models   330*   360*
             350   370
Option 010 or 98262A and
98658A

HP-IB device
(7957B)

Model 20GB/A

C1700A
might require 92222D
(1.0m SCSI extension
cable)

Terminator

*330/360 MMA,CMA, and
360 MMAX bundles may
not require expander
box.
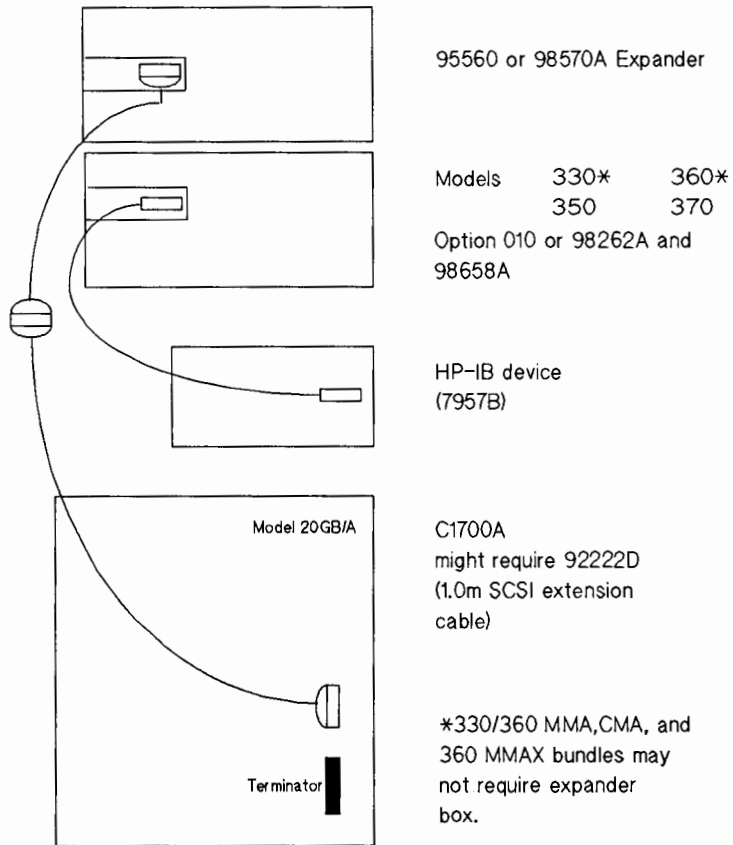
This is a good solution if you have an HP-IB disk drive as a system disk. (With a SCSI daughter-board, DIO HP-IB can also be offered in the expander.

Example 3: DIO SCSI

Models 332, 340, and
98658A

SCSI Disk(s)
7958S

Model 20GB/A   C1700A Option AFJ or 92222C
                    (add 2.0m SCSI
                    interconnect cable)

Terminator
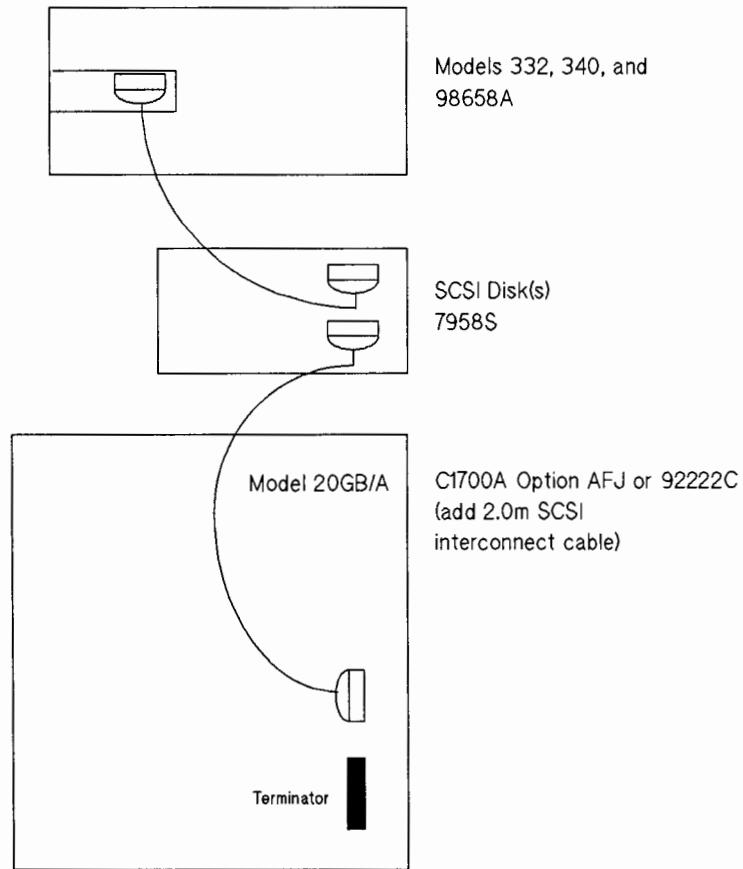
This is the recommended
configuration for building
a system based on HP Series 300
Models 320 or 340.

Example 4: DIO SCSI and DIO HP-IB

Model 332 and 98625B

HP-IB device(s)
(7957B)

Model 20GB/A

C1700A
might require 92222D
(1.0m SCSI extension
cable)

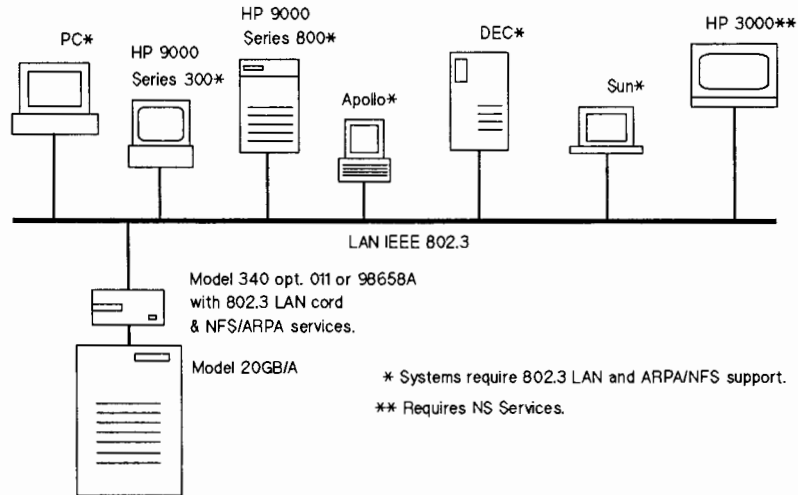Terminator
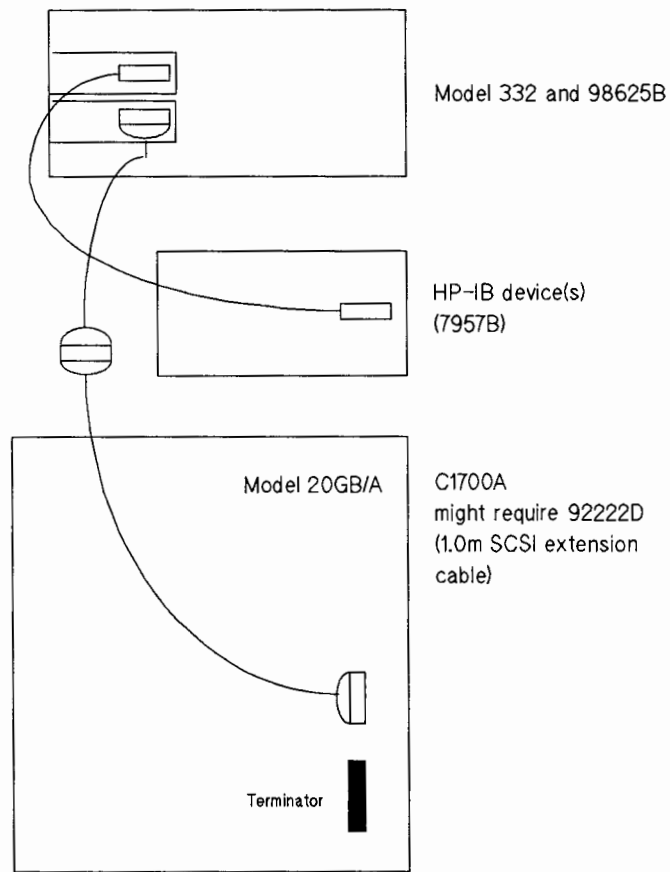
This is a good solution if you
want to connect an existing HP-IB
peripheral to a new HP Series 300
Model 332.

Example 5: Network Archive Solution
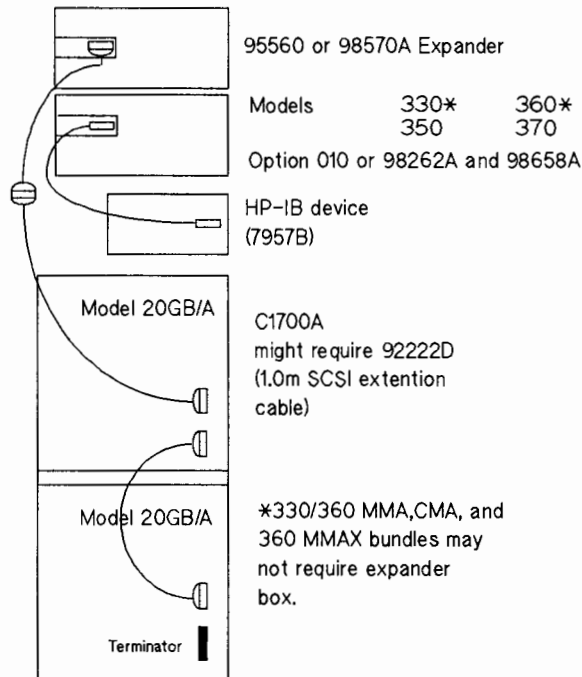

PC*

HP 9000
Series 300*

HP 9000
Series 800*

Apollo*

DEC*

Sun*

HP 3000**

LAN IEEE 802.3

Model 340 opt. 011 or 98658A
with 802.3 LAN cord
& NFS/ARPA services.

Model 20GB/A

* Systems require 802.3 LAN and ARPA/NFS support.

** Requires NS Services.

A low-cost server such as the Model 340 with a LAN card and NFS/ARPA will turn
the Model 20GB/A into an effective network archival device. Any system that
supports NFS or TCP/IP has access to the files resident in the Model 20GB/A
library. HP systems (Series 300, 800, and even HP 3000) and non-HP systems
(PCs, Sun, DEC, etc.) can be supported on a network. All that's required is an
IEEE 802.3 LAN card and NFS/ARPA support. Network performance will be
limited by the network traffic and throughput. The HP 3000 requires NS
services. Files can be transferred via DSCOPY, but the performance is limited
to about 50 Kbytes/s.

Example 6: Adding a Second Model 20GB/A

95560 or 98570A Expander

Models   330*   360*
              350   370

Option 010 or 98262A and 98658A

HP–IB device
(7957B)

Model 20GB/A

C1700A
might require 92222D
(1.0m SCSI extention
cable)

Model 20GB/A

*330/360 MMA,CMA, and
360 MMAX bundles may
not require expander
box.

Terminator

If you want to add a second Model 20GB/A, you should consider these points:

- One SCSI interface card can support a maximum of two Model 20GB/As.

- You will need to determine the SCSI addressing strategy for the additional Model 20GB/A. You should consider which three addresses were used for the first Model 20GB/A (default=3,4,and 5), and then determine what addresses are available.

- You need to consider the distance limitations for SCSI cables in connecting the second Model 20GB/A. The limit is six meters.

- Additional configuration steps need to be taken for the second Model 20GB/A. Follow the steps in Chapter 5, but make sure you don't overwrite the current device files and mount point directories.

C

Troubleshooting

This Appendix is divided into two sections, one for problems associated with running the auto-install utility and one for problems that may occur after installation.

Problems when Running the Auto-Install Utility

Note	If you encounter a fatal error (an error that results in the auto-install program being aborted, make sure your system information is correct (drive addresses, SCSI interface select code, etc.) and restart the program.

Error Message	Possible Causes
Cannot create the directory **/usr/contrib**	■ Not logged on as root ■ Directory does not have write permission set
Cannot create the directory **/usr/contrib/acinst**	■ Not logged on as root ■ Directory does not have write permission set
HP-UX version [version no.] does not support autochangers.	You must have HP-UX version 6.5 or greater for autochangers to be supported on the operating system.
Cannot communicate with autochanger.	■ Verify that all cables are connected correctly. ■ Verify that /etc/conf/dfile contains the correct drivers. ■ Verify the character and block device files exist.
I/O error (problem determining the number of slots in the autochanger using the command: numslots /dev/rad/ioctl.)	Check the SCSI addresses on the system and verify that there are no duplicate addresses.
Must be superuser (root) to execute this script. Cannot proceed with script on a mixed cluster.	You can only run this script when logged on as "root."

Error Message	Possible Causes
Cannot proceed with script. Cannot verify the the hardware matches the target system type of *hardware type.*	The **/bin/hp9000s***hardware type* is either does not exist or is unable to be executed.
Cannot access cartridge through character device file [device file name].	Verify that all cables are connected correctly.
Cannot access cartridge through block device file [device file name].	Verify that all cables are connected correctly.
The file [kernel name] does not exist.	When prompted for the name of the kernel you are booted on, an incorrect kernel name was entered. Re-enter the correct kernel name.
The following command did not execute successfully: [command]	When this error message is received, recovery instructions are provided after the error message.
Problem creating [filename] device file for the autochanger.	When this error message is received, recovery instructions are provided after the error message.
Problem determining the number of slots in the autochanger using the command: [command name]	The select code or the bus address entered is incorrect. Follow the instructions given by the auto-install program.

Problems Encountered after Installation

The following table can provide solutions to problems that can occur in the operation of the Disk Library System. If you are experiencing problems with the system, follow these steps before consulting your service representative.

Note

This appendix addresses problems that are specific to HP Model 9000 computers. To troubleshoot problems that are not host system related, refer to Appendix D, "Troubleshooting," in the *Optical Disk Library System User's Guide*.

Task	Problem/Symptom	What to do
Communicating HP-UX <-> Disk Library System	The HP-UX Host does not recognize the Disk Library System.	■ Check to make sure the host kernel is the correct version. ■ Check to make sure the Disk Library System was installed and configured exactly as described in Chapter 2 or Chapter 3. ■ Check the SCSI connections. ■ Verify SCSI bus was terminated correctly. ■ Check the SCSI interface address as it relates to the device files.

Task	Problem/Symptom	What to do
Power Fail	The Disk Library System power fails.	Once the power returns to the Disk Library System, unmount and remount the Disk Library System disk surfaces. Do not eject any disks until the surfaces are unmounted/unreserved.
	Host computer power fails and the Disk Library System stays on.	When the host reboots, file system check any write-mounted optical surfaces. (With HP-UX version 8.0, you only need to file system check optical disks that were in a drive when the power failed.)
	Both the host system and Disk Library System power fail.	When the host reboots, file system check any write-mounted optical surfaces. (With HP-UX version 8.0, you only need to file system check optical disks that were in a drive when the power failed.)

Caution

To prevent disks from being removed after a power failure, set Configuration 20 to "ON." See "Setting CONF 15 or CONF 20" in Chapter 8 of the *Optical Disk Library System User's Guide.*

Task	Problem/Symptom	What to do
Reading/Writing Magneto-Optical Disks	Can't write to the disk.	■ Check the HP-UX file system access permissions. ■ Check the write-protect tab on each disk side to assure write-enabled status. ■ Check to make sure the disk was initialized with the **mediainit** and **newfs** commands. ■ Check to make sure the disk surface was mounted correctly to the file system.
Removing Disks	Disk removal attempted, but the display will not show the disk's storage slot or drive location.	Make sure the optical disk surface's file systems have been unmounted.
	The unit's power failed while a disk was in the drive.	■ Try powering on the unit. If successful, use the file system check (**fsck**) command. ■ If poweron is unsuccessful, switch the unit off. *Do not move the unit.* Moving the unit risks damaging the magneto-optical drive. Call your HP Customer Engineer for assistance.

D

A Summary of vi Commands

A Summary of vi Commands

Cursor Movement Commands

Type This	To Do This
h	Move cursor left
j	Move cursor down
k	Move cursor up
l	Move cursor right
$	Move cursor to end of current line
0 (zero)	Move cursor to beginning of current line

Text-Entry Commands

Type This	To Do This
i	Insert text before cursor
I	Insert text at beginning of current line
a	Append text after cursor
A	Append text at end of current line
o	Open a blank line below cursor for text entry
O	Open a blank line above cursor for text entry
(esc)	Returns to cursor movement mode

Undo Commands

Type This	To Do This
u	Undo *last* command executed
U	Restore *current line* to original text
:q!	Quit vi without saving changes
:wq!	Writes file and quits
ZZ	Writes file and quits

Delete Commands

Type This	To Do This
x	Delete current character
dw	Delete current word
$n$dw	Delete next n words, including current
dd	Delete current line