HEWLETT PACKARD

HP Series 6300 Model 650/A Rewritable Optical Disk Drive

User's Guide

HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

HP Series 6300

Model 650/A Rewritable Optical Disk Drive User's Guide

HEWLETT PACKARD

HP Part No. C1701-90000
Printed in USA June 1989

Edition 1
E0689

Notice

Warranty and Service

Hewlett-Packard products are warranted against defects in materials and workmanship. For Hewlett-Packard optical products sold in the U.S.A. and Canada, this warranty applies for 90 (ninety) days from date of installation. (Warranty limitations may apply for delayed installation. Contact your local sales office to determine warranty terms for other countries.) Hewlett-Packard will, at its option, repair or replace equipment which proves to be defective during the warranty period. A copy of the complete warranty statement is available upon request.

The selection and use of media, supplies, and consumables is the customer's responsibility. Hewlett-Packard reserves the right to exclude from the warranty or service agreement any repairs for damage to Hewlett-Packard products which Hewlett-Packard reasonably determines or believes were caused by use of non-Hewlett-Packard media or cleaning supplies. Hewlett-Packard will, upon request, repair such damage on a time and material basis.

Repairs necessitated by misuse of the equipment, or by hardware, software, or interfacing not provided by Hewlett-Packard are not covered by this warranty.

No other warranty is expressed or implied, included, but not limited to, the implied warranties or merchantability and fitness for a particular purpose. Hewlett-Packard shall not be liable for consequential damages.

FCC Radio Frequency Interference Statement (USA Only)

This equipment generates and uses radio frequency energy and, if not installed and used properly (that is, in strict accordance with the manufacturer's instructions) may cause interference to radio and television reception. The equipment has been type tested and found to comply within the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a commercial environment. Operation of this equipment in a residential area is likely to cause interference.

If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

If necessary, the user should consult the dealer or an experienced radio/ television technician for additional suggestions.

The Federal Communications Commission has prepared a booklet entitled *How to Identify and Resolve Radio - TV Interference Problems* which may be helpful to you. This booklet (stock #004-000-00345-4) may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

German Electromagnetic Interference Regulations

Manufacturer's Declaration (English translation)

This certifies that the HP Series 6300 Model 650/A is in accordance with the Radio Interference Requirements of Directive FTZ 1046/1984. The German Bundespost has been notified that this equipment has been put into circulation, and the right to check the series for compliance with the requirements was granted.

If this equipment is to be operated with a system

- and if the General License is being claimed, the complete system has to comply with the General Licensing requirements.

- which has its own FTZ Serial License, and for which an operating license has been granted or requested, usually no further steps are necessary.

Funkentstörung Deutschland

Herstellerbescheinigung

Hiermit wird bescheinigt, daß das Gerät HP Series 6300 Model 650/A in Übereinstimmung mit den Bestimmungen von Postverfügung 1046/84 funkentstört ist. Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

Wird das Gerät innerhalb einer Anlage betrieben,

- so muß bei Inanspruchnahme der Allgemeinen Genehmigung FTZ 1046/84 die gesamte Anlage der oben genannten Genehmigung entsprechen.

- die mit einer FTZ-Serienprüfnummer gekennzeichnet ist, und für die eine Betriebsgenehmigung vorliegt oder beantragt wird, so sind in der Regel keine weiteren Schritte notwendig.

Turvallisuusyhteenveto

Laserturvallisuus

HP 50710A laserlukuyksikkö on käyttäjän kannalta turvallinen luokan 1 laserlaite. Laitteen on tarkastanut Suomessa Työterveyslaitos.

Tarkastuksessa laitteen turvallisuusluokka on määrätty valtioneuvoston päätöksen 472/1985 ja standardin SFS-IEC 825 mukaisesti. Laite on myös varustettu standardin SFS-IEC 825 mukaisella turvallisuusluokan ilmoittavalla merkillä:

```
LUOKAN 1 LASERLAITE
```

Normaalikäytössä laitteen suojakotelo estää lasersäteen pääsyn laitteen ulkopuolelle.

Huolto

Laserlukuyksikon sisällä ei ole käyttäjän huollettavissa olevia kohteita. Laitteen saa avata ja huoltaa ainoastaan laserlaitteiden huoltamiseen kuolutettu henkilö.

Laitteen turvallisuusluokka muuttuu mikäli sen suojakotelo avataan.

Japanese VCCI Statement

この装置は，第二種情報装置（住宅地域又はその隣接した地域において使用されるべき情報装置）で住宅地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会（VCCI）基準に適合しております。
しかし，本装置をラジオ，テレビジョン受信機に近接してご使用になると，受信障害の原因となることがあります。
取扱説明書に従って正しい取り扱いをして下さい。

Laser Safety Statement (USA Only)

The Hewlett-Packard HP Series 6300 Model 650/A Rewritable Optical Disk Drive is certified as a Class 1 laser product under the U.S. Department of Health and Human Services (DHHS) Radiation Performance Standard according to the Radiation Control for Health and Safety Act of 1968.

Because the Model 650/A complies with this law, no hazardous laser radiation is produced by the product. Since laser light emitted inside the Model 650/A is completely confined within a protective housing and external covers, the laser beam cannot escape from the machine during any phase of user operation.

CDRH Regulations (USA Only)

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States. The labels and artwork shown below indicate compliance with CDRH regulations and must be attached to laser products marketed in the United States.

This product conforms with CDRH Radiation Performance Standard, 21 CFR Chapter 1 Subchapter J.

Warning

Use of controls, adjustments or performing procedures other than those specified in this manual may result in hazardous laser radiation exposure.

Laser Class Information: A black on yellow label which reads, "Class 1 Laser Product" printed in English, French, German, Finnish, Italian, Japanese, and Spanish.

Contents

1

Introduction

This chapter explains the organization and the conventions used in this manual. It also gives an overview of Magneto-Optical (MO) technology and the features of the HP Series 6300 Model 650/A Rewritable Optical Disk Drive.

About This Manual

This manual assumes the user is familiar with HP-UX or UNIX™terminology, computer terms, and disk drive operation. It is divided into three chapters and is organized to allow you to quickly find the information you need. It also includes a glossary and index for your use.

Here's what you'll find in this manual:

Introduction - Gives you an overview of the optical disk drive and the optical medium.

Connecting the Optical Disk Drive To Your System - Gives instructions for setting the address and connecting the SCSI interface to your system.

Operation - Describes the controls found on the front and rear panels, and provides an overview of the steps needed to begin using your disk drive with the host system.

Specifications - Provides the physical and environmental specifications for the Model 650/A and rewritable optical disks.

Supplies and Sales Offices - Lists supplies that can be ordered and provides the addresses for the regional sales offices.

SCSI Commands- Provides you with a list of SCSI commands supported by the Model 650/A.

The following conventions are used in this manual:

Italic Font

Italic font designates the title of a document and statements that need to be emphasized.

Typewriter Font

`Typewriter font denotes commands to be typed on your keyboard or screen menu items to be selected.`

Warning

A warning symbol calls attention to a procedure or practice which could result in personal injury if not correctly performed. Do not proceed beyond this symbol until you fully understand and meet the indicated conditions.

A warning statement preceded by this symbol indicates a warning that appears on the product. It calls attention to a procedure or practice that could result in personal injury if not correctly performed. Do not proceed beyond this symbol until you fully understand and meet the indicated conditions.

Caution 

A caution symbol calls attention to an operating procedure or practice which could result in damage to the product if not correctly performed. Do not proceed beyond this symbol until you fully understand and meet the indicated conditions.

Note 

A note symbol calls attention to information which can be helpful in understanding the operation of the product.

The HP Series 6300 Model 650/A

The HP Series 6300 Model 650/A is a standalone rewritable optical disk drive. It uses 5.25-inch (130mm) Magneto-Optical (MO) disks and complies with the Continuous Composite (C*C) standard media format (ISO 10089).

With a rotational drive speed of 2400 rpm, the Model 650/A achieves a sustained write transfer rate of 340 Kbytes per second and a read transfer rate of 680 Kbytes per second. It connects to the host system with a Small Computer Systems Interface (SCSI) and can be accessed by SCSI commands like a conventional magnetic disk drive.

For a list of drive specifications, refer to Appendix A, "Specifications."

Magneto-Optical Disks

Magneto-Optical disks are more durable, more reliable, removeable, and cost far less per megabyte than magnetic disks. MO disks are made of the same kind of plastic used in bullet-proof windows. Data can be read through fingerprints and minor scratches. MO disks can withstand x-rays, magnetic interference, and can be dropped from desk height without damage.

Magneto-Optical technology uses a polycarbonate plastic disk with a magnetic layer, similar to the concept used in conventional magnetic disks. The digital information is stored in the form of magnetic flux directions, rather than in a pitted surface used in other optical technologies.

Because MO disks store data in the form of magnetic flux reversals rather than in a pitted surface, they can be written to and erased repeatedly with no measurable data degradation. Data retention for 10 years is a conservative specification based on accelerated life tests.

The disk is mounted in a rigid plastic case with a metal shutter, similar to a 3.5 inch magnetic flexible disk. The MO disk has two recording sides. Each side holds 325 Mbytes of data for a total of 650 Mbytes of storage. Because the disk drive contains only one read/write head assembly, the cartridge must be ejected, turned over, and re-inserted to access the second side.

For data safety, you can independently write-protect each side of the disk by setting the write-protect tab on the corner of the cartridge. (Refer to item 1 in the following illustration for the location of the write-protect tab.)

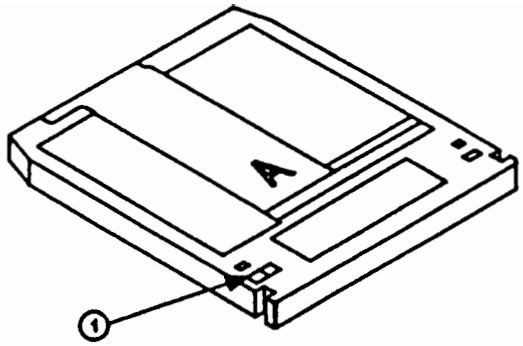

Figure 1-1. Magneto-Optical disk

2

Connecting The Optical Disk Drive To Your System

In this chapter you will find instructions for setting the address of the optical disk drive, checking the voltage setting, and connecting the drive to the host system.

Setting the Address

1. Make sure the power cord isn't connected to the drive.
2. Locate the SCSI ID and Operation Mode Switch on the rear panel of the disk drive (shown below).

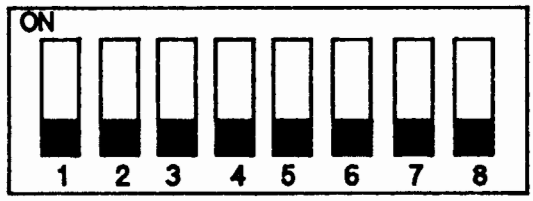

Figure 2-1. SCSI ID and Operation Mode Switch

3. Verify that switches 1 through 5 are in the "OFF" position.

   Switches 1 through 5 are used for diagnostics and test purposes.

4. Set the address number.

- Switches 6 through 8 are used to set the address. The address can be set from 0 to 7, with 0 being the default setting.
- Address 0 should be used if this address is not currently being used by any other device on the SCSI bus.
- If address 0 is being used by another device, select an available SCSI address (1 - 7).

Refer to the table below.

Note

If you are using the rewritable optical disk drive with an HP-UX system, you cannot use address 7 because the host system SCSI controller uses address 7.

Table 2-1. SCSI Settings

SCSI ADDRESS	SWITCH 6	SWITCH 7	SWITCH 8
0	OFF	OFF	OFF
1	OFF	OFF	ON
2	OFF	ON	OFF
3	OFF	ON	ON
4	ON	OFF	OFF
5	ON	OFF	ON
6	ON	ON	OFF
7	ON	ON	ON

Setting The Voltage Selector Switch

Caution

Make sure that the power cord isn't connected to the power source before changing the voltage select switch setting. Failure to disconnect the power cord could result in damage to the disk drive.

Your disk drive should come from the factory with the voltage set to the appropriate setting according to the area designated as the final destination on the order form. However, if the voltage select switch setting is incorrect, change the switch setting by sliding the voltage switch sideways using a flat-blade screwdriver.

Checking The Fuse

Verify that the correct fuse is inserted in the holder.

Although 3-amp fuses are required for both the 115-volt setting and the 230-volt setting, the physical size of the fuses differ. The fuse and fuseholder cap used with the 230-volt setting are shorter than those used with the 115-volt setting. Both versions of the fuse and fuseholder cap are included in the accessories kit.

WARNING: For protection against risk of fire, replace only with the same type and rating of fuse.

Note

The location of the fuseholder and the voltage select switch are illustrated in Chapter 3, "Operation."

Connecting The Disk Drive To Your Computer

1. Make sure the power is turned off on both the computer and the optical disk drive.
2. Do you have another SCSI device connected to your computer? If so, go to Step 3. If no other SCSI device is connected to your computer, continue as follows:
    a. Connect a SCSI cable to the top SCSI connector on the back of the optical disk drive. Press the cable connector in fully.
    b. Verify that the terminator is plugged into the bottom connector on the disk drive.

Note

If you do not have a SCSI cable, you will need to order one. The SCSI cables are available in different lengths to meet the needs of your system. (See Appendix B, "Supplies and Sales Offices" for more information.)

    c. Connect the other end of the SCSI cable to the SCSI interface on the computer. Press the cable connector in fully.
    d. Go to Step 4.

Note

If your host computer has two SCSI connectors, a terminator must be plugged into the second connector. If you don't have another terminator, you will need to order one. The Hewlett-Packard part number is 1252-3251.

3. If another SCSI device is already connected to your computer, do the following:
    a. Determine which SCSI device is the last on the chain by locating the terminator plugged into one of the SCSI connectors on that device.

b. Remove the terminator from the SCSI connector and plug the SCSI cable from the optical disk drive into that connector. Press the cable connector in fully.

c. Connect the other end of the SCSI cable into the top connector on the back of the optical disk drive. Press the cable connector in fully.

d. If either connector on the rear panel is not being used to connect to another SCSI device, the unused connector must be terminated. Attach the terminator (included in the accessories kit) to the unused connector on the optical disk drive. Press the terminator in fully.

4. Verify that the power switch is in the "OFF" position. Plug one end of the power cord into the AC line connector on the back of the disk drive and the other end into the power outlet.

Note

For the host computer to recognize the optical disk drive, the power to the disk drive must be turned on before the power to the host computer.

5. Press in the power switch on the front of the disk drive so that it is in the "ON" position.

6. Turn on the power to the host computer.

3

Operation

This chapter covers the features of the drive, its operation, and provides an overview of the necessary steps for setting up your host system for use with your rewritable optical disk drive.

Front Panel Operation

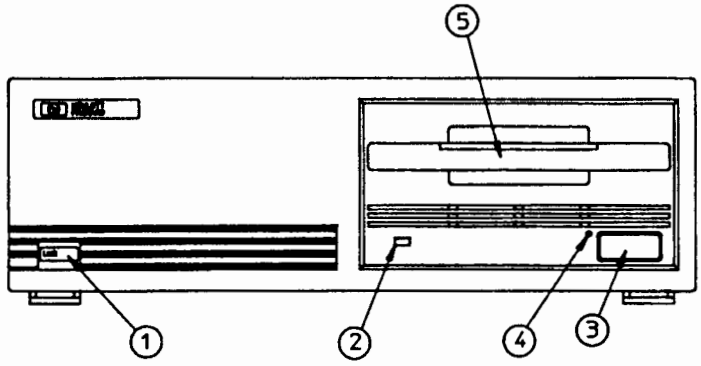

Figure 3-1. Front Panel

1. On/Off Switch	Press to turn the power on or off.
2. Busy Indicator	Lit when a read, write, erase, or seek operation is performed. It is also lit when a cartridge is loaded or unloaded, and during poweron self-test. (NOTE: If the busy indicator remains lit, poweron self-test failed.)

3. Cartridge Eject Button	Press to eject the cartridge from the disk drive. (The cartridge will not eject if the SCSI command, **Prevent Media Removal**, has been issued, or if the power to the disk drive is off.) The spin-down process takes approximately 3 seconds.
4. Cartridge emergency eject pinhole	In an emergency (such as a power outage) the cartridge can be ejected by inserting the emergency eject tool (included in the accessories kit) into the emergency eject pinhole. (If you don't have the tool, a paperclip can be used instead.)
5. Disk cartridge loading compartment	Insert the cartridge into the loading compartment in the direction indicated by the arrow on the cartridge. Once the cartridge is fully inserted, the loading mechanism lowers the cartridge and engages the disk on the spindle. To use surface A, load the cartridge so that the "A" on the cartridge is facing up. (The spin-up process takes approximately 4 seconds.)

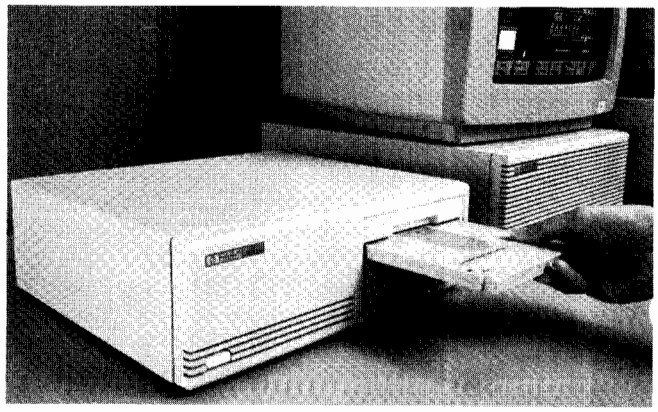

Figure 3-2. Inserting The Cartridge

Rear Panel Operation

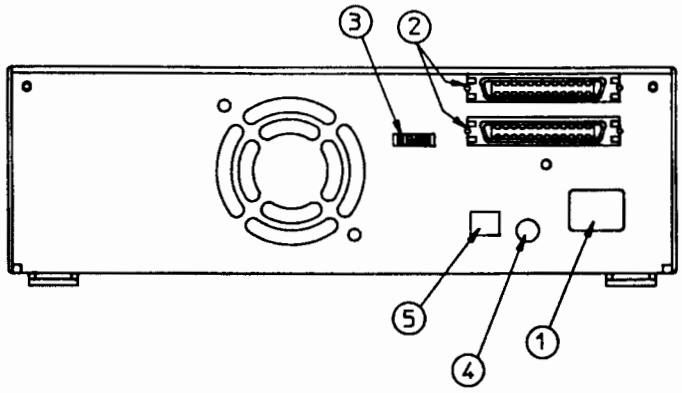

Figure 3-3. Rear Panel

1. Power Connector	Connection for the power cord.
2. SCSI Connectors	Two SCSI bus format connectors that allow SCSI devices to be daisy-chained. If no other SCSI device exists after the current device on the chain, a terminator must be connected to the unused connector.
3. SCSI ID and Operation Mode Switch	Used to set the SCSI ID and to run diagnostics.
4. Fuse Receptacle	The fuse receptacle holds the fuse and fuseholder cap.
5. Voltage Select Switch	The voltage select switch allows the user to specify either a 115-volt or a 230-volt setting depending on the country in which the disk drive will be used.

Making the Model 650/A Part of Your System

Once the optical disk drive is connected to the host system, you are ready to prepare your system to use the drive.

Because host systems differ, you will need to refer to the system documentation for specific system needs and command syntax if the Model 650/A is connected to systems other than HP 9000 Series 300 systems or Apollo Series 2500 systems.

Instructions for connecting the Model 650/A to an Apollo Series 2500 workstation, are in the section, "Connecting the Model 650/A to Apollo Series 2500 Computers," in this chapter.

Connecting the Model 650/A to HP 9000 Series 300 Computers

The following steps give instructions for connecting the Model 650/A to an HP 9000 Series 300 computer.

Checking the dfile

1. Login as user root.
2. Check the `/etc/conf/dfile` to see if your kernel includes the appropriate kernel driver for the Model 650/A and your interface card. The `dfile` should include an entry for `scsi`.

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

   If this entry doesn't exist, the driver must be added to `/etc/conf/dfile` and the kernel must be reconfigured (this involves a reboot of the system).

   These lines should not be commented out with an *. If they are, perform Step 3.

Note

You may edit the `etc/conf/dfile` directly to add the `scsi` entry or you can perform the following step.

If you need more information to edit the `dfile`, refer to your *HP 9000 Series 300 Systems Administration Tasks* manual, part number 98594-90061.

3. If the `scsi` entry does not exist in the `etc/conf/dfile` or the entry exists but it is commented out, perform the following steps.


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

4. 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
exec reboot
.
.
.
login: root
```

Creating Device Files

Each optical disk surface requires two device files—one character type and one block type. To create the device files, perform the following steps.

1. Using the **mknod** command, create device files (one character type and one block type) to specify the path name(s) for the optical disk drive.

   ```
   mknod name type major_num minor_num
   ```

   The four items that must go into the mknod command line are:

   name — Using HP-UX naming conventions, create a character device file in the **/dev/rdsk** directory and a block device file the the **/dev/dsk** directory. For example, the device file names for a new disk drive might be:

   ```
   /dev/dsk/mo (block file)
   /dev/rdsk/mo (character file)
   ```

   If the system is a part of a cluster, **/dev** is a Context Dependent File (CDF). This means you must be logged into the correct cnode when creating the device file.

   type — Each optical disk drive must have two device files associated with it, a block special file and a character (raw) special file. Type for block is b, for character is c.

major_num — The major number is 7 for block files and 47 for character files.

minor_num — The minor number is address-dependent and is the same for both block and character entries. It has the form 0xScBa00.

- 0x - indicates hexadecimal format
- Sc - select code (set on the interface card)
- Ba - bus address (set on the disk drive)
- 00 - reserved

The minor number must be given in hexadecimal format.

For example, if you have an optical disk drive, at select code 14, using bus address 1, your mknod command lines would be:

```
mknod /dev/dsk/mo b 7 0x0e0100
mknod /dev/rdsk/mo c 47 0x0e0100
```

Note

It is important that you know how your system is configured. For example, if you already have an interface at select code 14, your SCSI interface will have be set to a select code other than 14.

2. If the host system is a multi-user system, you will need to change access permission on the new device files.

   All device files that are associated with mountable file systems must have restricted access permission. This gives read/write permission to the owner (root) only. This also prevents someone from mounting unauthorized media on the host system, and prevents everyone on the system from accidentally overwriting a file system that resides on the device associated with this device file.

   For example:

```
chown root /dev/dsk/mo /dev/rdsk/mo
chmod 600 /dev/dsk/mo
chmod 600 /dev/rdsk/mo
```

Initializing Media

Note

Initialization takes approximately 25 minutes per side (50 minutes per disk). After you have initialized side A, eject the optical disk, flip it over and initialize side B.

Initialize the media by typing the `mediainit` command using the character special device file's pathname (for example, use `/dev/rdsk/mo` rather than `/dev/dsk/mo`):

```
mediainit /dev/rdsk/mo
```

Checking the Disktab File

Check the `/etc/disktab` file to see that the `hpS6300.650A` entry exists.

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

If the `hpS6300.650A` entry does not exist in the `ect/disktab` file, you will need to update the `disktab` file.

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

Creating a File System

If the Model 650/A is being used at `/dev/rdsk/mo`, you would type:

```
newfs /dev/rdsk/mo hpS6300.650A
```

Caution

Use the `noswap` entry in `/etc/disktab` since the optical disk is removable. File system errors will result if the optical disk is removed before it is unmounted.

Creating Mount Directories

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

```
mkdir /misc
chmod 777 /misc
```

To mount the file system, use the `mount` command. For example, to mount an optical disk in the drive at `/dev/dsk/mo` onto the `/misc` directory you would type:

```
/etc/mount /dev/dsk/mo /misc
```

Caution

Do not eject the optical disk until it has been unmounted.

```
/etc/umount /dev/dsk/mo
```

Note

Because optical media is removable, it is recommended that the media not be included as part of any automatically-mounted file systems. Refer to the host system documentation for more information on mounting and unmounting.

Optical disks can be used for miscellaneous file storage (i.e. for backups) using the `cpio` or `tar` commands to read from and write to them.

Caution

Damage to the optical read/write mechanism can occur if the unit is moved while a disk is in the drive and the drive is powered off.

Connecting the Model 650/A to Apollo Series 2500 Computers

If the host system is an Apollo Series 2500 workstation, you must perform the following steps. These steps give instructions for initializing a rewritable optical disk. (Follow this procedure for each side of the disk).

1. Invoke the `invol` utility.

   From the MD environment:

   ```
   >ex invol return
   ```

   From a BSD or SysV command shell:

   ```
   /etc/invol return
   ```

   In an Aegis shell:

   ```
   invol return
   ```

2. The `invol` utility asks you for the option to perform. Enter 7 to initialize the physical badspot list on the disk.

3. `Invol` then prompts you for the identity of the disk.

```
Select disk:  [w=Winch|s=Storagemod|f=Floppy|
              q=Quit] [ctrl#:] [unit#]
```

   For the Model 650/A, specify `w [x:][y]` where `x` is the SCSI target ID of the device and `y` is the unit number (usually 0). For example, if you have configured the drive as SCSI target ID device 3, specify `w3:0` at the prompt.

4. When you have finished option 7, `invol` asks you if you have any more requests. Type `y`, and then enter option `1 -f` to format the disk.

5. `Invol` again prompts for the identity of the disk:

```
Select disk:  [w=Winch|s=Storagemod|f=Floppy|
              q=Quit] [ctrl#:] [unit#]
```

   Specify the the device as you did in Step 3.

6. When the formatting is complete, `invol` again asks if you have any more requests. Type `n` to return to the calling program (operating system or Mnemonic Debugger).

You are now able to `mount` the disk. Refer to Chapter 2 of the *Domain Series 2500 Owner's Guide* (015463) for instructions on how to mount and store files on the disk. The instructions for rewritable optical disks are the same as those for a second Winchester disk.

Note

Because optical media is removable, it is recommended that the media not be included as part of any automatically-mounted file systems. Refer to the host system documentation for more information on mounting and unmounting.

Caution

Damage to the optical read/write mechanism can occur if the unit is moved while a disk is in the drive and the drive is powered off.

Backing Up and Restoring Files

The Model 650/A rewritable optical disk drive can accomodate most backup/restore situations with conventional HP-UX commands. However, your optical disk surface capacity must be equal to or larger than the size of the file system you want to back up.

To obtain infomation about your file system size and the available disk surface capacity use `du`, `df`, and `bdf`. If you have insufficient surface capacity, use the following techniques:

1. Back up smaller pieces of the system (for example, a single file system such as `/usr`).
2. Compress the files you back up; and uncompress the files you restore.

Example Backup to an Optical Disk.

This example assumes a file system named `/srce` (for the backup source) has been created and will be backed up to a file system named `/target`, which has been created and mounted on the optical disk.

Note

If you want to automate the backup process, you can create a script to perform the following steps.

You must have superuser capability to perform these steps.

1. Insert an optical disk into Model 650/A.
2. Mount the `/target` directory onto the optical disk so it can receive the backup.

```
/etc/mount /dev/dsk/mo /target
```

3. Change to the source directory.

```
cd /srce
```

4. Run the following command to perform the backup. Including the `-hidden` and `-depth` options backs up the CDFs if you have an HP-UX cluster. If you do not have a cluster, you can omit them.

```
find . -hidden -depth -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 the optical disk without unmounting it.

```
cd /
/etc/umount /dev/dsk/mo
```

6. After you remove the disk from the drive, put the disk in its container and store it in a safe place.

Restore from an Optical Disk

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

```
/etc/mount /dev/dsk/mo /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 media 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.

A

Specifications

This section provides the physical and environmental specifications for the Model 650/A and the rewritable optical disk.

Model 650/A

Technical Specifications

Rotational Speed	2400 rpm	
Average Seek	95 ms	
Short Stroke Seek (across 2.2 Mbytes)	22 msec	
Full Stroke Seek	185 ms	
Average Rotational Delay	12.5 ms	
Average Access Time	107 ms	
Burst Transfer Rate	1.2 Mbytes/s	
Data Transfer Rate	680 Kbytes/s	(read)
	340 Kbytes/s	(write)

Technical Specifications
Continued

Spin-up	4 seconds	
Spin-down	3 seconds	
Error Rate	1 sector in 10^{14} bytes	
Interface	SCSI	(single-ended asynchronous)

Physical Characteristics

Height	4.25 inches	105 mm
Width	12.8 inches	325 mm
Depth	11.2 inches	285 mm
Weight	19.0 pounds	8.6 kg

Environmental Specifications

Temperature Gradient	10 Deg. C/hour	
Temperature (operating)	10 to 40 Deg. C	
Temperature (non-operating)	-30 to 60 Deg. C	
Relative Humidity (operating)	10 to 90 percent	non-condensing
Relative Humidity (non-operating)	5 to 90 percent	
Max. Wet Bulb Temperature	29 Deg. C	
Shock (non-operating)	80 G @ 3msec,\halfsine waveform	end-use, handling
Vibration (operating)	0.21 G rms	5-500 Hz
Vibration (non-operating random)	2.40 G rms	"
Vibration (non-operating swept-sine)	0.75 G 0-peak	"
Altitude (operating)	15,000 feet	4,600m
Altitude (non-operating)	50,000 feet	15,300m
Acoustic Emissions	5.0 Bels	A-weighted sound power

Power Requirements

Line Voltage (120V setting)	100-120V	single-phase
Line Voltage (240V setting)	200-240V	"
Line Frequency	50-60Hz	
Power Consumption (typical)	175 Watts	

Service Characteristics

Mean time to repair	30 minutes
Preventive maintenance	none required

Product Certifications

Safety	IEC 380; 435
	UL 478 Listed (5th Edition)
	CSA 220-M1986
	TUV approved to VDE 0806
Electromagnetic emmisions	FCC 47 CFR Part 15 Subpart J - Class "A"
	FTZ 1046/84 - Level "B"
	CISPER 22, 0DB Relaxation; SABS
Laser	IEC 825
	CDRH 21 CFR Chapter 1, Subpart J Registered
	TUV approved to VBG93, VDE 0837
	TTL to Decision 472
	BS 4803 part 2 Approved

Rewritable Optical Disk

Physical Characteristics

Disk	5.25 in. diameter	(130 mm)
Capacity (1,024-byte sectors)	650 Mbytes (325 Mbytes/side)	formatted
Capacity (512-byte sectors)	594 Mbytes (297 Mbytes/side)	formatted
Format	Continuous Composite (C*C)	(ISO 10089)
Bytes Per Sector	1024/512	media dependant
Sectors Per Track	17/31	"
Tracks per side	18751	
Tracks per inch	15875	
Security	Write Protect Tab	1 per side

Environmental Specifications

Temperature (operating)	10 to 50 deg. C	
Temperature (non-operating)	-10 to 50 deg. C	long term (> 14 days)
	-10 to 55 deg. C	short term (≤ 14 days)
Temperature Gradient	10 deg. C per hour	
Maximum Wet Bulb Temperature	29 deg. C	
Humidity (operating)	10 to 80 percent	non-condensing
Humidity (non-operating)	10 to 90 percent	"

B

Supplies and Sales Offices

Accessories

A full range of computer supplies may be ordered through Hewlett-Packard. You may obtain the *Computer Users Catalog* by phoning 800-538-8787 or write to:

HP Direct Hewlett-Packard P.O. Box 3640 Sunnyvale, California 94088-3640

If you wish to place an order from outside the United States, contact your local sales office.

The following is a list of basic supplies and reorderable parts given here for your convenience.

Item	HP Part Number
3-amp fuse	2110-0003
Replacement fuseholder cap	2110-0565
3-amp fuse (250-volt)	2110-0780
Replacement fuseholder cap	2110-0567
Additional Optical Disk Cartridges (1024-byte sector)	92280A
0.5m (1.6 ft.) SCSI peripheral interface cable	
HP-UX workstations	92222A
Apollo workstations	8120-5362
1m (3.3 ft.) SCSI peripheral interface cable	
HP-UX workstations	92222B
Apollo workstations	8120-5363
2m (6.6 ft.) SCSI peripheral interface cable	
HP-UX workstations	92222C
Apollo workstations	8120-5364
1m (3.3 ft.) SCSI extender cable	92222D
SCSI terminator	1252-3251
Emergency Eject Tool	C1701-88800
19-inch rackslide kit	19500B
Series 6300 Model 650/A User's Guide	C1701-90000

Sales and Support Offices

United States:

Hewlett-Packard
4 Choke Cherry Road
Rockville, MD 20850
(301) 948-6370

Hewlett-Packard
5161 Lankershim Blvd.
North Hollywood, CA 91601
(818) 505-5600

Hewlett-Packard
5201 Tollview Drive
Rolling Meadows, IL 60008
(312) 255-9800

Hewlett-Packard
2000 South Park Place
Atlanta, GA 30339
(404) 955-1500

Canada:

Hewlett-Packard (Canada) Ltd.
6877 Goreway Drive
Mississauga, Ontario
Canada, L4V 1M8
(416) 678-9430

Europe:

Hewlett-Packard S.A.
World Trade Center
110 Avenue Louis Casai
1215 Cointrin, Geneva, Switzerland
(022) 98 96 51

Australia/New Zealand:

Hewlett-Packard Australia Ltd.
31-41 Joseph Street
Blackburn, Victoria 3130, Australia
895-2895

Japan:

Yokogawa-Hewlett-Packard Ltd.
29-21 Takaido-Higashi 3 Chome
Suginami-Ku, Tokyo 168
(03) 331-6111

Far East Area:

Hewlett-Packard Asia Ltd.
47/F, 26 Harbour Road
Wanchai, Hong Kong
G.P.O. Box 863, Hong Kong
5-8330833

Latin America:

Hewlett-Packard Company
Intercontinental Headquarters
3495 Deer Creek Road
Palo Alto, CA 94304 USA
(415) 857-1501

C

SCSI Commands

The following SCSI commands can be used with the HP Model 650/A. (To obtain a detailed description of these commands contact your HP sales representative.)

Group 0 Commands (6-byte command)

00H	TEST UNIT READY - Provides a means to check if the logical unit is ready.
01H	REZERO UNIT - Moves the optical head to the physical track 0.
03H	REQUEST SENSE - Requests the detailed error information.
04H	FORMAT UNIT - Initializes the medium.
07H	RE-ASSIGN BLOCKS - Re-assigns the defective sectors.
08H	READ - Reads data from the specified logical block address.
0AH	WRITE - Writes data to the specified logical block address.
0BH	SEEK - Moves the optical head to the physical track where the specified logical block exists.
12H	INQUIRY - Reads the information related to the controller and the drive unit.

15H	MODE SELECT - Sets medium, drive unit, or controller unit parameters.
16H	RESERVE - Gains the exclusive control of a specified logical unit.
17H	RELEASE - Releases a specified logical unit from the reservation state.
18H	COPY - Copies data from a specified logical unit to another or to the same logical unit.
1AH	MODE SENSE - Reads medium, drive unit, or controller unit parameters.
1BH	START/STOP UNIT - Starts or stops rotating the medium, and/or ejects the medium from the drive unit.
1CH	RECEIVE DIAGNOSTIC RESULTS - Requests analysis data be sent to the initiator.
1DH	SEND DIAGNOSTIC - Requests the disk controller to perform diagnostic tests.
1EH	PREVENT/ALLOW MEDIUM REMOVAL - Prevents or allows removal of the medium in the logical unit.

Group 1 Commands (10-byte command)

25H	READ CAPACITY - Reads capacity of the medium.
28H	READ - Reads data from the specified logical block address.
2AH	WRITE - Writes data to the specified logical block address.

2BH	SEEK - Moves the optical head to the physical track where the specified logical block exists.
2CH	ERASE - Executes erase operation from the specified logical block address.
2EH	WRITE AND VERIFY - Writes data to the medium and then verifies the written data by checking the error correction code.
2FH	VERIFY - Verifies the data starting from the specified logical block address by checking the error correction code.
37H	READ DEFECT DATA - Reads the medium defect information.
3AH	COPY AND VERIFY - Copies data from a specified logical unit to another or to the same logical unit and then verifies the written data by checking the error correction code.
3BH	WRITE BUFFER - Writes data to the data buffer of disk controller.
3CH	READ BUFFER - Reads data from the data buffer of disk controller.
3EH	READ LONG - Reads data from the specified logical block address with ECC data.
3FH	WRITE LONG - Writes data to the specified logical block address without using the ECC generation circuitry.

Group 7 Commands (10-byte command)

FEH	EXECUTE DATA - Installs and/or executes the code segment downloaded.

Glossary

Block device file
: A type of device file that buffers the I/O. Reads and writes to block devices are done in "block" mode (data is transferred one block at a time).

Character device file
: A type of device file that doesn't buffer the I/O. Reads and writes to character devices are done in "raw" mode, character by character.

Continuous Composite (C*C)
: A type of format that describes the physical, optical, and data format characteristics of a disk (ISO 10089-2A).

Device file
: The file associated with an I/O device. Device files are read and written just like ordinary files, but requests to read or write result in activation of the associated device.

Error Detection and Correction
: The identification and correction of data errors which occur in the reading and writing processes. Redundant information on the disk is used to detect errors. Error Detection Codes along with Error Correction Codes are used to reconstruct the data after an error occurs.

File system

The organization of files and folders, associated with a block device file, on a hard disk or a rewritable optical disk.

Magneto-Optical (MO)

Rewritable Optical technology which uses a plastic disk with a magnetic layer. To write, a spot on the magnetic layer is heated by a laser to a point where it can be magnetically altered by the write magnetic head. To read, the light from a second, low power laser is reflected from the spot. The magnetic alteration causes the light to be polarized in one direction (interpreted as a "1") or the opposite direction (interpreted as a "0").

Mount

The process where an additional, or functionally independent, file system is attached to the root file system.

Read/Write Head

A part of the assembly that heats and alters the magnetic layer of the disk. To write a spot on the magnetic layer is heated by a laser to a point where it can be magnetically altered by the write magnetic head. To read, the light from a second, low power laser is reflected from the spot. The magnetic alteration causes the light to be polarized in one direction (interpreted as a "1") or the opposite direction (interpreted as a "0").

Rewritable Optical

An optical disk technology in which data can be repeatedly written.

Terminator

A resistor array device used for terminating a SCSI bus line. If more than one device is connected to the SCSI bus controller, no terminator is necessary.

Write-Protect

To protect the data on the disk from being erased or overwritten using a write-protect tab located on either side of the disk cartridge.

Index