

OptiPac 8631AF User's Manual

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Revision A

© Copyright 2004

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Important FCC Information

This peripheral device generates and uses radio frequency energy and if it is not installed and used properly, that is, in strict accordance with this manual, it may cause interference to radio and television reception. It has been type tested and found to comply with 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 when operated in a commercial environment. However, there is no guarantee that interference will not occur in a particular installation. Operation of this equipment in a residential area is likely to cause interference and is up to the user, at his own expense, to take whatever measures may be required to correct the interference. You can test to see whether this equipment does cause interference with radio or television reception by turning the disk drive off and on. If it is causing interference, try to correct the problem by one or more of the following measures:

- Be sure you're using shielded interconnect cables.
- Reorient the receiving antenna.
- Relocate the drive with respect to the receiver.
- Move the receiver away from the disk drive, or vice versa.
- Plug the computer into a different outlet so that the computer and receiver are on different circuits.

If necessary, consult your dealer or an experienced radio/television technician for additional suggestions. You may also find a booklet prepared by the Federal Communications Commission helpful. It is entitled *How to Identify and Resolve Radio-TV Interference Problems*. Request Stock No. 004-000-00345-4, from the U.S. Government Printing, Washington, D.C., 20402.

Warning:

To prevent fire or shock hazard, do not expose the unit to rain or moisture. To avoid electrical shock, do not open the cabinet. Refer servicing to qualified personnel only.



The OptiPac product is classified as a CLASS 1 LASER PRODUCT.

A CLASS 1 LASER PRODUCT label is located on the top cover of the internal drive mechanism.

Printing History

If the Revision level of the manual does not change from one printing to the next, this indicates that the newer printing is a maintenance upgrade, i.e. typographic errors, page references, etc.

New revision levels of the manual indicate a new rewrite of the manual. This may include new installation instructions for a particular operating system, or a new ROM version of the OptiPac subsystem. If the new revision is because of a difference in the operating procedures for the system, the ROM version associated with the manual Rev letter will be listed in the ROM Ver column. You can determine the ROM version of your OptiPac by using the front panel LCD controls. See chapter 4 for details.

If you have upgraded your OptiPac to a later version than the last one listed in the following table, you should contact Bering Customer Service to determine the proper revision of the *OptiPac 8631AF User's Manual* required for your OptiPac subsystem.

Date = Date this manual was printed
Rev = Revision level of this manual
ROM Ver = Applicable subsystem ROM level

Date	Rev	Rom Ver	Changes to manual
Aug 2004	A	F.30	Initial release

Warranty Statement

OptiPac products sold in the U.S.A. and Canada carry a standard one year warranty against defects in materials and workmanship.* During the warranty period, Bering will, at its option, repair or replace equipment which proves to be defective.

OptiPac cartridge media is warranted against defects for one year from the date of purchase. If the media becomes defective, Bering will replace it upon receipt of the defective media from the customer.

All repairs will be performed at the factory. Any other arrangement, such as on-site service, will be at your expense. Before any product is returned for repair, a Return Materials Authorization number (RMA#) must first be obtained from a Customer Service representative.

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The selection and use of media, supplies, and consumables is the customer's responsibility. Bering reserves the right to exclude from the warranty any damage caused by misuse of the product, unauthorized modification, shipping damage, non-Bering-approved media, interface, software, or cleaning supplies.

NO OTHER WARRANTY IS EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. BERING SHALL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES, DIRECTLY OR INDIRECTLY RELATED TO THE USE OR PERFORMANCE OF BERING PRODUCTS.

*For products sold outside the U.S.A. and Canada, contact your local Bering distributor, representative, or dealer for warranty terms. Repairs and upgrades carry a limited time warranty. Contact a Bering sales representative or Customer Service Representative for details on the warranty period for replaced parts and upgrades.

Configuration Settings

Use this table to record the configuration settings of your Bering OptiPac cartridge disk drive subsystem.

Model _____ Serial Number _____

Time Zone _____

HP-IB address _____

Drive button Enabled Disabled

CS 80 format Enabled Disabled
Resets to enabled after power off

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INTRODUCTION

Congratulations on purchasing what we think is the finest removable cartridge system on the market. Bering OptiPac drives are built for years of reliable service. We're sure you'll agree as you begin to work with your drive.

Features

Bering OptiPac-3 series drives are compatible with HP computer systems with HP-IB interfaces. In this manual we refer to the Bering OptiPac-3 subsystem as *OptiPac* and all HP systems as *computer* unless otherwise indicated.

The Bering OptiPac-3 8631AF is a subsystem consisting of a 3.5 inch removable magneto optical cartridge drive in combination with a fixed disk to meet the mass storage requirements of any operating system.

- 8631AF - a 1.3GB Magneto-Optical / Multi Function Cartridge drive with a 30GB removable fixed disk

The OptiPac 8631AF subsystem uses a 3.5 inch removable cartridge which can store 1.3GB of data. This means:

- Your storage capacity is limited only by the number of cartridges you use.
- Each OptiPac removable fixed disk and MO cartridge contains multiple volumes called rings, so physical removal is not required to change to another ring. The fixed disk and the MO cartridge each contain 10 rings (H0-H9 and 0-9).
- Each ring has a capacity of 20MB. Each ring volume on the OptiPac 8631AF emulates an HP 7907 20MB volume.
- Your data is portable and secure. Just remove the cartridge and fixed disk from the drive and take it with you, or store it in a safe place.
- Your MO data cartridge is protected in a durable lexan case.
- Your OptiPac cartridge can be used to back up the data on fixed disks if your backup software supports that option.
- Front panel controls provide off-line copying of data from the fixed disk to the cartridge or from the cartridge to the fixed disk.
- Each ring on the fixed disk is equivalent in size to a ring on the cartridge in the MO drive.

The OptiPac provides fast, reliable storage that's always on hand. The installation procedure is almost identical for all models. No software or hardware modifications are required.

▲ DANGER:

Use of the OptiPac other than as prescribed in this manual may result in exposure to hazardous invisible laser radiation if the case is open during operation. Avoid direct exposure to laser radiation. Do not operate the OptiPac while the cover is removed.

Compatibility

The OptiPac subsystems read, write, and format ISO 128MB, 230MB, 640MB cartridges, and the GIGAMO 1.3GB MO cartridge. Use the "Show Cartridge Information" function using the front panel control buttons to determine the size of an inserted cartridge.

Magneto-Optical Technology

All of the Bering OptiPac disk drives are based on magnetic and optical technology. Like fixed disks, a Magneto-Optical drive writes data to the cartridge using a strong magnet that changes the magnetic fields at specific locations from 1's to 0's and vice versa. But because of the polycarbonate surface of the cartridge, the magnet is not powerful enough to change the polarity of a bit by itself. This is where the optical part of the write process comes in. In order for the magnet to change the polarity of a bit, the area must be heated to a high temperature by a focused, fine-point laser.

Because of the Polycarbonate substrate on the cartridge, data stored on Magneto-optical cartridges is highly secure for a long period of time. The estimated storage life of data stored on this media is greater than twenty years. Also the magnetic head does not "float" next to the surface such as fixed disks. This means it is virtually impossible for the head to crash.

Conventions in this Manual

We'll use the following conventions to make the information in this manual more clear and predictable:

- **Keys** on the keyboard are indicated by capital letters enclosed in square brackets, e.g., [ENTER], regardless of whether the characters on your keys are actually capitalized. On the other hand, **buttons** on the OptiPac are indicated by underlined capital letters alone followed by the word *button*, e.g., ENTER button.
- A monospaced type font, like `this`, is used to convey text you should see on your screen, e.g., "you'll see: Welc`ome!` on your monitor."
- The same monospaced font in contrast (either bold or regular) to the surrounding text, like `this`, is used to present the exact characters or keys you are to type or press, e.g., "type `UTIL` and press [`ENTER`] to continue." However, these keystrokes will not be typographically differentiated if they are conditional or theoretical. That is, if you have the option of making one of several entries or we are speaking of hypothetical situations, e.g., "If you type Y and press [ENTER] the disk will be reformatted, but if you type N and press [ENTER] you will exit the program."
- A bold font, like **this**, indicates text you should see on the LCD. The bold font will otherwise follow the conventions herein.
- Commands, program, utility, and file names are capitalized in body text to distinguish them from the rest of the text. However, when in a command line, they will be represented in lower case letters unless upper case (capital) letters are actually required, e.g.:
in body text: "... create a LIF volume using the LIFINIT command."
to be typed: `lifinit /dev/rdisk/B8631AF`
- Italics in any type face, like *this*, have a limited number of possible meanings:
 - Words as words, letters as letters, or numerals as numerals, e.g., "the word *enter* can be confused with the key on your keyboard, therefore we will use *type* in its place."
 - Titles of books, booklets, or disks, e.g., *Bering OptiPac 8631AF User's Manual*
 - Symbolic of variable words, characters, or numerals. That is, something must be in the variable's place, but the exact contents vary with different situations and cannot be specified without knowing a particular situation. *Variable* is not synonymous with *optional*. Frequently the letter(s) *n* (for numerals), or *x* (for words or characters) are used to hold the place of the variable, e.g., "the program will respond that there are *n* widgets."

Unpacking

Carefully unpack your OptiPac near the spot where you want to set it up, noting the packing method as you go. Save the packing materials, they'll come in handy if you ever want to ship the unit.

Besides this manual, you'll find:

- The OptiPac
- A removable fixed disk (installed)
- A removable data cartridge
- 1 set of fixed disk carrier keys
- A power cable
- A warranty card

If any item is missing, please call your dealer or call Bering Customer Service at (408) 364-6500.

INSTALLING THE DISK DRIVE

This chapter describes the installation procedure for the OptiPac and is divided into two sections. The “Quick-Start Procedure” section enables experienced users to begin operation right away. The “Connecting the OptiPac Drive” section helps new users connect the disk drive before going on to the next chapter for additional operating instructions.

Quick-Start Procedure

This section describes the quick-start procedure to set up the OptiPac 8631AF. Most of the configuration is already set at the factory. There may be some adjustments necessary before the OptiPac can operate in your particular environment.

The default configuration settings are as follows:

Date/time	current date/Pacific time
HP-IB address:	0
Drive button	disabled
CS80 Format:	enabled

1. Turn off your computer and connect the OptiPac.
If necessary, refer to the next section in this chapter.
2. Turn on the OptiPac and wait for the self-test to end.
When the test ends without incident, the time and date should be displayed on the front panel LCD and the clock should be running.
3. Check the time and date. Adjust the clock if required.
4. Check the HP-IB address in the configuration function. Make sure all devices on the HP-IB have a unique address.
5. Load a cartridge.
6. Format the cartridge from the Removable Utilities menu. This step is not necessary if the cartridge was previously formatted.
7. Turn on your computer.
8. Begin using the OptiPac.

Connecting the OptiPac Drive**▲ CAUTION:**

These instructions are for connecting an OptiPac 8631AF model to an HP-IB based computer with the OptiPac HP-IB connector.

Turn off your computer and unplug the power cord from the wall outlet. Disconnect any other cables attached to the back panel of your computer that may be in your way.

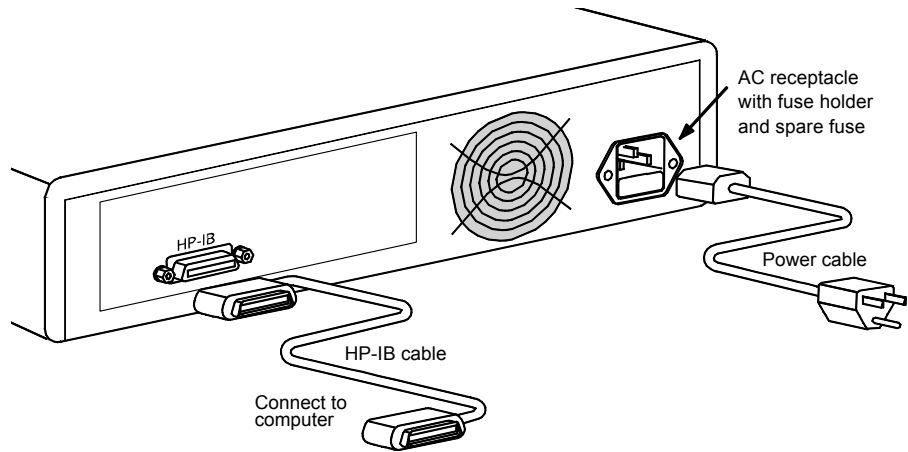


Figure 2-1: Connecting the OptiPac to an HP-IB computer

1. Turn off your computer and the OptiPac drive.
2. Connect one end of the HP-IB cable to the HP-IB connector on the back of the computer and the other end to the HP-IB connector on the back panel of the OptiPac. Tighten the thumb screws by hand.
3. Connect the power cable to the back of the OptiPac. Make sure there is at least one inch of space around the back and two inches around the sides of the drive.
4. Plug the OptiPac and the computer into a grounded electrical outlet or a surge protector.

Be sure that the outlets are grounded. The OptiPac should be on the same circuit as your computer.

▲ CAUTION:

Make sure that other equipment or appliances which might generate electrical noise or a power surge (such as electric typewriters or heaters) are on separate circuits.

5. Turn on the OptiPac, the computer, and any other peripherals.

OPERATING THE DISK DRIVE & CARTRIDGE

8631AF Controls

Figure 3-1 illustrates all controls and indicators required for operating the OptiPac 8631AF.

1. Press the **POWER** button on the front panel of the OptiPac.

The LCD will display a self-test message and the disk drive model number. This operation should take less than a minute. If a cartridge is loaded, a read test will be performed. After the self-test is successfully completed, the time, date and current ring will be displayed on the LCD.

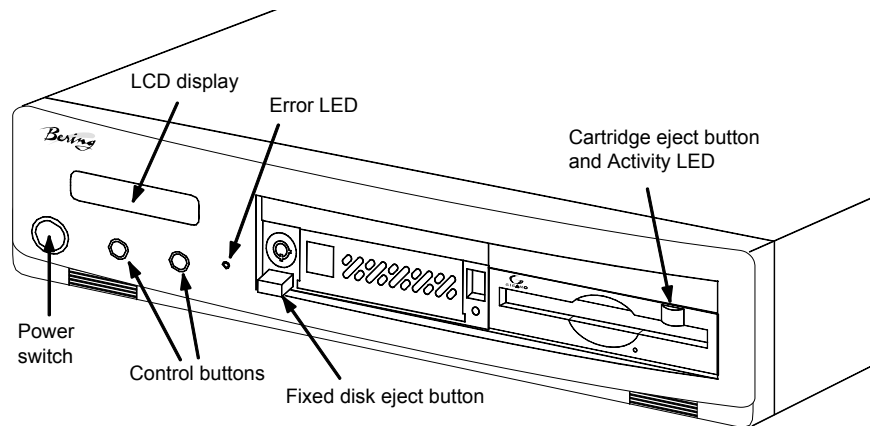


Figure 3-1: OptiPac 8631AF front panel

Cartridge Eject Button

The cartridge eject button by default is disabled. The cartridge will not eject when this button is depressed because the OptiPac controller has issued a lock command to the cartridge drive. The cartridge must be ejected using the **Unload cartridge** function in the LCD main menu. The eject button can be enabled by changing the enabling the drive in the configurations menu on the front panel.

Error LED

The Error LED turns red and stays illuminated when a system error is detected.

Fixed Disk Controls

The OptiPac 8631AF contains a removable fixed disk. The fixed disk has ten volumes called rings. Each ring is 20MB in size. The fixed disk uses a key lock to power on and lock the drive in place. The eject button cannot be pressed while the drive is locked.

The OptiPac is shipped to you with the drive locked in place. When the OptiPac is powered on the drive will also power on. When the OptiPac is on and the fixed disk is unlocked, a small letter "u" will appear on the disk's LCD display. The fixed disk cannot be accessed in this mode.

The fixed disk can be ejected while the disk is unlocked by pressing the eject button.

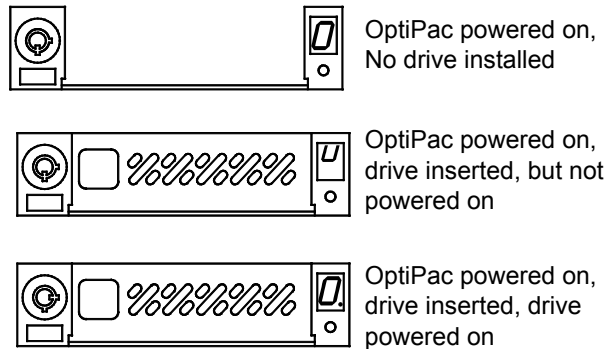


Figure 3-2: Fixed disk LCD indicator

Note: The key is required to lock and unlock the fixed disk for removal and power. To prevent loss, please attach a key to the unit with a wire, string, or other means.

Ejecting the Fixed Disk

To unlock the fixed disk, insert and turn the key clockwise. Wait until the LCD changes to a lower case “u.” Push the eject button to eject the fixed disk. The drive can be ejected with the OptiPac powered on or off.

Inserting the Fixed Disk

To lock and power on the fixed disk, push the fixed disk all the way into the chassis. The LCD will display a lower case “u”, indicating unlocked. Insert and turn the key counter clockwise to power on the drive. The LCD will change to a zero indicating the unit number.

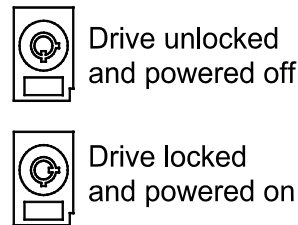


Figure 3-3: Locking and unlocking the fixed disk

Fixed Disk Activity Indicator

While the fixed disk is powered on, the fixed disk activity indicator will flash when the fixed disk is accessed.



Figure 3-4: Fixed disk activity indicator

MO Controls

The MO cartridge is divided into 20 MB rings. The number of rings depends on the size of the cartridge. All cartridges will have ten rings, except a 128MB cartridge, which will have six rings.

The MO drive controls are simple.

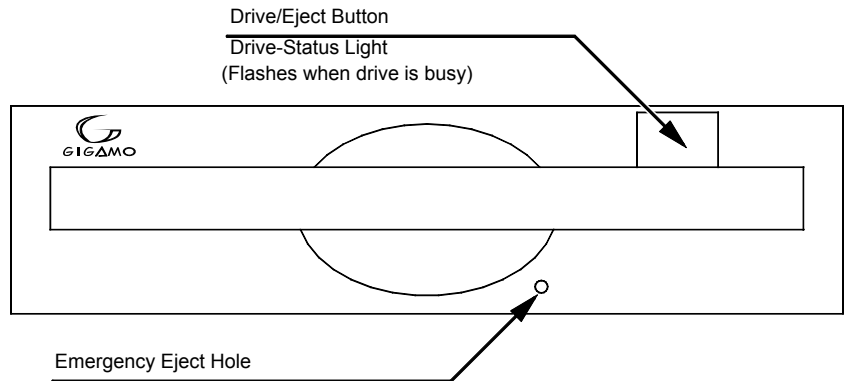


Figure 3-5: MO controls

Emergency Eject Hole

In an emergency, such as a power outage, the cartridge can be manually ejected by inserting a tool into this opening. Read the complete instructions in the section titled “Ejecting a Cartridge Without Power.”

Loading a Cartridge

Loading a data cartridge is very much like loading a diskette.

1. Make sure the OptiPac is turned on before you load a cartridge.
2. Remove the cartridge from its plastic storage case.
3. Insert the cartridge into the drive slot with the label side up and push the cartridge straight in, keeping it parallel with the top and bottom of the drive.
4. Slide the cartridge all the way into the drive.

The activity LED on the front of the removable drive will flash green as the drive spins up. After a brief test, the LED will extinguish when the drive is ready. Thereafter, the status LED will flash whenever the removable disk is accessed.

▲ CAUTION:

Never move or transport the OptiPac with a cartridge in the drive. This may damage the cartridge and cause read/write head damage.

Compatibility

The OptiPac subsystems read, write, and format ISO 128MB, 230MB, 640MB cartridges, and the GIGAMO 1.3GB MO cartridge.

Ejecting a Cartridge

It is important to remove the cartridge before you turn off the OptiPac. If you leave the cartridge in the drive, the shutter remains open and the recording media itself is vulnerable to dust. If the OptiPac is turned off prior to cartridge removal, the automatic disk spin-down operation does not occur and the cartridge disk will spin freely for up to 45 seconds. Attempting to remove the cartridge during this time may damage the media.

The OptiPac must be turned on before you can unload a cartridge. If the drive button is enabled, which is the default, just press the eject button on the front of the MO drive and proceed directly to step 3. If the drive button is disabled perform the following steps to eject a cartridge.

1. With the time function displayed on the LCD, push the **SELECT** button on the front panel.

The **Unload cartridge** function(s) will be displayed.

Unload cartridge

2. Push the **ENTER** button to execute the command.

The cartridge will spin down and eject from the drive.

Note:

NEVER eject a cartridge while the file system is mounted on your operating system.

3. Remove the cartridge carefully and place it in the protective plastic storage case immediately.

Remember to label and date the cartridge for future reference. Do not mark on labels with a graphite pencil. The graphite dust may contaminate the disk surface. Refer to Chapter 5, "Caring for The Disk Drive & Cartridge," for further information on cartridge care.

Ejecting a Cartridge Without Power

▲ CAUTION:

Never manually eject a cartridge while the power is on. This can damage the drive and invalidate the warranty.

1. Wait for 45 seconds or more after the power is off.
2. Insert a paper clip into the emergency reject hole on the front of the drive.
3. Gently push the paper clip into the hole until the cartridge pops out.
4. Return the cartridge to its protective case for storage or transport.

Write-Protecting a Cartridge

The MO cartridge can be physically write protected by pushing open the slide cover on the cartridge. This is similar to write protecting a floppy diskette.

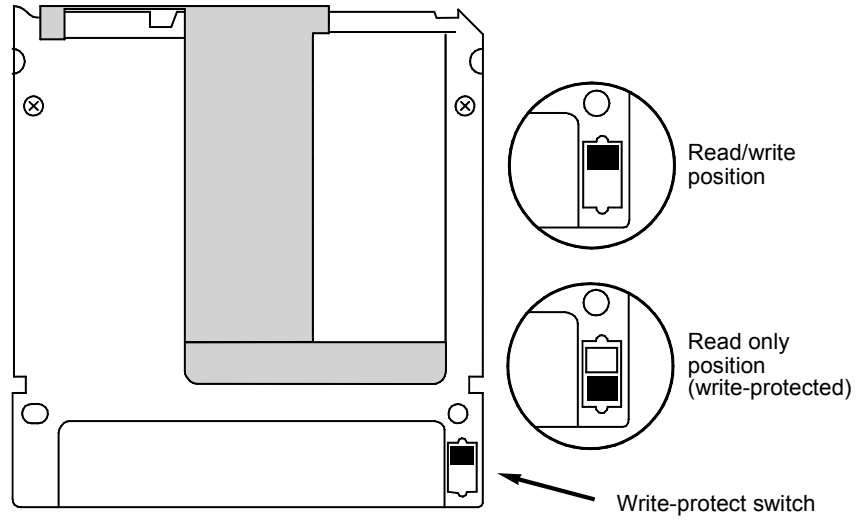


Figure 3-6: Cartridge write-protect switch

This chapter describes the OptiPac configuration and operating procedures. The OptiPac 8631AF features a push-button operation for performing configuration and operating procedures. This procedure is based on a hierarchical structure of system functions displayed on the disk drive's LCD. All procedures can be performed using the two front panel push-button controls: **SELECT** and **ENTER**.

These instructions should be used in conjunction with your specific HP computer's configuration procedure given in your operating system manuals.

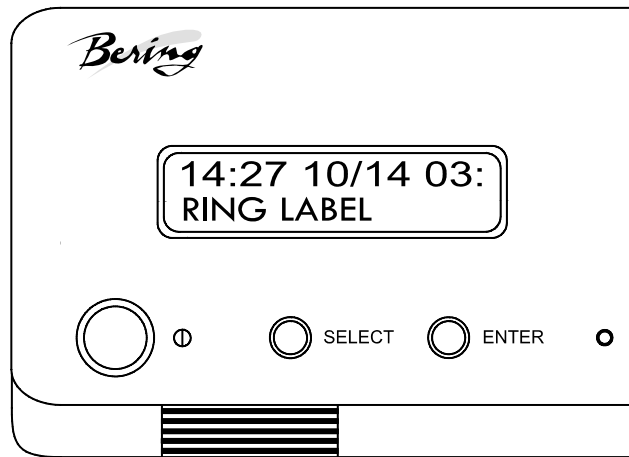


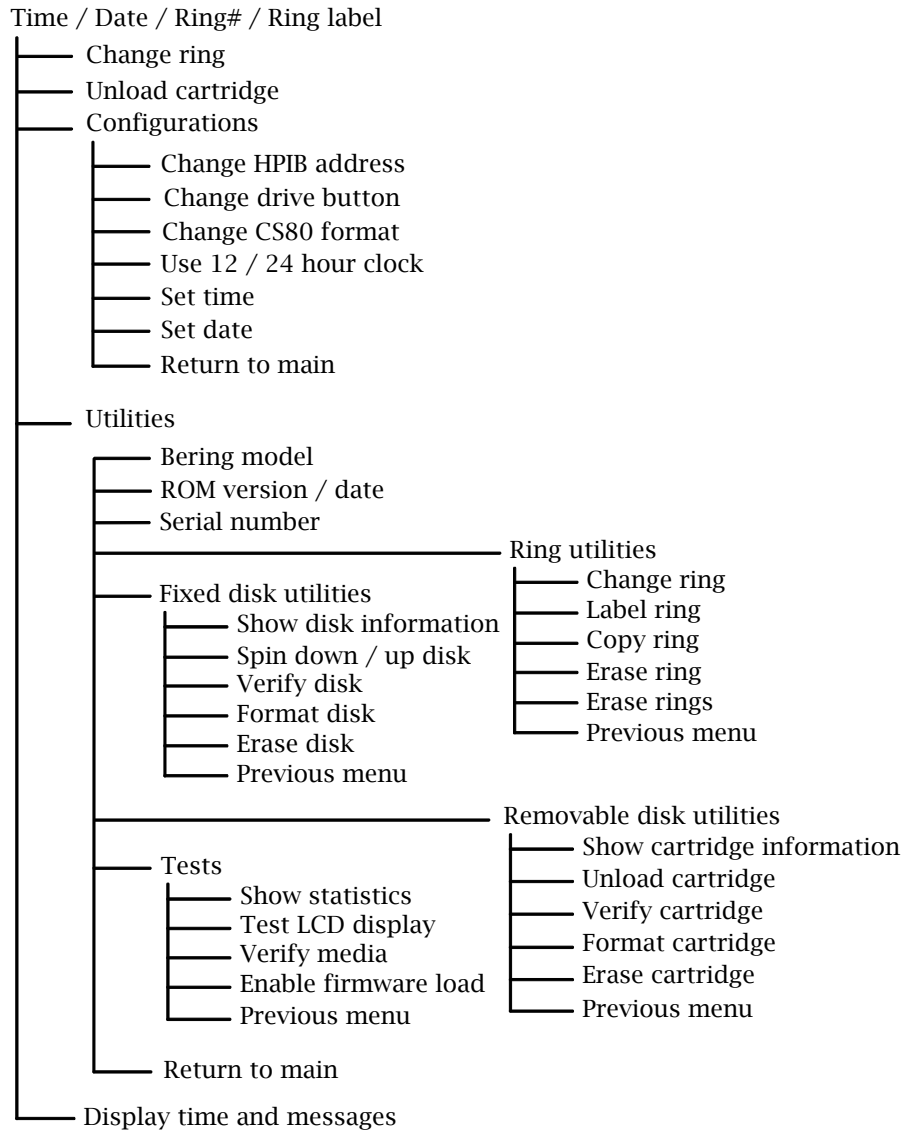
Figure 4-1: Front panel LCD and push-button controls

All system operations are performed by first selecting a function and then entering it for execution. The **SELECT** button enables you to scroll through all the available system functions and select desired choices. The **ENTER** button enables you to execute the chosen function.

- To select a system function, press the **SELECT** button until the desired function appears on the LCD.
- To execute the chosen function or display its options, press the **ENTER** button.
- If you want to abort the current operation, press the **SELECT** and **ENTER** buttons simultaneously.
The abort function is allowed only during certain operations.
- To scroll or step backward in a menu, press and hold the **SELECT** button first and then the **ENTER** button.

System Menu

This section contains a menu structure of the commands which can be accessed from the front panel LCD display and controls.



Main Menu

The default display on the front panel LCD is the time/date. When the **SELECT** button is pressed, the first choice of the Main menu will be displayed. You can scroll the Main menu by repeatedly pressing the **SELECT** button. To execute the selected function or to enter the sub-menu, press the **ENTER** button. The time/date display will look appear similar to the following display when the system is first powered on and when the unit is on-line:

14:15 7/12 05
RING LABEL

The time, date, current ring, and ring label are displayed. If the current ring has not been labeled, the bottom of the display will be blank.

The fixed disk and the cartridge each have ten volumes called rings. You can load multiple sets or copies of data or software on different rings. Changing to another ring is equivalent to removing and replacing an HP 7907 20MB cartridge.

Ring H00 is always unit 0, and the ring displayed on the LCD will be unit 1. Rings beginning with H, such as H05, are on the hard disk, while rings without the H, such as 07, are on the MO cartridge. The rings are numbered from 00 to 09 and H00 to H09.

Note: Attempting to perform any function on a new or unformatted cartridge will cause the following message to display:

Media not
initialized!

The cartridge must be formatted from the Removable Utilities menu before it can be used.

If a cartridge was formatted on an OptiPac 8600 other than the 8631AF, only one ring will be configured. If the data on the cartridge is more than 20MB, only the first 20MB will be accessible. The cartridge must be formatted in the 8631AF to see all ten rings.

The following options are available from the Main menu:

Change ring
Unload cartridge
Configurations
Utilities
Display time and messages

Change Ring

This function allows you to change the current ring. Each ring is equivalent to a 7907 20MB cartridge. When you return to the main menu the current ring will be displayed. You cannot change to ring H00 on the fixed disk.

1. Press the **SELECT** button until the Change ring function is displayed on the Main menu.
2. Press **ENTER** to select this option.

3. Use the **SELECT** button to scroll through the ring selections until you see the desired ring, then press the **ENTER** button.

Note: Removing a cartridge while the current ring is set to the cartridge will cause the unit to go off-line.

Unload Cartridge

Use this function to unload the cartridge from the drive.

1. Use the **SELECT** button to choose the function you want to initiate from the Main menu:

Unload cartridge

2. Press the **ENTER** button.

If the cartridge is in use by the operating system, the following message will appear.

Cartridge in use
UNLOAD IT! (NO)

3. Press the **SELECT** button to select **Yes**, if need be; when **Yes** is selected, press the **ENTER** button to eject the cartridge.

Configurations

This function sets the HP-IB address, enables or disables the drive eject button, selects the 24 hour clock format, and sets the date and time. See the “Configurations Submenu” section for detailed information.

Utilities

This function shows cartridge/disk information; verifies, and formats the cartridge; formats the fixed disk; erases cartridge data; performs ring functions, and performs test functions. Refer to the “Utilities Submenu” section for detailed information.

Display Time and Messages

This function exits the Main menu and displays the current date, time, and system messages.

Configurations Submenu

This function sets the HP-IB address, changes the format switch, and sets the date and time.

1. Press the **ENTER** button when the Configurations function is displayed on the Main menu.

The Configurations submenu will offer these functions:

- Change HP-IB address
- Change drive button
- Change C580 format
- Use 12 / 24 hour clock
- Set time
- Set date
- Return to main

2. Press the **SELECT** button to scroll through the functions.

To return to the Main menu, press the **ENTER** button when you see **Return to main**.

Change HP-IB Address

This function sets the HP-IB address of the OptiPac. The values range from 0 to 7. When selecting the HP-IB address, make sure each device on the same HP-IB has a unique address.

1. Press the **ENTER** button to execute this function.

The following message will appear:

HP-IB address = 0

2. Press the **SELECT** button to scroll through all the choices, then press the **ENTER** button to select the correct address.

The OptiPac will reset to the new value.

Change Drive Button

This function enables or disables the Eject/Drive button on the MO cartridge drive. The default setting has the Drive button disabled, permitting cartridge removal only by using the Unload cartridge function. This allows the OptiPac to communicate with the host system to request permission for cartridge removal. Enabling this function allows ejection of the cartridge by pressing the eject button on the front of the drive.

1. Press the **ENTER** button to execute this function.

The following message will appear:

disable / enable drive
button

2. Press the **SELECT** button to toggle between **disable** and **enable**.
3. Press the **ENTER** button to select the desired function. The **disable** function is recommended.

**Change CS80
Format**

Use this function to disable the CS80 FORMAT command when you want to speed up the initialization process or to prevent accidental execution of the FORMAT utility. The default is enabled. When the OptiPac is powered on, this function will always change to enabled.

▲ CAUTION:

When the FORMAT command is enabled, the INITIALIZE utility or command can overwrite the existing directory with a new one causing the loss of all of your files.

1. With the Change CS80 format function displayed, Press the **ENTER** button to initiate this function.

The following message will appear.

Disable/Enable CS80
format command

2. Press the **SELECT** button to toggle between disable and enable.
3. Press the **ENTER** button to select the desired function.

**Use 12 / 24 Hour
Clock**

This function changes the clock display on the front panel LCD from a 12 hour clock to a 24 hour clock or vice versa.

1. Press the **ENTER** button until the Use 12 / 24 hour clock function is displayed on the Configurations menu.
2. Press **ENTER** to select this option.
3. Use the **SELECT** button to toggle between 12 and 24. Then press the **ENTER** button when the desired option is displayed.

Set Time

This function allows you to change the time.

1. With the Set time function displayed, press the **ENTER** button.

You'll see:

Set time
3:15:27 PM

The actual time displayed will vary. The hour field will be blinking.

2. Press the **SELECT** button to increment the hour.

Holding the **SELECT** button will cause the hour to increment (through twelve hours) continuously. If you continue to hold down the **SELECT** button, incrementing will speed up.

To decrement the hour, press and hold the **SELECT** button, and then press the **ENTER** button. Again, decrementing will be continuous and speeds up if you hold the buttons down.

3. When the correct hour is displayed, press the **ENTER** button.
4. **SELECT** and **ENTER** the correct minute setting just as you did the hour.
5. **SELECT** and **ENTER** the correct setting for seconds.

Set Date

6. **SELECT** and **ENTER** the correct AM/PM setting.

You will now be returned to the **Set time** option.

This function allows you to change the date.

1. With the **Set date** function displayed, press the **ENTER** button.

You'll see:

Set date
Wed Jan 16, 2002

The actual date displayed will vary. The day field will be blinking.

2. Press the **SELECT** button to increment the day.

Holding the **SELECT** button will cause the day to increment (through twelve hours) continuously. If you continue to hold down the **SELECT** button, incrementing will speed up.

To decrement the day, press and hold the **SELECT** button, and then press the **ENTER** button. Again, decrementing will be continuous and speeds up if you hold the buttons down.

3. When the correct day is displayed, press the **ENTER** button.
The month field will start to blink.
4. **SELECT** and **ENTER** the correct month setting just as you did the day.
5. **SELECT** and **ENTER** the correct date setting.
6. **SELECT** and **ENTER** the correct year setting.

After you have made this setting, you'll be returned to the **Set date** option.

Utilities Submenu

This function shows cartridge or fixed disk information; verifies, and formats the cartridge; copies and erases cartridge data; formats and verifies the fixed disk; and performs test functions via these options:

- **MODEL NUMBER** — Displays the model number of the OptiPac.
- **ROM VERSION** — Displays the firmware version number and release date.
- **SERIAL NUMBER** — Displays the serial number of the OptiPac which is stored in the CMOS memory.
- **RING UTILITIES** — Changes rings; labels rings, copies rings, and erases rings. Refer to the “Ring Utilities Submenu” section for detailed information.
- **FIXED DISK UTILITIES** — Shows disk information; verifies, and formats the disk. Refer to the “Fixed Disk Utilities Submenu” section for detailed information.
- **REMOVABLE DISK UTILITIES** — Shows cartridge information; unloads, verifies, and formats the cartridge. Refer to the “Removable Disk Utilities Submenu” section for detailed information.
- **TESTS** — Tests the LCD, verifies, and certifies media. Refer to the “Test Submenu” section for detailed information.

To access and exit these utilities ...

1. Press the **ENTER** button when the Utilities function is displayed on the Main menu.

The Utilities submenu appears and displays the following functions:

Model number
ROM version
Serial number
Ring utilities
Fixed disk utilities
Removable disk utilities
Tests
Return to main

2. Press the **SELECT** button to scroll through the information or functions.
3. When you see Return to main , press the **ENTER** button to return to the Main menu.

Ring Utilities Submenu

This function changes rings, labels rings, copies rings, and erases rings. Ring "H00" indicates the first ring on the hard disk. Ring H00 emulates the hard disk in a HP 7907 disk unit. All other rings emulate removable disks.

1. Press the **ENTER** button when the Ring utilities function is displayed on the Utilities submenu.

The Ring utilities submenu then appears displaying these functions:

Change ring
Label ring
Copy ring
Erase ring
Erase rings
Previous menu

2. Press the **SELECT** button to scroll through the information or functions.
3. You can return to the Utilities menu by pressing the **ENTER** button when you see Previous menu.

Change Ring

This function allows you to change the current ring. When you return to the main menu the current ring will be displayed. Press the **SELECT** button until the **Change ring** function is displayed. You cannot change to ring H00.

1. Press **ENTER** to select this option.
2. Use the **SELECT** button to scroll through the ring selections until you see the desired ring, then press the **ENTER** button.

Note:

Removing a cartridge while the current ring is set to the cartridge will cause the OptiPac to go off-line.

Label Ring

This function allows you to change the label of the current ring. The main menu will display the current ring label. The label can be up to 15 characters in length. You cannot access ring H00 with this function. To label ring H00, copy H00 to another ring, label the new ring, then copy the labeled ring to H00.

1. Press the **SELECT** button until the **Change Label** function is displayed on the Ring utilities menu.
2. Press the **ENTER** button to select this option.
The current label will display.
3. Press the **SELECT** key to scroll through the characters (A-Z, 0-9) for the desired digit. A space is represented by an underscore character.
4. Press the **ENTER** key to select a letter and go to the next digit.

Copy Ring

This function allows you to copy any ring to any other ring. This function can be used to declassify a ring by copying a declassified ring to it. The label of the source ring will also be copied to the target ring.

1. Press the **SELECT** button until the **Copy** ring function is displayed on the Ring utilities menu.
2. Press **ENTER** to select this option.
3. Use the **SELECT** button to scroll through the copy from ring selections until you see the desired source ring, then press the **ENTER** button.
4. Use the **SELECT** button to scroll through the copy to ring selections until you see the desired target ring, then press the **ENTER** button.

You will see a display similar to this:

```
H00 Label...
00      No
```

The above example copies from ring H00 on the fixed disk to ring 00 on the MO cartridge.

5. Press the **SELECT** button to change **No** to **Yes** and press the **ENTER** button to start the copy process.

Erase Ring

This function will erase the current ring by performing a DOD wipe delete. This wiping of data is done by first filling the sectors with the hexadecimal characters FF and 00 three times each, then to write the hexadecimal character F6 once. This method prevents any traces of data from being read, even with sophisticated techniques.

1. Press the **SELECT** button until the **Erase** ring function is displayed on the Ring utilities menu.
2. Press **ENTER** to select this option.
3. Press the **SELECT** button to toggle between **Yes** and **No** and press the **ENTER** button when your selection is displayed.

A display similar to the following will display.

```
Erasing ring H06
1/7 nnnnnnn
```

After confirming your selection the erase function will begin. It takes approximately 2 minutes to erase a 20MB ring on the fixed disk and 3 minutes to erase a ring on the cartridge.

When the erase function is complete, the label of the erased ring will be "aaaaaaaaaaaa" because that was the last pattern written.

Erase Rings

This function is identical to the Erase ring function, except it will erase a sequential range of rings. You will be asked for a beginning ring and the number of rings to be erased.

1. Press the **SELECT** button until the Erase rings function is displayed on the Ring utilities menu.
2. Press **ENTER** to select this option.
3. Use the **SELECT** button to scroll through the erase from ring selections until you see the desired beginning ring, then press the **ENTER** button.
4. Use the **SELECT** button to scroll through the number of rings selections until you see the desired number of rings to be erased, then press the **ENTER** button. The value will default to the number of rings between the current ring and the end of the drive you are currently on.

▲ CAUTION:

Remember to count the first ring as one of the rings to be erased. So, to erase rings 5 through 10 will be a total of six rings—not five.

You will see a display similar to this:

```
Erase 06 rings
(03) label... No
```

5. Press the **SELECT** button to change No to Yes and press the **ENTER** button to start the erase process.

A display similar to the one in the Erase ring function above will display the progress of the Erase rings function and the current pattern. It takes approximately 2 minutes to erase each ring on the fixed disk and 3 minutes to erase each ring on the cartridge.

Fixed Disk Utilities Submenu

This function shows disk information; verifies, and formats the fixed disk, and spins the disk down or up.

1. Press the **ENTER** button when the Fixed disk utilities function is displayed on the Utilities submenu.

The Fixed disk utilities submenu then appears displaying the following functions:

```
Show DISK information
Spin down/up disk
Verify disk
Format disk
Erase disk
Previous menu
```

2. Press the **SELECT** button to scroll through the information or functions.
3. You can return to the Utilities menu by pressing the **ENTER** button when you see Previous menu.

Show DISK Information

This function displays information similar to the following list about the fixed disk.

```
Number of rings (10)
Ring capacity (20480 kbytes)
```

Ring size (627 cylinders)
 Ring cylinder size (2 tracks)
 Ring track size in sectors (64)
 Sectors in ring (80256)
 Logical sector size (256)
 Physical sector size (512)
 Interleave (1)
 Date disk last formatted*
 Date disk last written*
 Date disk last accessed*

* only if disk is formatted.

1. Press the **ENTER** button to scroll through each field.

Spin Down / Up Disk

This function will spin the fixed disk drive down or up. Using this function will help prevent wear on a drive which is constantly powered on.

1. Press the **ENTER** button to execute this function.

If the drive is already spun down, you will see the following message:

```
Spin up
disk
```

2. Press the **ENTER** button to spin the drive up.

The drive will spin up at the first sign of activity on the HP-IB bus, or when the LCD front panel controls access the drive.

▲ CAUTION:

If the computer system attempts to access the OptiPac while it is spun down, the drive will automatically spin up, but the computer system may time-out before the drive is ready, causing a system error.

Verify Disk

This function scans every sector on the fixed disk for defects. If a bad sector is found, this function will terminate with the LCD showing the error.

1. Press the **ENTER** button to start.

As the verification progresses, the record address is updated. The following message will appear:

```
Verify DISK
record n
```

2. To abort the function at any time, press and hold both the **SELECT** and **ENTER** buttons simultaneously until the following message appears:

```
Abort received.
wait ...
```

3. Release the buttons.

The function will abort at the appropriate time and you'll see:

User abort

4. Press the **ENTER** button to exit.

When you've exited the function, the following message will appear:

```
n complete  
verifies done
```

5. Press the **ENTER** button to return to the Fixed disk utilities submenu.

Format Disk

This function is used to format the fixed disk if the FORMAT utility is not available in your host system.

▲ CAUTION:

The Format Disk function will erase all data on the fixed disk.

The format may take up to two hours to complete.

1. Press the **ENTER** button when the Format disk function is displayed on the Fixed disk utilities submenu.

The Format disk submenu then appears displaying the following message:

```
Erase entire  
media? NO
```

2. Press the **SELECT** button to toggle between YES and NO.
3. Select YES and press the **ENTER** button to continue.

The following message will appear:

```
Format    (256 bps)  
continue?    No
```

If you choose No the FORMAT option will quit and you'll be returned to the Removable disk utilities menu.

4. Use the **SELECT** button to select Yes and press the **ENTER** button to start the format process.

The following message will appear:

```
Formatting  
DISK
```

Formatting will take up to three hours. When the process is complete, the following message will appear:

```
DISK  
formatted
```

5. Press the **ENTER** button to return to the Fixed disk utilities submenu.

Erase Disk

This function will erase the entire fixed disk by performing a DOD wipe delete. This wiping of data is done by first filling the sectors with the

hexadecimal characters FF and 00 three times, then to write the hexadecimal character F6 once. This method prevents any traces of data from being read, even with sophisticated techniques.

▲ **CAUTION:**

The erased fixed disk will be unreadable and must be formatted again to be usable. The erase takes approximately 38 hours.

1. Press the **ENTER** button when the **Erase disk** function is displayed on the fixed disk utilities submenu.

The Erase disk submenu will appear and ask:

```
Erase entire
media? NO
```

2. Use the **SELECT** button to select **YES** and press the **ENTER** button to continue.

Upon successful completion, the following message will appear:

```
DISK
erased
```

3. Press the **ENTER** button to return to the **Fixed disk utilities** submenu.

This function shows cartridge information; locks and unlocks, verifies, and formats the cartridge.

1. Press the **ENTER** button when the **Removable disk utilities** function is displayed on the Utilities submenu.

The Removable disk utilities submenu then appears displaying the following functions:

```
Show CARTRIDGE information
Unload cartridge
Verify cartridge
Format cartridge
Erase cartridge
Previous menu
```

2. Press the **SELECT** button to scroll through the information or functions.
3. You can return to the Utilities menu by pressing the **ENTER** button when you see Previous menu.

Removable Disk Utilities Submenu

Show CARTRIDGE Information

This function displays information similar to the following list about the cartridge.

```
Number of rings (up to 10)
Ring capacity (20480 kbytes)
Ring size (627 cylinders)
Ring cylinder size (2 tracks)
Ring track size in sectors (64)
Sectors in ring (80256)
```

Logical sector size (256)
Physical sector size (2048, 1.3GB cartridge)
Interleave (1)
Date cartridge last formatted*
Date cartridge last written*
Date cartridge last accessed*

* Not displayed for unformatted cartridges.

1. Press the **ENTER** button to scroll through each field.

Unload Cartridge

This is the same as **Unload cartridge** in the Main menu.

Verify Cartridge

This function scans every sector on the cartridge for defects. If a bad sector is found, this function will terminate with the LCD showing the error.

1. Press the **ENTER** button to start.

As the verification progresses, the record address is updated. The following message will appear:

```
Verify CARTRIDGE  
record n
```

2. To abort the function at any time, press and hold both the **SELECT** and **ENTER** buttons simultaneously until the following message appears:

```
Abort received.  
wait ...
```

3. Release the buttons.

The function will abort at the appropriate time and you'll see:

```
User abort
```

4. Press the **ENTER** button to exit.

When you've exited the function, the following message will appear:

```
n complete  
verifies done
```

5. Press the **ENTER** button to return to the Removable disk utilities submenu.

Format Cartridge

All new cartridges must be formatted with this utility before using on the computer system. This function is used to format the cartridge if the **FORMAT** utility is not available in your host system.

1. Press the **ENTER** button when the **Format cartridge** function is displayed on the Removable disk utilities submenu.

The **Format cartridge** submenu then appears displaying the following message:

Erase entire
media? NO

2. Press the **SELECT** button to toggle between YES and NO.
3. Select YES and press the **ENTER** button to continue.

The following message will appear:

Format (256 bps)
continue? No

4. Use the **SELECT** button to select YES and press the **ENTER** button to start the format process.

The following message will appear:

Formatting
CARTRIDGE

Formatting will take up to two hours. When the process is complete, the following message will appear:

CARTRIDGE
formatted

5. Press the **ENTER** button to return to the Removable disk utilities submenu.

Erase Cartridge

This function will erase the entire cartridge by performing a DOD wipe delete. This wiping of data is done by first filling the sectors with the hexadecimal characters FF and 00 three times, then to write the hexadecimal character F6 once. This method prevents any traces of data from being read, even with sophisticated techniques.

▲ CAUTION:

The erased cartridge will be unreadable and must be formatted again to be usable.

1. Press the **ENTER** button when the Erase cartridge function is displayed on the Removable disk utilities submenu.

The Erase cartridge submenu will appear and ask:

Erase entire
media? NO

2. Use the **SELECT** button to select YES and press the **ENTER** button to continue.

The erase takes approximately three hours to complete. Upon successful completion, the following message will appear:

CARTRIDGE
erased

3. Press the **ENTER** button to return to the Removable disk utilities submenu.

Tests Submenu

This function shows statistics, tests the LCD, and certifies media.

1. Press the **ENTER** button when the Tests function is displayed on the Utilities submenu.

The Tests submenu will appear displaying the following functions:

- Show statistics
- Test LCD display
- Verify media
- Enable firmware load
 - Load firmware cartridge (when firmware load is enabled)
 - Uninstall firmware (when firmware load is enabled)

2. Press the **SELECT** button to scroll through the information or functions.
3. To return to the Utilities menu, press the **ENTER** button when you see Previous menu.

Show Statistics

This function displays a list of statistical information.

1. Press the **ENTER** button and you'll see Cartridge statistics:
2. Press the **ENTER** button to show each of the following counters:

- Blocks read
- Blocks written
- Read errors
- Write errors
- Seek errors
- Other errors

3. Press the **ENTER** button after viewing Other errors and you'll see:

- Clear statistic
counters? No

4. Press the **SELECT** button to choose Yes and then press the **ENTER** button to exit.

Since the statistic counters are stored on the cartridge, this information will not be available if that cartridge becomes unreadable, or is not formatted. Normally there are no errors. Any soft errors due to dust particles or electrical noise should be recoverable using error correction code.

Test LCD Display

This function is used to make sure the LCD is working properly.

1. Press the **ENTER** button to start the test.

All of the dots on the LCD will be turned on. If there are any missing dots (except the last character with an *), call the Bering Technical Support Department for a replacement.

2. Press the **ENTER** button again to exit.

Verify Media

This function is similar to the **Verify cartridge** function in the Removable disk utilities menu, except Verify media processes indefinitely unless an error is found. Usually the process must be aborted by the user.

1. Press the **ENTER** button when the **Verify media** function is displayed on the Tests submenu.

The Verify media submenu will appear with this message:

```
Verify media until
abort? No
```

2. Press the **SELECT** button to toggle between **YES** and **NO**. For multiple verify passes, select **YES** and press the **ENTER** button. Otherwise, select **NO** for a single verify pass and press the **ENTER** button to start.

For subsystems with multiple drives you'll be asked whether you want to

```
Test all drives?
No
```

If you choose **Yes** the verification will begin immediately. If you choose **No**, you will need to select the drive(s) you do want tested:

For models with a fixed disk:

```
Test fixed disk? No
Test cartridge disk? No
```

- a. Use the **SELECT** button to choose **Yes** for the drive(s) you want to test and press the **ENTER** button to begin the test procedure.

The record address is updated on the display as the verification progresses. The following message will appear:

```
Verify CARTRIDGE
record n
```

Note:

If a bad sector is found, this function will terminate with the LCD showing the error.

The messages will include **DISK** rather than **CARTRIDGE** when you are verifying a fixed disk.

If you chose a single verification pass, you will be prompted when the process is complete, at that time jump to step 3.

If you chose multiple verification passes in step 2, you must stop the process yourself.

- a. To abort the function at any time, press both the **SELECT** and **ENTER** buttons simultaneously and hold them until you see:

Abort received.
wait ...

- b. Release the buttons.

The function will abort at the appropriate time and you will see **User abort**. It may take some time to stop the process and the display may resume showing the records being verified while it finds a stopping place.

- c. Press the **ENTER** button to exit.

Upon successful completion, you will be notified:

n complete
verifies done

3. Press the **ENTER** button to return to the Tests submenu.

Enable/Disable Firmware Load

This function allows you to upgrade the firmware on the controller board from a cartridge. The new firmware version will be read from a cartridge and loaded into FLASH memory on the controller board. Full instructions for the upgrade will be included with the upgrade cartridge. This also enables a feature to uninstall a firmware upgrade in case of a problem after upgrading. Contact Bering Technical Support for more information on this feature.

Uninstall Firmware

This feature appears in the menu when firmware load is enabled. It allows you to erase the part of the flash memory containing a firmware upgrade. It will revert back to the factory installed firmware version.

1. Go to the Tests menu.
2. Press **SELECT** until you see Enable Firmware load or Disable firmware load.
3. If the LCD says "Enable firmware load" press the **ENTER** button.
4. Press the **SELECT** button until Uninstall firmware is displayed and press **ENTER**.

The firmware will immediately erase the flash memory.

erasing flash
C000:0000

When complete you should recycle the power to boot with the original factory installed firmware.

CARING FOR THE DISK DRIVE & CARTRIDGE

This chapter describes how to care for your OptiPac and cartridges. It is divided into two sections. The “General Safeguards” section tells you what to look out for. The “Cartridge Care” section explains how to handle removable cartridges. The “Preventive Maintenance” section will explain user maintenance procedures. As long as you protect your OptiPac from hazards, it will provide you with years of service.

General Safeguards

To protect the OptiPac:

- To avoid overheating, place it where the air can circulate around it. Be particularly careful to avoid blocking the cooling vent at the rear of the unit.
- Make sure it is plugged into a grounded (three-hole) electrical outlet. Verify that the outlet actually is grounded — that the third prong really is connected to a ground. The OptiPac should be on the same circuit as your computer.
- Make sure that other equipment or appliances which might generate electrical noise or a power surge (such as electric typewriters or heaters) are on separate circuits.
- Do not expose your OptiPac to extreme heat or cold. Prolonged exposure to excessive heat, direct sunlight, or freezing conditions will harm the drive.
- Keep it away from moisture, dirt, and contaminants such as spilled liquids, steam, or excessive dust. Do not smoke near the OptiPac.
- Do not apply cleaners or lubricants to any part of the drive.
- Avoid exposure to magnetic fields such as those emitted by magnets, telephones, televisions, speakers, or large electric motors.
- Never bump the OptiPac when it's running.
- Always set the OptiPac upright on a flat surface.

You don't need to worry about leaving the OptiPac on for a long time — it doesn't use much power. It's normal for the drive to feel warm (but not hot) after it's been running for a while.

If the OptiPac does get hot, make sure the fan is running properly, the vent at the rear is not blocked, and that the unit is placed where air can circulate around it.

Fixed Disk Care

- Do not disassemble the fixed disk.
- Do not drop the fixed disk. Sudden jolts may damage the media and/or cause the loss of data.
- Unlock the fixed disk before ejecting it.
- Do not force the fixed disk out of the receiver chassis. Use the eject button after the fixed disk is unlocked using the attached key.

Cartridge Care

Removable cartridges are highly reliable and have a very long service life if you care for them properly.

- Store them properly. Remove the cartridge from the drive when you are not using it and store it in its protective case in a cool, dry, safe location.
- Do not leave the cartridge in the OptiPac after it is powered down. This leaves the cartridge shutter open and makes the recording media itself vulnerable to dust.
- Do not turn the drive off to remove the cartridge. This will not eject the cartridge. If the power is turned off, wait at least 60 seconds before removing the cartridge. See “Unloading a Cartridge” in Chapter 3 for more details.
- Keep your cartridges clean and dry and out of harm's way. Protect cartridges from dirt, spills, and smoke. Avoid handling the shutter edge of the cartridge since oil and dirt from your hands may be transferred to the disk media or to the inside of the drive.
- Do not open the cartridge access shutter. Minute particles such as smoke, pollen, or dust can contaminate the disk surface.
- Do not disassemble the cartridge.
- Avoid using cartridges at temperatures above 104° F (40° C) or below 41° F (5° C). To avoid permanently damaging data, the drive, cartridge, and room should all be about the same temperature when you insert the cartridge into the drive.
- Do not move the drive with a cartridge loaded.
- Do not drop the cartridge. Sudden jolts may damage the media and/or cause the loss of data.
- Label the cartridge clearly and make sure the label is securely attached before loading the cartridge. Do not mark on labels with a graphite pencil. The graphite dust from the pencil may contaminate the disk surface.
- Do not use defective or questionable cartridges on another drive. You may spread the problem.

Preventive Maintenance

Bering subsystems will provide extended and reliable service as long as the drives are properly maintained. The Bering OptiPac MO cartridge drive should be cleaned approximately every 300 hours of operation. This time can vary depending on the environment. A head (lens) cleaning cartridge is available for dusty environments.

In a very dusty environment, or if you begin getting read errors, the cartridges can be cleaned using the MO cartridge cleaning kit. In a dusty environment, a cartridge should be cleaned every 300 hours of usage.

If you have any questions concerning the proper preventive maintenance procedures please contact Bering Customer Support.

TROUBLESHOOTING & SERVICE

This chapter describes basic trouble-shooting procedures. It is divided into four sections: “Before You Do Anything Else,” “Error Codes and LCD Messages,” “Fuse Replacement,” and “If You’re Still Having Problems.”

Before You Do Anything Else

Often, problems you're having can be resolved by verifying that:

- The power cord is securely connected to the OptiPac and a wall outlet.
- The power is switched on, and the AC fuse in the back of the drive is not blown.
- None of the pins on the cable connectors are loose, broken, or shorted.
- All cables are installed correctly.
- The cartridge has been properly formatted.
- Each peripheral connected to your computer has a unique address.

Error Codes and LCD Messages

Occasionally, after installing an OptiPac, the system will display a disk initialization error code upon start up. It is sometimes possible to solve the problem by following the LCD instructions. Sometimes the LCD will display an error code in the form of a number. This error code indicates a problem that may be associated with another hardware device other than the OptiPac. If this occurs, shut down your system and restart it again. If the problem still occurs, contact Bering Technical Support at (408) 364-6500.

Fuse Replacement

If the drive fails to power on the AC fuse may be blown. The fuse is located in the AC input jack.

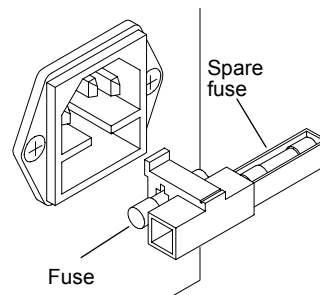


Figure 6-1: Replacing the AC fuse

If You're Still Having Problems

If you are able to start up from a floppy but not the OptiPac, the system files on the OptiPac may be damaged.

START-UP PROBLEMS

If you're unable to start up from an OptiPac, try starting up the computer with a floppy disk. If you're still unable to start up, the problem is with the computer rather than the OptiPac. Refer to the troubleshooting section in your computer manual for more information.

WHEN ALL ELSE FAILS...

If you still have problems after following the procedures in this chapter, call Bering Technical Support at (408) 364-6500. When you call, be ready to tell the service representative:

- The model number and serial number of the OptiPac, the firmware version of the OptiPac, the type of computer you're using, the operating system, and the software version.
- Any error messages that have appeared.
- A description of the problem(s) and the steps you've taken to correct it.
- Any recent changes to your system, such as new software installed, software upgrades, new hardware, even a new brand of cartridge.

Bering Customer Service can be reached by several methods. The mailing/shipping address and phone numbers are:

Bering Technology, Inc.
Customer Service/Technical Support
1400 Dell Avenue, Suite B
Campbell, CA 95008

(408) 364-6500 x412
Fax: (408) 364-6501
EMail: help@bering.com

▲ CAUTION:

Never remove the cover of the OptiPac box. This voids the warranty.

SPECIFICATIONS

1.3GB Cartridge Disk Drive

1.3GB MO Cartridge

The specifications listed on this page are for a 1.3GB cartridge. Each ring on the 1.3GB, 2048 bps cartridge is identical in capacity to each ring on the hard drive. Use the show cartridge information to determine the correct values.

PERFORMANCE	Rings	10	w/ 1.3GB cartridge
	Ring capacity	20	MB
	Rotation speed	1.3GB cartridge 3,214	rpm
		other cartridge 4,558	rpm
	Average seek time	23	ms, read
	MTBF	120,000	Power on Hours
ENVIRONMENTAL (operational)	Temperature	5° to 45°	C
	Relative humidity	10 to 85	% non-condensing
	Vibration	5 to 500	Hz, 0.4 G's p-p
	Shock	2	G, 10 ms half sine pulse
	Altitude	0 to 10,000 0 to 3,048	feet meters
(non-operating)	Temperature	-20° to 60°	C
	Relative Humidity	5 to 90	% non-condensing
	Vibration	5 to 500	Hz, 1 G p-p
	Shock (cartridge removed)	5	G's at 10 ms half sine pulse
	transport	50	G's at 10 ms half sine pulse
	Altitude	0 to 40,000 0 to 12,192	feet meters
LASER DIODE	Type	Semiconductor Laser	
	Wavelength	785nm, Continuous	
	Output power	30mW (max)	
	Classification	Class 1 (IEC. 825) GaAIAs	

30 GB Fixed Disk**Ring capacity**

Use the show disk information on the front panel to determine the correct values, such as ring capacity, heads, tracks, and cylinders.

PERFORMANCE

Rings	10	
Ring capacity	20	MB
Rotation speed	5400+	rpm
Minimum seek time	1.0	ms
Average seek time	12	ms
Maximum seek time	18	ms
HP-IB burst transfer rate	1	MB/sec
HP-IB average transfer rate	940	KB/sec

**ENVIRONMENTAL
(operational)**

Temperature	5° to 55°	C
	41° to 131°	F
Relative humidity	8 to 90	% non-condensing
Vibration	0.67	G, 5 to 500Hz
Shock	200	G, 2 ms
Altitude	-60 ~ 3,000	meters
	-200 ~ 10,000	feet

(non-operating)

Temperature	-40° to 65°	C
	-40° to 149°	F
Relative Humidity	5 to 95	%
Vibration	3.0	G, 22 to 500 Hz
Shock	1,000	G, 1 ms
Altitude	-60 ~ 12,200	meters
	-200 ~ 40,000	feet

General

Power Requirements	Line voltage	96 - 240	volts
	Line frequency	47 - 63	Hz
	Current	0.5	Amps
	Fuse	"Slow blow" 1.6A, 250V	

General Dimensions	Interface	HP-IB, CS80 command set	
	Dimension	5"x 12.8"x 11"	
		12.7 x 32.5 x 27.9 cm	
	Shipping weight	28 lbs. 12.7 Kg	

Accessories	Cartridge, MO, 1.3GB, 1024bps	ACCS-3070
	Cartridge MO, 1.3GB, 1024bps, 5 Pack	ACCS-3071
	Removable Hard Drive Module, 30GB	ACCS-3072
	Cleaning kit, cartridge and head	ACCS-3513
	Cleaning kit, cartridge	ACCS-3514
	HP-IB Cable 1.0m (3.3 ft.)	ACCS-7110
	HP-IB Cable 2.0m (6.7 ft.)	ACCS-7115
	Rack Mount Kit - 19" EIA	ACCS-7207

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