

# **SWIOW-AA Multifunction Optical Disk Drive SBB**

---

## **User's Guide**

**Order Number: EK-SMOD1-UG. A01**

---

First Edition, November 1994

The information in this document is subject to change without notice and should not be construed as a commitment by Digital Equipment Corporation. Digital Equipment Corporation assumes no responsibility for any errors that may appear in this document.

Restricted Rights: Use, duplication, or disclosure by the U.S. Government is subject to restrictions as set forth in subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013.

Digital Equipment Corporation does not give a warranty of any kind regarding the fitness or applicability of the information content for a particular purpose. The user assumes all responsibility for understanding the interrelationships of this enclosed information with other affected software or system products.

The disclosure of this information does not grant to the user a license under any patents, pending patents, trademarks, or copyrights or other rights of Digital Equipment Corporation, or of any third party.

FCC Notice: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. Any changes or modifications made to this equipment may void the user's authority to operate this equipment. The shielded interconnect cable, as supplied with the unit, may not be substituted, nor altered or modified, in any way.

This equipment generates, uses, and can emit radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference's to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful 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:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the Digital reseller or an experienced radio/TV technician for help.

Copyright © Digital Equipment Corporation 1994

All Rights Reserved

Printed in U. S. A

The following are trademarks of Digital Equipment Corporation:

DEC

Digital

StorageWorks

VMS

and the Digital Logo:



All other trademarks and registered trademarks used in this publication are the property of their respective owners.

---

# Contents

---

<b>Revision Record .....</b>	<b>v</b>
<b>About This Guide.....</b>	<b>vii</b>
<b>1 Introduction</b>	
1.1 Performance Features of the StorageWorks Multifunction Optical Disk Drive SBB....	1-1
1.2 Design Features.....	1-1
1.3 Performance Considerations.....	1-2
1.4 Optical Disks.....	1-3
1.5 Supplies .....	1-3
1.5.1 Cartridge Provided .....	1-3
1.5.2 How To Order Additional Cartridges.....	1-3
<b>2 Drive SBB Installation</b>	
2.1 Introduction.....	2-1
2.2 Preparing The Environment.....	2-1
2.2.1 Clearance Requirements .....	2-1
2.2.2 Location Requirements.....	2-1
2.3 Unpacking.....	2-1
2.4 Preinstallation Procedures .....	2-2
2.4.1 Setting the SCSI ID Address of the Drive.....	2-2
2.5 Installing the Drive SBB Into A Storage Works Expansion Storage Enclosure.....	2-2
<b>3 Front-Panel Controls &amp; Indicators and Operation</b>	
3.1 General.....	3-1
3.2 Front-Panel Controls and Indicators .....	3-1
3.2.1 Eject Push-Button .....	3-2
3.2.2 Manual Ejection of Optical disk Cartridge.....	3-2
3.3 Power-On Self-Test (POST) Exercise.....	3-3
3.4 Using and Handling Optical Disk Cartridges .....	3-4
3.4.1 Choosing An Optical Disk.....	3-5
3.4.2 Labeling An Optical Disk Cartridge .....	3-6
3.4.3 Write-Protecting Data.....	3-6
3.4.4 Guidelines for Using Optical Disks .....	3-6
3.4.5 Loading A Cartridge.....	3-8
3.4.6 Disk In Use .....	3-8
3.4.7 Unloading A Cartridge .....	3-9
3.4.8 Cleaning A Disk Cartridge .....	3-9

## 4 Troubleshooting

4.1	Introduction.....	4-1
4.2	Common Errors.....	4-1
4.2.1	Avoiding Basic Problems.....	4-1
4.2.2	Error Influences.....	4-1

## Appendix A Specifications

## Appendix B Quick Start for Novell™ NetWare™

## Glossary

## Reader Comment form

## Figures

1-1	Front-Panel of Optical Disk Drive SBB.....	1-2
2-1	Location of Drive SBB SCSI ID Switches.....	2-3
2-2	Installing the Drive SBB Into A Storage Expansion Enclosure.....	2-5
3-1	Optical Disk Drive SBB Front-Panel Controls and Indicators.....	3-1
3-2	Rewritable and WORM Optical Disk Cartridge,s Showing Proper Label Positions and Write-Protect Switch Location.....	3-5
3-3	Loading Cartridge Into Optical Disk Drive.....	3-8

## Tables

1-1	Ordering Numbers for Optical Disk Cartridges.....	1-3
2-1	Drive SBB SCSI ID Switch Settings.....	2-3
3-1	Drive SBB LED Status.....	3-2
3-2	Operating States of Drive SBB Following Initialization.....	3-4
4-1	Drive SBB Troubleshooting Table.....	4-2
A-1	Drive SBB Specifications.....	A-1

---

Novell™ is a tradename of Novell, Inc.

NetWare™ is a trademark of Novell, Inc.

## ***Revision Record***

---

*This Revision Record provides a concise publication history of this guide. It lists the manual revision levels, release dates, and reasons for the revisions. It also describes how the changes to affected pages are marked in the guide.*

---

The following revision history lists all revisions of this publication and their effective dates. The publication part number is included in the *Revision Level* column, with the last entry denoting the latest revision. This publication supports the StorageWorks Multifunction Optical Disk Drive SBB.

<b>Revision Level</b>	<b>Date</b>	<b>Summary of Changes</b>
EK-SMOD1-UG. A01	November 1994	Original release



# About This Guide

---

*This section identifies the users of this guide and describes its contents and structure. In addition, this section also includes a list of conventions used in this guide.*

---

This guide provides product overview, installation, operation, and maintenance information for the StorageWorks SWIOW-AA Multifunction Optical Disk Drive SBB (StorageWorks Building Block), hereinafter referred to either simply as the drive or as the SBB.

## Intended Audience

This guide is intended for people who will install, operate, and maintain the SBB.

## Document Structure

This guide contains the following chapters:

### Chapter 1: Introduction

**Introduction** provides a product overview of the drive and identifies design features (including basic components and performance considerations). The chapter also includes overview descriptions of the optical disk cartridges and identifies what is supplied with the drive.

### Chapter 2: Installation

**Installation** provides specific details pertaining to environmental concerns and preparation, unpacking, preinstallation setup, installation, connection to a host system, and POST operational testing of the drive, which is designed to be operated in a Digital StorageWorks expansion storage enclosure.

### Chapter 3 Operation

**Operation** identifies the switches and LED indicators on the front panel of the drive, describes how to use them (including operation of the power-on self-test (POST) exercise, provides use rules for the optical disk cartridge (including how to choose the right optical disk for the application, labeling an optical disk, and maintaining an optical disk), and gives detailed procedures for correct loading and unloading of the optical disk cartridges.

### Chapter 4 Troubleshooting

**Troubleshooting** describes troubleshooting for the drive. It identifies common errors, describes how to clean the optical diskette, and provides a troubleshooting table to help diagnose common problems.

### Appendix A: Specifications

**Appendix A** lists the physical, electrical, cooling, environmental, and environmental stabilization specifications for the drive.

### Appendix B: Product Notes for NetWare™

**Appendix B** provides information that should be read by the system administrator before installing the drive when it will be used with a host operating under Novell™ NetWare.

### Conventions

This guide uses the following conventions:

#### Documentation Conventions

Style	Meaning
<b>boldface type</b>	<b>For emphasis</b>
<i>italic type</i>	<i>For emphasis and manual titles</i>

---

NetWare™ is a trademark of Novell, Inc.

Novell™ is a tradename of Novell, Inc.



## *Introduction*

---

*This chapter provides a product overview of the StorageWorks Multifunction Optical Disk Drive SBB and identifies design features (including basic components and performance considerations). The chapter also includes overview descriptions of the data cartridges and identifies what is supplied with the drive.*

---

### **1.1 Performance Features of the Multifunction Optical Disk Drive**

This chapter provides an overview of the StorageWorks SWIOW-AA Multifunction Optical Disk Drive SBB (StorageWorks Building Block), hereinafter referred to either simply as the drive or as the SBB. The drive offers the following features:

#### **High Performance**

- 23 millisecond average seek time
- 8 millisecond average latency
- 1000 Kbytes/second data transfer rate for reads
- 500 Kbytes/second data transfer rate for writes
- less than 3 second media load and spin-up time
- Digital Signal Processor based servo - intelligent servo system for faster seeks and lower error rates
- split optics – lighter optical head for faster and more accurate data access
- caching – full read and write caching for optimizing system performance

#### **Industry Standard Compliance**

- 5.25 inch industry standard media (ISO and ANSI)
- Continuous composite format

#### **Superior Reliability**

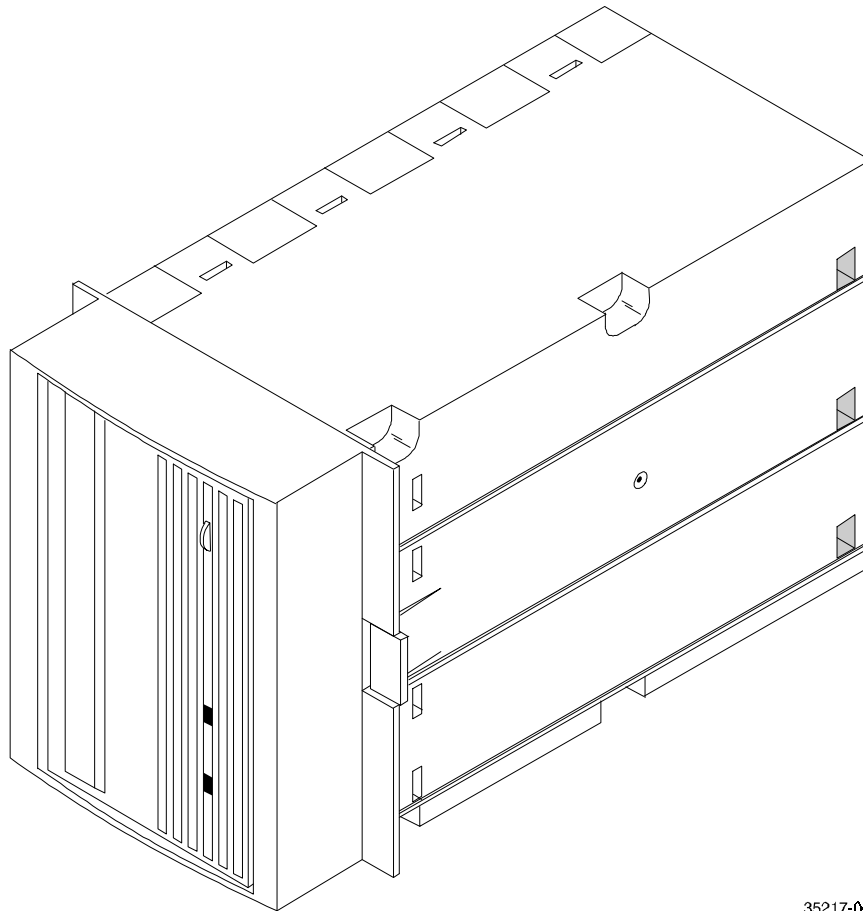
- 100,000 hours MTBF (Mean Time Between Failures)

### **1.2 Design Features**

Figure 1–1 shows the SBB as viewed from the front in normal orientation. This view includes the front panel, which provides a disk ejection switch and status indicators for system operation, along with an access door for inserting and removing the optical disk. The

optical disk drive is embedded in a plastic enclosure, which is designed to fit into and connect to a SCSI bus through any of the StorageWorks family of storage expansion enclosures, such as the Expansion Storage Pedestal.

**Figure 1–1 Front Panel of Optical Disk Drive SBB**



35217-001

### **1.3 Performance Considerations**

The performance achieved with the drive can depend on a number of considerations—including, for example, the host system processor. Host SCSI IO or other computer-intensive operations on the host CPU will tend to reduce throughput to disk.

When data is being passed to or from client workstations in a client-server environment, additional parameters having to do with reduced local area network bandwidth, network traffic, or lower client workstation performance characteristics will also tend to reduce maximum throughput to the drive.

## 1.4 Optical Disks

The multifunction drive operates with both rewritable and write-once disk cartridges. Refer to Section 3.4 for details on the different types and guidelines on labeling, write-protecting, and handling the disk cartridges.

### NOTE

Consult your operating system manuals to determine which media is supported by your operating system. Digital strongly recommends that 512 bytes/sector 1.2-GB media be used, in order for the disks to be compatible with multiple operating systems with maximum storability.

## 1.5 Supplies

### 1.5.1 Cartridge Provided

One rewritable, 512-bytes/sector, 1.2-GB optical disk cartridge (RWX5K-01; 30-38754-02) comes in the shipping package with each StorageWorks optical disk drive.

### 1.5.2 How To Order Additional Cartridges

Additional optical disk cartridges can be ordered from any Digital reseller.

Table 1–1 lists ordering numbers for various quantities of cartridges:

**Table 1–1 Order Numbers for Optical Disk Cartridges**

Order Number	Description
RWX1K-01 (30-38754-01)	Rewritable Optical Disk (512 bytes/sector), 594 MB per disk, formatted
RWX5K-01 (30-38754-02)	Rewritable Optical Disk (512 bytes/sector), 1.2 GB per disk, formatted
RWX1K-02 (30-40952-01)	Write-Once Optical Disk (512 bytes/sector), 594 MB per disk, formatted
RWX5K-02 (30-38754-02)	Write-Once Optical Disk (512 bytes/sector), 1.2 GB per disk, formatted



## *Drive SBB Installation*

---

*This chapter provides specific details pertaining to environmental concerns and preparation, unpacking, preinstallation setup, installation, connection to a host system, and POST operational testing of the SWIOW-AA Storage Building Block (SBB) Optical Disk Drive, which is designed to be operated in a Digital StorageWorks expansion storage enclosure.*

---

### **2.1 Introduction**

The drive is housed in an SBB storage carrier and is designed for installation into a StorageWorks enclosure, such as the Storage Expansion Pedestal. The drive can be placed in any of the mounting slots and is configured as one of up to seven devices on the SCSI bus. This chapter describes how to unpack the drive, how to prepare the drive for installation, how to set the SCSI ID of the drive, how to install the device into a StorageWorks subsystem, and how to evaluate the Power On Self Test (POST) exercise.

The information in this chapter is divided as follows:

- Preparing the environment
- Unpacking the optical disk drive
- Preinstallation setup of the drive (setting SCSI ID address of the Optical Disk Drive)
- Installation into the storage subsystem
- POST operation

### **2.2 Preparing the Environment**

For optimal performance of the drive, consider the following environmental factors.

#### **2.2.1 Clearance Requirements**

A minimum of 70-80 mm (3 in.) should be available in front of the disk drive unit to allow air circulation.

#### **2.2.2 Location Requirements**

Locate the StorageWorks enclosure away from such sources of particulate contamination as frequently-used doors and walkways, printers, stacks of supplies that collect dust, and smoke-filled rooms, or from any sources of extreme electromagnetic radiation.

### **2.3 Unpacking**

Unpack and inspect the contents of the shipment. It contains the following items:

- This guide
- One Model SWIOW-AA Multifunction Optical Disk Drive
- One blank 1.2-GB rewritable optical disk cartridge (Part No. RWX5K-01; 30-38754-02)
- One ejection tool (for manual ejection of disk cartridge when necessary)

Check all contents for damaged components. Notify the vendor immediately if any items are damaged. Keep all boxes and packing material for reshipment.

## 2.4 Preinstallation Procedures

### NOTE

The interface cable to connect the SBB to a fast, single-ended SCSI bus cannot exceed three meters (9.8 feet). The interface cable to connect the SBB to a slow, single-ended SCSI bus can be up to 6 meters (19.7 feet) in length. In both cases, this maximum cable length includes not only the length of cable from the StorageWorks enclosure to the host computer but also the length of cable inside the enclosure (including the backplane) and the length of cable inside the host computer.

### 2.4.1 Setting the SCSI ID Address of the Drive

The pedestal slots are numbered 0 through 7, from top to bottom, with the power supply occupying slot 7. The SCSI address switches on the rear of the drive (refer to Figure 2–1) are preset at the factory to *automatic* — SW-1, SW-2, and SW-3 set off; SW-4, SW-5, and SW-6 set to ON. This setting means that the SBB will have the address of the physical slot into which it is connected (that is, 1 through 5, as applicable). To obtain a different specific logical address for any reason (i.e., to use the physically unobtainable SCSI ID 0 or 6, or any specific value in between, regardless of physical location of the unit), set the drive to any desired logical address by manually changing the settings of the switches on the SCSI switch pack, as delineated in Table 2–1, before inserting the SBB into the StorageWorks subsystem.

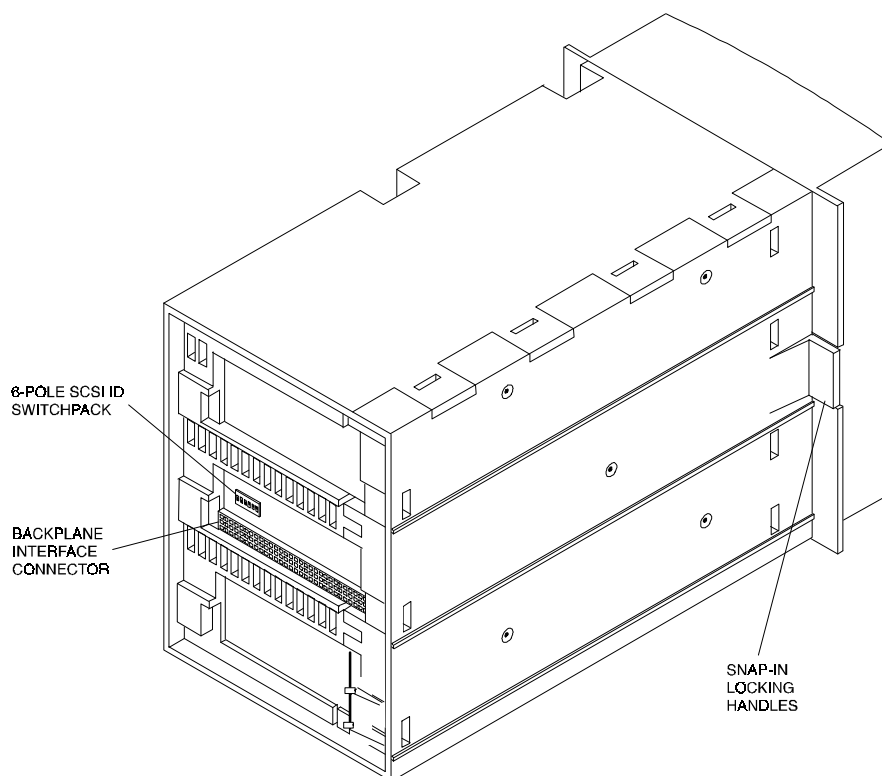
## 2.5 Installing the Drive SBB Into a StorageWorks Expansion Storage Pedestal

### CAUTION

Refer to the applicable documentation for your host computer and/or your specific operating system before installing the drive. This installation procedure assumes that you have already installed and appropriately cabled the StorageWorks Storage Expansion Enclosure and have checked out that subsystem as applicable, so that it is ready to receive this SBB unit.

To install the drive in a storage subsystem, insert the drive so that the connector on the rear surface fits into any available SCSI device storage slot. Since slot 7 is reserved for the pedestal power supply, and the centrally-mounted interface connector on the back of the unit, which occupies three enclosure slots, cannot reach the uppermost (slot 0) or lowermost (slot 6) available SCSI-bus connections, this means any of slots 1 through 5.

Figure 2–1 Location of Drive SBB SCSI ID Switches



35217-003

Table 2–1 Drive SBB SCSI ID Switch Settings

Address	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6
0	Off	Off	Off	Off	Off	Off
1	On	Off	Off	Off	Off	Off
2	Off	On	Off	Off	Off	Off
3	On	On	Off	Off	Off	Off
4	Off	Off	On	Off	Off	Off
5	On	Off	On	Off	Off	Off
6	Off	On	On	Off	Off	Off
7*	On	On	On	Off	Off	Off
Automatic†	Off	Off	Off	On	On	On

\* Normally reserved for host.

† Sets device address to storage subsystem slot number.

**CAUTIONS**

- Perform a full system backup prior to connecting the drive to the host computer for full data protection.
- Do not insert an optical disk cartridge in the drive before installing the drive in the StorageWorks expansion storage enclosure. Damage to the optical read/write mechanism can occur if the drive is moved or bumped while the power is off and a disk is inserted.

To install the drive:

1. Ensure that there is no disk cartridge in the drive.
2. Ensure that the SCSI bus is inactive.
3. Remove the filler panel (or any previously mounted SBB) from the desired three adjacent device slots in the storage enclosure by squeezing the locking handles at the ends of each respective panel (or SBB) and removing the panel (or SBB).
4. Install the drive in the open slots (refer to Figure 2–2), sliding the drive in firmly until its locking handles snap into place.

**NOTE**

If the green-yellow fault indicator (upper, right) becomes steadily lit and/or the activity indicator (lower, left) flashes green-yellow continuously for more than 30 seconds in the following test, the POST test has failed. Repeat the test to clear the failure (power off and then on). If the test still fails, replace the drive.

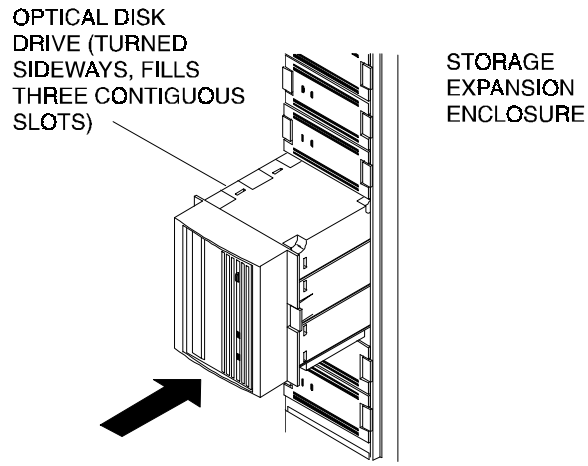
1. Power on the drive device, either by cycling the StorageWorks enclosure power switch off and on or, if other SBB units in that subsystem are active and should not be powered down, by hot-swapping the SBB unit under test (i.e., pull it free from the enclosure and then slide it back into its operating position). Confirm that both indicators blink, with the (upper) fault indicator going out immediately and the (lower) activity indicator remaining on for one to two seconds while the internal mechanism moves into position and then going out. (Refer to Figure 3–1 for the locations and identifications of the front panel LED indicators.)
2. Load a disk cartridge into the drive and observe the front-panel indicators. The (lower) activity indicator initially should blink momentarily after the disk is pushed into the drive, as the drive engages the disk, and then go out.
3. The drive is now installed. If applicable, have the system administrator assign a device name to the drive.

**NOTE**

You may need to reboot the host system to ensure that the new identification is recognized at both ends of the SCSI bus.



**Figure 2-2 Installing the Drive SBB into an Expansion Storage Pedestal**





## Operation

---

*This chapter identifies the switches and LED indicators on the front panel of the drive, describes how to use them (including operation of the power-on self-test (POST) exercise, provides use rules for the optical disk cartridge (including choosing the right optical disk for your application, labeling an optical disk, and maintaining an optical disk), and gives detailed procedures for correct loading and unloading of the disk cartridges.*

---

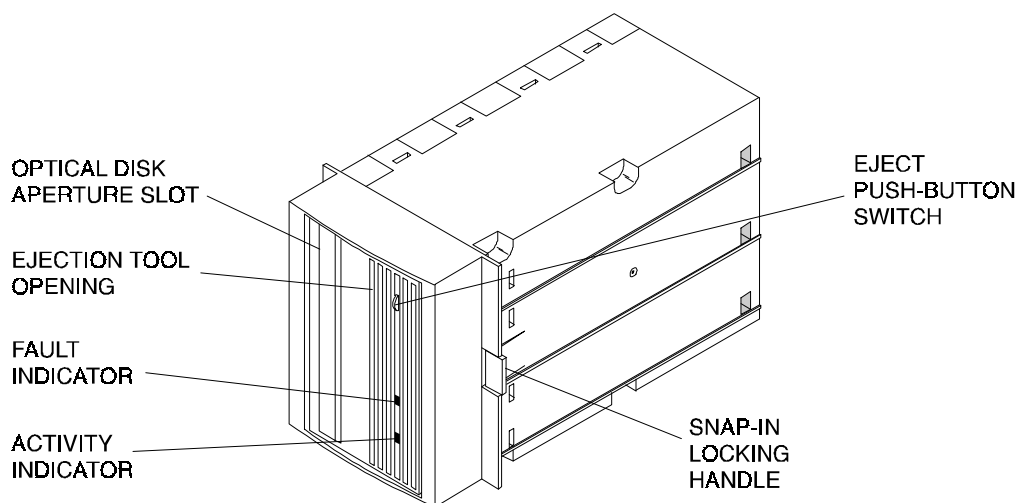
### 3.1 General

Digital's drive offers outstanding performance and integrity, combined with ease of use. All normal-use operator controls are mounted on the front panel, consisting of an activity indicator to provide confirmation that the drive is being accessed, a fault indicator to report any failure condition that prevents the optical drive from working correctly, and a push-button for ejecting the optical disk cartridge from the drive. The front panel also contains the cartridge slot into which optical disk cartridges are inserted, along with an opening for insertion of an ejection tool to manually eject an optical disk cartridge following power failure.

### 3.2 Front-Panel Controls and Indicators

All operating controls and indicators are located on the front panel (refer to Figure 3–1).

**Figure 3–1 Optical Disk Drive SBB Front-Panel Controls and Indicators**



35217-005

Table 3–1 identifies each of these indicators/controls and gives the operating condition and function of each one.

**Table 3–1 Optical Drive SBB Front-Panel Controls and Indicators**

Control/Indicator	Description
Cartridge slot	Opening for inserting optical disk cartridge.
Activity indicator (Green-Yellow)	Lights while a cartridge is being loaded or unloaded, during the power-up self-test sequence, and any time the drive is being accessed. This indicator also lights momentarily when the eject button is pressed.
Fault indicator (Green-Yellow)	Remains lit whenever device detects a failure condition that keeps the drive from operating normally.
Eject push-button	Ejects the disk cartridge from the drive when pressed. (The cartridge does not eject if a SCSI Prevent/Allow Media Removal command has been issued by the operating system, or if power to the drive is off.)
Eject tool opening	An access hole for the eject tool. In an emergency, such as a power outage, you can eject the cartridge manually by inserting the eject tool into this opening and turning it clockwise. (Refer to section 3.2.2, following.)

### 3.2.1 Eject Push-Button

**CAUTION**

Do not press eject push-button unless drive is not currently in use.

Activation of the eject push-button causes the drive to eject the disk from the disk drive mechanism. In the event that the drive is writing data to the disk when you press the eject push-button, the drive flushes any buffered write data to the medium before beginning the unloading sequence.

If the drive is in an error state (fault indicator lit), pushing the eject push-button causes the drive to reset and unload the disk, if possible.

### 3.2.2 Manual Ejection of Optical Disk Cartridge

The drive does not automatically eject an optical cartridge if a power failure occurs. An eject tool shipped with the drive (or any equivalent tool, such as a small flathead screwdriver with a 0.5-mm thick blade, having a blade width of no more than 2.45 mm and a length of at least 50 mm) can be used to eject a cartridge manually, as follows:

- STEP 1. Disconnect all power to the drive (that is, either shut down power service to the associated StorageWorks enclosure or else pull the SBB unit forward to separate the rear-mounted interface connector from the SCSI bus and power connections).
- STEP 2. Insert the blade end of the ejection tool into the small round hole in the front panel of the drive, just above the eject button.
- STEP 3. Turn the ejection tool in a clockwise direction (to the right) until approximately 3/4 inch of the disk is ejected through the front of the drive (approximately 20 complete rotations).

- STEP 4. Grasp the protruding edge of the disk cartridge and pull it firmly forward, out of the disk drive.

**CAUTION**

Do not reach into the drive to get the disk or attempt to pull the disk out with tweezers or some similar tool. Such premature removal of the optical disk could damage the drive. Instead, keep turning the ejection tool until enough of the disk (approximately 3/4 inch) is ejected through the front of the drive to allow you to get a firm finger grip on the disk and pull it free.

**NOTE**

After ejecting a cartridge, the drive remains in its "eject position" until power is restored. At that time, the drive automatically resets itself.

### 3.3 Power-On Self-Test (POST)

A Power-On Self-Test (POST), which is performed automatically whenever the drive is powered on, verifies operational integrity of the drive.

To execute POST, proceed as follows:

**NOTE**

If the green-yellow fault indicator (upper, right) lights steadily and/or the green-yellow activity indicator (lower, left) indicator blinks for more than 30 seconds in the POST exercise, the unit has failed the test. Repeat the test to clear the failure (power off and then on). If the test still fails, replace the drive.

1. Power on the drive (turn on enclosure power—or else pull the SBB out of the enclosure and then push it back into place).
2. Observe that both green-yellow panel indicators initially light, with the fault indicator going out after one blink and the activity indicator remaining on for a couple seconds, while the internal mechanism operates, and then going out.

Following initialization, the drive is in one of the four states defined in Table 3–2.

**NOTE**

Under normal conditions, you should not power up the drive with a disk cartridge mounted, so that only conditions **a** and **c** in Table 3-2 would apply. The other two conditions, describing situations in which a disk was already mounted before power was applied, are included here merely to cover emergency situations.

**Table 3–2 Operating States of Drive SBB Following Initialization**

	Starting Condition	Status Light Sequence	Status of Drive
a.	If no disk cartridge is mounted in drive and the drive passes POST:	(1) The failure indicator (upper, right) blinks and turns off. (2) The activity indicator (lower, left) lights for approximately two seconds and then turns off.	The drive is operational. You can now put a disk cartridge into the drive.
b.	If a cartridge is present in the drive <sup>1</sup> and the drive passes the test:	(1) The failure indicator (upper, right) blinks and turns off. (2) The activity indicator (lower, left) lights for approximately two seconds, while the drive loads the optical disk, blinks off, lights again for another second or two while the drive interacts with the media, and then turns off.	The drive is operational and ready for use.
c.	If no disk cartridge is mounted in the drive and the drive fails POST:	(1) The failure indicator (upper, right) blinks and becomes steadily lit. (2) The activity indicator (lower, left) lights momentarily and then turns off.	The drive has failed. Unpower the drive and try again. If the failure result repeats, contact your Digital reseller for help.
d.	If a disk cartridge is mounted in the drive <sup>1</sup> and the drive fails POST:	(1) The failure indicator (upper, right) blinks and becomes steadily lit. (2) The activity indicator (lower, left) lights momentarily and then turns off or stays on.	The drive has failed. Unpower the drive and try again. If the failure result repeats, contact your Digital reseller for help.

<sup>1</sup> Not recommended. Shutting down power while an optical disk cartridge is still mounted in the drive can result in damage either to the disk cartridge (and/or its data) or to the drive, itself.

### 3.4 Using and Handling Optical Disk Cartridges

The optical disk cartridge is a 5.25-inch by 6-inch plastic cartridge that slides into the aperture slot on the front panel of the drive. The following subsections explain the different types of disk cartridges available, describe how to label and write-protect disks, and give guidelines for handling and storing disk cartridges.

#### NOTE

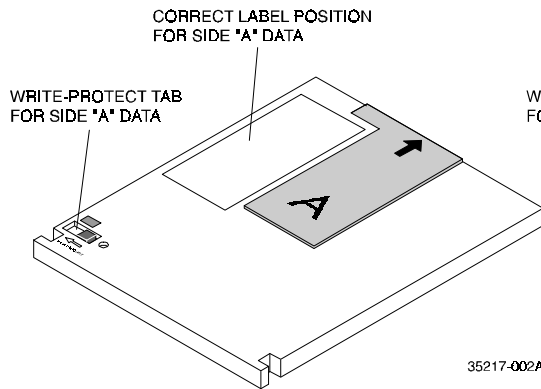
You can order additional disk cartridges from your Digital reseller. (Refer to Table 1-1 for applicable Digital Equipment Corporation order numbers for different sizes and capabilities.)

### 3.4.1 Choosing An Optical Disk

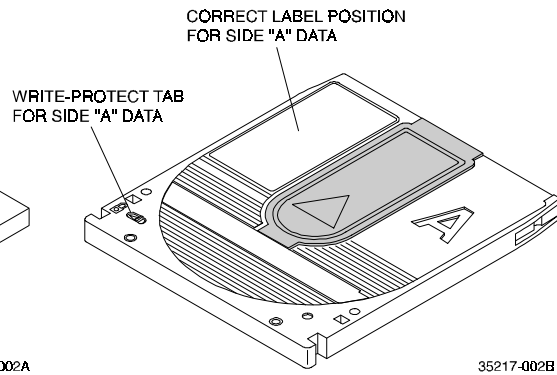
The multifunction drive operates with two types of disk cartridges. One type is a rewritable disk that can be used over and over, for standard backup or data preservation. The other type is a write-once/read-many (WORM) disk, often used for distribution of software or special data. Figure 3–2 illustrates both types, showing their similarity and differences.

**Figure 3–2 Rewritable and WORM Optical Disk Cartridges, Showing Proper label Positions and Write-Protect Switch Location**

**a. Rewritable Disk Cartridge**



**b. Write-Once/Read-Many Disk Cartridge**



Both rewritable and write-once disk types are produced in two sector sizes: 512 bytes/sector and 1024 bytes/sector. The capacity of the 512 bytes/sector media is 600 MB for single-sided disks or 1.2 GB for double-sided disks. The capacity of the 1024 bytes/sector media is either 650 MB or 1.3 GB.

This optical disk drive supports both 512 bytes/sector and 1024 bytes/sector disk types. The correct sector size depends on the host computer operating system, however. Digital Equipment Corporation's operating systems, such as VMS and OSF, only support 512-byte sectors.

**NOTES**

Consult your operating system manuals to determine which media is supported by your operating system. Digital strongly recommends that 512 bytes/sector 1.2-GB media be used, in order for the disks to be compatible with multiple operating systems.

Do not use write-once disks in a computer system that does not support write-once disks. Check your computer system reference manuals to determine the disk types that are supported.

### 3.4.2 Labeling An Optical Disk Cartridge

#### CAUTION

Appropriate label stickers are supplied with each optical disk cartridge. Always place the label in the recessed area on the upper side of the cartridge so as to ensure that the label does not obstruct the movement of the metal shutter on the disk or does not catch on the sides of the loading slot or on the internal mechanism. Use soft-tip pens for all labeling.

Make it a practice to label your optical disk cartridges. Adhesive labels for this purpose are shipped with each disk cartridge. Consider the following suggestions for labeling:

- Date of format or initialization
- Disk owner (e.g. group/department, etc.)
- Storage purpose (e.g. backup, old version of operating system, etc.)

Apply the label to the optical disk in the recessed area on the disk surface, so that the label does not obstruct the movement of the metal shutter. On side A of an optical disk, as shown in Figure 3–2, the correct label position is in the recessed area just to the left of the metal shutter; on side B, it is the area just to the right of the metal shutter.

#### CAUTION

If a label is applied incorrectly, the disk cartridge may get caught in the drive, which may cause damage to the media and/or to the drive.

### 3.4.3 Write-Protecting Data

A write-protect slide switch on each side of the optical disk assembly provides a write-enable/write-protect function for that side of the disk (See Figure 1–2).

- If you are reading data (copying from disk), set the write-protect tab to “Write Protected” (to the left, in the direction of the arrowhead on or under the switch).
- If you are writing data (writing to disk), set the write-protect tab to “Write Enabled” (to the right, opposite to the direction of the arrowhead).

With write-once optical disks, existing files cannot be altered or erased regardless of whether or not the write-protect button has been set. However, the use of the write-protect button will prevent any additional files from being written to a disk.

### 3.4.4 Guidelines for Using Optical Disks

To ensure your optical disks remain in good condition for optimal performance, observe the following guidelines when using and handling the disks.



**NOTE**

For optimum performance and reliability, Digital recommends the use of Digital-labeled optical disks which have been fully tested for use with Digital's optical products. These disks can be purchased through any Digital-authorized dealer. See Table 1-1 on page 1-4 for ordering information.

- Store the optical disk cartridge in its storage case in a clean, safe place, shielded from dust particles, when it is not in use.
- Avoid placing the disk cartridges near magnets or sources of electromagnetic radiation such as terminals, video, or X-ray equipment. Extreme magnetic radiation from this type of equipment can erase or corrupt data on the disk.
- Do not leave an optical disk cartridge in the drive for extended periods of time, if possible.
- Do not expose the disk to extreme temperatures or extreme humidity. Store optical disk cartridges and cleaning cartridge at room temperatures between -10°C and +55°C (+14°F through +131°F), and avoid large temperature changes. Keep disk cartridges out of direct sunlight and away from heaters and other direct sources of heat.
- Store cartridges in a dust-free environment where the relative humidity is within the range from 10% to 90%.
- Do not drop the disk. In the event that one is dropped, inspect the disk cartridge carefully for any signs of damage, such as a cracked casing, and discard the cartridge if such signs are found.
- Do not take the disk cartridge apart, and do not open the shutter to expose the disk to light or touch the disk surface.
- Do not tape the shutter closed; adhesive residue may interfere with correct shutter operation.
- Do not place heavy objects on the disk cartridge.
- Do not insert disks with loosely attached labels into the drive.
- Remove the old label before applying a new one.
- When shipping disk cartridges, wrap the cartridge in a plastic bag to guard it from shipping debris and protect the cartridge with adequate bubble-pack material.

**NOTE**

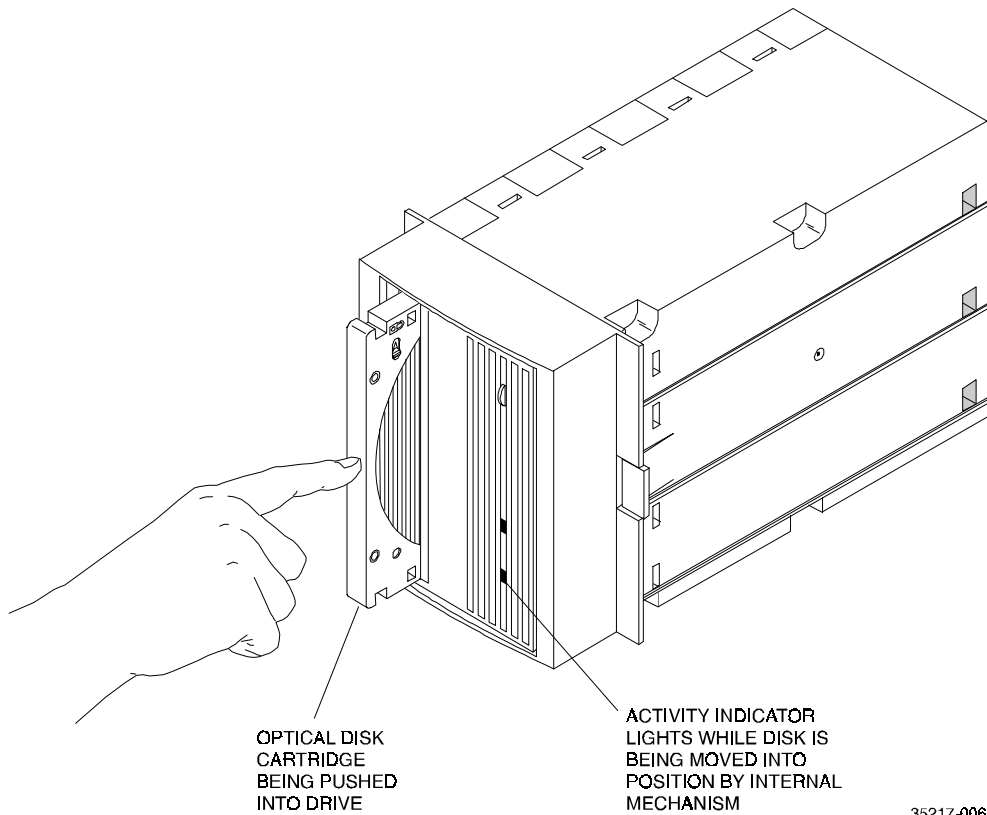
Remove an inserted disk before the drive is moved. Damage to the optical read/write mechanism can occur if the drive is moved or bumped while the power is off with a disk inserted.

### 3.4.5 Loading A Cartridge

To load an optical disk cartridge into the optical disk drive, proceed as follows:

1. Determine whether you wish to write-protect the optical disk (or its upper side) or have it write-enabled, and then move the write-protect switch in the front left corner of the top side of the disk cartridge, accordingly. (Refer to Section 3.4.3.)
2. Insert the rear end of the cartridge (opposite from you if the write-protect tab is on the left as you hold the disk cartridge) into the aperture at the top of the front panel (or on the left side, in case of vertical orientation), with the top of the triangle embossed on the side of the disk cartridge pointing into the aperture.
3. Push the cartridge assembly firmly into the drive just until the internal roller mechanism catches the disk, when less than one inch of the nearer end of the disk remains outside the aperture, and then let go, letting the mechanism pull the disk forward.
4. Note that the fault indicator blinks briefly, one time, and that the activity indicator lights and stays lit for the couple seconds during which the drive is loading the disk, after which that activity indicator also goes out, showing that the disk is ready for use.

**Figure 3-3 Loading Cartridge Into Optical Disk Drive**



### 3.4.6 Disk in Use

When the activity indicator is off, the disk is ready for use. While a disk is being read, written to, or repositioned, that indicator blinks.

### 3.4.7 Unloading A Cartridge

#### NOTE

The following procedure presumes that the operator manually initiates the unloading sequence by pressing the eject push-button. In some host-driven applications, the application software may issue an appropriate system software command to initiate the unloading sequence, producing the same effect.

1. Press the eject push-button on the front panel's right side (upper, in the sideways vertical orientation) or issue the appropriate system software command. The activity indicator lights as the disk unloads and then goes out when the disk is ejected..
2. When the activity indicator goes out, with approximately an inch of the disk cartridge protruding through the loading aperture, grasp the edges of the cartridge and pull the cartridge firmly forward, out of the drive.

### 3.4.8 Cleaning A Disk Cartridge

Disk cleaning to remove surface contamination should only be done if read/write failures are occurring and hardware failure can be ruled out as the cause of the failure, with the firmware known to be at the most current code level.

Use the Hewlett-Packard Optical Disk Cleaning Kit (Ordering No. Ca700-88800) for cleaning the optical disks. This kit contains cleaning swabs and alcohol, a special cartridge holder that keeps the sliding sleeve open, and full cleaning instructions.

After cleaning the disk, proceed as follows to ensure continued performance integrity:

1. Back up the data from each side of the disk.
2. Reformat the disk.
3. Restore the stored data to the applicable disk sides.

#### CAUTION

**Do not attempt to clean the SBB's objective lens!**

Although disk drive cleaning kits are available on the market, they cannot be used with this drive. Damage to the optical drive mechanism can result if unapproved cleaning kits are used.



## Troubleshooting

---

*This chapter describes troubleshooting for the drive. It identifies common errors and provides a troubleshooting table to help diagnose common problems.*

---

### 4.1 Introduction

This chapter describes what to do if problems occur with the drive or disk. If problems occur, first check to make sure:

- The power cord connection is tight
- The SCSI cables are connected properly
- The software drivers are loaded properly

If none of the above actions remedy the problem, refer to Table 4–1. If the problem still cannot be resolved, contact a digital reseller.

### 4.2 Common Errors

#### 4.2.1 Avoiding Basic Problems

Observe the following basic guidelines to avoid simple errors:

- Use the correct cartridge type (refer to Table 1–1).
- Care for the cartridges (both data and cleaning) in accordance with the guidelines in Chapter 3.
- Unload the cartridge before powering down the drive.
- Do not load a cartridge until after the activity indicator goes out, following initialization of the drive.

#### 4.2.2 Error Influences

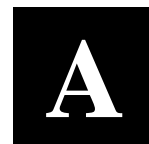
If an error occurs during drive operation, consider the following factors as potential causes:

- Defective media.
- Operator or user errors.
- Incorrect backup commands.

Use Table 4–1 to interpret error symptoms, determine their cause, and take corrective action.

**Table 4–1 Possible Corrections for Common Error Situations**

<b>Symptom</b>	<b>Probable Cause</b>	<b>Possible Correction</b>
Failure to mount or read/write with new or used cartridge.	Bad cartridge	Retry same operation with a different cartridge.
	Dirty optical disk surface	Clean the optical disk (see Section 3.4.8).
Unable to back up or copy data to disk.	Cartridge write-protected. No disk in drive.	1. Set write-protected tab on cartridge to write-enabled. 2. Insert disk.
Drive not available to system.	Drive not plugged in. (storage expansion enclosure may not be plugged in.)  SCSI ID switches set to incorrect address.  Defective SCSI cable.	1. Check ac power source.  2. Check SCSI ID switch settings.  3. Ensure power cable is plugged in and SCSI cable is seated properly.



## Specifications

*This appendix describes the performance characteristics, environmental specifications, ac power requirements, reliability and service calculations, and physical characteristics for the drive, together with the media specifications for the associated optical disk cartridges.*

**Table A-1 SWIOW-AA Optical Disk Drive Specifications**

	Specifications	
Performance Characteristics	650 MB Disks	1.3 GB Disks
<b>Seek Times</b>		
Average Seek	23.5 ms	23.5 ms
Full Stroke	45 ms	45 ms
Short Seek(across 2.2 MB)	5 ms	4 ms
Single track(track-to-track)	2 ms	2 ms
<b>Average Latency</b>	8.3 ms	12.5 ms
<b>Average Access Time</b>	31.8 ms	36 ms
<b>Spindle Rotational Speed</b>	3600 rpm	2400 rpm
<b>Data Transfer Rates</b>		
Reads (max. sustained)	1.0 Mbytes/sec.	Up to 1.6 Mbytes/sec.
Writes (max. sustained)	0.5 Mbytes/sec.	Up to 0.8 Mbytes/sec.
Burst (synchronous)	5 Mbytes/sec.	5 Mbytes/sec.
Burst (asynchronous)	3 Mbytes/sec.	3 Mbytes/sec.
Buffer size	512 Kbytes	512 Kbytes
Read buffering	Read ahead	Read ahead
Write buffering	Immediate Reporting Write Re-ordering	Immediate Reporting Write Re- ordering
<b>Read/Write Error Rate</b>	less than 1 per 10 <sup>14</sup> bytes	less than 1 per 10 <sup>14</sup> bytes
<b>Media Load/Unload Times (Standalone)</b>		
Load (including spin up)	3.8 sec. avg.	3.3 sec. avg.
Unload (including spin down)	2.3 sec. avg.	2.3 sec. avg.
<b>Interface</b>	SCSI-2 single-ended	SCSI-2 single-ended

Digital supports only 512-byte sectors.

**Table A–1 SWIOW-AA Optical Disk Drive Specifications (Continued)**

<b>Environmental Specifications</b>	
<b>Shock</b>	
Operating (@11 ms)	2 g, transparent
Non-Operating	25 g, no damage

<b>Vibration (5-500 Hz)</b>	
<b>Operating</b>	0.5 g rms
<b>Non-Operating</b>	
Random	3 g rms
Swept-sine	1 g (0 to peak)

<b>Altitude</b>	
Operating	7,620 m (25,000 ft.)
Non-Operating	15,300 m (50,000 ft.)

<b>Temperature</b>	
Operating	10 degrees to 40 degrees C
Non-Operating	-40 degrees to 60 degrees C
Gradient	10 degrees C/hour
<b>Humidity</b>	
Operating	5 to 90 percent
Non-Operating	5 to 95 percent
Maximum wet bulb	29 degrees C

**Reliability and Service**

Preventive Maintenance	None required
Mean Time Between Failures	100,000 power-on hours

**Physical Characteristics**

Height*	150.9 mm (5.94 in.)
Width* (inside locking-tab flange)	114.3 mm (4.5 in.)
Depth*	254.0 mm (10.0 in.)
Weight( Net)	2.63 kg. (5.8 lb.)

\*Measured for normal orientation (refer to Figure 1–1).





## *Product Notes for Novell NetWare™*

---

*This appendix provides information for the system administrator. It should read before installing and using the SWIOW multifunction optical drive while operating under the Novell operating system.*

---

The multifunction optical drive utilizes the standard SCSI-2 command set to interface to the PC-based host system. Therefore, the host system must be equipped with a SCSI host adapter to properly interface the optical drive to the PC host.

To operate the optical drive with the read/write media in a Novell Netware environment, simply load disk drivers for the host adapter and create a Netware volume on the optical disk. Corel Network Manager and Micro Design International SCSI Express also support the optical drive.

To operate the optical drive with WORM media in a Novell environment, a third party product such as Corel Network Manager or Micro Design International SCSI Express must be used.



# *Glossary*

## **continuous composite**

A format that describes the physical, optical, and data format characteristics of a disk that complies with ISO DP 10089-2A.

## **daisy chain**

A method of connecting devices in a serial manner, which typically starts from the host. The last device in the chain must be terminated.

## **device file**

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

## **disk**

See **optical disk**.

## **front panel**

For the optical drive, the surface facing out of the mounting enclosure, containing a power indicator light, indicator lights which display disk functions and fault detection, a place to insert and remove optical disk cartridges, a push-button to initiate automatic rejection of a mounted cartridge, and a slot for manual ejection in case of program/circuit failure.

## **magneto-optical (MO)**

A type of optical technology which uses a laser to read from and write to a magnetic layer on an MO disk. To write, a spot on the magnetic layer is heated by a laser to a point at which it can be magnetically altered by the write magnetic head. To read, the light from the laser is reflected from that same 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").

## **multifunction drive**

An optical disk drive that supports both rewritable and write-once optical disks. The drive detects the disk type by reading a factory-stamped code on the disk.

## **optical disk**

A term synonymous with 5.25-inch magneto-optical disk. There are two types of optical disks: *rewritable* and *write-once*.

**read/write head**

A part of the disk drive assembly that uses a laser and a magnet to read and write data on the magneto-optical disk.

**rear panel**

For the optical drive SBB, the surface interfacing with the SCSI bus, containing SCSI address selection buttons, SCSI and power connections, part number, and serial number labels.

**rewritable optical**

An optical disk technology in which data can be repeatedly written and erased using magneto-optical reading and writing technology.

**SCSI**

An acronym for Small Computer Systems Interface.

**terminator**

A resistor array device used for terminating a SCSI bus. A SCSI bus must be terminated at its two physical ends. A peripheral device thus needs a terminator if it is at the end of the bus, but only when it is the last item in line.

**write-once optical**

An optical disk technology available on multifunction drives. When a write-once disk is inserted, the drive will write data, but will not write over data that has been previously written.

**write-protect**

A method of preventing data from being written to a disk. A write-protect tab is located on each side of the optical disk cartridge to enable write-protection on the associated surface of the disk.

# Reader's Comments

---

**Manual Order Number:**

EK-SMOD1-UG. A01

*StorageWorks SWIOW-AA Multifunction Optical Disk Drive*

Digital is committed to providing the best possible products and services. Since our manuals are important components of our products, we value your comments, corrections, and suggestions for improvements. Please take a few minutes to fill out and return this form, attaching additional sheets, if needed. Thank you.

<b>Manual Rating</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
Accuracy (correct presentation of facts)	[ ]	[ ]	[ ]	[ ]
Completeness (adequate information)	[ ]	[ ]	[ ]	[ ]
Clarity (easy to understand)	[ ]	[ ]	[ ]	[ ]
Organization (logical sequence of information)	[ ]	[ ]	[ ]	[ ]
Layout (easy to follow subject matter)	[ ]	[ ]	[ ]	[ ]
Indexing (easy to locate desired information)	[ ]	[ ]	[ ]	[ ]

**Errors Noted (please include page, paragraph, table or figure number)**

---

---

---

**Most-Liked Features**

---

---

---

**Least-Liked Features**

---

---

---

**Suggestions for Improvement**

---

---

---

**Return Address:**

Digital Equipment Corporation  
Customer Research  
Response Center  
ATTN: Nan Andrews Amish  
334 South Street, SHR3-2/S27  
Shrewsbury, MA 01545

Name

Phone

Title

Company

Street Address

Mail Stop

City

State

ZIP

Country (if other than USA)

