

RWZ52 Optical Disk Drive

User's Guide

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Digital Equipment Corporation
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Contents

Drive Characteristics	1-1
Features of the RWZ52 Multifunction Optical Disk Drive	1-2
Performance Characteristics	1-3
Media Characteristics	1-4
Interface	1-4
Environmental Specifications	1-5
AC Power Requirements (Standalone)	1-5
Reliability and Service	1-6
Physical Characteristics	1-6
Setting up the RWZ52	2-1
Preparing the environment	2-1
Clearance requirements	2-1
Location requirements	2-1
Rear panel features	2-2
To set the SCSI ID	2-3
To set the operation mode	2-4
Connecting to the host computer	2-5
Troubleshooting	2-6
Using Optical Disks	3-1
Choosing an optical disk	3-2
Labeling an optical disk cartridge	3-3
Write-protecting an optical disk	3-4
Maintaining an optical disk in good condition	3-5

Operating the RWZ52	4-1
Identifying front panel features.....	4-2
To manually eject a cartridge	4-3
Software Applications For The RWZ52	5-1
Product Numbers Options and Supplies	A-1

Figures

Rear Panel Features	2-2
Proper Label Positions.....	3-3
Write-Protect Button Location.....	3-4
Front Panel Features	4-1

Tables

RWZ52 Supported Options.....	5-2
Optical Library Products Matrix	A-1
Basic Supplies and Reorderable Parts	A-2
Related Documentation	A-3

Preface

Purpose of This Guide

This guide provides information on setting up and using the RWZ52 Optical Disk Drive.

Who Should Use This Guide

This guide is written for owners and users of the RWZ52 Optical Disk Drive.

Structure of This Guide

This guide is organized as follows:

Chapter 1: **Drive Characteristics** - This chapter provides an overview of the RWZ52 Optical disk drive. Included are tables listing the drive's physical, environmental, electrical, reliability, and performance specifications.

Chapter 2: **Setting up the RWZ52** - Instructions on choosing a location, configuring the drive, and connecting it to the host computer are contained in this chapter.

Chapter 3: **Using Optical Disks** - This chapter explains how to label and write-protect optical disks. In addition, suggestions are provided for the proper care and handling of disks.

Chapter 4: **Operating the RWZ52** - The front panel features are described in this chapter. A procedure for manually ejecting a cartridge is included as well.

Chapter 5: Software Applications for the RWZ52 - This chapter provides a summary of some of the supported software applications and operating systems available for the RWZ52.

Appendix A: Product Numbers, Options, and Supplies - Tables are supplied listing part numbers for Digitals family of optical disk products, order numbers for media and supplies, and order numbers for related documentation.

Drive Characteristics

This chapter provides information on the following topics:

- product features
- performance characteristics
- media characteristics
- environmental specifications
- power requirements
- service specifications
- physical characteristics

Features of the RWZ52 Multifunction Optical Disk Drive

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)
- 1,200,000 MSBF (Mean Swaps Between Failure - Autochanger only)

Performance Characteristics

	650 MByte Disks	1.3 GByte Disks
Seek Times		
Average Seek	23.5 ms	23.5 ms
Full Stroke	45 ms	45 ms
Short Seek(across 2.2 Mbyte)	5 ms	4 ms
Single track(track-to-track)	2 ms	2 ms
Average Latency		
Average Latency	8.3 ms	12.5 ms
Average Access Time		
Average Access Time	31.8 ms	36 ms
Spindle Rotational Speed		
Spindle Rotational Speed	3600 rpm	2400 rpm
Data Transfer Rates		
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 aheads	Read aheads
Write buffering	Immediate Reporting Write Re-ordering	Immediate Reporting Write Re-ordering
Read/Write Error Rate		
Read/Write Error Rate	less than 1 per 10 ¹⁴ bytes	less than 1 per 10 ¹⁴ bytes
Media Load/Unload Times (Autochanger)		
Load (including spin up)	2.8 sec. avg.	2.3 sec. avg.
Unload (including spin down)	1.4 sec. avg.	1.4 sec. avg.
Media Load/Unload Times (Standalone)		
Load (including spin up)	3.8 sec. avg.	3.3 sec. avg.
Unload (including spin down)	2.3 sec. avg.	2.3 sec. avg.

Drive Characteristics

Media Characteristics

	650MByte Disks	1.3GByte Disks
Formatted Capacity		
1024 Bytes/sector disks	650 Mbytes (325/side)	1.3 Gbytes (650/side)
512 Bytes/sector disks	594 Mbytes (297/side)	1.2 Gbytes (600/side)
Bytes per sector	1024 ¹ /512	1024 ¹ /512
Sector per track	31/17	31/17
Physical tracks per surface	18751	21600
Logical tracks per surface	18751	37594
Rewritable media format	Continuous Composite conforming to ISO/IEC 10089A; ANSI X3.212	ECMA-184; ISO/IEC DIS 13549 (draft)
Write-Once media format	Continuous Composite write- once (CCW) conforming to ISO/IEC DIS 11560; ANSI X3.220	ECMA-184; ISO/IEC DIS 13549 (draft)
Media Life	30 years	30 years
Interface	SCSI-2 single-ended	SCSI-2 single-ended

¹Digital supports 512 byte sectors only!

Environmental Specifications

Shock

Operating (@11 ms)	2 g, transparent
Non-Operating	25 g, no damage

Vibration (5-500Hz)

Operating	0.5 g rms
Non-Operating	
Random	3 g rms
Swept-sine	1 g (0 to peak)

Altitude

Operating	7,620 m (25,000 ft.)
Non-Operating	15,300 m (50,000 ft.)

Temperature

Operating	10 degrees to 40 degrees C
Non-Operating	-40 degrees to 60 degrees C
Gradient	10 degrees C/hour

Humidity

Operating	5 to 90 percent
Non-Operating	5 to 95 percent
Maximum wet bulb	29 degrees C

AC Power Requirements (Standalone)

Line Voltage	100 to 240 Vac
Line Frequency	50 to 60 Hz
Power Consumption	30 W typical, 50 W maximum

Drive Characteristics

Reliability and Service

Preventive Maintenance	None required
Mean Time Between Failures	100,000 poweron hours
Cartridge load/unload cycles	1,200,000 (autochanger only)

Physical Characteristics

Drive Dimensions (Embedded)

Height	82.5 mm (3.25 in.)
Width	146 mm (5.75 in.)
Depth	203.2 mm (8 in.)
Weight(Net)	2.7 kg. (6.0 lb.)

Drive Dimensions (Standalone)

Height	146 mm (5.8 in.)
Width	174 mm (6.9 in.)
Depth	280 mm (11 in.)
Weight(Net)	4.98 kg. (11 lb.)
Weight(Shipping)	6.33 kg. (14 lb.)

Setting up the RWZ52

This chapter discusses the environment, hardware and procedures that are necessary to connect a Digital Equipment Corporation RWZ52 to the host computer:

- preparing the environment
- understanding the rear panel
- setting up the optical disk drive address
- choosing the operation mode
- connecting the drive to the host system
- preparing the host computer for use with the RWZ52
- troubleshooting

Preparing the environment

The following environmental factors should be considered for optimal performance of the RWZ52.

Clearance requirements

A minimum of 70-80 mm (3 in.) is required behind the rear panel and in front of the optical disk drive to allow air circulation.

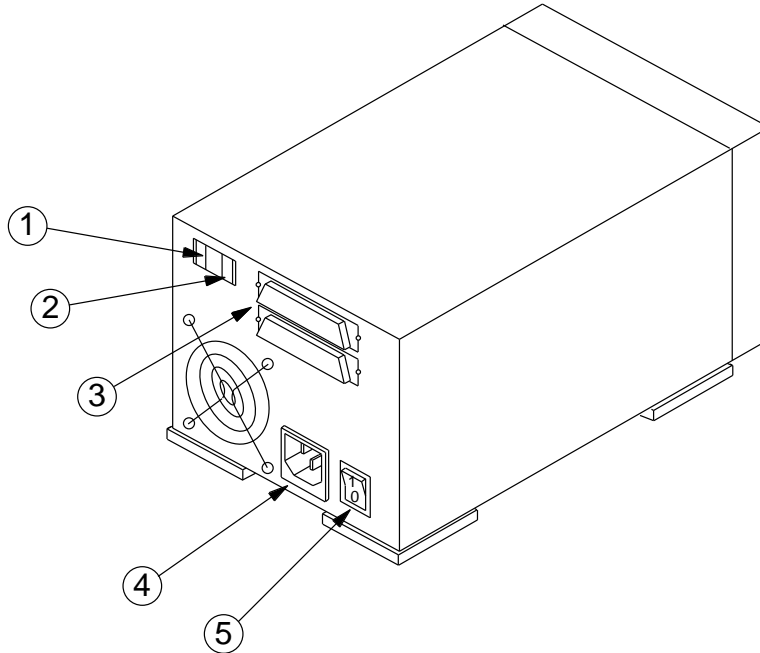
Location requirements

Position the drive away from sources of particulate contamination such as frequently-used doors and walkways, printers, stacks of supplies that collect dust, and smoke-filled rooms.

Rear panel features

Identify the following rear panel features before you connect the RWZ52 to the host system.

Figure 2-1: Rear Panel Features



The following numbers correspond to the numbers in the drawing on the previous page.

- | | | |
|---|-----------------------|--|
| 1 | SCSI ID switch | Used to set the SCSI ID. |
| 2 | Operation mode switch | Used to choose the operating mode. Refer to "To set the operation mode" on page 0-4 |
| 3 | SCSI connectors | Two connectors that allow SCSI devices to be daisy-chained. If no other SCSI device exists on the chain after the optical drive, a terminator must be connected to the unused connector. |
| 4 | Power connector | Connection for the power cord. |
| 5 | On/Off switch | Used to switch power on or off. |

To set the SCSI ID

Follow these steps to set the SCSI ID.

CAUTION:

Before disconnecting power to any device on the SCSI bus, verify that the bus is inactive. Switching off power while the SCSI bus is active can result in data loss or indeterminate bus states.

Step 1: Make sure the power to the drive is switched off.

Step 2: Locate the SCSI ID switch on the rear panel of the disk drive. Refer to Rear panel features.

Step 3: Set the SCSI ID by pushing in on the button directly above or below the address window with a small screwdriver or the point of a pen. (A small screwdriver was shipped with the RWZ52.) The button above the window decreases the number by one; the button below the window increases the number by one.

NOTE:

If you change the SCSI ID, you must power cycle the drive so that the drive recognizes the new ID. You may also need to reboot the host system.

To set the operation mode

The mode selection switch designates in which mode the RWZ52 operates.

Select 0 to operate the RWZ52 as a Digital recognized device. This is the default mode.

Select 1 to operate the RWZ52 as a Hewlett Packard (Model 1300T) recognized device.

Digital recommends operating the RWZ52 as a Digital recognized device. Hewlett Packard mode is available for use with systems and applications that do not recognize the RWZ52.

To change the operation mode, push in on the button directly above or below the operation mode window with a small screwdriver or the point of a pen. (*A small screwdriver was shipped with the RWZ52.*) The button above the window decreases the number by one; the button below the window increases the number by one.

NOTE:

If you change the operation mode, you must power cycle the drive so that the drive recognizes the new mode. You may also need to reboot the host system.

Connecting to the host computer

When you are ready to connect the RWZ52 to your host computer, note the following cautions, then complete the steps below.

CAUTION:

- Perform a full system backup prior to connecting the optical disk drive to the host computer for full data protection.
- Verify that the bus is inactive before disconnecting power to any device on the SCSI bus. Shutting off any device while the SCSI bus is active can result in data loss or indeterminate bus states.
- 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 and a disk is inserted.

Step 1. Make sure the power is switched off on both the computer and the optical disk drive.

Step 2. Connect a SCSI cable from the RWZ52 to the host or to the last peripheral which has been daisy-chained.

Step 3. Connect a SCSI terminator to the last device in the chain.

NOTE:

The length of the SCSI cable cannot exceed 6 meters, including the internal cable length of all peripherals on the SCSI bus. The RWZ52 internal cable length is .3 m.

Step 4. Plug one end of the power cord into the AC line connector on the back of the RWZ52 and the other end into the power outlet.

Step 5. Press in the power switch on the rear of the RWZ52 so that it is in the "ON" position.

Step 6. Switch on the power to the host computer.

Setting up the RWZ52

NOTE:

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

Step 7. Install the drivers appropriate to your host system, if necessary.

Troubleshooting

If you are having problems with the RWZ52, check to make sure:

- the power cord connection is tight
- the SCSI cables are connected properly
- the power switch located on the rear panel is ON
- the software drivers are loaded properly

If none of the above actions remedy the problem, contact a service representative.

Using Optical Disks

The optical disks that you use in the RWZ52 are an integral part of the storage process. This chapter provides information on the following topics:

- choosing an optical disk
- labeling an optical disk
- maintaining an optical disk
- write-protecting an optical disk

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, or ordered through Digital Direct. See Table A-3 on page A-2 for ordering information.

Choosing an optical disk

Optical disks are available in two capacities, 650 Mbytes and 1.3 Gbytes. The RWZ52 can read from and write to both 650-Mbyte disks and 1.3-Gbyte disks. However, RWZ52 users should choose 1.3 Gbyte optical disks to receive maximum storage capacity.

Two types of optical disks are available: rewritable disks and write-once disks. To choose which type of disk to use, consider these points:

- Rewritable optical disks - data can be repeatedly written and erased.
- Write-once optical disks - data can be written only once, and the data cannot be altered or erased. If you have a need for data security and audit trails, write-once disks may be your disk choice.
- Both rewritable and write-once disks come in two sector sizes: 1024 bytes/sector and 512 bytes/sector. The sector size you choose depends upon what type of operating system you are running on your computer, and which software package you have chosen. Digital operating systems support 512 byte sectors only. Refer to your computer system documentation or your optical driver software documentation to see which format is supported on your computer. The information is probably listed under optical disk sector size or optical disk format.

NOTE:

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.

Labeling an optical disk cartridge

Make it a practice to label your optical disk cartridges. You are provided adhesive labels with each disk for this purpose. Here are some suggestions for labeling:

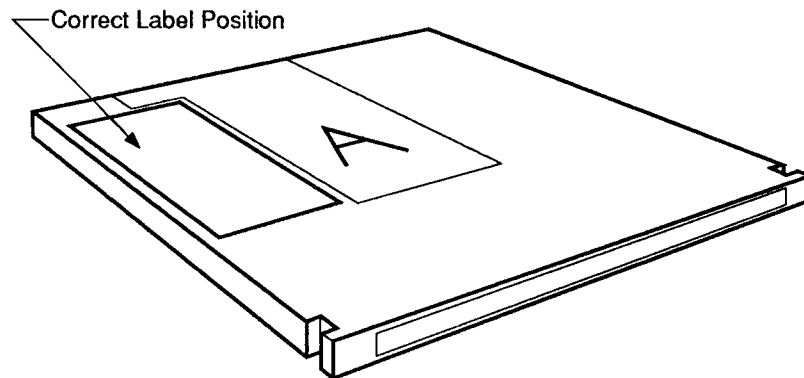
- date of format or initialization
- disk owner (e.g. group/department, etc.)
- storage purpose (e.g. backup, old version of operating system, etc.)

Apply the label to the optical disk in an area that does not obstruct the movement of the metal shutter. On side A of an optical disk, the correct label position is just to the left of the metal shutter; on side B, it is the area just to the right of the metal shutter. See the figure below for proper placement of labels on a disk.

CAUTION:

If a label is applied incorrectly, the disk cartridge may get caught in the drive.

Figure 3-1: Proper Label Positions



ZS-0507-MH

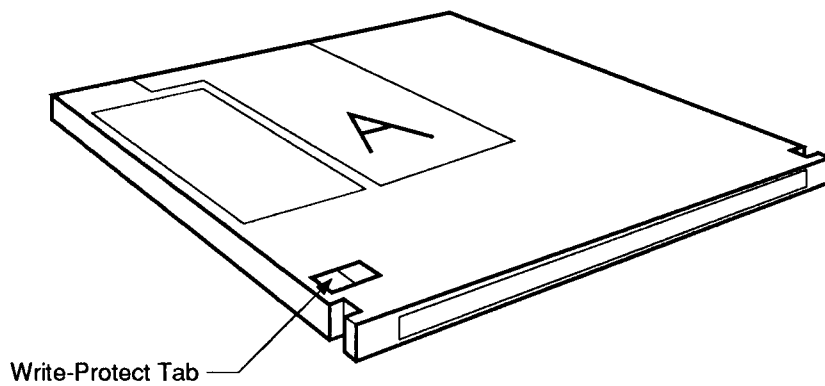
Write-protecting an optical disk

Each side of an optical disk can be write-protected by sliding the write-protect button in the direction of the arrow on the cartridge.

With rewritable optical disks, the use of the write protect button ensures data safety for files that have been previously written to the disk and prevents any additional files being written to the disk.

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 being written to a disk.

Figure 3-2: Write-Protect Button Location



ZS-0508-MH

Maintaining an optical disk in good condition

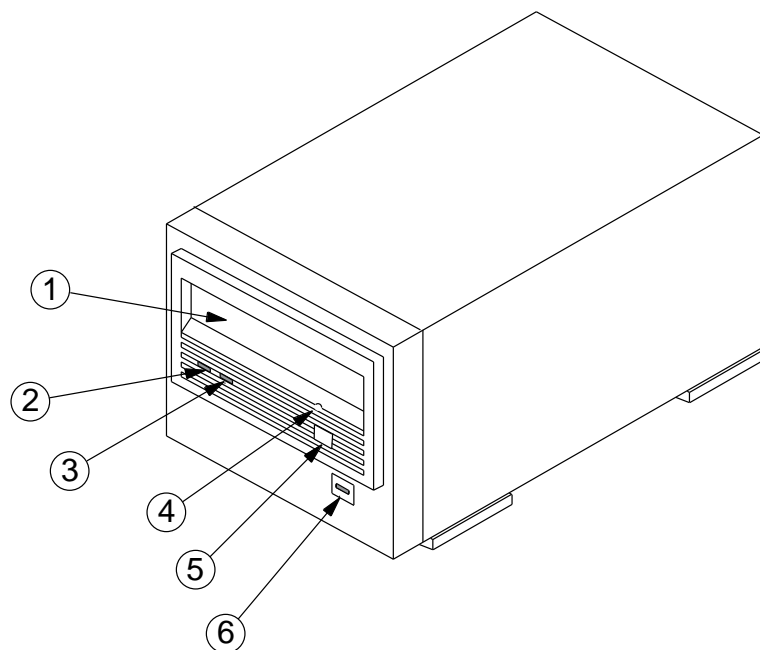
Follow these guidelines to maintain your disk in good condition:

- Do not expose the disk to extreme magnetic fields.
- Do not expose the disk to dust particles.
- Do not expose the disk to extreme temperatures or extreme humidity.
- Do not drop the disk.
- Do not open the shutter and touch the disk surface.
- Do not take the disk cartridge apart.
- Do not clean the disk's surface.
- Do not insert disks with loosely attached labels into the drive.
- Remove the old label before applying a new one.
- Store the disk in a clean, safe place when it is not in use.

Operating the RWZ52

This chapter explains the features used to operate the optical disk drive.

Figure 4-1: Front Panel Features



Identifying front panel features

The following numbers correspond to the numbers in Figure 4-1 on page 4-1.

- | | | |
|---|--------------------|--|
| 1 | Cartridge slot | Opening for inserting optical cartridge. |
| 2 | Activity indicator | Remains lit while a cartridge is loaded or unloaded, during the powerup selftest sequence, and any time the drive is being accessed. It also remains lit for approximately two seconds when the eject button is pressed. |
| 3 | Fault indicator | Remains lit whenever a failure condition exists that keeps the drive from operating normally. |
| 4 | Eject tool opening | An access hole for the eject tool. In an emergency, such as a power outage, the cartridge can be manually ejected by inserting the eject tool into this opening. Read To manually eject a cartridge on the next page. |
| 5 | Eject button | Pressed to eject the cartridge from the drive. The cartridge does not eject if a SCSI Prevent/Allow Media Removal command has been issued, or if power to the drive is off. |
| 6 | Power indicator | Remains lit while the power is on. |

To manually eject a cartridge

The RWZ52 does not automatically eject an optical cartridge if a power failure occurs. An eject tool was shipped with the RWZ52 to eject a cartridge manually.

Follow these steps to remove the cartridge from the optical drive:

Step 1. Disconnect all power to the drive.

Step 2. Insert the eject tool into the small round hole in the front panel of the drive.

Step 3. Turn the eject tool in a clockwise direction (to the right) until the disk is ejected through the front of the drive (approximately 20 complete rotations).

NOTE:

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

Software Applications For The RWZ52

The RWZ52 is supported on many hardware platforms and by several software applications. The two most common applications are DEC Optical Storage Desktop Software(OSDS) for OpenVMS VAX and AXP on workstations and the CorelSCSI packages for PC platforms.

The DEC OSDS product provides OpenVMS applications and users the functionality necessary to access Write Once Read Many(WORM) and multifunction standalone (desktop) optical drives using the conventional device, file, and record access services provided by the OpenVMS Operating System. In most cases no changes will be required to existing applications that use magnetic disk storage. The OpenVMS AXP version of DEC OSMS provides local access to RW5xx autochangers using rewritable media only at this time. The order number for DEC OSDS can be found in Table A-2.

CorelSCSI version 2 will access, maintain and test up to seven devices connected to a single host adaptor. It supports DOS, WINDOWS and OS/2 operating systems. CorelSCSI Network Manager has the same capabilities as version 2 with the addition of network support and fault-tolerant protection for your network data. Both packages will support 512 and 1024 sector size media, however there is no 2048 sector WORM support.

Software Applications For The RWZ52

Table 5-1 RWZ52 Supported Options

Platform	Version	Interface	WORM* MODE	Software Package
VAX	VMS 5.4-3 or higher	Direct SCSI host adapter	Y	OSDS OpenVMS VAX
VAX	VMS 6.1 or higher	Direct SCSI host adapter	N	None needed for rewritable mode
AXP	VMS 1.5 or higher	Direct SCSI host adapter	N	OSDS OpenVMS AXP
CI VAX	VMS 5.5-2 and 6.1 only	HSC/K.SCSI	N	None needed for rewritable mode
PC	MS-DOS 4.0 or higher Windows 3.1	Direct SCSI host adapter	Y	CorelSCSI Version 2
PC	OS/2 2.0 or higher	Direct SCSI host adapter	Y	CorelSCSI Version 2
PC Networks	Novell NetWare 3.11 and 3.12	Direct SCSI host adapter	Y	CorelSCSI Network Manager

* WORM functionality for the RWZ52 standalone drive connected to workstations is only supported on a non-clustered, VAX platform with OSDS OpenVMS VAX software. In the future additional platforms and clustered environments may be supported using the OSDS software. The Software Product Descriptions (SPDs) will always state the latest supported options.

A

Product Numbers Options and Supplies

This appendix lists the product numbers and options for the Optical Library, and the available supplies.

Table A-2: Optical Library Products Matrix

Model Number	Description
RW504-ZA	A 10 gigabyte Optical Jukebox with a 16 disk slot capacity, one mail slot, one 650 Mbyte multi-function drive, one auto changer mechanism. Plus packaging, skid, ESD bag, and accessory kit. Single ended SCSI.
RW524-ZA	A 20 gigabyte Optical Jukebox with a 16 disk slot capacity, one mail slot, one 1.3 Gbyte multi-function drive, one auto changer mechanism. Plus packaging, skid, ESD bag, and accessory kit. Single ended SCSI.
RW510-ZC	A 20 gigabyte Optical Jukebox with a 32 disk slot capacity, one mail slot, two 650 Mbyte multi-function drives, one auto changer mechanism. Plus packaging, skid, ESD bag, and accessory kit. Single ended SCSI.
RW530-ZC	A 40 gigabyte Optical Jukebox with a 32 disk slot capacity, one mail slot, two 1.3 Gbyte multi-function drives, one auto changer mechanism. Floor stand model Plus packaging, skid, ESD bag, and accessory kit. Single ended SCSI.
RW514-ZF	A 57 gigabyte Optical Jukebox with a 88 disk slot capacity, one mail slot, four 650 Mbyte multi-function drives, one auto changer mechanism. Plus packaging, skid, ESD bag, and accessory kit. Single ended SCSI.
RW534-ZF	A 114 gigabyte Optical Jukebox with a 88 disk slot capacity, one mail slot, four 1.3 Gbyte multi-function drives, one auto changer mechanism. Plus packaging, skid, ESD bag, and accessory kit. Single ended SCSI.

Product Numbers Options and Supplies

RW516-ZF	A 94 gigabyte Optical Jukebox with a 144 disk slot capacity, one mail slot, four 650 Mbyte multi-function drives, one auto changer mechanism. Plus packaging, skid, ESD bag, and accessory kit. Single ended SCSI.
RW536-ZF	A 188 gigabyte Optical Jukebox with a 144 disk slot capacity, one mail slot, four 1.3 Gbyte multi-function drives, one auto changer mechanism. Plus packaging, skid, ESD bag, and accessory kit. Single ended SCSI.
RW516-UA	Slot upgrade kit only for (RW514 to RW516) Consists of 56 slots, controller and hardware. Plus packaging, and ESD bag.
RW536-UA	Slot upgrade kit only for (RW534 to RW536) Consists of 56 slots, controller and hardware. Plus packaging, and ESD bag.
RW524-UB	One drive 1.3 Gbyte upgrade kit only for RW504.
RW530-UB	Two drive 1.3 Gbyte upgrade kit only for RW510.
RW536-UB	Four drive 1.3 Gbyte upgrade kit only for RW514 or RW516.
RW500-ZZ	Single ended to differential adapter and hardware. Plus packaging, and ESD bag.
RWZ52-AA	Embedded 1.3 Gbyte multi-function optical drive.
RWZ52-FA	Tabletop 1.3 Gbyte multi-function optical drive.
RWZ52-VA	Embedded 1.3 Gbyte multi-function optical drive mounted in a StorageWorks container.

Table A-3: Basic Supplies and Reorderable Parts

Item	Part Number
Rewritable Optical Disk (512 bytes/sector) 594 Mbytes per disk formatted	RWX1K-01 (30-38754-01)
Rewritable Optical Disk (512 bytes/sector) 1.2 Gbytes per disk formatted	RWX5K-01 (30-38754-02)
Write-Once Optical Disk (512 bytes/sector) 594 Mbytes per disk formatted	RWX1K-02 (30-40952-01)
Write-Once Optical Disk (512 bytes/sector) 1.2 Gbytes per disk formatted	RWX5K-02 (30-38754-02)
2.7m (9 ft) SCSI interface cable; Champ to Honda connectors	BC09D-09 (Storage Server)
0.9m (3 ft) SCSI jumper cable; Champ to Champ connectors	BC09K-03
1.8m (6 ft) SCSI interface cable	BC06P-06 (17-02659-02)
Single-ended SCSI terminator	H8574-A
Power cord	RW1KA-AA
DEC Optical Storage Desktop Software (OSDS)	QL-OU9A9-AA

Table A-4: Related Documentation

Item	Part Number
Optical Storage Desktop Software Installation Guide	AA-PXYKB-TE
Optical Storage Desktop Software User's Guide	AA-PXYLB-TE
Optical Storage Management Software Installation Guide	AA-PXYPB-TE
Optical Storage Management Software User's Guide	AA-PXYQB-TE
Storage Server 100 Installation Guide	EK-D59SS-IN
Small Optical Disk Library Service Manual	EK-SOL10-SV
Medium Optical Disk Library Service Manual	EK-MOL20-SV
Large Optical Disk Library Service Manual	EK-SS100-SV
Storage Server 100 Optical Disk Service Manual	EK-STSOP-SV ²
Optical Library User's Guide	EK-STSOP-UG
RWZ52 Optical Disk Drive User's Guide	EK-RWZ52-UG

²Only for older model 10/20 jukeboxes shipped with (ninja) storage server systems.

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 just like ordinary files, but requests to read or write result in activation of the associated device.

disk

See optical disk.

front panel

The part of the optical drive that includes a power indicator light, indicator lights which display disk functions, and a place to insert and remove disks.

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 where it can be magnetically altered by the write magnetic head. To read, the light from the laser is reflected from the spot. The magnetic alteration causes the light to be polarized in one direction (interpreted as a "1") or the opposite direction (interpreted as a "0").

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 MO disk.

rear panel

The part of the optical drive that provides SCSI address selection buttons, SCSI and power connections, mode selection switch, on/off switch, and safety, 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 the 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 uses a terminator only if it is at the end of the bus.

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 both sides of the optical disk cartridge to enable write-protection on one or both surfaces of the disk.

Index

A

address setting, 2-3

C

Cartridge labels, 3-3

connecting to the host computer, 2-5

connectors,

power, 2-2

SCSI, 2-2

E

environmental requirements, 2-1

clearance, 2-1

location, 2-1

F

Front Panel, 4-1

R

rear panel features, 2-2

S

SCSI,

connectors, 2-2

ID switch, 2-2

Index

setting the ID, 2-3

setting the operation mode, 2-4

Switch

SCSI ID, 2-2

switches

operation mode, 2-2

W

Write-Protect Button, 3-4