StorageWorks™ Solutions

SW500-Series Cabinet Installation and User's Guide

Order Number: EK–SW500–IG. D01

This manual describes the concepts and procedures necessary to install, configure, and use StorageWorks SW500-series cabinets. Both mechanical cabinet configuration and power configuration are covered in this manual. The configuration and connection of SCSI–2 signal buses is covered in referenced StorageWorks documentation.

Digital Equipment Corporation
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Preface

This document presents the concepts and procedures necessary to install, configure, and use **StorageWorks**™ SW500-series **cabinets**. Both mechanical cabinet configuration and power configuration are covered in this manual. Configuring and connecting SCSI–2 signal buses is covered in referenced StorageWorks documentation.

Intended Audience

This manual is intended for use by customers and Digital Multivendor Customer Services engineers responsible for installing, configuring, and using StorageWorks SW500-series cabinets.

Note

The procedures described in this guide are to be performed only by qualified service personnel.

Structure

This manual is organized as follows:

Chapter 1	Discusses how to use this manual to configure an SW500-series cabinet storage subsystem.
Chapter 2	Provides an overview of the SW500-series cabinet, a description of its major components, and a discussion of the power options available for it.
Chapter 3	Contains site preparation information.
Chapter 4	Describes the unpacking and installation of SW500-series cabinets.
Chapter 5	Describes the configuration of SW500-series storage-only cabinets.
Chapter 6	Describes the configuration of SW500 **controller**/storage cabinets.
Chapter 7	Describes the mounting of StorageWorks shelves within SW500-series cabinets.
Chapter 8	Describes the mounting of TZ8*x*7-series tape drives within SW500-series cabinets.
Chapter 9	Describes the configuration of power within SW500-series cabinets.
Glossary	The Glossary defines the acronyms and specialized terms used in the StorageWorks environment.

Related Documents

Table 1 lists the StorageWorks-related user documents organized by use, system, or product.

Table 1 StorageWorks Related Documentation

Document Title	Order Number
StorageWorks Primary Publications	
StorageWorks Solutions Configuration Guide	EK–BA350–CG
StorageWorks Solutions Shelf and SBB User's Guide	EK–BA350–UG
StorageWorks RAID Array 110 Subsystem	
DEC RAID Utilities User's Guide	EK–DECRA–UG
HSZ10–AA Controller Site Preparation Guide	EK–HSZ10–IN
StorageWorks Expansion Storage Pedestal User's Guide	EK–SMCPA–UG
StorageWorks RAID Array 110 Subsystem User's Guide	EK–SM2CA–UG
StorageWorks RAID Array 110 Utility for MS–DOS User's Guide	AA–Q0N5A–TE
StorageWorks RAID Array 110 Utility for Novell NetWare User's Guide	AA–Q0N4A–TE
StorageWorks RAID Array 110 Utility for SCO UNIX User's Guide	AA–Q0N6A–TE
StorageWorks Array Controller 140-Series	
StorageWorks Array Controller HS Family of Array Controllers User's Guide	EK–HSFAM–UG
StorageWorks BA350–MA Controller Shelf User's Guide	EK–350MA–UG
DECraid+ Rackmount Storage Subsystem and HSC Intelligent I/O Servers	
HSC Controller User's Guide	AA–PFSQA–TK
HSC Controller Installation Manual	EK–HSCMN–IN

Table 1 (Cont.)   StorageWorks Related Documentation

Document Title	Order Number
StorageWorks Enclosures	
BA35X–VA Vertical Mounting Kit User's Guide	EK–350SV–UG
InfoServer 1000 Installation and Owner's Guide	EK–INFLC–OM
StorageWorks Solutions Desktop Expansion Unit User's Guide	EK–BA353–UG
StorageWorks Solutions SW500 and SW800 Cabinet Metric Shelf Bracket Kit Installation Guide	EK–35XRD–IG
StorageWorks Solutions HSR95-Series Cabinet Metric Shelf Bracket Kit Installation Guide	EK–35XRD–IG
StorageWorks RETMA Shelf Rail Kit Installation Guide	EK–35XRB–IG
StorageWorks Solutions SW500-Series Cabinet Installation and User's Guide	EK–SW500–IG
StorageWorks Solutions SW500-Series Cabinet Cable Distribution Unit Installation Guide	EK–SW5CU–IG
StorageWorks Solutions SW800-Series Data Center Cabinet Cable Distribution Unit Installation Guide	EK–SWCDU–IS
StorageWorks Solutions SW800-Series Data Center Cabinet Installation and User's Guide	EK–SW800–IG
Instructions for Installation of the Tape Bezel Kit on SF400 Series Cabinets‡	EK–SFTBK–IS
Storage Devices	
SCSI Signal Converter DWZZA–AA	EK–DWZZA–SV
SCSI Signal Converter DWZZA–MA	EK–DWZZM–SV
SCSI Signal Converter DWZZA–VA	EK–DWZAA–SV
StorageWorks Building Blocks User's Guide	EK–SBB35–UG
StorageWorks Solutions 3½-Inch Storage Device Installation Guide	EK–MC350–IG
StorageWorks Solutions 5¼-Inch Storage Device Installation Guide	EK–MC525–IG
TZ86–VA Cartridge Tape Drive Device Addresses	EK–TZ86A–UG
TZ87–VA Cartridge Tape Drive Device Addresses	EK–TZ87A–DA
Storageworks Solutions TZ8x7-Series Tape Drive SCSI Bus Configuration and Installation Guide	EK–TZ8X7–IG
General Reference Publications	
Digital Systems and Options Catalog	†
Small Computer System Interface, An Overview	EK–SCSIS–OV
Small Computer System Interface, A Developer's Guide	EK–SCSIS–DK

† Available from your Digital account representative.
‡ Also applies to StorageWorks cabinets.

Documentation Conventions

The following conventions are used in this manual:

boldface type   Boldface type indicates the first instance of terms being defined in text, in the glossary, or both.

italic type   Italic type indicates emphasis and complete manual titles. In the glossary, italic type also is used to indicate cross-references.

Manufacturer's Declarations

Following are manufacturer's declarations applicable to StorageWorks
SW500-series cabinets:

_____ **CAUTION** _____

This is a class A product. In a domestic environment, this product may
cause radio interference, in which case the user may be required to take
adequate measures.

_____

_____ **ACHTUNG !** _____

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen
können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in
welchen Fällen die Benutzer für entsprechende Gegenmaßnahmen
verantwortlich sind.

_____

_____ **ATTENTION !** _____

Ceci est un produit de Classe A. Dans un environment domestique, ce
produit risque de créer des interférences radiélectriques, il appartiendra
alors à l´utilisateur de prendre les mesures spécifiques appropriées.

_____

_____ **Note** _____

The equipment described in this manual is listed by the Underwriters
Laboratories Incorporated and bears the UL Listing mark. SW500-series
cabinets are also certified by the Canadian Standards Association and
TÜV Product Service GmbH and bear both the CSA certification and
TÜV GS marks. The equipment also complies with the requirements for
CE-mark Class A.

_____

Table 2 Acoustics—Preliminary Declared Values per ISO 9296 and ISO 7779

Product†	Sound Power Level L_{WAd}, B‡		Sound Pressure Level L_{pAm}, dBA (Bystander Positions)	
	Idle	Operate	Idle	Operate
SW500 cabinet only	0.0	0.0	0.0	0.0
SW500 with 2 BA350–MA shelves, each containing 2 HSJ40™ controllers and 8 BA350–SA shelves, each containing 6 RZ26–VA disk drives	7.0	7.0	50.0	51.0
Per device when installed in SW500				
BA350–SA shelf containing 6 RZ26–VA disk drives	5.7	5.7	39	39
BA350–MA shelf with 2 HSJ40 controllers	5.6	5.6	39	39

Product†	Sound Power Level L_{WAd}, B‡		Sound Pressure Level L_{pAm}, dBA (Operator Positions)	
	Idle	Operate	Idle	Operate
SW500 cabinet only	0.0	0.0	0.0	0.0
SW500 with 2 BA350–MA shelves, each containing 2 HSJ40 controllers and 8 BA350–SA shelves, each containing 6 RZ26–VA disk drives	7.0	7.0	50.0	51.0
Per device when installed in SW500				
BA350–SA shelf containing 6 RZ26–VA disk drives	5.8	5.8	46	46
BA350–MA shelf with 2 HSJ40 controllers	5.7	5.7	46	46

† Current values for specific configurations are available from Digital representatives.
‡ 1 B = 10 dBA.

Note ————————————————

Table 3 is a translation of the English language specifications in Table 2 into the German language.

Table 3 Schallemissionswerte—Vorläufige Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779

Gerät†	Schalleistungspegel L_{WAd}, B‡		Schalldruckpegel L_{pAm}, dBA (Beistehende Position)	
	Leerlauf	Betrieb	Leerlauf	Betrieb
nur SW500 Kabinett	0,0	0,0	0,0	0,0
SW500 mit 2 BA350–MA shelves, jedes bestückt mit 2 HSJ40 controllers und 8 BA350–SA shelves, jedes bestückt mit 6 RZ26–VA disk drives	7,0	7,0	50,0	51,0
Pro Gerät installiert im SW500				
BA350–SA shelf mit 6 RZ26–VA disk drives	5,7	5,7	39	39
BA350–MA shelf mit 2 HSJ40 controllers	5,6	5,6	39	39

Gerät†	Schalleistungspegel L_{WAd}, B‡		Schalldruckpegel L_{pAm}, dBA (Bediener Position)	
	Leerlauf	Betrieb	Leerlauf	Betrieb
nur SW500 Kabinett	0,0	0,0	0,0	0,0
SW500 mit 2 BA350–MA shelves, jedes bestükt mit 2 HSJ40 controllers und 8 BA350–SA shelves, jedes bestükt mit 6 RZ26–VA disk drives	7,0	7,0	50,0	51,0
Pro Gerät installiert im SW500				
BA350–SA shelf mit 6 RZ26–VA disk drives	5,8	5,8	46	46
BA350–MA shelf mit 2 HSJ40 controllers	5,7	5,7	46	46

† Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich.
‡ 1 B = 10 dBA.

1

How to Use This Manual

This chapter shows you how to use the information in this manual to configure an SW500-series cabinet storage subsystem.

1.1 Cabinet Configuration

Following is the sequence of steps that you must follow to set up a storage subsystem in an SW500-series cabinet:

1. Understanding cabinet concepts—To follow the procedures in this manual, you should be familiar with the components and nomenclature used with the SW500-series cabinet family.

2. Site preparation—You must ready the site for the installation of the cabinet.

3. Unpacking—You must unpack the cabinet and set it in place at the site.

4. Cabinet layout—You must determine the layout of the cabinet's shelves, tape units, and power cabling.

5. Component installation—You must install the cabinet's shelves and tape units in accordance with the layout.

6. Power cabling routing and installation—You must install and route the cabinet's power cabling in accordance with the layout.

7. SCSI bus design and connection—You must design and connect the cabinet's SCSI bus signal cabling.

8. SCSI bus cable routing—You must properly route the cabinet's SCSI bus signal cabling, as it is installed.

1.2 Locating the Information You Need

This manual contains the information and procedures to support the cabinet configuration process. The design and connection of SCSI signal buses, however, is covered in referenced documentation. Table 1–1 shows each configuration step, where you can find the information, and procedures you need to complete the step.

Table 1–1 Information and Procedure Locations

Configuration Step	Location of Supporting Information	Comments
Understanding cabinet concepts	Chapter 2, Introduction	
Site preparation	Chapter 3, Site Preparation	
Unpacking	Chapter 4, Unpacking and Installation	
Cabinet layout	Chapter 5, Configuring SW500 Storage-Only Cabinets	To lay out storage-only cabinets
	Chapter 6, Configuring SW500 Controller/Storage Cabinets	To lay out cabinets containing both controllers and storage
Component installation		
StorageWorks shelves	Chapter 7, Installing StorageWorks Shelves	
TZ8*x*7 tape drives	Chapter 8, Installing TZ8*x*7-Series Tape Drives	
Power cabling routing and installation	Chapter 5, Configuring SW500 Storage-Only Cabinets	For storage-only cabinets
	Chapter 6, Configuring SW500 Controller/Storage Cabinets	For cabinets containing both controllers and storage
SCSI bus design and connection†	*StorageWorks Solutions Family Configuration Guide* *StorageWorks Solutions SBB and Shelf User's Guide*	For BA350–S*x* storage shelves
	StorageWorks Array Controller HS Family of Array Controllers User's Guide *StorageWorks BA350–MA Controller Shelf User's Guide*	For BA350–M*x* controller/storage shelves
	StorageWorks RAID Array 110 Subsystems User's Guide	For BA350–E*x* controller/storage shelves (major component of the RAID Array 110 subsystem)
	Storage Solutions TZ8x7-Series Tape Drive SCSI Bus Configuration and Installation Guide	For TZ8*x*7-series tape drives
SCSI bus cable routing	Chapter 5, Configuring SW500 Storage-Only Cabinets	Routing for storage-only cabinets
	Chapter 6, Configuring SW500 Controller/Storage Cabinets	For cabinets containing both controllers and storage

†The procedures involved in SCSI bus design and connection are specific to the components being bused together. See the referenced documentation for detailed information on SCSI bus design and connection.

2

Introduction

This chapter presents an overview, a description of major components, and a discussion of power options for StorageWorks SW500-series cabinets.

2.1 Overview

The SW500-series cabinet, shown in Figure 2–1, is a member of Digital's StorageWorks family of modular enclosures. The 600 mm-wide cabinet provides an attractive enclosure with rackmount space and primary power for up to 10 StorageWorks shelves of different types. Up to six StorageWorks shelves can be used in conjunction with two TZ8*x*7-series tape drives. The cabinet can accommodate both data storage and controller/data storage combinations. The cabinet and its StorageWorks shelves can be configured with dual ac power capability to provide redundant power supplies.

SW500-series cabinets offer a versatile, modular solution to array storage problems. You may use them in both open-office and data center applications. You may order the cabinet in a variety of preconfigured subsystem versions with such options as mixed storage device types and storage, controller, or power redundancy. You also can order custom configurations to meet your specific needs. The modularity of the cabinet and its components offers efficient and cost-effective upgrade paths.

Specifications for SW500-series cabinets are shown in Table 2–1.

Figure 2–1 SW500-Series Cabinet
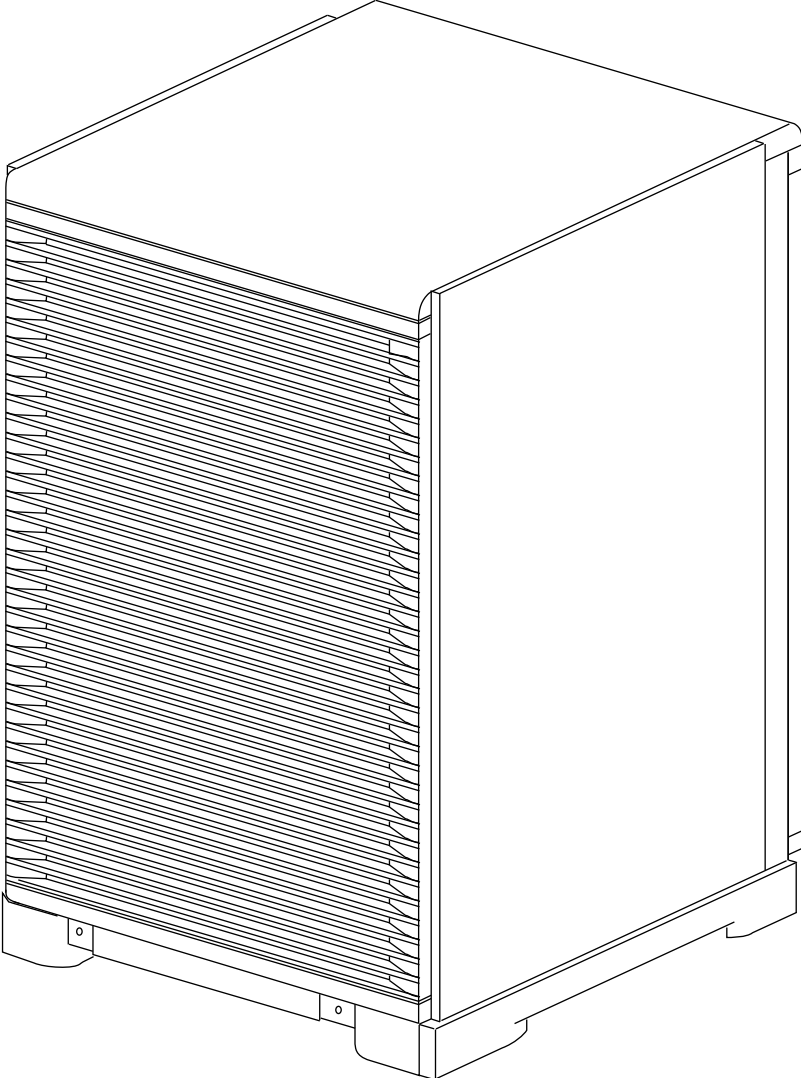
CXO-3897A-MC

Table 2–1 SW500-Series Cabinet Specifications

Characteristic	Specification
Dimensions (nominal)	110.00 cm (43.31 in) height, 60.00 cm (23.62 in) width, 87.25 cm (34.35 in) depth
Weight	
Empty cabinet (only 1 CDU installed)	140 kg (309 lb)
Empty cabinet with shipping packaging	160 kg (353 lb)
Maximum configuration (2 BA350– MA shelves, 8 BA350–SA shelves with 6 RZ26 disk drives in each, 2 CDUs)	290 kg (639 lb)
Agency compliance	FCC, UL, CSA, TÜV, and CE-mark
Electrical rating	
SW5xx–AC	100–120 volts, 60 Hz, single phase, 20 amperes
SW5xx–AD	100–120/200–240 volts, 50/60 Hz, single phase, 20/16 amperes
Temperature	+10°C to +40°C (+50°F to +95°F) Reduce rating by 1.8°C for each 1000 m altitude (1.0°F for each 1000 ft altitude)
Humidity	10 to 85% at maximum wet bulb temperature of +32°C (+90°F) and minimum dew point of +2°C (+36°F)
Recommended Environmental Limits†	
Operating environment	
Temperature	18°C to 24°C (64.4°F to 75.2°F) with an average rate of change of 3°C/hour maximum and a step change of 3°C or less
Relative humidity	40 to 60% (noncondensing) with a step change of 10% or less (noncondensing)
Altitude	Up to 2400 m (8000 ft)
Air quality (maximum particle count)	Not to exceed 500,000 particles per cubic foot of air at a size of 0.5 micron or larger
Nonoperating environment	
Temperature	–40°C to +66°C (–40°F to +151°F)
Relative humidity	10 to 80% noncondensing
Altitude	4900 m (16,000 ft)

†These limits are for optimum equipment performance and reliability.

2.2 Major Components

The major components of the SW500-series cabinet are shown in Figures 2–2 and 2–3 and are as follows:

- Cabinet—The cabinet is a general-purpose enclosure that provides rack-mount capability for standard 44.5 cm (17.5 inch) wide components. The cabinet uses a standard metric rackmount bolt pattern with holes on 25-mm (.98-inch) centers. Hinged front and rear doors and removable side panels allow easy access to the cabinet interior. Casters and leveler feet are provided to facilitate placement of the cabinet, and base trim **skirts** are provided to enhance its appearance.

   The cabinet provides six storage shelf positions in the front and four storage shelf positions in the rear. Storage shelves may generally be installed in any of the usable shelf positions, although some limitations may be imposed by either weight or cable length restrictions. One shelf position in the rear of the cabinet is reserved for power **cable distribution unit (CDU)** installation, and one is left open for proper air flow.

- Shelf brackets—Movable **shelf brackets** within the cabinet can be configured to hold any of the StorageWorks shelf types. Shelf brackets must be procured separately from the cabinet or may come packaged with cabinet options.

- SBB shelves—**StorageWorks building block (SBB) shelves** are designed to house any of the SBBs in the StorageWorks family. The shelves can accept one or two power supply SBBs as well as a number of peripheral device SBBs. SBB shelves provide the mechanical mounting, power, and signal interfaces for the SBBs they house. The shelves are 445 mm (17.5 inch) in width and are designed to slide into the shelf brackets.

- SBBs—StorageWorks building blocks (SBBs) are modular computer peripheral devices or power units from the StorageWorks family. SBBs may be disk drives, tape drives, shelf power supplies, battery backup units, or other types of peripherals conforming to the **Small System Computer Interface 2 (SCSI–2)** specification. They are housed in both 3½-inch and 5¼-inch wide modular carriers designed to plug into slots in SBB shelves. Connectors on the rear of each SBB mate with connectors in the SBB shelf to provide the electrical interface between the two units.

- Controller shelves—Controller shelves are StorageWorks shelves designed specifically to house SCSI–2 peripheral controller and cache memory modules. These shelves may also accept one or two power supply SBBs. Controller shelves provide the mechanical mounting, power, and signal interfaces for the units they house. The cabinet allows for the mounting of one controller shelf in the front and one in the rear.

- CDUs—Cable distribution units (CDUs) provide the connections necessary to distribute ac power to the shelves in the SW500 cabinet. CDUs also provide surge and spike protection, along with a circuit breaker to control the incoming ac power. As an option, two CDUs can be configured with an auxiliary ac power source to provide redundant primary power within the cabinet.

Figure 2–2 Cabinet Major Components

CABINET

SBB
SHELF

SBB

CONTROLLER
SHELF

SHELF
BRACKET

CDU
(INSTALLED
IN REAR)

CXO-4077A-MC
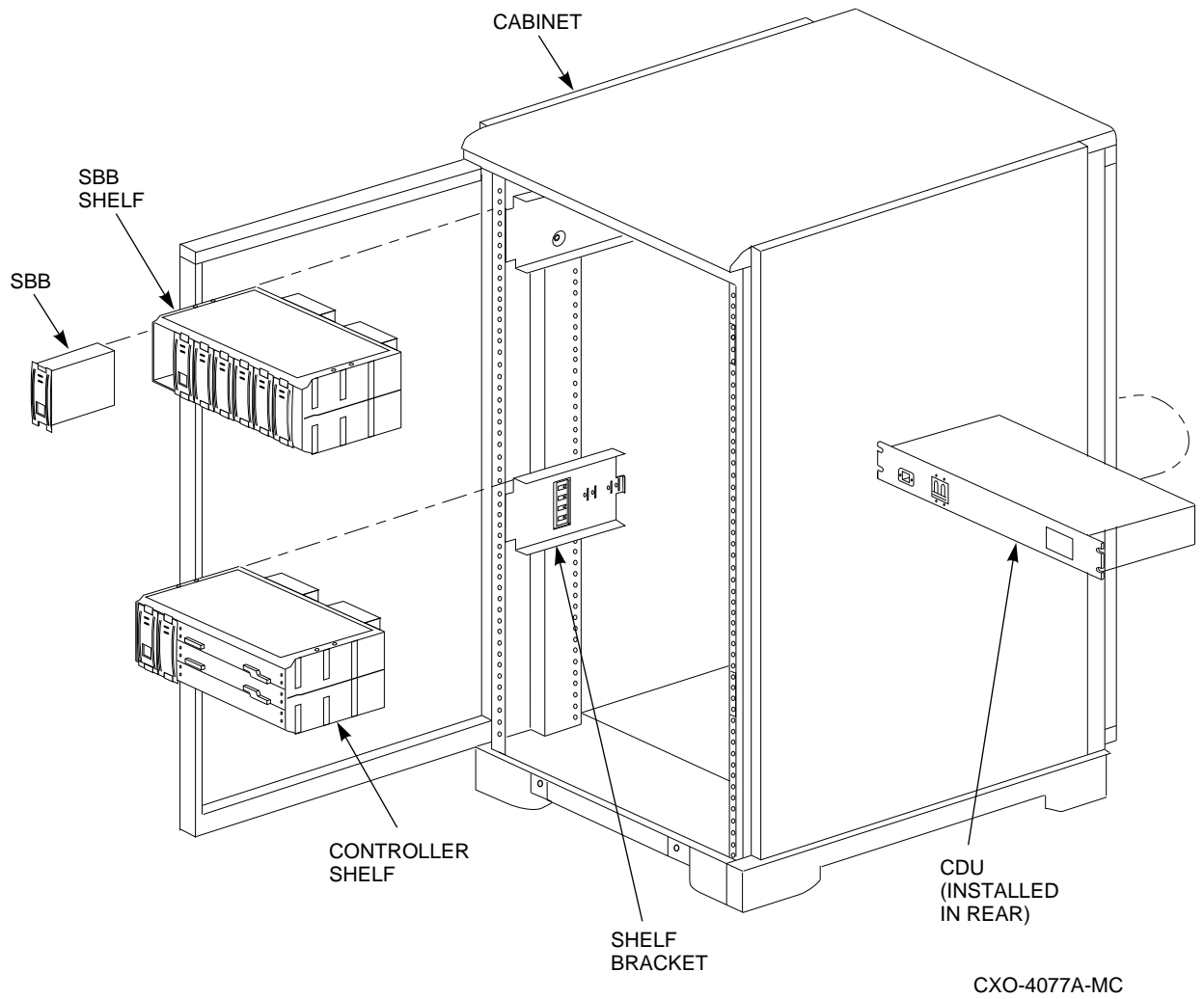
- TZ8*x*7-Series Tape Drives–Up to two TZ8*x*7-series tape drives can be installed in the upper area of the cabinet, as shown in Figure 2–3. A **chassis rail** is used to support the tape drive from one side.

Figure 2–3 TZ8*x*7-Series Tape Drive

CABINET

CHASSIS RAIL

TAPE BEZEL

TZ8x7-SERIES TAPE DRIVE
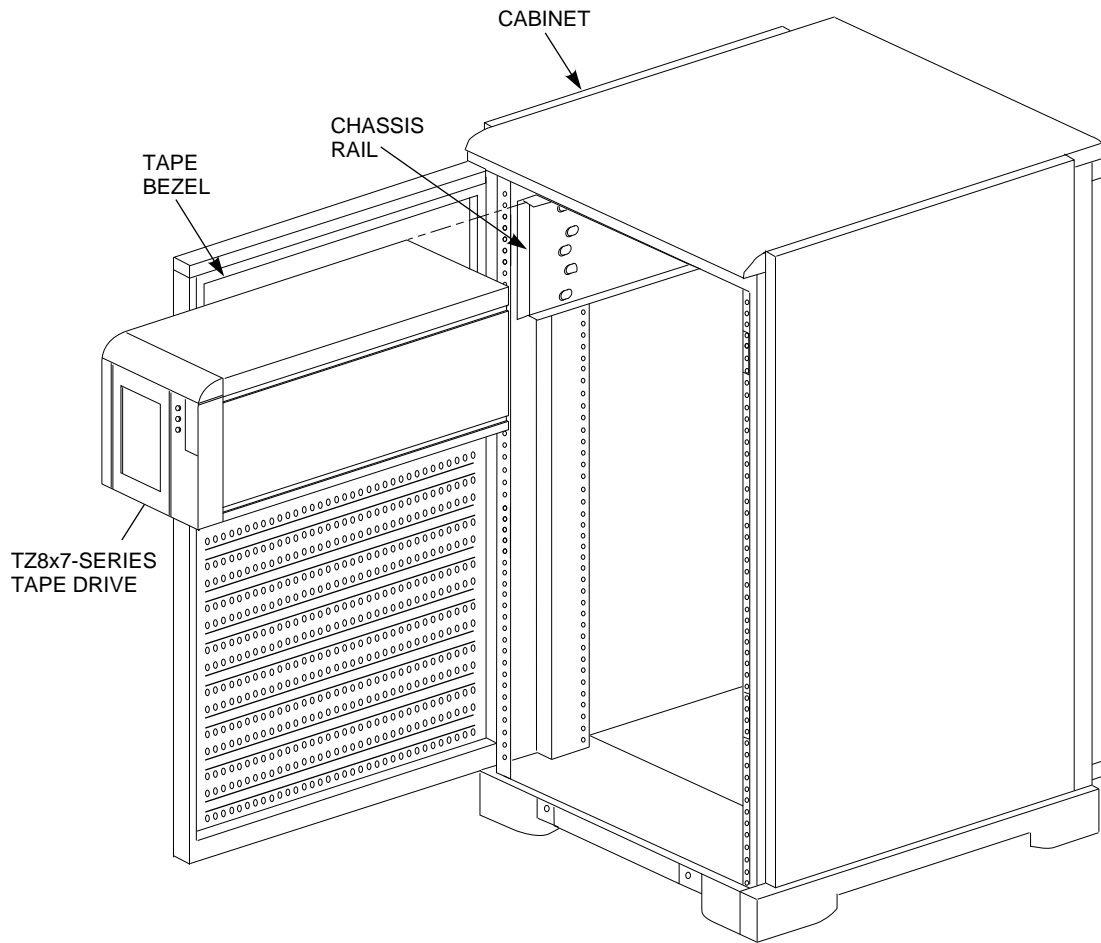
CXO-3925A-MC

2.3 Power Configurations

The ac power distribution within the SW500-series cabinet can be configured in one of the following three ways to provide the desired level of power redundancy to the cabinet's shelf-mounted peripheral devices:

- **Single-cabinet power configuration**
- **Dual-shelf power configuration**
- **Dual-cabinet power configuration**

A description of each configuration option is presented in the following sections.

2.3.1 Single-Cabinet Power Configuration

In the single-cabinet power configuration, shown in Figure 2–4, a single ac power source and CDU (A) are used to supply ac power to a single **ac power supply** (A) in each shelf. This is the normal configuration for the cabinet, and it provides no power redundancy to shelf peripheral devices.

Figure 2–4 Single-Cabinet Power Configuration
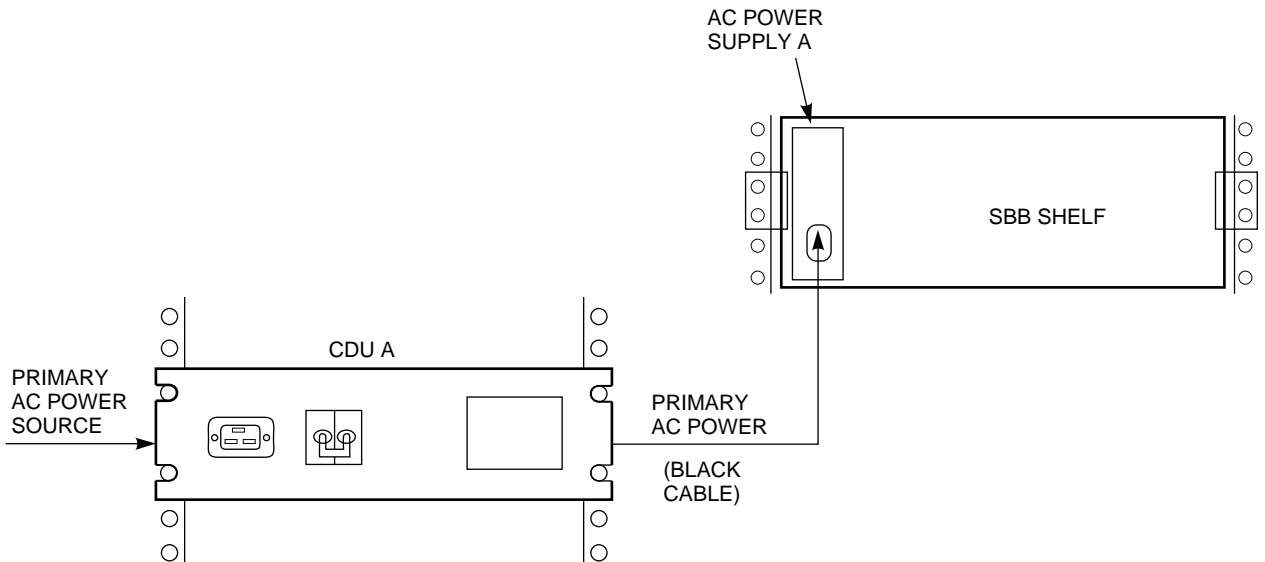
CXO-3937A-MC

2.3.2 Dual Shelf Power Configuration

In the dual-shelf power configuration, shown in Figure 2–5, a single primary power source and CDU (A) are used to supply ac power to two ac power supplies (A and B) in each shelf. If either power supply fails, the shelf remains powered by the other supply. This configuration provides shelf power supply redundancy to the shelf's peripheral devices. The cabinet supports a maximum of six shelves in the dual-shelf power configuration. An additional CDU, powered also from the primary ac power source, can be installed to accommodate up to 10 shelves with this power configuration.

Figure 2–5 Dual-Shelf Power Configuration
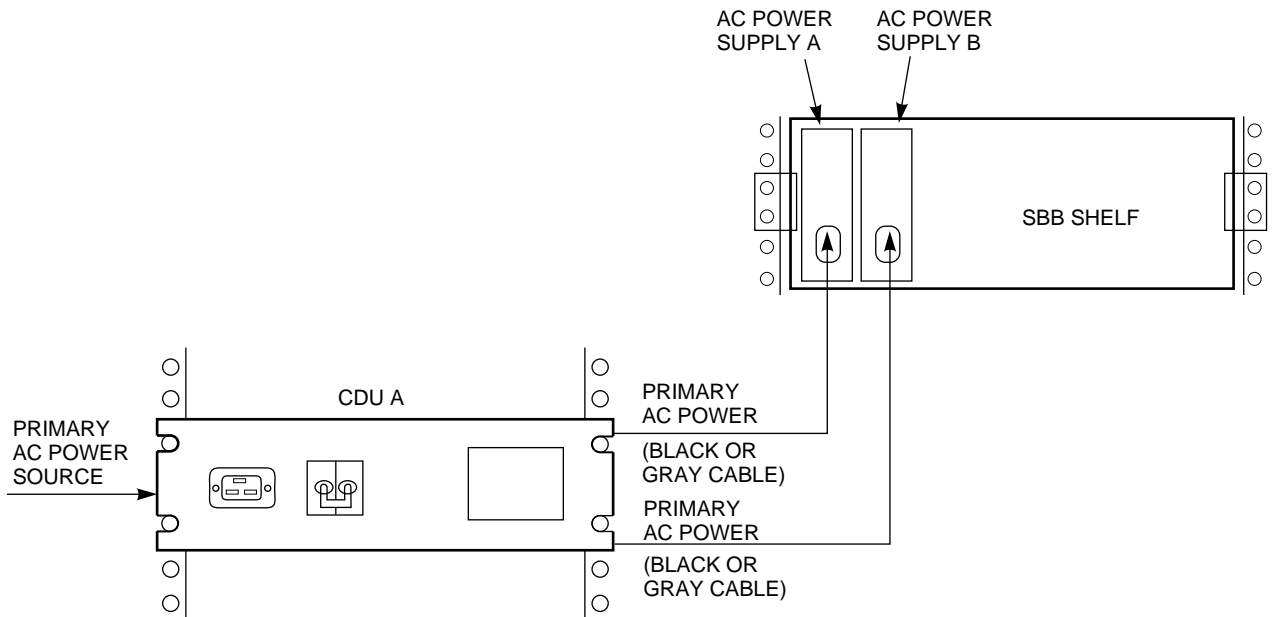
CXO-3938A-MC

2.3.3 Dual-Cabinet Power Configuration

In the dual-cabinet power configuration, shown in Figure 2–6, an auxiliary power source and a second CDU (B) are used to supply ac power to a second ac power supply (B) in each shelf. If the primary power source, CDU A, or ac power supply A, fails, the shelf remains powered by ac power supply B. This configuration provides complete power redundancy to the shelf's peripheral devices.

Figure 2–6 Dual-Cabinet Power Configuration
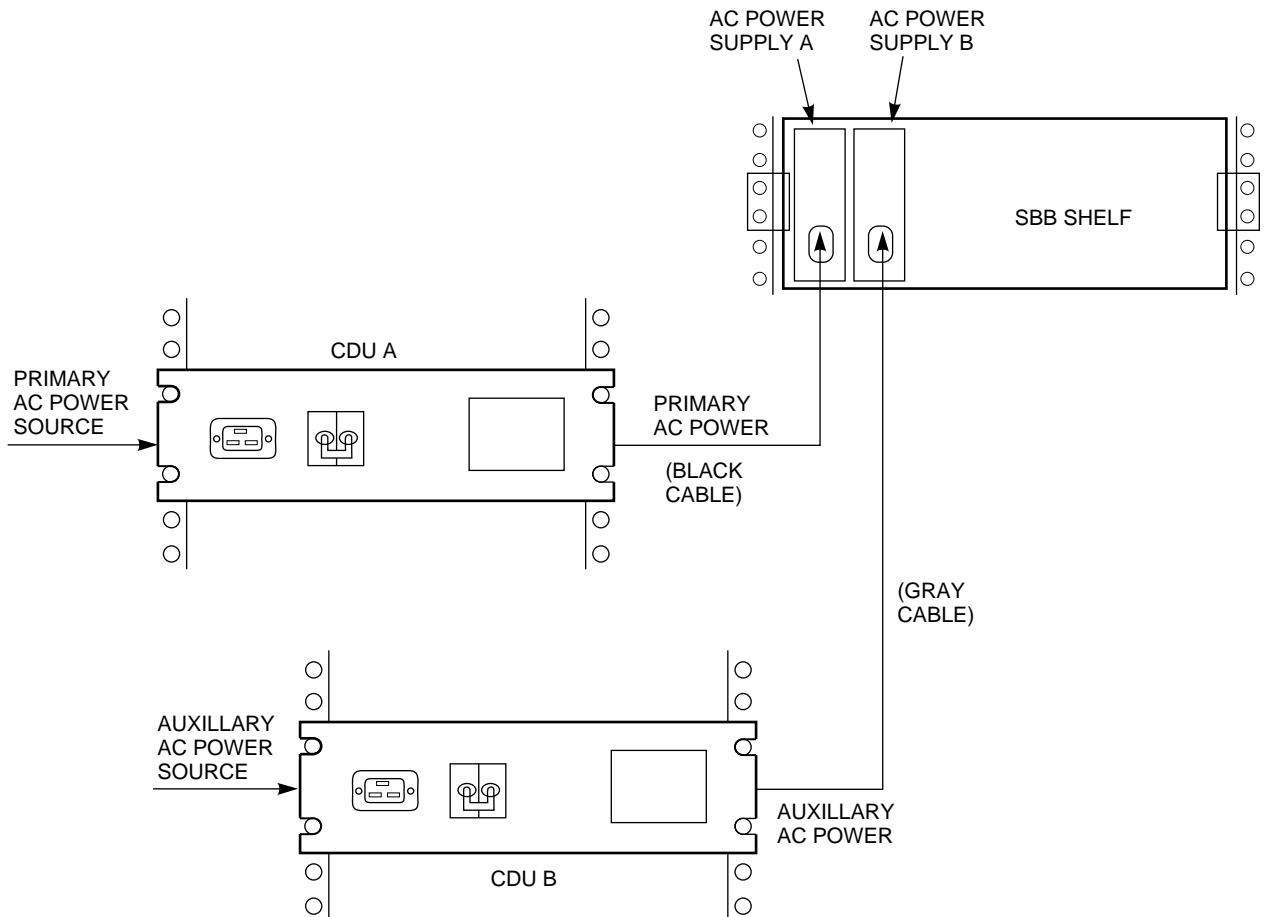
CXO-3936A-MC

2.4 Cabinet Cooling System

Each StorageWorks shelf contains two rear-mounted **blowers** that move heat from the shelf into the cabinet interior. The cabinet structure is such that heated air moves from the cabinet interior up and out through the unused shelf positions in the rear. It is then exhausted through the rear door. Logic signals allow the status of the shelf blowers to be monitored by the host system.

Filler panels and **air separation panels** are used to properly route heated air through the cabinet. Filler panels are flat plates that serve as covers for unused shelf positions. Air separation panels are small baffles that mount just above and outside the upper-most shelf in each side of the cabinet to prevent heated air from being drawn down between the cabinet door and the shelf. Heated air would be drawn back into the shelf and would interfere with proper cooling.

3

Site Preparation

This chapter presents the information necessary to prepare a site for the installation of the StorageWorks SW500-series cabinet.

3.1 General Considerations

SW500-series cabinets are intended for installation in Class A computer room environments. Before installing the cabinet, make sure that the following conditions have been met:

- The primary power source can supply the required amount of ac power, as specified in Table 2–1.

- The site's primary power receptacles are the correct versions for the power plugs provided with the cabinet. (The SW5*xx*–AC cabinet is supplied with a power cable that has a NEMA 5-20P twist-lock plug. The SW5*xx*–AD cabinet is supplied with a power cable that has an IEC 309 plug.)

- The site floor can safely bear the weight of the cabinet, as specified in Table 2–1. Keep in mind that the entire weight of the cabinet is borne by the small surface area of the four leveler feet when the cabinet is installed in its final position.

- Adequate space is provided around the cabinet for opening the front and rear doors, for accessing cables, and for adequate airflow. SW500-series cabinets are not designed to be fastened to adjacent cabinets. See Figure 3–1 for specific space requirements.

Figure 3–1 Minimum Installation Clearances

31.50 in
600.0 mm

REAR
DOOR

SW500
SERIES
CABINET

FRONT
DOOR

29.33 in
60.0 cm

34.45 in
87.5 cm MAX

29.33 in
60.0 cm

KBO-3805A-MC
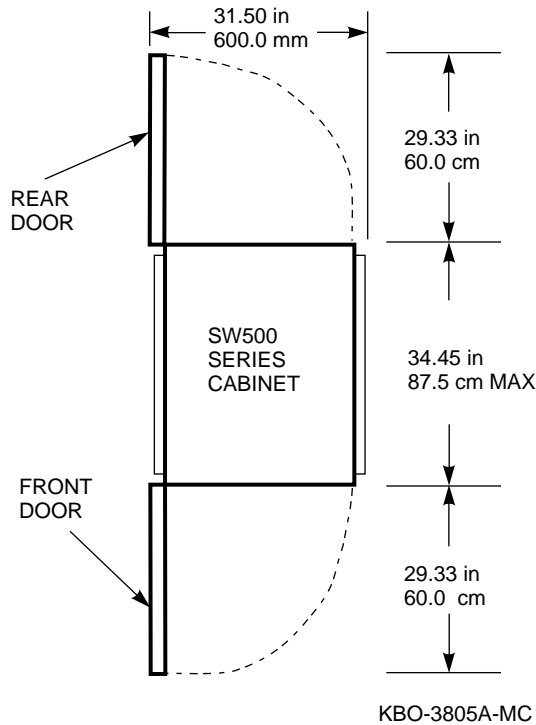
- The cabinet is positioned to allow external interface cables to reach to the appropriate system units.

- If the cabinet is to be positioned next to other enclosures, there is sufficient service loop in any connecting cables to allow the cabinet to be moved out for access.

3.2 Equipment Grounding

SW500-series cabinets are normally connected to other equipment by one or more interface buses. For both safety and reliable operation, proper grounding is required between the cabinet and other equipment.

_____ **WARNING** _____

If enclosures are not connected to a common ground, there is a potential for personal injury as a result of electric shock.

_____ **WARNING** _____

When connecting a terminal to a controller within the cabinet, proper grounding is required to prevent personal injury and equipment damage. For optimum safety and performance, it is recommended that the terminal be powered by one of the two utility IEC outlets on the back of each cable distribution unit (CDU). A spare power cord is furnished with each cabinet for this purpose.

If ground offset voltages generated in the power distribution system are excessive, data transmission across interface buses can be affected. Significant performance degradation or possible data corruption could result. SW500-series cabinets are shipped with a ground strap (Digital part number 12–13756–A8) that is connected to the rear of the unit. For optimum safety and performance, Digital recommends that the ground strap be connected to the chassis of the **host** system.

Make sure that site power distribution systems meet local electrical codes prior to the installation of SW500-series cabinets.

To make sure that the power distribution system will perform satisfactorily, a power system survey should be done before installation. The following areas should be investigated:

- Do all outlets have power ground connections?

- Do the power cables on all equipment at the site have grounding prongs?

- Are all power outlet neutral connections isolated from ground?

- Are the grounds for all outlets connected to the same power distribution panel?

- Are all devices that are connected to the same breaker as the SW500 cabinet Underwriter's Laboratories (UL) or International Electrotechnical Commission (IEC) approved?

_____ **CAUTION** _____

If there is a deficiency found in any area during the power survey, a qualified electrician must correct it before installation may begin. Failure to resolve power survey deficiencies before installing the equipment may result in personal injury as a result of electric shock.

_____

If no problems are found during the survey, the site grounding system may be considered to be adequate for personnel safety and reliable SW500-series cabinet operation.

4

Unpacking and Installation

This chapter describes the unpacking, installation, inspection, and powering of
StorageWorks SW500-series cabinets.

4.1 Unpacking the Cabinet

SW500-series cabinets are packed in a corrugated carton attached to a wooden
shipping pallet, as shown in Figure 4–1. Unpack the cabinet as follows:

Note

Before unpacking the equipment, inspect the shipping carton for signs
of external damage. Report any damage to the local carrier and to
Multivendor Customer Services or your local Digital sales office.

CAUTION

Failure to thermally stabilize preconfigured storage subsystems may
damage drive media or associated electronics when the unit is turned on.
Environmental stabilization begins when the equipment is placed in the
room in which it is to be installed.

---

1. Remove the cover, the fasteners, and the corrugated board from the pallet.

2. Remove the cartons containing the ramp set and skirt kit and set them aside.

3. Cut the shipping straps. Some cabinets are packaged in a plastic or barrier
   bag. If the cabinet arrives in a plastic bag, leave the bag in place until the
   cabinet has adjusted to the local temperature and humidity, as follows:

   • To ensure proper operation of Digital storage devices, the StorageWorks
     building block (SBB) temperature must be within 18–29°C (65–85°F).
     Table 4–1 specifies the time required to thermally stabilize SBBs based
     on the ambient shipping temperature.

Table 4–1 Thermal Stabilization Specifications

Ambient Temperature Range °C	Ambient Temperature Range °F	Minimum Stabilization Time
60 to 66	140 to 151	3 hours
50 to 59	122 to 139	2 hours
40 to 49	104 to 121	1 hour
30 to 39	86 to 103	30 minutes
18 to 29	65 to 85	None
10 to 17	50 to 64	30 minutes
0 to 9	32 to 49	1 hour
−10 to −1	14 to 31	2 hours
−20 to −11	−4 to 13	3 hours
−30 to −21	−22 to −5	4 hours
−40 to −31	−40 to −21	5 hours

- If condensation *is visible* on the outside of the storage device, stabilize the device and the SBB in the operating environment for 6 hours or until the condensation is no longer visible, whichever is longer. Do not insert the storage device into the shelf until it is fully stabilized.

- If condensation *is not visible* on the outside of the storage device, thermally stabilize the device for the amount of time specified in Table 4–1.

4. Once the cabinet is unpacked, examine the front and rear doors, right and left side panels, top panel, and undercarriage for any apparent damage. Report such problems immediately.

5. Retain the shipping container and all packing materials.

Figure 4–1 Shipping Container Contents

COVER

CARTON
CONTAINING
SKIRT KIT

CORRUGATED
BOARD

FASTENERS

MANUALS

FASTENERS

PLASTIC OR
BARRIER BAG

SHIPPING
STRAPS

PALLET

CARTON
CONTAINING
UNLOADING
RAMPS
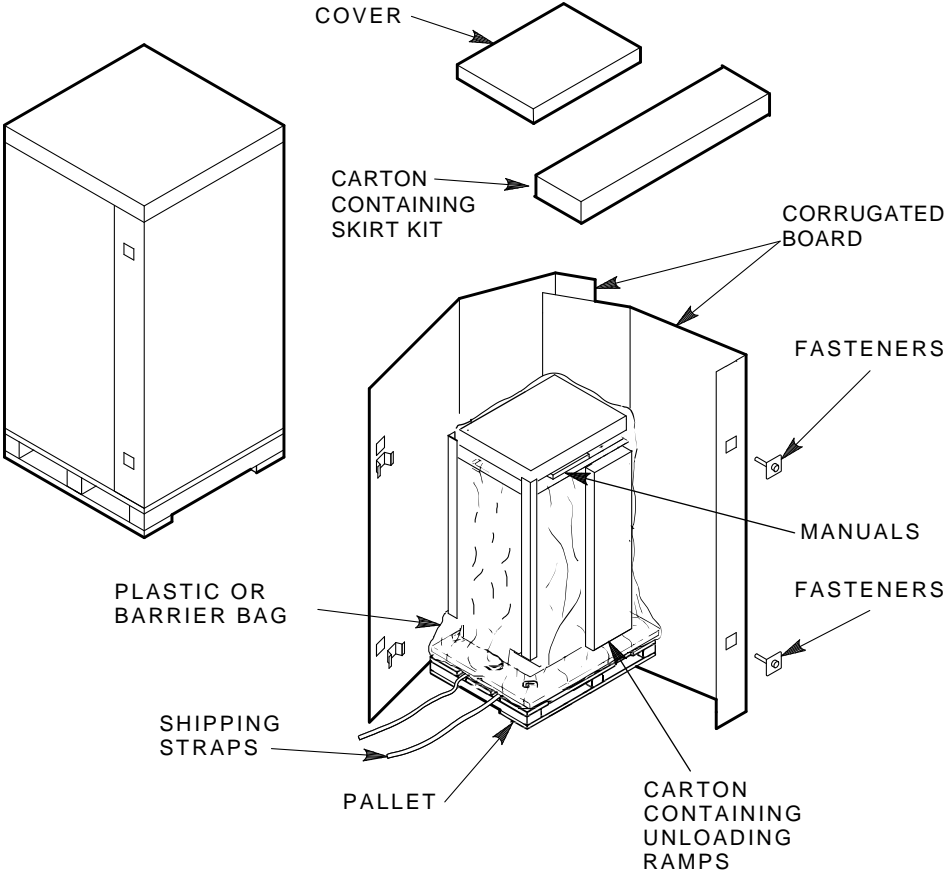
CXO-3533A-TI

4.2 Removing the Cabinet from the Pallet

This section describes how to remove the cabinet from the pallet.

Use the following procedure to remove the cabinet from the shipping pallet:

1. Remove any packing material remaining on the pallet.

_____ **WARNING** _____

Serious personal injury may result if correct safety precautions are not taken during the unpacking procedure. All personnel should wear safety glasses. The ramps, ramp side rails, and metal hardware should be inspected for the following defects:

- Cracks more than 25 percent of the ramp depth, either across or lengthwise on the ramp

- Knots or knotholes going through the thickness of the ramp and greater than 50 percent of the ramp width

- Loose, missing, or broken ramp side rails

- Loose, missing, or bent metal hardware

If any of these defects exist, do not use the ramp. Investigate alternate means of removing the cabinet or order a new ramp. (The part number for the ramp set is 99–08897–05.)

_____

2. Remove the two unloading ramps from the carton and inspect them.

3. Attach the ramps by fitting the metal prongs into the holes on the pallet, as shown in Figure 4–2. Make sure that the arrows on the ramps match up with the arrows on the pallet.

4. Extend the ramps to their full length.

5. See Figure 4–3 for the location of the shipping bolts. Remove the bolts.

6. Remove the shipping brackets, shown in Figure 4–3, from the cabinet levelers and set them aside.

Figure 4–2 Shipping Pallet Ramp Installation

LEFT
UNLOADING
RAMP

SHIPPING
PALLET

REAR

FRONT

RIGHT RAMP
ATTACHES HERE

RIGHT
UNLOADING
RAMP

EXTEND RAMP TO
FULL LENGTH
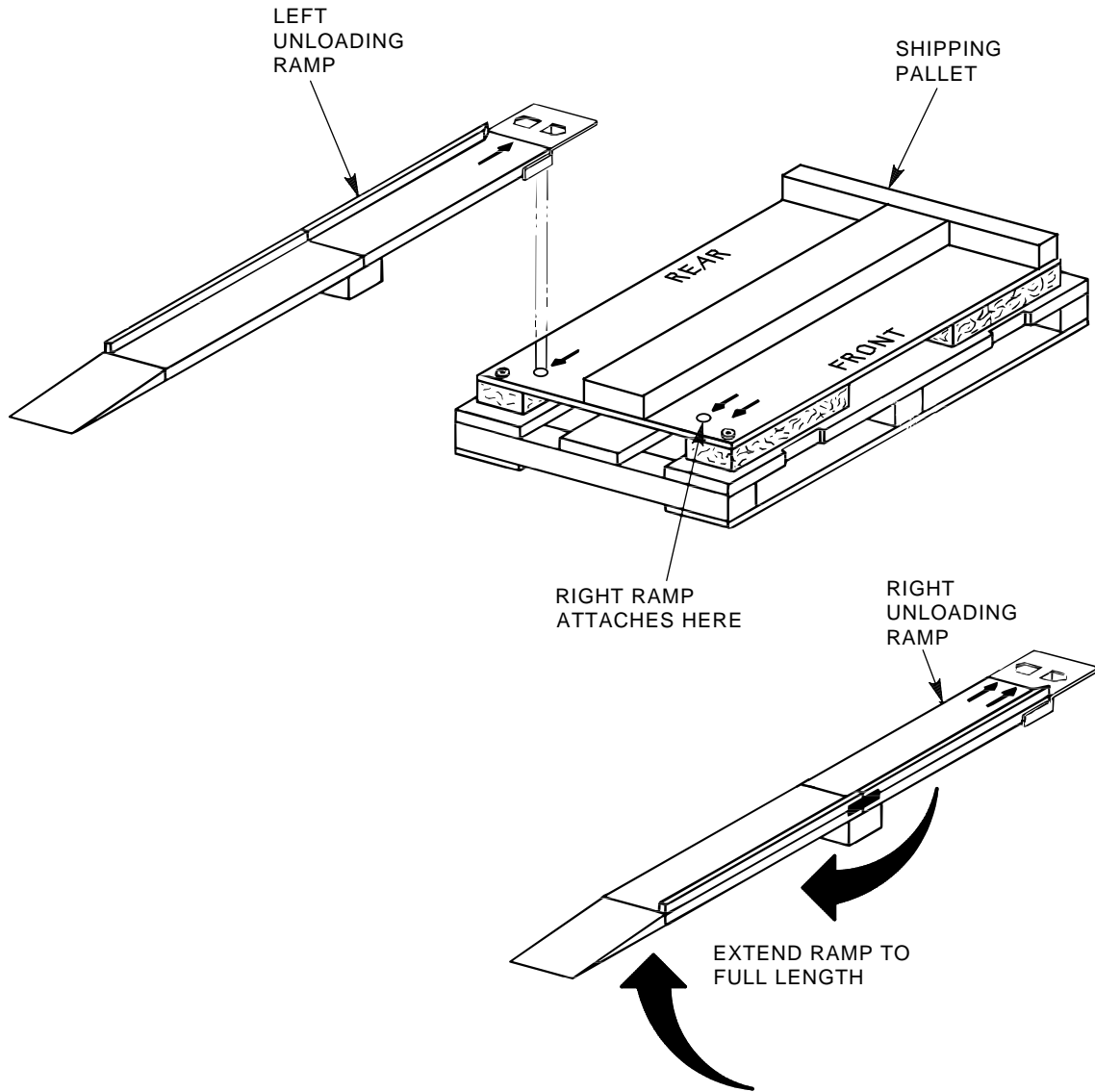
CXO-688D_S

Figure 4–3 Shipping Bolts and Brackets

LEVELER

SHIPPING
BOLT
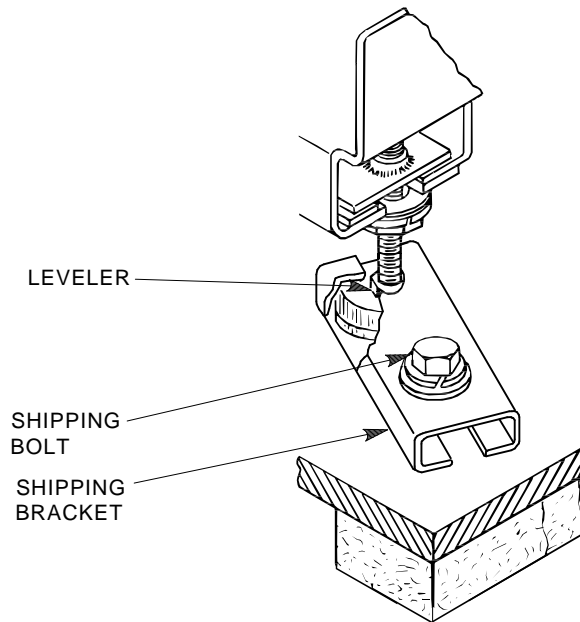
SHIPPING
BRACKET

SHR_X1102A_89_SCN

_____ **WARNING** _____

The levelers must be raised fully for the cabinet to roll easily down the
unloading ramps. Failure to do so may result in personnel injury as a
result of the cabinet tipping off the pallet or ramp.

_____

7. Loosen the leveler locking nuts and screw the four cabinet levelers all the
    way up into the cabinet.

_____ **WARNING** _____

Three people are required to unload the cabinet from the shipping pallet.
Failure to use sufficient personnel may result in injury and equipment
damage.

_____

8. Carefully roll the cabinet off the pallet and down the ramps to the floor as
    shown in Figure 4–4.

Figure 4–4 Removing the Cabinet from the Pallet
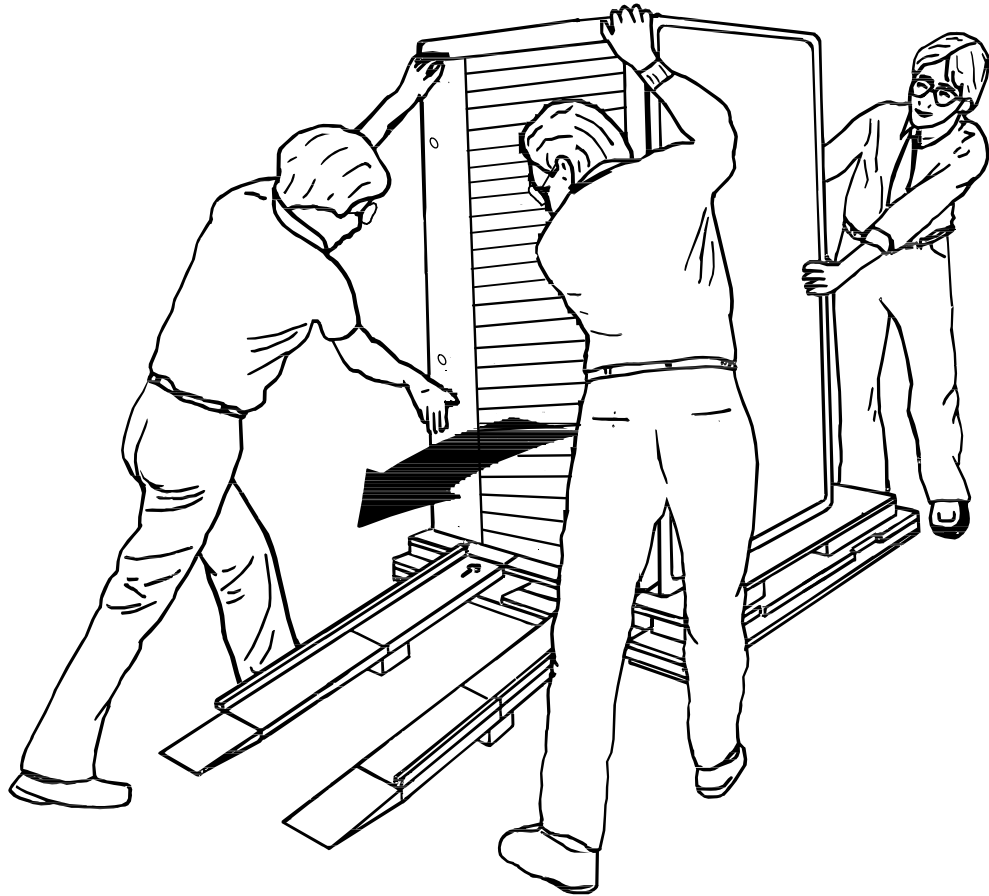
CXO-3808A

4.3 Configuring the Cabinet Rack Space

Any shelves to be added to the cabinet should be installed before it is placed in its permanent position. See Chapter 5 or 6 for the proper location of shelves. See Chapter 7 for detailed information and procedures regarding shelf bracket and shelf installation.

4.4 Placing the Cabinet

_____ WARNING _____

Use extreme caution when rolling the cabinet across the floor. Failure to raise all leveler feet and to provide a clear path for the cabinet's casters may result in the cabinet tipping over and injury to personnel.

_____

Once the cabinet rack space is configured as desired, the cabinet may be rolled to its final installation position. Secure loose cabinet cables up and out of the way when rolling the cabinet.

4.5 Leveling the Cabinet

Level the cabinet in its final position as follows:

1. Loosen the locknuts on all four leveler feet as shown in Figure 4–5.

2. Turn each leveler hex nut clockwise until the leveler foot contacts the floor.

3. Adjust all four leveler feet until the cabinet is level and the load is removed from all casters. Verify that the casters spin freely.

4. Tighten the locknuts on all four leveler feet.

Figure 4–5 Leveler Foot Adjustment

LOCKNUT

LEVELER HEX NUT

LEVELER FOOT
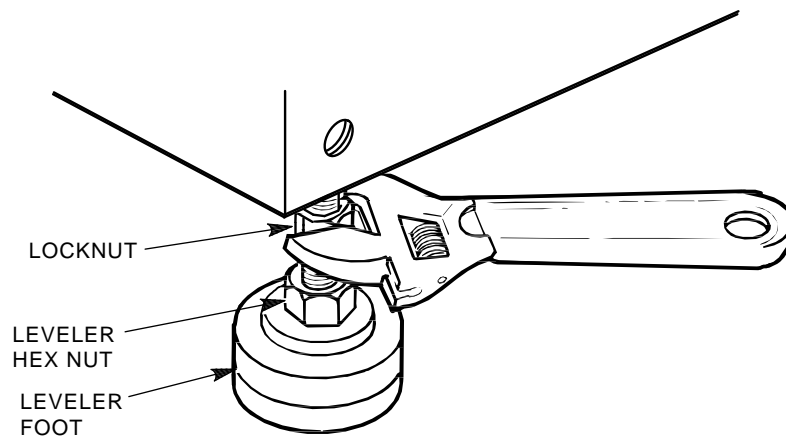
CXO-3829A

4.6 Installing the Skirt Kit

The skirt kit is packaged separately inside the corrugated carton with the cabinet. Installation of the skirt kit is optional. Install the skirt kit around the base of the cabinet as follows:

1. Unpack the skirt kit carton and use Figure 4–6 to identify the right, left, front, and rear skirts.

2. Position the skirts next to the cabinet, as shown in Figure 4–6.

3. The skirt fasteners are quarter-turn fasteners. Position each skirt against the cabinet such that the fasteners mate with the receptacles on the cabinet's base.

4. Using a screwdriver, push each fastener into its mating receptacle on the cabinet base and turn it one quarter-turn clockwise.

   (Once the skirts are installed, there is a small amount of play that allows them to be adjusted slightly up or down for proper alignment.)

Figure 4–6 Cabinet Skirt Installation
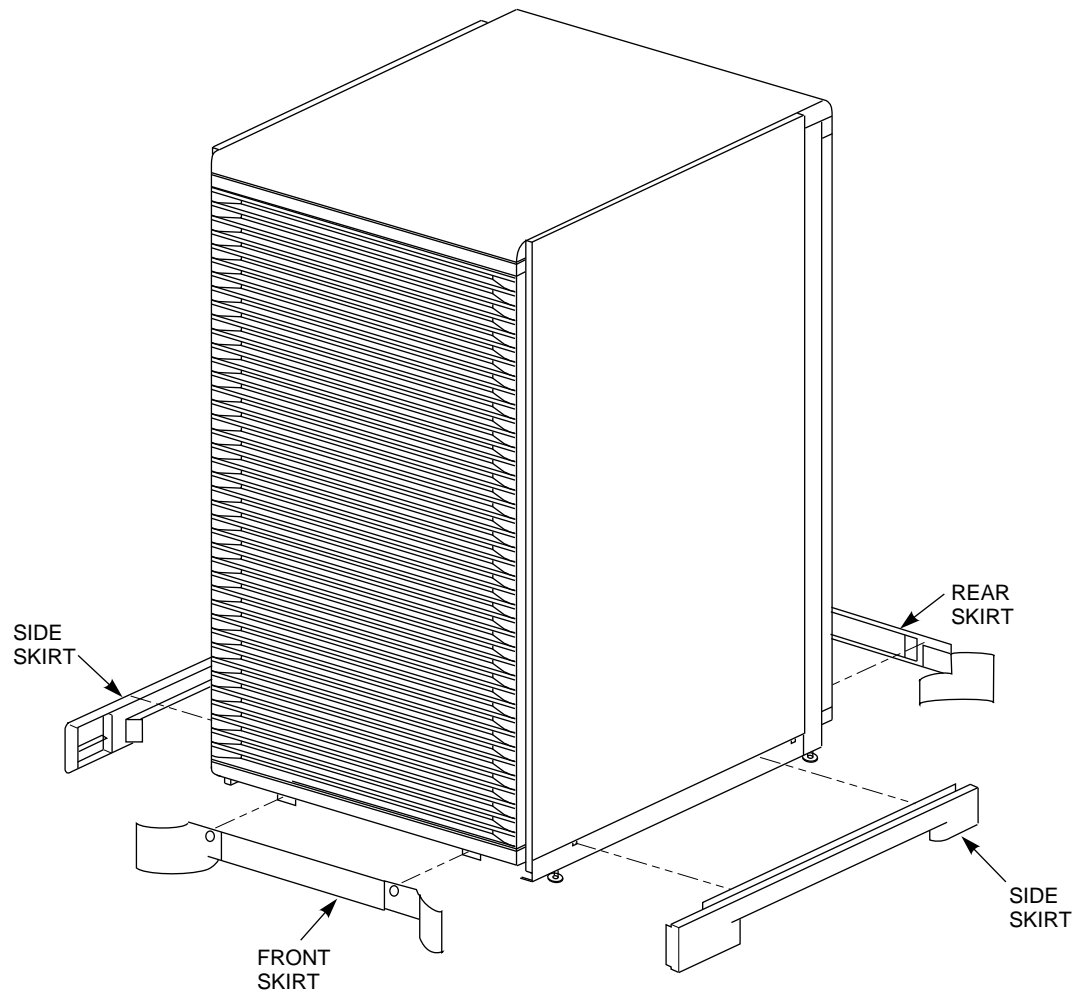
CXO-3898A-MC

4.7 Inspecting the Cabinet

Inspect the cabinet installation as follows:

1. Make sure that all hardware within the cabinet is fastened securely, and that there are no loose pieces present in the cabinet interior.

2. Make sure that all four leveler feet are lowered to support the full weight of the cabinet, and that the cabinet is level.

3. Make sure that there are no obstructions to the airflow from the shelf blowers. (The side panels may need to be removed to check the shelf blowers.)

4. Check the identification label on the rear of the cabinet to verify that the cabinet is configured to accept the power available at the site.

5. Make sure that all ac power cords connected from the shelves and cabinet fans to the CDUs are firmly seated in their connectors at both ends.

6. Make sure that all signal cables internal to the cabinet are firmly seated in their connectors at both ends.

7. Make sure that all SBBs are seated firmly in their shelves.

8. Make sure that any necessary external interface cables are installed and firmly seated in their connectors.

9. Make sure that the circuit breaker on each CDU is in the ◯ (OFF) position.

4.8 Powering the Cabinet

Once the cabinet has been inspected, power may be applied as follows:

1. Plug the primary power cables from each CDU into the appropriate site power receptacles.

2. Switch the circuit breaker on each CDU to the | (ON) position.

3. Verify that all shelf blowers are operating and that both status indicators on each shelf power supply SBB are illuminated. Refer to the *StorageWorks Solutions SBB and Shelf User's Guide* for further information on shelf status indicators.

_____ WARNING _____

Failure to reduce the leakage current can result in equipment performance degradation and personal injury due to electric shock.

_____

4. Measure the cabinet's leakage current. If the leakage current exceeds 3.5 mA after installation, Digital recommends that power cables with industrial type B, IEC 950 connectors be installed.

5. Initialize the storage subsystem. Procedures for initializing the cabinet's controller and storage devices are specific to the host system to which it is connected. Refer to the appropriate system documentation for initialization procedures.

5

Configuring SW500 Storage-Only Cabinets

This chapter describes the configuration of the SW500 storage-only cabinet. This storage subsystem uses only the StorageWorks BA350–S*x* shelf type. The Small Computer Systems Interface 2 (SCSI–2) is used as the communications path between the cabinet's storage devices and their external controllers. SW500 storage-only cabinets can be configured with up to 10 storage shelves.

_____ WARNING _____

While working in the cabinet interior, ac power must be removed from cabinet components. Failure to do so may result in personal injury as a result of electric shock.

_____

Prior to performing any of the procedures in this chapter, remove ac power from the cabinet components. If the cabinet is operating, spin down all disk drives and halt all tape drives in the cabinet. Switch the circuit breaker on the front panel of the cabinet's cable distribution units (CDUs) to the ◯ (OFF) position.

5.1 Cabinet Configuration

_____ WARNING _____

Failure to install cabinet components in the proper order could result in cabinet instability, injury to personnel, and damage to equipment.

_____

_____ Note _____

To maintain FCC compliance and proper airflow, filler panels and air separation panels must be installed as specified for your particular cabinet configuration. See Section 5.2 for further information.

_____

The order of shelf installation in SW500 storage-only cabinets is predetermined to allow for cabinet loading and cable length factors. Figures 5–1 and 5–2 show the layout of both the front and rear of the storage-only cabinet. To prevent cabinet instability, shelves must be installed in the order shown by the position numbers in the illustrations.

5.1.1 Shelf Locations Without Tape Drives

Figure 5–1 shows the proper cabinet rail mounting holes for each shelf location when TZ8*x*7-series tape drives are not installed. Shelf mounting hole numbers are counted from the top of each rail. The hole number assignments shown in the figure identify the mounting holes for each shelf bracket's *top* mounting stud. See Chapter 7 for detailed procedures pertaining to the mounting of StorageWorks shelves.

Figure 5–1 SW500 Storage-only Cabinet Shelf Locations Without Tape Drives
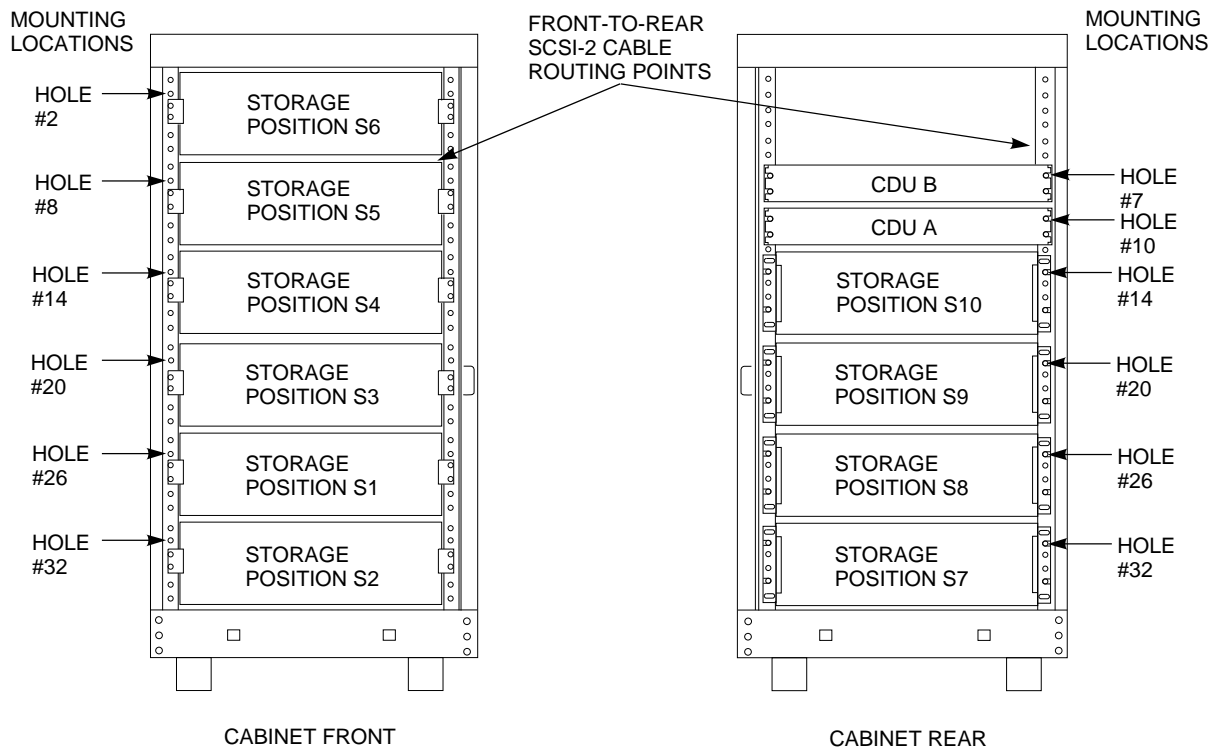
CXO-3900C-MC

5.1.2 TZ8*x*7-Series Tape Drive/Shelf Locations

Figure 5–2 shows the proper cabinet rail mounting holes for each shelf location when TZ8*x*7-series tape drives are installed. Mounting hole numbers are counted from the top of each rail. The hole number assignments shown in the figure identify the mounting holes for each shelf bracket's *top* mounting stud and for the tape drive chassis rail *round standoff* locating hole. See Chapter 7 for detailed procedures pertaining to the mounting of StorageWorks shelves. See Chapter 8 for detailed procedures pertaining to the mounting of the tape drive. Note that the TZ8*x*7-series tape drive extends completely through the cabinet and uses the upper two shelf mounting positions in the front and the rear.

Figure 5–2 SW500 Storage-only Cabinet Shelf and Tape Drive Locations
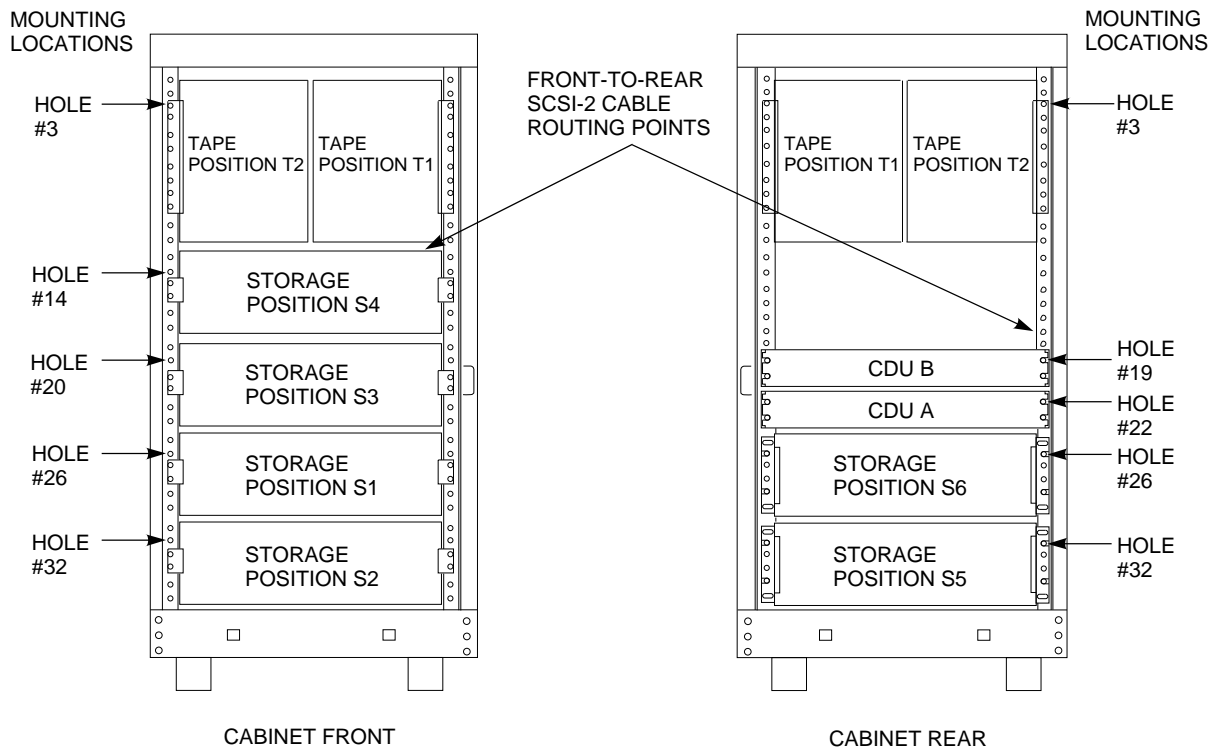
CXO-3901C-MC

5.2 Filler and Air Separation Panels

_____ **Note** _____

To maintain FCC/VDE compliance and proper airflow, filler panels and air separation panels must be installed as specified for your particular cabinet configuration and in accordance with the following guidelines.

_____

Filler panels can be installed in empty shelf positions to control air flow and electromagnetic emissions, and for the purpose of cosmetics. Filler panels are normally supplied and installed based on the specific configuration of the SW500 storage-only cabinet ordered. At least two filler panels are shipped with each cabinet. Install filler panels using the following guidelines:

- If your cabinet has a particular filler panel configuration that was factory-installed, do not remove the panels unless you are reconfiguring the cabinet.

- If you are adding shelves or reconfiguring your cabinet, use filler panels in all open slots *below* the highest shelf installed. This applies in the front and the rear of the cabinet.

- To ensure proper cooling air flow, never install filler panels *above* the highest shelf installed in the cabinet.

Two air separation panels are supplied with each cabinet. Install an air separation panel just above the upper-most shelf in the front and the rear of the cabinet. Air separation panels are not required above TZ8*x*7-series tape drives, or above storage position S4 when one or two tape drives are installed. See Chapter 7 for complete details on the installation of air separation panels.

5.3 Power Configuration

The power in SW500 storage-only cabinets can be configured in any of the forms described in Section 2.3. See Chapter 9 for detailed procedures on configuring power within the cabinet.

5.4 Signal Cabling and Routing

Signal cabling in the SW500 storage-only cabinet consists of intershelf SCSI–2 cabling and shelf-to-host SCSI–2 controller cabling.

5.4.1 Shelf SCSI–2 Cable Selection and Connection

The procedures involved in SCSI bus design and connection are specific to the components being bused together. Refer to the following publications for details on the selection of SCSI–2 cables and their connection to the cabinet's shelves:

- *StorageWorks Solutions Family Configuration Guide*
- *StorageWorks Solutions SBB and Shelf User's Guide*

5.4.2 SCSI–2 Cable Routing

SCSI–2 signal cables enter SW500 storage-only cabinets through openings in the rear edges of the base pan of the cabinet. Cables destined for rear shelves are normally routed along the base pan to the right-most vertical cabinet rail. They are then routed to the the right-hand side of each rear shelf along the rail.

SCSI–2 cables destined for front shelves are routed along the base pan and up the right-hand vertical cabinet rail to a point just above the CDUs (refer to Figures 5–1 and 5–2). The cables then pass into the interior of the cabinet and across to an opening in the vertical chassis rail behind the two right-hand shelf brackets of positions S1 and S2. They pass through the opening and out to the front of the cabinet through the space between the S1/S2 shelf brackets. On the front of the cabinet, cables are normally routed along the right vertical cabinet rail to the right-hand side of each shelf along the rail.

Half-meter, SCSI–2 cables are normally used to link adjacent shelves to each other.

When TZ8*x*7-series tape drives are installed, there is a space between the bottom of the drives and shelf position S1 (refer to Figure 5–2). This space is normally used for the routing of SCSI–2 cables from the rear to the front of the cabinet.

5.4.3 General Cable Routing Rules

Cables should be routed and installed with the following rules in mind:

---------------------- **WARNING** ----------------------

Cabinet rail edges may be sharp and can slice or abrade skin or cable insulation.

- Cables should be routed in a manner that allows the shortest overall cable length.

- Signal cables should be kept away from power cables.

- Care should be taken to avoid sharp cable bends.

- Cables should be routed to allow StorageWorks building blocks (SBBs) and controller modules to be freely inserted and removed from their shelves.

- Cables should not be routed tightly against the metal edges of the cabinet.

- Signal cable bundling along the outside of the cabinet rails should be done to allow the doors to easily close.

- Cables should be fastened along cabinet rails using cable ties or nylon cable clamps, U-nuts, and screws. Added cables should be included in existing cable clamps where possible.

6

Configuring SW500 Controller/Storage Cabinets

This chapter describes the configuration of SW500 controller/storage cabinets. These storage subsystems use StorageWorks HSZ10™, HSZ15, HSJ40™, or HSZ40 controllers mounted in BA350–E*x* or BA350–M*x* shelves. Storage devices are housed in BA350–S*x* shelves.

6.1 HS-Family Controllers

The SW500-series cabinet is qualified for use with the following HS-family controllers:

- HSJ40 controller—The HSJ40 Controller uses Digital's **CI™** interface as the communication path with the **host** computer and uses the Small Computer System Interface 2 (SCSI–2) as the storage device bus. Two HSJ40 controllers can be housed in a single StorageWorks BA350–M*x* controller shelf. Factory preconfigured cabinets set up to use the HSJ40 controller are designated by the model number SW51x.

- HSZ10 and HSZ15 controllers—HSZ10 and HSZ15 controllers use the SCSI–2 interface as the communication path with the host computer, as well as for the storage device bus. Two HSZ10 or HSZ15 controllers can be installed in a single StorageWorks BA350–E*x* shelf. The StorageWorks BA350–E*x* shelf is a controller/storage shelf combination with an integral backplane. It takes up two adjacent shelf positions in the cabinet.

- HSZ40 controller—The HSZ40 controller uses the SCSI–2 interface as the communication path with the host computer, as well as for the storage device bus. Two HSZ40 controllers can be installed in a single StorageWorks BA350–M*x* shelf.

SW500 controller/storage cabinets can be configured with up to four controllers in redundant pairs and with up to nine storage shelves. The configuration of HSJ40, HSZ10, HSZ15, and HSZ40 cabinets is very similar. The differences lie in the host interface cable configuration used and the fact that a StorageWorks DWZZA SCSI signal converter may be used with the HSZ*xx* controllers.

Refer to the *StorageWorks Array Controller HS Family of Array Controllers User's Guide* and the *StorageWorks BA350–MA Controller Shelf User's Guide* for further information on the installation and configuration of the BA350–M*x* shelf. The BA350–E*x* shelf is a major component of the StorageWorks RAID Array 110 subsystem. Refer to the *StorageWorks RAID Array 110 Subsystem User's Guide* for further information on the installation and configuration of the BA350–E*x* shelf.

6.2 Cabinet Configuration

_____ **WARNING** _____

While working in the cabinet interior, ac power must be removed from the cabinet components. Failure to do so may result in personal injury as a result of electric shock.

_____

Prior to performing any of the procedures in this chapter, remove ac power from the cabinet components. If the cabinet is operating, spin down all disk drives and halt all tape drives in the cabinet. Switch the circuit breaker on the front panel of the cabinet's CDUs to the ◯ (OFF) position.

_____ **WARNING** _____

Failure to install cabinet components in the proper order could result in cabinet instability, injury to personnel, and damage to equipment.

_____

_____ **Note** _____

To maintain FCC compliance and proper airflow, filler panels and air separation panels must be installed as specified for your particular cabinet configuration. See Section 6.3 for further information.

_____

The order of shelf installation in SW500 controller/storage cabinets is predetermined to allow for cabinet loading and cable length factors. Figures 6–1 and 6–2 show the layout of both the front and rear of the controller/storage cabinet. To prevent cabinet instability, shelves must be installed in the order shown by the position numbers in the illustrations.

6.2.1 Shelf Locations Without Tape Drives

Figure 6–1 shows the proper cabinet rail mounting holes for each shelf location when TZ8*x*7-series tape drives are not installed. Note that storage position S7 may be used for the installation of a second controller shelf. Shelf mounting hole numbers are counted from the top of each rail. The hole number assignments shown in the figure identify the mounting holes for each shelf bracket's *top* mounting stud. See Chapter 7 for detailed procedures pertaining to the mounting of StorageWorks shelves.

_____ **Note** _____

The BA350–E*x* modular storage shelf consists of a controller shelf with an attached storage shelf. In systems using BA350–E*x* shelves, the storage shelf directly below each controller shelf is physically attached to and functionally dedicated to its respective controller.

_____

Figure 6–1 SW500 Controller/Storage Cabinet Shelf Locations Without Tape Drives
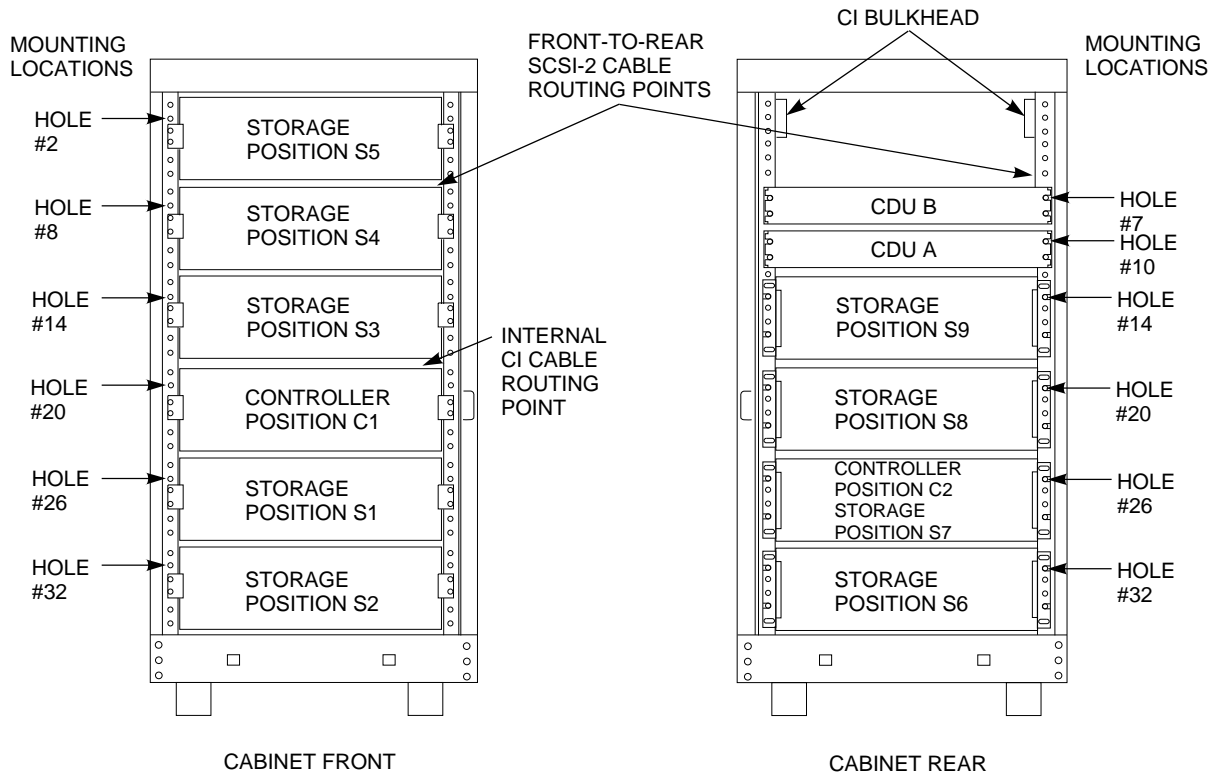
CXO-3902B-MC

6.2.2 TZ8*x*7-Series Tape Drive/Shelf Locations

Figure 6–2 shows the proper cabinet rail mounting holes for each shelf location when TZ8*x*7-series tape drives are installed. Mounting hole numbers are counted from the top of each rail. The hole number assignments shown in the figure identify the mounting holes for each shelf bracket's *top* mounting stud and for the tape drive chassis rail *round standoff* locating hole. See Chapter 7 for detailed procedures pertaining to the mounting of StorageWorks shelves. See Chapter **8** for detailed procedures pertaining to the mounting of TZ8*x*7-series tape drives. Note that the TZ8*x*7-series tape drive extends completely through the SW500 cabinet and utilizes the upper two shelf mounting positions in the front and the rear.

_____ **Note** _____

The BA350–E*x* modular storage shelf consists of a controller shelf with an attached storage shelf. In systems using BA350–E*x* shelves, the storage shelf directly below each controller shelf is physically attached to and functionally dedicated to its respective controller.

_____

Figure 6–2 SW500 Controller/Storage Cabinet Shelf and Tape Drive Locations
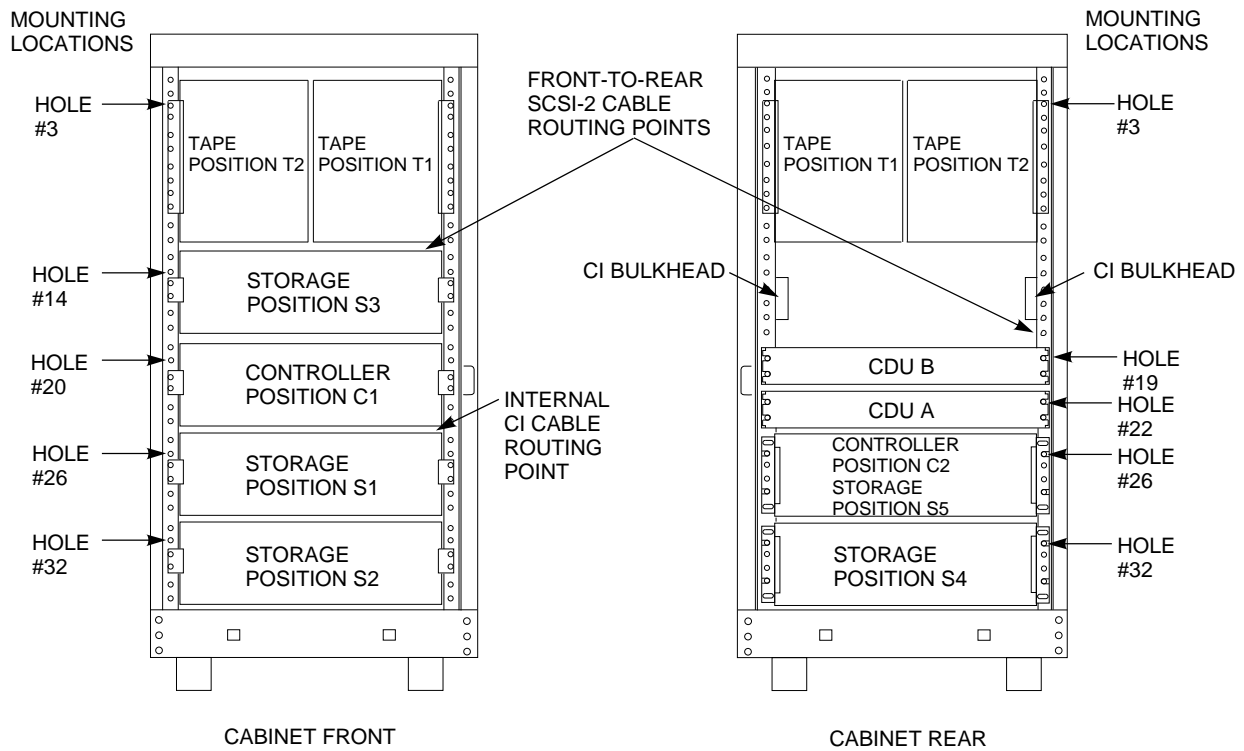
CXO-3903A-MC

6.3 Filler and Air Separation Panels

_____ **Note** _____

To maintain FCC compliance and proper airflow, filler panels and air separation panels must be installed as specified for your particular cabinet configuration and in accordance with the following guidelines.

_____

Filler panels can be installed in empty shelf positions to control air flow and electromagnetic emissions and for the purpose of cosmetics. Filler panels are normally supplied and installed based on the specific configuration of the SW500 controller/storage cabinet ordered. At least two filler panels are shipped with each cabinet. Install filler panels using the following guidelines:

- If your cabinet has a particular filler panel configuration that was factory-installed, do not remove the panels unless you are reconfiguring the cabinet.

- If you are adding shelves or reconfiguring your cabinet, use filler panels in all open slots *below* the highest shelf installed. This applies in the front and the rear of the cabinet.

- To ensure proper cooling air flow, never install filler panels *above* the highest shelf installed in the cabinet.

Two air separation panels are supplied with each cabinet. Install an air separation panel just above the upper-most shelf in the front and the rear of the cabinet. Air separation panels are not required above TZ8*x7*-series tape drives, or above storage position S3 when one or two tape drives are installed. See Chapter 7 for details on the installation of air separation panels.

6.4 Power Configuration

The power in SW500 controller/storage cabinets can be configured in any of the forms described in Section 2.3. See Chapter 9 for detailed procedures on configuring power within SW500 controller/storage cabinets.

6.5 Host CI Signal Cabling and Routing

In installations using HSJ40 controllers, the interface signal cabling for each controller consists of two parts:

- An internal CI cable connected to the host port on the controller. The cable terminates at the other end with a cable connector block.

- Four host CI cables, connecting the cable connector block to the host.

A CI bulkhead is used to mount the cable connector block to the cabinet. CI bulkheads are small brackets mounted in the unused shelf position above the CDUs (refer to Figures 6–1 and Figure 6–2). The connector block on the end of each internal CI cable is mounted to the CI bulkhead, and the host CI cables are connected to the connector block, as shown in Figure 6–3.

Each CI bulkhead can accept two internal CI cables, enough for one controller shelf containing two controllers. Two CI bulkheads are supplied with each cabinet.

6.5.1 CI Bulkhead Installation

Install the CI bulkheads as follows (see Figure 6–3):

1. Choose a mounting position on the inner flange of the right rear vertical chassis rail above the upper-most CDU in the cabinet, as shown in the illustration. Choose a position as close to the top of the cabinet as possible.

2. Position a CI bulkhead against the vertical chassis rail, as shown.

3. Fasten the CI bulkhead to the chassis rail with two screws and KEP nuts, as shown.

4. Repeat steps 1–3 for the left-hand CI bulkhead, choosing a mounting position on the inner flange of the left rear vertical chassis rail directly across from the right-hand CI bulkhead.

6.5.2 Internal CI Cable Routing

Route the internal CI cables as follows (refer to Figure 6–3):

- **For rear-mounted controllers:**

    1. Remove the four connector block retaining nuts and flat washers from the internal CI cable connector block. (Discard the flat washers.)

Figure 6–3 CI Bulkhead and Internal CI Cable Installation
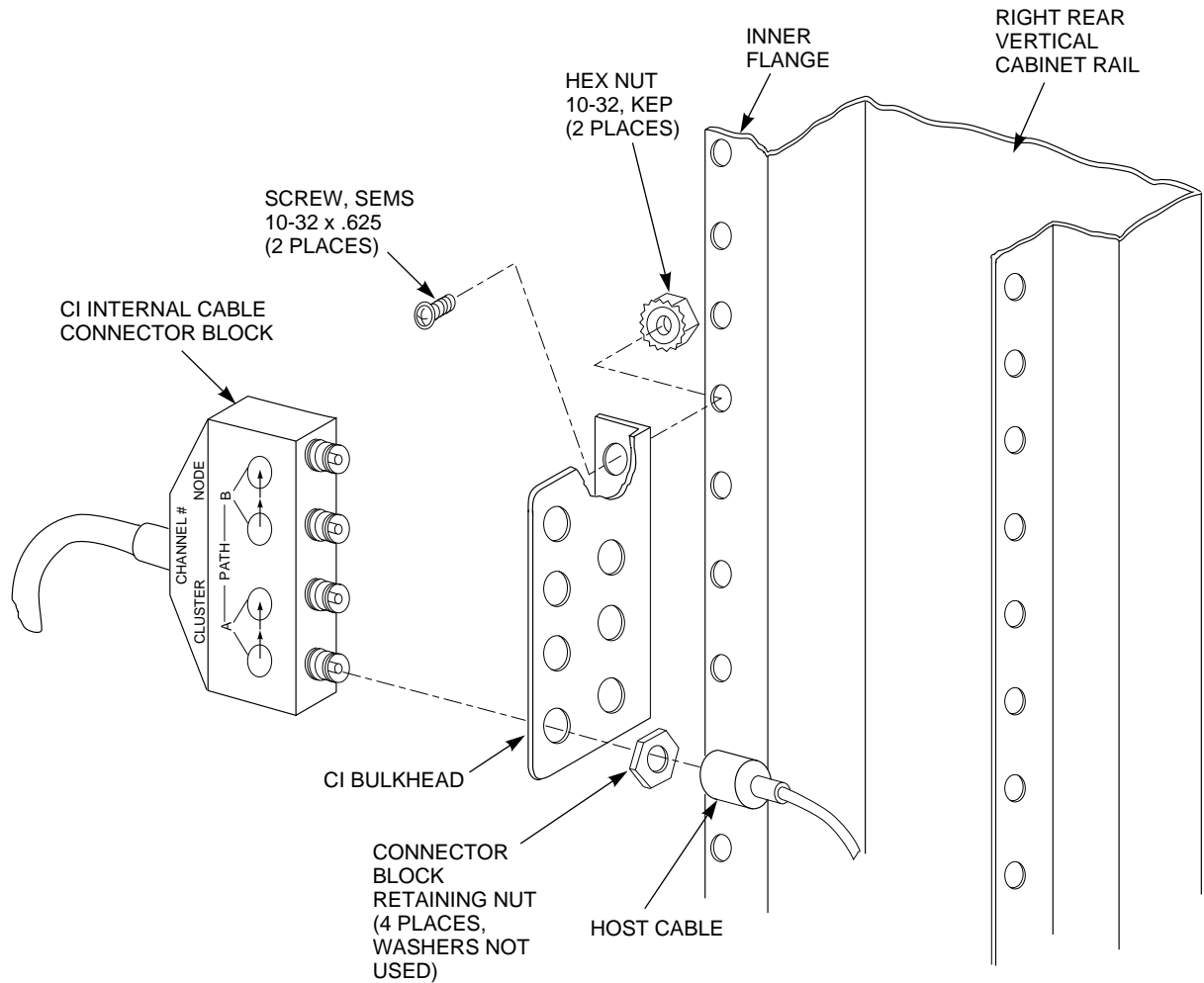
CXO-3931A-MC

2. Insert the connectors on the internal CI cable connector block into one of the free positions on the CI bulkhead, as shown. Fasten the connector block to the bulkhead with the four retaining nuts, as shown.

3. Route the cable from the CI bulkhead down along the right-hand vertical cabinet rail to the rear-mounted controller shelf.

4. Repeat for each internal CI cable to be connected to the rear-mount controller.

• **For front-mounted controllers:**

1. Remove the four connector block retaining nuts and flat washers from the internal CI cable connector block. (Discard the flat washers.)

2. Insert the connectors on the internal CI cable connector block into one of the free positions on the CI bulkhead, as shown. Fasten the connector block to the bulkhead with the four retaining nuts, as shown.

3. Pass the cable across the interior of the cabinet to the opening in the front vertical cabinet rail behind the two right-hand shelf brackets of positions C1 and S3 (refer to Figures 6–1 and 6–2).

4. Pass the cable through the opening and out to the front of the cabinet through the opening next to the C1/S3 shelf brackets.

5. Route the cable to the front controller in position C1.

6. Repeat for each internal CI cable to be connected to the front-mounted controller.

6.5.3 Host-to-CI Bulkhead Cable Routing

Route the CI cables from each host to the appropriate CI bulkhead as follows:

1. Pass the host CI cables into the cabinet through the openings in the rear edges of the base pan of the cabinet.

2. Bundle and route the four host CI cables along the base pan to the rear right-hand vertical rail and upward to the open shelf position above the upper-most CDU.

3. Once at the open shelf position, route the host CI cables to the appropriate internal CI cable connector block, already installed on either the right or left CI bulkhead.

4. Screw the connector on each host CI cable onto its correct connector on the internal CI cable connector block. (Refer to the *StorageWorks Array Controller HS Family of Array Controllers User's Guide* for information regarding the connections to the CI cable connector block.) If your cabinet contains multiple controllers, make sure that you connect the host CI cables to the correct internal CI cable.

5. Repeat steps 1–4 for each set of four host CI cables from the host.

6.6 Host SCSI–2 Signal Cabling and Routing

In installations where the controllers use the SCSI–2 interface to communicate with the host, the interface cables are routed directly from the controller to the host. A bulkhead is not used.

---------------------------------- Note ----------------------------------

If a StorageWorks DWZZA–AA SCSI signal converter is being used on the
host interface, it may be desirable to house the converter in the SW500
cabinet. If either the front or rear lower shelf position is unused, the
converter may be placed in the base pan of the cabinet. In this case, the
host interface cable is routed through openings in the rear edges of the
base pan of the cabinet and directly to the single-ended side of the signal
converter. The cable connecting to the differential side of the converter is
then routed as described in the following paragraphs.

Host SCSI–2 Signal Cable Routing

Route the host SCSI–2 interface cables to rear or front-mounted controllers as
follows:

- For rear-mounted controllers:

  1. Route the cable into the SW500 controller/storage cabinet through the
     openings in the rear edges of the base pan of the cabinet.

  2. Route the cable along the base pan to the rear right-hand vertical cabinet
     rail.

  3. Route the cable upward along the right-hand vertical cabinet rail to the
     rear-mounted controller shelf.

  4. Repeat for each host SCSI–2 cable to be connected to a rear-mounted
     controller.

- For front-mounted controllers:

  1. Route the cable into the SW500 controller/storage cabinet through the
     openings in the rear edges of the base pan of the cabinet.

  2. Route the cable along the base pan to the rear right-hand vertical cabinet
     rail.

  3. Route the cable upward along the right rear vertical cabinet rail to the
     open shelf position just above the upper-most CDU.

  4. Pass the cable across the interior of the cabinet to the opening in the front
     vertical cabinet rail behind the two right-hand shelf brackets of positions
     C1 and S3 (refer to Figures 6–1 and 6–2).

  5. Pass the cable through the opening and out to the front of the cabinet
     through the opening next to the C1/S3 shelf brackets.

  6. Route the cable to the front controller shelf in position C1.

  7. Repeat for each host SCSI–2 cable to be connected to a front-mounted
     controller.

6.7 Shelf SCSI–2 Signal Cabling and Routing

The following sections describe the routing of SCSI–2 signal cabling from the
cabinet's controllers to its shelves.

6.7.1 Shelf SCSI–2 Cable Selection and Connection

The procedures involved in SCSI bus design and connection are specific to the
components being bused together. Refer to the following publications for details
on the selection of SCSI–2 cables and their connection to the cabinet's shelves:

- *StorageWorks Solutions Family Configuration Guide*

- *StorageWorks Solutions SBB and Shelf User's Guide*

- *StorageWorks Array Controller HS Family of Array Controllers User's Guide*

- *StorageWorks BA350-MA Controller Shelf User's Guide*

- *StorageWorks RAID Array 110 Subsystem User's Guide*

6.7.2 SCSI–2 Cable Routing

SCSI–2 cables from the front controller to the controller's associated front storage
shelves are normally routed along the right-hand vertical cabinet rail to the
right-hand side of each shelf. Half-meter, SCSI–2 cables are normally used to
link adjacent shelves or tape drives to each other.

SCSI–2 cables connecting front shelves to rear shelves pass to the rear of the
cabinet via the opening between the right-hand shelf brackets at positions S4
and S5 (refer to Figure 6–1). The cables pass through this opening and into the
interior of the cabinet through the opening in the vertical cabinet rail behind
the S4/S5 brackets. They then pass across the interior of the cabinet to the
unused shelf position above the CDUs. They pass through the right-hand side
of the unused shelf position and down along the right-hand cabinet rail to the
appropriate rear shelves.

When TZ8*x*7-series tape drives are installed, there is a space between the bottom
of the drives and shelf position S3 (refer to Figure 6–2). This space is normally
used for the routing of SCSI–2 cables from the rear to the front of the cabinet.

Table 6–1 specifies the SCSI–2 cable length required to connect each controller
position with its companion shelves in SW500 controller/storage cabinets.

Table 6–1 SW500 Controller/Storage Cabinet SCSI–2 Cable Lengths

Controller Position	Storage Shelf/Tape Position	Cable Length Required
C1	Front shelves	1.00 m (3.28 ft)
C1	Rear shelves	2.00 m (6.56 ft)
C1	T1, T2	2.00 m (6.56 ft)
C2	Rear shelves	1.00 m (3.28 ft)

6.8 General Signal Cable Routing Rules

Cables should be routed and installed with the following rules in mind:

_____ WARNING _____

Cabinet rail edges may be sharp and can slice or abrade skin or cable
insulation.

_____

- Cables should be routed in a manner that allows the shortest overall cable length.

- Signal cables should be kept away from power cables.

- Care should be taken to avoid sharp cable bends.

- Cables should be routed to allow SBBs and controller modules to be freely inserted and removed from their shelves.

- Cables should not be routed tightly against the metal edges of the cabinet.

- Signal cable bundling along the outside of the cabinet rails should be done to allow the doors to easily close.

- Cables should be fastened along cabinet rails using cable ties or nylon cable clamps, U-nuts, and screws. Added cables should be included in existing cable clamps where possible.

7

Installing StorageWorks Shelves

This chapter describes the installation of StorageWorks shelves into SW500-series data center cabinets. Procedures for horizontal front and rear shelf installation are presented.

There are two types of shelf brackets: shelf brackets with screw mounts and shelf brackets with tab mounts.

Installing air separation panels in both the front and rear of the cabinet also are covered.

7.1 General Shelf Mounting Considerations

_____ **Note** _____

In the following descriptions and procedures, the terms *front* and *rear* refer to locations in the cabinet. The terms *inner* and *outer* refer to positions on the shelf brackets.

_____

Each metric bracket set consists of a pair of shelf brackets, stop brackets, and locking brackets. See Figure 7–2 for examples of these components.

There are two types of shelf brackets: shelf brackets with screw mounts and shelf brackets with tab mounts.

The stop brackets are attached to the inner portion of the shelf brackets to position the shelf within the brackets. The locking brackets fix the shelf in place. Various combinations of stop positions and locking bracket size are necessary to situate a particular shelf for proper clearance from the cabinet doors.

The shelf bracket and stop bracket parts are used to mount all types of StorageWorks shelves in all locations. The bracket set for shelves mounted in various positions in the cabinet differs only in that the locking brackets are unique parts sized for specific cabinet positions.

An air separation panel is required in both the front and rear of the cabinet to prevent the recirculation of heated air to the cabinet's shelves. The air separation panels are mounted just above the upper-most shelf in each side of the cabinet. Air separation panels normally are installed after shelf installation.

7.2 Shelf Bracket Types

SW500 cabinets can come preconfigured with screw-mounted or tab-mounted shelf brackets. Cabinets that have been field modified can contain both types of shelf brackets. See the following descriptions to determine your cabinet configuration.

7.2.1 Screw-Mounted Shelf Brackets

A typical screw-mounted bracket set is shown in Figure 7–2. The shelf bracket used in this set can be identified by the two screw holes between the front of the bracket and the stop bracket screw holes.

In the horizontal position, the screw-mounted brackets are attached to the vertical cabinet rails with six screws.

7.2.2 Tab-Mounted Shelf Brackets

A typical tab-mounted bracket set is shown in Figure 7–4. The shelf bracket used in this set can be identified by the formed metal slot with four mounting tabs between the front of the bracket and the stop bracket screw holes.

In the horizontal position, the tab-mounted brackets are attached to the vertical cabinet rails with four M5 KEP nuts and four mounting tabs.

7.3 Shelf Bracket Kit Configurations

Before mounting the metric shelf bracket kit, check the contents of the bracket kit against the parts list. See Table 7–1 for the SW500 Metric Shelf Screw-Mounted Bracket Kit Parts List. See Table 7–2 for the SW500 Metric Shelf Tab-Mounted Bracket Kit Parts List.

Table 7–1 SW500 Metric Shelf Screw-Mounted Bracket Kit Parts List

Kit Part Number 70–30092–05

Digital Part Number	Description	Quantity
74–46442–01	Shelf mounting bracket	2
74–46441–01	Front shelf locking bracket	2
74–46441–02	Front shelf locking bracket	2
74–46441–03	Front shelf locking bracket (not used)	2
74–46439–01	Rear shelf locking bracket	2
74–46439–02	Rear shelf locking bracket	2
74–46440–01	Stop bracket	2
90–00063–39	Screw, THRL 10–32 TRS .500 ARCS	14
90–07786–00	U-nuts, 10–32	4

Table 7–2   SW500 Metric Shelf Tab-Mounted Bracket Kit Parts List

Kit Part Number 70–30092–01

Digital Part Number	Description	Quantity
74–47506–01	Shelf mounting bracket	2
74–46441–01	Front shelf locking bracket	2
74–46441–02	Front shelf locking bracket	2
74–46441–03	Front shelf locking bracket (not used)	2
74–46439–01	Rear shelf locking bracket	2
74–46439–02	Rear shelf locking bracket	2
74–46440–01	Stop bracket	2
90–00063–39	Screw, THRL 10–32 TRS .500 ARCS	2
90–40148–02	Nut, KEP, M5, 8 MMAF, CSZ	8

7.4 Cabinet Preparation and Shutdown

Before mounting the metric shelf bracket kit, perform the following actions:

_____ WARNING _____

While working in the cabinet interior, ac power must be removed from
cabinet components. Failure to do so can result in personnel injury as a
result of electric shock.

_____

1. If the cabinet is installed and operating, spin down all disk drives and halt
    all tape drives in the cabinet.

2. Remove ac power from cabinet components by switching the circuit breaker
    on the front panel of the cabinet's power controllers or cable distribution units
    to the OFF or ○ position.

After you have made sure that all the parts are present and that ac power has
been removed from the cabinet components, you can begin shelf installation.

7.5 Accessing the Cabinet Rack Space

In maximum configurations when access to the interior of the cabinet is limited,
external cabinet panels might need to be removed before shelves can be installed
or reconfigured. Section 7.5.1 presents procedures for removing exterior cabinet
panels.

The front and rear cabinet doors are held closed by door locks mounted on
the smooth vertical panel of each door. The locks are released by turning
counterclockwise with a 5/32-inch hex wrench.

7.5.1 Removing the Exterior Cabinet Panels

As shown in Figure 7–1, there are three side panel hanger clips on each side
of the cabinet. A matching set of hanger clips are attached to each side panel.
Remove the side panels as follows:

Figure 7–1 Exterior Cabinet Panel Removal and Installation

FASTENER
PIN
(4 PLACES)

NYLON SNAP
FASTENER
(4 PLACES)

LIP

TOP COVER

M6x40mm BOLT
(4 PLACES)

UPPER
SIDE PANEL
HANGER
CLIP

SIDE PANEL
HANGER
CLIPS

LOWER
SIDE PANEL
HANGER
CLIPS

CABINET
FRONT

SIDE PANEL

CXO-3787A-MC

1. Move the cabinet away from adjacent enclosures as necessary.

2. Loosen the top cover by pushing up on its front and rear edges until it snaps free of its fasteners.

_____ **WARNING** _____

The top cover is heavy and awkward to lift. Removing it requires two people. Failure to use sufficient personnel can result in personnel injury or equipment damage.

_____

3. Using two people, lift the top cover from the cabinet and set it aside.

4. Remove the bolts attaching the side panels to the top side rails of the cabinet.

5. Grasp a panel along its front and rear edges and lift up until the hanger clips disengage. Lift the panel away from the cabinet.

6. Repeat the previous step to remove the other panel.

7. Install the horizontal shelf brackets using the following procedures.

7.6 Installing the Shelves

There are two types of shelf brackets: shelf brackets with screw mounts and shelf brackets with tab mounts. See Section 7.6.1 for shelf brackets with screw mounts. See Section 7.6.2 for shelf brackets with tab mounts and mounting studs.

7.6.1 Installing Shelves With Screw Mounts

Shelf bracket installations for front and rear shelves using screw mounts are shown in Figures 7–2 and 7–3. Using the illustrations as a guide, install the shelf brackets as follows:

_____ **WARNING** _____

Cabinet rail edges can be sharp and can slice or abrade skin or cable insulation.

_____

_____ **Note** _____

Two small ESD grounding posts are provided with the cabinet. One is located on a front vertical cabinet rail, and one on a rear rail. Should an ESD grounding post interfere with the installation of a shelf, move the post out of the way to any free hole on the cabinet.

_____

1. Switch off the cabinet power as described in Section 7.1.

2. Determine the correct shelf mounting locations and corresponding cabinet rail mounting holes for the shelf bracket. Refer to Chapter 5 or 6 for this information.

3. Position the shelf bracket at the correct mounting holes just behind the outer flange of the vertical cabinet rail, as shown.

4. Using the shelf bracket as a template, mark the two U-nut mounting holes on the inner flange of the cabinet rail.

5. Remove the shelf bracket and install two U-nuts along the inner flange of the cabinet rail at the holes marked in step 4.

6. Position and fasten the shelf bracket to the outer flange of the cabinet rail with two screws, as shown.

7. Fasten the bracket to the U-nuts with two screws.

8. Using Table 7–3, determine the correct stop bracket position for the shelf type being installed.

Table 7–3 Shelf Stop Bracket Positions

StorageWorks Shelf Type	Front Shelf Stop Bracket Position	Rear Shelf Stop Bracket Position
BA350–S*x*	4	1
BA350–M*x*	5	2

9. Insert the tab on the stop bracket into the slot at the correct stop position on the shelf bracket. Fasten the stop bracket to the shelf bracket, as shown.

10. Repeat steps 2 through 9 to mount the companion shelf bracket on the opposite cabinet rail. To be sure of proper alignment of the brackets, use care to mount the bracket to the correct rail mounting holes.

11. With the power supply end of the shelf to the left and the blowers facing the cabinet, slide the shelf into the shelf brackets until it contacts the inner stop brackets. The shelf should slide smoothly into the brackets. If it binds, remove it and check the alignment of the shelf brackets. The shelf bracket mounting screws might need to be loosened slightly to allow the brackets to align with the shelf. Retighten the screws when the shelf brackets are properly aligned.

12. Using Table 7–4, verify that you have the correct locking bracket part number for the shelf type and position (front or rear) being installed.

Table 7–4 Shelf Locking Bracket Part Numbers

StorageWorks Shelf Type	Front Shelf Locking Bracket Part No.	Rear Shelf Locking Bracket Part No.
BA350–S*x*	74–46441–01	74–46439–01
BA350–M*x*	74–46441–02	74–46439–02

13. Once the shelf is positioned within the shelf brackets, install the shelf's locking brackets to both shelf brackets with screws, as shown. Push the locking bracket against the shelf to seat it before tightening the screws.

Figure 7–2 Horizontal Shelf Bracket Installation

STOP POSITION #4

STOP POSITION #3

STOP POSITION #2

STOP POSITION #1

STOP POSITION #5

U-NUT, 10-32 (2 PLACES)

FRONT VERTICAL CABINET RAIL

STOP BRACKET

FRONT SHELF LOCKING BRACKET

STOP BRACKET

SCREW, THRL 10-32 TRS .500 XRCS (7 PLACES)

SHELF MOUNTING BRACKET (LEFT FRONT POSITION)

CXO-3768A-MC

Figure 7–3 Rear Shelf Bracket Installation
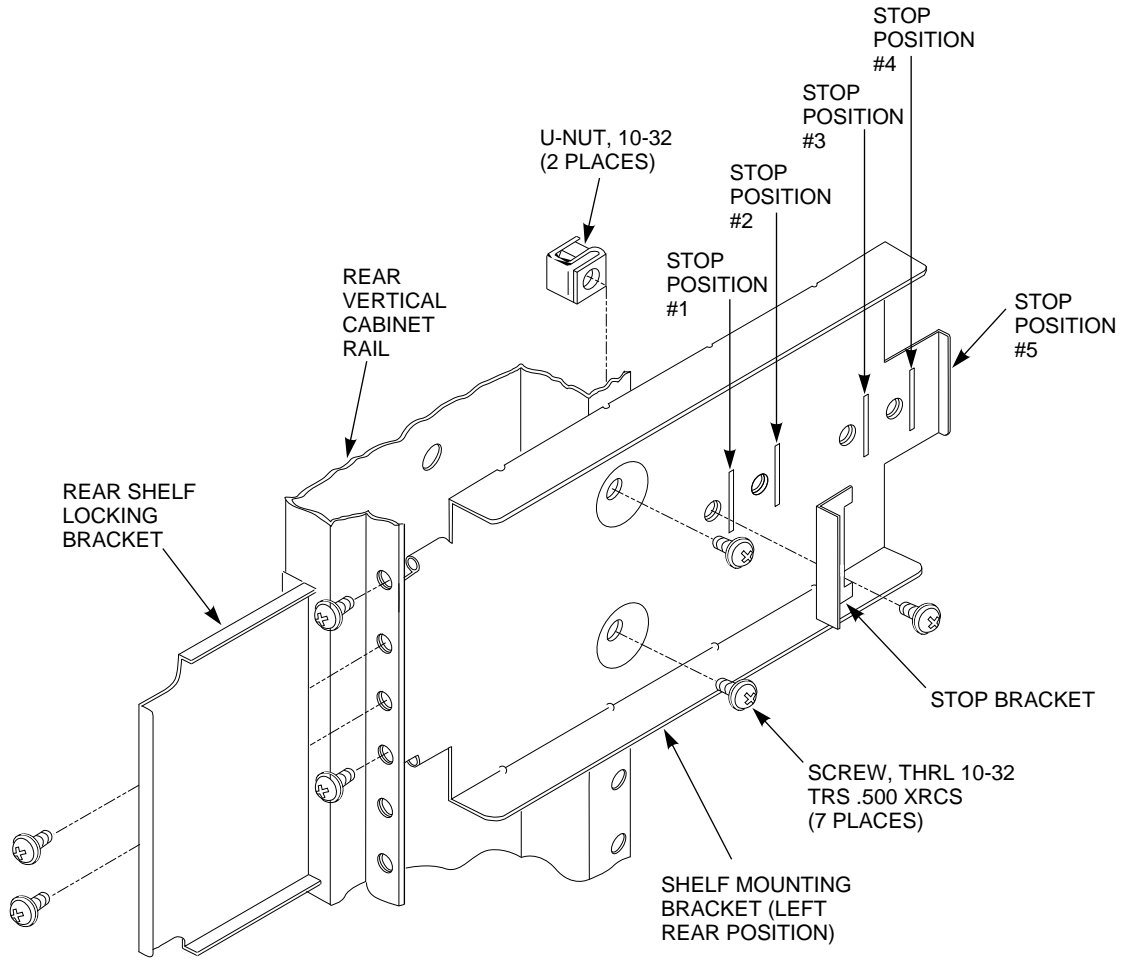
CXO-3767A-MC

7.6.2 Installing Shelves with Tab Mounts

Shelf bracket installations for front and rear shelves using tab mounts are shown in Figures 7–4 and 7–5. Using the illustrations as a guide, install the shelf brackets as follows:

_____ WARNING _____

Cabinet rail edges can be sharp and can slice or abrade skin or cable insulation.

_____

_____ Note _____

Two small ESD grounding posts are provided with the cabinet. One is located on a front vertical cabinet rail, and one on a rear vertical cabinet rail. Should an ESD grounding post interfere with the installation of a shelf, move the post out of the way to any free hole on the cabinet.

_____

1. Switch off the cabinet power as described in Section 7.1.

2. Determine the correct shelf mounting locations and corresponding cabinet rail mounting holes for the shelf bracket. Refer to Chapter 5 or 6 for this information.

3. Position the shelf bracket at the correct mounting holes just behind the outer flange of the vertical cabinet rail, as shown.

4. Align the bracket mounting studs and mounting tabs with the appropriate holes in the front vertical cabinet rail and seat the studs and tabs in the holes.

5. Fasten the bracket to the cabinet rail by installing KEP nuts on the upper-most and lower-most mounting studs, as shown. Do not install KEP nuts on the two middle studs at this time.

6. Using Table 7–5, determine the correct stop bracket position for the shelf type being installed.

Table 7–5 Horizontal Shelf Stop Bracket Positions

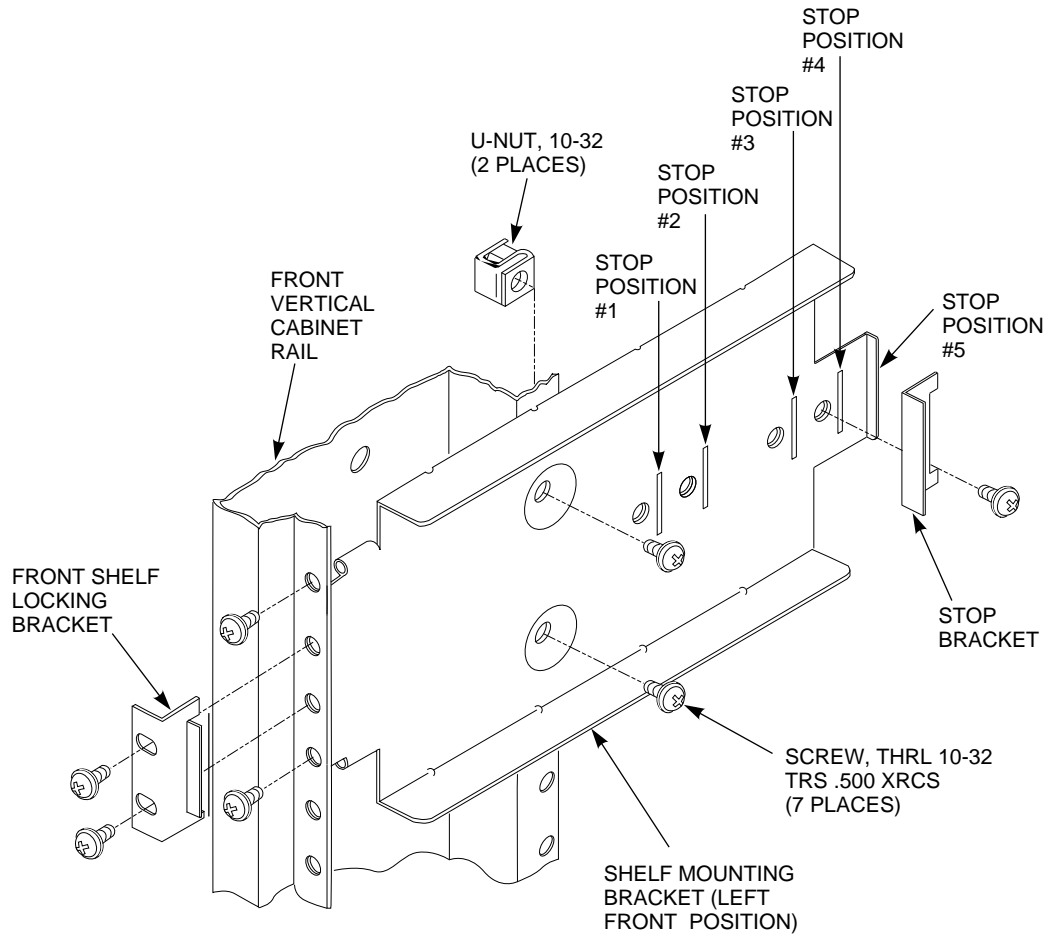| StorageWorks Shelf Type	Front Shelf Stop Bracket Position	Rear Shelf Stop Bracket Position
BA350–S*x*	4	1
BA350–M*x*	5 (Stop bracket not used)	2
BA350–E*x*	3	1

7. Insert the tab on the stop bracket into the slot at the correct stop position on the shelf bracket. Fasten the stop bracket to the shelf bracket, as shown. For front-mounted BA350–M*x* shelves, the inner lip on the mounting bracket serves as the stop bracket.

8. Repeat steps 2 through 7 to mount the companion shelf bracket on the opposite cabinet rail. To be sure of proper alignment of the brackets, use care to mount the bracket to the correct rail mounting holes.

9. With the power supply end of the shelf to the left and the blowers facing the cabinet, slide the shelf into the shelf brackets until it contacts the inner stop brackets. The shelf should slide smoothly into the brackets. If it binds, remove it and check the alignment of the shelf brackets. The shelf bracket mounting nuts might need to be loosened slightly to allow the brackets to align with the shelf. Retighten the nuts when the shelf brackets are properly aligned.

10. Using Table 7–6, verify that you have the correct locking bracket part number for the shelf type and position (front or rear) being installed.

11. Once the shelf is positioned within the shelf brackets, install both shelf locking brackets with KEP nuts on the middle mounting studs, as shown. Push each locking bracket against the shelf to seat it before tightening the nuts.

Table 7–6 Horizontal Shelf Locking Bracket Part Numbers

StorageWorks Shelf Type	Front Shelf Locking Bracket Part No.	Rear Shelf Locking Bracket Part No.
BA350–S*x*	74–46441–01	74–46439–01
BA350–M*x*	74–46441–02	74–46439–02
BA350–E*x*	74–46441–03	74–46439–01

Figure 7–4 Front Shelf Bracket Installation

STOP POSITION #4

STOP POSITION #3

STOP POSITION #2

STOP POSITION #1

FRONT VERTICAL CABINET RAIL

MOUNTING TAB (4 PLACES)

STOP POSITION #5

FRONT SHELF LOCKING BRACKET

STOP BRACKET

SCREW, THRL, 10-32 TRS .500 XRCS

SHELF MOUNTING BRACKET (LEFT FRONT POSITION)

NUT, M5 KEP (4 PLACES)

MOUNTING STUD (4 PLACES)

INNER FLANGE
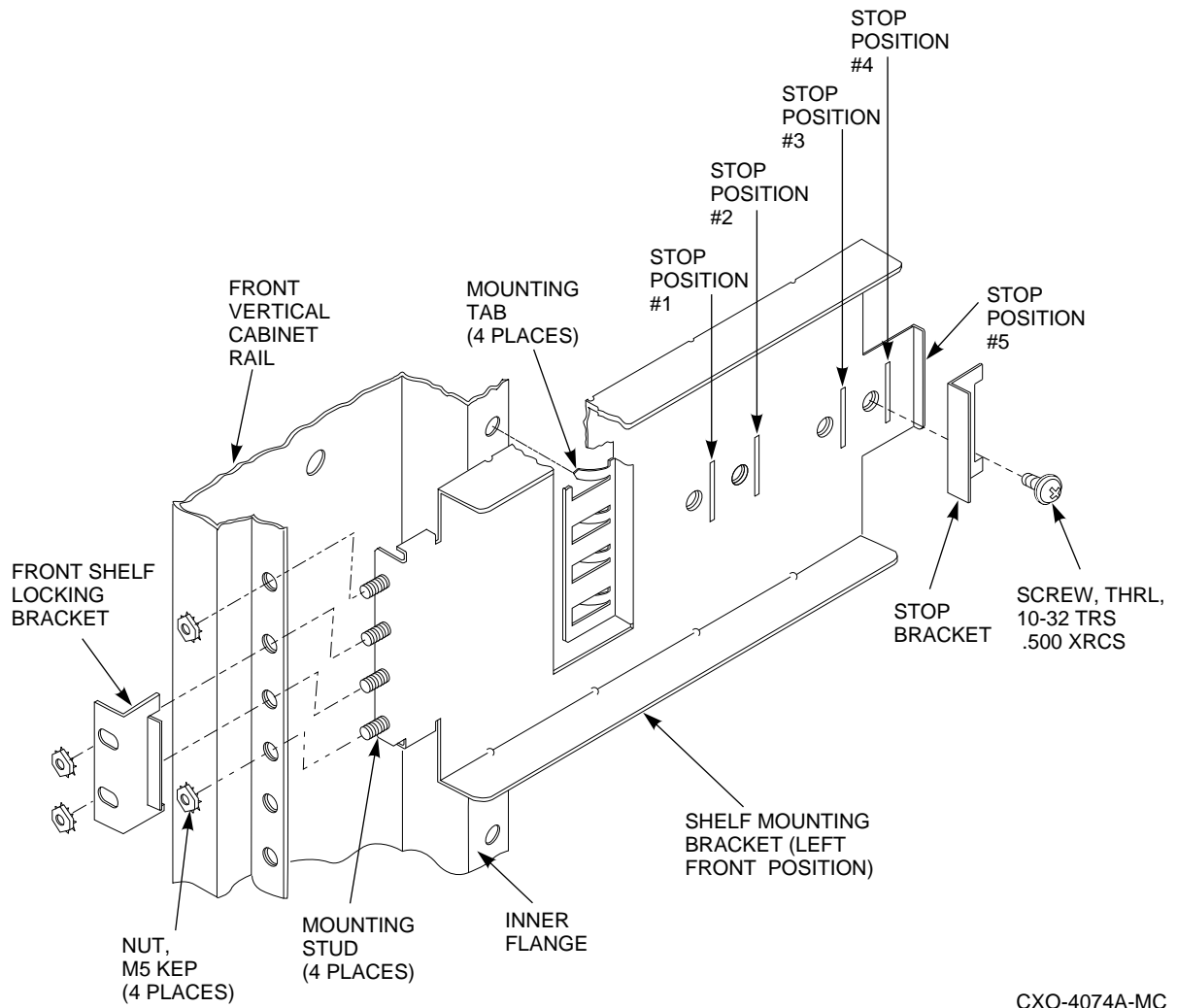
CXO-4074A-MC

Figure 7–5 Rear Shelf Bracket Installation

STOP
POSITION
#4

STOP
POSITION
#3

STOP
POSITION
#2

REAR
VERTICAL
CABINET
RAIL

MOUNTING
TAB
(4 PLACES)

STOP
POSITION
#1

STOP
POSITION
#5

REAR SHELF
LOCKING
BRACKET

STOP
BRACKET

SCREW, THRL,
10-32 TRS
.500 XRCS

SHELF MOUNTING
BRACKET (LEFT
REAR POSITION)

MOUNTING
STUD
(4 PLACES)

INNER
FLANGE

NUT,
M5 KEP
(4 PLACES)
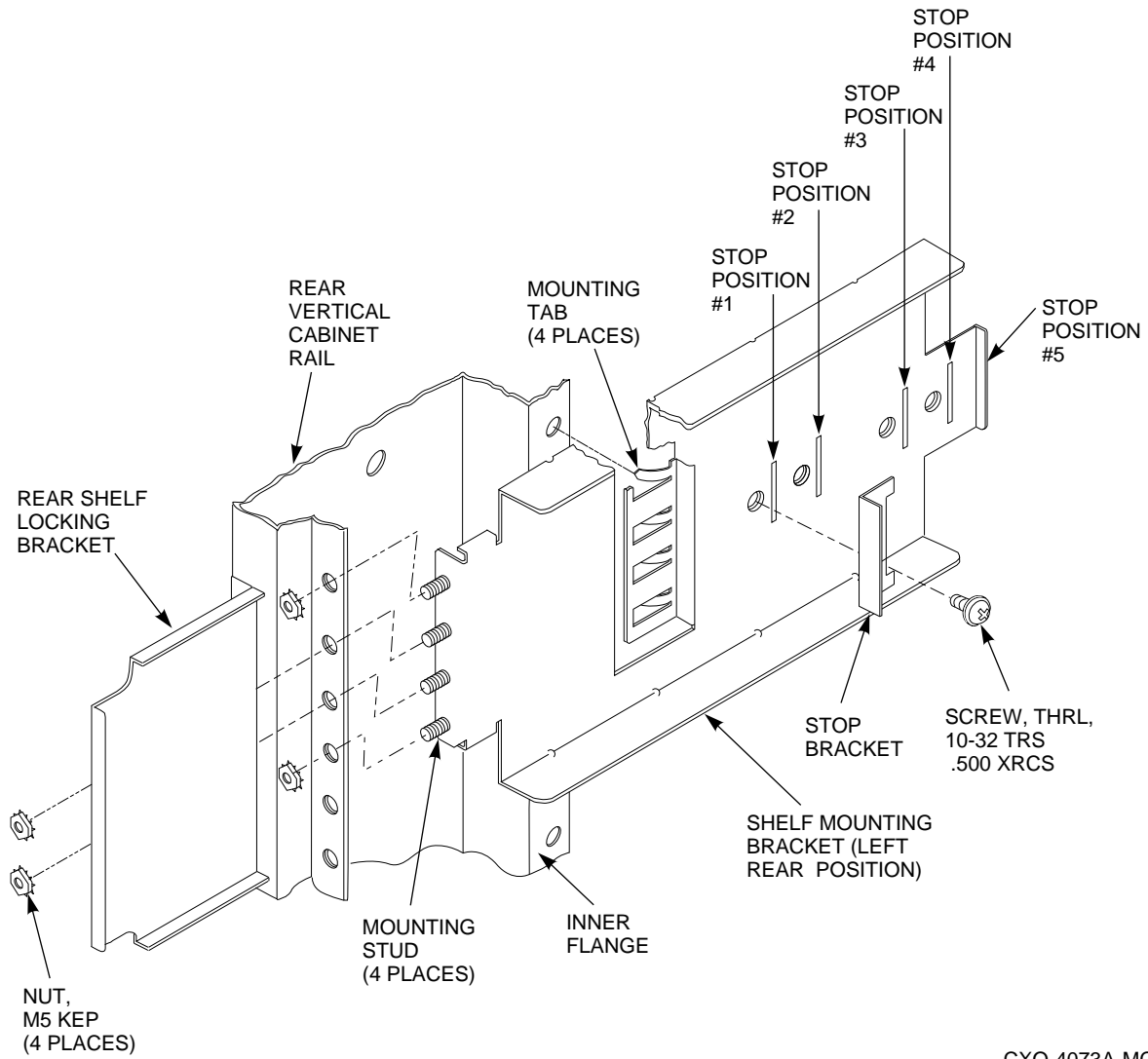
CXO-4073A-MC

7.7 Air Separation Panel Installation

Once the cabinet's shelves are configured, the air separation panels must be installed. The front and rear air separation panels are identical parts, but they are positioned in different ways depending upon where in the cabinet they are installed. Install the air separation panels in both the front and rear of the cabinet as described in Sections 7.7.1 and 7.7.2.

7.7.1 Installing the Front Air Separation Panel

The front air separation panel is required only if there is an open storage position above the upper-most shelf in the front of the cabinet. Install the front air separation panel as follows:

1. Install four U-nuts on the air separation panel, as shown in Figure 7–6.

2. Position the air separation panel just behind the front vertical cabinet rails. Position the panel as closely as possible to the top of the upper-most front cabinet shelf.

3. Fasten the air separation panel to the front vertical cabinet rails with four screws.

Figure 7–6 Front Air Separation Panel Installation

CXO-3930A-MC
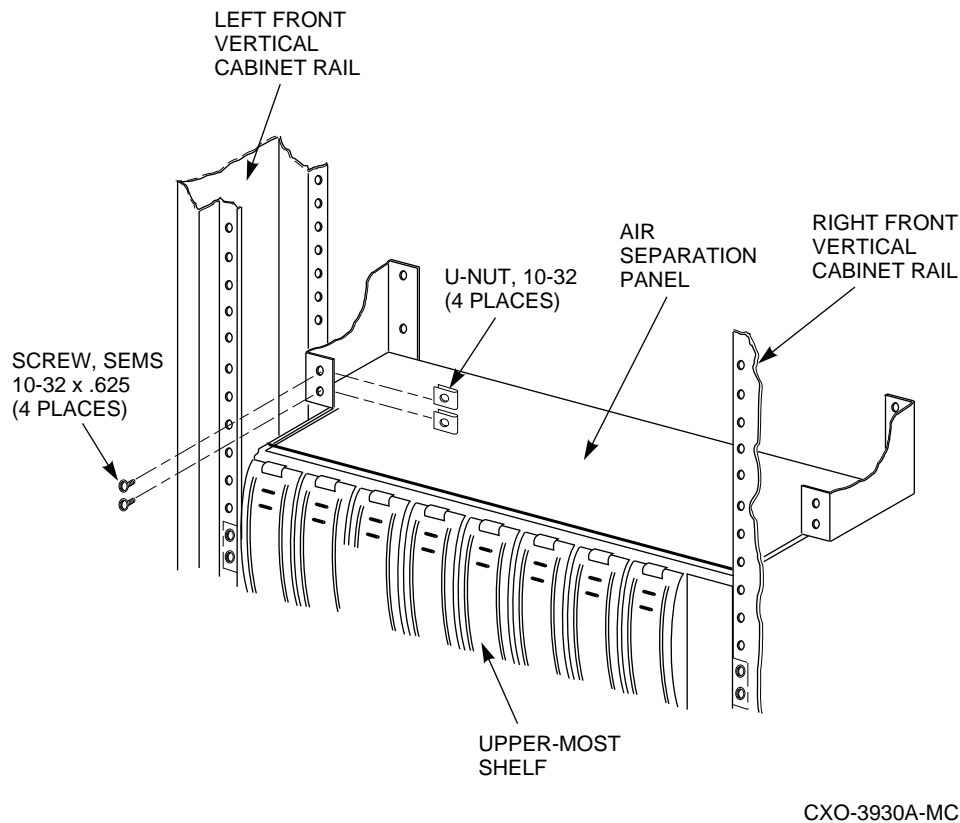
7.7.2 Installing the Rear Air Separation Panel

The rear air separation panel is installed just above the upper-most shelf in the rear of the cabinet. If cable distribution unit (CDU) A is installed in this position, the air separation panel is installed against the front panel of CDU A.

7.7.2.1 Rear Air Separation Panel Installation—Opening Above the Upper-Most Shelf

If the position just above the upper-most shelf is open, install the rear air separation panel as follows:

1. Install four U-nuts on the vertical cabinet rails, as shown in Figure 7–7.

Figure 7–7 Rear Air Separation Panel Installation—Empty Shelf Position Above Upper-Most Shelf

CXO-3935A-MC
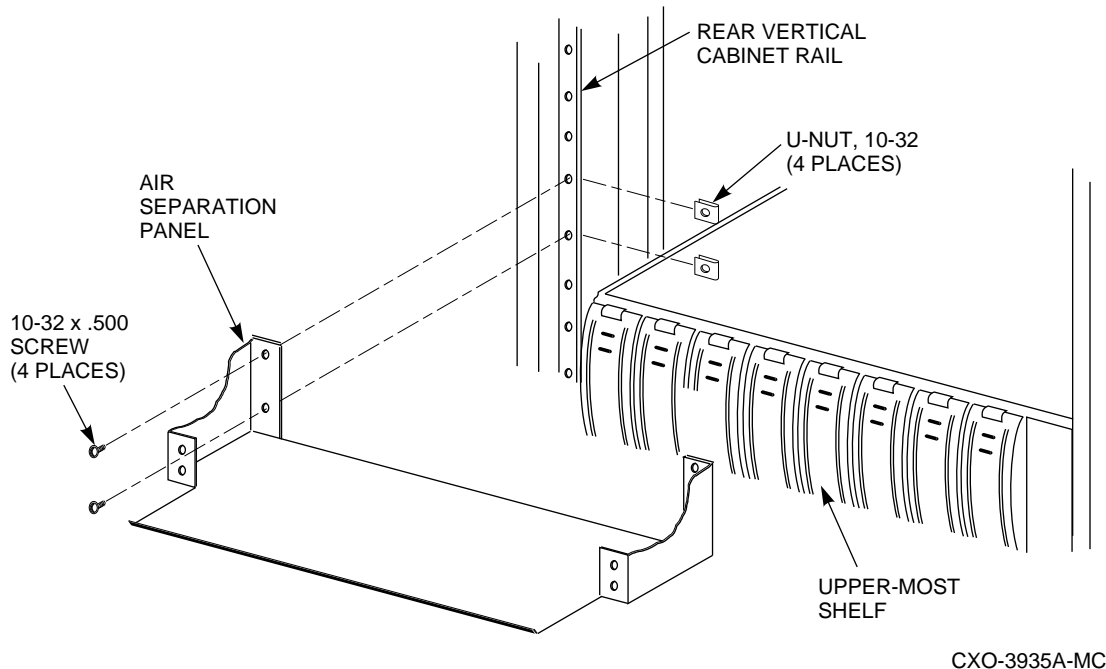
2. Position the air separation panel against the four U-nuts.

3. Fasten the air separation panel to the rear vertical cabinet rails with four screws.

7.7.2.2 Rear Air Separation Panel Installation—CDU A Above the Upper-Most Shelf

If CDU A is installed above the upper-most rear shelf, the rear air separation panel is installed against its front panel. If a redundant CDU is installed above CDU A, the air separation panel is still installed against the front panel of CDU A. Install the rear air separation panel as follows:

1. Support CDU A in position against the rear vertical cabinet rails while removing its mounting screws, as shown in Figure 7–8.

Figure 7–8 Rear Air Separation Panel Installation—CDU A Installed Above Upper-Most Shelf

REAR VERTICAL
CABINET RAIL

CDU A

AIR
SEPARATION
PANEL

CDU MOUNTING
SCREW
(4 PLACES)

UPPER-MOST
SHELF
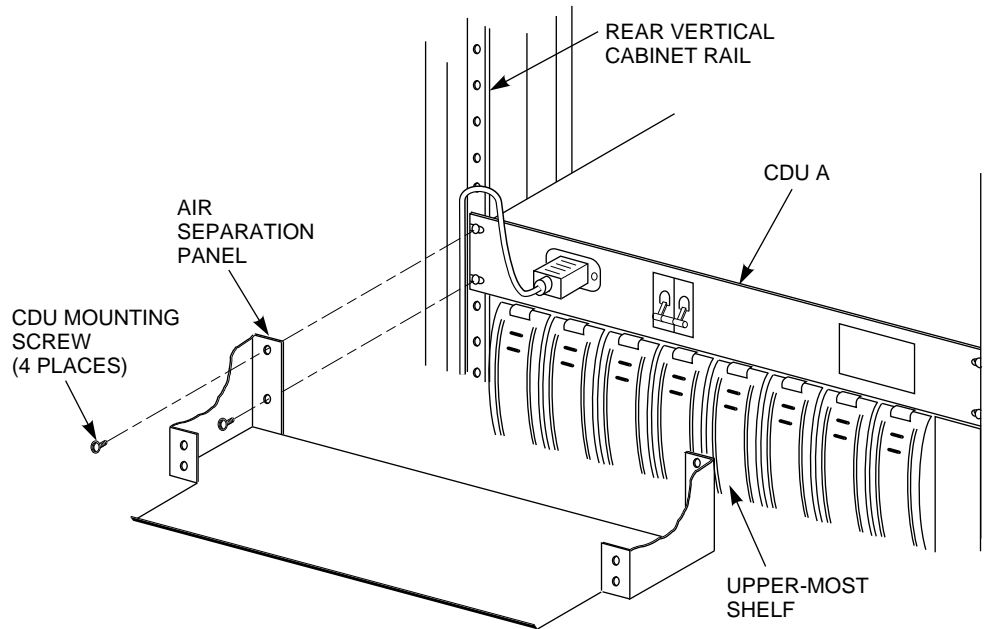
CXO-3929A-MC

2. Position the air separation panel against the front panel of CDU A.

3. Fasten the air separation panel, along with CDU A, to the rear vertical
   cabinet rails with four screws.

4. Route the CDU's power cord up and over the air separation panel to the left.

7.8 Installing Exterior Cabinet Panels

Once the cabinet rack space is configured as desired, the exterior cabinet panels
can be installed. Refer to Figure 7–1 and reinstall the exterior cabinet panels as
follows:

1. Position a side panel against the cabinet with the lip above the upper hanger
   clips just over the upper edge of the side of the cabinet.

2. Make sure that the entire surface of the side panel rests firmly against the
   side of the cabinet.

3. Allow the panel to slide downward, catching the two hanger clips as it moves.

4. Install the side panel bolts into the side panel through the holes in the top
   side rails of the cabinet.

5. Repeat steps 1 through 4 to install the other side panel.

6. Locate the four inset nylon snap fasteners on the top cabinet rails.

_____ WARNING _____

The top cover is heavy and awkward to lift. Installing it requires two
people. Failure to use sufficient personnel can result in personnel injury
or equipment damage.

_____

7. Position the top cover over the cabinet. Position the cover as shown in
   Figure 7–1 such that the front end of the panel with the shorter overhang is
   oriented toward the rear of the cabinet.

8. Align the pins on the underside of the top cover with the inset nylon fasteners
   on the top cabinet rails.

_____ WARNING _____

Be careful not to catch your fingers between the cabinet and the top panel
when snapping the panel to the cabinet.

_____

9. Lower the cover onto the cabinet and press it down, making sure the pins
   snap into the top panel fasteners.

10. If the cabinet was moved to access the side panels, place it in its original
    position.

8

Installing TZ8*x*7-Series Tape Drives

This chapter describes the mounting and power cabling of TZ8*x*7-series tape drives in SW500-series cabinets.

8.1 General Installation Considerations

The TZ8*x*7-series tape drive is mounted in the SW500 cabinet with one chassis rail, as shown in Figure 8–1. The chassis rail is attached to the cabinet's internal vertical rails, and it supports the TZ8*x*7-series tape drive from one side. Grooves machined into the side of the tape drive enclosure mate with flanges along the sides of the chassis rail, allowing the tape drive to be slid onto the chassis rail from the front of the cabinet. Once installed, the tape drive enclosure extends from the front to the rear of the SW500 cabinet.

Two TZ8*x*7-series tape drives can be mounted side-by-side at a given vertical position in the cabinet. The chassis rail hardware is the same for both the left and right mounting positions. Only the orientation of the hardware differs between the two mounting positions. There is no mechanical connection between two tape drives mounted side-by-side in the cabinet.

In situations where only one TZ8*x*7-series tape drive is being installed at a given vertical position in the cabinet, the tape drive must be installed in the right mounting position. This will ensure that the front panel of the tape drive mates with the correct opening in the tape bezel in the cabinet door. A filler panel in the tape bezel covers the left mounting position in this case.

WARNING

While working in the cabinet interior, ac power must be removed from cabinet components. Failure to do so may result in personal injury as a result of electric shock.

Prior to performing any of the procedures in this chapter, remove ac power from cabinet components. If the cabinet is installed and operating, spin down all disk drives and halt all tape drives in the cabinet. Switch the circuit breaker on the front panel of the cabinet's CDU(s) to the ○ (OFF) position.

Figure 8–1 TZ8x7-Series Tape Drive Installation

CABINET

CHASSIS
RAIL

TAPE
BEZEL

TZ8x7-SERIES
TAPE DRIVE
(LEFT POSITION)

TZ8x7-SERIES
TAPE DRIVE
(RIGHT POSITION)
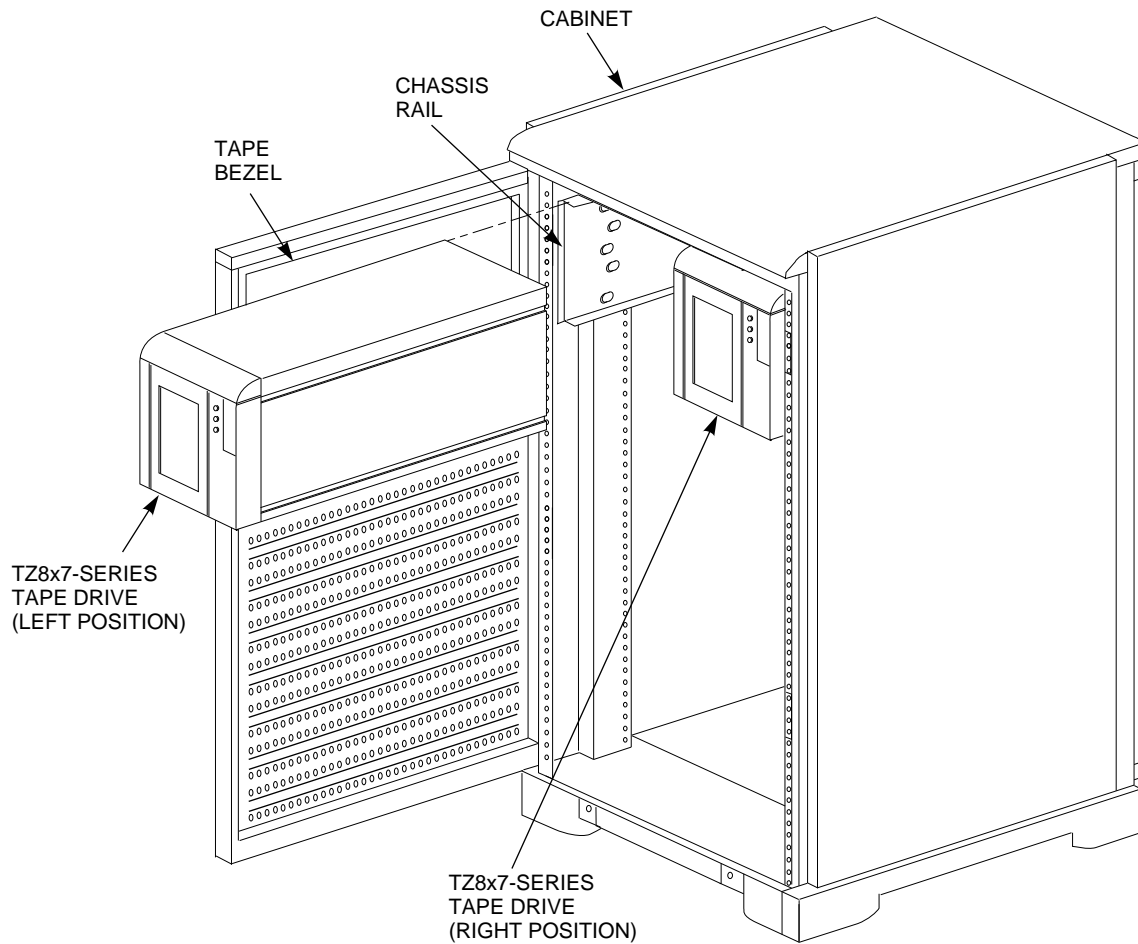
CXO-3926A-MC

8.2 Accessing the Cabinet Rack Space

TZ8x7-series tape drives can normally be installed without removing cabinet side panels. To route the cabling in configurations where access to the interior of the cabinet is limited, however, cabinet side panels may need to be removed. Sections and 8.8 present procedures for removing and replacing exterior cabinet panels.

The front and rear cabinet doors are held closed by door locks mounted on each door. The locks are released by turning counterclockwise with a 5/32-inch hex wrench.

Removing the Cabinet Side Panels

As shown in Figure 8–2, there are three side panel hanger clips on each side of the cabinet. A matching set of hanger clips are attached to each side panel. Remove the side panels as follows:

Figure 8–2 Cabinet Side Panel Removal and Installation

FASTENER PIN (4 PLACES)

NYLON SNAP FASTENER (4 PLACES)

TOP COVER

LIP

M6x40mm BOLT (4 PLACES)

UPPER SIDE PANEL HANGER CLIP

SIDE PANEL HANGER CLIPS

LOWER SIDE PANEL HANGER CLIP

CABINET FRONT

SIDE PANEL HANGER CLIPS

SIDE PANEL
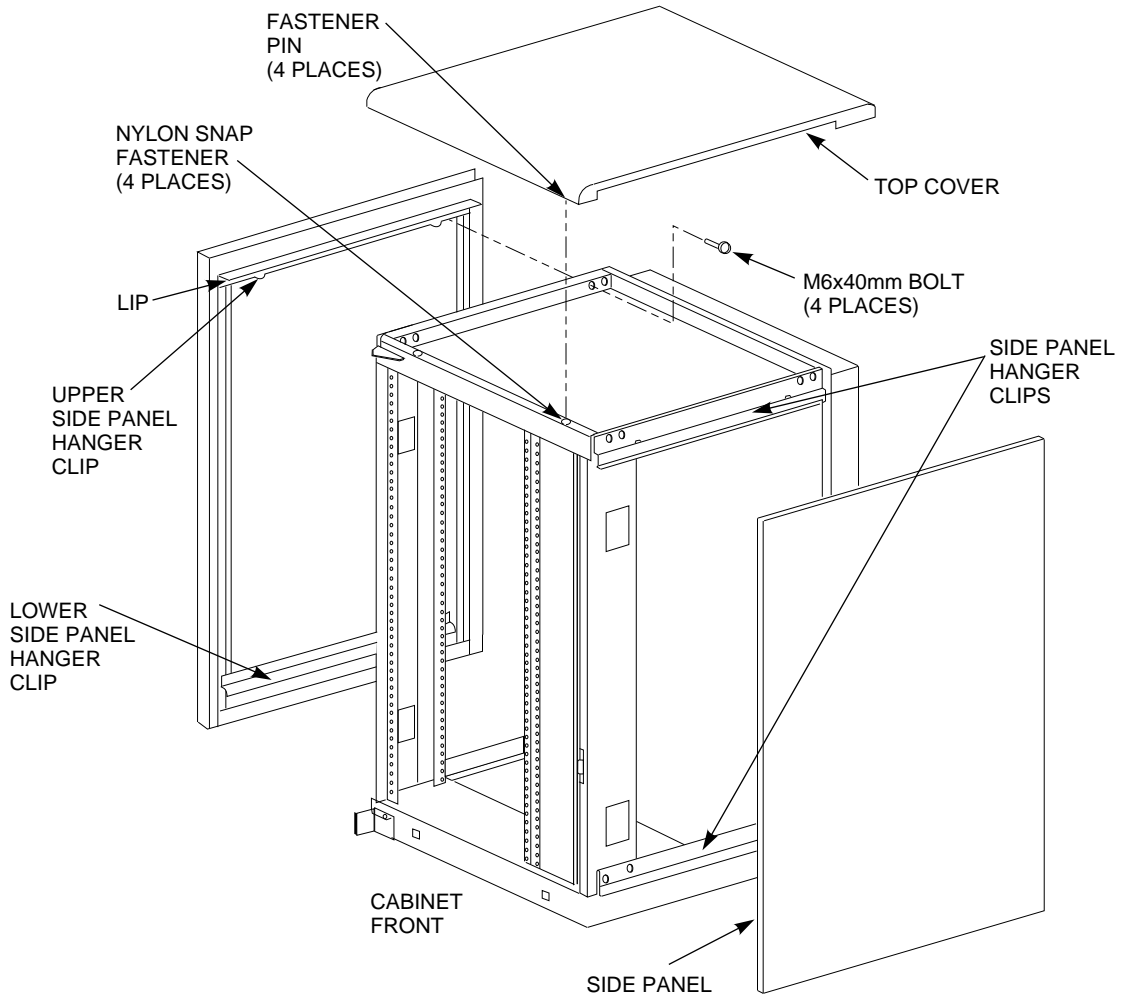
NOTE: FRONT AND REAR DOORS NOT SHOWN FOR CLARITY

CXO-3899A-MC

1. Move the cabinet away from adjacent enclosures as necessary.

2. Loosen the top cover by pushing up on its front and rear edges until it snaps free of its fasteners.

_____ WARNING _____

The top cover is heavy and awkward to lift. Removing it requires two people. Failure to use sufficient personnel may result in injury or equipment damage.

_____

3. Using two people, lift the top cover from the cabinet and set it aside.

4. Remove the bolts attaching the side panels to the top side rails of the cabinet.

5. Grasp a panel along its front and rear edges and lift up until the hanger clips disengage. Lift the panel away from the cabinet.

6. Repeat the previous step to remove the other panel.

8.3 Chassis Rail Installation

As shown in Figure 8–3, one end of the tape drive chassis rail is extendible using a sliding rail bracket, to allow the length of the chassis rail to be adjusted to fit the cabinet. Two round standoffs are used to locate the chassis rail along the vertical cabinet rails. The round standoffs are inserted into front and rear chassis rail locating holes to position the chassis rail while it is fastened to the cabinet.

Chassis rail component assembly and installation procedures for both left and right tape drive mounting positions are presented in Sections 8.3.1, 8.3.2, and 8.3.3.
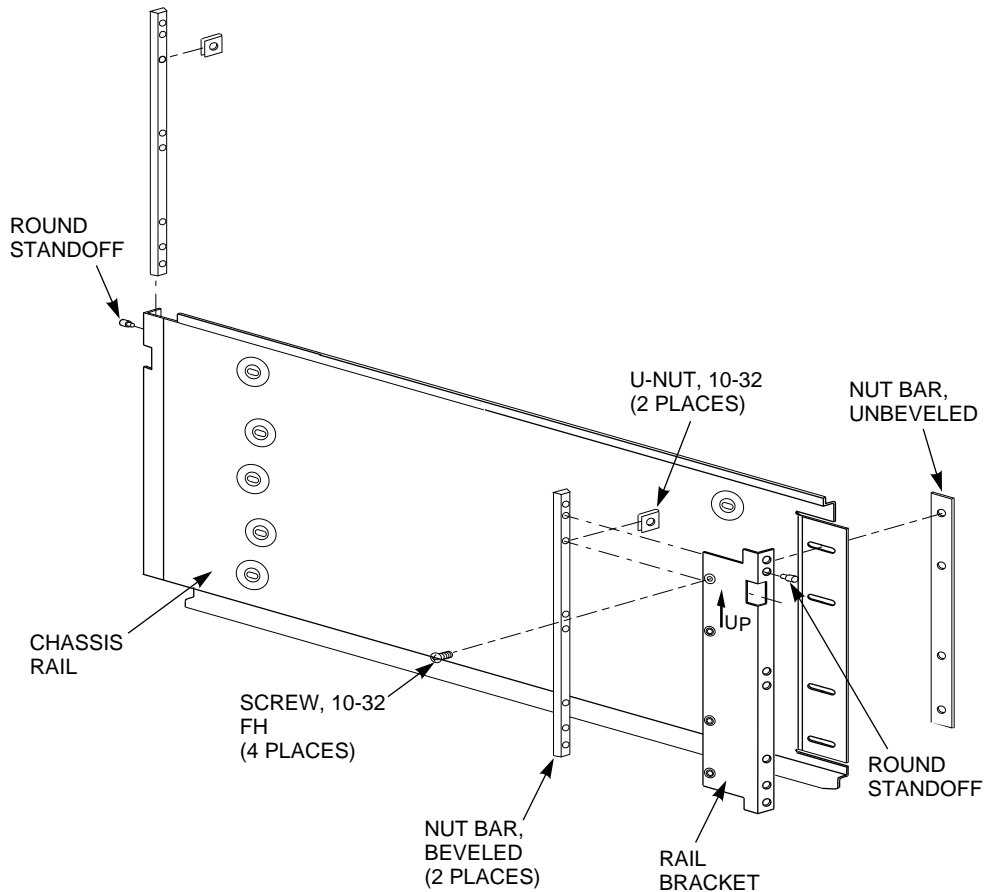
_____ Note _____

Two small ESD grounding posts are provided with the cabinet. One is located on a front vertical cabinet rail, and one on a rear rail. Should an ESD grounding post interfere with the installation of the chassis rail, move the post out of the way to any free hole on the cabinet.

_____

8.3.1 Chassis Rail Assembly

Before the chassis rail components can be mounted in the cabinet, they must be assembled. Assemble the chassis rail components as follows (see Figure 8–3):

1. Position the rail bracket against the chassis rail, as shown in the illustration.

2. Fasten the rail bracket to the chassis rail with the unbeveled nut bar and four screws, as shown. Leave the screws loose enough to allow the rail bracket to be moved along the chassis rail.

3. Install a U-nut in the groove near the end of each of the beveled nut bars. The flat side of the U-nuts must be installed on the *beveled* side of the nut bar.

Figure 8–3 Chassis Rail Assembly

ROUND
STANDOFF

U-NUT, 10-32
(2 PLACES)

NUT BAR,
UNBEVELED

CHASSIS
RAIL

SCREW, 10-32
FH
(4 PLACES)

UP

ROUND
STANDOFF

NUT BAR,
BEVELED
(2 PLACES)

RAIL
BRACKET

CXO-3934A-MC

4. Install the beveled nut bars on the chassis rail and rail bracket, using the round standoffs to hold them in place. The beveled side of the nut bars must face the flanges on the chassis rail and rail bracket.

The chassis rail assembly is now ready to be installed in the cabinet.

8.3.2 Right Position Chassis Rail Assembly Installation

Install the chassis rail assembly in the right position within the cabinet as follows (see Figure 8–4):

_____ **WARNING** _____

Cabinet rail edges may be sharp and can slice or abrade skin or cable insulation.

_____

1. Turn the cabinet power off as described in Section 8.1.

2. Determine the correct tape drive mounting locations and corresponding cabinet rail mounting holes for the chassis rail assembly. Refer to Chapter 5 or 6 for this information. The tape mounting hole specified for each position is the chassis rail locating hole shown in Figure 8–4.

Figure 8–4 Right Position Chassis Rail Assembly Installation
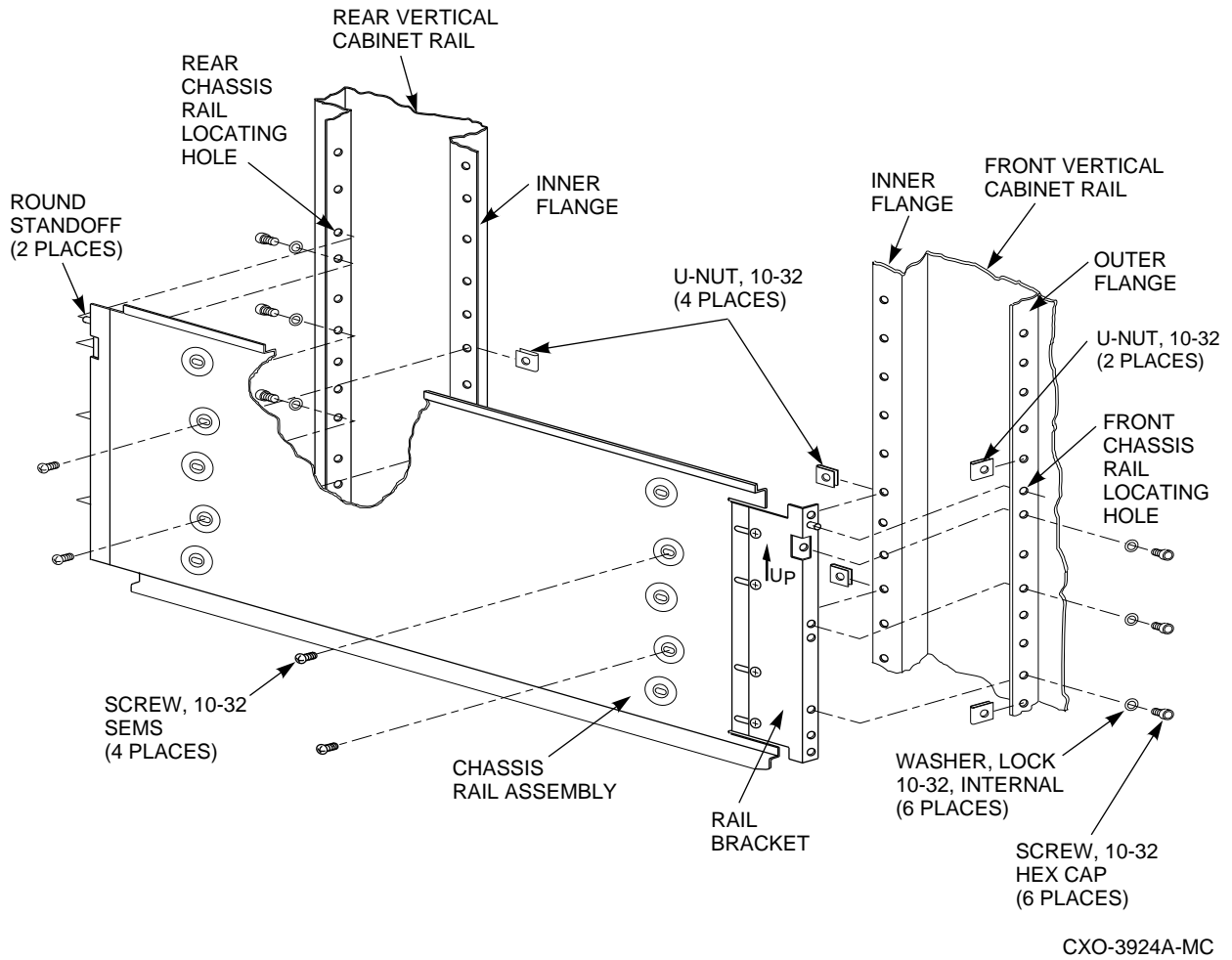
REAR VERTICAL
CABINET RAIL

REAR
CHASSIS
RAIL
LOCATING
HOLE

INNER
FLANGE

ROUND
STANDOFF
(2 PLACES)

U-NUT, 10-32
(4 PLACES)

INNER
FLANGE

FRONT VERTICAL
CABINET RAIL

OUTER
FLANGE

U-NUT, 10-32
(2 PLACES)

FRONT
CHASSIS
RAIL
LOCATING
HOLE

UP

SCREW, 10-32
SEMS
(4 PLACES)

CHASSIS
RAIL ASSEMBLY

RAIL
BRACKET

WASHER, LOCK
10-32, INTERNAL
(6 PLACES)

SCREW, 10-32
HEX CAP
(6 PLACES)

CXO-3924A-MC

_____ **WARNING** _____

Use care in supporting the chassis rail assembly. It is heavy and awkward
to position within the cabinet. If possible, use two people to support and
position the chassis rail assembly. The chassis rail assembly may cause
injury and equipment damage if dropped during installation.

_____ **Note** _____

To ensure proper alignment of the chassis rail assembly, use care to position the round standoffs in the correct front and rear chassis rail locating holes.

_____

3. From the front of the cabinet, position the chassis rail assembly at the correct mounting holes, as shown. Ensure that the rail bracket is positioned toward the front of the cabinet, and that the arrow on the rail bracket points up.

4. Insert the rear round standoff into the rear chassis rail locating hole.

5. Support the chassis rail against the rear vertical cabinet rail and maintain the rear round standoff in its locating hole. Extend the rail bracket to insert the front round standoff into its correct front chassis rail locating hole.

6. Using the shelf bracket as a template, mark the four U-nut mounting holes on the inner flanges of both the front and rear vertical cabinet rails. Make sure to use the correct set of holes in the chassis rail.

7. Temporarily remove the chassis rail assembly and install four U-nuts along the inner flanges of the front and rear vertical cabinet rails at the holes marked in step 6.

8. Reposition the chassis rail assembly as directed in steps 3 through 5.

9. Fasten the chassis rail to the inner flanges of the front and rear vertical cabinet rails with four screws, as shown.

10. Fasten the rail bracket to the front vertical cabinet rail with its beveled nut bar and three screws, as shown.

11. Fasten the chassis rail to the rear vertical cabinet rail with its beveled nut bar and three screws, as shown.

12. Tighten the screws fastening the rail bracket to the chassis rail.

13. Install two U-nuts along the outer flange of the front vertical cabinet rail. Install one U-nut at the hole just above the front chassis rail locating hole and the other at the eighth hole below the locating hole.

8.3.3 Left Position Chassis Rail Assembly Installation

_____ **Note** _____

Install the chassis rail assembly in the left mounting position only if a tape drive is also installed in the right position. The front cabinet door tape bezel openings are designed to allow a single tape drive to be installed only in the right position.

_____

Install the chassis rail assembly in the left position within the cabinet as follows (see Figure 8–5):

_____ **WARNING** _____

Cabinet rail edges may be sharp and can slice or abrade skin or cable insulation.

_____

1. Turn the cabinet power off as described in Section 8.1.

2. Determine the correct tape drive mounting locations and corresponding cabinet rail mounting holes for the chassis rail assembly. Refer to Chapter 5 or 6 for this information. The tape mounting hole specified for each position is the chassis rail locating hole shown in Figure 8–5.

Figure 8–5 Left Position Chassis Rail Assembly Installation
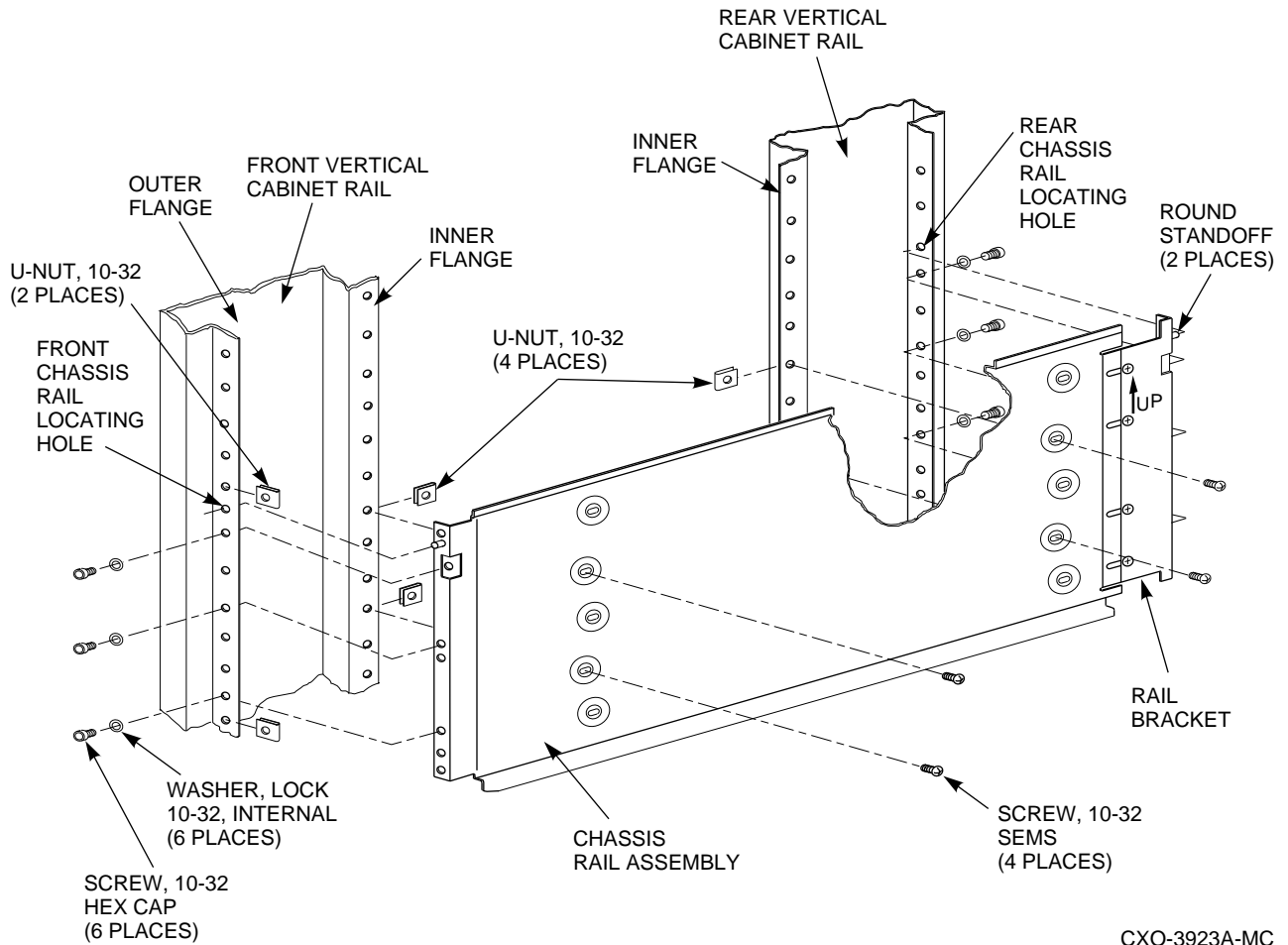
CXO-3923A-MC

_____ **WARNING** _____

Use care in supporting the chassis rail assembly. It is heavy and awkward to position within the cabinet. If possible, use two persons to support and position the chassis rail assembly. The chassis rail assembly may cause injury and equipment damage if dropped during installation.

_____ **Note** _____

To ensure proper alignment of the chassis rail assembly, use care to
position the round standoffs in the correct front and rear chassis rail
locating holes.

_____

3. From the rear of the cabinet, position the chassis rail assembly at the correct
   mounting holes, as shown. Ensure that the rail bracket is positioned toward
   the rear of the cabinet, and that the arrow on the rail bracket points up.

4. Insert the front round standoff into the front chassis rail locating hole.

5. Support the chassis rail assembly against the front vertical cabinet rail and
   maintain the front round standoff in its locating hole. Extend the rail bracket
   to insert the rear round standoff into its correct rear chassis rail locating hole.

6. Using the chassis rail as a template, mark the four U-nut mounting holes on
   the inner flanges of both the front and rear vertical cabinet rails. Make sure
   to use the correct set of holes in the chassis rail.

7. Temporarily remove the chassis rail assembly and install four U-nuts along
   the inner flanges of the front and rear vertical cabinet rails at the holes
   marked in step 6.

8. Reposition the chassis rail assembly as directed in steps 3 through 5.

9. Fasten the chassis rail assembly to the inner flanges of the front and rear
   vertical cabinet rails with four screws, as shown.

10. Fasten the rail bracket to the rear vertical cabinet rail with its beveled nut
    bar and three screws, as shown.

11. Fasten the chassis rail to the front vertical cabinet rail with its beveled nut
    bar and three screws, as shown.

12. Tighten the screws fastening the rail bracket to the chassis rail.

13. Install two U-nuts along the outer flange of the front vertical cabinet rail.
    Install one U-nut at the hole just above the front chassis rail locating hole
    and the other at the eighth hole below the locating hole.

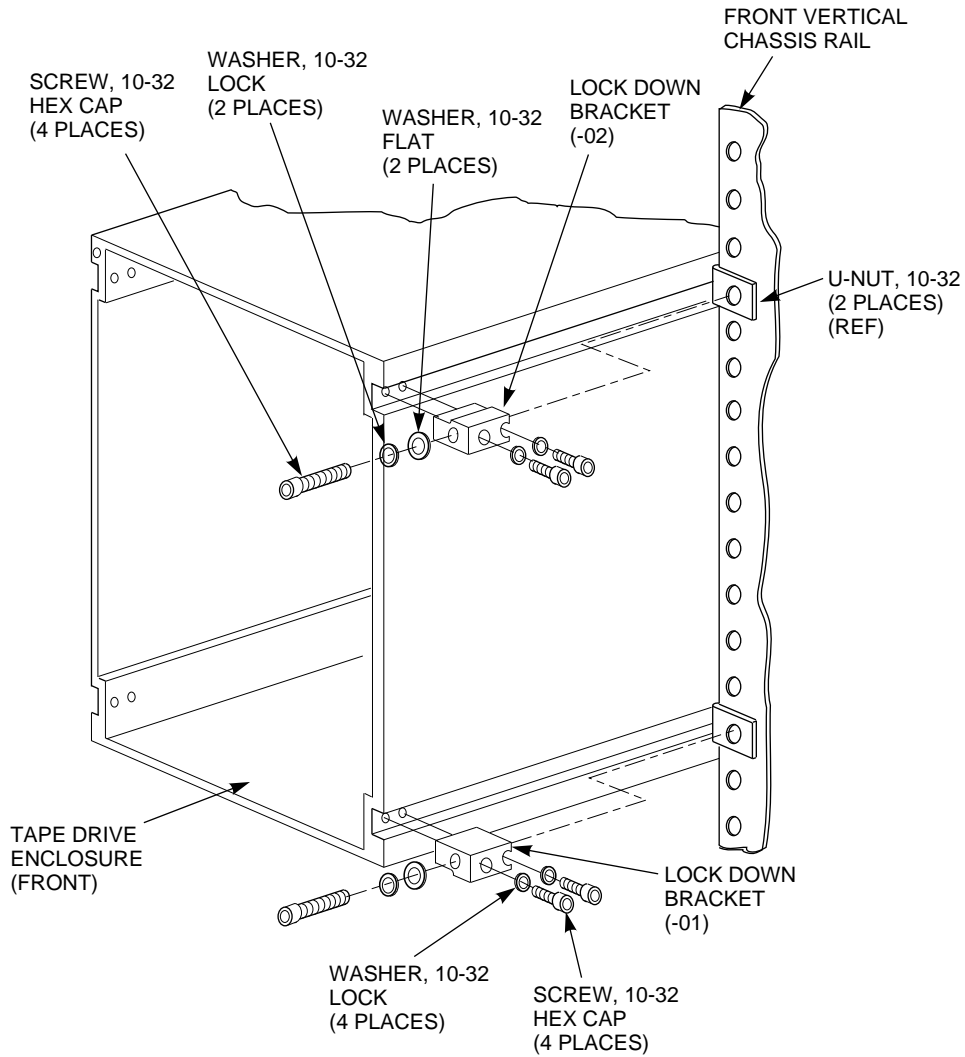## 8.4 Mounting the TZ8*x*7-Series Tape Drive Enclosure

Once the chassis rail is installed in the cabinet, the tape drive enclosure can be mounted on it. Mount the TZ8*x*7-series tape drive to the chassis rail as follows:

Note

The lock down brackets are mirror images of each other, and they are identified as the -01 and -02 versions. They must be installed with the orientation shown in the illustration.

---

1. Install the the two lock down brackets on the side of the tape drive enclosure near the front end, as shown in either Figure 8–6 or 8–7. Figure 8–6 shows the installation for the right mounting position, and Figure 8–7 shows the installation for the left mounting position.

Figure 8–6 Right Position Tape Drive Mounting

FRONT VERTICAL
CHASSIS RAIL

SCREW, 10-32
HEX CAP
(4 PLACES)

WASHER, 10-32
LOCK
(2 PLACES)

WASHER, 10-32
FLAT
(2 PLACES)

LOCK DOWN
BRACKET
(-02)

U-NUT, 10-32
(2 PLACES)
(REF)

TAPE DRIVE
ENCLOSURE
(FRONT)

LOCK DOWN
BRACKET
(-01)

WASHER, 10-32
LOCK
(4 PLACES)

SCREW, 10-32
HEX CAP
(4 PLACES)

NOTE: TAPE DRIVE INTERNAL COMPONENTS NOT SHOWN FOR CLARITY.

CXO-3918A-MC

Figure 8–7 Left Position Tape Drive Mounting
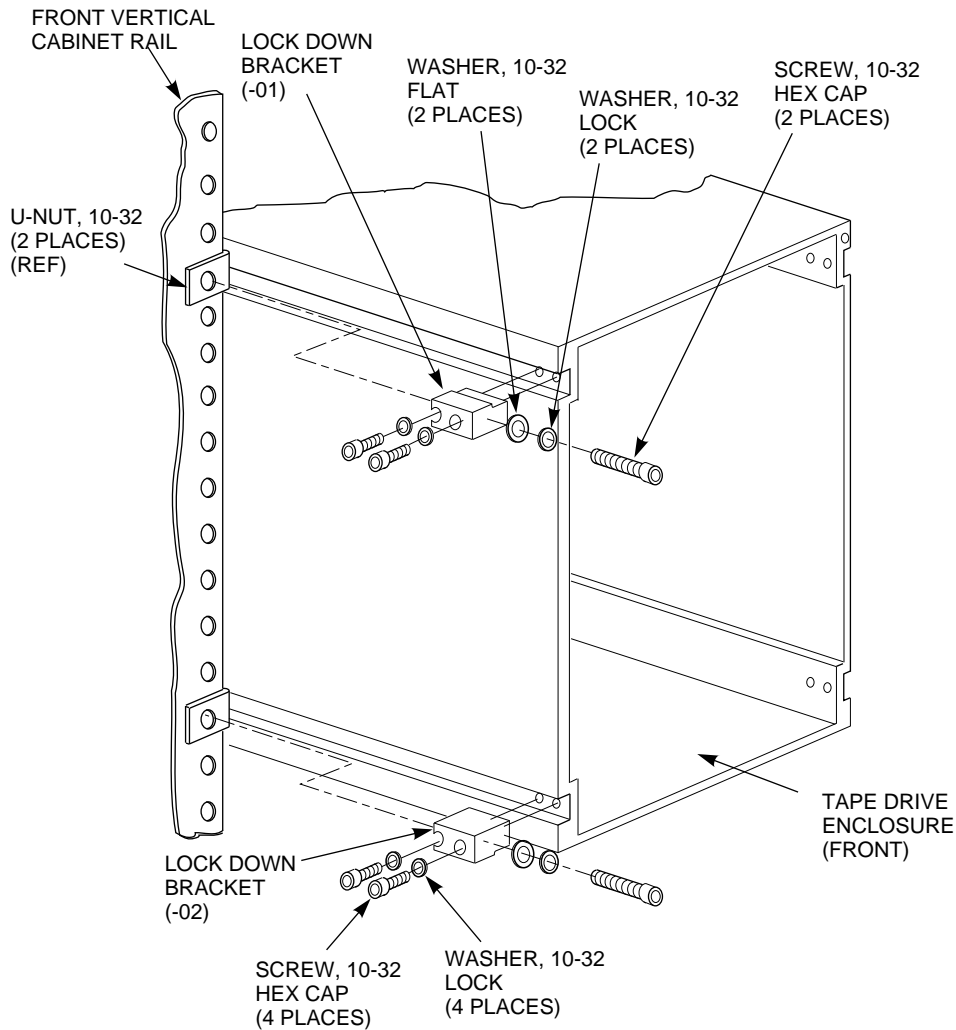
NOTE: TAPE DRIVE INTERNAL COMPONENTS NOT SHOWN FOR CLARITY.

CXO-3919A-MC

_____ **WARNING** _____

Use two persons to lift the TZ8*x*7-series tape drive. The unit is heavy
and awkward to lift. Failure to use two persons to lift the tape drive may
result in injury or damage to equipment.

_____

2. From the front of the cabinet and using two persons, position the tape drive
such that the machined grooves in the side of the tape drive enclosure mate
with the upper and lower edges of the chassis rail.

_____ **CAUTION** _____

Use care when sliding the tape drive into the cabinet. Do not allow the
tape drive enclosure to pull or pinch cables that may be routed through

the cabinet interior. Failure to use care when mounting the tape drive may result in equipment damage.

3. Slide the tape drive onto the chassis rail until the lockdown brackets contact the U-nuts on the front vertical cabinet rail.

4. Fasten the lock down brackets to the front vertical chassis rail with two hex cap screws, as shown in Figure 8–6 or 8–7.

_____ Note _____

Preconfigured cabinets containing TZ8*x*7 tape drives are sent from the factory with red shipping brackets installed on the rear of the tape drives for stability. The shipping brackets may be left in place or removed at the user's discretion. The brackets are not needed, nor are they supplied, with tape drives ordered to be installed on site.

_____

8.5 Supplying AC Power

AC power for the TZ8*x*7-series tape drive is obtained from CDU A. One of the cabinet's preinstalled shelf power cords is used to supply power to the tape drive.

To use one of the preinstalled cabinet power cords, simply locate an unused cord next to the tape drive's rear-panel power receptacle and plug it into the receptacle. Switch the power switch on the rear panel of the tape drive to the | (ON) position to allow the CDU to control the unit's power.

8.6 SCSI–2 Signal Cabling

Refer to the *Storage Solutions TZ8x7-Series Tape Drive SCSI Bus Configuration and Installation Guide* for details on the selection of SCSI–2 cables and their connection to the TZ8*x*7-series tape drive.

8.7 Installing the Cabinet Door Tape Bezel Kit

To allow operator access to the TZ8*x*7 tape drive, the front cabinet door tape bezel kit must be installed. To install the tape bezel kit, see the *Instructions for Installation of the Tape Bezel Kit on SF400 Series Cabinets* provided with the kit. The SF400 installation instructions also apply to SW500-series cabinets.

If the tape bezel kit is already installed, you need only remove its filler panel to accommodate a tape drive in the left mounting position.

8.8 Reinstalling Exterior Cabinet Panels

Once the cabinet rack space is configured as desired, the exterior cabinet panels may be reinstalled. Refer to Figure 8–2 and reinstall the exterior cabinet panels as follows:

1. Position a side panel against the cabinet with the lip above the upper hanger clips just over the upper edge of the side of the cabinet.

Figure 8–8 TZ8x7-Series Tape Drive Rear Panel

SCSI-2
CONNECTORS

AC POWER
SWITCH

AC RECEPTACLE
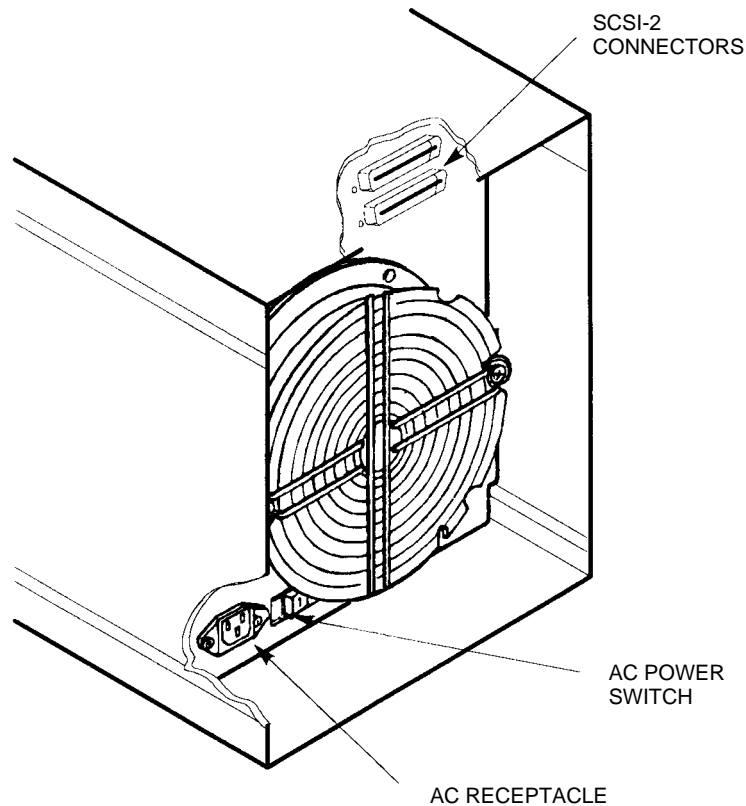
CXO-3932A-MC

2. Ensure that the entire surface of the side panel rests firmly against the side of the cabinet.

3. Allow the panel to slide downward, catching the three hanger clips as it moves.

4. Install the side panel bolts into the side panel through the holes in the top side rails of the cabinet.

5. Repeat steps 1 through 4 to install the other side panel.

6. Locate the four inset nylon snap fasteners on the top cabinet rails.

_____ **WARNING** _____

The top cover is heavy and awkward to lift. Installing it requires two people. Failure to use sufficient personnel may result in injury or equipment damage.

_____

7. Position the top cover over the cabinet. Position the cover as shown in Figure 8–2 such that the end of the panel with the shorter overhang is oriented toward the front of the cabinet.

8. Align the pins on the underside of the top cover with the inset nylon fasteners on the top cabinet rails.

_____ WARNING _____

Be careful not to catch your fingers between the cabinet and the top panel when snapping the panel to the cabinet.

_____

9. Lower the cover onto the cabinet and press it down, ensuring that the pins snap into the top panel fasteners.

10. If the cabinet was moved to access the side panels, place it in its original position.

9

Power Configuration

This chapter discusses the configuration of primary power within SW500-series cabinets. Descriptions of the cabinet's power configuration options can be found in Section 2.3.

9.1 General Considerations

_____ WARNING _____

While working in the cabinet interior, ac power must be removed from the cabinet components. Failure to do so may result in personal injury as a result of electric shock.

_____

Prior to performing any of the procedures in this chapter, remove ac power from the cabinet components. If the cabinet is installed and operating, spin down all disk drives and halt all tape drives in the cabinet. Switch the circuit breaker on the front panel of the cabinet's CDUs to the ◯ (OFF) position.

9.2 Cable Distribution Units

The 887–E CDU is used with SW500-series cabinets and is designed for both 230 volt, 50 Hz and 120 volt, 60 Hz applications. The unit provides ac power to the cabinet's components via 12 Molex output connectors on its rear panel. Two International Electrotechnical Commission (IEC) output connectors are also provided for utility purposes.

_____ WARNING _____

If the leakage current of the cabinet is above 3.5 mA after installation, Digital recommends that power cables with industrial type B, IEC 950 connectors be installed. Failure to reduce the leakage current can result in equipment performance degradation and personal injury due to electric shock.

_____

Table 9–1 lists the power cables used with the 887–E CDU.

Table 9–1 CDU Power Cable Variations

Cable Part No.†	Country Usage	Comments‡
17–01255–01	Europe, Japan	IEC 309 plug and cordage (220/240 volt)
17–00083–57	United States	NEMA 5–20P twist-lock plug (120 volt)

†The SW500–AD cabinet version for Europe and Japan is shipped with the either the 17–01255–01 or 17–00083–57 power cable, depending upon customer requirements. The SW500–AC cabinet version for the United States is shipped with only the 17–00083–57 power cable. If a different cable is required, the customer must order it prior to installation.

‡All power cables are supplied with a female plug compatible with the IEC input connector on the front panel of the CDU.

9.3 Utility Power Cord

Each SW500 cabinet is furnished with one additional power cord for the purpose of powering monitors, printers, or other devices. The power cord is connected to the rear panel of the CDU and may be found coiled up in the base of the cabinet.

9.4 Single CDU Configurations

Using one CDU, cabinet power can be configured with both single and dual power supplies in each shelf. Refer to Sections 2.3.1 and 2.3.2 for further information on these configurations.

9.4.1 Single Cabinet Power Configuration

Unless options are specified, SW500-series cabinets are shipped with a single CDU and single-shelf power supplies. For ease of upgrade, the cabinet is supplied with 10 black and 10 gray preinstalled ac power cords. One black and one gray power cord is routed to each usable front and rear shelf position. These cords are used to supply ac power to shelves as they are added to the cabinet. The black cord at each newly added shelf's mounting position needs only to be plugged into the shelf's power supply to complete the shelf's installation.

9.4.2 Dual-Shelf Power Configuration

In the dual-shelf power configuration, a second ac power supply is necessary for each shelf (refer to Figure 2–5). Configure each shelf for dual ac power supplies as follows:

1. Power the cabinet down as described in Section 9.1.

2. Plug in a second ac power supply (B) next to the existing ac power supply (A) in each shelf.

3. Plug the gray ac power cord at each shelf position into the connector on the newly added ac power supply.

4. Using the procedures appropriate to your system, turn on the cabinet and initialize it.

9.5 Dual-Cabinet Power Configuration

The dual-cabinet power configuration requires two CDUs for power distribution. The second CDU (CDU B) is installed immediately above CDU A in the rear of the cabinet. Install the dual power option kit as follows:
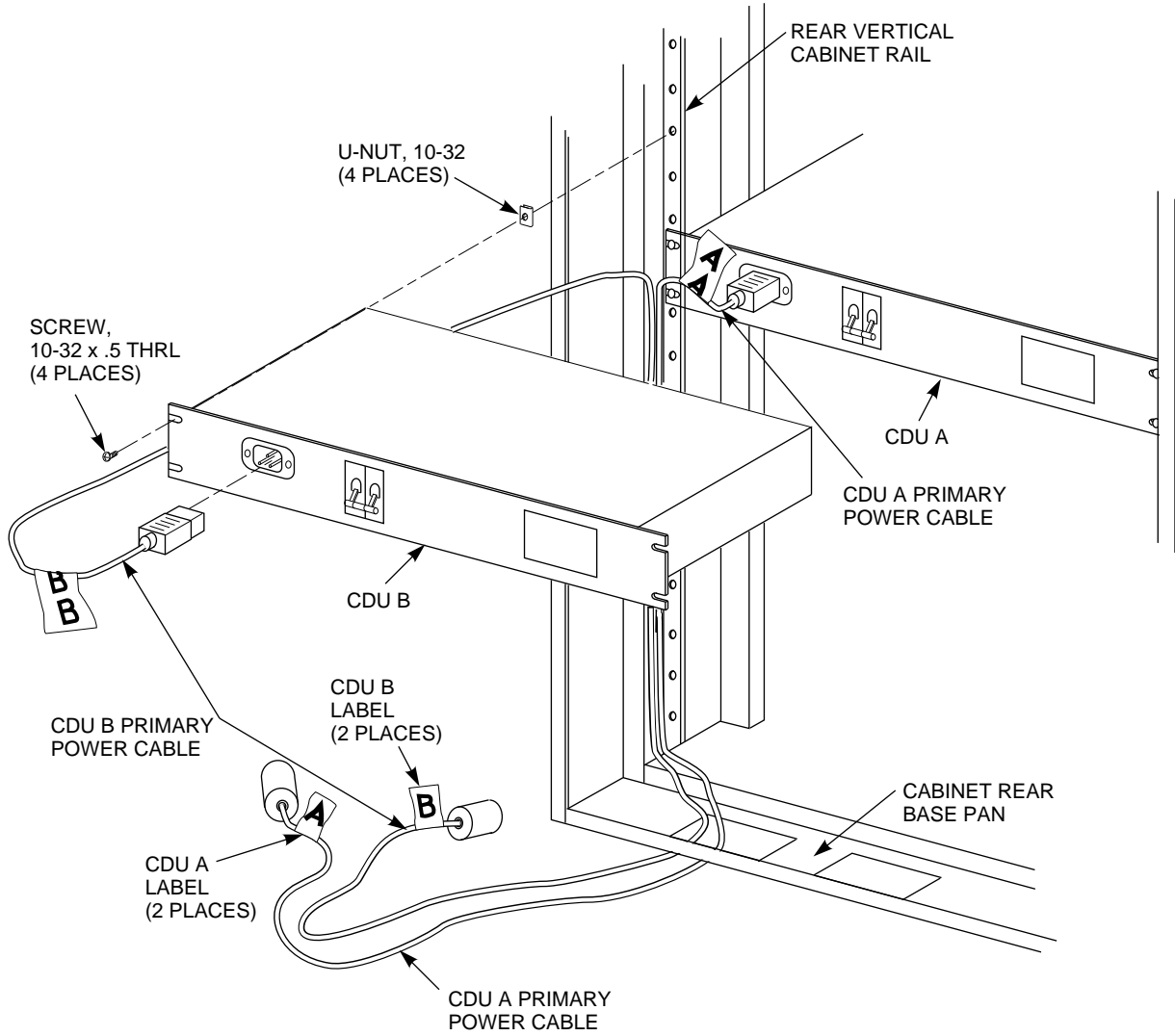
1. Check the contents of the dual power option kit against the parts list shown in Table 9–2 to verify that all the parts are present.

Table 9–2   SW500 Cabinet Dual Power Option Kit Parts List

Kit option numbers SW5xP–AC (120V, 60 Hz), SW5xP–AD (230V, 50 Hz)		Quantity	
Digital Part Number	Description	–AC	–AD
EK–SW5CU–IG	CDU and dual power option installation guide	1	1
90–00063–39	Screw, 10–32 Phillips, .500 inch	4	4
90–07786–00	U-nut, 10–32	4	4
30–32959–05	Cable distribution unit, 120/230V, 60/50 Hz	1	1
17–00083–57	Power cable, NEMA 5–20 twist-lock plug	1	–
17–01255–01	Power cable, IEC 309 plug	–	1
90–07085–00	Cable clamp, .500 inch	–	1
90–07089–00	Cable clamp, .750 inch	2	2
36–38274–01	Label, caution and cable ID	2	2

2. See Figure 9–1 to familiarize yourself with the location and identification of each of the CDUs to be configured for the dual power option.

3. Spin down all disk drives and halt all tape drives in the cabinet.

4. Open the rear cabinet door to expose CDU A.

5. Switch the circuit breaker on the front panel of CDU A to the ○ (OFF) position.

6. Disconnect CDU A's primary power cable from the power source.

Figure 9–1 CDU Installation

REAR VERTICAL
CABINET RAIL

U-NUT, 10-32
(4 PLACES)

SCREW,
10-32 x .5 THRL
(4 PLACES)

CDU A

CDU A PRIMARY
POWER CABLE

CDU B

CDU B
LABEL
(2 PLACES)

CDU B PRIMARY
POWER CABLE

CABINET REAR
BASE PAN

CDU A
LABEL
(2 PLACES)

CDU A PRIMARY
POWER CABLE

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_____ **Note** _____

In some cases, it may be desirable to allow the host computer system to operate while the dual power option kit is being installed. In this instance, the cabinet may be isolated from power by disconnecting the host computer interface cables. Refer to the documentation for your host computer configuration for the steps necessary to disconnect the cables.

_____

7. Isolate the cabinet electrically by powering down the host computer.

8. To install CDU B, you must have free access to the interior area of the cabinet. If necessary, gain access to the cabinet interior by separating the cabinet from adjacent ones and removing its side panels. Refer to Chapter 7 for details on exterior cabinet panels.

_____ **WARNING** _____

Cabinet rail edges may be sharp and can slice or abrade skin and cable insulation.

_____

9. Remove CDU B from its packing material.

10. Locate the 10 preinstalled gray power cords coiled in the interior of the cabinet. Bring the free end of each of the cords to the opening above CDU A.

11. Position CDU B at the opening above CDU A, as shown in Figure 9–1.

12. Plug the CDU plug of each gray cord into the rear panel of CDU B. The cords may be plugged in in any order.

13. Slide CDU B into position against the vertical cabinet rails.

14. Using the hardware provided in the kit, mount CDU B to the cabinet chassis rails, as shown in Figure 9–1.

_____ **WARNING** _____

To prevent injury from electric shock, it is important that safety labels be properly applied. Confusion can result from the fact that the cabinet uses two primary power sources with the dual power option. Install the cable and cabinet labeling carefully in accordance with the instructions in steps 15 through 25.

_____

15. Cut off one letter "A" from one of the yellow "A" labels in the kit. Remove the cut label from its backing paper and place it on the front panel of CDU A just to the left of the power receptacle.

16. Wrap the remainder of the cut "A" label around the primary power cable for CDU A as close to the CDU (female) end as possible, as shown in Figure 9–1.

17. Remove another of the yellow "A" labels in the kit from its backing paper and wrap it around the other (male) end of the primary power cable of CDU A, as shown in Figure 9–1.

18. Cut off one letter "B" from one of the yellow "B" labels in the kit. Remove the cut label from its backing paper and place it on the front panel of CDU B just to the left of the power receptacle.

19. Locate the primary power cable for CDU B in the kit.

20. Wrap the remainder of the cut "B" label around the primary power cable for CDU B as close to the CDU (female) end as possible, as shown in Figure 9–1.

21. Remove another of the yellow "B" labels in the kit from its backing paper and wrap it around the other end of the primary power cable of CDU B, as shown in Figure 9–1.

22. Install the primary power cable for CDU B into the cabinet, as shown in Figure 9–1. Follow the same routing and use the same cable ties or clamps as the existing primary power cable.

23. Plug the CDU B primary power cable into the receptacle on the front panel of CDU B, as shown in Figure 9–1.

24. Remove one of the two yellow "CAUTION" labels from its backing paper and place it on the left side of the rear air separation panel.

25. Remove the second yellow "CAUTION" label from its backing paper and place it on the left side of the front air separation panel.

26. Make sure that the redundant dc power supply required for the dual power option is installed in each shelf. (The redundant dc power supply is the right-hand one.)

27. Plug the gray power cord preinstalled next to each shelf position into the redundant dc power supply in each shelf.

28. If the cabinet's host computer interface cables were disconnected in step 7, reconnect the cables.

29. Replace the cabinet side panels and reposition the cabinet next to adjacent ones as appropriate.

30. Reconnect the primary power cable from CDU A to its source.

31. Connect the primary power cable from CDU B to the auxiliary power source.

32. Switch the circuit breakers on both CDUs to the | (ON) position.

33. Close and secure the cabinet doors.

34. Restart all disk and tape drives and check them for proper function.

StorageWorks Glossary

ac distribution

The method of distributing ac power in a cabinet.

ac power supply

A power supply designed to produce dc power from an ac input.

adapter

A device that converts the protocol and hardware interface of one bus type into that of another without changing the functionality of the bus. *See* **signal converter**.

American National Standards Institute

See **ANSI**.

ANSI

American National Standards Institute. An organization that develops and publishes electronic and mechanical standards.

array controller

A hardware/software device that facilitates communications between a host and one or more devices organized in an array. HS-family controllers are examples of array controllers.

BA350–M*x* controller shelf

The StorageWorks controller shelf used for HS-family controller modules, cache modules, and shelf power units.

BA350–S*x* SBB shelf

A StorageWorks shelf used for only power units and SBBs.

bad block

A disk drive data block containing a physical defect.

bad block replacement

See **BBR**.

battery backup unit

See **BBU**.

BBR

Bad block replacement. The substitution of defect-free disk blocks for those found to have defects.

BBU

Battery backup unit. Extends power availability after the loss of primary ac power or a power supply to protect against the corruption or loss of data.

block

A stream of data transferred as a unit. (Used interchangeably with the term **sector** for disk drives.)

blower

An airflow device mounted in a StorageWorks shelf.

cable distribution unit

See **CDU**.

carrier

A standard, StorageWorks shelf-compatible, plastic shell into which a device can be installed. Sometimes called SBB carrier.

CDU

Cable distribution unit. The power entry device for StorageWorks cabinets. The unit provides the connections necessary to distribute ac power to cabinet shelves and fans.

channel

The RAID Array 110 subsystem term for a SCSI bus.

CI bus

Computer Interconnect bus. Uses two serial paths, each with a transfer rate of 70 Mb/s (8.75 MB/s).

CLI

Command line interpreter. Operator command line interface for the HS-family controller firmware.

cold swap

A method of device replacement that requires that power be removed from all shelves in a cabinet. This method is used when conditions preclude the use of the warm swap or hot swap methods.

command line interpreter

See **CLI**.

controller

A hardware/software device that facilitates communications between a host and one or more devices. A controller translates bus protocols and hardware interfaces and adds functionality to the host/device communications.

controller shelf

A StorageWorks shelf designed to contain controller and cache memory modules.

DAT

Digital Audio Tape. A format for recording digital data on a cartridge tape.

data center cabinet

A generic reference to the large cabinets, such as the SW800 series, in which StorageWorks components can be mounted.

deskside expansion unit

A pedestal enclosure designed to house one or two StorageWorks shelves in a vertical position.

Diagnostics and Utilities Protocol

See **DUP**.

digital audio tape

See **DAT**.

DIGITAL Storage Architecture

See **DSA**.

DIGITAL Storage System Interconnect

See **DSSI**.

DILX

Disk inline exerciser. Diagnostic firmware used to test the data transfer capabilities of disk drives in a way that simulates a high level of user activity.

Disk Inline Exerciser

See **DILX**.

DSA

DIGITAL Stoage Architecture. A set of specifications and interfaces describing standards for designing mass storage products. DSA defines the functions performed by host computers, controllers, and drives. It also specifies how they interact to accomplish mass storage management.

DSSI

Digital Storage System Interconnect. A Digital-specific data bus with an 8-bit data transfer rate of 4 to 5 MB/s.

dual cabinet power configuration

A cabinet ac power configuration in which two ac sources and two ac power supplies are used to provide redundant dc power to each of the cabinet's SBB shelves.

dual shelf power configuration

A cabinet ac power configuration in which one ac source and two ac power supplies are used to provide redundant dc power to each of the cabinet's SBB shelves.

dual universal asynchronous receiver transmitter

See **DUART**.

dual-redundant configuration

A controller configuration consisting of a primary and backup controller in one controller shelf . If the primary controller fails, the backup controller assumes control over the failing controller's devices.

DUART

Dual Universal Asynchronous Receiver Transmitter. An integrated circuit containing two serial, asynchronous transceiver circuits.

DUP

Diagnostic and Utility Protocol. Host application software that allows a host operator terminal to connect to the controller's command line interpreter. *See also* **virtual terminal**.

ECC

Error correction code. One or more cyclic redundancy check (CRC) words that allow detection of a mismatch between transmitted and received data in a communications system, or between stored and retrieved data in a storage system. The ECC allows for location and correction of an error in the received/retrieved data. All ECCs have limited correction power.

EDC

Error detection code. One or more checksum words that allow detection of a mismatch between transmitted and received data in a communications system, or between stored and retrieved data in a storage system. The EDC has no data correction capability.

electromagnetic interference

See **EMI**.

electrostatic discharge

See **ESD**.

EMI

Electromagnetic interference. The impairment of a signal by an electromagnetic disturbance.

error correction code

See **ECC**.

error detection code

See **EDC**.

ESD

Electrostatic discharge. The discharge of a potentially harmful static electric voltage as a result of improper grounding.

failover

Failover is the process that takes place when one controller in a dual-redundant configuration fails, and the other controller takes over the direction of the storage subsystem. The other controller continues to direct the storage subsystem until the failed controller becomes operational or is replaced.

fan

An airflow device mounted in a StorageWorks cabinet.

fast, differential SCSI

See **FD SCSI**.

fast, wide, differential SCSI

See **FWD SCSI**.

FD SCSI

Fast, differential SCSI. The differential SCSI bus with an 8-bit data transfer rate of 10 MB/s.

See also **FWD SCSI** and **SCSI**.

field replaceable unit

See **FRU**.

filler panel

A sheet metal or plastic panel used to cover unused mounting areas in StorageWorks cabinets and shelves.

FRU

field replaceable unit. A hardware component that can be replaced in the field.

full-height device

A single device that occupies an entire 5.25 inch SBB carrier. StorageWorks full-height devices have an order number suffix of "–VA."

FWD SCSI

Fast, wide, differential SCSI. The differential SCSI bus with a 16-bit data transfer rate of up to 20 MB/s.

See also **FD SCSI** and **SCSI**.

half-height device

A device that occupies half of a 5.25 inch SBB carrier. Two half-height devices can be mounted in a 5.25 inch SBB carrier. The first half-height device is normally mounted in the lower part of the carrier. The second device is normally mounted in the upper part of the carrier.

HBVS

Host-Based Volume Shadowing. Also known as Phase 2 Volume Shadowing.

Hierarchical Storage Controller

See **HSC**.

Hierarchical Storage Operating Firmware

See **HSOF**.

HIS

Host Interconnect Services. The firmware that communicates with the host in HS-family controllers.

host

The primary or controlling computer to which a storage subsystem is attached.

Host Interconnect Services

See **HIS**.

Host-Based Volume Shadowing

See **HBVS**.

hot swap

A method of device replacement whereby the complete system remains on line and active during device removal and reinstallation. The device being removed or reinstalled is the only device that cannot perform operations during this process.

HSC

Hierarchical Storage Controller. An intelligent mass storage server used on the CI bus. Capable of supporting a total of eight disk and/or tape data channels, the HSC is part of the System Interconnect Architecture and Digital Storage Architecture. By performing as an I/O manager, the HSC can be classified as an I/O server, removing the burden of I/O management from the CPU.

HSOF

Hierarchical Storage Operating Firmware. HS-family controller firmware is contained on a removable ROM card.

KILL line

The controller-to-controller disable signal used in a dual-redundant configuration.

least recently used

See **LRU**.

logical units

A group of devices addressable as a virtual unit.

LRU

Least recently used. The block replacement algorithm for the read cache.

maintenance terminal

The operator terminal used to identify an HS-family controller, to enable its host paths, to define its subsystem configuration, and to check its status. The HS-family maintenance terminal interface is designed to accept any terminal conforming to EIA–423. The maintenance terminal is only required to configure a storage subsystem and is not required for normal operations.

nonredundant

A configuration in which there is no backup hardware in place for the hardware that is present.

nonvolatile

See **NV**.

NV

Nonvolatile. A term used to describe memory, the contents of which survive loss of power.

OCP

Operator control panel. The control/indicator panel associated with a device. The OCP is usually mounted on the device and is accessible to the operator.

operator control panel

See **OCP**.

port

The hardware and software used to connect a host controller to a communication bus, such as a CI, SCSI, or SDI bus.

qualified device

A device that has been fully tested in all appropriate StorageWorks hardware and software configurations, and is in complete compliance with Digital and country-specific standards,for example, FCC and TÜV.

quiesce

To make a bus inactive or dormant. The operator must quiesce SCSI bus operations, for example, during a device warm swap.

radio frequency interference

See **RFI**.

RAID

Redundant array of independent disks. A set of storage techniques devised to increase the performance and availability of a storage subsystem.

read cache

A block of high-speed memory used by a controller to buffer data being read from storage devices by a host. A read cache increases the controller's effective device access speed by satisfying host read requests from its local cache memory when possible, instead of from external storage devices. The controller maintains in the cache copies of data recently requested by the host, and may fetch blocks of data ahead in anticipation that the controller will access the next sequential blocks. In a normal read cache, host write requests are handled as usual, without involving the caching mechanism. *See also* **write through cache**.

Redundant Array of Independent Disks

See **RAID**.

RFI

Radio frequency interference. The impairment of a signal by an unwanted radio signal or radio disturbance.

SBB

StorageWorks building block. A device housed in a standard StorageWorks SBB carrier. An SBB has a standard physical and electrical interface that is compatible with those of StorageWorks shelves and enclosures.

SBB shelf

StorageWorks building block shelf. A StorageWorks shelf, such as the BA350–S*x*, designed to house plug-in SBB modules.

SCS

System Communication Services. A delivery protocol for packets of information (commands or data) to or from the host.

SCSI

Small Computer System Interface. An ANSI interface defining the physical and electrical parameters of a parallel I/O bus used to connect hosts to a maximum of seven devices. The StorageWorks device interface is implemented according to the SCSI–2 standard, allowing the synchronous transfer of 8-bit data at rates of up to 10 MB/s.

shelf brackets

Sheet metal components designed to attach and position StorageWorks shelves in their associated enclosures.

signal converter

A device that converts the protocol and hardware interface of one bus type into that of another without changing the functionality of the bus. *See* **adapter**.

single cabinet power configuration

A cabinet ac power configuration in which only one ac source and one ac power supply is used to supply dc power to the cabinet's SBB shelves.

skirt

A trim panel designed to mount around the base of the cabinet.

Small Computer System Interface

See **SCSI**.

storage sets

A grouping of disk drives that make up a new distinct container.

StorageWorks

Digital's family of modular data storage products that allows customers to design and configure their own storage subsystems. Components include power, packaging, cabling, devices, controllers, and software. Customers can integrate devices and array controllers in StorageWorks enclosures to form storage subsystems.

StorageWorks building block

See **SBB**.

stripesets

In a RAID configuration, a virtual disk drive with its physical data spread across multiple physical disks. Stripeset configurations do not include a data recovery mechanism.

supported device

A device tested as functionally compatible with an approved StorageWorks hardware and software configuration.

System Communications Services

See **SCS**.

Tape Inline Exerciser

See **TILX**.

TILX

Tape Inline Exerciser. Diagnostic firmware used to test the data transfer capabilities of tape drives in a way that simulates a high level of user activity.

VAXcluster System Console

See **VCS**.

VCS

VAXcluster System Console. This terminal allows access to hosts (by networks). Another method of accessing the controller. *See also* **DUP**.

virtual terminal

A software path from an operator terminal on the host to the controller's CLI interface. The path can be established via the host port on the controller (using DUP) or via the maintenance port through an intermediary host (VCS). A virtual terminal is also sometimes called a host console.

warm swap

A controller function that allows devices to be added, removed, or replaced while the subsystem remains operational. All activity on the device's SCSI bus must normally be halted for the duration of the warm swap operation.

write through cache

A technique for handling host write requests in read caches. When the host requests a write operation, the cache writes data directly to the external storage device and updates the cache memory to ensure that the memory does not contain obsolete data. This technique increases the chances that future host read requests can be filled from the cache. The host sees the write operation as complete only after the external storage device has been updated. *See also* **read cache**.

write-back cache

A cache configuration that increases the performance of host write requests. When the host requests a write operation, the cache writes the host's data first to the cache memory, completing the host's request quickly. It performs the slower operation of flushing the data to the external storage device at a later time. The host sees the write operation as complete when the data has reached the cache.

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