

StorageWorks™ Solutions

SW800-Series Data Center Cabinet Installation and User's Guide

Order Number: EK–SW800–IG. D01

This manual describes the concepts and procedures necessary to install, configure, and use StorageWorks SW800-series data center cabinets. Mechanical cabinet configuration and power configuration are covered in this manual. The configuration and connection of SCSI-2 buses is covered in referenced StorageWorks documentation.

June 1994

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Preface

This document presents the concepts and procedures necessary to install, configure, and use **StorageWorks™ SW800-series data center cabinets**. Mechanical cabinet configuration and power configuration is covered in this manual. The configuration and connection of SCSI-2 signal buses is covered in referenced StorageWorks documentation.

Intended Audience

This manual is intended for use by customers and Digital™ Services engineers responsible for installing, configuring, and using StorageWorks SW800-series data center 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 SW800-series cabinet storage subsystem.
Chapter 2	Provides an overview of the SW800-series data center 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 SW800-series data center cabinets.
Chapter 5	Describes the configuration of SW800-series storage-only cabinets.
Chapter 6	Describes the configuration of SW800 controller /storage cabinets.
Chapter 7	Describes the mounting of StorageWorks shelves within SW800-series data center cabinets.
Chapter 8	Describes the installation of TZ8x7-series tape drives within SW800-series data center cabinets.
Chapter 9	Describes the configuration of power within SW800-series data center 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	
<i>StorageWorks Solutions Configuration Guide</i>	EK-BA350-CG
<i>StorageWorks Solutions Shelf and SBB User's Guide</i>	EK-BA350-UG
StorageWorks RAID Array 110 Subsystem	
<i>DEC RAID Utilities User's Guide</i>	EK-DECRA-UG
<i>HSZ10-AA Controller Site Preparation Guide</i>	EK-HSZ10-IN
<i>StorageWorks Expansion Storage Pedestal User's Guide</i>	EK-SMCPA-UG
<i>StorageWorks RAID Array 110 Subsystem User's Guide</i>	EK-SM2CA-UG
<i>StorageWorks RAID Array 110 Utility for MS-DOS User's Guide</i>	AA-Q0N5A-TE
<i>StorageWorks RAID Array 110 Utility for Novell NetWare User's Guide</i>	AA-Q0N4A-TE
<i>StorageWorks RAID Array 110 Utility for SCO UNIX User's Guide</i>	AA-Q0N6A-TE
StorageWorks Array Controller 140-Series	
<i>StorageWorks Array Controller HS Family of Array Controllers User's Guide</i>	EK-HSFAM-UG
<i>StorageWorks BA350-MA Controller Shelf User's Guide</i>	EK-350MA-UG
DECraid+ Rackmount Storage Subsystem and HSC Intelligent I/O Servers	
<i>HSC Controller User's Guide</i>	AA-PFSQA-TK
<i>HSC Controller Installation Manual</i>	EK-HSCMN-IN

(continued on next page)

Table 1 (Cont.) StorageWorks Related Documentation

Document Title	Order Number
StorageWorks Enclosures	
<i>BA35X-VA Vertical Mounting Kit User's Guide</i>	EK-350SV-UG
<i>InfoServer 1000 Installation and Owner's Guide</i>	EK-INFLC-OM
<i>StorageWorks Solutions Desktop Expansion Unit User's Guide</i>	EK-BA353-UG
<i>StorageWorks Solutions SW500 and SW800 Cabinet Metric Shelf Bracket Kit Installation Guide</i>	EK-35XRD-IG
<i>StorageWorks Solutions HSR95-Series Cabinet Metric Shelf Bracket Kit Installation Guide</i>	EK-35XRD-IG
<i>StorageWorks RETMA Shelf Rail Kit Installation Guide</i>	EK-35XRB-IG
<i>StorageWorks Solutions SW500-Series Cabinet Installation and User's Guide</i>	EK-SW500-IG
<i>StorageWorks Solutions SW500-Series Cabinet Cable Distribution Unit Installation Guide</i>	EK-SW5CU-IG
<i>StorageWorks Solutions SW800-Series Data Center Cabinet Cable Distribution Unit Installation Guide</i>	EK-SWCDU-IS
<i>StorageWorks Solutions SW800-Series Data Center Cabinet Installation and User's Guide</i>	EK-SW800-IG
<i>Instructions for Installation of the Tape Bezel Kit on SF400 Series Cabinets‡</i>	EK-SFTBK-IS
Storage Devices	
<i>SCSI Signal Converter DWZZA-AA</i>	EK-DWZZA-SV
<i>SCSI Signal Converter DWZZA-MA</i>	EK-DWZZM-SV
<i>SCSI Signal Converter DWZZA-VA</i>	EK-DWZAA-SV
<i>StorageWorks Building Blocks User's Guide</i>	EK-SBB35-UG
<i>StorageWorks Solutions 3½-Inch Storage Device Installation Guide</i>	EK-MC350-IG
<i>StorageWorks Solutions 5¼-Inch Storage Device Installation Guide</i>	EK-MC525-IG
<i>TZ86-VA Cartridge Tape Drive Device Addresses</i>	EK-TZ86A-UG
<i>TZ87-VA Cartridge Tape Drive Device Addresses</i>	EK-TZ87A-DA
<i>StorageWorks Solutions TZ8x7-Series Tape Drive SCSI Bus Configuration and Installation Guide</i>	EK-TZ8X7-IG
General Reference Publications	
<i>Digital Systems and Options Catalog</i>	†
<i>Small Computer System Interface, An Overview</i>	EK-SCSIS-OV
<i>Small Computer System Interface, A Developer's Guide</i>	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.
<i>italic type</i>	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 SW800-series data center 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 environnement 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. SW800-series data center cabinets also are certified by the Canadian Standards Association and TUV Product Service GmbH and bear both the CSA certification and TUV GS marks.

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
SW800 with only cabinet fans operating	6.4	6.4	55.7	55.7
SW800 with 4 BA350–MA shelves and 18 BA350–SA shelves, each containing 6 RZ26–VA disk drives	6.8	6.9	58.9	59.9
Per device when installed in SW800				
BA350–SA shelf containing 6 RZ26–VA disk drives	5.7	5.7	39	39
BA350–MA shelf	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
SW800 with only cabinet fans operating	6.6	6.6	57.1	57.1
SW800 with 4 BA350–MA shelves and 18 BA350–SA shelves, each containing 6 RZ26–VA disk drives	6.7	7.0	57.9	60.2
Per device when installed in SW800				
BA350–SA shelf containing 6 RZ26–VA disk drives	5.8	5.8	46	46
BA350–MA shelf	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
SW800 nur mit kabinett Lüftern in Betrieb	6,4	6,4	55,7	55,7
SW800 mit 4 BA350–MA shelves und 18 BA350–SA shelves, jedes bestückt mit 6 RZ26–VA disk drives	6,8	6,9	58,9	59,9
Pro Gerät installiert im SW800				
BA350–SA shelf mit 6 RZ26–VA disk drives	5,7	5,7	39	39
BA350–MA shelf	5,6	5,6	39	39
Gerät†	Schalleistungspegel $L_{WAd}, B‡$		Schalldruckpegel L_{pAm}, dBA (Bediener Position)	
	Leerlauf	Betrieb	Leerlauf	Betrieb
SW800 nur mit kabinett Lüftern in Betrieb	6,6	6,6	57,1	57,1
SW800 mit 4 BA350–MA shelves und 18 BA350–SA shelves, jedes bestückt mit 6 RZ26–VA disk drives	6,7	7,0	57,9	60,2
Pro Gerät installiert im SW800				
BA350–SA shelf mit 6 RZ26–VA disk drives	5,8	5,8	46	46
BA350–MA shelf	5,7	5,7	46	46
† Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich.				
‡ 1 B = 10 dBA.				

How to Use This Manual

This chapter shows you how to use the information in this manual to configure an SW800-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 SW800-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 SW800-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 SW800 Storage-Only Cabinets	To lay out storage-only cabinets
	Chapter 6, Configuring SW800 Controller/Storage Cabinets	To lay out cabinets containing both controllers and storage
Component installation		
StorageWorks shelves	Chapter 7, Installing StorageWorks Shelves	
TZ8x7 tape drives	Chapter 8, Installing TZ8x7-Series Tape Drives	
Power cabling routing and installation	Chapter 5, Configuring SW800 Storage-Only Cabinets	For storage-only cabinets
	Chapter 6, Configuring SW800 Controller/Storage Cabinets	For cabinets containing both controllers and storage
SCSI bus design and connection†	<i>StorageWorks Solutions Family Configuration Guide</i> <i>StorageWorks Solutions Shelf and SBB User's Guide</i>	For BA350–Sx storage shelves
	<i>StorageWorks Array Controller HS Family of Array Controllers User's Guide</i> <i>StorageWorks BA350–MA Controller Shelf User's Guide</i>	For BA350–Mx controller/storage shelves
	<i>StorageWorks Solutions TZ8x7-Series Tape Drive SCSI Bus Configuration and Installation Guide</i>	For TZ8x7-series tape drives
SCSI bus cable routing	Chapter 5, Configuring SW800 Storage-Only Cabinets	Routing for storage-only cabinets
	Chapter 6, Configuring SW800 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.

This chapter presents an overview, a description of major components, and a discussion of power options for StorageWorks SW800-series data center cabinets.

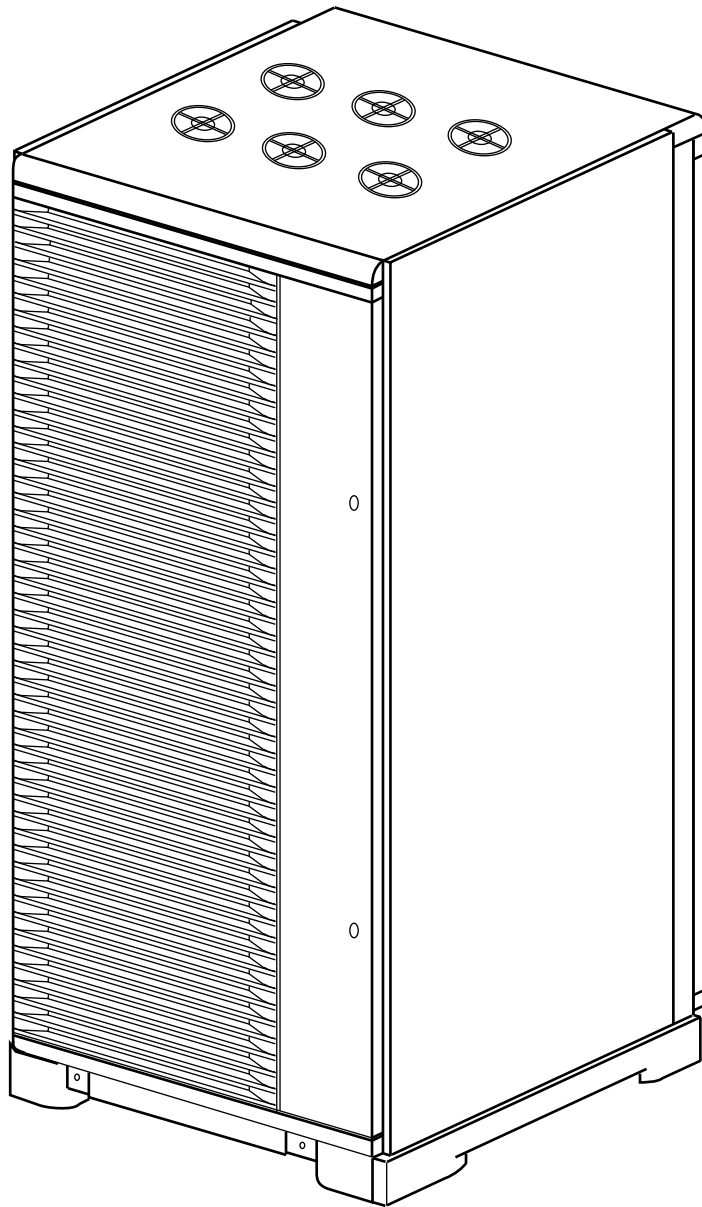
2.1 Overview

The SW800-series data center cabinet, shown in Figure 2–1, is a member of Digital’s StorageWorks family of modular enclosures. The 800 mm-wide cabinet provides an attractive enclosure with rackmount space and primary power for up to 24 StorageWorks shelves of different types. It can accommodate both data storage and controller/data storage combinations. The cabinet and its StorageWorks shelves can be configured with dual ac power capability for power redundancy.

SW800-series data center cabinets offer a versatile, modular solution to array storage problems. 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 SW800-series data center cabinets are shown in Table 2–1.

Figure 2–1 SW800-Series Data Center Cabinet



CXO-3784A-MC

Table 2–1 SW800-Series Data Center Cabinet Specifications

Characteristic	Specification
Dimensions (nominal)	170.00 cm (66.93 in) height, 80.00 cm (31.50 in) width, 87.25 cm (34.35 in) depth
Weight	
Minimum configuration	265 kg (585 lb)
Maximum configuration	535 kg (1180 lb)
Agency compliance	FCC, UL, IEC, CSA, TUV, and VDE
Electrical rating	
SW800–AA	120/208 volts, 50/60 Hz, 3 phase Y, 24 amperes per phase
SW800–AB	380–415 volts, 50/60 Hz, 3 phase Y, 16 amperes per phase
Temperature	+10°C to +40°C (+50°F to +104°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
Nominal airflow through enclosure	480 cubic ft/minute
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

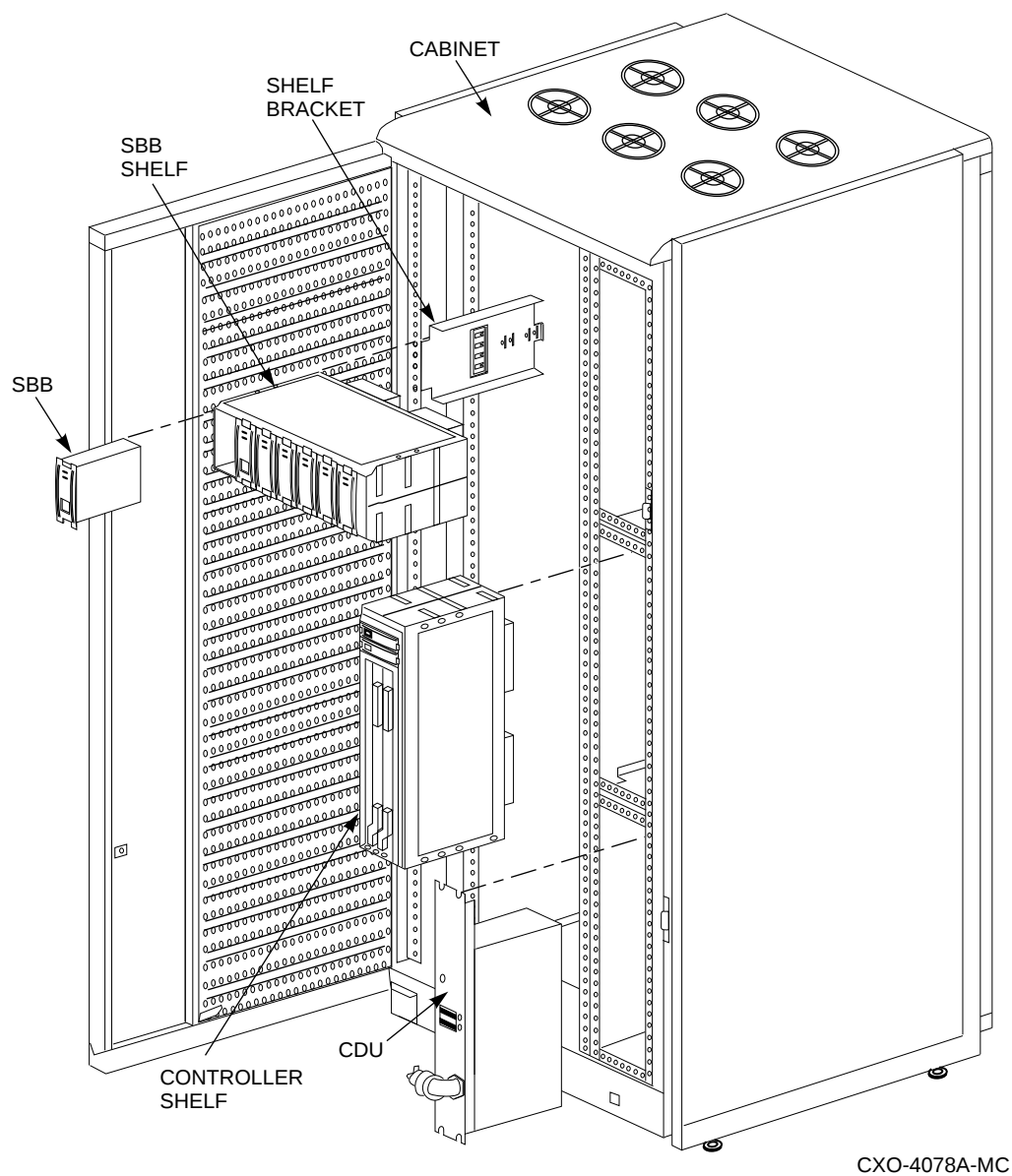
The major components of the SW800-series data center cabinet are shown in Figures 2–2 and 2–3 and are as follows:

- **Cabinet**—The cabinet is a general-purpose enclosure that provides rackmount 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 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 appearance.

The cabinet provides 20 horizontal and 4 vertical shelf positions. Storage or controller shelves may generally be installed in any of the shelf positions, although some limitations may be imposed by cable length restrictions. The lower vertical shelf positions in the front and rear of the cabinet are each reserved for power **cable distribution unit (CDU)** installation and cable routing.

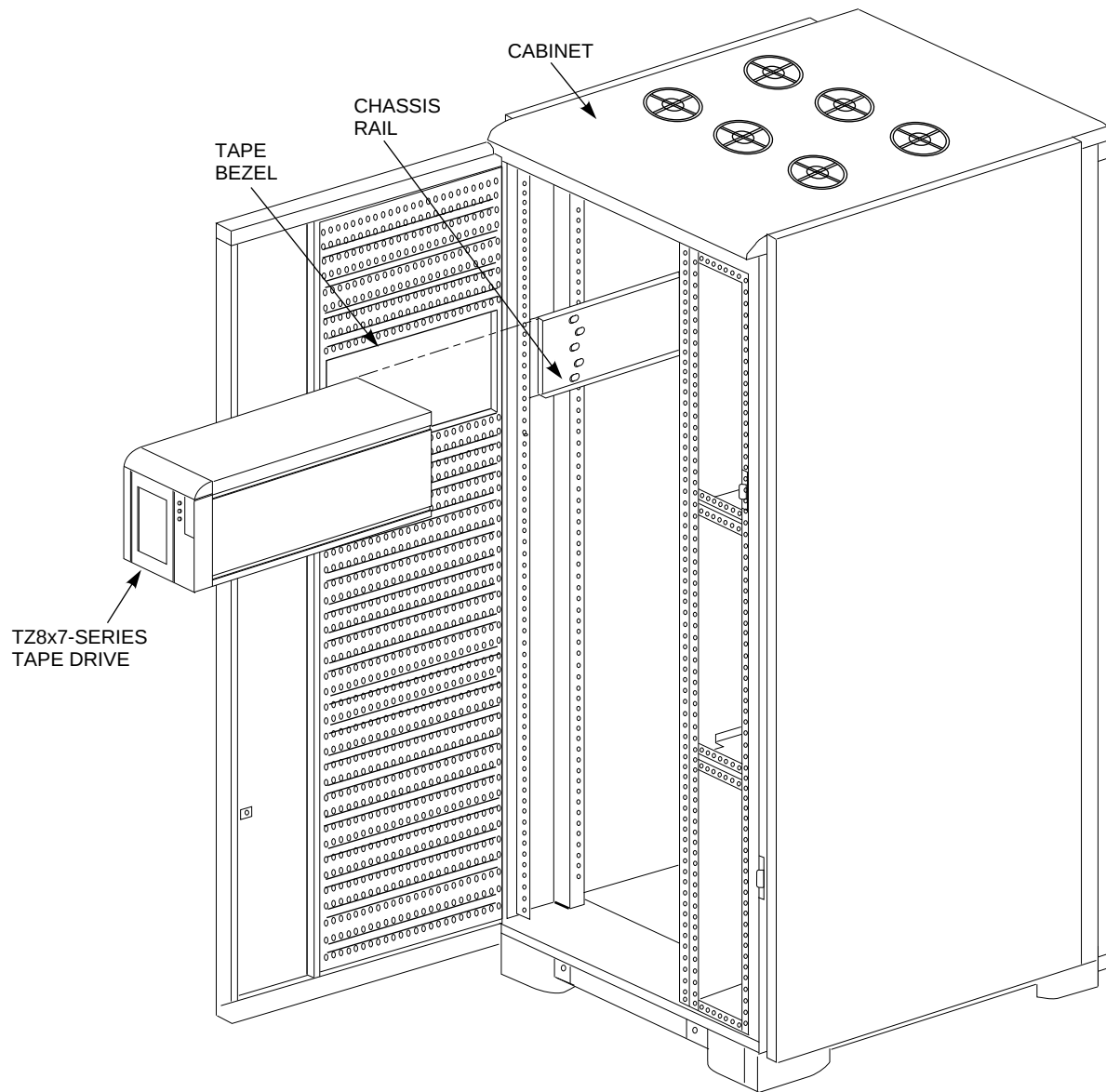
- **Shelf brackets**—Movable **shelf brackets** within the cabinet can be configured to hold any of the StorageWorks shelf types. Shelf brackets must be procured separately from the cabinet or may come packaged with cabinet options.
- **SBB shelves**—**StorageWorks building block (SBB) shelves** are 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 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 (BBUs), 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 the 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.
- **CDUs**—Cable distribution units (CDUs) provide the connections necessary to distribute ac power to the shelves and fans within the SW800 data center 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. One CDU can be installed in the lower vertical opening in each side of the cabinet.

Figure 2-2 Cabinet Major Components



- **TZ8x7-Series Tape Drives**—Up to four TZ8x7-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 TZ8x7-Series Tape Drive



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2.3 Power Configurations

The ac power distribution within the SW800-series data center cabinet can be configured in one of the following three ways to provide the desired level of power redundancy to the shelf-mounted peripheral devices:

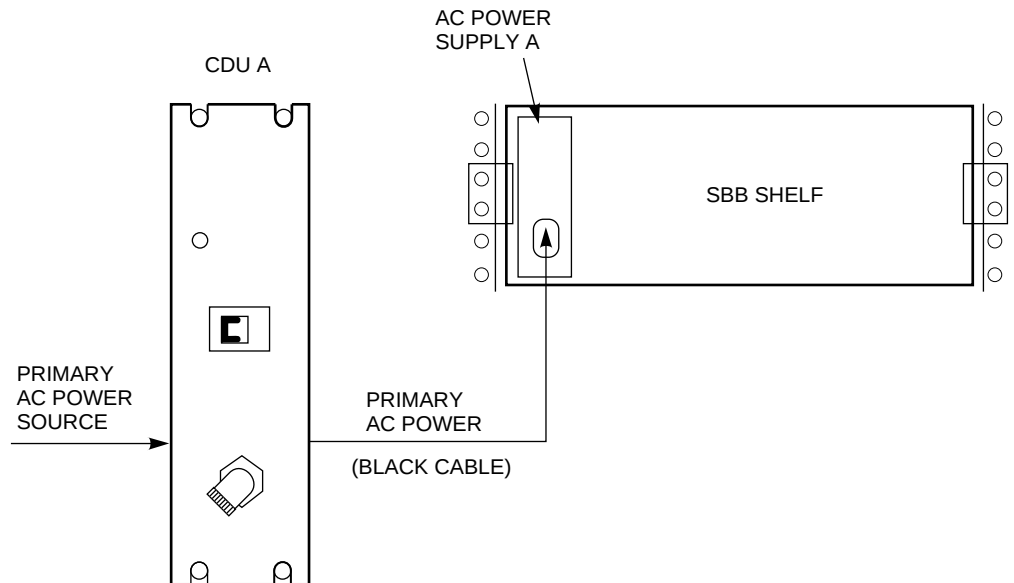
- **Single-cabinet power configuration**
- **Dual-shelf power configuration**
- **Dual-cabinet power configuration**

A description of each configuration option follows.

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

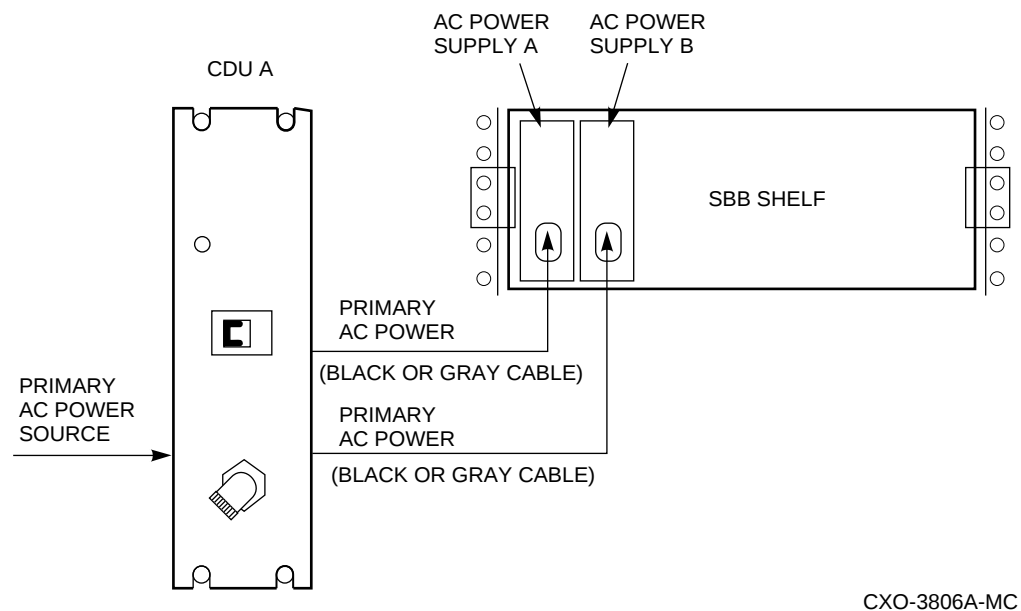


CXO-3783A-MC

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. Up to 12 shelves can be configured with dual shelf power from one CDU. An additional CDU, powered also from the primary AC power source, can be installed to accommodate up to 24 shelves with this power configuration.

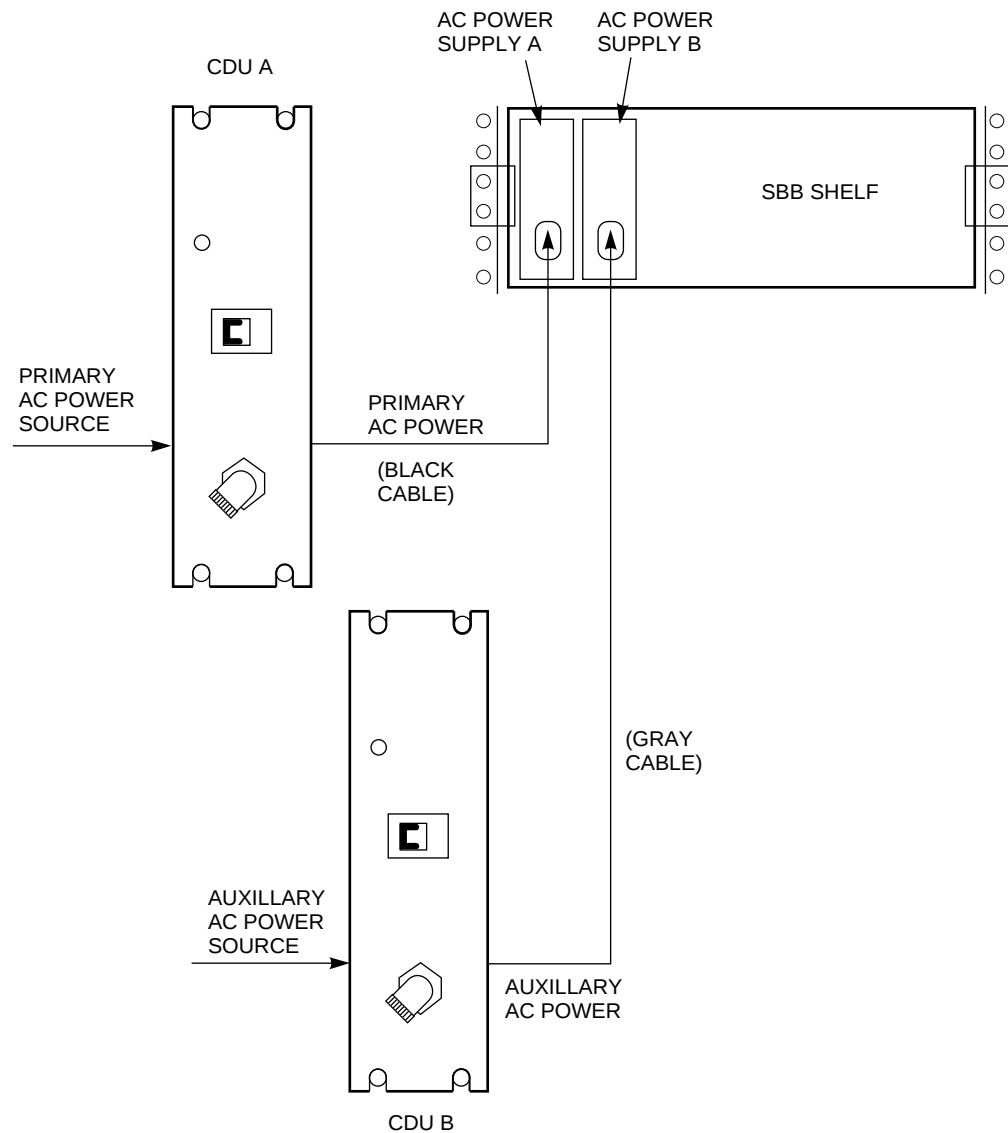
Figure 2–5 Dual-Shelf Power Configuration



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. Up to 24 shelves can be configured in this manner.

Figure 2–6 Dual-Cabinet Power Configuration



CXO-3782A-MC

2.4 Cabinet Cooling System

The SW800-series data center cabinet contains airflow devices in both the shelves and the cabinet itself. Each StorageWorks shelf contains two rear-mounted **blowers** that move heat from the shelf into the cabinet interior. Six **fans** in the top of the cabinet draw air up through the center of the enclosure to blow the interior heat out through the top. Logic signals allow the status of the shelf blowers to be monitored by the host system.

The cabinet fans are powered in two groups of three fans each. For single-CDU systems, both sets of fans are powered from the single CDU. To ensure a level of cooling redundancy in dual-CDU systems, each CDU powers a separate set of three fans.

Filler panels are flat plates that serve as covers for unused shelf positions.

Site Preparation

This chapter presents the information necessary to prepare a site for the installation of the StorageWorks SW800-series data center cabinet.

3.1 General Considerations

SW800-series data center 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 plug(s) provided with the cabinet. Figure 3–1 specifies the cabinet primary power plugs supplied for both 60 and 50 Hz power.

Figure 3–1 CDU Primary Power Plugs

PLUGS GOING TO WALL OUTLET (FROM CONTROLLER)

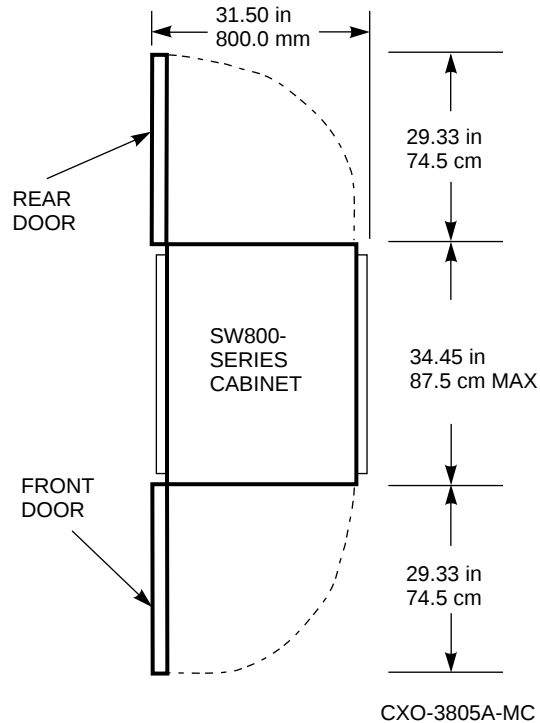
120/208V AC 60HZ 30A 3-PHASE WYE		5-WIRE NEMA NO. L21-30P
220-240/380-415V AC 50HZ 20A OR 16A 3-PHASE WYE		5-WIRE, 4-POLE, IEC 309

CXO-3807A

- 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. SW800-series data center cabinets are not designed to be fastened to adjacent cabinets. See Figure 3–2 for specific space requirements.

Figure 3–2 Minimum Installation Clearances



- 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

SW800-series data center 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.

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.

Make sure that site power distribution systems meet local electrical codes prior to the installation of SW800-series data center 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 cords 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 SW800 data center cabinet UL or 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 safety and reliable SW800-series data center cabinet operation.

Unpacking and Installation

This chapter describes the unpacking, installation, inspection, and powering of StorageWorks SW800-series data center cabinets.

4.1 Unpacking the Cabinet

SW800-series data center 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 Digital 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.

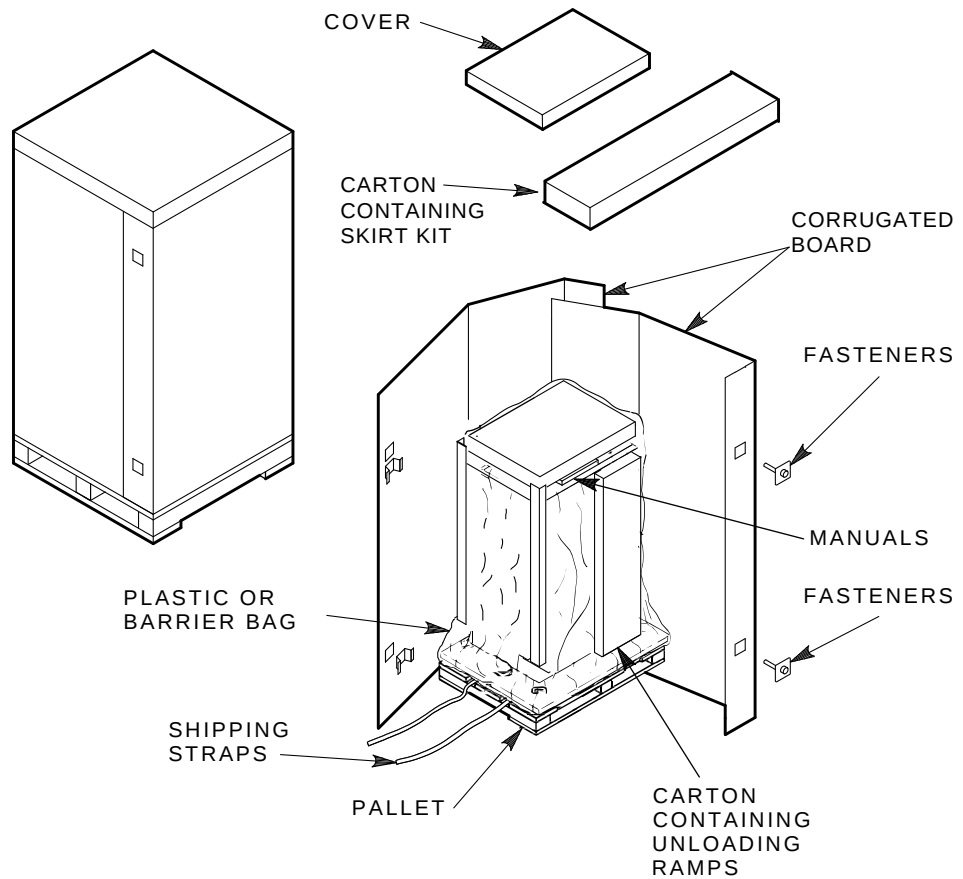
1. Remove the cover, the fasteners, and the corrugated board from the pallet.
2. Remove the cartons containing the ramp set and skirt kit and set them aside.
3. Cut the shipping straps. Some cabinets are packaged in a plastic or barrier bag. If the cabinet arrives in a plastic bag, leave the bag in place 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



CXO-3533A-TI

4.2 Removing the Cabinet from the Pallet

This section describes how to remove the cabinet from the pallet and level it.

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

1. Remove any packing material remaining on the pallet.

WARNING

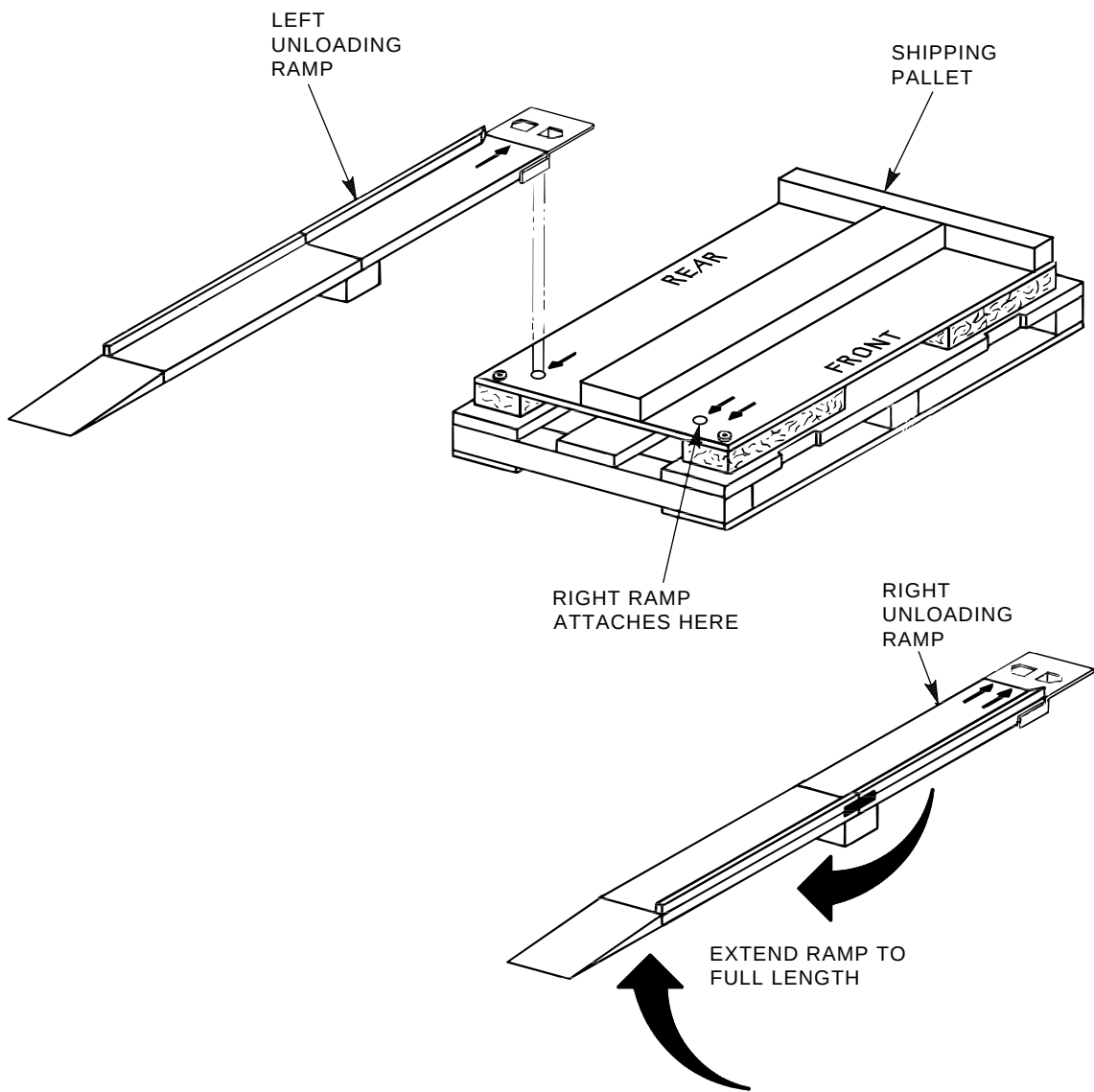
Serious personal injury may result if correct safety precautions are not taken during the unpacking procedure. All personnel should wear safety glasses. The ramps, ramp side rails, and metal hardware should be inspected for the following defects:

- 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.)

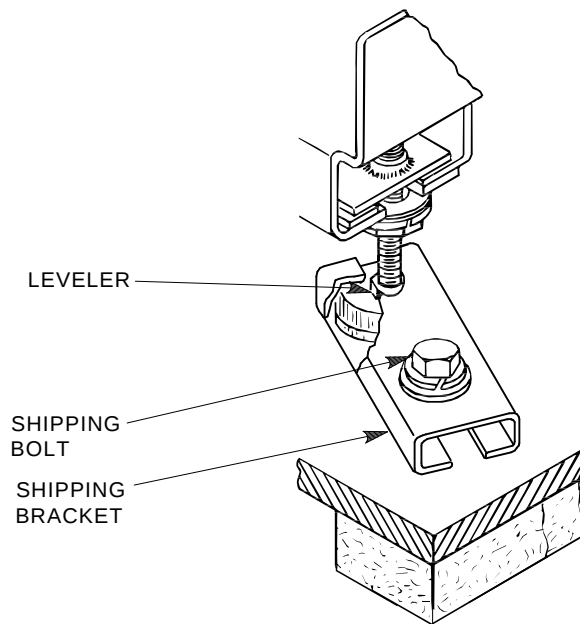
2. Remove the two unloading ramps from the carton and inspect them.
3. Attach the ramps by fitting the metal prongs into the holes on the pallet, as shown in Figure 4-2. Make sure that the arrows on the ramps match up with the arrows on the pallet.
4. Extend the ramps to their full length.
5. See Figure 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 aside.

Figure 4-2 Shipping Pallet Ramp Installation



CXO-688D_S

Figure 4-3 Shipping Bolts and Brackets



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 the cabinet tipping off the pallet or ramp.

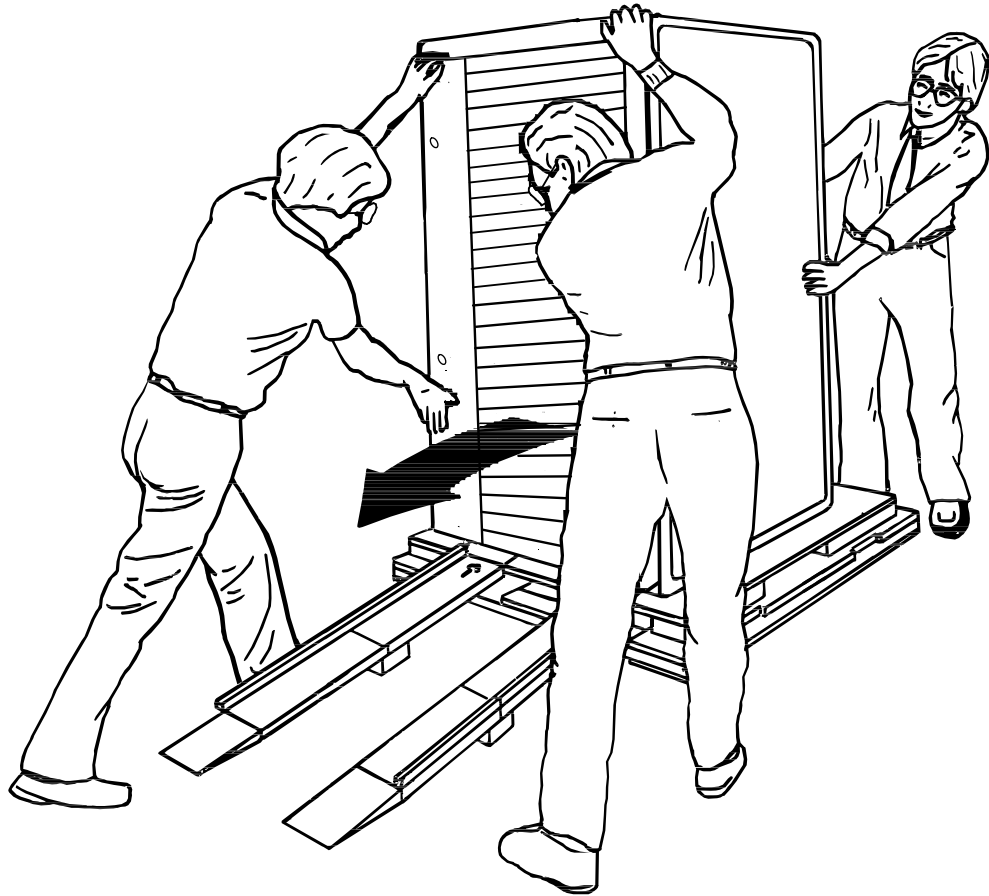
7. Loosen the leveler locking nuts and screw the four cabinet levelers all the way up into the cabinet.

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 in your cabinet. See Chapter 7 for 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.

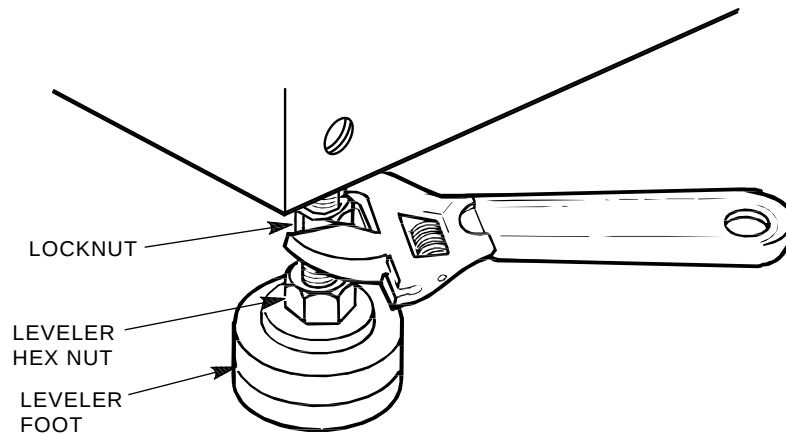
Once the cabinet rack space is configured as desired, the cabinet may be rolled to its final installation position. Secure loose cabinet cables up and out of the way when rolling the cabinet.

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



CXO-3829A

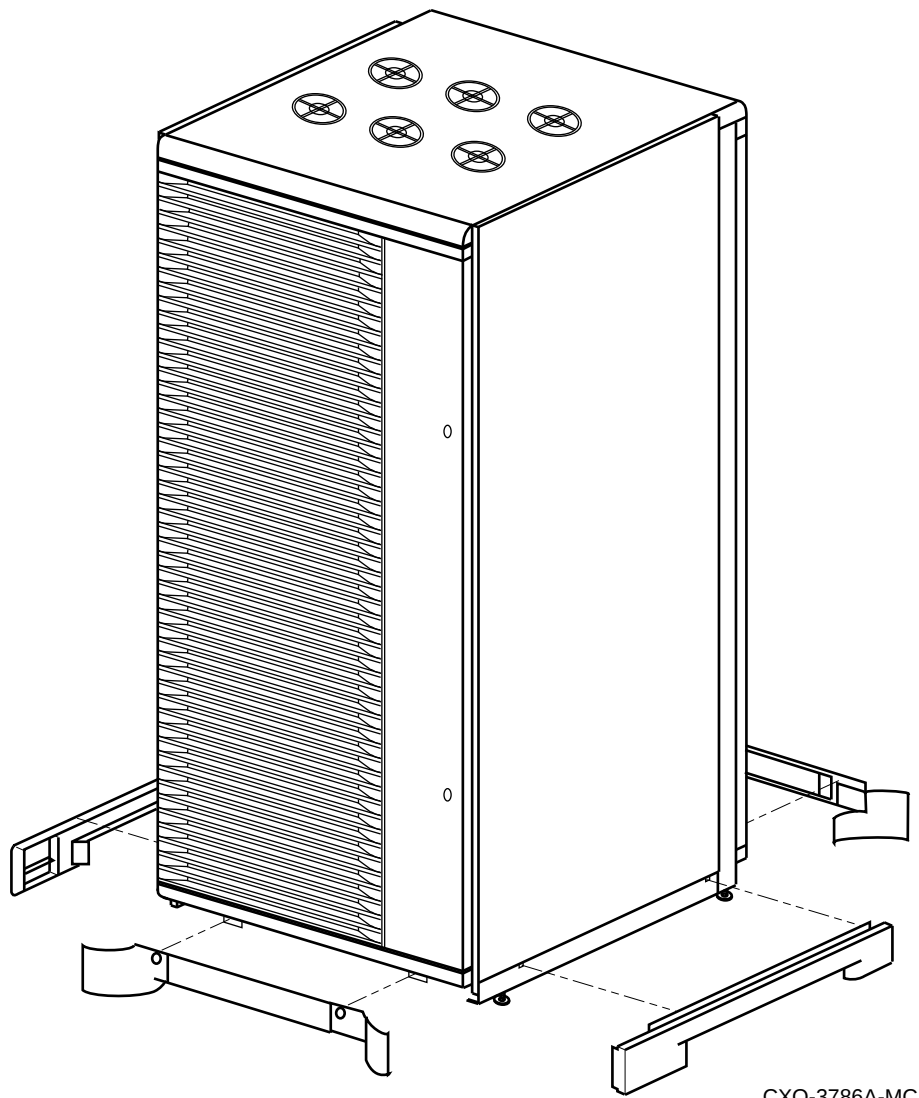
4.6 Installing the Skirt Kit

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



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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. Check each of the cabinet fans to make sure that the blades turn freely and are not obstructed. (The top cover may need to be removed to check the fans.)
4. 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.)

5. 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.
6. 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.
7. Make sure that all signal cables internal to the cabinet are firmly seated in their connectors at both ends.
8. Make sure that all SBBs are seated firmly in their shelves.
9. Make sure that any necessary external interface cables are installed and firmly seated in their connectors.
10. 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 cabinet fans and shelf blowers are operating and that both status indicators on each shelf power supply SBB are illuminated. Refer to the *StorageWorks Solutions Shelf and SBB User's Guide* for further information on shelf status indicators.
4. 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.

Configuring SW800 Storage-Only Cabinets

This chapter describes the layout and configuration of the SW800 storage-only data center cabinet. This storage subsystem uses only the StorageWorks BA350–Sx shelf type. The Small Computer Systems Interface 2 (SCSI–2) interface is used as the communications path between the cabinet's storage devices and their external controllers. SW800 storage-only cabinets can be configured with up to 24 storage shelves and up to four TZ8x7 tape drives.

WARNING

While working in the cabinet interior, ac power must be removed from cabinet components. Failure to do so may result in personnel 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 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.

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

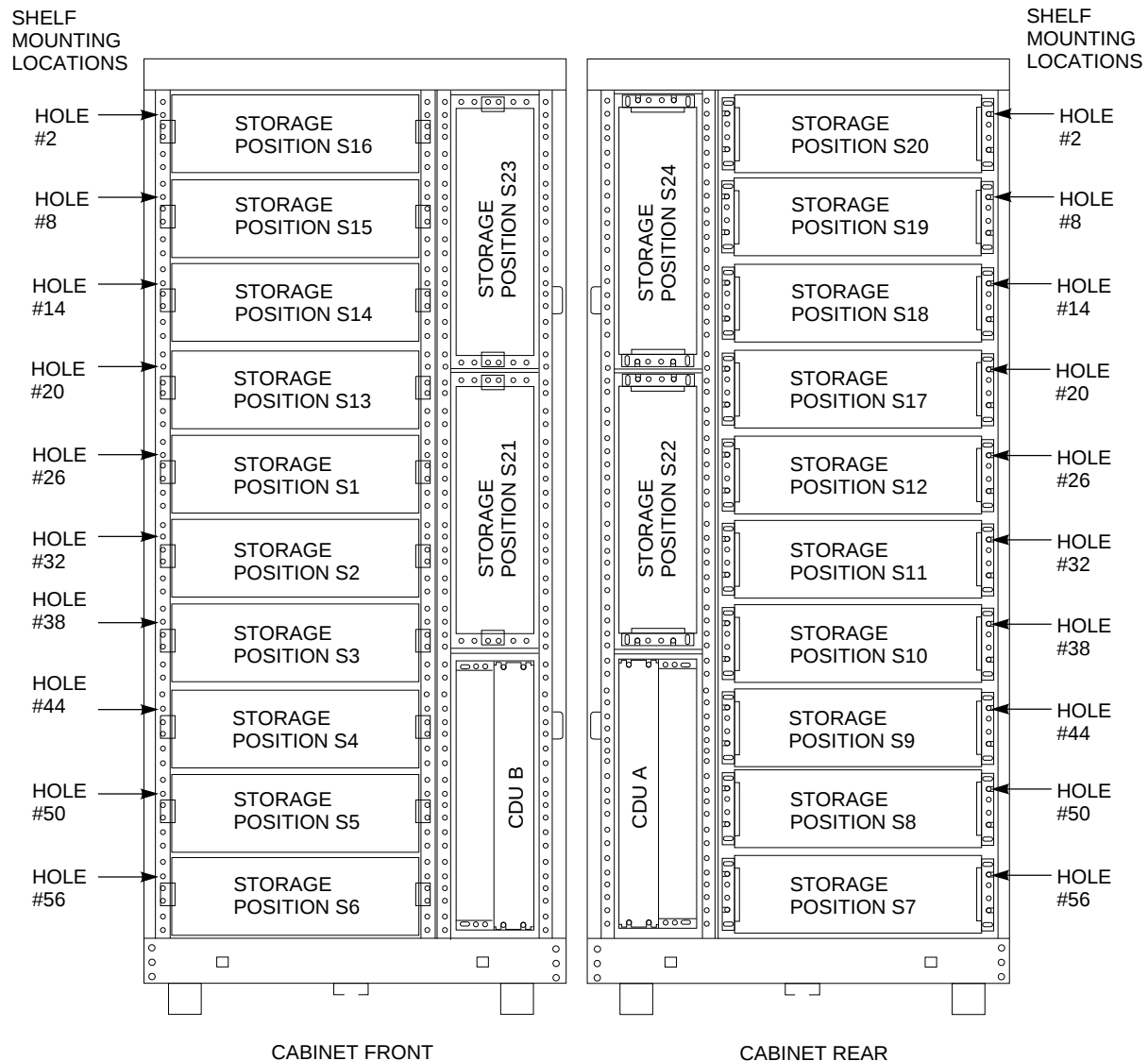
To maintain FCC compliance and proper cooling, filler panels must be installed as specified for your particular cabinet configuration. See Section 5.2 for further information.

The order of installation of shelves in SW800 storage-only cabinets is predetermined to allow for cooling, cabinet loading and cable length factors. Figures 5–1, 5–2, and 5–3 show the layout of both the front and rear of the cabinet. To ensure proper cooling and to prevent cabinet instability, shelves must be installed in the order shown by the position numbers in the illustration.

5.1.1 Shelf Locations Without Tape Drives

Figure 5–1 shows the proper cabinet rail mounting holes for each shelf location when TZ8x7-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 SW800 Storage-Only Cabinet Shelf Locations Without Tape Drives



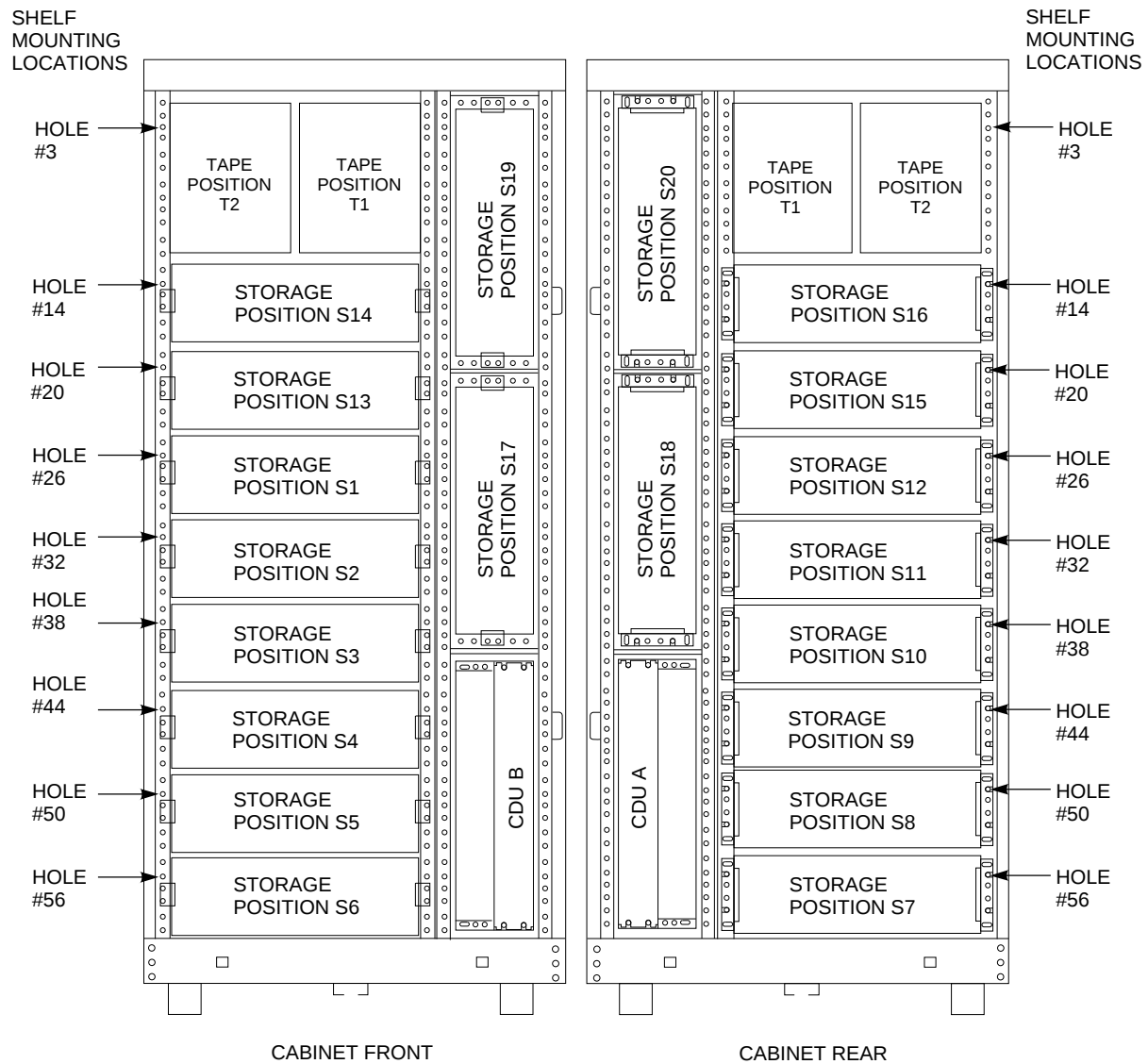
CXO-3811E-MC

5.1.2 TZ8x7-Series Tape Drive/Shelf Locations

Figures 5–2 and 5–3 show the proper cabinet rail mounting holes for each shelf and tape location when TZ8x7-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 TZ8x7-series tape drives.

Note that the TZ8x7-series tape drive extends completely through the SW800 storage-only cabinet, and that four drives utilize the upper four shelf mounting positions in the front and the rear.

Figure 5–2 SW800 Storage-Only Cabinet Shelf Locations With Two Tape Drives



CXO-4219C-MC

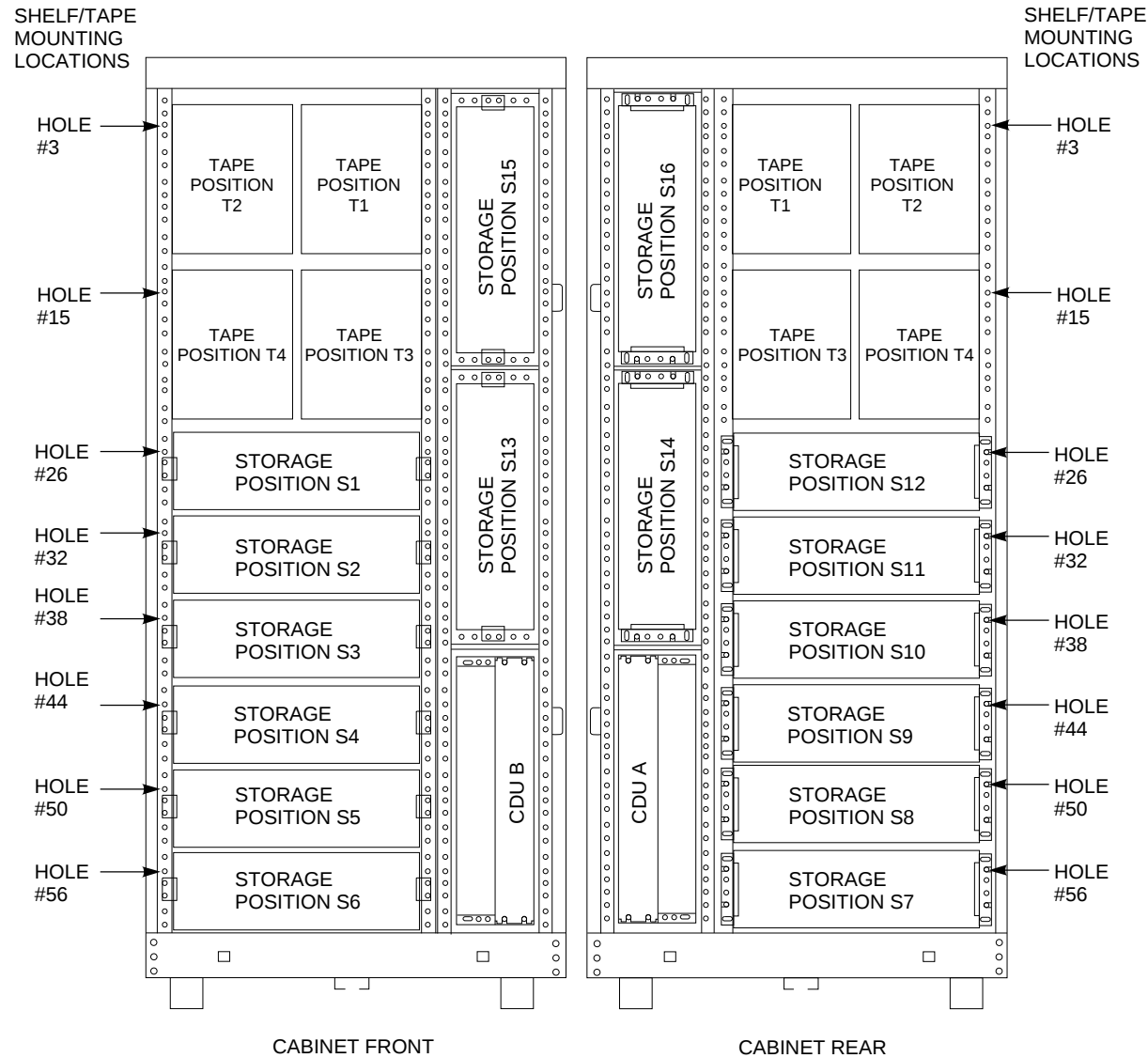
5.2 Filler Panels

Note

To maintain FCC/VDE compliance and proper cooling, filler panels must be installed as specified for your particular cabinet configuration.

Filler panels can be installed in empty shelf positions for cosmetics and to control electromagnetic emissions. Filler panels are normally supplied and installed based on the specific configuration of the SW800 storage-only cabinet ordered. See Chapter 7 for details on the installation of filler panels.

Figure 5-3 SW800 Storage-Only Cabinet Shelf Locations With Four Tape Drives



CXO-3920E-MC

5.3 Power Configuration and Power Cable Routing

The power in SW800 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. Figures 5-1 and 5-3 show the locations of both the primary and redundant CDUs.

Table 5-1 specifies the power cable length required for each shelf position in SW800 storage-only cabinets.

Table 5–1 SW800 Storage-Only Cabinet Power Cable Lengths

Storage Shelf Position	Cable Length Required
S1/S11	2.13 m (7.00 ft)
S2/S10	2.13 m (7.00 ft)
S3/S9	2.13 m (7.00 ft)
S4/S8	2.13 m (7.00 ft)
S5/S7	1.52 m (5.00 ft)
S6/S12	1.52 m (5.00 ft)
S13/S17	2.74 m (9.00 ft)
S14/S18	2.74 m (9.00 ft)
S15/S19	2.74 m (9.00 ft)
S16/S20	2.74 m (9.00 ft)
S21/S23	2.13 m (7.00 ft)
S22/S24	2.13 m (7.00 ft)
T1–T4	2.74 m (9.00 ft)

Power cables in the front of the cabinet are normally routed along the inside of the left-most vertical cabinet rail. Power cables in the rear of the cabinet are normally routed along the outside of the center vertical rail. (See Figure 5–4).

5.4 Signal Cabling and Routing

Note

Cables must be routed as described in this section to maintain FCC/VDE compliance of SW800 storage-only cabinets

Signal cabling in the SW800 storage-only cabinet consists of host-to-shelf SCSI–2 cabling and intershell SCSI–2 cabling.

5.4.1 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 documentation for details on the selection of SCSI–2 cables and their connection to the cabinet's controller and storage shelves:

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

5.4.2 Host-to-Shelf SCSI–2 Cable Routing

Host SCSI–2 signal cables enter SW800 storage-only cabinets through openings in the rear edges of the base pan of the cabinet. Host cables destined for rear shelves are normally routed along the base pan to the right-most vertical rail. They are then routed to the the right-hand side of the destination shelf along the rail. Host cables destined for front shelves pass to the front of the cabinet through the openings next to the CDUs. On the front of the cabinet, host cables are normally routed to the center vertical cabinet rail and then to the right-hand side of the destination shelf along the rail.

5.4.3 Intershelf SCSI-2 Cable Routing

Inter-shelf SCSI-2 cables are routed along the vertical cabinet rail to the right of the shelves. Half-meter SCSI-2 cables are normally used to link shelves to each other.

5.5 General Cable Routing Rules

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

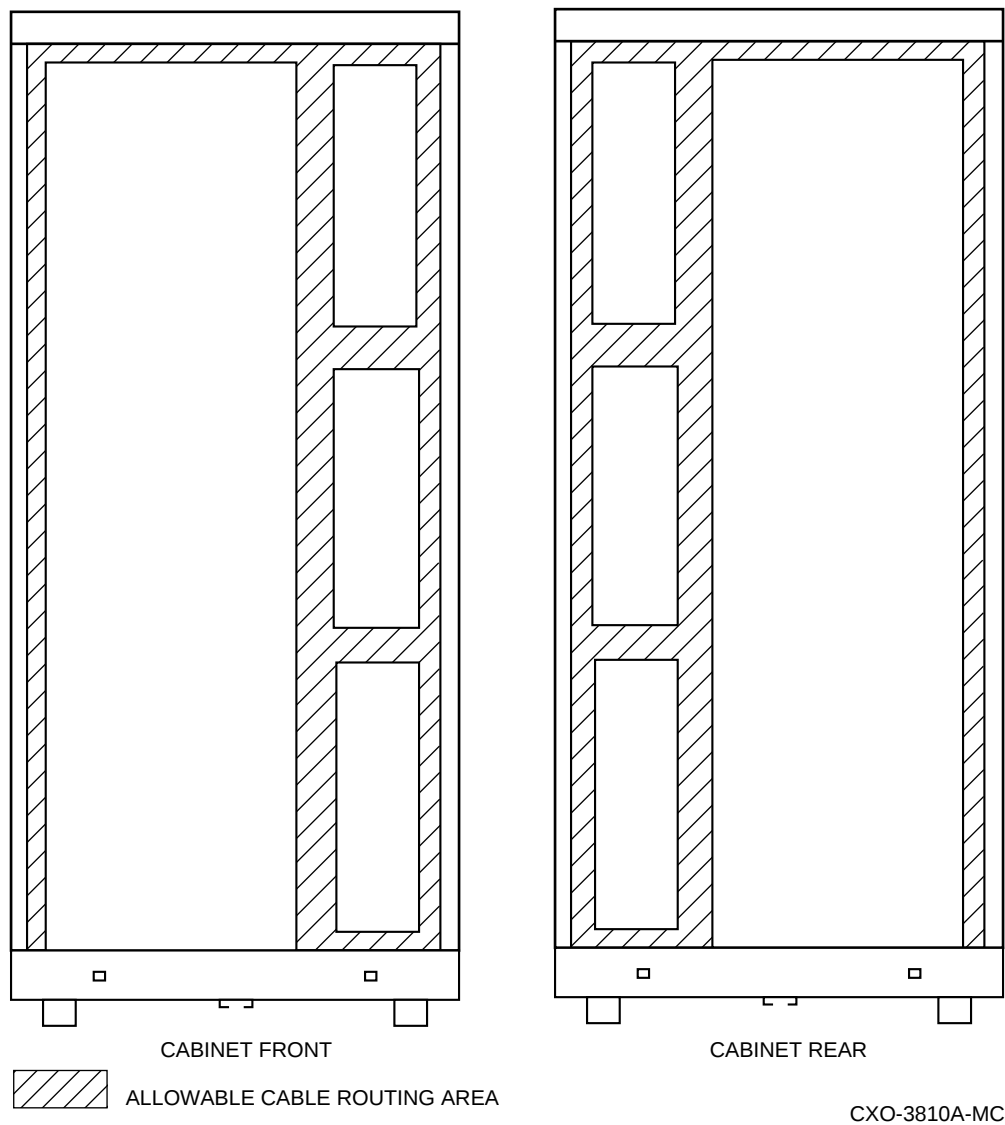
WARNING

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 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.

Figure 5-4 shows the cabinet areas in which cable routing is allowed.

Figure 5-4 SW800 Storage-Only Cabinet Cable Routing



Configuring SW800 Controller/Storage Cabinets

This chapter describes the layout and configuration of SW800 controller/storage data center cabinets. These cabinet configurations use StorageWorks HSJ40™ or HSZ40™ array controllers mounted in BA350-Mx shelves. Storage devices are housed in BA350-Sx shelves. SW800 controller/storage cabinets can be configured with up to eight controllers in redundant pairs, up to eighteen storage shelves, and up to four TZ8x7 tape drives.

6.1 HSJ40 and HSZ40 Controllers

The HSJ40 Controller uses Digital's **CI™** interface as the communication path with the **host** computer, and the Small Computer System Interface 2 (SCSI-2) as the storage device bus. Factory preconfigured cabinets using the HSJ40 controller are designated by the model number SW81x.

The HSZ40 controller uses the SCSI-2 interface as the communication path with the host computer, as well as for the storage device bus.

The configuration of HSJ40 and HSZ40 cabinets is almost identical. The only difference is the host interface cable used, and the fact that a StorageWorks DWZZA SCSI signal converter may be used with the HSZ40 controller. 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 HSJ40 and HSZ40 controllers and their installation.

6.2 Cabinet Configuration

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 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.

WARNING

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

The order of installation of shelves in SW800 controller/storage cabinets is predetermined to allow for cooling, cabinet loading and cable length factors. Figures 6–1, 6–2, and 6–3 show the layout of both the front and rear of the cabinet. To ensure proper cooling and to prevent cabinet instability, shelves must be installed in the order shown by the position numbers in the illustration.

Note that no more than 18 storage shelves may be installed in the controller/storage cabinet. Certain storage positions are reserved for passing cables from the front to the rear of the cabinet. Note also that each storage position is assigned to be cabled to a specific controller, as designated by the Cx number in each storage position.

6.2.1 Shelf Locations Without Tape Drives

Figure 6–1 shows the proper cabinet rail mounting holes for each shelf location when TZ8x7-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.

6.2.2 TZ8x7-Series Tape Drive/Shelf Locations

Figures 6–2 and 6–3 show the proper cabinet rail mounting holes for each shelf location when TZ8x7-series tape drives are 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 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 TZ8x7-series tape drives.

Note that the TZ8x7-series tape drive extends completely through the SW800 controller/storage cabinet, and that two drives utilize the upper two shelf mounting positions in the front and the rear.

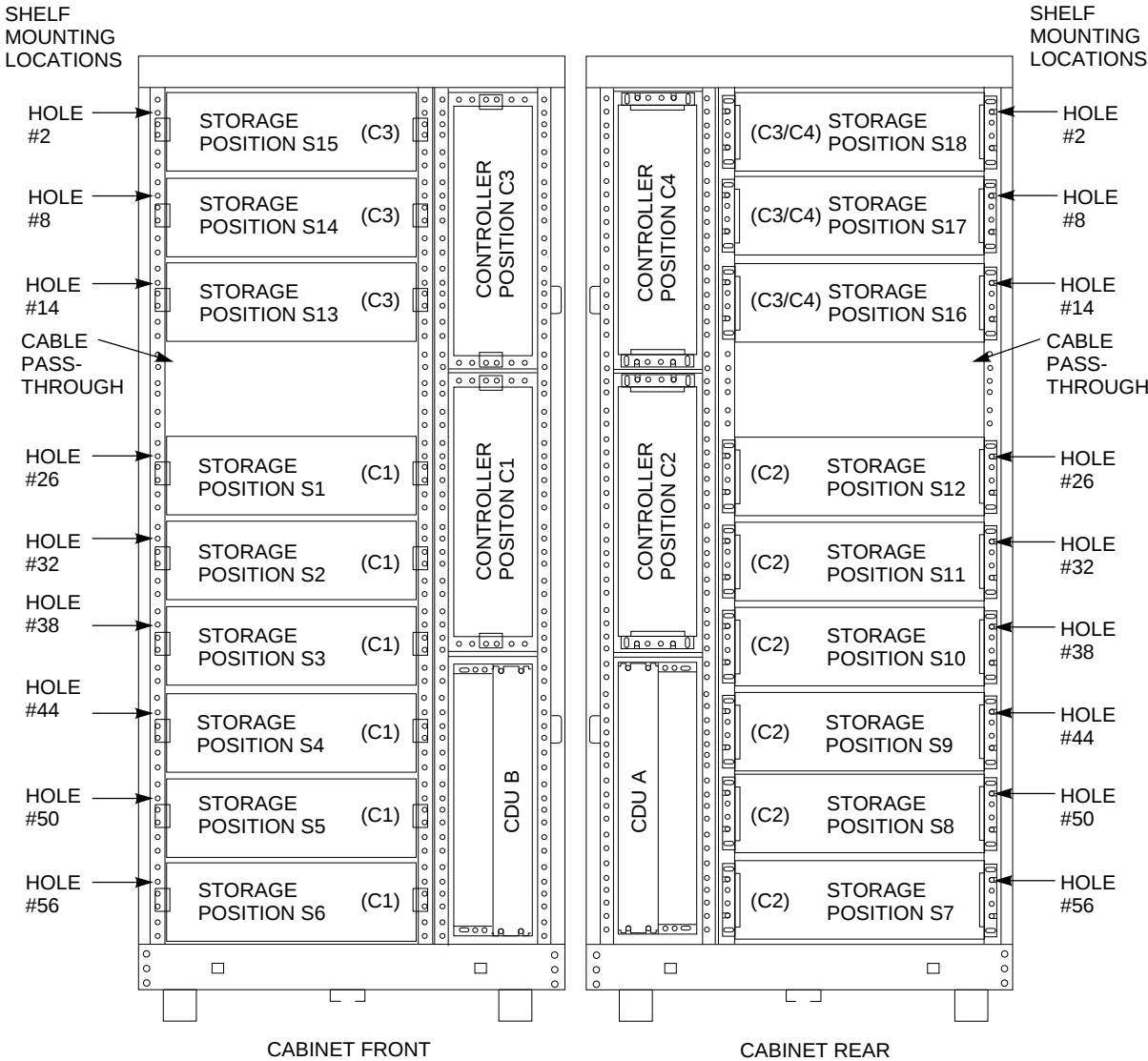
6.3 Filler Panels

Note

To maintain FCC/VDE compliance and proper cooling, filler panels must be installed as specified for your particular cabinet configuration.

Filler panels can be installed in unused shelf positions for cosmetics and to control electromagnetic emissions. Filler panels are normally supplied and installed based on the specific configuration of the SW800 controller/storage cabinet ordered. See Chapter 7 for details on the installation of filler panels.

Figure 6–1 SW800 Controller/Storage Cabinet Shelf Locations Without Tape Drives



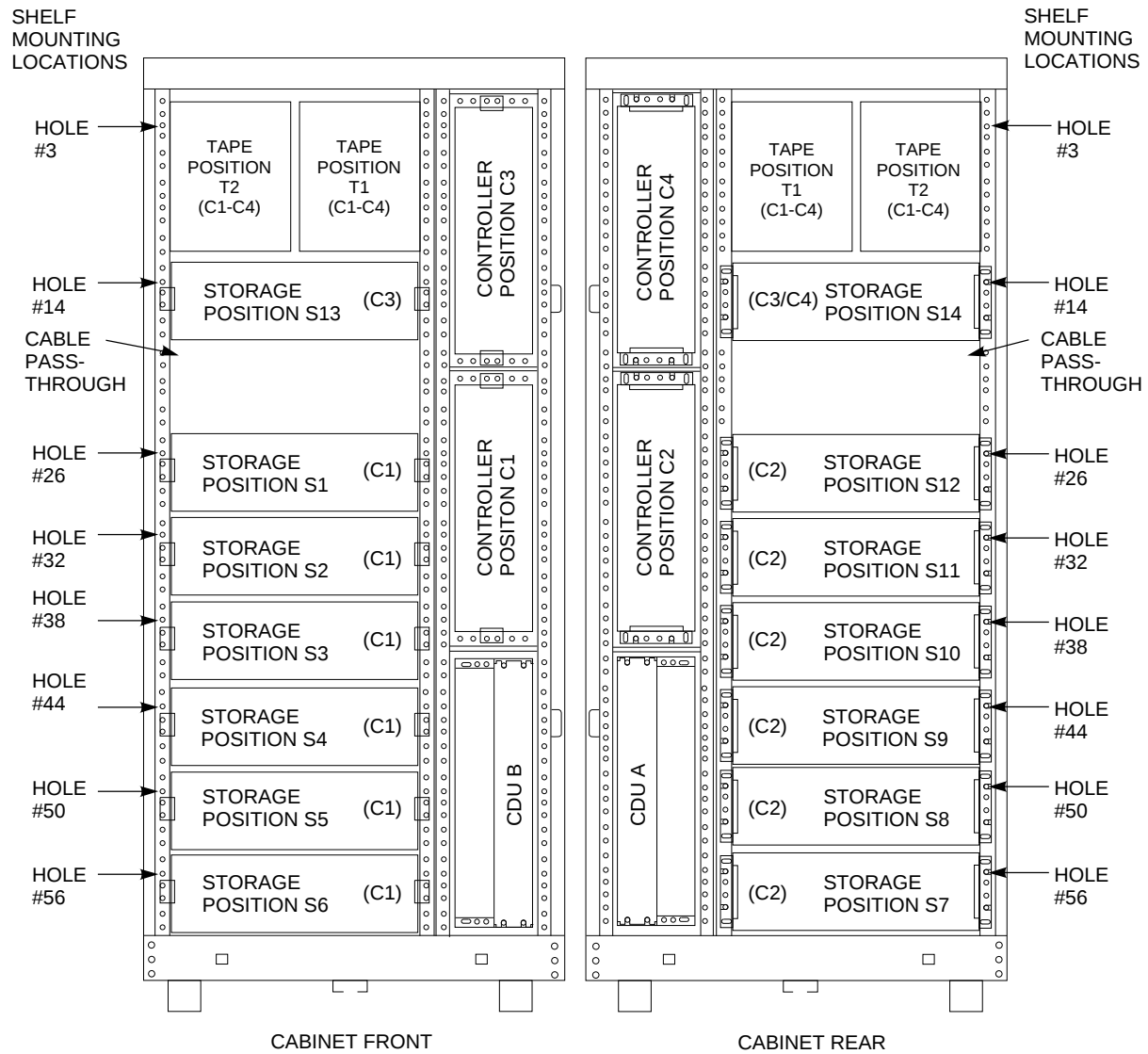
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6.4 Power Configuration and Power Cable Routing

The power in SW800 controller/storage cabinets can be configured in any of the forms described in Section 2.3. Refer to Chapter 9 for detailed procedures on configuring power within SW800 controller/storage cabinets. Figures 6–1, 6–2, and 6–3 show the locations of both the primary and redundant CDUs.

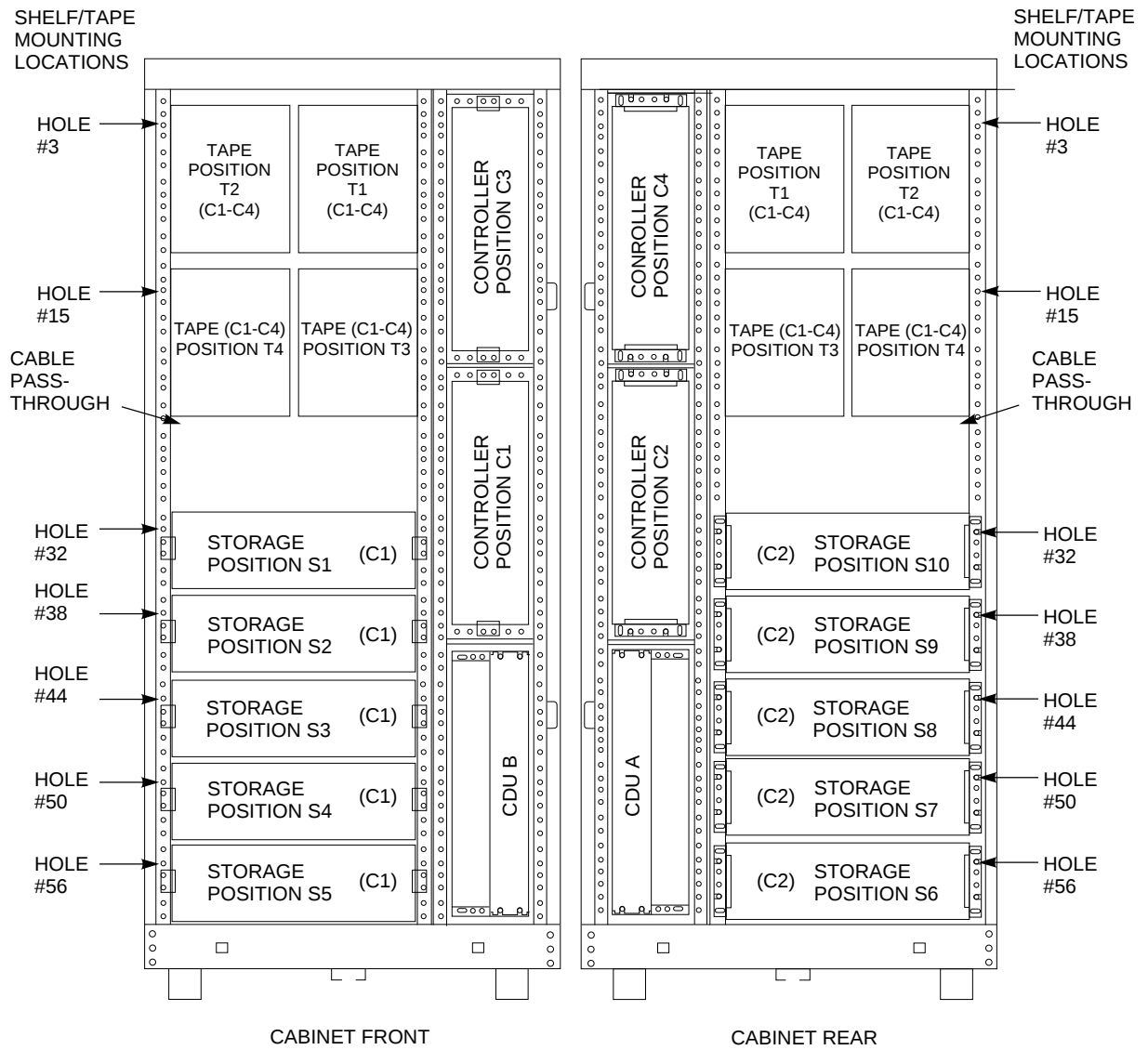
Table 6–1 specifies the power cable length required for each shelf and tape position in SW800 controller/storage cabinets.

Figure 6-2 SW800 Controller/Storage Cabinet Shelf Locations With Two Tape Drives Installed



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Figure 6-3 SW800 Controller/Storage Cabinet Shelf Locations With Four Tape Drives Installed



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Table 6–1 SW800 Controller/Storage Cabinet Power Cable Lengths

Storage Shelf Position	Cable Length Required
S1/S11	2.13 m (7.00 ft)
S2/S10	2.13 m (7.00 ft)
S3/S9	2.13 m (7.00 ft)
S4/S8	2.13 m (7.00 ft)
S5/S7	1.52 m (5.00 ft)
S6/S12	1.52 m (5.00 ft)
S13/S16	2.74 m (9.00 ft)
S14/S17	2.74 m (9.00 ft)
S15/S18	2.74 m (9.00 ft)
C1/C2	2.13 m (7.00 ft)
C3/C4	2.13 m (7.00 ft)
T1–T4	2.74 m (9.00 ft)

Power cables in the front of the cabinet are normally routed along the inside of the left-most vertical cabinet rail. Power cables in the rear of the cabinet are normally routed along the outside of the center vertical rail (see Figure 6–4).

6.5 Signal Cabling and Routing

Note

Cables must be routed as described in this section to maintain FCC/VDE compliance of SW800 controller/storage cabinets.

Signal cabling in the SW800 controller/storage cabinet consists of host-to-controller CI cabling, controller-to-shelf SCSI–2 cabling, and intershell SCSI–2 cabling.

6.5.1 Host-to-Controller Cable Routing

Host interface cables enter SW800 controller/storage cabinets through openings in the rear edges of the base pan of the cabinet.

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 SW800 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 interface cables destined for rear-mounted controllers are normally routed along the base pan to the left-most vertical cabinet rail and on to the appropriate controller along the rail.

Host interface cables destined for front-mounted controllers pass to the front of the cabinet through the openings next to the CDUs.

In the front of the cabinet, host interface cables are normally routed to the center vertical cabinet rail and on to the appropriate controller along the rail.

6.5.2 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 documentation for details on the selection of SCSI-2 cables and their connection to the cabinet's controller and storage shelves:

- *StorageWorks Solutions Family Configuration Guide*
- *StorageWorks Solutions Shelf and SBB User's Guide*
- *StorageWorks Array Controller HS Family of Array Controllers User's Guide*
- *StorageWorks BA350-MA Controller Shelf User's Guide*

6.5.3 Controller-to-Shelf SCSI-2 Cable Routing

Controller-to-shelf SCSI-2 cables are normally routed to the vertical cabinet rail between the controller and the shelves the controller serves.

When connecting front-mounted controllers with tapes or shelves mounted in the rear of the cabinet, pass the cables through the vacant storage positions indicated in Figures 6-1, 6-2, and 6-3.

Table 6-2 specifies the SCSI-2 cable length required to connect each controller position with its companion shelves in the SW800 controller/storage cabinets.

Table 6–2 SW800 Controller/Storage Cabinet SCSI–2 Cable Lengths

Controller Position	Storage Shelf/Tape Position	Cable Length Required
C1	S1–S6	1.00 m (3.28 ft)
C2	S7–S12	2.00 m (6.56 ft)
C3	S13–S15	1.00 m (3.28 ft)
C3	S16–S18	2.00 m (6.56 ft)
C4	S16–S18	2.00 m (6.56 ft)
C1–C4	T1–T4	2.00 m (6.56 ft)

6.5.4 Intershelf Cable Routing

Intershelf SCSI–2 cables are routed along the vertical cabinet rail to the right of the shelves. Half-meter SCSI–2 cables are normally used to link shelves to each other.

6.6 General Cable Routing Rules

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

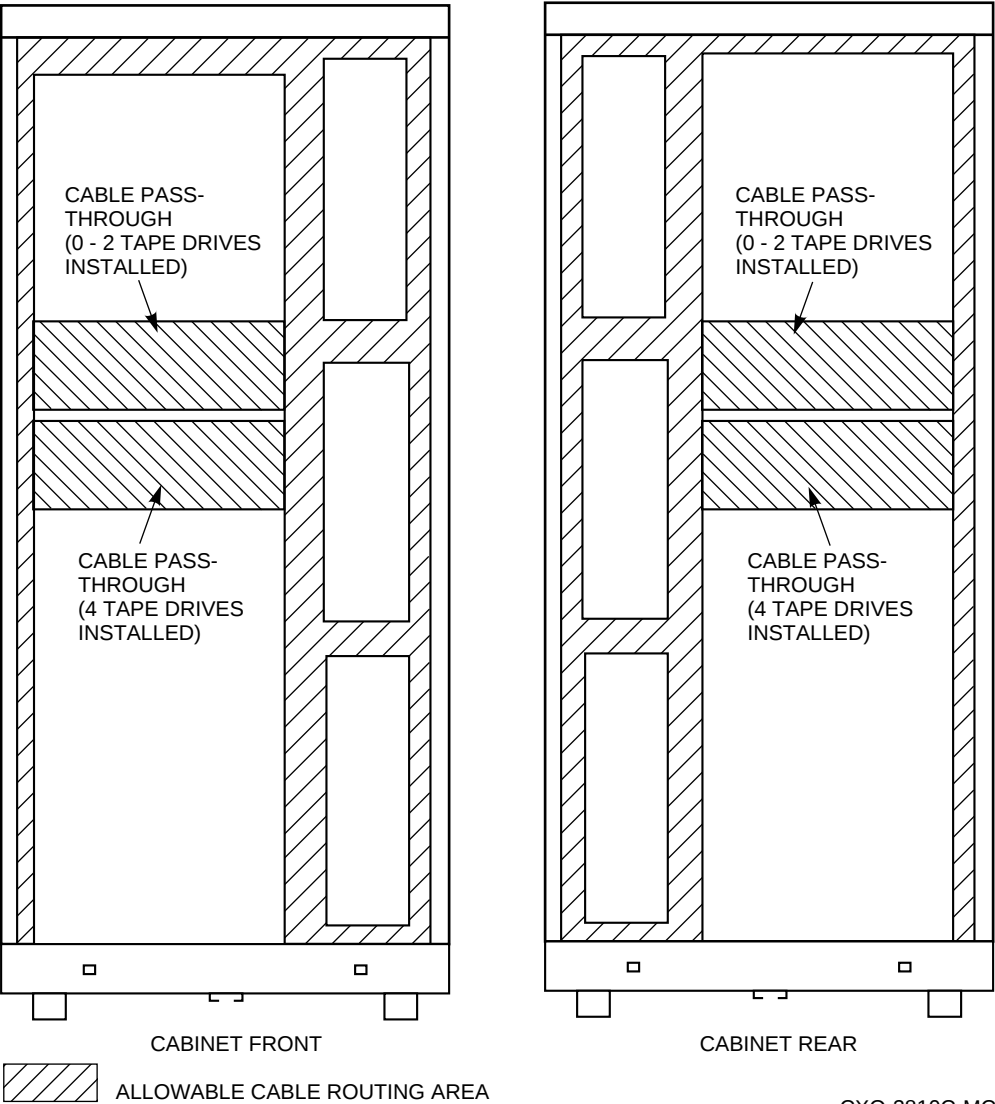
WARNING

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 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.

Figure 6–4 shows the cabinet areas in which cable routing is allowed.

Figure 6-4 SW800 Controller/Storage Cabinet Cable Routing



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Installing StorageWorks Shelves

This chapter describes the installation of StorageWorks shelves into SW800-series data center cabinets. Procedures for horizontal and vertical 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.

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.

7.2 Shelf Bracket Types

SW800 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 Figures 7–2 and 7–8. 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. In the vertical position, the screw-mounted brackets are attached to the horizontal cabinet bracket with six screws.

7.2.2 Tab-Mounted Shelf Brackets

A typical tab-mounted bracket set is shown in Figures 7–4 and 7–10. 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. In the vertical position, the tab-mounted brackets are attached to the horizontal cabinet bracket with four M5 KEP nuts and four mounting tabs.

7.2.3 Horizontal Cabinet Brackets on the Vertical Slots

Before installing a shelf bracket kit in the vertical position in a SW800 cabinet, determine the type of horizontal cabinet bracket. The type of horizontal cabinet bracket determines which type of shelf bracket kit is compatible.

There are two types of horizontal cabinet brackets; a set of two narrow brackets or a one-piece bracket:

- Type 1: Two narrow brackets, one attached to the front vertical cabinet rails and the other attached to the interior vertical rails. The rear bracket has two holes with captive floating nuts. Type 1 horizontal cabinet brackets accept only screw-mounted shelf brackets. To install tab-mounted shelf brackets in a cabinet with type 1 horizontal cabinet brackets, see Section 7.7.2 for cabinet configuration differences and Section 7.7.3 for cabinet modification procedures.
- Type 2: A one-piece bracket that attaches to the vertical cabinet rails and has four holes at the rear where the shelf bracket's mounting tabs are inserted. The type 2 horizontal cabinet bracket accepts either the screw-mounted or tab-mounted brackets.

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 SW800 Metric Shelf Screw-Mounted Bracket Kit Parts List. See Table 7–2 for the SW800 Metric Shelf Tab-Mounted Bracket Kit Parts List.

Table 7–1 SW800 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 SW800 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

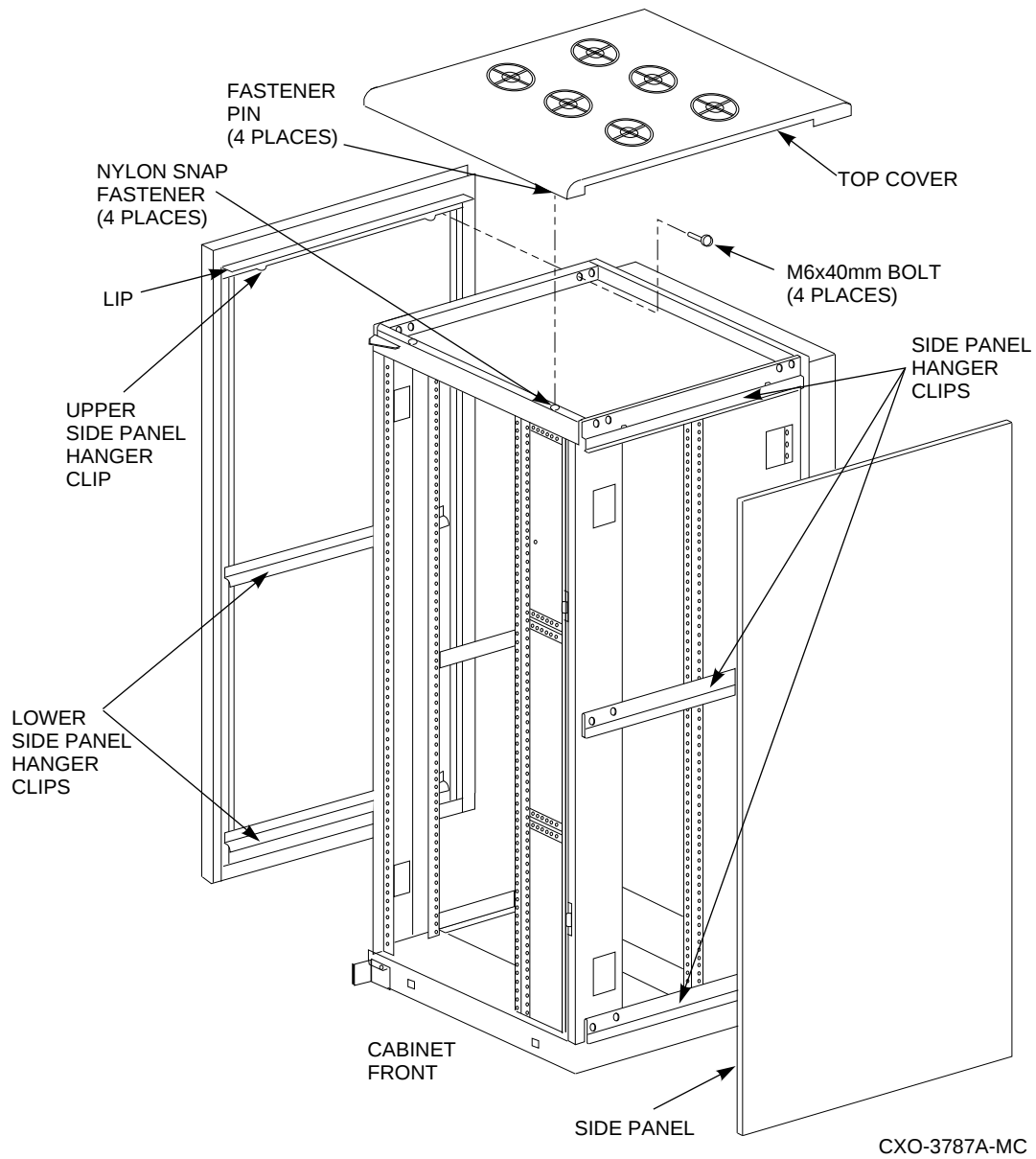
In maximum configurations when access to the interior of the cabinet is limited, external cabinet panels might need to be removed before shelves can be installed or reconfigured. Section 7.5.1 presents procedures for removing exterior cabinet panels.

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



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 or vertical shelf brackets using the following procedures.

7.6 Horizontal Shelf Installation

There are two types of horizontal shelf bracket installations: those using shelf brackets with screw mounts, and those using shelf brackets with tab mounts. See Section 7.6.1 for installations using shelf brackets with screw mounts. See Section 7.6.2 for installations using shelf brackets with tab mounts and mounting studs. Either the screw-mounted bracket set or tab-mounted bracket set can be used in horizontal shelf installations in any SW800 cabinet.

7.6.1 Installing Horizontal Shelf Brackets with Screw Mounts

Shelf bracket installations for front and rear horizontal shelves using screw mounts are shown in Figures 7–2 and 7–3. Using the illustrations as a guide, install horizontal 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. Turn the cabinet power off as described in Section 7.4.
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.
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.
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 Horizontal Shelf Stop Bracket Positions

StorageWorks Shelf Type	Front Shelf Stop Bracket Position	Rear Shelf Stop Bracket Position
BA350–Sx	4	1
BA350–Mx	5	2

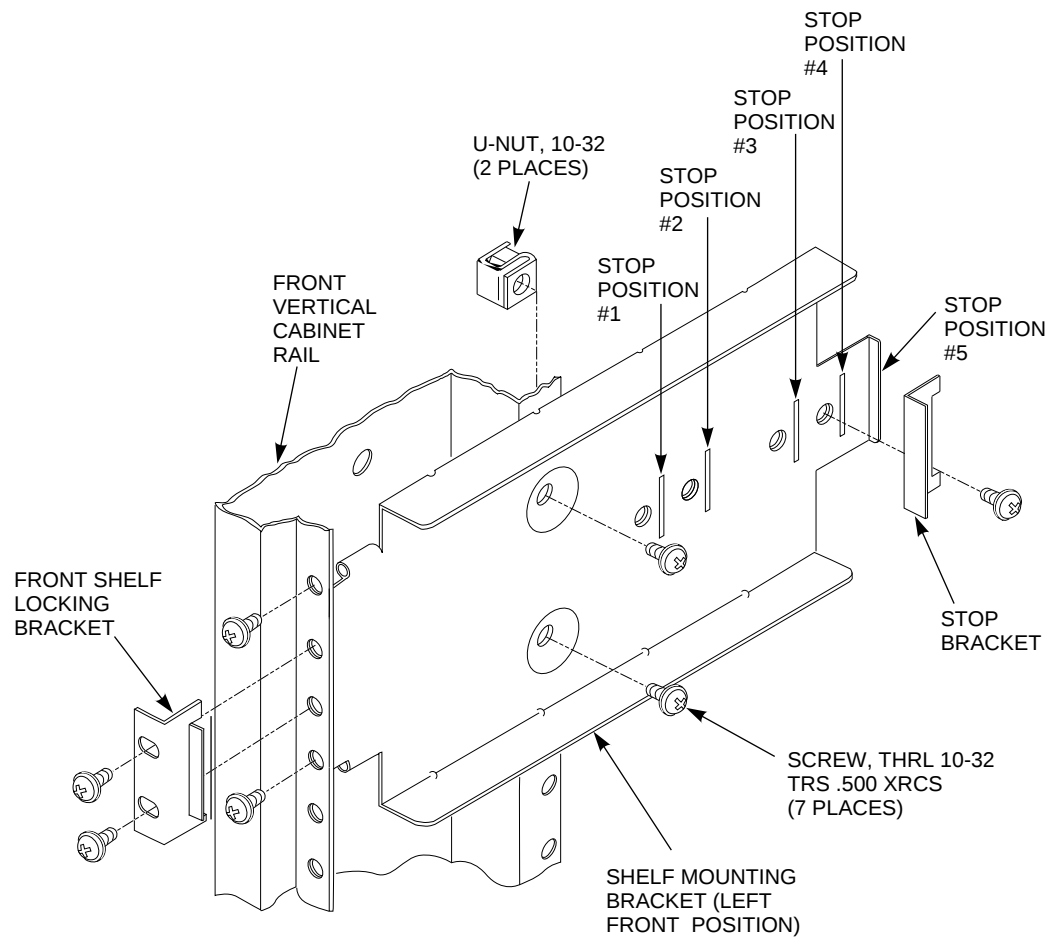
9. Insert the tab on the stop bracket into the slot at the correct stop position on the shelf bracket. Fasten the stop bracket to the shelf bracket.
10. Repeat steps 2 through 9 to mount the companion shelf bracket on the opposite cabinet rail. To be sure of proper alignment of the brackets, use care 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. Tighten 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 Horizontal Shelf Locking Bracket Part Numbers

StorageWorks Shelf Type	Front Shelf Locking Bracket Part No.	Rear Shelf Locking Bracket Part No.
BA350–Sx	74–46441–01	74–46439–01
BA350–Mx	74–46441–02	74–46439–02

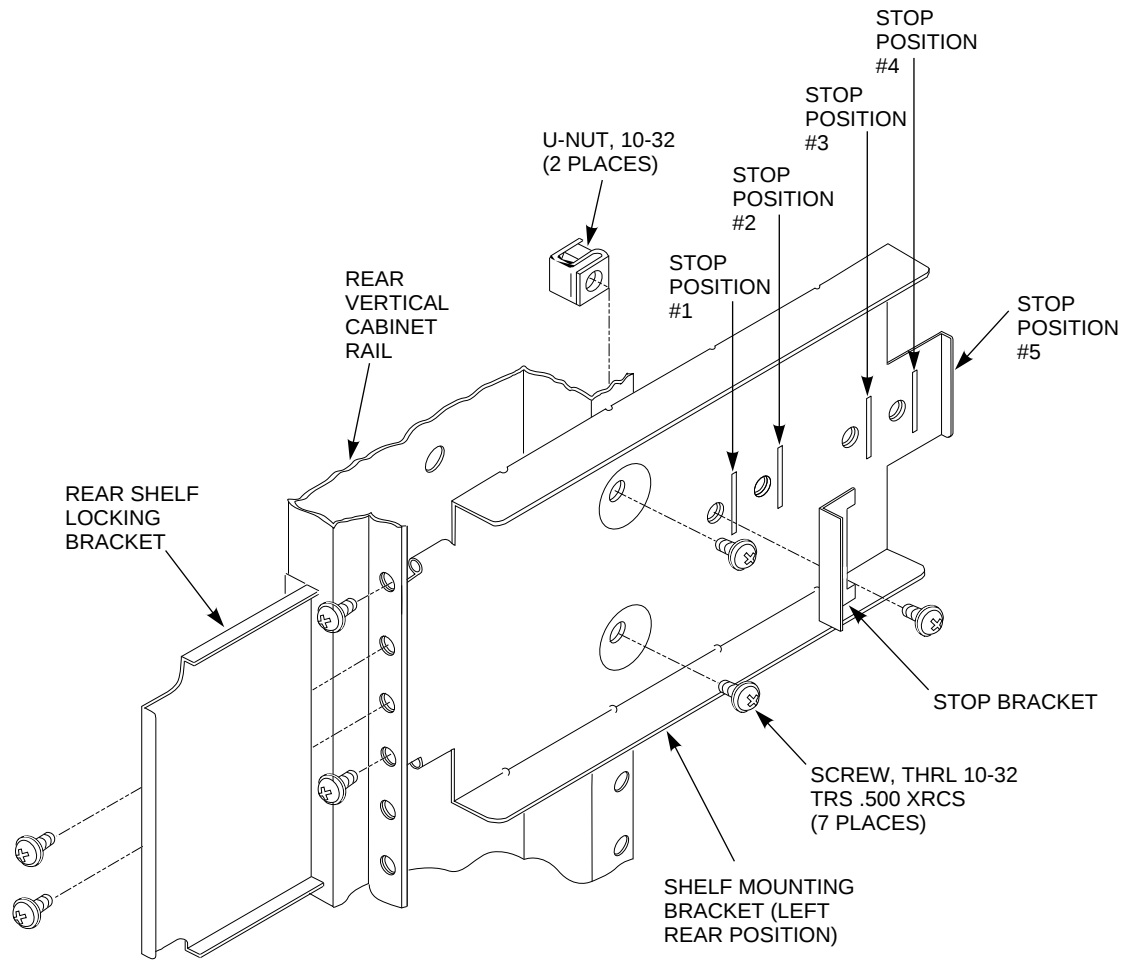
13. Once the shelf is positioned within the shelf brackets, install the shelf's locking brackets to both shelf brackets with screws. Push the locking bracket against the shelf to seat it before tightening the screws.

Figure 7-2 Front Horizontal Shelf Bracket Installation



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Figure 7-3 Rear Horizontal Shelf Bracket Installation



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7.6.2 Installing Horizontal Shelves with Tab Mounts

Shelf bracket installations for front and rear horizontal shelves using tab-mount brackets are shown in Figures 7–4 and 7–5. Using the illustrations as a guide, install horizontal 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. Turn the cabinet power off as described in Section 7.4.
2. Determine the correct shelf mounting locations and corresponding cabinet rail mounting holes for the shelf brackets. 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.
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 bracket mounting studs. 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–Sx	4	1
BA350–Mx	5 (stop bracket not used)	2

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. Note that for front-mounted BA350–Mx shelves, the inner lip on the shelf 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. Tighten 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.

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–Sx	74–46441–01	74–46439–01
BA350–Mx	74–46441–02	74–46439–02

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

Figure 7-4 Front Horizontal Shelf Bracket Installation

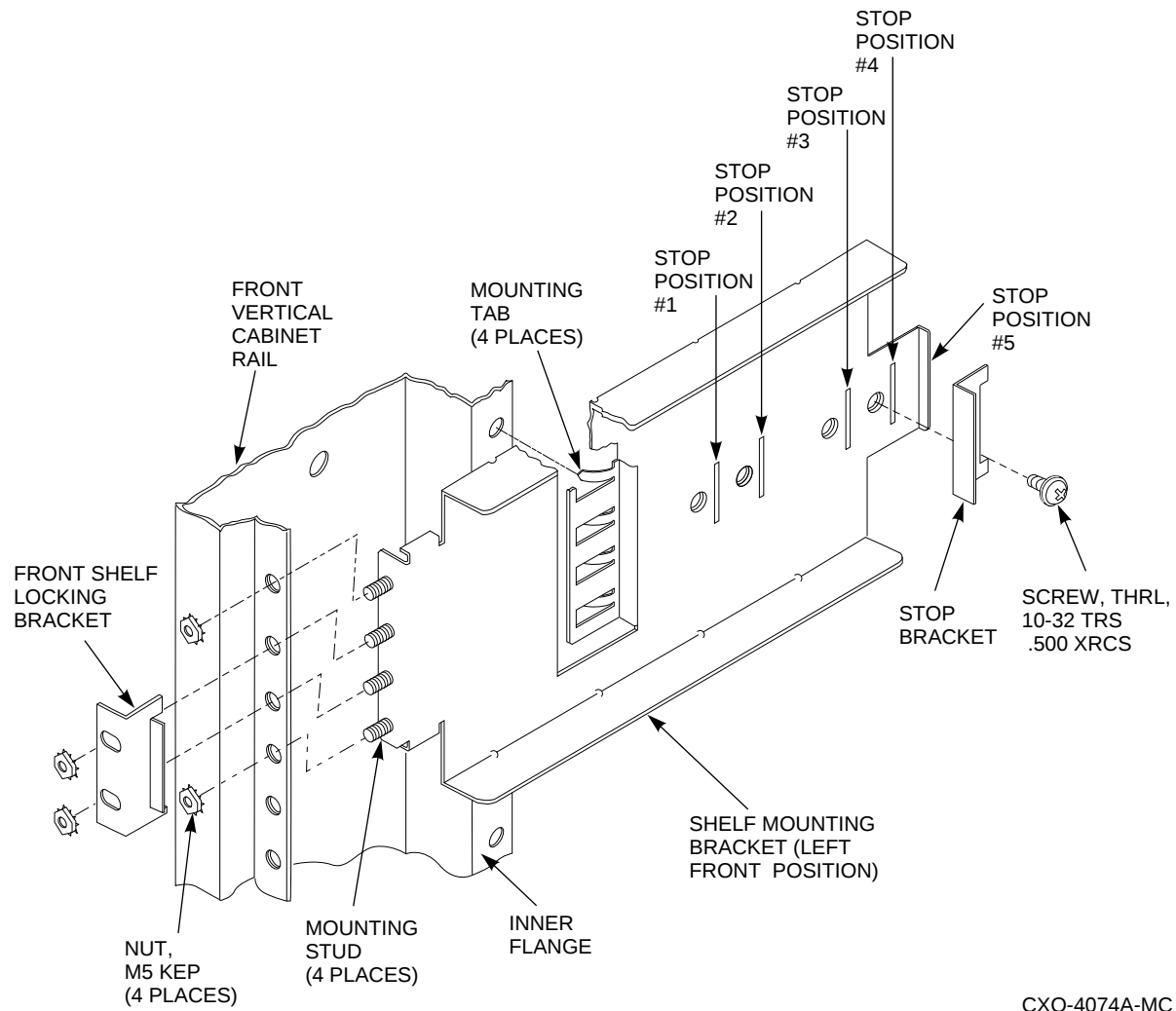
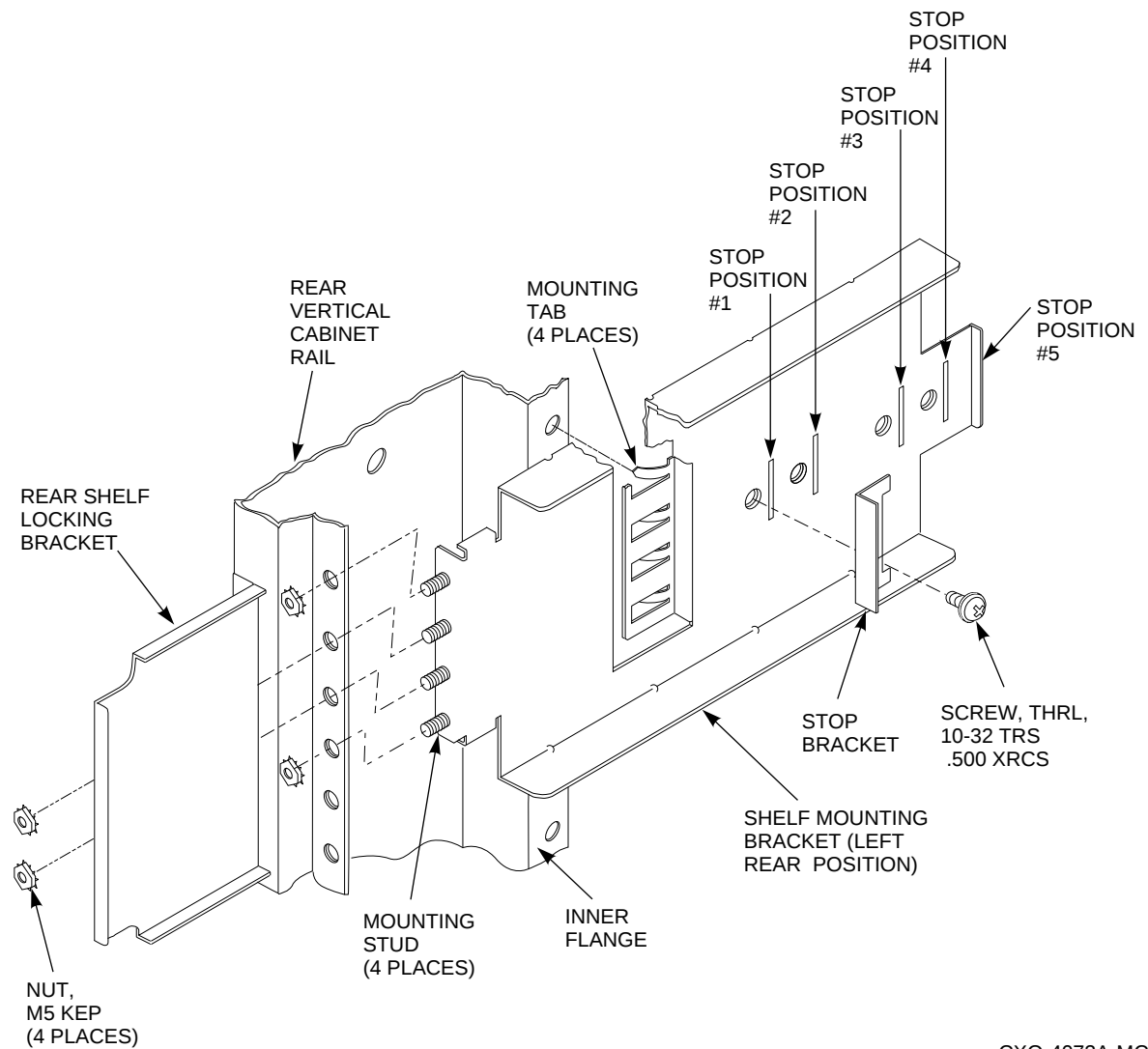


Figure 7-5 Rear Horizontal Shelf Bracket Installation



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7.7 Vertical Shelf Installation

There are two types of vertical shelf bracket installations: those using shelf brackets with screw-mounts, and those using shelf brackets with tab-mounts. When installing shelf brackets in the vertical position the shelf brackets used are determined by the horizontal cabinet bracket that was factory installed.

7.7.1 Horizontal Cabinet Bracket Types

There are two types of horizontal cabinet brackets: a set of two narrow brackets or a one piece bracket:

- Type 1: A two-piece bracket, one attached to the front vertical cabinet rails and the other attached to the interior vertical rails (see Figure 7–6). The rear bracket has two holes with captive floating nuts. Type 1 horizontal cabinet brackets accept only screw-mounted shelf brackets. To install tab-mounted shelf brackets in a cabinet with type 1 horizontal cabinet brackets, see Section 7.7.2 for cabinet configuration differences and Section 7.7.3 for cabinet modification procedures.
- Type 2: A one-piece bracket that attaches to the vertical cabinet rails and has four holes at the rear where the shelf bracket's mounting tabs are inserted (see Figure 7–7). The type 2 horizontal cabinet bracket accepts either the screw-mounted or tab-mounted brackets.

Figure 7–6 A Two-Piece Horizontal Cabinet Bracket

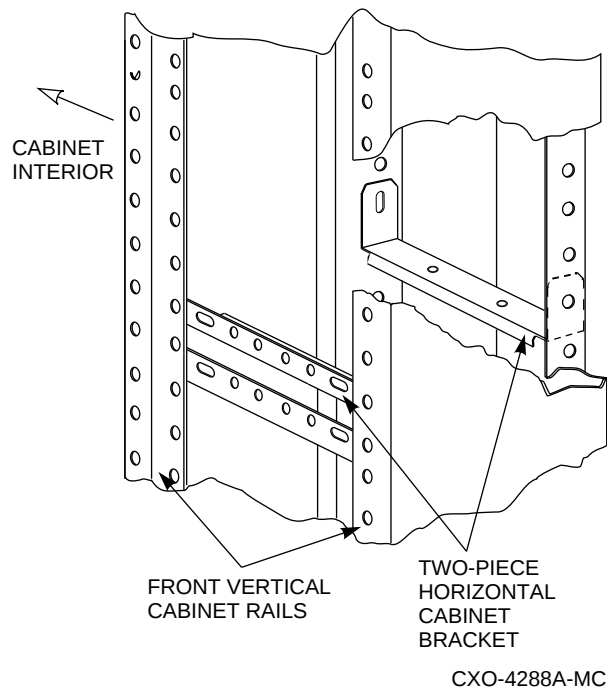
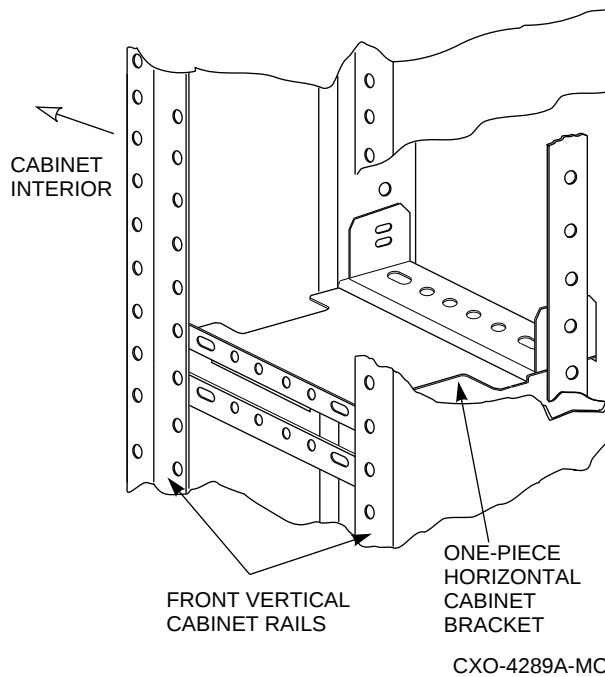


Figure 7–7 A One-Piece Horizontal Cabinet Bracket



7.7.2 Determining Cabinet Configurations

To determine the configuration of your cabinet's vertical slot, look at the horizontal cabinet bracket in the vertical slots of the cabinet. Is the horizontal cabinet bracket a type 1 two-piece bracket, or a type 2 one-piece bracket? Use Table 7–7 as a guide to properly determine your vertical shelf brackets.

Table 7–7 Determining Cabinet Configurations

If the horizontal cabinet bracket is a ...	And you are installing a ...	Then go to ...
Type 1 two-piece	Screw-mounted bracket kit	Section 7.7.4
Type 1 two-piece	Tab-mounted bracket kit	Section 7.7.3
Type 2 one-piece	Tab-mounted bracket kit	Section 7.7.5
Type 2 one-piece	Screw-mounted bracket kit	Section 7.7.4

7.7.3 Cabinet Modification

This procedure applies to cabinets with the type 1 two-piece horizontal cabinet bracket, and it only applies when installing a tab-mounted vertical shelf bracket. This procedure instructs you to remove a horizontal shelf and shelf brackets and to exchange the new tab-mounted bracket kit for the horizontal, screw-mounted brackets.

1. Turn the cabinet power off as described in Section 7.4.
2. Select a horizontal shelf to remove.
3. Disconnect the signal and power cables from the horizontal shelf.
4. Remove the locking brackets from the horizontal shelf.

5. Remove the horizontal shelf.
6. Remove the horizontal, screw-mounted shelf brackets from the cabinet.
7. Remove the two U-nuts from each of the vertical cabinet rails.
8. Refer to Section 7.6.2 and install the tab-mounted shelf brackets in the horizontal position.
9. Install the shelf in the horizontal position.
10. Install the locking brackets on the horizontal shelf.
11. Connect the signal and power cables.
12. See Section 7.7.4 and install the screw-mounted shelf brackets in the vertical position.

7.7.4 Installing Vertical Shelves with Screw Mounts

Shelf bracket installations for front and rear vertical shelves using screw mount brackets are shown in Figures 7–8 and 7–9. Using the illustrations as a guide, install the vertical 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. Turn the cabinet power off as described in Section 7.4.
2. Determine the correct vertical shelf location 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 horizontal cabinet rail.
4. Fasten the shelf bracket to the outer flange of the cabinet rail with two screws.

Note

If a Type 2 one-piece horizontal cabinet bracket is installed, two 10–32 retaining nuts (not provided) are required.

5. Fasten the shelf bracket to the inner horizontal cabinet bracket with two screws and 10–32 retaining nuts if required.

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

Table 7–8 Vertical Shelf Stop Bracket Positions

StorageWorks Shelf Type	Front Shelf Stop Bracket Position	Rear Shelf Stop Bracket Position
BA350–Sx	3	1
BA350–Mx	4	1

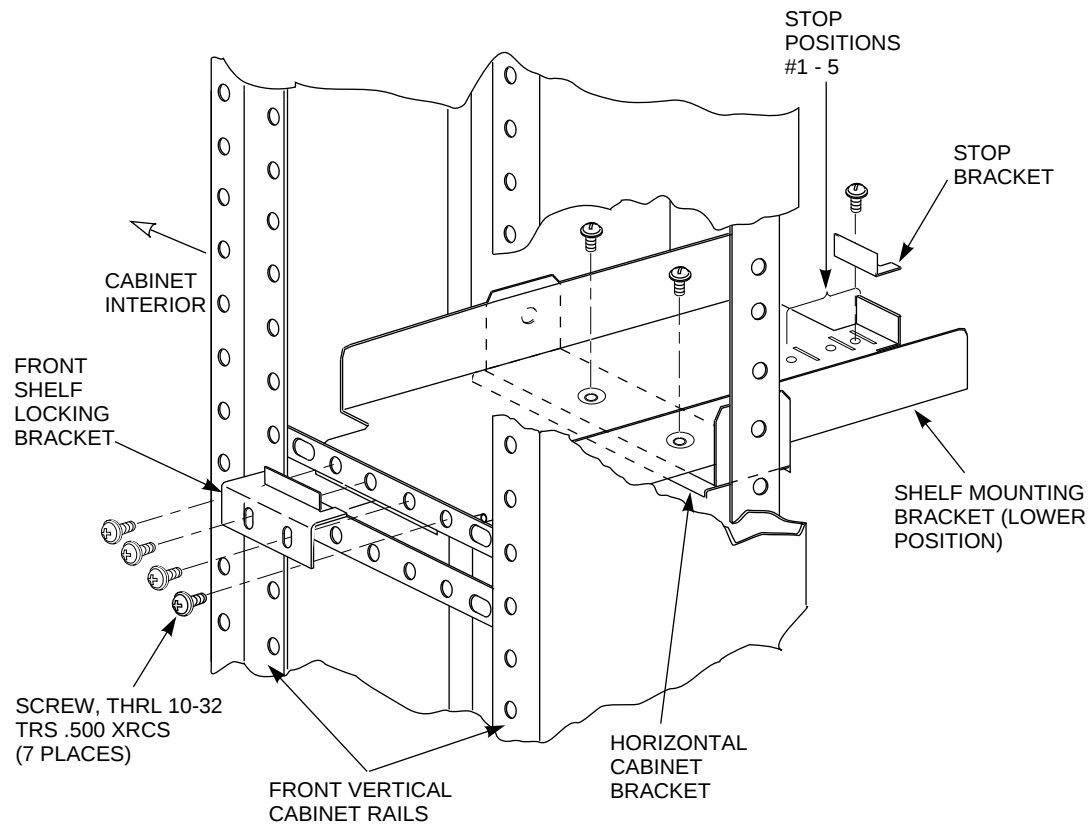
7. Insert the tab on the stop bracket into the slot at the correct stop position on the shelf bracket. Fasten the stop bracket to the shelf bracket.
8. Repeat steps 2 through 7 to mount the companion shelf bracket on the opposite cabinet rail.
9. With the power supply end of the shelf at the top and the blowers facing the cabinet, slide the shelf into the shelf brackets until it contacts the stop brackets. The shelf should slide smoothly into the shelf brackets. If it binds, remove it and check the alignment of the shelf brackets. The bracket mounting screws might need to be loosened slightly to allow the brackets to align with the shelf. Tighten the screws when the brackets are properly aligned.
10. Using Table 7–9, verify that you have the correct locking bracket part number for the shelf type and position (front or rear) being installed.

Table 7–9 Vertical Shelf Locking Bracket Part Numbers

StorageWorks Shelf Type	Front Shelf Locking Bracket Part No.	Rear Shelf Locking Bracket Part No.
BA350–Sx	74–46441–01	74–46439–01
BA350–Mx	74–46441–02	74–46439–02

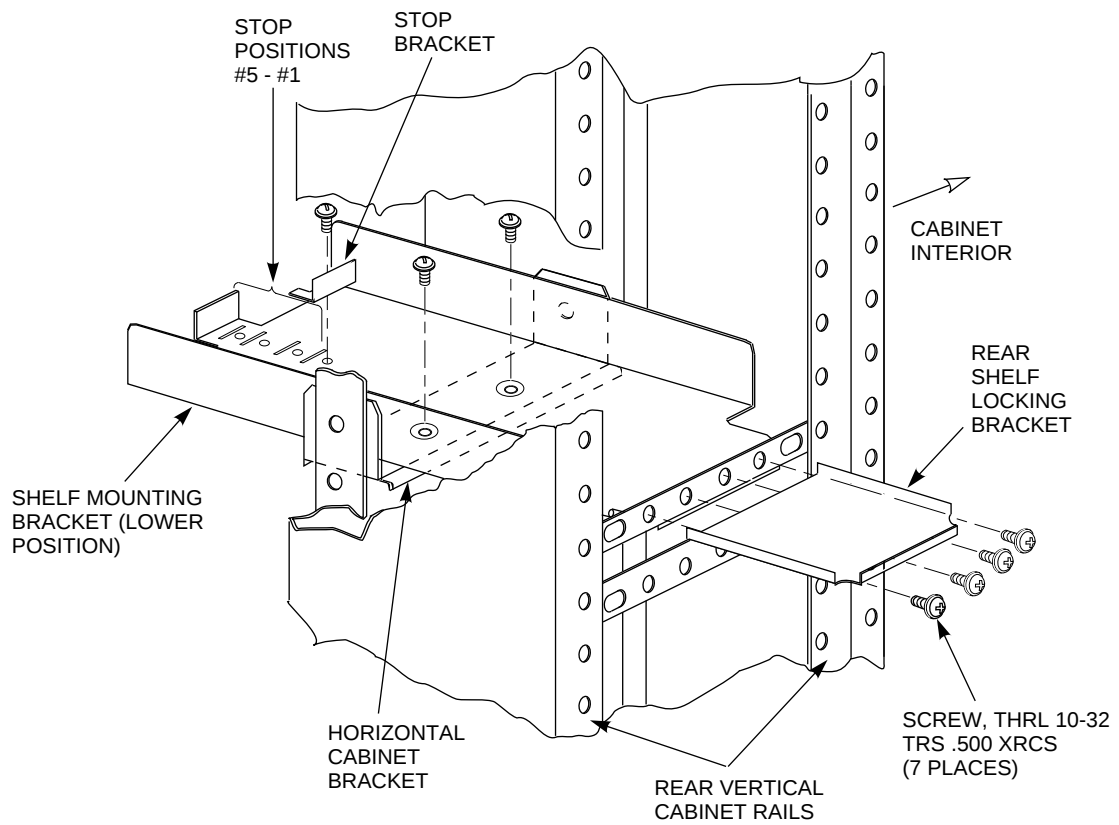
11. Once the shelf is positioned within the shelf brackets, install the locking brackets with screws. Push each locking bracket against the shelf to seat it before tightening the screws.

Figure 7-8 Front Vertical Shelf Bracket Installation



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Figure 7-9 Rear Vertical Shelf Bracket Installation



CXO-3776A-MC

7.7.5 Installing Vertical Shelves With Tab Mounts

Shelf bracket installations for front and rear vertical shelves using tab mount brackets are shown in Figures 7–10 and 7–11. Using the illustrations as a guide, install the vertical 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. Turn the cabinet power off as described in Section 7.4.
2. Determine the correct vertical shelf location 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 horizontal cabinet bracket.
4. Align the bracket mounting studs and mounting tabs with the appropriate holes in the horizontal cabinet bracket and seat the studs and tabs in the holes.
5. Fasten the bracket to the horizontal cabinet bracket by installing KEP nuts on the left-most and right-most bracket mounting studs. Do not install nuts on the two middle studs at this time.
6. Using Table 7–10, determine the correct stop bracket position for the shelf type being installed.

Table 7–10 Vertical Shelf Stop Bracket Positions

StorageWorks Shelf Type	Front Shelf Stop Bracket Position	Rear Shelf Stop Bracket Position
BA350–Sx	3	1
BA350–Mx	4	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.
8. Repeat steps 2 through 7 to mount the companion shelf bracket on the horizontal cabinet bracket above the one just installed.
9. With the power supply end of the shelf at the top and the blowers facing the cabinet, slide the shelf into the shelf brackets until it contacts the stop brackets. The shelf should slide smoothly into the shelf brackets. If it binds, remove it and check the alignment of the shelf brackets. The bracket mounting nuts might need to be loosened slightly to allow the brackets to align with the shelf. Tighten the nuts when the brackets are properly aligned.

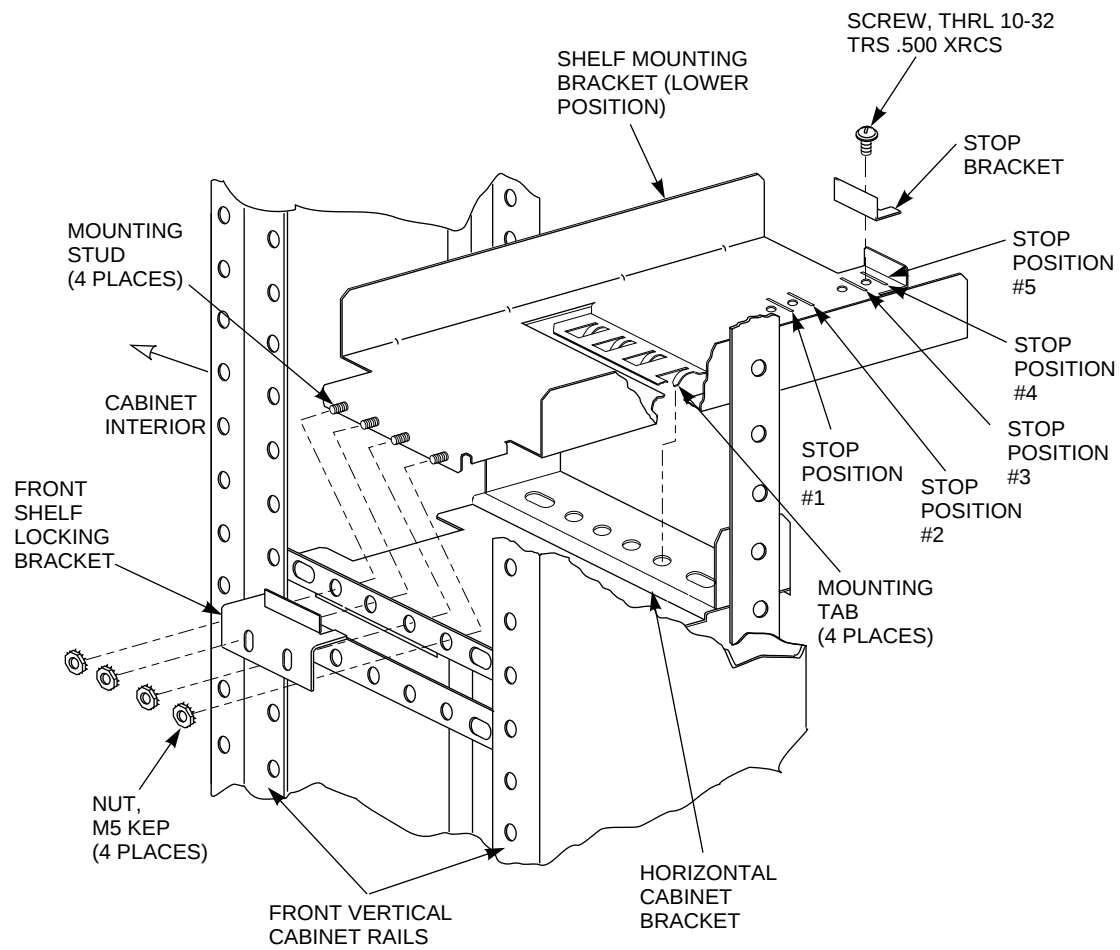
10. Using Table 7–11, verify that you have the correct locking bracket part number for the shelf type and position (front or rear) being installed.

Table 7–11 Vertical Shelf Locking Bracket Part Numbers

StorageWorks Shelf Type	Front Shelf Locking Bracket Part No.	Rear Shelf Locking Bracket Part No.
BA350–Sx	74–46441–01	74–46439–01
BA350–Mx	74–46441–02	74–46439–02

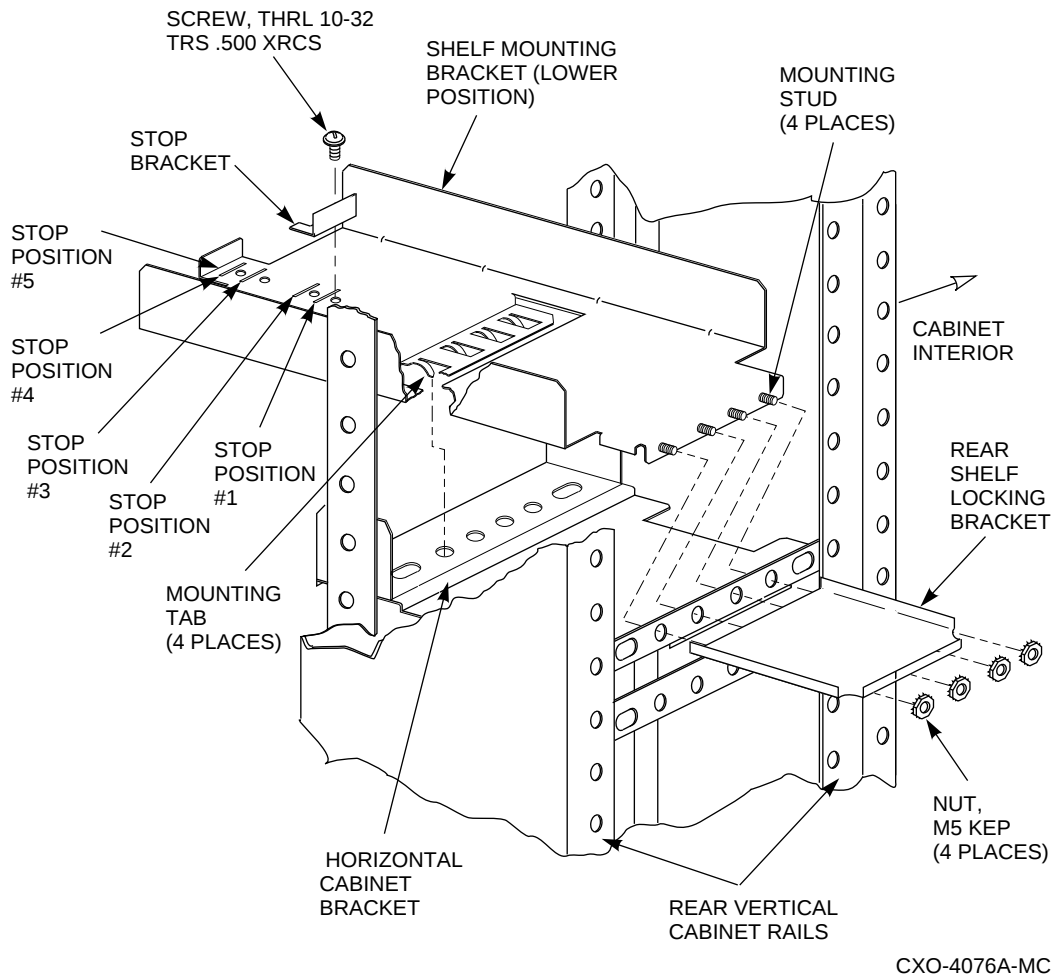
11. Once the shelf is positioned within the shelf brackets, install the locking brackets with KEP nuts on the two middle mounting studs. Push each locking bracket against the shelf to seat it before tightening the nuts.

Figure 7-10 Front Vertical Shelf Bracket Installation



CXO-4075A-MC

Figure 7-11 Rear Vertical Shelf Bracket Installation



7.8 Filler Panel Installation

Filler panels are attached to the cabinet with four screws and U-nuts. Install a filler panel in an unused shelf location as follows:

1. Place the filler panel against the cabinet rails in the shelf position to be covered.
2. Use the panel as a template to mark the U-nuts locations on the cabinet rails.
3. Remove the filler panel from the cabinet rails.
4. Install four 10-32 U-nuts on the cabinet rails in the locations marked in step 2.
5. Mount the filler panel to the cabinet rails using four 10-32 screws.

7.9 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 install 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 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 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 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, making sure 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.

Installing TZ8x7-Series Tape Drives

This chapter describes the mounting and power cabling of TZ8x7-series tape drives in SW800-series data center cabinets.

8.1 General Installation Considerations

The TZ8x7-series tape drive is mounted in the SW800 data center 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 TZ8x7-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 SW800 data center cabinet.

Two TZ8x7-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.

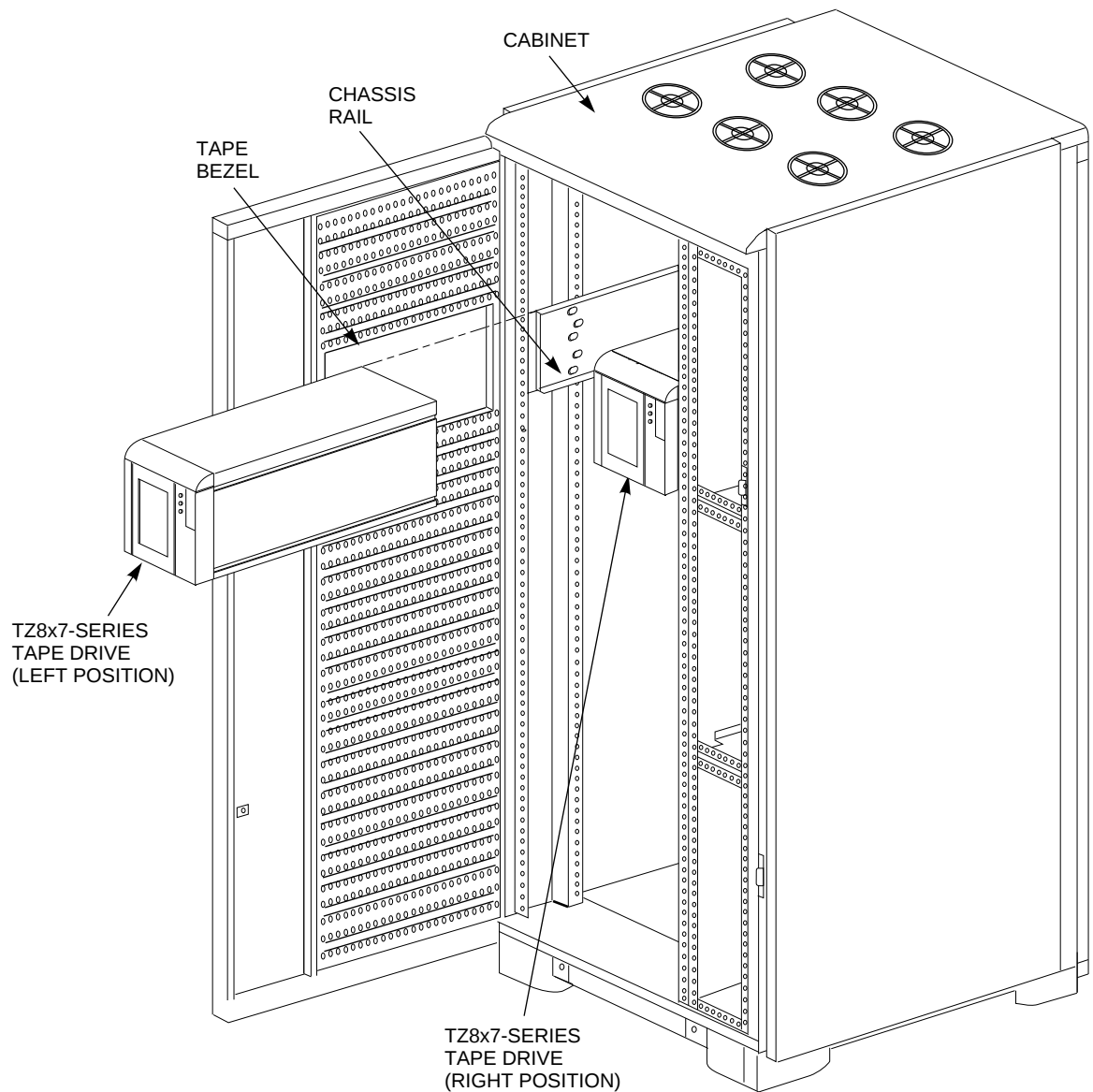
In situations where only one TZ8x7-series tape drive is being installed at a given vertical position in the cabinet, the tape drive must be installed in the right mounting position. This will ensure that the front panel of the tape drive mates with the correct opening in the tape bezel in the cabinet door. A filler panel in the door 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



CXO-3922A-MC

8.2 Accessing the Cabinet Rack Space

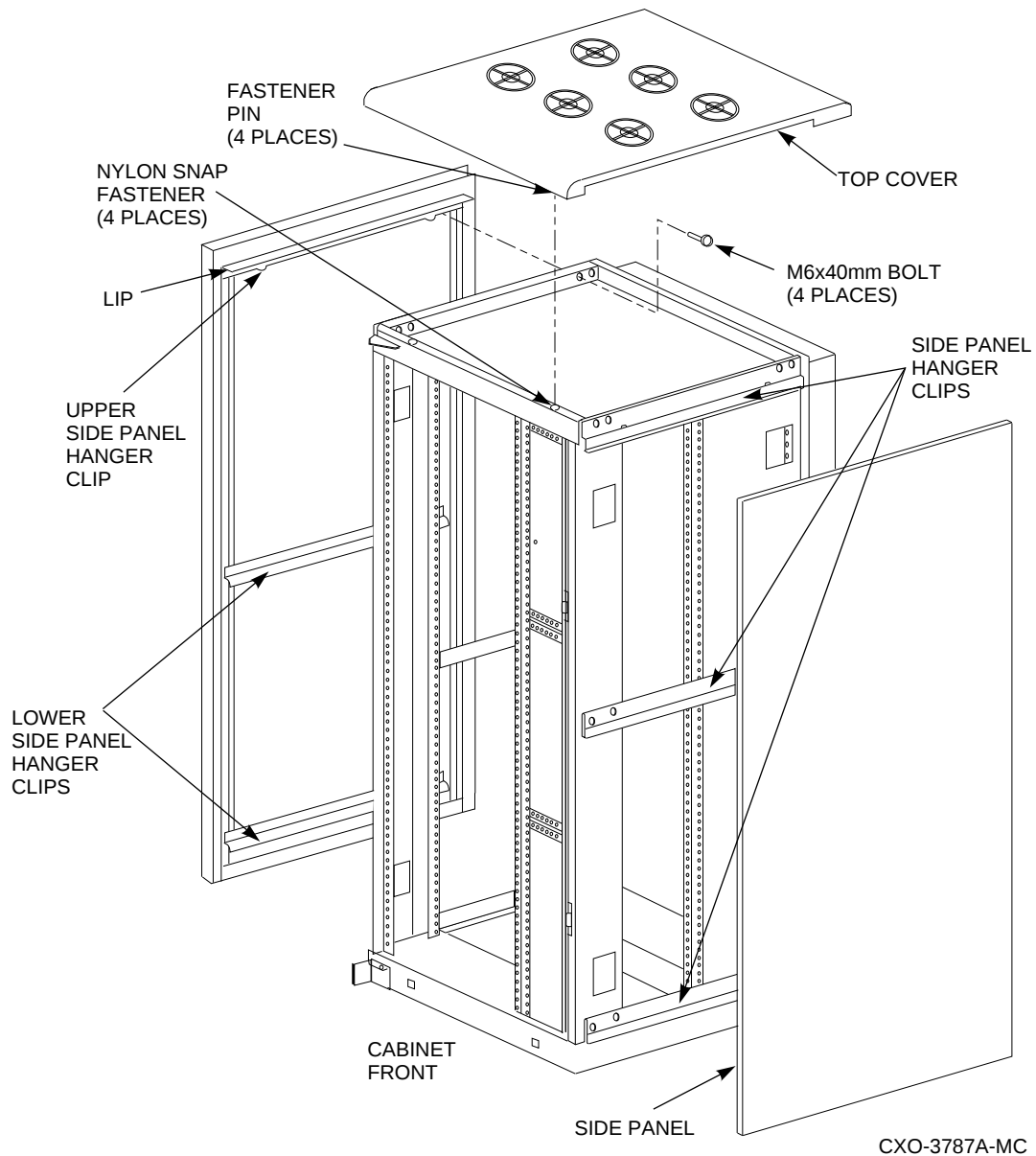
TZ8x7-series tape drives can normally be installed without removing cabinet side panels. To route the cabling in configurations where access to the interior of the cabinet is limited, however, cabinet side panels may need to be removed. Sections 8.7 and 8.8 present procedures for removing and replacing 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



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 is a two-person task. Failure to use sufficient personnel may result in injury or equipment damage.

3. Using two persons, 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 extendable 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

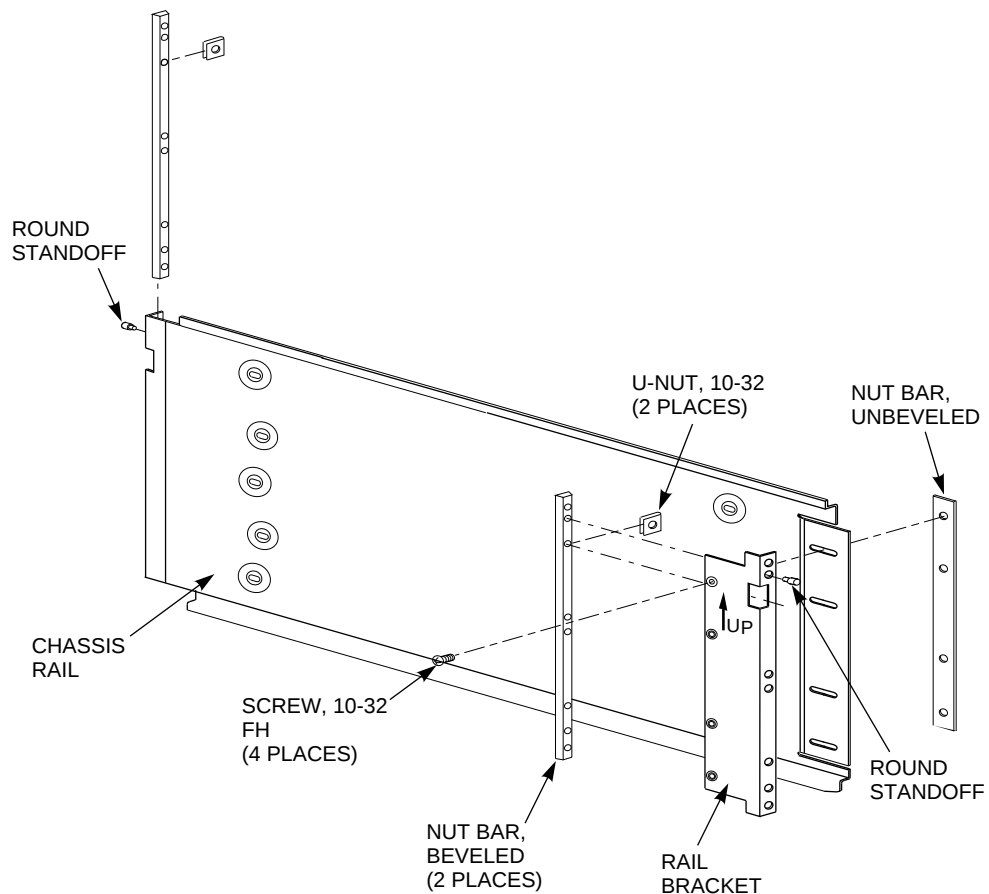
Two small ESD grounding posts are provided with the cabinet. One is located on a front vertical cabinet rail, and one on a rear rail. Should an ESD grounding post interfere with the installation of the chassis rail, move the post out of the way to any free hole on the cabinet.

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



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):

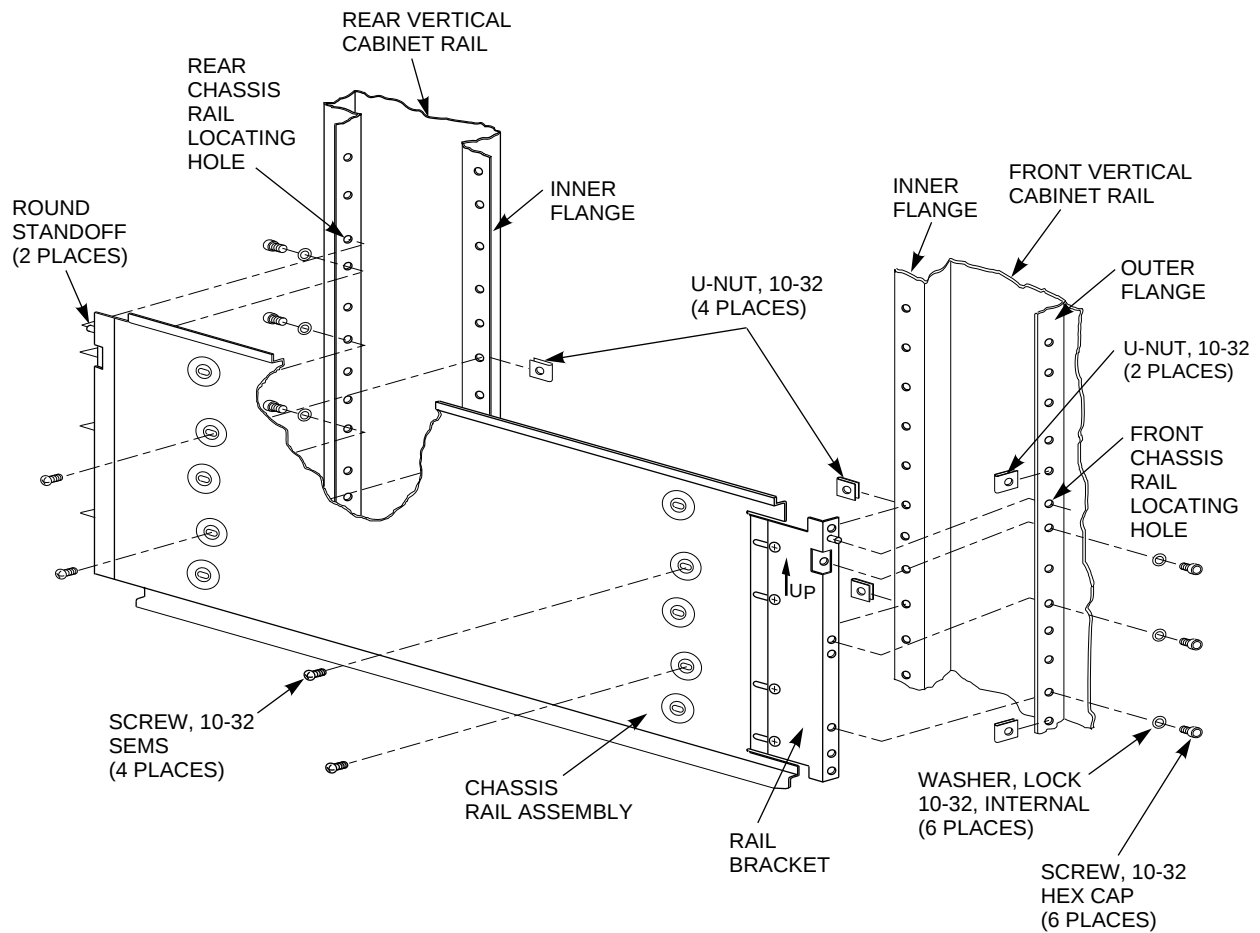
WARNING

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. See 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 Installation



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 persons to support and position the chassis rail assembly. The chassis rail assembly may cause personal 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.

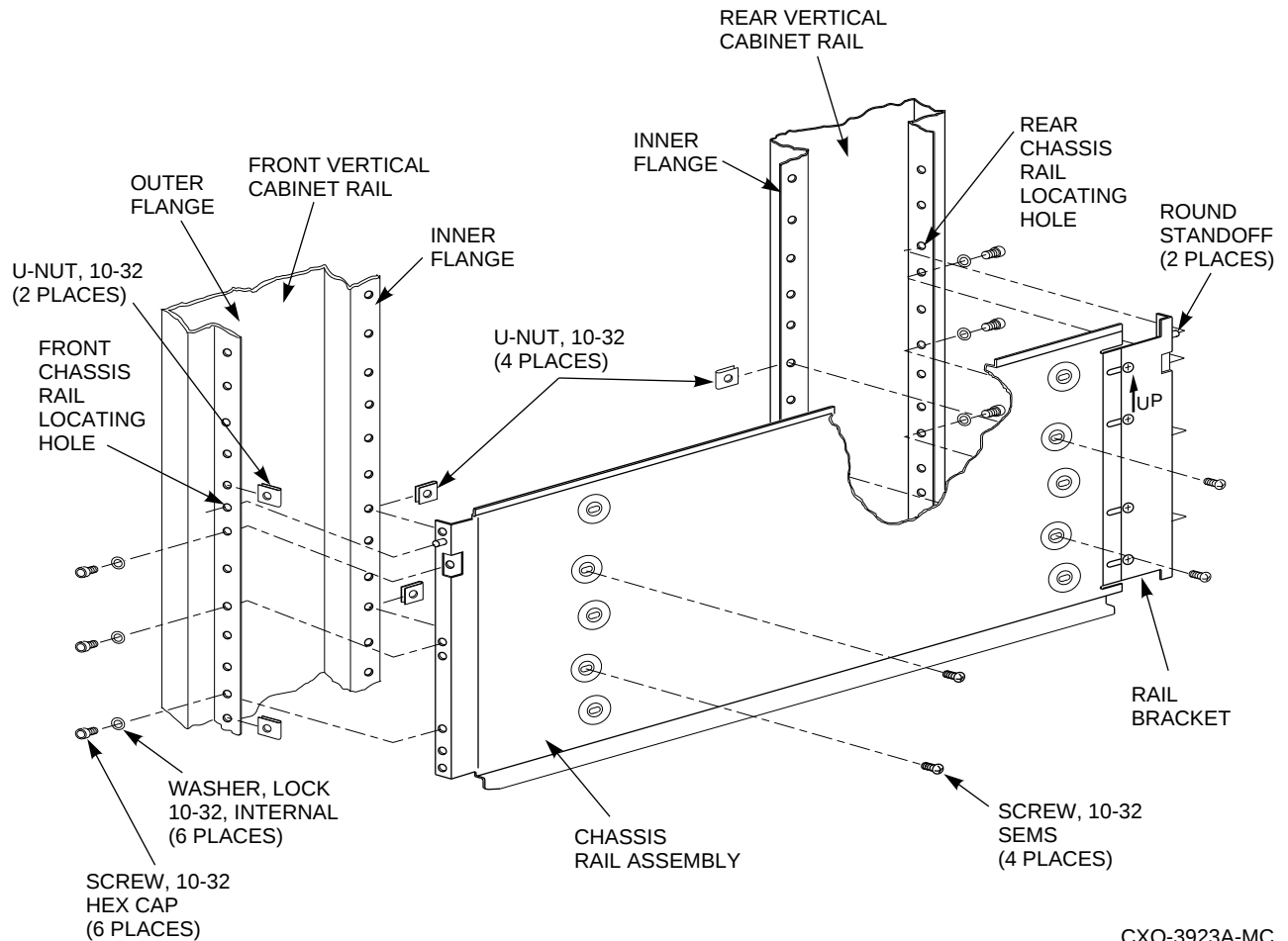
8.3.3 Left Position Chassis Rail Assembly Installation

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):

Figure 8-5 Left Position Chassis Rail Assembly Installation



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. See 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.

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 personal 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 TZ8x7-Series Tape Drive Enclosure

Once the chassis rail is installed in the cabinet, the tape drive enclosure can be mounted on it. Mount the TZ8x7-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.

WARNING

Use two persons to lift the TZ8x7-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

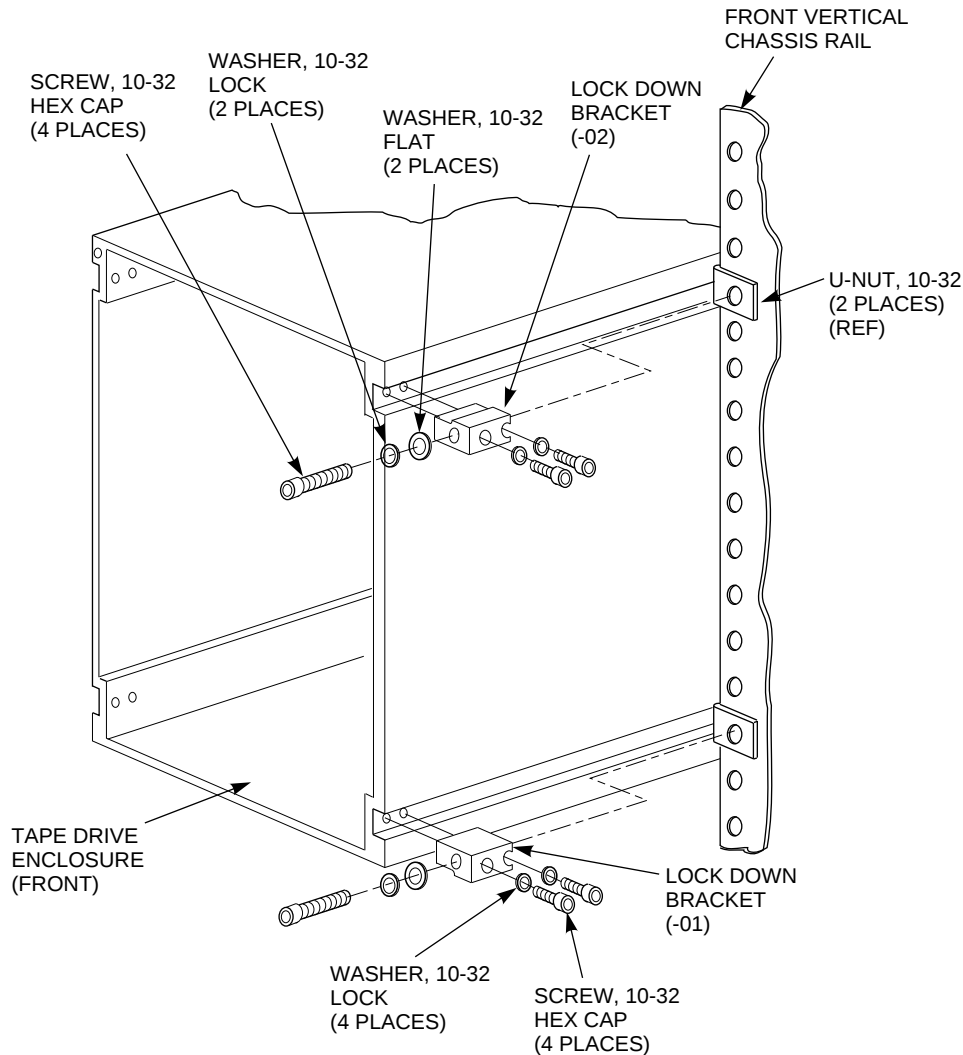
Use care when sliding the tape drive into the cabinet. Do not allow the tape drive enclosure to pull or pinch cables that may be routed through the cabinet interior. Failure to use care when mounting the tape drive may result in equipment damage.

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 TZ8x7 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.

Figure 8-6 Right Position Tape Drive Mounting



NOTE: TAPE DRIVE INTERNAL COMPONENTS NOT SHOWN FOR CLARITY.

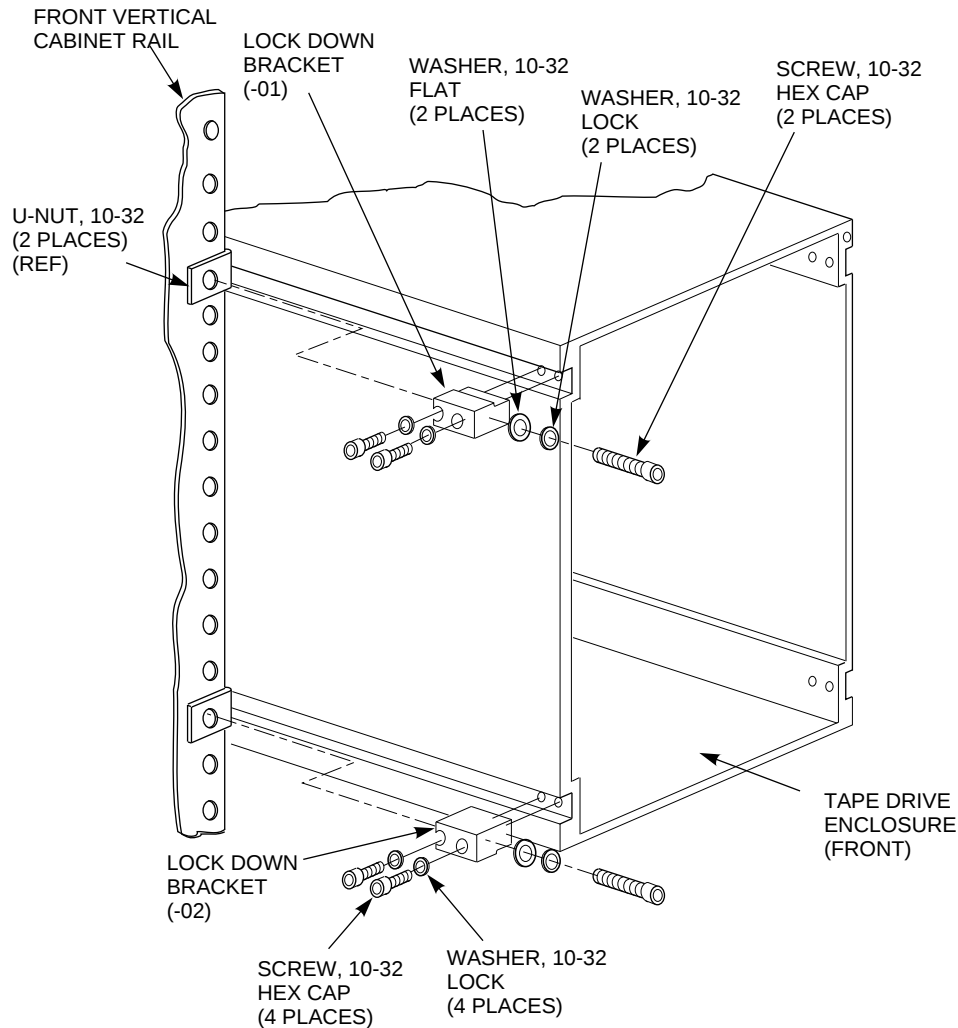
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8.5 Supplying AC Power

AC power for the TZ8x7-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 tape drive's power.

Figure 8–7 Left Position Tape Drive Mounting



NOTE: TAPE DRIVE INTERNAL COMPONENTS NOT SHOWN FOR CLARITY.

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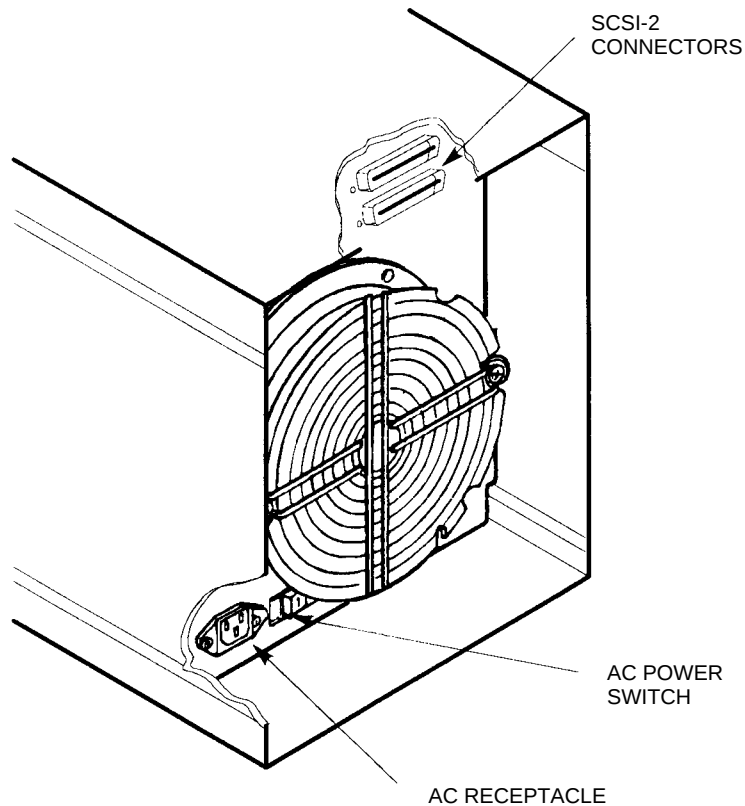
8.6 SCSI–2 Signal Cabling

Refer to the *StorageWorks 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 TZ8x7-series tape drive.

8.7 Installing the Cabinet Door Tape Bezel Kit

To allow operator access to the TZ8x7 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. These SF400 installation instructions also apply to SW800-series data center cabinets.

Figure 8-8 TZ8x7-Series Tape Drive Rear Panel



CXO-3932A-MC

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.
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 is a two-person task. 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.

Power Configuration

This chapter presents the procedures necessary to configure the primary power within SW800-series data center cabinets. Descriptions of the cabinet's power configuration options can be found in Section 2.3.

9.1 General Considerations

WARNING

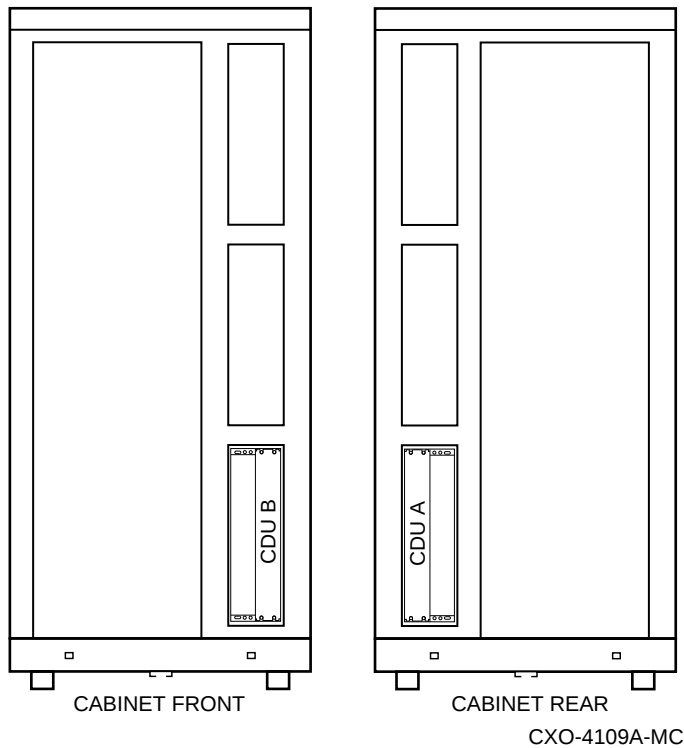
While working in the cabinet interior, ac power must be removed from cabinet components. Failure to do so may result in personal injury as a result of electric shock.

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.

9.2 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. The CDU in single-CDU configurations, CDU A, is installed in the position shown in Figure 9–1.

Figure 9–1 CDU Locations



9.2.1 Single-Cabinet Power Configuration

Unless options are specified, SW800-series data center cabinets are shipped with a single CDU and are cabled for single shelf power supplies. The cabinet is supplied with 24 preinstalled, black ac power cables. One of these cables is routed to each front and rear shelf position. These cables are used to supply ac power to shelves as they are added to the cabinet. The cables need only to be plugged into each shelf's power supply to complete the shelf's installation. No additional cables are necessary for this configuration.

9.2.2 Dual-Shelf Power Configuration

In the dual-shelf power configuration, a second ac power cable and ac power supply are 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. For cabinets with 12 or fewer shelves, ac power cables preinstalled at unused shelf positions may be used to supply power to the newly-added ac power supplies. For each newly-installed shelf, locate a preinstalled, black power cable of the proper length at an unused shelf position and remove it from any cable clamps holding it to the cabinet.

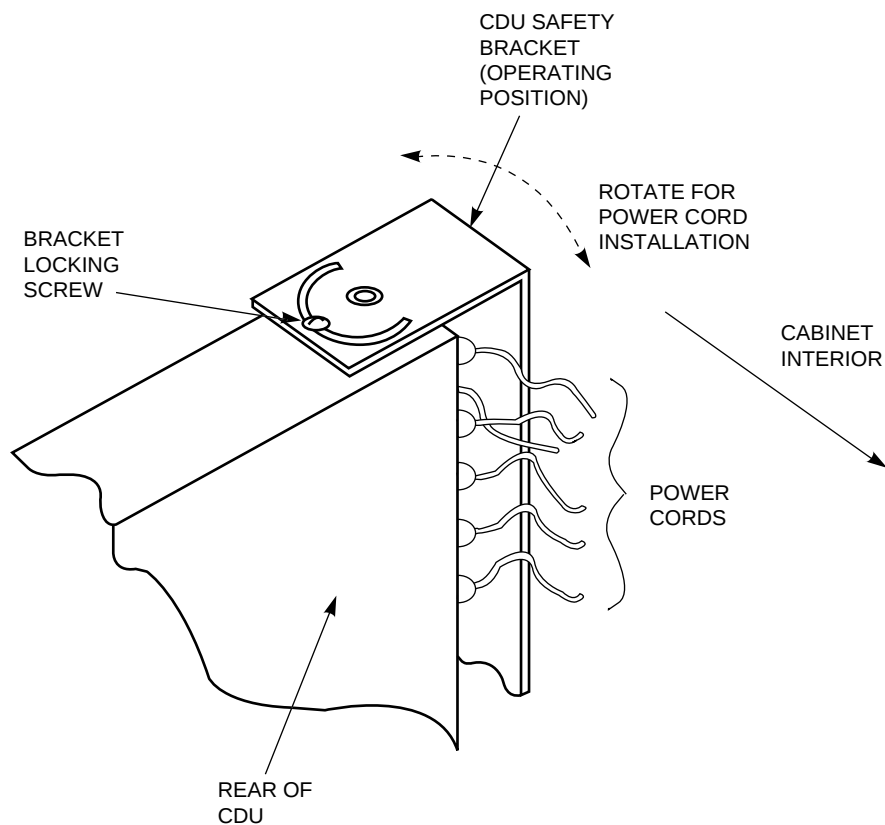
For cabinets with more than 12 shelves, a second CDU is needed to provide dual shelf power throughout the cabinet. A complete set of ac power cables of the proper lengths is supplied with the additional CDU.

The ac power cables for each shelf location must be of a minimum length to

reach the cabinet's CDU(s) along assigned routing paths. Refer to the chapter pertaining to your cabinet configuration for information on ac power cable lengths for various shelf locations.

4. Once the cables are selected, plug the appropriate end of each ac power cable into a connector on the rear panel of the CDU. Choose the upper-most available connector and work down. If necessary, loosen the bracket locking screw and rotate the CDU safety bracket to the side to facilitate installing the cables, as shown in Figure 9–2. After the ac power cables are installed, make sure to rotate the safety bracket back into position over the cable connectors, and to tighten the bracket locking screw.

Figure 9–2 Safety Bracket Rotation



CXO-4108A-MC

5. Route an ac power cable to the second dc power supply (B) in each shelf. Use the existing power cable routing and cable clamps or ties. Plug the cable connector into the front of the power supply.
6. Using the procedures appropriate to your system, turn on the cabinet and initialize it.

9.3 Dual-Cabinet Power Configuration

The dual-cabinet power configuration requires two CDUs for power distribution. The CDUs are installed in the positions shown in Figure 9–1. The following procedure describes how to install the dual-power option kit.

1. Check the contents of the dual-power option kit against the appropriate parts list shown in Tables 9–1 and 9–2 to verify that it is complete.

Table 9–1 SW800-Series Data Center Cabinet 60 Hz Dual-Power Option Kit Parts List

Kit option number SW8xP-AA (120/208V, 60 Hz) Kit part number 70–30101–05		
Digital Part Number	Description	Quantity
EK–SWCDU–IS	CDU installation guide	1
70–30101–01	Cable distribution unit, 60 Hz	1
90–00063–39	Screw, 10–32 Phillips, .500 inch	7
90–07786–00	U-nut, 10–32	20
90–07032–00	Tie-wrap	40
17–03718–03	Cable, ac power, gray, 5 feet	10
17–03718–05	Cable, ac power, gray, 7 feet	8
17–03718–07	Cable, ac power, gray, 9 feet	6
36–38274–01	Label, CDU ID/Caution	1
90–08264–00	Cable tie, adhesive-backed	13
90–07093–00	Cable clamp	2
12–21368–02	Screw, SEMS, 10–32 pan, .625 inch	14

Table 9–2 SW800-Series Data Center Cabinet 50 Hz Dual-Power Option Kit Parts List

Kit option number SW8xP-AB (380-415V, 50 Hz) Kit part number 70–30101–06		
Digital Part Number	Description	Quantity
EK–SWCDU–IS	CDU installation guide	1
70–30101–02	Cable distribution unit, 50 Hz	1
90–00063–39	Screw, 10–32 Phillips, .500 inch	7
90–07786–00	U-nut, 10–32	20
90–07032–00	Tie-wrap	40
17–03718–03	Cable, ac power, gray, 5 feet	10
17–03718–05	Cable, ac power, gray, 7 feet	8
17–03718–07	Cable, ac power, gray, 9 feet	6
36–38274–01	Label, CDU ID/Caution	1
90–08264–00	Cable tie, adhesive-backed	13

(continued on next page)

Table 9–2 (Cont.) SW800-Series Data Center Cabinet 50 Hz Dual-Power Option Kit Parts List

Kit option number SW8xP–AB (380-415V, 50 Hz) Kit part number 70–30101–06		
Digital Part Number	Description	Quantity
90–07093–00	Cable clamp	2
12–21368–02	Screw, SEMS, 10–32 pan, .625 inch	14

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 the CDU to the ○ (OFF) position.
6. Disconnect the CDU's primary power cable from the power source.
7. Isolate the cabinet electrically by powering down the host computer.

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 cable(s). Refer to the documentation for the host computer configuration for the steps necessary to disconnect the cables.

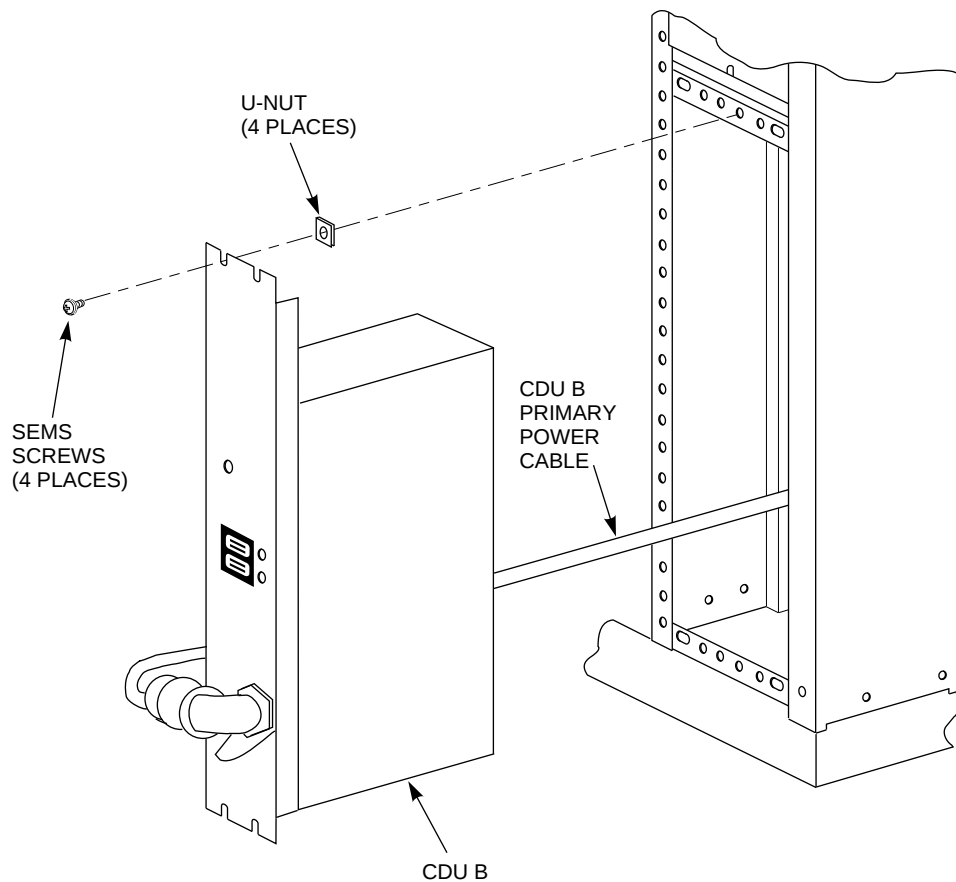
8. To install CDU B, you must have free access to the interior area of the front and rear CDU mounting slots. If necessary, gain access to the cabinet interior by separating the cabinet from adjacent ones and removing its side See Chapter 7 for details on cabinet hardware.

WARNING

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

9. Remove the new CDU (to be installed as CDU B) from its packing material. Thread the primary power cable through the cabinet as shown in Figures 9–3 and 9–4.
10. Using the hardware provided in the kit, mount CDU B to the cabinet chassis rails as shown in Figure 9–3.

Figure 9-3 CDU B Installation



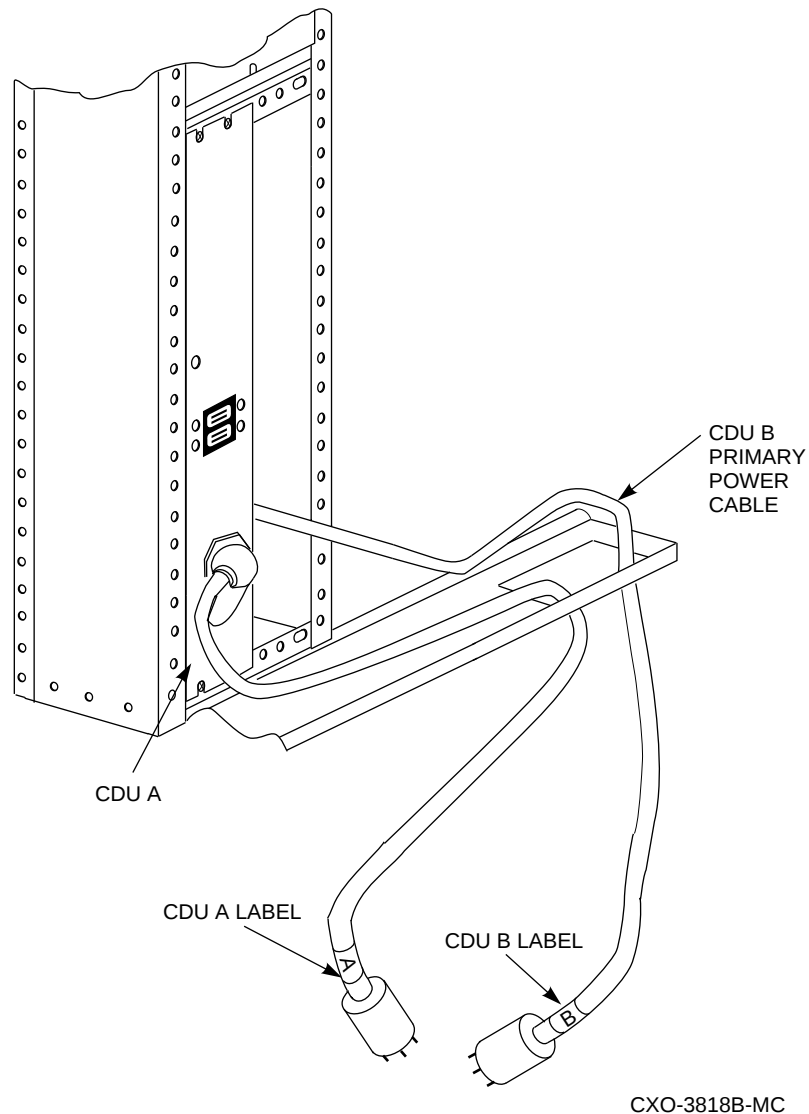
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Note

To prevent confusion resulting from the fact that the cabinet uses two power cables with the dual-power option, it is important that safety labels be properly applied. Install the cable and cabinet labeling carefully in accordance with the instructions in steps 11 through 15.

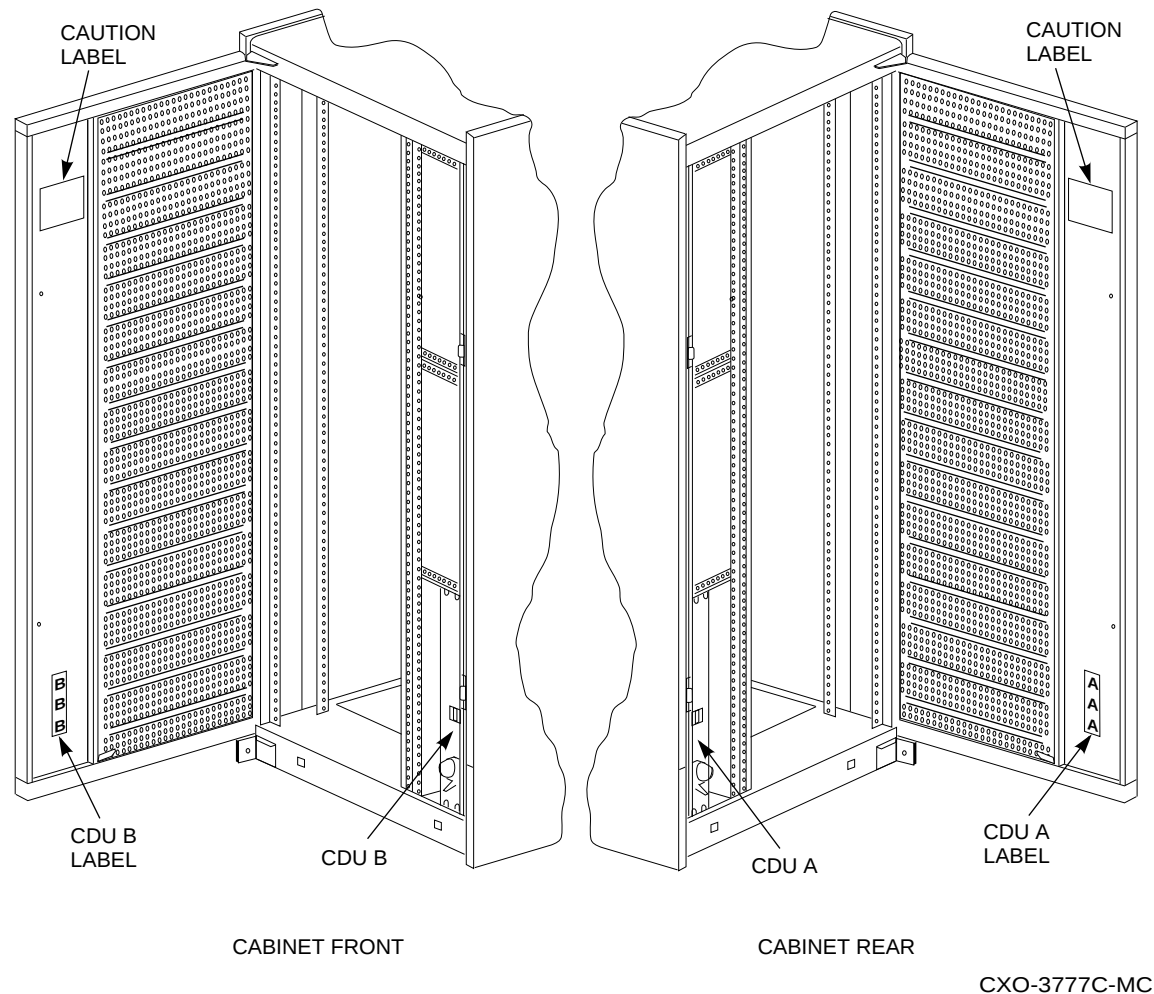
11. Remove one of the yellow “A” labels in the kit from its backing paper and place it on the lower inside panel of the rear cabinet door as shown in Figure 9-5.
12. Remove another of the yellow “A” labels in the kit from its backing paper and wrap it around the plug end of the primary power cable of CDU A as shown in Figure 9-4.
13. Remove one of the yellow “B” labels in the kit from its backing paper and place it on the lower inside panel of the front cabinet door as shown in Figure 9-5.

Figure 9-4 Power Cable Routing



14. Remove another of the yellow “B” labels in the kit from its backing paper and wrap it around the plug end of the primary power cable of CDU B as shown in Figure 9-3.
15. Remove the two yellow “CAUTION” labels from their backing papers and place them at eye level on the inside of each door as shown in Figure 9-5.
16. Make sure that the second dc power supply required for the dual-power option is installed in each shelf.
17. A complete set of gray ac power cables of various lengths is supplied in the kit. The ac power cables for each shelf location must be of a minimum length to reach CDU B. Refer to Chapter 5 or 6 to determine the correct cable length for each shelf.

Figure 9-5 Safety Label Locations



18. Loosen the safety bracket locking screw on CDU B and rotate its safety bracket away from the cables to be connected to it, as shown in Figure 9-2.
19. Plug the gray cable of the appropriate length into the second dc power supply in each shelf and route the cable to CDU B. (The second dc power supply is the right one for horizontal shelves, and the lower one for vertical shelves.) Route each added cable to CDU B along the same path as the shelf's existing black ac power cable. Attach the added cable to the cabinet rails using the existing cable clamps where possible. Use the additional cable ties, cable clamps, and mounting hardware provided in the kit where needed.
20. Connect the gray power cable(s) to the connector(s) on the rear panel of CDU B, starting at the top-most connector and working down.
21. Locate the cabinet fan power cords plugged into CDU A. One is labelled "A" and one "B", each with large, yellow labels. Unplug the cord labeled "B". Loosen the safety bracket on CDU A and rotate it out of the way to facilitate unplugging the cord as necessary. Make sure to return the safety bracket to the operating position if you move it.

22. Plug the fan power cord labeled "B" into a free outlet on the rear panel of CDU B.
23. Rotate the safety bracket back into position over the rear panel of CDU B and tighten the bracket locking screw.
24. If the cabinet's host computer interface cable(s) was disconnected in step 7, reconnect the cable(s).
25. Replace the cabinet side panels and reposition the cabinet next to the adjacent ones as appropriate.
26. Reconnect the primary power cable from CDU A to its source.
27. Connect the primary power cable from CDU B to the auxiliary power source.
28. Switch the circuit breakers on both CDUs to the | (ON) position.
29. Close and secure the cabinet doors.
30. 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–Mx controller shelf

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

BA350–Sx 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 Storage 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–Sx, 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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