

# DIGITAL StorageWorks UltraSCSI RAID Data Center Cabinet (DS–SW600–Series)

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## Installation and User's Guide

Part Number: EK–SW600–UG. B01

**February 1998**

Using a combination of the DIGITAL DS–SW600–series cabinets and UltraSCSI rack-mountable enclosures, you can create UltraSCSI RAID subsystems. This publication describes the procedures for preparing a site, installing, and using these cabinets.

**Digital Equipment Corporation  
Maynard, Massachusetts**

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**February 1998**

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**Note**

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This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules which are designed to provide reasonable protection against such radio frequency interference. Operation of this equipment in a residential area may cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference. Any modifications to this equipment — unless expressly approved by the manufacture — can void the user authority to operate this equipment under part 15 of the FCC rules.

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# Preface

The *DIGITAL StorageWorks UltraSCSI RAID Data Center Cabinet (DS-SW600-Series) Installation and User Guide* describes a cabinet specifically configured for UltraSCSI RAID subsystem use. This publication and the *DIGITAL StorageWorks UltraSCSI RAID Enclosure (DS-BA370-Series) User Guide* comprise the basic subsystem hardware documentation set. Related documentation describes the associated controllers, software, firmware, and procedures for combining multiple elements to create a user-defined, function-specific UltraSCSI RAID data center cabinet subsystem.

## Intended Audience

This publication is for use by customers and DIGITAL employees responsible for installing, configuring, and assembling data center cabinet subsystems.

## Structure

This manual is organized as follows:

### **Chapter 1**

Provides an overview of the major components of the data center cabinet.

### **Chapter 2**

Describes the site requirements and the procedures for inspecting, moving, and installing the data center cabinet.

### **Chapter 3**

Describes the procedure for installing an UltraSCSI enclosure in the lower position in a data center cabinet.

**Chapter 4**

Describes the procedure for installing an UltraSCSI enclosure in the upper position in a data center cabinet.

**Chapter 5**

Describes the procedure for removing and installing a power distribution unit in a data center cabinet.

**Chapter 6**

Describes the procedure for assembling a two cabinet configuration.

**Chapter 7**






Defines the physical, electrical, and environmental, specifications of the data center cabinet.

**Glossary**

Contains definitions of acronyms and specialized terms for this StorageWorks product.

# Documentation Conventions

The documentation conventions used in this publication are as follows:

<b>boldface type</b>	Boldface type indicates the first instance of terms being defined in the text, the glossary, or both.		
<i>italic type</i>	Italic type indicates emphasis and publication titles. Italic type in the glossary indicates a cross-reference.		
A/R	As required		
	Light Emitting diode (LED) is OFF or slowly blinking.		
	LED is ON.		
	LED is FLASHING (rapidly blinking).		
	Single-ended SCSI bus		
	Differential SCSI bus		

## Related Documents

The following publications contain additional information about the UltraSCSI subsystem.

Publication Title	Order Number
AC Power Controller (DS-BA35X-HE) Installation Guide	EK-35XHE-IG
Blower (DS-BA35X-MK) Installation Guide	EK-35XMK-IG
Environmental Monitor Unit (DS-BA35X-EB) Installation Guide	EK-35XEB-IG
HSZ70 Array Controller HSOF Version 7.0 CLI Reference Manual	EK-CLI70-RM
HSZ70 Array Controller HSOF Version 7.0 Service Manual	EK-HSZ70-SV
HSZ70 Array Controller Operating Software HSOF Version 7.0 Release Notes	EK-HSZ70-RN
HSZ70 Array Controller Configuration Version 7.0 Manual	EK-HSZ70-CG
Installing an External Cache Battery Cable	EK-HSZ70-TE
Power Verification and Addressing Assembly (DS-BA35X-EC) Installation Guide	EK-35XEC-IG
Shelf Power Supply (DS-BA35X-HH) Installation Guide	EK-35XHH-IG
Single-Ended I/O Module (DS-BA35X-MN) Installation Guide	EK-35XMN-IG
UltraSCSI Data Center Cabinet (DS-SW600-Series) Installation and User Guide	EK-SW600-UG
UltraSCSI Enclosure (DS-BA370-Series) User Guide	EK-BA370-UG
UltraSCSI Enclosure (DS-BA370-Series) Installation Guide	EK-BA370-IG
UltraSCSI Enclosure (DS-BA370-Series) RETMA Installation Guide	EK-35XRK-IG
UltraSCSI Subsystem Standby Power Operation	EK-POWER-IG

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# Manufacturer's Declarations

## Electromagnetic Compatibility

You can install this CE-Mark Class A certified product in a commercial or an office environment.



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### WARNING

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

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### ACHTUNG!

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

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### AVERTISSEMENT!

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**Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.**

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## Acoustic Noise Declarations

DIGITAL declares that the acoustic values of this product are as follows:

<b>Acoustics – Declared Values per ISO 9296 and ISO 7779:</b>				
<b>Product</b>	<b>Sound Power Level <math>L_{WA,d}</math>, B</b>		<b>Sound Pressure Level <math>L_{pAm}</math> dBA (bystander positions)</b>	
	<b>Idle</b>	<b>Operate</b>	<b>Idle</b>	<b>Operate</b>
RAID Array 7000 Subsystem (DS-SWXRA-HA) with: 1 ea. AC input power controllers (DS-BA35X-HE) 5 ea. 180 W enclosure power supplies (DS-BA35X-HH) 24 ea. disk drives (2, 4, 9 GB)	6.3	6.4	51.1	51.1
<b>Note</b>				
Current values for sound power levels are available from DIGITAL Equipment representatives. 1 Bel = 10 dBA.				

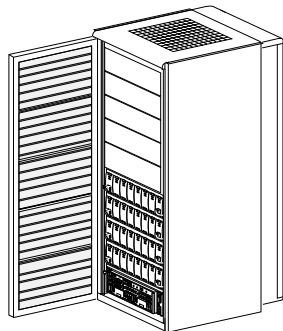
<b>Schallemissionswerte – Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779:</b>				
<b>Gerät</b>	<b>Schalleistungspegel <math>L_{WA,d}</math>, B</b>		<b>Schalldruckpegel <math>L_{pAm}</math>, dBA (Zuschauerpositionen)</b>	
	<b>Leerlauf</b>	<b>Betrieb</b>	<b>Leerlauf</b>	<b>Betrieb</b>
RAID Array 7000 Subsystem (DS-SWXRA-HA) with: 1 ea. AC input power controllers (DS-BA35X-HE) 5 ea. 180 W enclosure power supplies (DS-BA35X-HH) 24 ea. disk drives (2, 4, 9 GB)	6,3	6,4	51,1	51,1
<b>Note</b>				
Aktuelle Werte für spezielle Ausstattungsstufen sind über die DIGITAL Equipment Vertretungen erhältlich. 1 Bel = 10 dBA.				

# 1

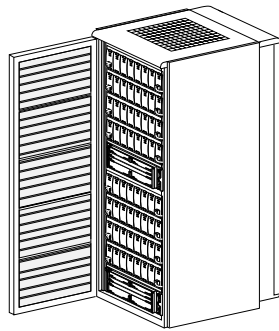
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## Introducing the Data Center Cabinet

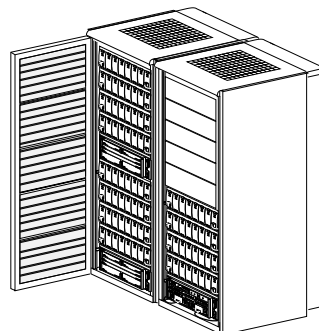
This chapter is an overview of the major components of the DIGITAL™ StorageWorks™ UltraSCSI data center cabinet. The basic building blocks of these subsystems are the DIGITAL StorageWorks **UltraSCSI Raid enclosure** (DS-BA370-series), otherwise known as the “enclosure,” and the **UltraSCSI data center cabinet** (DS-SW600-series), otherwise known as the “cabinet.”



**Single Cabinet with  
Master Enclosure**



**Single Cabinet with  
2 Master Enclosures**



**Two Cabinets with  
1 Master Enclosure and  
2 Expansion Enclosures**

## Introducing the Data Center Cabinet

Using UltraSCSI enclosures and this cabinet you can create a 24 or 72-device UltraSCSI RAID subsystem. Table 1-1 lists the general configuration of the DIGITAL supported subsystems.

**Table 1-1 Enclosure Configuration**

<b>Devices</b>	<b>Master Enclosures</b>	<b>Expansion Enclosures</b>	<b>Cabinets</b>
24	1	0	1
72	1	2	2

## Overview

This cabinet provides rack-mounting capability for standard 44.5 cm (17.5 inch) wide enclosures or shelves. The mounting holes for the metric rack-mounting pattern are on 25 mm (0.984 in) centers. The front and rear doors and the removable side panels provide easy access to the cabinet interior.

The cabinet has four feet and four casters. The casters enable you to easily move the cabinet; the adjustable feet provide stability and the capability to level the cabinet. Raising the adjustable feet will place the cabinet weight on the casters.

Each cabinet can be installed individually, or it can be joined to another cabinet to create a two-cabinet configuration with a **master enclosure** (an enclosure with array controllers) that controls the storage devices with a maximum of two **expansion enclosures**.

Although it is physically possible to join multiple cabinets together, DIGITAL recommends joining no more than two cabinets. This is the maximum number of cabinets that can be easily moved about.

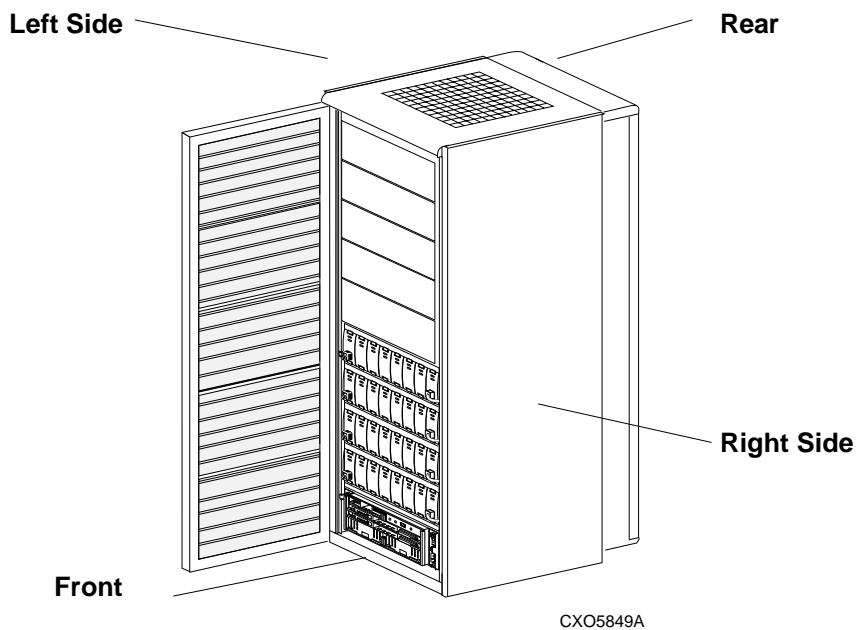


## Introducing the Data Center Cabinet

### Cabinet Orientation

Throughout this manual, references are made to various areas of the cabinet. The cabinet orientation is always viewed from the front of the cabinet. For example, the right rear rail is on the left when the cabinet is viewed from the rear.

**Figure 1-1 Cabinet Orientation**



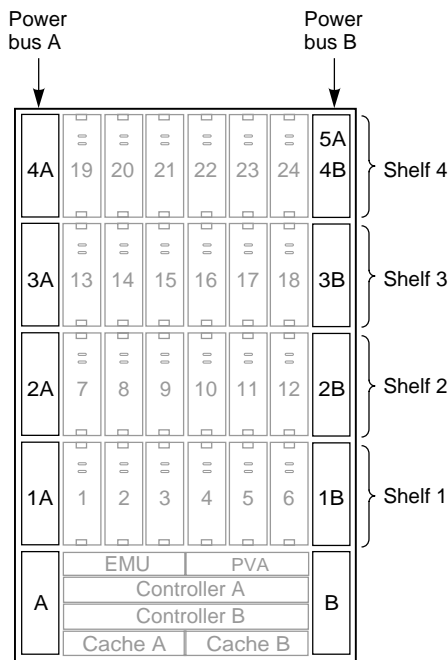
## Introducing the Data Center Cabinet

### Power Distribution

Ac power is distributed to the cabinet through one or two power distribution units (PDUs) mounted in the bottom, rear of the cabinet. DIGITAL recommends that when connecting two cabinets, never connect one cabinet power cord to the other (*cross wiring*). The cabinet power configurations are as follows:

- Standard power configuration (N+1);** the cabinet has one primary PDU that distributes power to the ac power controller marked A (black power bus). In this configuration, the ac power controller distributes ac power to the ac power side of bus A. Bus A distributes the ac power to five power supplies. The five power supplies (1A, 2A, 3A, 4A, and 5A) converts the ac power to dc power and supplies it to the dc side of bus A. Power supply 5A is the A bus redundant power supply. In event a power supply fails, it will ensure continuous dc power is available to the enclosure A bus (see Figure 1-2 and Figure 1-3).

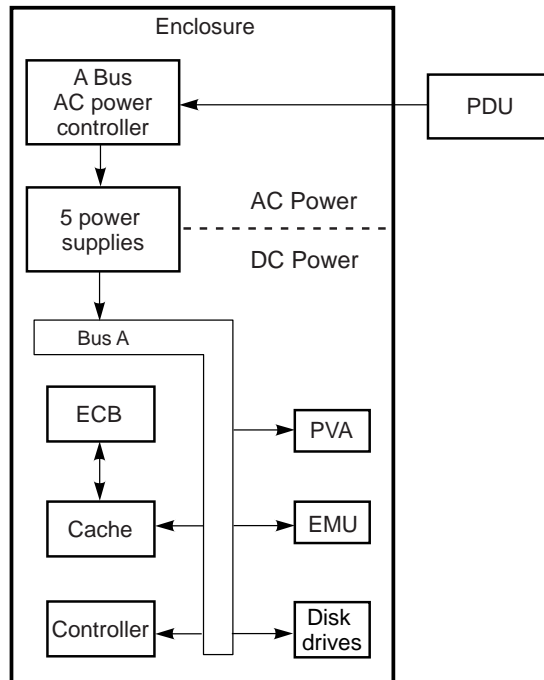
**Figure 1-2 Enclosure Power Buses**



CXO5808A

## Introducing the Data Center Cabinet

**Figure 1-3 Standard Power Configuration (N+1)**

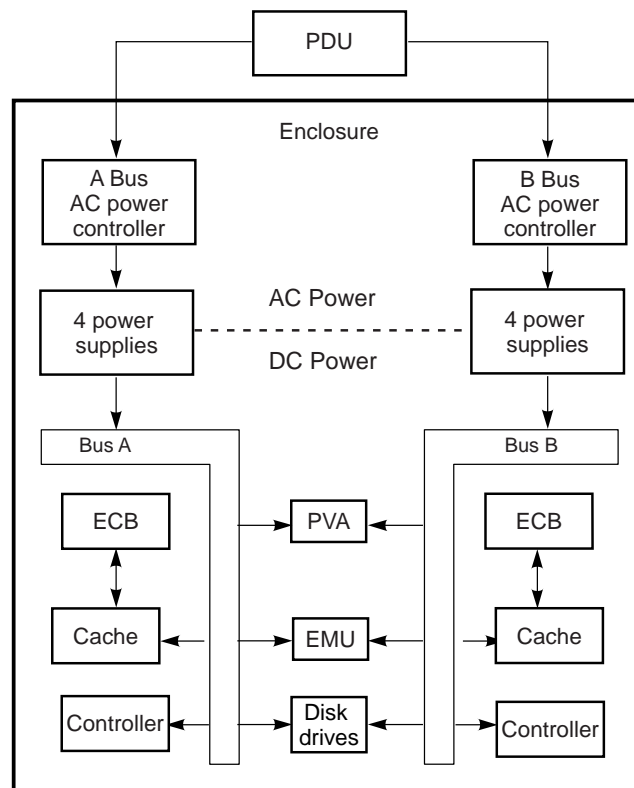


CXO6292A

## Introducing the Data Center Cabinet

- *Redundant power configuration (N+4)*; the cabinet has one primary PDU that distributes power to both ac power controller (marked A and B). The A ac power controller distribute power to four shelf power supplies (1A, 2A, 3A, and 4A) on bus A. The B ac power controller also distribute power to four shelf power supplies (1B, 2B, 3B, and 4B) on power bus B (see Figure 1-2).

**Figure 1-4 Redundant Power Configuration (N+4)**

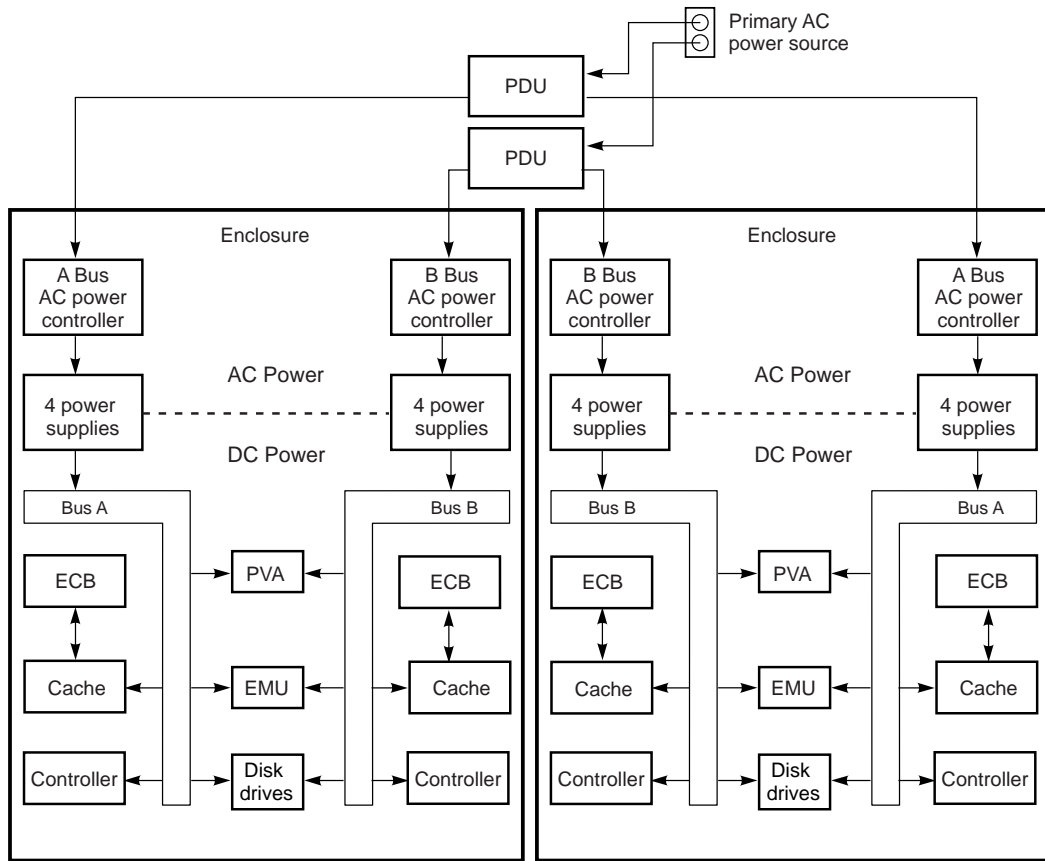


CXO6293A

## Introducing the Data Center Cabinet

- *Full redundant power configuration;* is the same as the redundant power configuration (N+4), except that there are two PDUs. The optional PDU mounts above the primary PDU and distributes power through the white power cords to the power bus B ac input power controllers.

**Figure 1-5 Full Redundant Power Configuration**

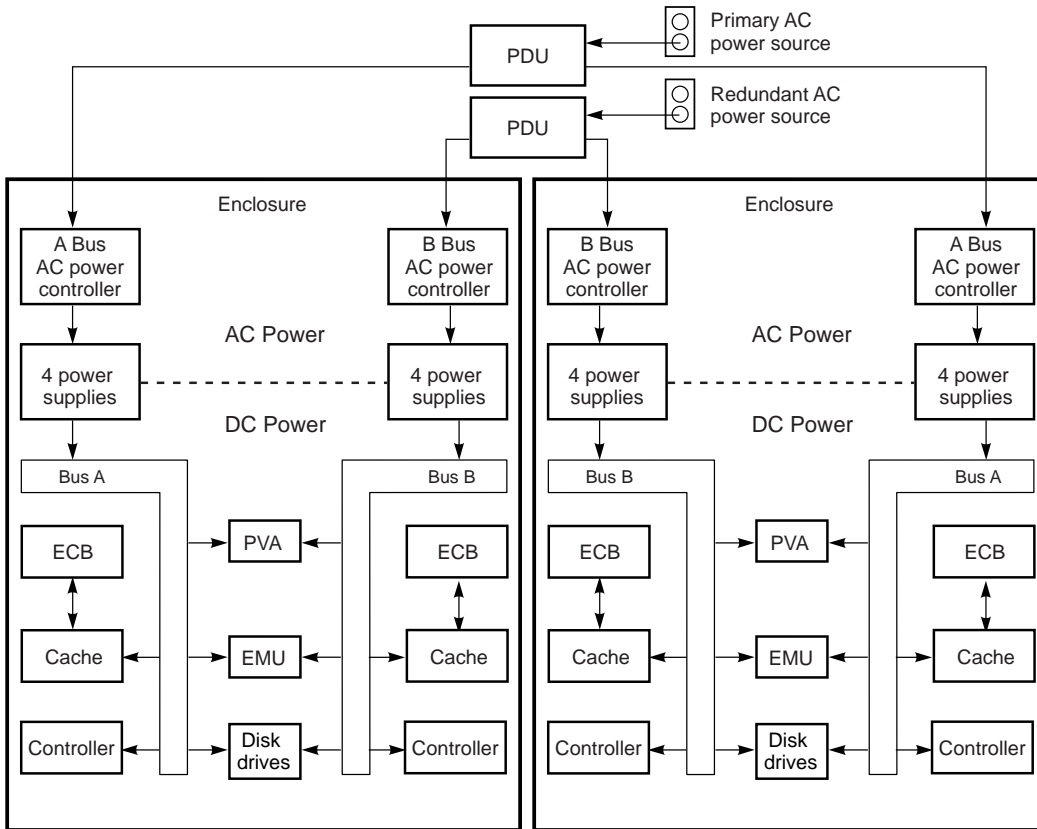


CXO6294A

## Introducing the Data Center Cabinet

- *Optimum redundant power configuration*; is the same as the full redundant power configuration (N+4), except that primary PDU is connected to the primary ac power source and the redundant PDU is connected to the redundant ac power source.

**Figure 1-6 Optimum Redundant Power Configuration**



CXO6295A

The PDUs are rated for 50 Hz and a 60 Hz at 250 V ac and is either 6 A or 12 A, respectively. PDUs are factory configured with the appropriate connector plugs (European or United States). The PDU that is supplied with the SW600-series cabinets comes with three outlets, only two of outlets should ever be used. Reason; with two ac power controllers connected to the PDU, the earth current leakage limit is nearly maximized.

## Introducing the Data Center Cabinet

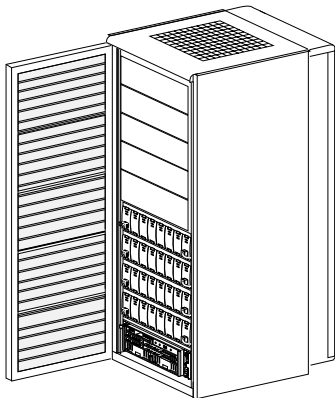
Therefore all three outlet The **external cache batteries (ECBs)** are not part of the basic power system. They are part of the array controller and are a dc source for the cache memory modules should there be an enclosure power failure.

### UltraSCSI RAID Enclosure

Each UltraSCSI RAID enclosure accommodates a maximum of twenty four 3.5-inch disk drives. These enclosures provide the mechanical mounting, power distribution, data signal interfaces for the **StorageWorks building blocks (SBBs)**, the array controllers, the **environmental monitor unit (EMU)**, and the **power verification assembly (PVA)**.

See Figure 1-7, Figure 1-8, and Figure 1-9 for descriptions of the DIGITAL supported cabinet configurations.

**Figure 1-7 Single-Cabinet with One Master Enclosure**



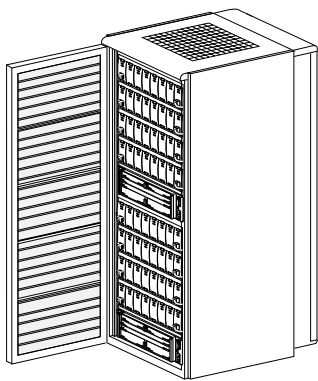
CX05849A

In this configuration a single enclosure is installed in the lower position of the cabinet. When using the *optional* full-redundant power configuration and dual-redundant controllers, the components of this configuration are as follows:

<b>Enclosure Components</b>	<b>Qty</b>
3.5-inch disk drives .....	24
AC input power controllers .....	2
Shelf power supplies .....	8
Controllers, cache memories, and ECBs .....	2
EMU .....	1
PVA .....	1
<b>Cabinet Components</b>	
PDU's .....	2
Filler panels .....	5

## Introducing the Data Center Cabinet

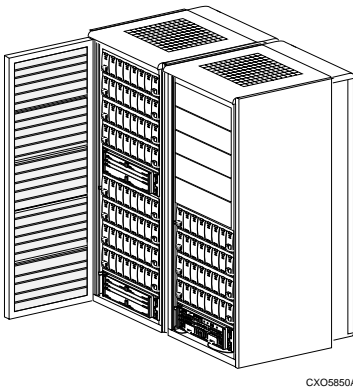
**Figure 1-8 Single Cabinet with Two Master Enclosures**



In this configuration two master enclosures are installed in one cabinet. These enclosures operate independently of each other and do not communicate directly. When using the *optional* full-redundant power configuration and dual-redundant controllers, the components of this configuration are as follows:

<b>Components per Master Enclosure</b>	<b>Qty</b>
3.5-inch disk drives .....	24
AC input power controllers.....	2
Shelf power supplies.....	8
Controllers, cache memories, and ECBs .....	2
EMU .....	1
PVA .....	1
<b>Cabinet Components</b>	<b>Qty</b>
PDU.....	2

**Figure 1-9 Two Cabinet Configuration**



In this configuration, the master enclosure mounts in the right hand cabinet. The left hand cabinet contains two expansion enclosures. These three enclosures comprise an UltraSCSI RAID subsystem. When using the *optional* full-redundant power configuration and dual-redundant controllers, the components of this configuration are as follows:

<b>Master Enclosure Components</b>	<b>Qty</b>
Controllers, cache memories, and ECBs .....	2
<b>Components per Enclosure</b>	<b>Qty</b>
3.5-inch disk drives .....	24
AC input power controllers.....	2
Shelf power supplies.....	8
EMU .....	1
PVA .....	1
<b>Cabinet Components</b>	<b>Qty</b>
PDU.....	4
Filler panels.....	5



## Introducing the Data Center Cabinet

### UltraSCSI Product Information

For detailed information about UltraSCSI products (for example, enclosures, array controllers, power supplies, disk drives, EMU, PVA, and so forth) refer to the following publications.

- *DIGITAL StorageWorks UltraSCSI RAID Enclosure (BA370-Series) User's Guide.*
- The array controller documentation.



# 2

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## Installing a Data Center Cabinet

This chapter describes the considerations, site preparation, and procedures for installing a data center cabinet.

### Site Requirements

Installation of the data center cabinets is restricted to a Class A open office environment. The site must meet the following general requirements:

- A primary power source providing 220–240 V ac, 50 or 60 Hz.
- The 60 Hz, 12 A power source must have a NEMA L6-30R, 3-pin, 30 A receptacle that is compatible with the ac power cable connector.



NEMA L6-30R



IEC 309

- The 50 Hz, 6 A power source must have a IEC-309, 3-pin, 16 A receptacle that is compatible with the ac power cable connector.
- Provides sufficient cooling to maintain the proper operating environment (see Chapter 7).
- The location of the data center cabinet depends on the location of the host adapter and the length of the host-to-array controller cable.
- The floor space required for a data center cabinet depends upon its configuration (single cabinet or two cabinets) as shown Figure 2-3 and Figure 2-4.
- Moving the cabinet to the installation area requires a clear, uncarpeted pathway at least 0.8 m (30 in) wide. DIGITAL suggests that the pathway be at least 0.9 m (36 in) wide.

## Installing a Data Center Cabinet

### Unpacking the Cabinet

Unpacking the cabinet involves removing the shipping carton and unloading the cabinet from the pallet. Instructions for completing these procedures are attached to the shipping carton.

### Inspecting the Subsystem

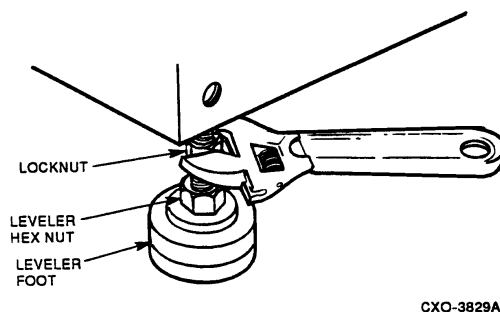
After unpacking the cabinet and removing it from the pallet, thoroughly inspect it to ensure that there is no physical damage as follows:

1. Ensure there is no external or internal damage.
2. Ensure that all hardware, panels, cable clamps, wire ties, and so forth, are fastened securely.
3. Make sure that all four leveler feet are fully raised so that the casters support the cabinet weight.

If the feet are not fully raised, complete the following procedure:

1. Use a wrench to turn the locknuts so that they are no longer against the bottom of the cabinet (see Figure 2-1).

**Figure 2-1 Raising the Leveler Feet**

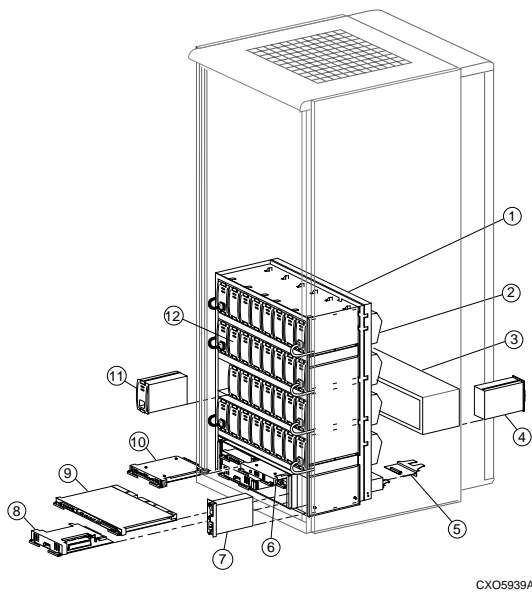


2. Raise the feet by turning the leveler feet hex nut counter-clockwise until the weight of the cabinet is fully on the casters. Continue to turn the hex nuts until all four feet are in the fully raised position.
3. Tighten the locknuts on all four leveler feet.

Figure 2-2 shows the location of the major components of a single enclosure cabinet.

## Installing a Data Center Cabinet

**Figure 2-2 Major Components of Data Center Cabinet**



1. UltraSCSI RAID enclosure (1 each)
2. Dual-speed blowers (8 each)
3. ECB shelf (1 each)
4. ECB (2 each)
5. I/O modules (6 each)
6. PVA (1 each)
7. AC input power controller (2 each)
8. Cache memory (2 each)
9. Array controller (2 each)
10. EMU (1 each)
11. Shelf power supplies (8 each)
12. 3.5-Inch disk drives SBBs (24 each)
13. **Not Shown**  
Power distribution unit  
beneath ECB shelf

Refer to Figure 2-2 and complete the following to ensure all components are secure and controls are in the Off position:

1. The PDU (item 13), ac input power controllers (item 7), and shelf power supplies (item 11) power cords are firmly seated.
2. The array controller (item 9), cache memory (item 8), and ECB (item 4) cables are firmly seated.
3. All SBBs (item 12) are seated firmly in their enclosures.
4. The ECB (item 4) is firmly seated in the ECB shelf.
5. The PDU (item 13) circuit breakers are in the Off (down) position.
6. For expansion configurations, the I/O module (item 5) data cables are firmly seated.

## Installing a Data Center Cabinet

### Moving the Cabinet

After inspecting the cabinet, you can move the cabinet to the installation area.



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#### WARNING

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**The size and weight of a data center cabinet requires a minimum of two people to move it.**

**For ease of maneuverability, always push the cabinet from the front.**

---

Moving the cabinet to the installation area requires a clear, uncarpeted pathway to the installation area that is at least 0.8 m (30 in) wide. DIGITAL suggests a pathway with a minimum clearance of at least 0.9 m (36 in).

### Installation Area

The area required for installing a cabinet depends upon whether you are installing a single cabinet or two attached cabinets.

#### Single Cabinet Installation Area

As shown in Figure 2-3, a single cabinet requires an area at least 600 mm (23.6 in) wide by 2100 mm (82.7 in) deep. This provides the minimum service area.

---

#### Note

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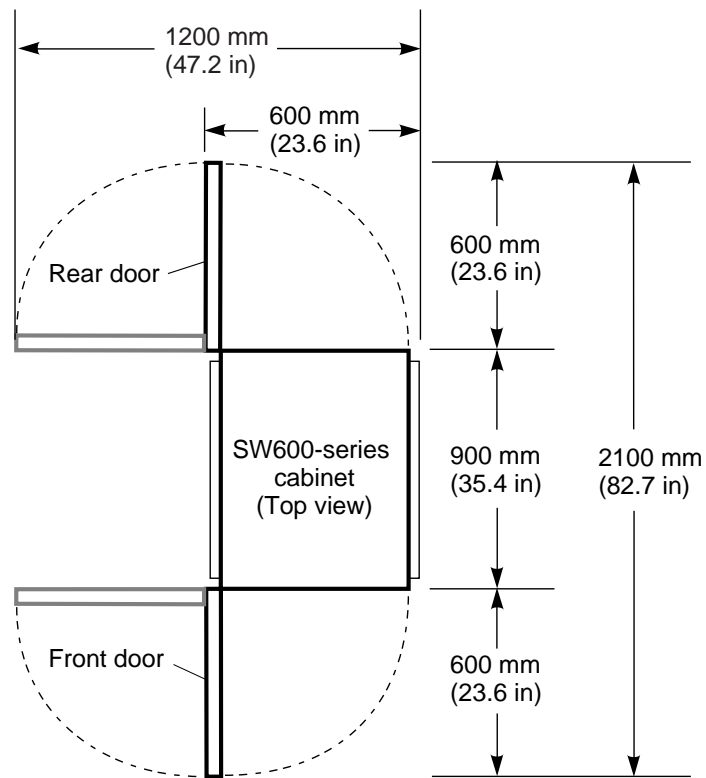
DIGITAL recommends allowing a minimum of 0.8 m (30 in) in the front and rear of the cabinet for servicing. This increases the depth of the installation area from 2100 mm (82.7 inches) to 2424 mm (95.4 in).

---

Fully opening the front and rear doors is not usually required for service. Doing so increases the installation area width to 1200 mm (47.2 in).

## Installing a Data Center Cabinet

**Figure 2-3 Single Cabinet Installation Requirements**



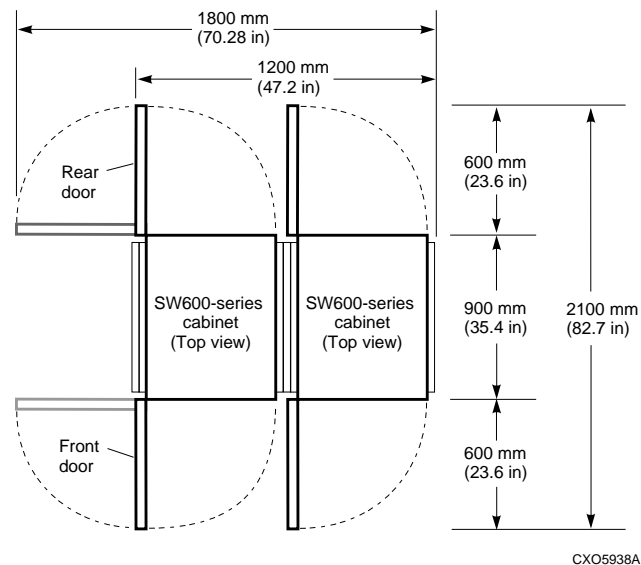
CXO5825A

## Installing a Data Center Cabinet

### Two Cabinet Installation Area

As shown in Figure 2-4, a two-cabinet configuration requires an area at least 1200 mm (47.2 inches) wide by 2100 mm (82.7 inches) deep. This provides the minimum service area.

**Figure 2-4 Two Cabinet Installation Area Requirements**



#### Note

DIGITAL recommends allowing a minimum of 0.8 m (30 inches) in the front and rear of the cabinet for servicing. This increases the depth of the installation area from 2100 mm (82.7 inches) to 2424 mm (95.4 inches)

Fully opening the front and rear doors is not usually required for service. Doing so increases the installation area width to 1800 mm (70.8 inches).

Before you can install a two-cabinet configuration, you must assemble the cabinet (see Chapter 6). This requires an assembly area that is larger than the installation area.



## Installing a Data Center Cabinet

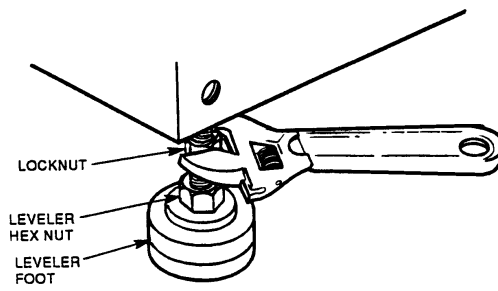
### Leveling the Cabinet

After positioning the cabinet in the installation area, you must stabilize and level the cabinet. By lowering the feet, you transfer the cabinet weight from the casters to the feet. Once the weight is fully on the feet, you can level the cabinet by making minor adjustments.

Complete the following procedure to level the cabinet:

1. Use a wrench to turn the locknuts so that they are no longer against the bottom of the cabinet (see Figure 2-5).

**Figure 2-5 Lowering the Leveler Feet**



CXC-3829A

2. Lower the feet by turning the leveler feet hex nut clockwise until the weight of the cabinet is fully on the feet.
3. If the cabinet is not completely level, loosen the locknut, adjust an individual foot, and then tighten the locknut.
4. Tighten the locknuts on all four leveler feet until the locknuts are tight against the cabinet.

## Completing the Installation



### 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.**

Once the cabinet is assembled and correctly positioned, you can complete the installation as described in the following sections.

### Installing the Enclosure Components

The basic installation sequence is the same for all cabinets. The *DIGITAL StorageWorks UltraSCSI RAID Enclosure (DS-BA370-Series) User's Guide* describes the following procedures in detail:

1. Install the power distribution components.
2. Install the EMU.
3. Install the PVA.
4. Install the controller.
5. Install the disk drives.

### Connecting Cabinet Power

Connect cabinet power using the procedures described in *DIGITAL StorageWorks UltraSCSI RAID Enclosure (DS-BA370-Series) User's Guide* for the following:

1. Connect the internal ac power cords.
2. Connect the ECB cables.
3. Connect the external ac power cables.

### Configuring the UltraSCSI Cabinet

Configure the cabinet using the procedures described in *DIGITAL StorageWorks UltraSCSI RAID Enclosure (DS-BA370-Series) User's Guide* for the following:

1. Set the enclosure address.
2. Connect the internal data cables.
3. Connect the external data cables.

# 3

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## Installing the Lower Enclosure

Always install the lower enclosure in the cabinet first. For cabinets configured with only one enclosure, the upper portion of the cabinet must have filler panels installed. A single cabinet, two enclosure configuration does not require cabinet filler panels.

Installing enclosure components, configuring power systems, and similar enclosure-specific procedures are described in the *DIGITAL StorageWorks UltraSCSI RAID Enclosure (DS-BA370-Series) User Guide*.

For information about configuring and operating the array controller, refer to the array controller documentation.



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### WARNING

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**Never install an upper enclosure into a cabinet that does not have a lower enclosure installed. To do so will cause the cabinet to become top-heavy and unstable. Failure to comply with this warning could result in personal injury or death.**

**Never attempt to lift an enclosure with components installed. Enclosures with all components installed weigh more than 81 kg (178 lb).**

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## Installing the Lower Enclosure

### Mounting Kit

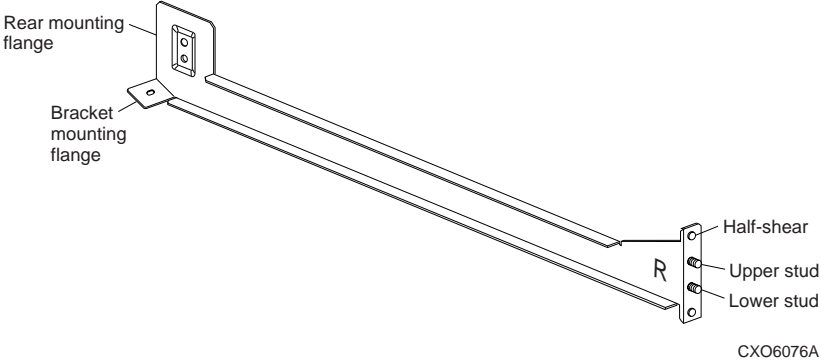
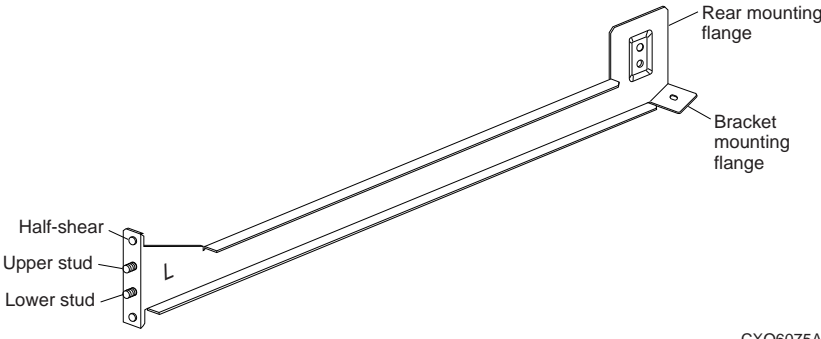
Each individual enclosure (DS-BA370-AA) includes a metric enclosure mounting kit. After unpacking the mounting kit, refer to

Table 3-1 and verify that the kit is complete.

#### Note

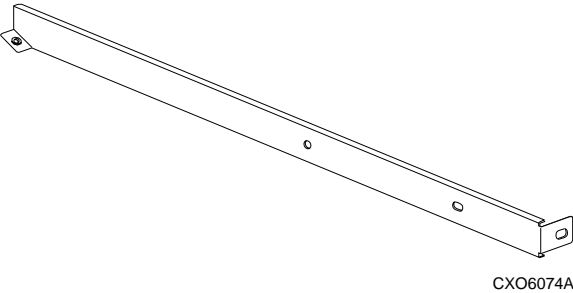
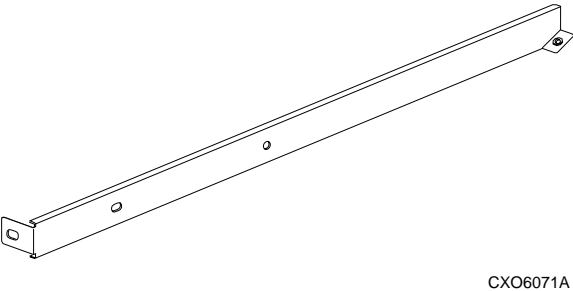
An optional RETMA mounting kit (DS-BA35X-RK) is available.

**Table 3-1 Enclosure Mounting Kit**

Description	Qty
Enclosure Mounting Rail—Right	2
 <p>Rear mounting flange</p> <p>Bracket mounting flange</p> <p>Half-shear</p> <p>Upper stud</p> <p>Lower stud</p> <p>CXO6076A</p>	
Enclosure Mounting Rail—Left	2
 <p>Rear mounting flange</p> <p>Bracket mounting flange</p> <p>Half-shear</p> <p>Upper stud</p> <p>Lower stud</p> <p>CXO6075A</p>	

## Installing the Lower Enclosure

**Table 3-1 Enclosure Mounting Kit (Continued)**

Description	Qty
Enclosure Mounting Bracket—Right	2
	
Enclosure Mounting Bracket—Left	2
	
10-32 U-nut	4
10-32 x 5/8 inch pan head SEMS screw	8
M5 Kep nut	8
8-32 x 1/4 inch pan head SEMS screw	8

## Installing the Lower Enclosure



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### WARNING

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**The left and right rails are not interchangeable. There are two ways to identify the rails—by the markings (L and R), and the notch at the front of the top flange.**

**Unless the notch is at the top, you cannot align the enclosure with the rail. If rails are incorrectly installed, you cannot insert the bracket into the rail and the enclosure could fall, resulting in personal injury or damage to the equipment.**

---

## Installation Procedure

The sequence for installing the enclosure is as follows:

1. Shut down the subsystem.
2. Remove the enclosure components (see page 3–6).
3. Install the enclosure rails (see page 3–6).
4. Mount the enclosure (see page 3–12).
5. Complete the installation (see page 3–17).

## Shutting Down the Subsystem



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### WARNING

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**The possibility of injury exists due to the high voltages present within the cabinet when power is applied. Therefore, all components must be turned off to include the power distribution unit (PDU). DIGITAL recommends that you disconnect the PDU ac power cord from the wall receptacle.**

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Complete the procedure in Table 3-2 and the following to shut down the subsystem.

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### Note

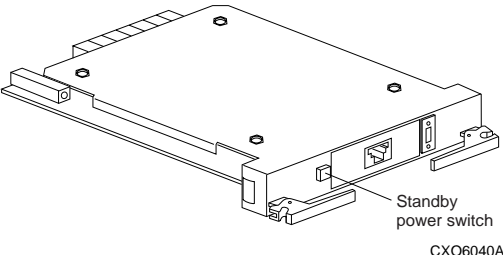
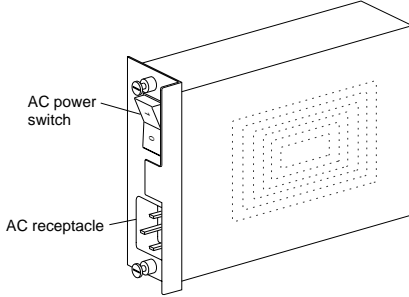
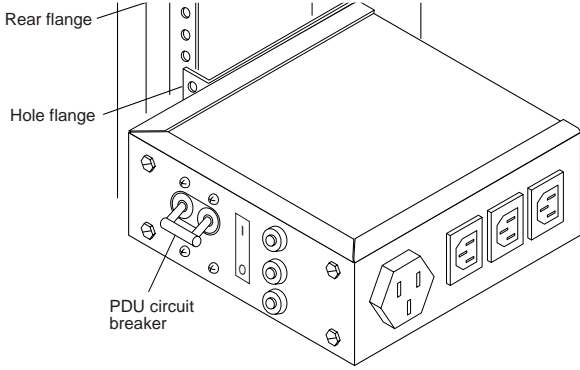
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When there is no expansion EMU, press the PVA standby power switch on the Master Enclosure.

---

## Installing the Lower Enclosure

**Table 3-2 Shutting Down the Subsystem**

<p>1. Shut down the array controller (refer to the array controller documentation).</p> <p>2. After shutting down the array controller, press and hold the PVA standby power switch on an expansion enclosure until the master EMU initiates a power shut down on all enclosures.</p>  <p>Standby power switch CXO6040A</p>
<p>3. Set the ac power controller switches to the <b>O</b> (Off) position.</p>  <p>AC power switch AC receptacle CXO5488A</p>
<p>4. Set the PDU circuit breaker to the <b>O</b> (Off) position.</p>  <p>Rear flange Hole flange PDU circuit breaker CXO6029A</p>
<p>5. Disconnect the PDU ac power cord from the wall receptacle.</p>

## Installing the Lower Enclosure

### Removing Enclosure Components

Before installing an enclosure in a cabinet you must remove the DIGITAL installed components. The *DIGITAL StorageWorks UltraSCSI RAID Enclosure (BA370-Series) User Guide* describes the procedures for accomplishing this task.



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#### WARNING

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**An enclosure with all the components installed weighs more than 81 kg (178 lb).**

**To reduce the possibility of injury, you must use the following procedures:**

- 1. Remove all the components before lifting the enclosure.**
  - 2. Use a minimum of two people to move or install the enclosure.**
  - 3. Use a handcart or dolly to move the enclosure.**
- 

### Installing the Enclosure Rails

The enclosure rails are attached to both the front and rear cabinet rails using a combination of a threaded mounting stud, a lock nut, a U-nut, and a screw.

The front of the rail has two half-shears and the rear mounting flange has one; their purpose is to align the enclosure rail to the cabinet rail.

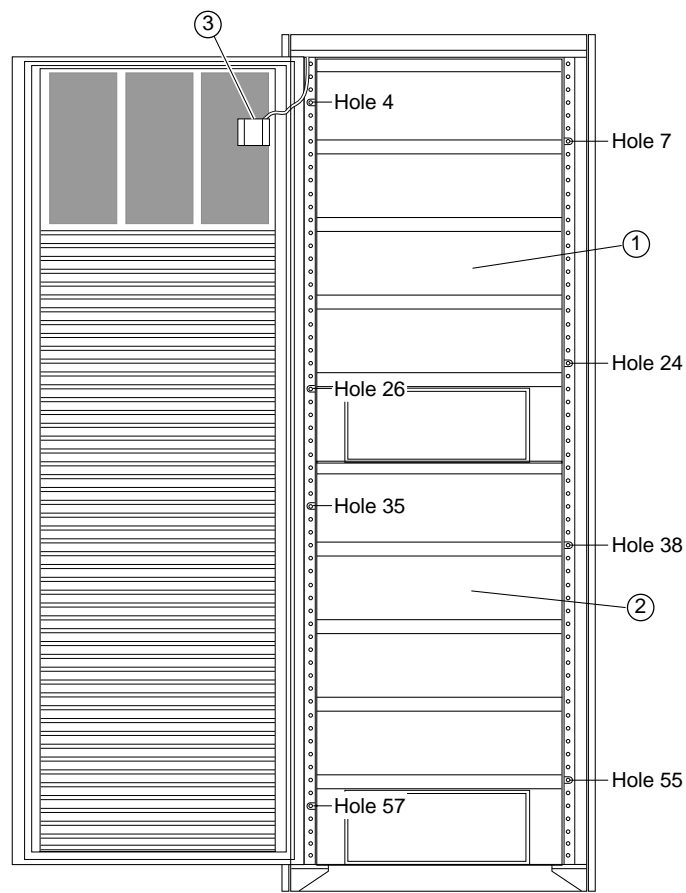
The rear half-shear will disengage from the cabinet rail as the rear mounting screw is tightened.

Figure 3-1 identifies the cabinet rail holes that are used to insert each mounting rail upper stud.



## Installing the Lower Enclosure

**Figure 3-1 Lower Enclosure Cabinet Rail Locations**



CXO5972A

The rail installation sequence is as follows:

1. Install the upper-left enclosure mounting rail (see page 3-8).
2. Install the lower-left enclosure mounting rail (see page 3-9).
3. Install the upper-right enclosure mounting rail (see 3-10).
4. Install the lower-right enclosure mounting rail (see 3-11).

## Installing the Lower Enclosure



### WARNING

The left and right rails are not interchangeable.

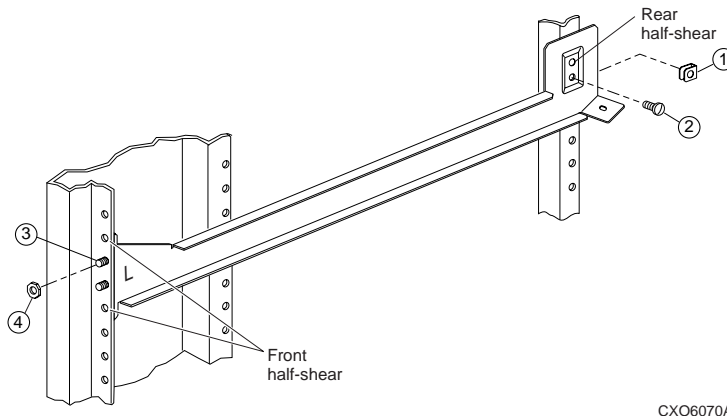
Unless the rails are installed with the notch at the top, the enclosure could fall, resulting in personal injury or damage to the equipment.

## Installing the Upper-Left Enclosure Mounting Rail

Complete the procedure in Table 3-3 to install the upper-left enclosure mounting rail.

**Table 3-3 Installing the Upper-Left Enclosure Mounting Rail**

1. On the cabinet left-rear rail, install a U-nut (callout 1) over hole 35.



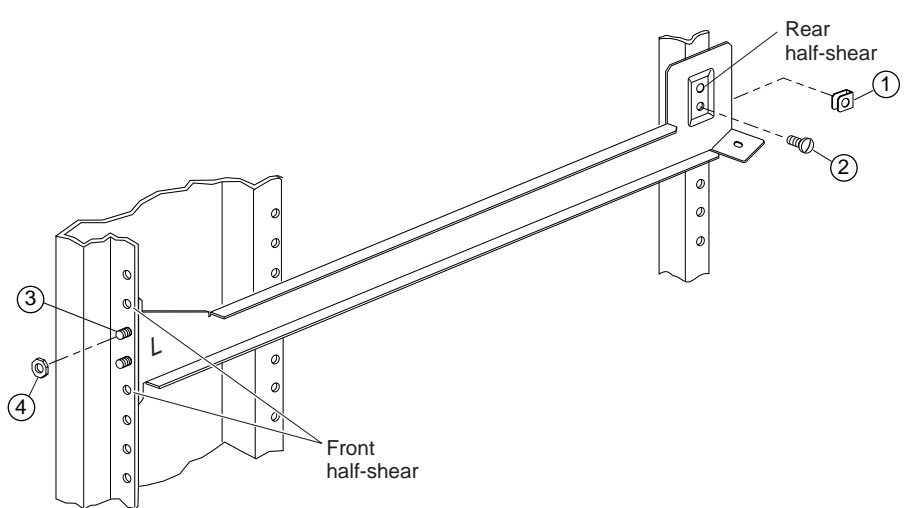
2. Align the front upper stud (callout 3) with the cabinet left front rail hole 35.
3. Slide the rail towards the cabinet front, ensuring that both half-shears fully engage the rail.
4. Finger tighten a Kep nut (callout 4) onto the upper stud (callout 3). The Kep nut (callout 4) will be tightened after all the rails have been installed.
5. Insert the rear mounting flange half shear into the hole with the U-nut (hole 35).
6. Insert a 10-32 x 5/8 inch pan head screw (callout 2) through the rail into the U-nut (callout 1) and finger tighten.

## Installing the Lower Enclosure

### Installing the Lower-Left Cabinet Rail

Complete the procedure in Table 3-4 to installing the lower-left cabinet rail.

**Table 3-4 Installing the Lower-Left Cabinet Rail**

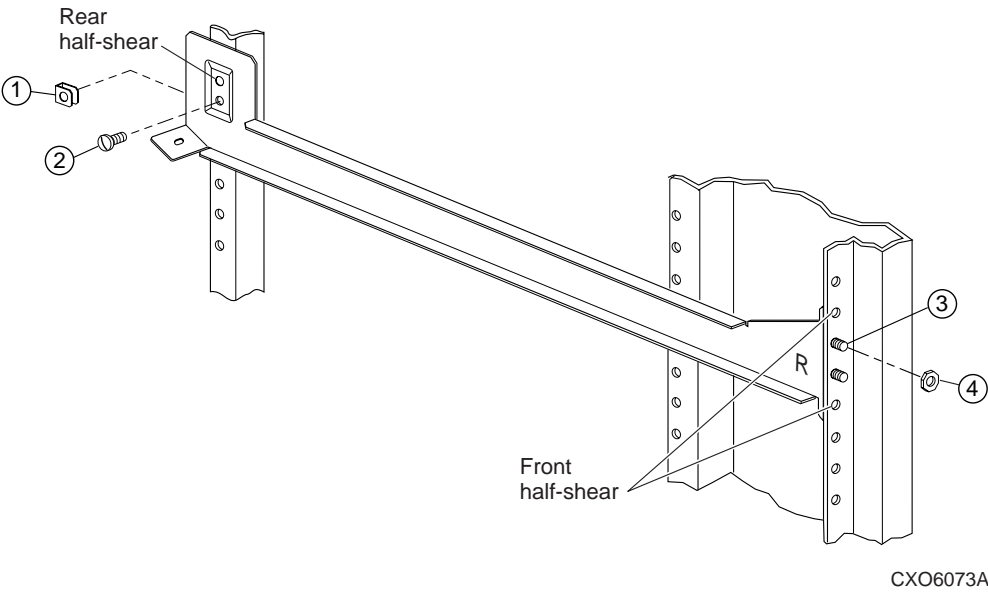
<p>1. On the cabinet left-rear rail, install a U-nut (callout 1) over hole 57.</p>  <p style="text-align: right;">CXO6070A</p>
<p>2. Align the front upper stud (callout 3) with the cabinet left front rail hole 57.</p>
<p>3. Slide the rail towards the cabinet front, ensuring that both half-shears fully engage the rail.</p>
<p>4. Finger tighten a Kep nut (callout 4) onto the upper stud (callout 3). The Kep nut (callout 4) will be tightened after all the rails have been installed.</p>
<p>5. Insert the rear mounting flange half shear into hole 56.</p>
<p>6. Insert a 10-32 x 5/8 inch pan head screw (callout 2) through the rail into the U-nut (callout 1) and fully tighten.</p>

## Installing the Lower Enclosure

### Installing the Upper-Right Cabinet Rail

Complete the procedure in Table 3-5 to installing the upper-right cabinet rail.

**Table 3-5 Installing the Upper-Right Cabinet Rail**

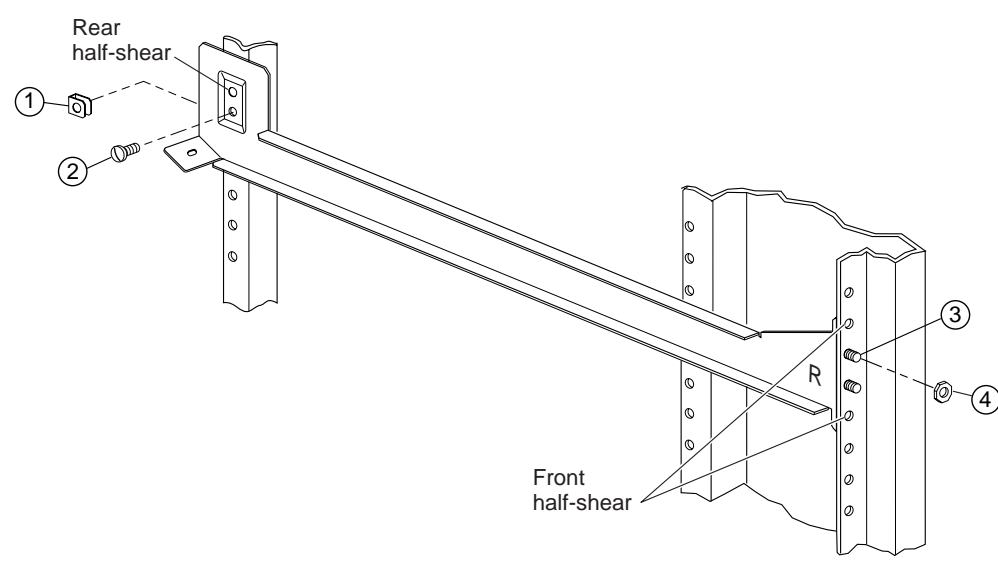
<p>1. On the cabinet right-rear rail, install a U-nut (callout 1) over hole 38.</p>  <p>Rear half-shear</p> <p>Front half-shear</p> <p>R</p> <p>CXO6073A</p>
<p>2. Align the front upper stud (callout 3) with the cabinet right front rail hole 38.</p>
<p>3. Slide the rail towards the cabinet front, ensuring that both half-shears fully engage the rail.</p>
<p>4. Finger tighten a Kep nut (callout 4) onto the upper stud (callout 3). The Kep nut (callout 4) will be tighten after all the rails have been installed.</p>
<p>5. Insert the rear mounting flange half shear into hole 37.</p>
<p>6. Insert a 10-32 x 5/8 inch pan head screw (callout 2) through the rail into the U-nut (callout 1) and fully tighten.</p>

## Installing the Lower Enclosure

### Installing the Lower-Right Cabinet Rail

Complete the procedure in Table 3-6 to installing the lower-right cabinet rail.

**Table 3-6 Installing the Lower-Right Cabinet Rail**

<p>1. On the cabinet right-rear rail, install a U-nut (callout 1) over hole 55.</p>  <p>CXO6073A</p>
<p>2. Align the front upper stud (callout 3) with the cabinet right front rail hole 55.</p>
<p>3. Slide the rail towards the cabinet front, ensuring that both half-shears fully engage the rail.</p>
<p>4. Finger tighten a Kep nut (callout 4) onto the upper stud (callout 3). The Kep nut (callout 4) will be tightened after all the rails have been installed.</p>
<p>5. Insert the rear mounting flange half shear into hole 54.</p>
<p>6. Insert a 10-32 x 5/8 inch pan head screw (callout 2) through the rail into the U-nut (callout 1) and fully tighten.</p>
<p>7. Fully tighten all the front stud Kep nuts (callout 4).</p>

## Installing the Lower Enclosure

### Mounting the Enclosure



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#### WARNING

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**An empty enclosure weighs more than 37 kg (81 lb) and an enclosure with all the components installed weighs more than 81 kg (178 lb).**

**To reduce the possibility of personal injury, always implement the following procedures:**

- **Use a minimum of two people to move or install the enclosure.**
- **DIGITAL recommends using a handcart or dolly to move the enclosure.**
- **Remove all the components before lifting the enclosure.**
- **To ensure cabinet stability, always mount the first enclosure in the bottom of the cabinet.**

---

Mounting an enclosure in a data center cabinet involves the following procedures:

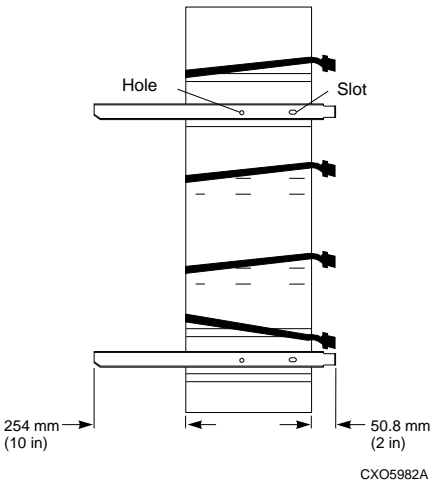
1. Installing the enclosure mounting brackets (see page 3–13).
2. Installing the enclosure in the cabinet (see page 3–14).
3. Connecting the status light emitting diode (LED) cable (see page 3–14).
4. Mounting the enclosure in the cabinet (see page 3–15).
5. Installing the cabinet filler panels (see page 3–15).
6. Completing the installation (see page 3–17).

## Installing the Lower Enclosure

### Installing the Enclosure Mounting Brackets

Complete the procedure in Table 3-7 to install the enclosure mounting brackets.

**Table 3-7 Installing the Enclosure Mounting Brackets**

<p>1. Position the bracket with the slot towards the enclosure front.</p>  <p>254 mm (10 in)</p> <p>50.8 mm (2 in)</p> <p>CXO5982A</p>
<p>2. Insert an 8–32 x ¼ inch screw through the slot and into the enclosure. Do not fully tighten the screw.</p>
<p>3. Align the screw hole at the rear of the bracket with the mounting hole in the enclosure. Insert an 8–32 x ¼ inch screw through the hole into the enclosure and fully tighten.</p>
<p>4. Fully tighten the front mounting screw.</p>
<p>5. Repeat steps 1 through 3 for the other three brackets.</p>
<p>6. Use two people to position the <i>empty</i> enclosure on the floor in front of the cabinet.</p>

## Installing the Lower Enclosure

### Installing the Enclosure

Complete the procedure in Table 3-8 to install the enclosure in the cabinet:

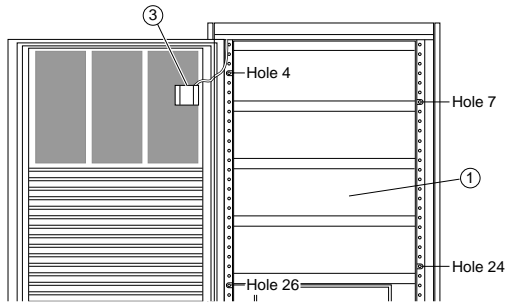
**Table 3-8 Installing the Enclosure**

1. Place all data cables, power cords, and ECB cables behind the cabinet rails so that the enclosure will not pinch or cut them.
2. Using two people, lift the empty enclosure and place the enclosure brackets into the notch at the front of the rails. Ensure that all four brackets fully engage the rails.
3. Carefully slide the enclosure half-way into the cabinet, taking care to not pinch or damage cords and cables.

### Connecting the Status LED

Complete the procedure in Table 3-9 to connect the enclosure status LEDs to the front door.

**Table 3-9 Connecting the Status LED**

1. Connect the front door LED cable to the enclosure LED cable.

2. Visually inspect all the cables (LED, ECB, and ac power) and verify that they are behind the rails.



## Installing the Lower Enclosure

### Mounting the Enclosure in the Cabinet

Complete the procedure in Table 3-10 to mount the enclosure in the cabinet.

**Table 3-10 Mounting the Enclosure in the Cabinet**

1. Carefully slide the enclosure into the cabinet, (ensure that the enclosure does not pinch the cables or cords) until it is fully seated. Make sure the front tab enclosure brackets are centered over the middle stud of the rail.
2. Install a Kep nut on the middle stud of all four rail and bracket sets and finger tighten.
3. In the rear of the cabinet, install a 10-32 x 5/8 inch pan head screw through each rail into the bracket.
4. Fully tighten all nuts and screws that secure the enclosure to the cabinet.

### Installing the Cabinet Filler Panels

A single enclosure always requires cabinet filler panels to maintain the proper air flow.

\_\_\_\_\_ **Note** \_\_\_\_\_

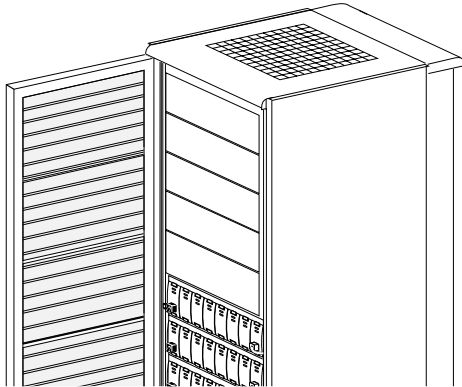
The filler panels are not part of any enclosure or enclosure mounting kit and must be ordered separately.

\_\_\_\_\_

Complete the procedure in Table 3-11 to install cabinet filler panels.

## Installing the Lower Enclosure

**Table 3-11 Installing Cabinet Filler Panels**

1. On both front cabinet rails, install U-nuts over holes 2, 7, 8, 13, 14, 19, 20, 25, 26 and 31.

2. Align the top filler with holes 2 and 7. Insert the four screws through the panel into U-nuts and tighten.
3. Align the second panel over holes 8 and 13. Insert the four screws through the panel into U-nuts and tighten.
4. Align the third panel over holes 14 and 19. Insert the four screws through the panel into U-nuts and tighten.
5. Align the fourth panel over holes 20 and 25. Insert the four screws through the panel into U-nuts and tighten.
6. Align the fifth panel over holes 26 and 31. Insert the four screws through the panel into U-nuts and tighten.

## Installing the Lower Enclosure

### Completing the Installation

After installing the enclosure, refer to *DIGITAL StorageWorks UltraSCSI RAID Enclosure (DS-BA370-Series) User Guide*, and complete the following procedures:

1. Install the ac power controllers.
2. Install the power supplies.
3. Install the EMU.
4. Install the PVA.
5. Install the I/O modules.
6. Install the SBBs.
7. Connect the expansion enclosure cables.
8. Install the I/O modules.
9. Install the array controllers and cache module.
10. Install the ECBs.
11. Configure the subsystem.
12. Start the subsystem and ensure that it is operating correctly.



# 4

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## Installing the Upper Enclosure

The UltraSCSI solution data center cabinets are factory-configured to meet specific customer requirements. An existing system can be expanded by adding a second enclosure to a cabinet or by adding an enclosure to a new cabinet. This chapter describes the procedure for installing an upper enclosure into a cabinet.

Installing enclosure components, configuring power systems, and similar enclosure-specific procedures are described in the *DIGITAL StorageWorks UltraSCSI RAID Enclosure (DS-BA370-Series) User Guide*.

For information about configuring and operating the array controller, refer to the array controller documentation.



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### WARNING

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**Never install an upper enclosure into a cabinet that does not have a lower enclosure installed. To do so will cause the cabinet to become top-heavy and unstable. Failure to comply with this warning could result in personal injury or death.**

**Never attempt to lift an enclosure with components installed. Enclosures with all components installed weighs more than 81 kg (178 lb).**

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## Installing the Upper Enclosure

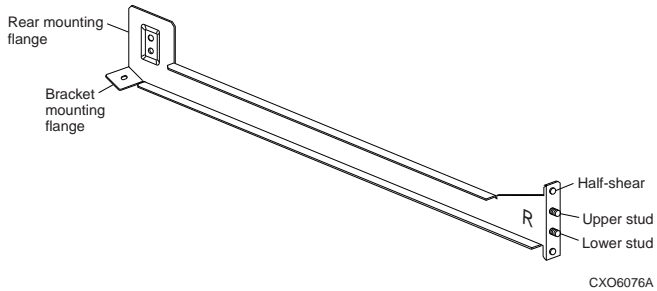
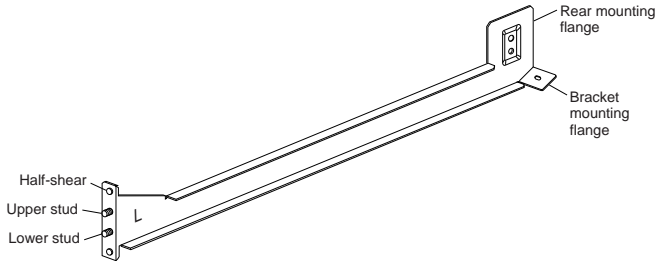
### Mounting Kit

Each individual enclosure (DS-BA370-AA) includes a metric enclosure mounting kit. After unpacking the mounting kit, refer to Table 4-1 and verify that the kit is complete.

**Note**

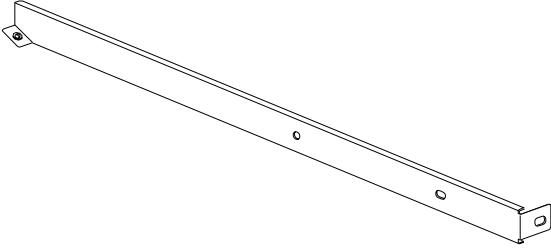
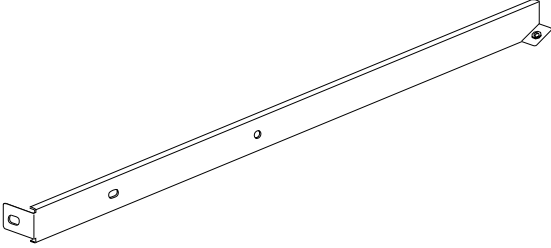
An optional RETMA mounting kit (DS-BA35X-RK) is available.

**Table 4-1 Enclosure Mounting Kit**

Description	Qty
<p>Enclosure Mounting Rail—Right</p>  <p style="text-align: right;">CXO6076A</p>	2
<p>Enclosure Mounting Rail—Left</p>  <p style="text-align: right;">CXO6075A</p>	2

## Installing the Upper Enclosure

**Table 4-1 Enclosure Mounting Kit (Continued)**

Description	Qty
Enclosure Mounting Bracket—Right  <div style="text-align: right; margin-right: 100px;">CXO6074A</div>	2
Enclosure Mounting Bracket—Left  <div style="text-align: right; margin-right: 100px;">CXO6071A</div>	2
10-32 U-nut	4
10-32 x 5/8 inch pan head SEMS screw	8
M5 Kep nut	8
8-32 x 1/4 inch pan head SEMS screw	8

## Installing the Upper Enclosure



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### WARNING

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**The left and right rails are not interchangeable. There are two ways to identify the rails—by the markings (L and R), and the notch at the front of the top flange.**

**Unless the notch is at the top, you cannot align the enclosure with the rail. If rails are incorrectly installed, you cannot insert the bracket into the rail and the enclosure could fall, resulting in personal injury or damage to the equipment**

---

## Installation Sequence

The installation sequence is as follows:

1. Shut down the subsystem.
2. Remove the cabinet filler panels (see page 4-6).
3. Remove enclosure components (see page 4-7).
4. Install the enclosure mounting rails (see page 4-7).
5. Mount the enclosure (see page 4-13).
6. Complete the installation (see page 4-16).

## Shutting Down the Subsystem



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### WARNING

---

**The possibility of injury exists due to the high voltages present within the cabinet when power is applied. Therefore, all components must be turned off to include the power distribution unit (PDU). DIGITAL recommends that you disconnect the PDU ac power cord from the wall receptacle.**

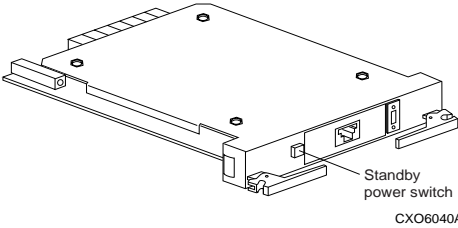
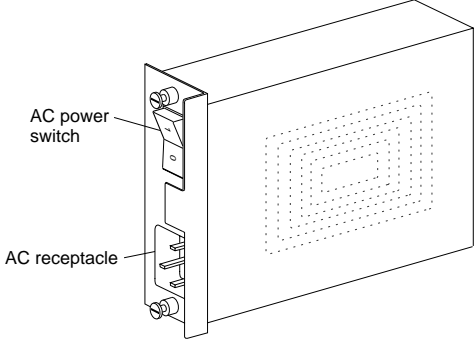
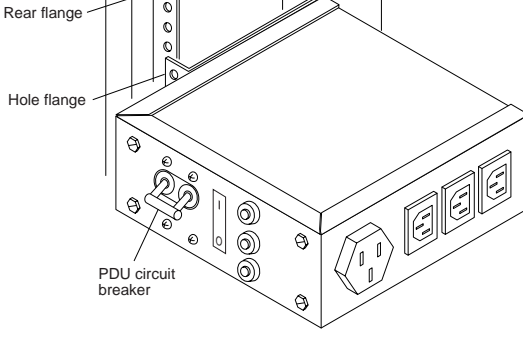
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Complete the procedure the procedure found in Table 4-2 to shut down the subsystem.



## Installing the Upper Enclosure

**Table 4-2 Subsystem Shut Down Procedure**

<p>1. Shut down the array controller (refer to the array controller documentation).</p> <p>2. After shutting down the array controller, press and hold the PVA standby power switch on an expansion enclosure until the master EMU initiates a power shut down on all enclosures.</p>  <p>The diagram shows a perspective view of the array controller expansion enclosure, model CXO6040A. A label points to a small rectangular switch on the front panel, identified as the 'Standby power switch'.</p>
<p>3. Set the ac power controller switches to the <b>0</b> (Off) position.</p>  <p>The diagram shows a perspective view of the AC power controller enclosure, model CXO5488A. Two labels point to components on the front panel: 'AC power switch' and 'AC receptacle'.</p>
<p>4. Set the PDU circuit breaker to the <b>0</b> (Off) position.</p>  <p>The diagram shows a perspective view of the PDU enclosure, model CXO6029A. Three labels point to components: 'Rear flange' at the top, 'Hole flange' below it, and 'PDU circuit breaker' pointing to a switch on the front panel.</p>
<p>5. Disconnect the PDU ac power cord from the wall receptacles.</p>

## Installing the Upper Enclosure

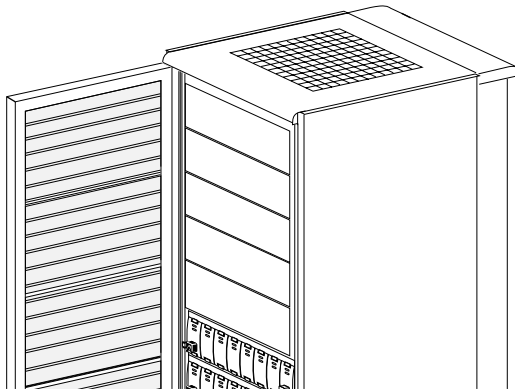
### Removing the Cabinet Filler Panels

When adding an enclosure to a single cabinet with an enclosure installed, you must remove the five cabinet filler panels at the top of the cabinet.

Complete the procedure found in Table 4-3 to remove the filler panels.

**Table 4-3 Removing Cabinet Filler Panels**

1. Remove the four mounting screws from the top panel.



2. Remove the panel.
3. Remove and store the four filler panel U-nuts from the cabinet rails.
4. Repeat Steps 1 and 2 for the other four panels.
5. Retain screws, panels, and U-nuts for future use.

## Removing Enclosure Components

Before installing an enclosure in a cabinet, you must remove the DIGITAL installed components. The *DIGITAL StorageWorks UltraSCSI RAID Enclosure (BA370-Series) User Guide* describes the procedures for accomplishing this task.



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### WARNING

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**An enclosure with all the components installed weighs more than 81 kg (178 lb).**

**To reduce the possibility of injury, you must use the following procedures:**

- 1. Remove all the components before lifting the enclosure.**
- 2. Use a minimum of two people to move or install the enclosure.**
- 3. Use a handcart or dolly to move the enclosure.**

**Never slide hands along the cabinet rails. Cabinet rail edges may be sharp and personal injury can occur if this warning is not complied with.**

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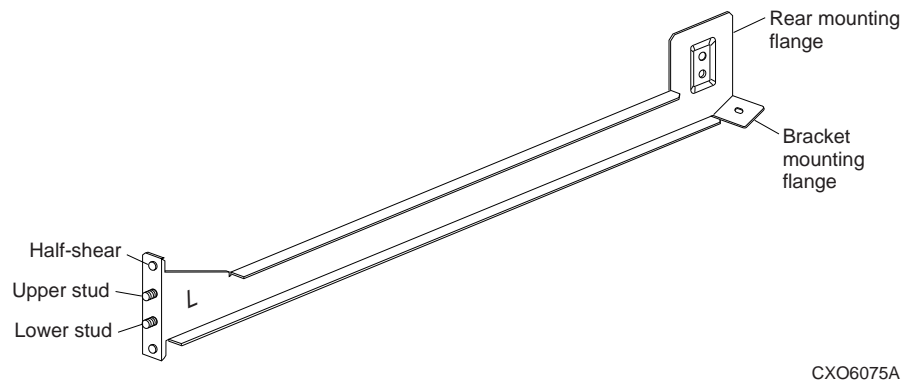
## Installing the Enclosure Mounting Rails

The enclosure mounting rails (see Figure 4-1) attach to both the front and rear cabinet rails using a combination of threaded mounting studs, lock nuts, U-nuts, and screws.

- Both front and the rear half-shears are used to align the enclosure mounting rail to the cabinet rail.
- Both studs are inserted through the front rail holes and are secured with M5 Kep nuts.
- A U-nut and a screw secure the enclosure mounting rail to the rear cabinet rail.

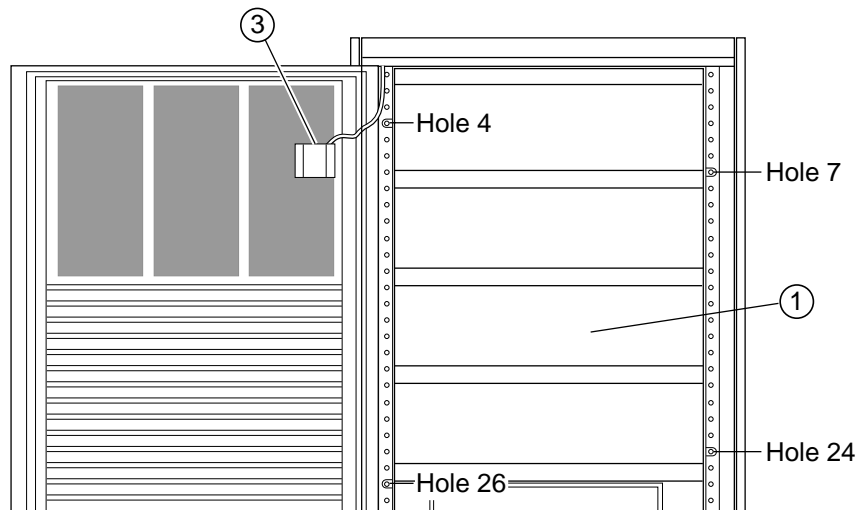
## Installing the Upper Enclosure

**Figure 4-1 Typical Enclosure Mounting Rail**



The enclosure mounting rail upper stud are insert into the holes identified in Figure 4-2. The rear rail hole location (used to insert the U-nuts) is the same as the front rail holes location.

**Figure 4-2 Upper Enclosure Cabinet Rail Hole Locations**



## Installing the Upper Enclosure

The rail installation sequence is as follows:

1. Install the upper left cabinet rail.
2. Install the lower left cabinet rail (see page 4-10).
3. Install the upper right cabinet rail (see page 4-11).
4. Install the lower right cabinet rail (see page 4-12).

The following warning applies to all enclosure mounting rail installations:



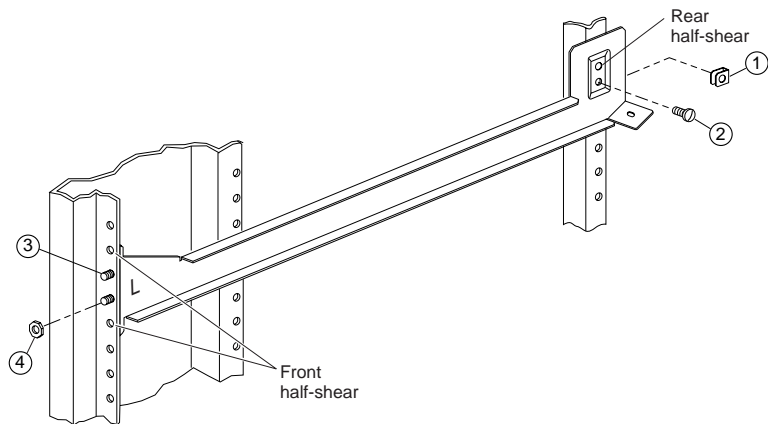
### WARNING

**The left and right rails are not interchangeable.  
Unless the rails are installed with the notch at the top,  
the enclosure could fall, resulting in personal injury  
or damage to the equipment**

## Installing the Upper-left Rail

Complete the procedure in Table 4-4 to install the upper-left enclosure mounting rail.

**Table 4-4 Installing the Upper-Left Enclosure Mounting Rail**

<p>1. On the cabinet left-rear rail, install a U-nut (callout 1) over hole 4.</p>  <p>CXO6070A</p>
<p>2. Align the top-left enclosure mounting rail stud (callout 3) with the cabinet left-front rail hole 4.</p>

## Installing the Upper Enclosure

**Table 4-4 Installing the Upper-Left Enclosure Mounting Rail (Continued)**

3.	Slide the rail towards the cabinet front ,ensuring that the half-shears engage the cabinet rail.
4.	Finger tighten a Kep nut (callout 4) on the upper stud (callout 3).
5.	Align the rear half-shear with hole 3 and insert a 10-32 x 5/8 inch pan head screw (callout 2) through the enclosure mounting rail into the U-nut (callout 1). Fully tighten.
6.	The Kep nuts (callout 4) will be tightened after all rails have been installed.

## Installing the Lower-Left Rail

Complete the procedure in Table 4-5 to install the lower-left enclosure mounting rail.

**Table 4-5 Installing the Lower-Left Enclosure Mounting Rail**

1.	On the cabinet left–rear rail, install a U-nut (callout 1) over hole 25.
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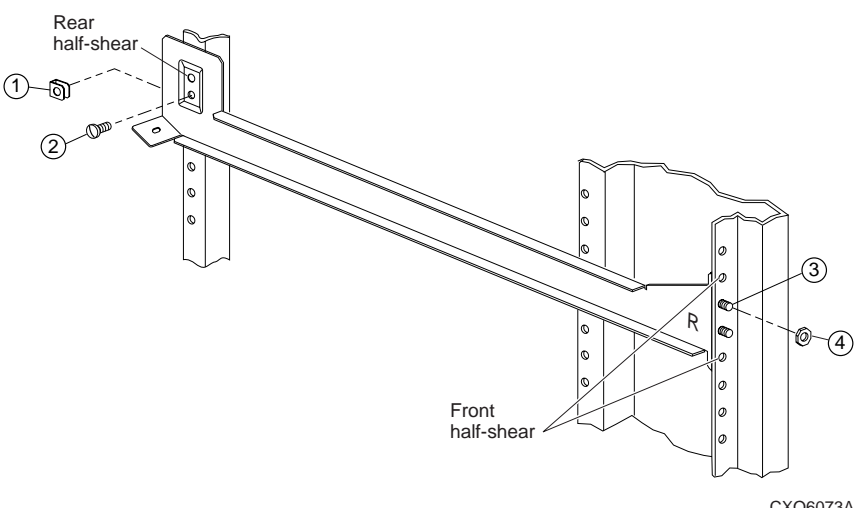
2.	Align the top–left enclosure mounting rail stud (callout 3) with the cabinet left–front rail hole 25.
3.	Slide the rail towards the cabinet front, ensuring that the half-shears engage the cabinet rail.
4.	Finger tighten a Kep nut (callout 4) on the upper stud (callout 3).
5.	Align the rear half-shear with hole 24 and insert a 10-32 x 5/8 inch pan head screw (callout 2) through the enclosure mounting rail into the U-nut (callout 1). Fully tighten.
6.	The Kep nuts (callout 4) will be tightened after all rails have been installed.

## Installing the Upper Enclosure

### Installing the Upper-Right Rail

Complete the procedure in Table 4-6 to install the upper-right enclosure mounting rail.

**Table 4-6 Installing the Upper-Right Enclosure Mounting Rail**

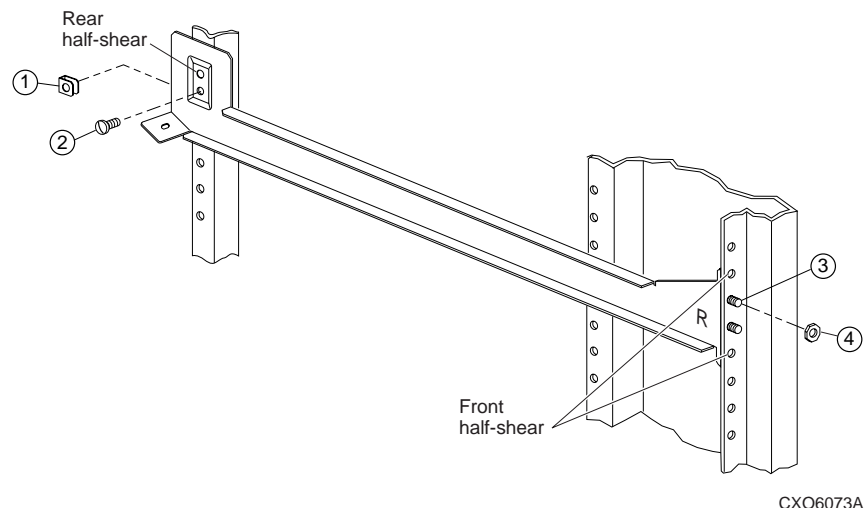
<p>1. On the cabinet right-rear rail, install a U-nut (callout 1) over hole 7.</p>  <p style="text-align: right;">CXO6073A</p>
<p>2. Align the top-right enclosure mounting rail stud (callout 3) with the cabinet right-front rail hole 7.</p>
<p>3. Slide the rail towards the cabinet front, ensuring that the half-shears engage the cabinet rail.</p>
<p>4. Finger tighten a Kep nut (callout 4) on the upper stud (callout 3).</p>
<p>5. Align the rear half-shear with hole 6 and insert a 10-32 x 5/8 inch pan head screw (callout 2) through the enclosure mounting rail into the U-nut (callout 1). Fully tighten.</p>
<p>6. The Kep nuts (callout 4) will be tightened after all rails have been installed.</p>

## Installing the Upper Enclosure

### Installing the Lower-Right Rail

Complete the procedure in Table 4-7 to install the lower-right enclosure mounting rail.

**Table 4-7 Installing the Lower-Right Enclosure Mounting Rail**

1. On the cabinet right-rear rail, install a U-nut (callout 1) over hole 24.
 <p>The diagram shows a perspective view of the lower-right enclosure mounting rail assembly. A long, thin rail is being attached to a cabinet rail. On the left, a 'Rear half-shear' is shown with a U-nut (callout 1) and a 10-32 pan head screw (callout 2) being inserted. On the right, a 'Front half-shear' is shown with a stud (callout 3) and a Kep nut (callout 4) being installed. The rail is labeled 'R'. The diagram is labeled 'CXO6073A'.</p>
2. Align the top-right enclosure mounting rail stud (callout 3) with the cabinet right-front rail hole 24.
3. Slide the rail towards the cabinet front ensuring that the half-shears engage the cabinet rail.
4. Finger tighten a Kep nut (callout 4) on the upper stud (callout 3).
5. Align the rear half-shear with hole 23 and insert a 10-32 pan head screw (callout 2) through the enclosure mounting rail into the U-nut (callout 1). Fully tighten.
6. Tighten the Kep nuts (callout 4) installed in step 4 for all four enclosure mounting rails.



## Mounting the Enclosure



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### WARNING

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**An empty enclosure weighs more than 37 kg (81 lb) and an enclosure with all the components installed weighs more than 81 kg (178 lb).**

**To reduce the possibility of personal injury always implement the following procedures:**

- **Use a minimum of two people to move or install the enclosure.**
- **DIGITAL recommends using a handcart or dolly to move the enclosure.**
- **Remove all the components before lifting the enclosure.**

**To ensure cabinet stability, always mount the first enclosure in the bottom of the cabinet.**

---

The following list is the sequence for mounting an enclosure into a data center cabinet:

1. Installing the enclosure mounting brackets (see page 4–14).
2. Positioning the enclosure in the cabinet (see page 4–15).
3. Connecting the status LED cable (see page 4–15).
4. Mounting the enclosure in the cabinet (see page 4–16).
5. Completing the installation (see page 4–16).

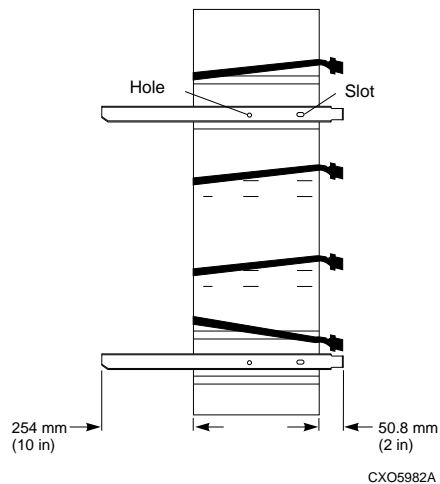
## Installing the Upper Enclosure

### Installing the Enclosure Mounting Brackets

Complete the procedure in Table 4-8 to install the mounting brackets on the enclosure.

**Table 4-8 Installing the Enclosure Mounting Brackets**

1. Position the bracket with the slot towards the enclosure front.



2. Insert an 8–32 x ¼ inch screw through the slot and into the enclosure. Do not fully tighten the screw.
3. Align the screw hole at the rear of the bracket with the mounting hole in the enclosure. Insert an 8–32 x ¼ inch screw through the hole into the enclosure and fully tighten.
4. Fully tighten the front mounting screw.
5. Repeat steps 1 through 3 for the other three brackets.
6. Use two people to position the *empty* enclosure on the floor in front of the cabinet.

## Installing the Upper Enclosure

### Positioning the Enclosure

Complete the procedure in Table 4-9 to install the enclosure in the cabinet rails.

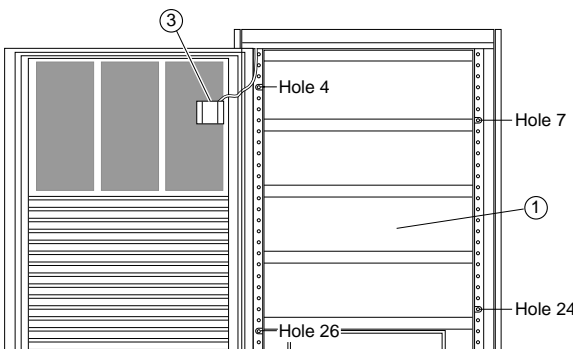
**Table 4-9 Installing the Enclosure in the Cabinet Rails:**

1. Place all data power and ECB cables and cords behind the cabinet rails so that the enclosure will not pinch or cut them.
2. Using two people, lift the empty enclosure and place the enclosure brackets into the notch at the front of the rails. Ensure that all four brackets fully engage the rails.
3. Carefully slide the enclosure—half way into the cabinet, taking care to not pinch or damage cords and cables.

### Connecting the Status LED

Complete the procedure in Table 4-10 to connect the enclosure status LEDs to the front door.

**Table 4-10 Connecting the Status LED**

1. Connect the front door LED cable to the enclosure LED cable (callout 3).

2. Visually inspect all the cables (LED, ECB, and ac power) and verify that they are behind the rails.

## Installing the Upper Enclosure

### Mounting the Enclosure in the Cabinet

Complete the procedure in Table 4-11 to mount the enclosure in the cabinet.

**Table 4-11 Mounting the Enclosure in the Cabinet**

1. Carefully slide the enclosure into the cabinet (ensure that it does not pinch data cables or power cords) until it is fully seated. Make sure the front tab enclosure brackets are centered over the middle stud of the rail.
2. Install a Kep nut on the two studs of all four rail and bracket set and finger tighten.
3. In the rear of the cabinet, install a 10-32 x 5/8 inch pan head screw through each rail into the bracket.
4. Fully tighten all nuts and screws to secure the enclosure to the cabinet..

### Completing the Installation

After installing the enclosure, refer to *DIGITAL StorageWorks UltraSCSI RAID Enclosure (DS-BA370-Series) User Guide*, and complete the following procedures:

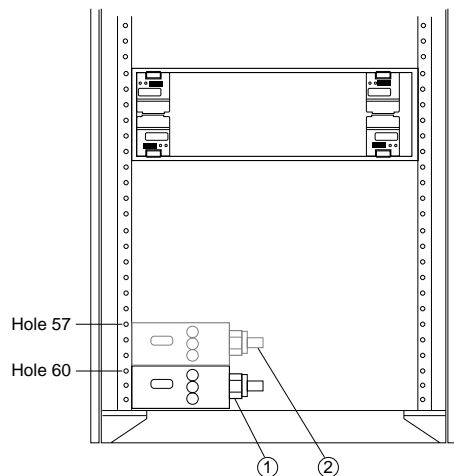
1. Install the ac power controllers.
2. Install the power supplies.
3. Install the EMU.
4. Install the PVA.
5. Install the I/O modules.
6. Install the SBBs.
7. Connect the expansion enclosure cables.
8. Install the I/O modules.
9. Install the array controllers and cache module.
10. Install the ECBs.
11. Configure the subsystem.
12. Start the subsystem and ensure that it is operating correctly.

# 5

## Installing a PDU

This chapter contains the procedure for replacing or installing either a primary (callout 1) or a redundant (callout 2) power distribution unit (PDU).

**Figure 5-1 Typical PDU Location**



Rear View

The PDUs are available for either 50 Hz or 60 Hz operation. For detailed information about configuring the power systems, see the *DIGITAL StorageWorks UltraSCSI RAID User's Manual*.

## Installing a PDU

## Shutting Down the Subsystem



### WARNING

The possibility of injury exists due to the high voltages present within the cabinet when power is applied. Therefore, all components must be turned off to include the (PDU). DIGITAL recommends that you disconnect the PDU ac power cord from the wall receptacle.

Shutting down the subsystem in the proper sequence ensures that data integrity is maintained and that potentially hazardous power is removed in preparation for the installation procedure.

## RAID Subsystem Shut Down

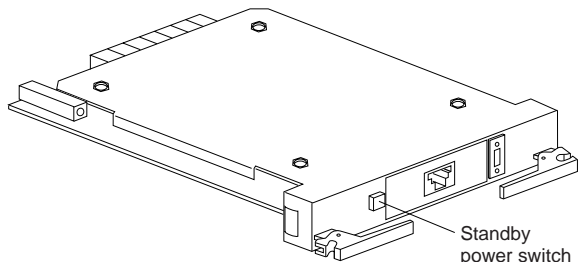
Complete the procedure in Table 5-1 to Shut down the RAID Subsystem.

**Table 5-1 Shutting Down the RAID Subsystem**

1. Shut down the array controller (see array controller documentation).
2. After shutting down the array controller, press and hold the PVA standby power switch on an expansion enclosure until the master EMU initiates a power shut down on all enclosures.

### Note

When there is no expansion EMU, press the PVA standby power switch on the Master Enclosure.

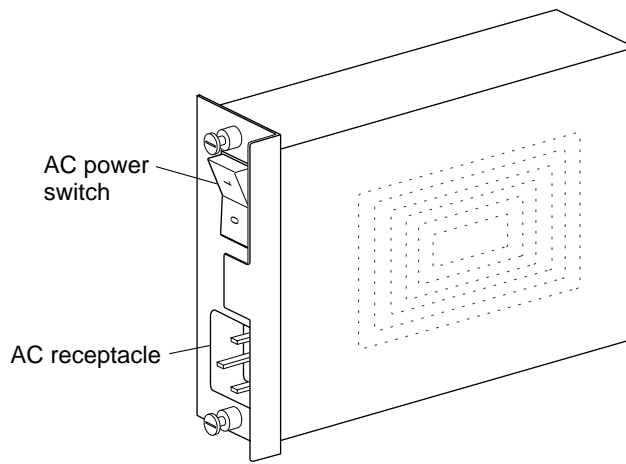


CXO6040A

## Installing a PDU

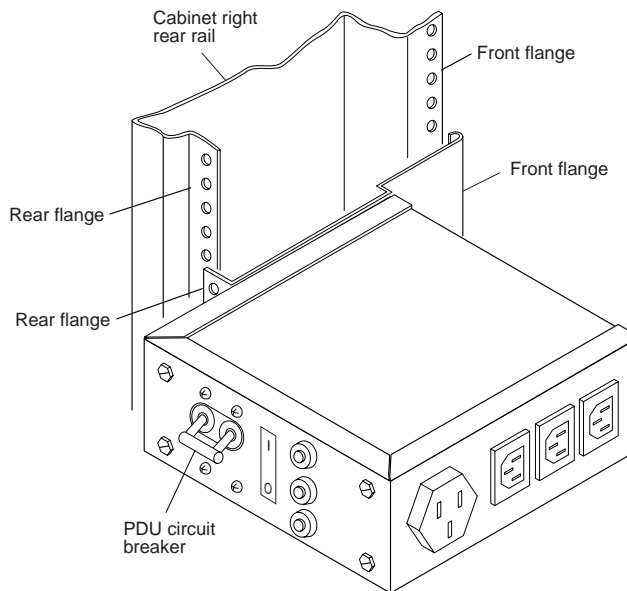
**Table 5-1 Shutting Down the RAID Subsystem (Continued)**

3. Set the ac power controller switch to the **O** (off) position.



CXO5488A

4. Set the PDU circuit breaker to the **O** (off) position.



CXO6029A

5. Disconnect the PDU ac power cord from the wall receptacles.

## Installing a PDU

### Removing the PDU

Complete Table 5-2 to remove a PDU from the cabinet:

**Table 5-2 Removing the PDU**

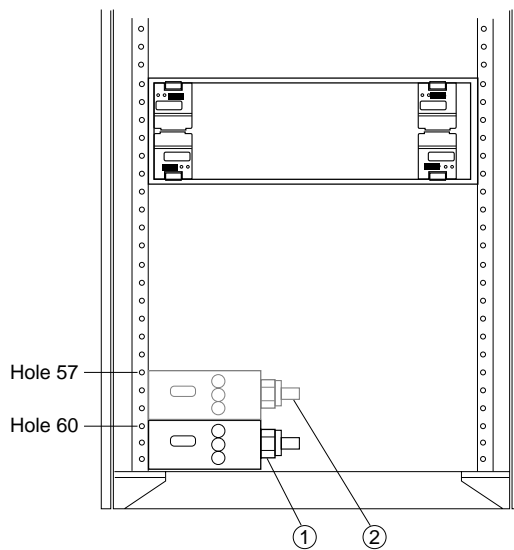
1. Disconnect the ac power controller power cord from the PDU.
2. Remove the two screws that secure the PDU to the cabinet.
3. Slide the PDU towards the front of the cabinet to disengage it from the front rail.
4. Remove the PDU from the cabinet.

### Primary PDU Installation Procedure

Complete the procedure in Table 5-3 to install a primary PDU.

**Table 5-3 Installing the Primary PDU**

1. Install two 10–32 U–nuts onto the rail over holes 60 and 62.



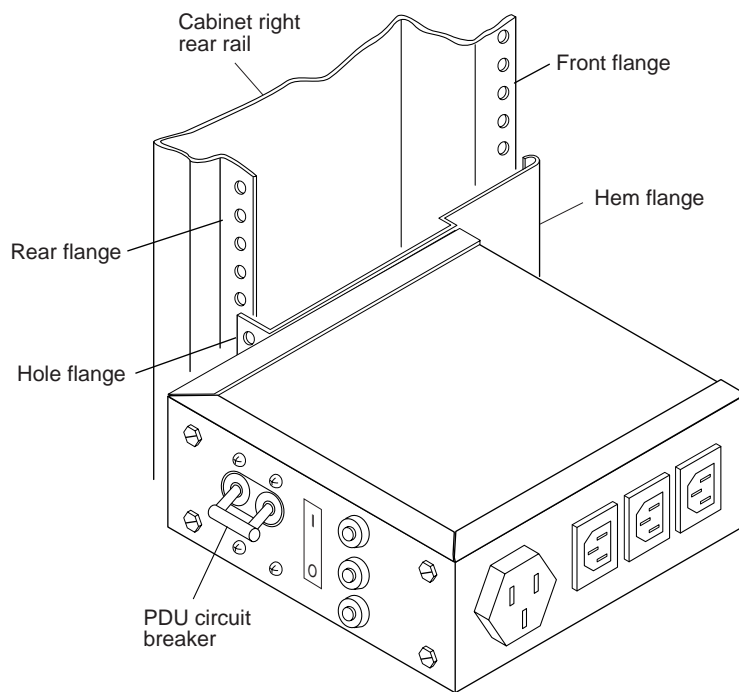
2. Position the PDU (callout 1) so that the hem flange is forward of the rail front flange.



## Installing a PDU

**Table 5-3 Installing the Primary PDU (Continued)**

- Slide the PDU to the rear so that the hem flange engages the rail front flange.



CXO6029A

- Align the PDU hole flange with the U-nuts.
- Install two 10-32 x 5/8 inch screws through the PDU rear mounting flange and into the U-nuts. Fully tighten both screws.
- Ensure the PDU circuit breaker is set to the **O** (off) position.
- Connect the **A** bus ac power controller power cord (**black**) to the primary PDU.
- Connect the PDU power cord to the wall receptacle.
- Set the PDU circuit breaker to the **I** (on) position to apply power.
- Verify PDU performance by powering up the subsystem (see documentation supplied with equipment.)

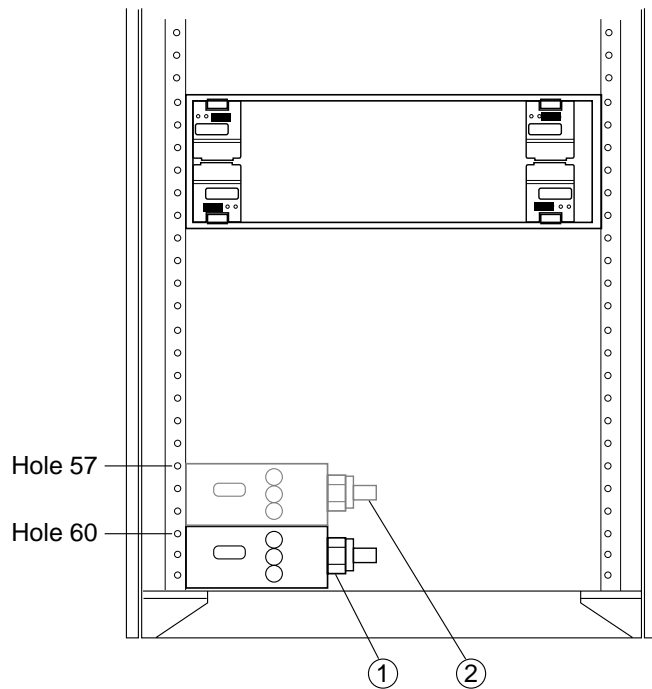
## Installing a PDU

### Redundant PDU Installation Procedure

Complete the procedure in Table 5-4 to install a redundant PDU.

**Table 5-4 Installing the Redundant PDU**

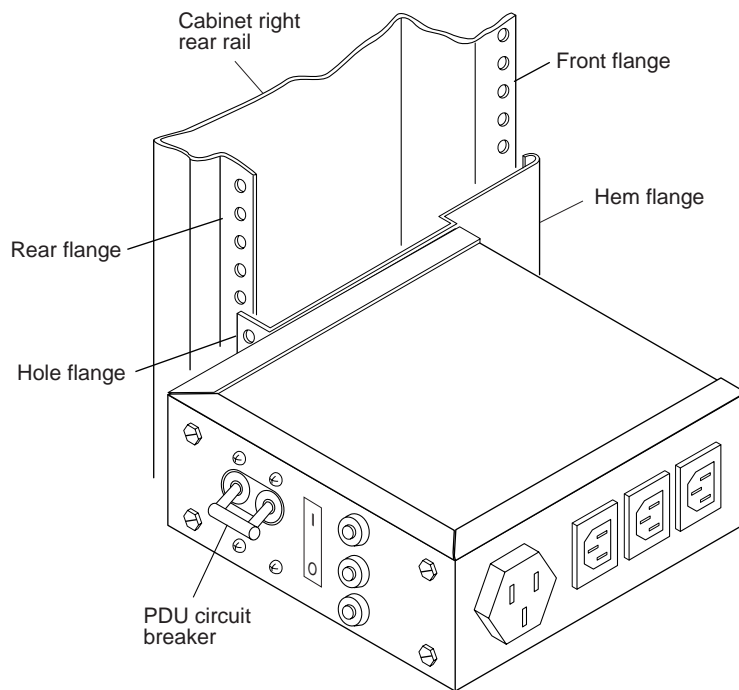
1. Install two 10–32 U–nuts onto the rail over holes 57 and 59.



## Installing a PDU

**Table 5-5 Installing the Redundant PDU (Continued)**

2. Position the PDU (callout 2) so that the hem flange is forward of the rail Front flange.



CXO6029A

3. Slide the PDU to the rear so that the hem flange engages the rail front flange.
4. Align the PDU hole flange with the U-nuts.
5. Install two 10-32 x 5/8 inch screws through the PDU rear mounting flange and into the U-nuts. Fully tighten both screws.
6. Ensure the PDU circuit breaker is set to the **O** (off) position.
7. Connect the **B** bus ac power controller power cord (**white**) to the primary PDU.
8. Connect the PDU power cord to the wall receptacle.
9. Set the PDU circuit breaker to the **I** (on) position to apply power.
10. Verify PDU performance by powering up the subsystem (see documentation supplied with equipment).



# 6

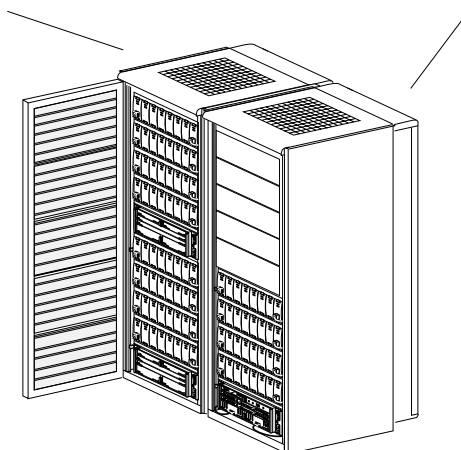
## Assembling a Two-Cabinet Configuration

The shipping configuration for all data center cabinets is one cabinet per pallet. Creating a two-cabinet configuration requires assembling the cabinets using a joiner kit and the procedures in this chapter.

In these procedures the cabinets are identified as either the left or right cabinet. The cabinet function is defined by the location of the array controller. The master cabinet contains the array controller; the other cabinet is the expansion cabinet. Either cabinet can be installed in either location. In these procedures, the primary concern is the cabinet physical location, not the cabinet function.

**Figure 6-1 Two-Cabinet Configuration**

**Left Cabinet  
(Expansion Cabinet)**                      **Right Cabinet  
(Master Cabinet)**



CXO5850A

## Assembling a Two-Cabinet Configuration

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### NOTE

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It is possible to connect multiple cabinets together. However, DIGITAL only supports up to a two-cabinet configurations.

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The installation sequence for both cabinets is as follows:

1. Unpack the cabinet, inspect for damage and move to installation area.
2. Remove a side panel.
3. Install the front trim (left cabinet only).
4. Install the front rear trim mounting screws (left cabinet only).
5. Install the pawl and receptacle assemblies.
6. Align the two cabinets.
7. Use the Allen wrench (provided in the joiner kit) to engage the pawl into the pawl receptacles.
8. Move the cabinet to the installation location.
9. level the cabinets.
10. install the front and rear trim pieces.

## Preliminary Procedure

Prior to beginning the installation, complete the following procedures:

1. Unpack the cabinets.
2. Inspect the cabinets for damage.
3. Unpack the joiner kit and inventory for completeness.
4. Move both cabinets to an area adjacent to the final installation area.

## Assembling a Two-Cabinet Configuration

### Joiner Kit

The joiner kit contains trim, receptacle assemblies, pawl assemblies, an Allen wrench, and mounting hardware. After unpacking the joiner kit, refer to Table 6-1 and verify that the kit is complete.

**Table 6-1 Joiner Kit Parts List**

Description	QTY
Allen wrench—24 in	1
Assembly—Pawl	4
Assembly—Receiver	4
Screw, keybutton—M5	2
Screw, machine—M5 x 12 mm	18
Screw, machine—M5 x 16 mm	2
Trim piece—Front	1
Trim piece—Rear	1
Trim piece—Top	1
U-nut—M5	16

### Preparing the Right Cabinet

Complete the procedure in Table 6-2 and Table 6-3 in preparation for joining the right cabinet to the left cabinet.

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**NOTE**

To reduce the possible confusion, the drawings do not show neither enclosures nor the doors.

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Assembling a Two-Cabinet Configuration

**Table 6-2 Removing the Right Cabinet Side Panel**

1. Open the right cabinet rear door.
2. Remove left side panel retaining screw located near the bottom of the right rear vertical rail.
3. Use two people to lift the side panel until it clears the cabinet brackets.
4. Store the side panel.

Side panel retaining screw location

Hole 12 (from bottom)

Hole 9 (from bottom)

M5 U-clip

Hole 12 (from bottom)

Hole 9 (from bottom)

M5 U-clip

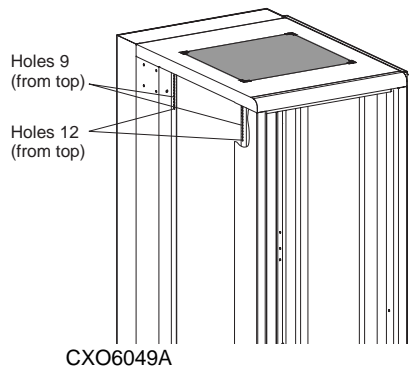
CXO6049A



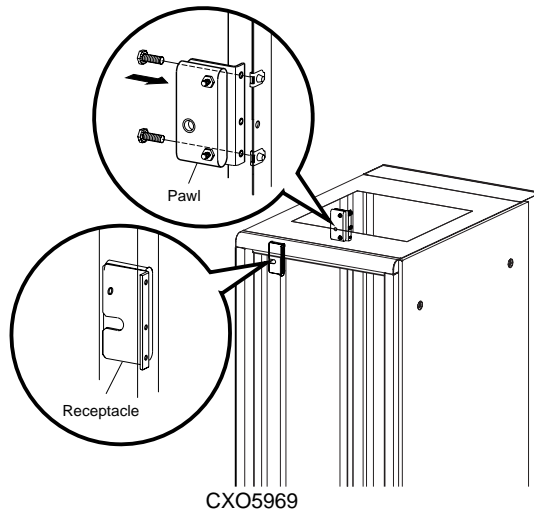
## Assembling a Two-Cabinet Configuration

**Table 6-3 Installing the Right Cabinet Pawl and Receptacle Assemblies**

1. At the top of the *front* vertical rail, install U-nuts over holes 9 and 12.



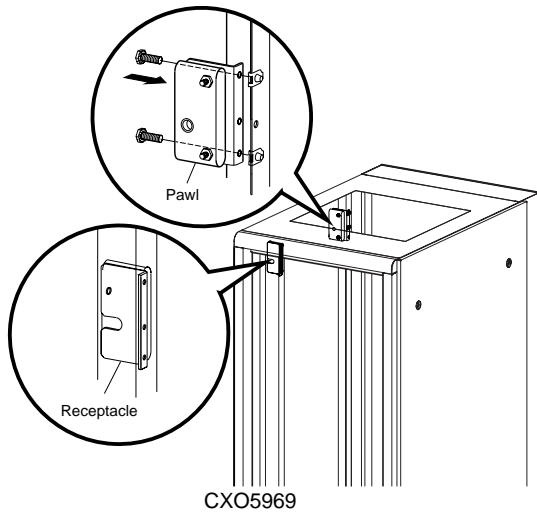
2. At the top of the *rear* vertical rail, install U-nuts over holes 9 and 12.
3. Align a pawl assembly with the U-nuts on the top of the rear vertical rail.
4. Insert two M5 x 12 mm screws and tighten.



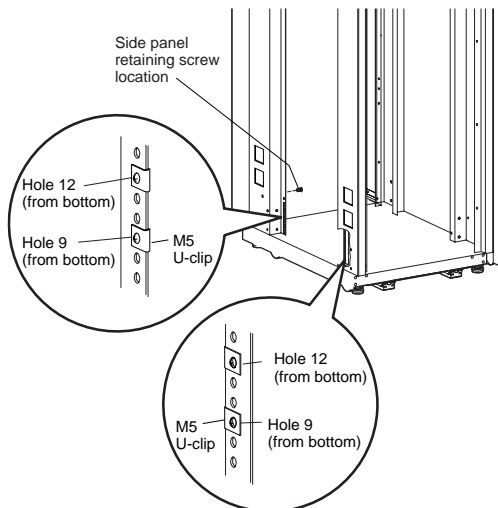
## Assembling a Two-Cabinet Configuration

**Table 6-3 Installing the Right Cabinet Pawl and Receptacle Assemblies (Continued)**

5. Align a receptacle assembly with the U-nuts on the top of the front vertical rail.
6. Insert two M5 x 12 mm screws and tighten.



7. At the bottom of the front vertical rail, install U-nuts over holes 9 and 12.
8. At the bottom of the rear vertical rail, install U-nuts over holes 9 and 12.

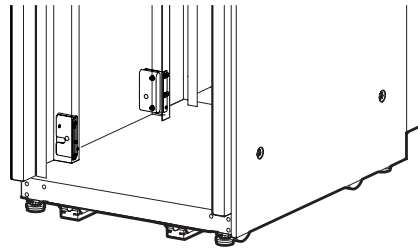


## Assembling a Two-Cabinet Configuration

**Table 6-3 Installing the right Cabinet Pawl and Receptacle Assemblies (Continued)**

9. Align a pawl assembly with the U-nuts on the bottom of the rear vertical rail.

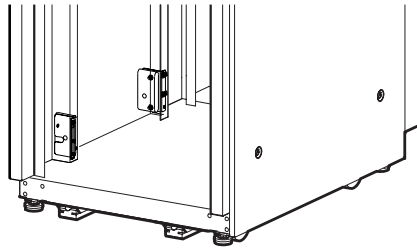
10. Insert two M5 x 12 mm screws and tighten.



CXO5969A

11. Align a receptacle assembly with the U-nuts on the bottom of the front vertical rail.

12. Insert two M5 x 12 mm screws and tighten.



CXO5969A

## Assembling a Two-Cabinet Configuration

### Preparing the Left Cabinet

Complete the procedure in Table 6-4 and Table 6-5 in preparation for joining left cabinet to the right cabinet.

#### NOTE

To reduce the possible confusion, the drawings do not show neither enclosures nor the doors.

**Table 6-4 Removing the Left Cabinet Side Panel**

1. Open the left cabinet rear door.
2. Remove right side panel retaining screw located on the <i>inside</i> of the right rear vertical rail.
3. Use two people to lift the side panel until it clears the cabinet brackets.
4. Store the side panel.
5. Install a keybutton screw from the <i>outside</i> of the rear vertical rail where you removed the side panel screw. Tighten the screw until the shoulder is seated against the rail. (This screw is for mounting the rear trim piece.)
6. Install a keybutton screw from the <i>outside</i> of the front vertical. Tighten the screw until the shoulder is seated against the rail. (This screw is for mounting the front trim piece.)

Location of 5/16" side panel retaining screw

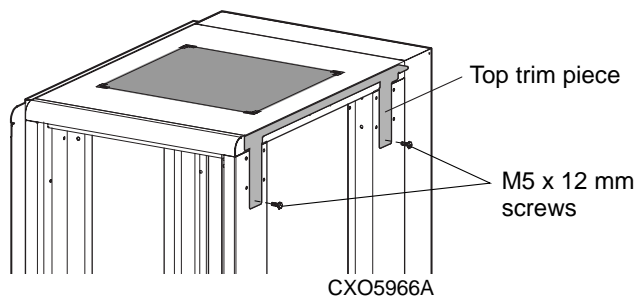
M5 keybutton screw (2X)

CXO5966A

## Assembling a Two-Cabinet Configuration

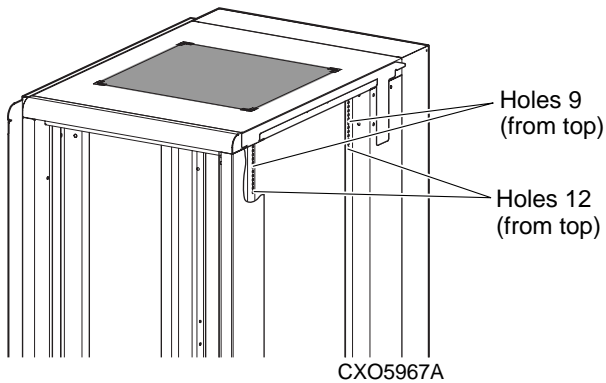
**Table 6-4 Removing the Left Cabinet Side Panel (Continued)**

7. Attach the top trim piece to the left cabinet with two M5 x 12 mm screws.



**Table 6-5 Installing the Left Cabinet Pawl and Receptacle Assemblies**

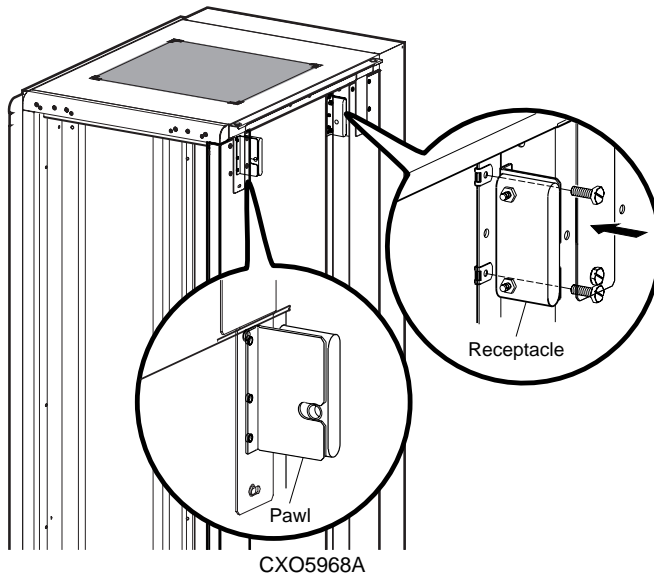
1. At the top of the front vertical rail, install U-nuts over holes 9 and 12.
2. At the top of the rear vertical rail, install U-nuts over holes 9 and 12.



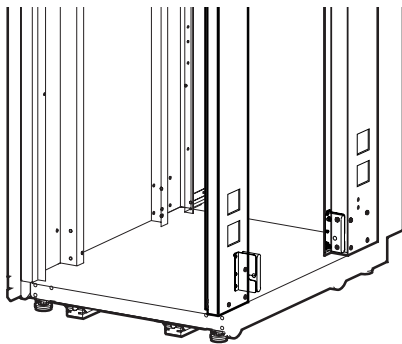
## Assembling a Two-Cabinet Configuration

**Table 6-5 Installing the left Cabinet Pawl and Receptacle Assemblies (Continued)**

3. Align a pawl assembly with the U-nuts on the top of the front vertical rail.
4. Insert two M5 x 12 mm screws and tighten.

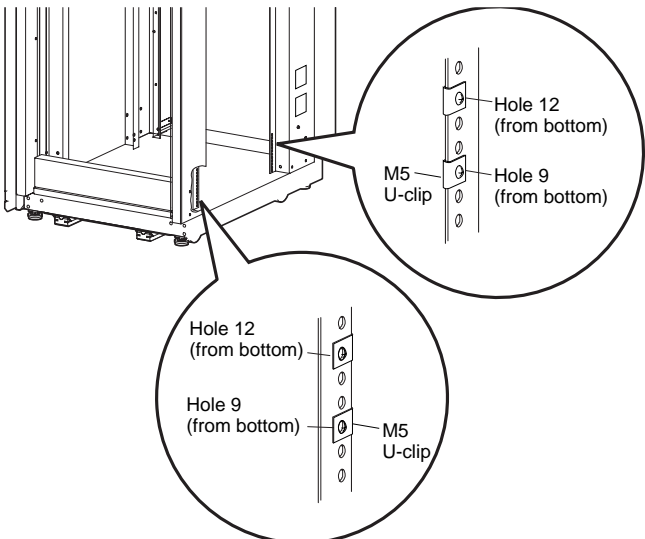
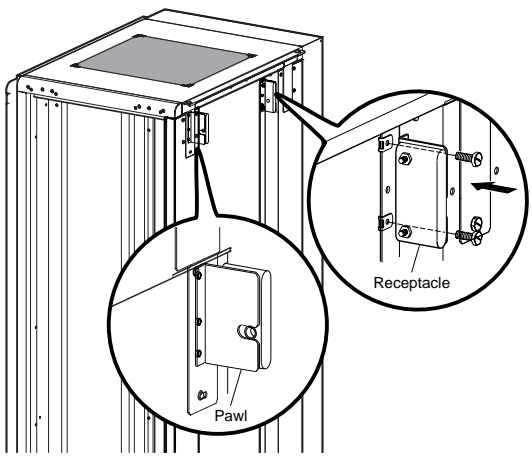


5. Align a receptacle assembly with the U-nuts on the top of the rear vertical rail.
6. Insert two M5 x 12 mm screws and tighten.



## Assembling a Two-Cabinet Configuration

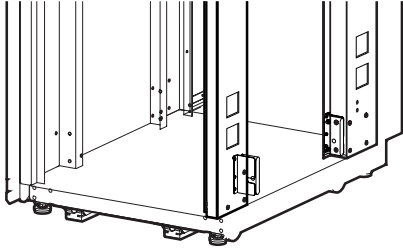
**Table 6-5 Installing the left Cabinet Pawl and Receptacle Assemblies (Continued)**

<p>7. At the bottom of the front vertical rail, install U-nuts over holes 9 and 12.</p>
<p>8. At the bottom of the rear vertical rail, install U-nuts over holes 9 and 12.</p>  <p style="text-align: right;">CXO5967A</p>
<p>9. Align a pawl assembly with the U-nuts on the top of the front vertical rail.</p> 
<p>10. Insert two M5 x 12 mm screws and tighten.</p>

## Assembling a Two-Cabinet Configuration

**Table 6-5 Installing the left Cabinet Pawl and Receptacle Assemblies (Continued)**

11. Align a receptacle assembly with the U-nuts on the top of the rear vertical rail.
12. Insert two M5 x 12 mm screws and tighten.



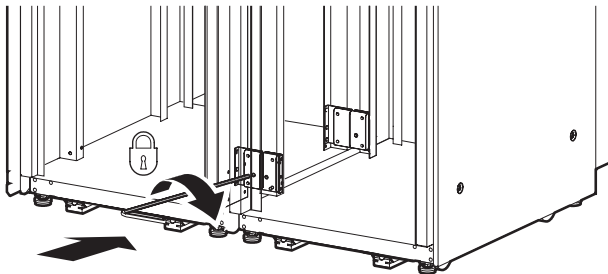
CXO5968A

## Connecting the Cabinets

The final phase of the assembly procedure involves moving the cabinets to the installation location, connecting the cabinets, leveling the cabinets and installing the front and rear trim piece between the cabinets. Complete the procedure in Table 6-6 to connect the cabinets.

**Table 6-6 Connecting the Cabinets**

1. Move the cabinets to their final location.
2. Align the pawl assemblies to the receptacle assemblies.
3. On the left cabinet, insert the Allen wrench into the bottom front pawl assembly.
4. Turn the wrench clockwise to engage the pawl in the receptacle. Continue to turn the Allen wrench until the pawl is firmly seated in the receptacle.



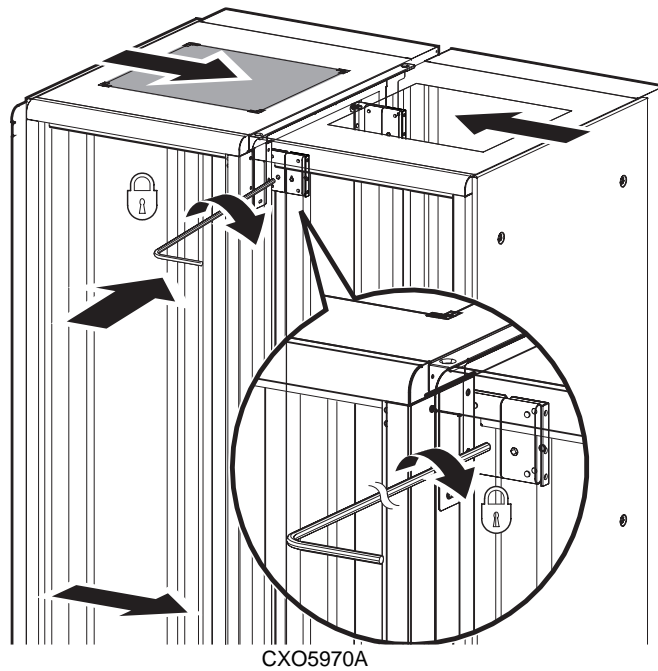
CXO5970A



## Assembling a Two-Cabinet Configuration

**Table 6–6 Connecting the Cabinets (Continued)**

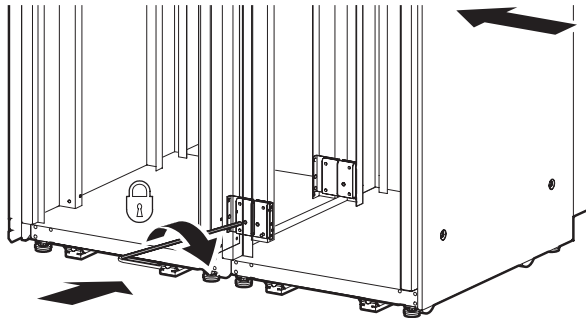
5. On the left cabinet, insert the Allen wrench into the top front pawl assembly.
6. Turn the wrench clockwise to engage the pawl in the receptacle. Continue to turn the Allen wrench until the pawl is firmly seated in the receptacle.



## Assembling a Two-Cabinet Configuration

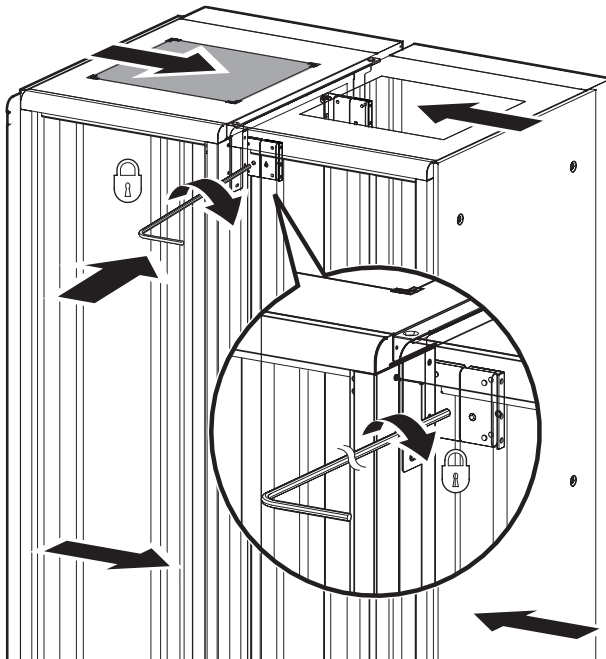
**Table 6–6 Connecting the Cabinets (Continued)**

7. On the right cabinet, insert the Allen wrench into the bottom front pawl assembly.
8. Turn the wrench clockwise to engage the pawl in the receptacle. Continue to turn the Allen wrench until the pawl is firmly seated in the receptacle.



CXO5970A

9. On the right cabinet, insert the Allen wrench into the top front pawl assembly.
10. Turn the wrench clockwise to engage the pawl in the receptacle. Continue to turn the Allen wrench until the pawl is firmly seated in the receptacle.



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## Assembling a Two-Cabinet Configuration

### Leveling the Cabinets

Complete the procedure in Table 6-7 to level the cabinets.

**Table 6-7 Leveling the cabinets**

1. Turn each locknut clockwise to loosen.
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. Turn each locknut counter-clockwise until fully seated against the cabinet.

The diagram illustrates the leveling mechanism. It shows a vertical assembly consisting of a locknut at the top, a leveler hex nut in the middle, and a leveler foot at the bottom. A wrench is shown adjusting the leveler hex nut. Labels with arrows point to the LOCKNUT, LEVELER HEX NUT, and LEVELER FOOT. The part number CXO-3829A is printed at the bottom right of the diagram area.

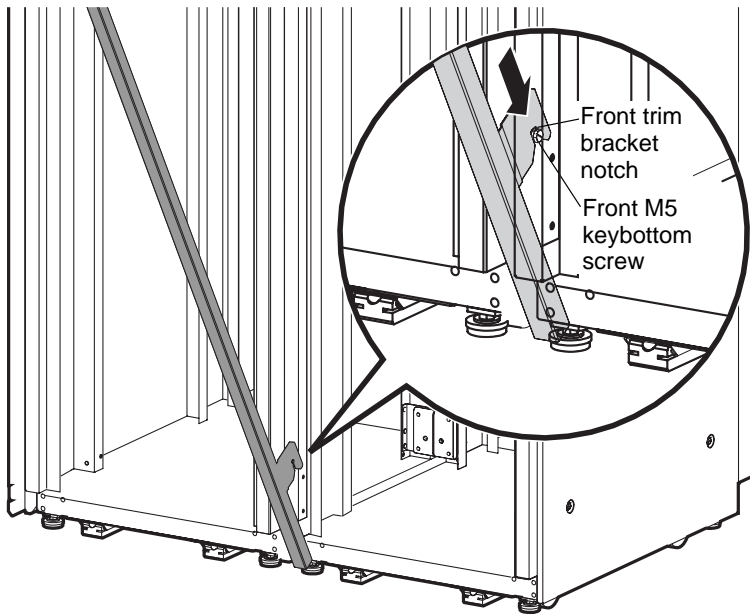
## Assembling a Two-Cabinet Configuration

### Installing the Front Trim

Complete the procedure in Table 6-8 to install the front trim.

**Table 6-8 Installing the Front Trim**

1. Orientate the trim piece so that that the notch flanged is at the bottom. The front trim piece flange is on the right side.
2. Slide the notch over the keybutton screw on the left cabinet.

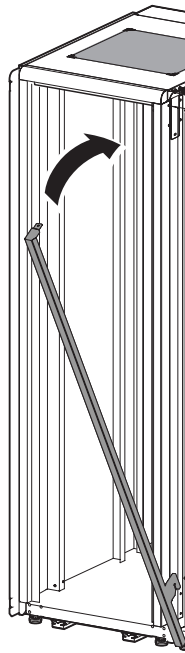


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## Assembling a Two-Cabinet Configuration

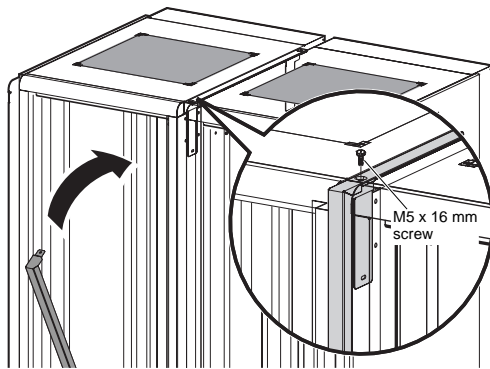
**Table 6–8 Installing the Front Trim (Continued)**

3. Rotate the top of the front trim so that it slides beneath the top trim piece.



CXO5971A

4. Fasten the trim piece with a M5 x 16 mm screw through the top trim piece.



CXO5971A

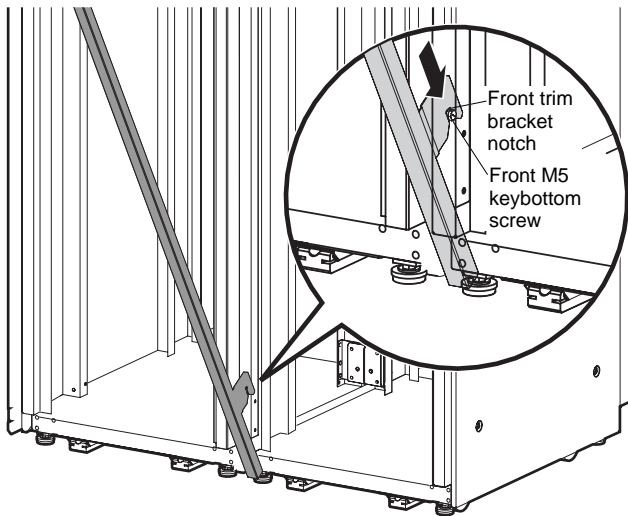
## Assembling a Two-Cabinet Configuration

### Installing the Rear Trim

Complete the procedure in Table 6-9 to install the front trim.

**Table 6-9 Installing the Rear Trim**

1. Orient the trim piece so that the notch flanged is at the bottom. The rear trim piece flange is on the right side.
2. Slide the notch over the keybottom screw on the left cabinet.

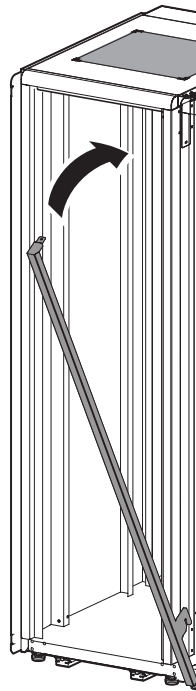


CXO5971A

## Assembling a Two-Cabinet Configuration

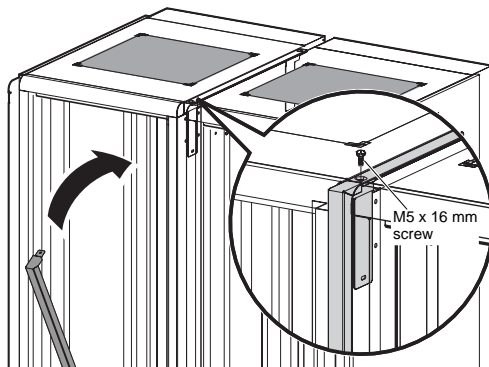
**Table 6–9 Installing the Rear Trim (Continued)**

3. Rotate the top of the **rear** trim so that it slides beneath the top trim piece.



CXO5971A

4. Fasten the trim piece with a M5 x 16 mm screw through the top trim piece.



CXO5971A





# 7

## Specifications

This chapter defines the physical, electrical, and environmental specification of the DS-SW600-series UltraSCSI data center cabinets. Each cabinet can contain either one or two rack-mountable UltraSCSI enclosures.

All DS-SW600-series data center cabinets include the components listed in Table 7-1.

**Table 7-1 DS-SW600-Series Data Center Cabinet Components**

Quantity	Component Description
1	External cache battery (ECB) shelf.
1	DS-SW6XP-AA PDU, 220–240 V ac, 60 Hz with a 3-wire power cable with a NEMA L6–30P connector plug. <b>or</b> DS-SW6XP-AB PDU, 220–240 V ac, 50 Hz with a 3-wire power cable with a 2 pole—IEC 309 connector plug.
2	AC power cords (white)
2	AC power cords (black)

## Specification

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### Note

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DS–SW600–series cabinets do not include UltraSCSI enclosures, controllers, cache memories, SBBs, ECBs, or the ECB-to-cache module cables. These components are only available in factory-configured systems or in upgrade kits.

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DIGITAL supports the UltraSCSI configurations listed in Table 7-2.

**Table 7-2 DIGITAL Supported UltraSCSI Subsystems**

Quantity		Component Description
Min	Max	
1	2	UltraSCSI RAID controllers with cache modules
1	2	AC input power controller
5	8	180 W power supplies
24	24	9 GB 7200 RPM UltraSCSI disk drives
6	6	Single-ended I/O Modules

## Environment Conditions

Table 7-3 provides the environmental conditions for shipping or short term storage.

**Table 7-3 Non-Operating Operating Environment**

Condition	Specification
Temperature	–40°C to +66°C (–40°F to +150°F)
Relative humidity	10% to 80% noncondensing
Altitude	4900 m (16,000 ft)

## Specifications

DIGITAL recommends maintaining environments to ensure proper operation of all models of this product.

Table 7-4 provides the optimum operating environment.

**Table 7-4 Optimum Operating Environment**

<b>Suggested for optimum operation</b>	
<b>Condition</b>	<b>Specification</b>
Temperature	18°C to +24°C (+64°F to +75°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	Not to exceed a maximum of 500,000 particles, 0.5 micron or larger, per cubic foot of air.
Nominal airflow	50 cubic ft/minute

Table 7-5 provides the minimum operating environment.

**Table 7-5 Minimum Operating Environment**

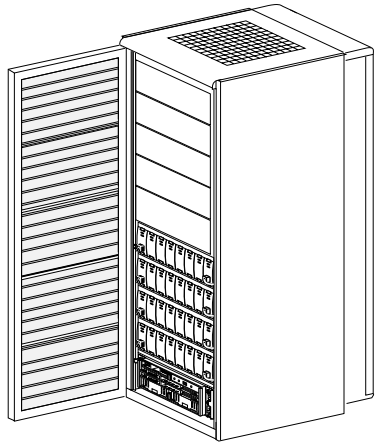
<b>Condition</b>	<b>Specification</b>
Temperature	+10°C to +40°C (+50°F to +104°F) Reduce rating by 1.8°C for each 1000 m altitude (1.0°F for each 1000 ft altitude)
Relative humidity	10 to 85% at maximum wet bulb temperature of +32°C (+90°F) and a minimum dew point of +2°C (+36°F)
Altitude	Up to 2400 m (8000 ft)
Air quality	Not to exceed a maximum of 500,000 particles, 0.5 micron or larger, per cubic foot of air.
Nominal airflow	40 cubic ft/minute

Specification

## DIGITAL Supported UltraSCSI RAID Configuration

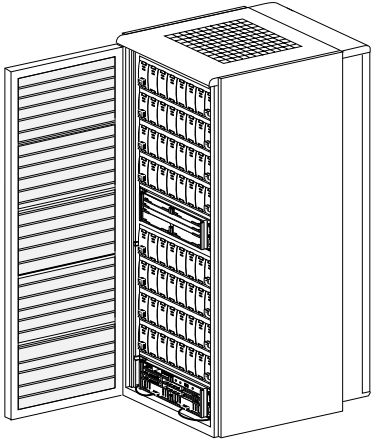
Table 7-6 through Table 7-8 defines the UltraSCSI RAID configurations that DIGITAL supports.

**Table 7-6 Single Cabinet, Single Enclosure**

<p><b>Shipping Dimensions</b></p> <p><b>Height</b> 1943 mm (76.5 in)</p> <p><b>Width</b> 914 mm (36 in)</p> <p><b>Depth</b> 121 mm (48 in)</p> <p><b>Weight</b> 272.4 kg (600 lb)</p> <p><b>PDU</b> 1 each</p> <p><b>Power (per PDU)</b></p> <p>250 V ac Single Phase 50 Hz 6 A</p> <p><b>or</b></p> <p>250 V ac Single Phase 60 Hz 12 A</p>	 <p style="text-align: right; font-size: small;">CX05849A</p>	<p><b>Installed Dimensions</b></p> <p><b>Height</b> 1700 mm (66.9 in)</p> <p><b>Width</b> 600 mm (23.6 in)</p> <p><b>Depth</b> 900 mm (35.4 in)</p> <p><b>Weight</b> 190.6 kg (420 lb)</p> <p><b>Service Dimensions</b></p> <p><b>Height</b> 1700 mm (66.9 in)</p> <p><b>Width</b> 1200 mm (47.2 in)</p> <p><b>Depth</b> 3000 mm (118 in)</p> <p><b>Weight</b> 295 kg (650 lb)</p> <p><b>Heat Dissipation</b></p> <p>3070 BTUs/hr</p>
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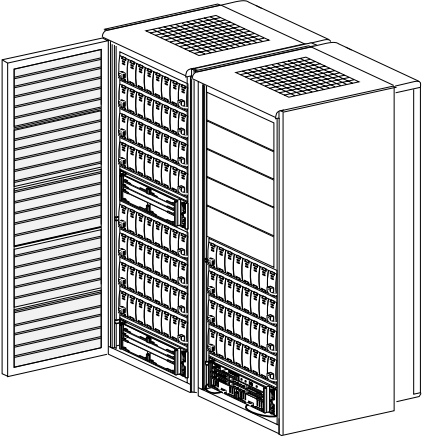
## Specifications

**Table 7-7 Single Cabinet, Two Enclosures**

<p><b>Shipping Dimensions</b></p> <p><b>Height</b> 1943 mm (76.5 in)</p> <p><b>Width</b> 914 mm (36 in)</p> <p><b>Depth</b> 121 mm (48 in)</p> <p><b>Weight</b> 362.3 kg (798 lb)</p> <p><b>PDU</b> 2 each</p> <p><b>Power (per PDU)</b></p> <p>250 V ac Single Phase 50 Hz 6 A</p> <p><b>or</b></p> <p>250 V ac Single Phase 60 Hz 12 A</p>	 <p style="text-align: right;">CX05847A</p>	<p><b>Installed Dimensions</b></p> <p><b>Height</b> 1700 mm (66.9 in)</p> <p><b>Width</b> 600 mm (23.6 in)</p> <p><b>Depth</b> 900 mm (35.4 in)</p> <p><b>Weight</b> 290.6 kg (640 lb)</p> <p><b>Service Dimensions</b></p> <p><b>Height</b> 1700 mm (66.9 in)</p> <p><b>Width</b> 1200 mm (47.2 in)</p> <p><b>Depth</b> 3000 mm (118 in)</p> <p><b>Heat Dissipation</b></p> <p>3070 BTUs/hr</p>
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## Specification

**Table 7-8 Two Cabinets, Three Enclosures**

<p><b>Shipping Dimensions</b></p> <p><b>Height</b> 1943 mm (76.5 in)</p> <p><b>Width</b> 914 mm (36 in)</p> <p><b>Depth</b> 121 mm (48 in)</p> <p><b>Weight</b> 362.3 kg (798 lb)</p> <p><b>2d Cabinet</b> 272.4 kg (600 lb)</p> <p><b>Master Cabinet; PDU</b> 2 each</p> <p><b>Expansion Cabinet; PDU</b> 2 each</p> <p><b>Power (per PDU)</b></p> <p>250 V ac Single Phase 50 Hz 6 A</p> <p><b>or</b></p> <p>250 V ac Single Phase 60 Hz 12 A</p>	 <p style="text-align: right; font-size: small;">CXO5850A</p>	<p><b>Installed Dimensions</b></p> <p><b>Height</b> 1700 mm (66.9 in)</p> <p><b>Width</b> 1200 mm (47.2 in)</p> <p><b>Depth</b> 900 mm (35.4 in)</p> <p><b>Weight</b> 481.2 kg (1060 lb)</p> <p><b>Service Dimensions</b></p> <p><b>Height</b> 1700 mm (66.9 in)</p> <p><b>Width</b> 1200 mm (47.2 in)</p> <p><b>Depth</b> 3000 mm (118 in)</p> <p><b>Heat Dissipation</b></p> <p>9210 BTUs/hr</p>
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## SBB Thermal Stabilization

For proper operation upon *initial power application*, the DIGITAL SBB storage device temperature should be within the range of 18-29°C (65-85°F).



**Caution**

Always stabilize disk drives in the operating environment prior to installation or operation. Otherwise, applying power can damage the media or associated electronics.

**Table 7-9 Environmental Stabilization Requirements**

Condition			Then You Must ...		
When there is <i>condensation</i> on the outside of the SBB.			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 enclosure until it is fully stabilized.		
When there is <i>no condensation</i> on the outside of the SBB.			Thermally stabilize the device for the amount of time specified.		
Storage Temperature Range			Storage Temperature Range		
°C	°F	Stabilize for	°C	°F	Stabilize for
60 to 66	140 to 151	3 hours	10 to 17	50 to 63	30 minutes
50 to 59	122 to 138	2 hours	0 to 9	32 to 48	1 hour
40 to 49	104 to 120	1 hour	-10 to -1	14 to 30	2 hours
30 to 39	86 to 102	30 minutes	-20 to -11	-4 to 12	3 hours
18 to 29	64 to 84	None	-30 to -21	-22 to -6	4 hours
			-40 to -31	-40 to -24	5 hours





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# Glossary

**array controller**

*See controller.*

**blower assembly**

A blower assembly is an airflow device mounted in a StorageWorks shelf.

**cabinet**

A cabinet is the StorageWorks enclosure that has exterior panels and doors containing the cable or power distribution units, shelves, fans, and cables that form a storage subsystem.

*See data center cabinet and departmental server cabinet*

**cable connector**

A cable connector is any connector that physically is part of a cable assembly attached to backplanes or other non-device connectors.

**cache memory**

Cache memory is a fast storage buffer.

**CE-Mark**

A CE-Mark is a European Economic Community (EEC) certification label that identifies electronic devices authorized for sale within member nations.

### **CE–Mark Class A**

A CE-Mark Class A is similar to, but more stringent than the FCC Class A certification. This certification label appears on electronic devices that are used in a commercial environment. A CE–Mark certified device can be used in the United States.

### **CE–Mark Class B**

A CE-Mark Class B is similar to, but more stringent than the FCC Class B certification. This certification label appears on electronic devices that are for use in either a home or commercial environment. A CE–Mark certified device can be used in the United States.

### **controller**

A controller has two definition applications:

1. A hardware–firmware device that manages communications on behalf of host systems over the SCSI bus to devices. Controllers typically differ by the type of interface to the host and provide functions beyond those the devices support.
2. A standalone device that connects a host adapter to the storage SCSI bus. This device provides RAID functionality, typically has multiple SCSI bus ports, performs the lower layers of the SCSI protocol, and normally operates in the initiator role.

### **devices**

Devices are the targets, initiators, hubs, converters, bus expanders, and similar devices interconnected to form a SCSI bus. Connectors, expanders, and hubs do not use SCSI bus IDs.

*See also* **nodes**.

### **device connector**

A device connector is any connector that physically is part of a SCSI device. These are the targets, initiators, hubs, converters, bus expanders, and similar devices interconnected to form a SCSI bus. Connectors, expanders, and hubs do not use a SCSI bus ID.

### **differential SCSI bus**

A differential SCSI bus is a bus in that the potential difference between two wires determines the signal level. A differential bus is more robust and less subject to electrical noise than is a single-ended bus.

**disk**

A disk is a storage device that supports random access to fixed-size blocks of data.

**disk array controller**

*See controller.*

**dual power configuration**

*See redundant power configuration.*

**ECB**

*See external cache battery.*

**electromagnetic interference**

*See EMI.*

**electrostatic discharge**

*See ESD.*

**EMI**

Electromagnetic interference (EMI) is the impairment of a signal by an electromagnetic disturbance.

**EMU**

The environmental monitor unit (EMU) is a device that monitors the status of the enclosure including the power, air temperature, blower status, and so forth. It detects problems and displays and reports these conditions to the user and the controller. In some cases, corrective actions are implemented.

**enclosure connector**

An enclosure connector is any connector that physically is part of the enclosure (for example, pedestal, deskside enclosure, cabinet, and so forth).

**ESD**

Electrostatic discharge (ESD) is the discharge of a potentially harmful static electric voltage that is a result of improper grounding.

**external cache battery**

An external cache battery (ECB) provides power to the cache memory should there be a power failure.

**expansion enclosure**

An UltraSCSI RAID enclosure connected to the Master Enclosure with UltraSCSI Bus cables. Each subsystem can have a maximum of two expansion enclosures. Set the expansion PVA SCSI bus address switch to either:

- **2**, to establish SCSI bus device address 8, 9, 10, and 11.
- **3**, to establish SCSI bus device address 12, 13, 14, and 15.

**FAST 10**

FAST 10 is a SCSI bus that transfers data at a rate up to 10 MB/sec.

**FAST 20**

*See* UltraSCSI.

**fast differential SCSI bus**

*See* FD SCSI.

**fast wide differential SCSI bus**

*See* FWD SCSI.

**FCC**

The Federal Communications Commission (FCC) is the federal agency responsible for establishing standards and approving electronic devices within the United States.

**FCC Class A**

The FCC Class A certification label appears on electronic devices that are used only in a commercial environment within the United States. A CE-Mark certified device also meets the equivalent FCC certification standard.

**FCC Class B**

The FCC Class B certification label appears on electronics that are used in either a home or commercial environment within the United States. A CE-Mark certified device also meets the equivalent FCC certification standard.

**Federal Communications Commission**

*See* **FCC**.

**filler panel**

A filler panel is used to cover open or unused areas in cabinets or shelves for EMI suppression, airflow control, or cosmetic purposes.

**Footprint**

The space occupied by a cabinet

**host**

A host is the primary or controlling computer (in a multiple computer network) to which storage is attached.

**host adapter**

A host adapter is a device that connects the host system, I/O bus (for example, a PCI bus) to the storage SCSI bus. It also performs the lower layers of the SCSI protocol and normally operates in the initiator role.

**host computer**

*See* **host**.

**host controller**

A host controller is a device that connects the host system, I/O bus (for example, a PCI bus) to the storage SCSI bus. A host controller provides RAID functionality. It typically has multiple SCSI bus ports, performs the lower layers of the SCSI protocol, and normally operates in the initiator role.

**IEC**

The International Electrotechnical Committee (IEC) is an organization that develops and publishes electronic and mechanical standards.

**International Electrotechnical Committee**

*See IEC.*

**Master enclosure**

An UltraSCSI RAID enclosure includes the HSZ-series controllers and cache modules. There is only one Master Enclosure in each UltraSCSI Raid subsystem. The SCSI bus address switch is always 0, 2, and 3 to the devices.

*See also expansion enclosure.*

**PDU**

A power distribution unit is a data center cabinet that conditions and distributes ac power.

**port**

A port has two definition applications:

1. A port is a logical route for data that is going in and out of a controller. It can have one or more channels that contain the same type of data.
2. The hardware and software that connects a host controller to a CI, SCSI, or SDI bus.

**power distribution unit**

*See PDU.*

**power verification and addressing assembly**

*See PVA.*

**PVA**

Power verification and addressing assembly.

**radio frequency interference**

*See RFI.*

**RAID**

A redundant array of independent disks (RAID) is a set of storage techniques devised to increase the performance and availability of a storage subsystem.

**redundant power configuration**

A redundant power supply configuration is a StorageWorks configuration that utilizes multiple power sources, power controllers, and supplies that are used to eliminate single points of failure.

1. For a cabinet, two ac power sources and two CDUs are used to distribute primary and redundant ac power to shelf power supplies.
2. For a shelf, the primary and redundant, shelf, SBB, power supplies ensure that dc power is available even when there is a failure of one supply, one ac source, or one CDU. Implementing the redundant power configuration provides protection against the loss or corruption of data.

**RFI**

A radio frequency interference (RFI) is the impairment of a signal by an unwanted radio signal or radio disturbance.

**SBB**

A StorageWorks building block (SBB) is any device conforming to shelf mechanical and electrical standards that is installed in either a 3.5-inch or 5.25-inch carrier, and is considered to be an SBB, whether it is a storage device, a power supply, or another device.

**SCSI**

A small computer system interface (SCSI) is an ANSI interface that defines the physical and electrical parameters of a parallel I/O bus used to connect computers and a maximum of seven devices. The StorageWorks subsystem implementation uses SCSI-2, for the synchronous transfer of 8-bit data at rates of up to 10 MB/s.

**SCSI bus connection**

A SCSI bus connection is a connection between two terminators.

**SCSI bus connector**

A SCSI bus connector is any connector that is used to create a SCSI bus segment. Both their function and their physical placement define SCSI bus connectors. There are only two functions allowed: bus-path and stub. There are numerous physical placement descriptions, for example, device stub connectors and terminator bus-path connectors.

**SCSI bus connection**

A SCSI bus connection is a connection in the SCSI bus that is between two terminators, such as the SBB-shelf, SCSI, input connector.

**SCSI device**

A SCSI device is a host computer adapter, a peripheral controller, or an intelligent peripheral that can be attached to a SCSI bus.

**SCSI device ID**

A SCSI device ID is the bit-significant representation of the SCSI addresses that refers to one of the signal lines numbered 0 through 7 for an 8-bit bus or 0 through 15 for a 16-bit bus. It is also known as the “target ID.”

**SCSI device-side device address**

A SCSI device-side device address is one of the 8 (0 through 7) or 16 (0 through 15) device addresses (target IDs) assigned to the SCSI controller and the devices that it controls.

*See also* **SCSI host-side device address.**

**SCSI domain**

A SCSI domain is a logical bus consisting of at least one bus segment, at least one initiator, and at least one target. The use of bus extenders can enable multiple bus segments within a domain. Domains are limited by device addressability. Domains are limited to a total of 16 initiators and targets without the use of LUN bridges.

**SCSI end-bus position**

A SCSI end-bus position is the physical location of a controller, a SCSI bus controller, or a device that contains the bus terminator.

**SCSI host-side device address**

A SCSI host-side device address is any one of the eight-device addresses (target IDs) assigned to the host device and the SCSI controllers and the devices that SCSI controllers control.

*See also* **SCSI device-side device address.**

**SCSI hub**

A SCSI hub is a device that connects multiple SCSI segments within a SCSI domain. This hub does not use a device ID.



**SCSI ID**

*See SCSI device ID.*

**SCSI mid-bus position**

A SCSI mid-bus position is the physical location of a controller or a device that the SCSI bus passes through enroute to the controller or device that contains the SCSI bus termination.

**SCSI port**

A SCSI port has two definition applications:

1. Software. The channel that controls communications to and from a specific SCSI bus in the system.
2. Hardware. The name of the logical socket at the back of the system unit to which a SCSI device is connected.

**SCSI stubbing connection**

A SCSI stubbing connection is a connection in the SCSI-bus path that is between a terminator and a connector. For example, a tralink connector, and is used to place a controller in the mid-bus position.

**single-ended SCSI bus**

A single-ended SCSI bus is a bus in which the voltage of a single wire, in relation to a ground, determines each signal's logic level.

**single-power configuration**

A single-power configuration is a power configuration in which there is only one ac power source and CDU or PDU to distribute ac power.

**skirt**

A skirt is the trim panel mounted around the base of a cabinet.

**Small Computer System Interface**

*See SCSI.*

**storage array**

A storage array is an integrated set of storage devices.

**storage array subsystem**

*See storage subsystem.*

**storage subsystem**

A storage subsystem is a collection of controllers, storage devices, shelves, cables, and power supplies that form a mass-storage subsystem.

**StorageWorks**

StorageWorks is the DIGITAL product set that allows customers to design and configure their own storage subsystem. Components include power, packaging, and interconnections in a StorageWorks shelf. SBBs and array controllers are integrated to form storage subsystems. System-level enclosures house the shelves.

**StorageWorks building block**

*See SBB.*

**supported device**

A supported device has two application definitions:

1. A device that has been fully evaluated in an “approved” StorageWorks configuration (such as, shelf, cabinet, power supply, cabling, and so forth), and is in complete compliance with country-specific standards (for example, FCC, CE-Mark, CSA, TÜV, VDE, and so forth) and all DIGITAL standards.
2. A device supported by a controller or host operating system.

**target**

A target is a SCSI device that performs an operation requested by an initiator.

**target ID**

*See SCSI device ID.*

**terminators**

Terminators are the interconnect components that form the ends of the transmission lines in bus segments. A SCSI domain must have at least one segment and at least two terminators. The terminators ensure that inactive SCSI bus signals are in a known state. There are special cases where the electrical transmission lines are very short and only one termination or pull-up is required.

There are two basic types of terminators—active and passive:

- Single-ended bus segments use active, linear terminators.
- Differential bus segments use passive (linear totem pole) terminators.

**terminator connector**

A terminator connector is any connector that physically is part of a terminator. It is not uncommon for terminators to have both stub and bus-path connectors.

**topology**

Topology is the physical arrangement and relationship of interconnected nodes and SCSI buses in a network. A network topology shows the hosts and the lines between them. A legal topology must satisfy all of the requirements for the associated SCSI bus (FAST 10, UltraSCSI, and so forth).

**transmission medium**

A transmission medium is an electrical conductor that has bus terminations, and possibly stubs, on each end. Common examples of media are cables, printed wiring boards, flex circuits, and connectors that create electrical connections between various combinations of SCSI devices, bus extenders, and terminators.

**tree**

A tree is an UltraSCSI RAID bus configuration where an expander, located in the middle of a bus segment, enables the bus to “branch” or create a tree configuration, rather than a point-to-point configuration. It is also known as a “branch” configuration.

**UL**

Underwriter’s Laboratories (UL) is an organization that tests and certifies electrical devices.

## **UltraSCSI**

UltraSCSI is an improvement in SCSI technology that was invented in 1993 by Digital Equipment Corporation StorageWorks Engineering Group. Subsequently the ANSI SCSI standards committee issued standard X3T10 for UltraSCSI.

The UltraSCSI improvements over Fast SCSI include the following:

- Maximum transfer rate increases from 10 MHz to 20 MHz.
- Maximum wide bus bandwidth increases from 20 MB/s to 40 MB/s.
- VHDCI (very high-density connector interface) cables and connectors are significantly thinner and smaller.

## **UltraSCSI devices**

An improvement in SCSI technology invented in 1993 by Digital Equipment Corporation StorageWorks Engineering Group. Subsequently the ANSI SCSI standards committee issued standard X3T10 for UltraSCSI.

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- Maximum wide bus bandwidth increased from 20 MB/s to 40 MB/s.
- VHDCU (very high density cable interconnect) cables and connectors are significantly thinner and smaller.

## **UltraSCSI domain**

A single, logical UltraSCSI bus composed of multiple diverse bus segments.

*See also* **Bus segment**.

## **UltraSCSI RAID enclosure**

A 24-SBB RAID shelf, such as the DS-BA370.

## **UltraSCSI hub**

An UltraSCSI hub consists of a set of multiple (more than 2) bus expanders. Each couples a common, short, single-ended bus segment, internal to the UltraSCSI hub, to an external bus segment. Some of the external bus segments can be single-ended and some can be differential. They are all couple to each other. This creates a radial bus topology as part of the UltraSCSI domain that contains the UltraSCSI hub.

Bus expanders and the equipment that utilizes them do not have SCSI Ids.

**UltraSCSI RAID cabinet subsystem**

An UltraSCSI RAID cabinet subsystem is one or more cabinet-mounted, 24-SBB, UltraSCSI RAID subsystem shelves mounted in a cabinet.

**UltraSCSI RAID enclosure**

An UltraSCSI RAID enclosure is an enclosure that has a 24-SBB, RAID shelf.

**UltraSCSI RAID shelf**

An UltraSCSI RAID shelf is a shelf that has a 24-SBB RAID shelf.

**UltraSCSI RAID subsystem**

An UltraSCSI RAID subsystem has one or more enclosures mounted in either a pedestal or a cabinet. Each subsystem requires a master enclosure. Installing one or two expansion enclosures, and interconnecting all the enclosures with UltraSCSI bus cables, creates an expanded subsystem.

**Underwriters Laboratories**

*See UL.*

**universal ac input power supply**

*See shelf power supply.*

**VHDCI**

A Very High Density Cable Interface (VHDCI) has a 68-pin interface with connectors on 8 mm centers. It is required for UltraSCSI.

