StorageWorks™ Solutions
SW300-Series RAID Enclosure

Installation and User's Guide

Order Number: EK–SW300–UG. A01

This manual describes the SW300-series redundant array of independent disks (RAID) enclosure, the rules for unpacking and installing, configuring the enclosure, and its associated components, and describes error analysis and fault isolation. Procedures for replacing the major components also are described.

This document was prepared using VAX DOCUMENT Version 2.1.

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Intended Audience

This manual is intended for use by customer and Digital™ employees responsible for installing, configuring, operating, and maintaining the SW300-series redundant array of independent disks (*RAID*) enclosure. Replacing the ac power entry controller must be performed only by qualified service personnel.

Structure

This manual is organized as follows:

Chapter 1	Describes the SW300 enclosure including physical characteristics, layout, specifications, components, and StorageWorks products.
Chapter 2	Describes site preparation, unpacking, installation, and powering up procedures for the SW300 enclosure.
Chapter 3	Describes the rules and restrictions for configuring an SW300 enclosure.
Chapter 4	Describes the error analysis and fault isolation of the SW300 components.
Chapter 5	Describes the procedures for removing and installing the ac power entry controllers, power supply and storage device StorageWorks building blocks (SBBs), environmental monitor units (EMUs), controllers, and dual speed blowers.
Glossary	Defines SW300 terms.

Related Documents

The following table lists documents (alphabetically by title) that contain information related to this product.

Document Title	Order Number
StorageWorks Array Controllers HS Family of Array Controllers Service Manual	EK–HSFAM–SV
StorageWorks Array Controllers HS Family of Array Controllers User's Guide	EK–HSFAM–UG
StorageWorks Solutions Configuration Guide	EK–BA350–CG
StorageWorks Solutions High-Availability Storage Subsystem Fault Bus OEM Engineering Specification	EK–FAULT–ES
StorageWorks Solutions Shelf and SBB User's Guide	EK–BA350–UG
StorageWorks Solutions 3½-Inch Device Installation Guide	EK–MC350–IG
StorageWorks Solutions 5¼-Inch Storage Device Installation Guide	EK–MC525–IG
StorageWorks SW800-Series Data Center Cabinet Installation and User's Guide	EK–SW800–IG

Electrostatic Discharge

<hr>
CAUTION
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Some of the components can be damaged by electrostatic discharge (ESD).

Do not implement the procedures in this document until you have taken the proper precaution against ESD. As a minimum, you must wear an ESD grounding strap whenever you handle any of the components, storage devices, or remove an SBB cover.

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Electronic Emissions

<hr>
Note
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Electronic devices emit radio frequencies that under certain conditions may interfere with other electronic equipment or radio frequency transmissions.

Should operation of SW300 cause unacceptable interference, the customer is responsible for taking whatever steps are necessary to correct the interference.

The SW300 complies with industry accepted product safety standards and is intended for use only with storage devices that meet these requirements. For continued compliance, install only SBBs that are listed by Underwriter Laboratories, Inc., as an accessory for use with the BA350-series shelves.

For a list of qualified SCSI devices, contact your Digital account representative or the latest edition of the *StorageWorks Solution Configuration Guide*.

<hr>

Compatibility

For a list of compatible Digital storage devices, contact your Digital representative.

Documentation Conventions

The following conventions are used in this manual:

boldface type	Boldface type indicates the first instance of terms being defined in text, in the glossary, or both.
italic type	Italic type indicates emphasis and complete manual titles. In the glossary, italic type is also used to indicate cross-references.

Manufacturer's Declarations

Following are manufacturer's declarations applicable to StorageWorks SW300-series RAID enclosures:

───────────────── **CAUTION** ─────────────────

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

───────────────── **ACHTUNG !** ─────────────────

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

───────────────── **ATTENTION !** ─────────────────

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

───────────────── **Note** ─────────────────

The equipment described in this manual is listed by the Underwriters Laboratories Incorporated and bears the UL Listing mark. SW300-series RAID enclosures are also certified by the Canadian Standards Association and TUV Product Service GmbH and bear both the CSA certification and TUV GS marks. The equipment also complies with the requirements for CE-mark Class A.

───────────────── **Note** ─────────────────

Das in dissem Manual beschriebene Gerät wurde von TÜV Produkt Service GmbH auf Sicherheit geprüft und trägt das GS Zeichen. Bitte beachten Sie, daß Eingriffe in das Gerät, Reparaturen oder der Einbau von Erweiterungen nur von Digital Personal erfolgen darf, da sonst die GS Zulassung ungültig wird. Die Zulassung wird auch ungültig, wenn nicht von Digital qualifizierte Speichererweiterungen eingebaut verden.

Das Gerät muß so aufgestellt werden, daß die Steckdose frei zugänglich ist.

Für Bundesrepublik Deutschland
For Federal Republic of Germany
Pour la République féderale d'Allemagne

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Hiermit wird bescheinigt, daß die Einrichtung in Übereinstimmung mit
den Bestimmungen der DBP-Verfügung 523/1969, Amtsblatt 113/1969, und
Grenzwertklasse "A" der VDE0871 funkentstört ist.
Das Bundesamt für Zulassungen in der Telekommunikation der Deutschen
Bundespost (DBP) hat diesem Gerät eine FTZ-Serienprüfnummer zugeteilt.

Betriebsgenehmigung:
Hochfrequenzgeräte dürfen erst in Betrieb genommen werden, nachdem hierfür
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(Anhang des Handbuches) mit Angabe der FTZ-Serienprüfnummer.
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kann das im Einzelnen zusätzliche Funkentstörungsmaßnahmen durch den
Benutzer erfordern.
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Funkstörungsmeßstelle Ihres Fernmeldeamtes.

Externe Datenkabel:
Sollte ein Austausch der von Digital spezifizierten Datenkabel nötig werden,
muß der Betreiber für eine einwandfreie Funkentstörung sicherstellen, daß
Austauschkabel im Aufbau und Abschirmqualität dem Digital Originalkabel
entsprechen.

Kennzeichnung:
Die Geräte werden bereits in der Fertigung mit der Zulassungsnummer
gekennzeichnet und mit einer Anmeldepostkarte versehen. Sollte Kennzeichnung
und Anmeldepostkarte übergangsweise nicht mit ausgeliefert werden,
kontaktieren Sie bitte das nächstgelegene Digital Equipment Kundendienstbüro.

Acoustic Noise Declaration

SW300-Series RAID Enclosure
August 1, 1994

Acoustics—Preliminary Declared Values per ISO 9296 and ISO 7779

Product†	Sound Power Level L_{WAd}, B‡		Sound Pressure Level L_{pAm}, dBA (Bystander Positions)	
	Idle	Operate	Idle	Operate
SW300-series RAID enclosure	6.10	6.12	46.7	47.0

† Current values for specific configurations are available from Digital Account Representatives.

‡ 1 B = 10 dBA

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

Gerät†	Schalleistungspegel L_{WAd}, B‡		Schalldruckpegel L_{pAm}, dBA (Beistehende Position)	
	Leerlauf	Betrieb	Leerlauf	Betrieb
SW300-series RAID enclosure	6,10	6,12	46,7	47,0

† Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich.

‡ 1 B = 10 dBA

1

Introduction to the SW300 Enclosure

This chapter describes the SW300-series redundant array of independent disks (RAID) enclosure including the unit layout, dimensions, and the small computer system interface 2 (**SCSI**–2) connections (ports) for StorageWorks building block (**SBB**) shelves.

_____ **Note** _____

The SW300 enclosure contains up to two HS **array controllers**. This manual contains only the removal and replacement procedures for the HS array controllers. Controller descriptions, operation, and diagnostics are provided in the specific controller documentation.

_____

1.1 Overview

The SW300 enclosure, as shown in Figure 1–1, is a member of Digital's StorageWorks family of modular enclosures. This enclosure can accommodate both data storage and controller combinations. The SW300 enclosure has the following capabilities:

- StorageWorks compatible

- Provides packaging for the following components:

     24 3½-inch SBBs, 8 5¼-inch SBBs, or mixed combinations
     8 power supplies
     8 dual speed blowers
     2 environmental monitor units (EMUs)
     2 ac power entry controllers
     2 controllers
     2 cache modules
     6 single-ended SCSI buses

- Redundant shelf power supplies

- Redundant EMUs

- Redundant ac power entry controllers

- Hot/warm swap of all field replaceable units (FRUs)

- Compatible with the High Availability Storage Subsystem Fault Bus

- Optimized for four devices per SCSI bus

Figure 1–1 SW300-Series Deskside RAID Enclosure
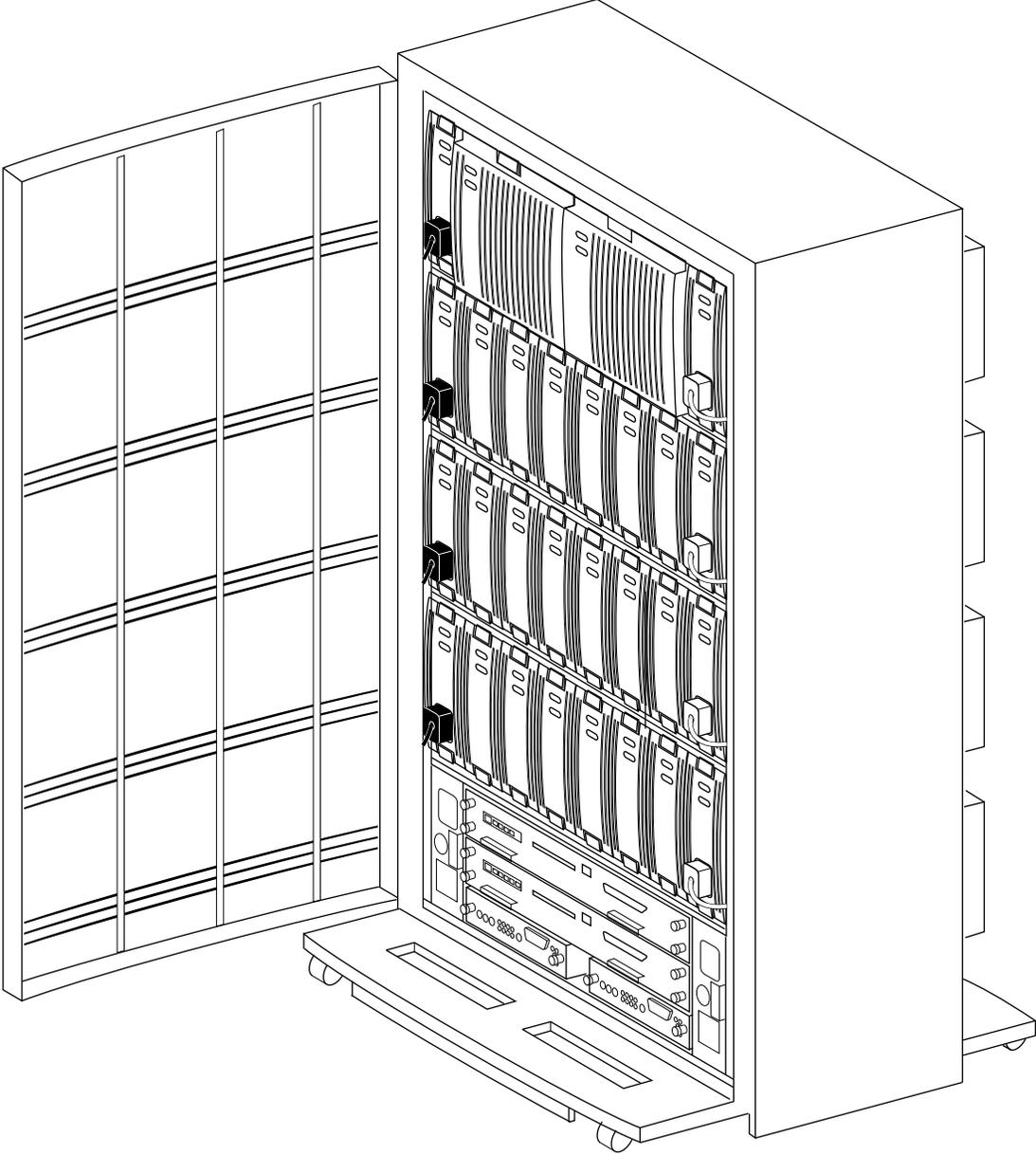
CXO-4268A-MC

1.2 Specifications

Specifications for the SW300 enclosure are shown in Table 1–1.

Table 1–1 SW300 Specifications

Characteristic	Specification
Dimensions (nominal)	838.20 mm (33.00 in) height 476.25 mm (18.75 in) width 482.60 mm (19.00 in) depth
Weight	
Cabinet with shipping packaging	106.65 kg (242.00 lb)
Maximum configuration	77.85 kb (178.00 lb)
Agency compliance	FCC, UL, CSA, TUV, and CE-mark
Electrical rating	100-120/220-240 V ac, 50/60 Hz, single phase, 12/6 amperes
Operating environment	
Temperature	+10°C to +40°C (+50°F to +95°F) Derate 1.8°C for each 1000 m altitude (1.0°F for each 1000 ft altitude)
Relative humidity	10% to 90% (noncondensing) Maximum wet bulb temperature: +28°C (+82°F) Minimum dew point: +2°C (+36°F)
Altitude	From sea level to 2400 m (8000 ft)
Air quality (maximum particle count)	Not to exceed 500,000 particles per cubic foot of air at a size of 0.5 micron or larger
Nonoperating environment	
Temperature	-40°C to +66°C (-40°F to +151°F) (During transportation and associated short-term storage)
Relative humidity	8% to 95% in original shipping container (noncondensing); otherwise, 50% (noncondensing)
Altitude	3600 m (12,000 ft)

1.3 Major Components

The major components of the SW300 enclosure are shown in Figure 1–2.

Figure 1–2 SW300 Components (Cabinet Removed for Clarity)

CXO-4305A-MC
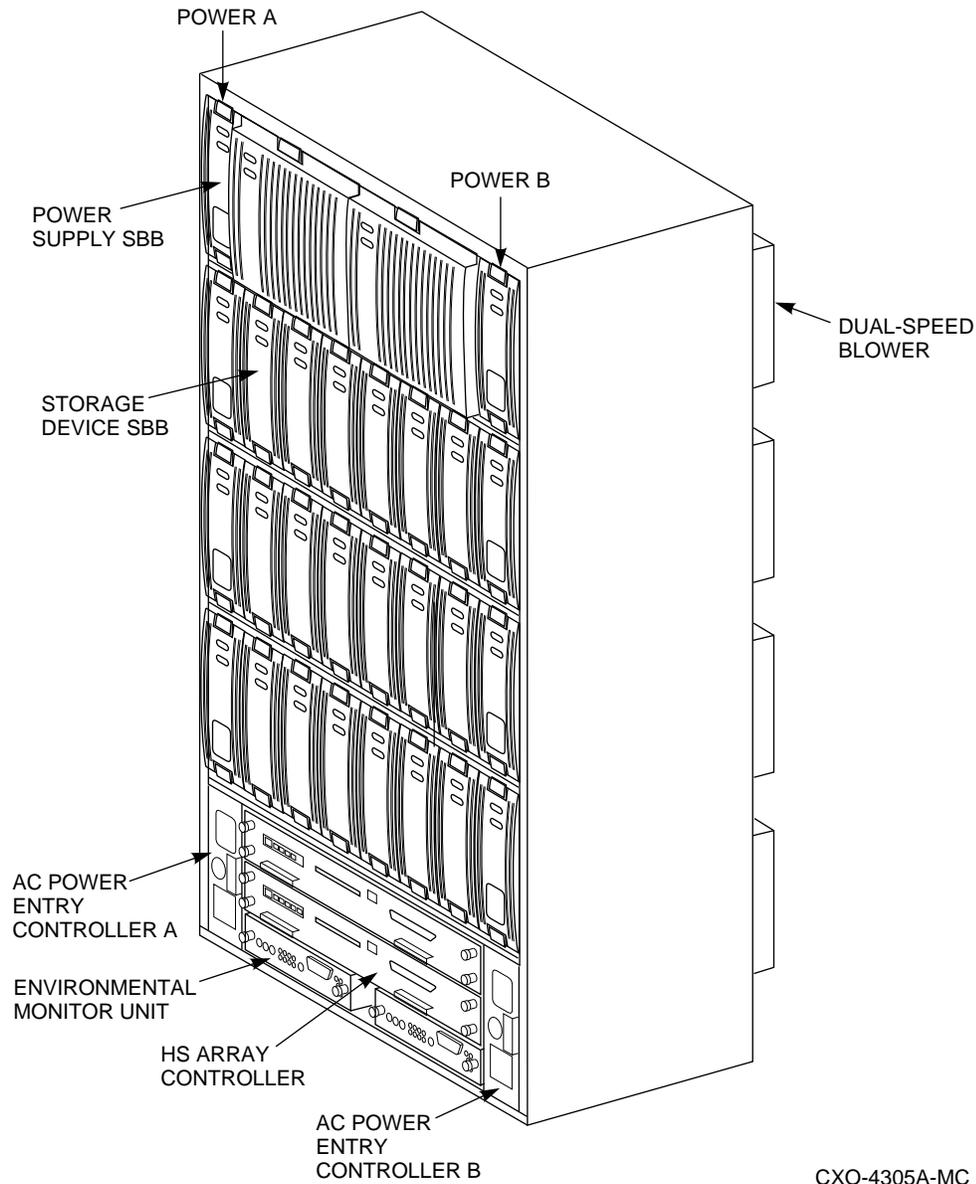
1.3.1 AC Power Entry Controller

The two ac power entry controllers provide the system on/off switch, ac power to all power supply SBBs, noise filtering, surge suppression, and electromagnetic interference (EMI) filtering.

In the SW300 enclosure, an auxiliary ac power source and a second ac power entry controller supply ac power to a second power supply SBB in each shelf. If the primary ac power source or ac power entry controller A fails, the shelf

remains powered by the ac power entry controller B. As shown in Figure 1–3, this configuration provides complete power redundancy to the shelf's devices.

The ac power entry controller A provides power to the four power supply SBBs on power supply bus A. This is the minimum power configuration (4+0) for the system. The power supply SBB located at the top of power supply bus B provides power for 4+1 redundancy.

For 4+4 redundancy, the ac power entry controller B provides power to the four power supply SBBs on power supply bus B. See Chapter 3 for additional information on power configurations.

Figure 1–3 SW300 Power Configuration

CXO-4306A-MC
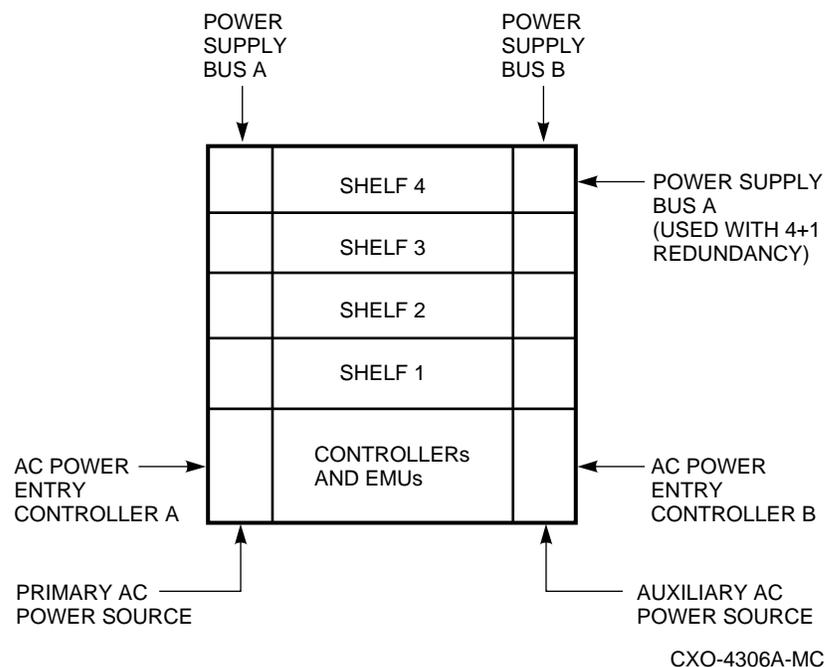
1.3.2 The High-Availability Storage Subsystem Fault Bus

The HS-series controllers use the StorageWorks high-availability storage subsystem fault bus to monitor certain fault conditions in the subsystem's shelves and enclosure. The fault bus, which is not a FRU, offers the following features:

- Notification when a device is physically removed from or inserted into the storage subsystem

- Notification of a failure associated with a device shelf and enclosure (for example, a shelf blower)

- Visual indication of bus/device status, facilitating fault isolation by the user

The high-availability storage subsystem fault bus consists of four signals added to each SCSI device port as described in the *StorageWorks Solutions High-Availability Storage Subsystem Fault Bus OEM Engineering Specification*. The controller uses the fault bus signals in the manner described in the specification.

1.3.3 Environmental Monitor Unit (EMU)

The EMU provides increased protection against catastrophic subsystem faults. The SW300 enclosure has two EMUs to provide complete system redundancy. If one EMU should fail, the other continues to monitor all system functions. The EMU works with the controller to warn the user of various types of existing or impending subsystem failures. The controller responds to such conditions by displaying error messages to the operator via the maintenance terminal and host interfaces. At the same time, it controls the warning light emitting diodes (LEDs) on the HS controller operator control panel (OCP) and the storage devices. The EMU reports faults by turning on status LEDs on the SW300 front panel.

The EMU has a selectable audible alarm switch on the front panel:

*   In the up (enable) position, the alarm is activated and produces an audible signal whenever a fault condition occurs.

*   In the down (disable) position, the alarm is deactivated.

The EMU performs the following specific functions:

*   Monitors and controls the cabinet blowers—The EMU monitors the FAN_OK signals coming from each of the eight blowers. If any blower malfunctions (that is, its speed goes below a setpoint), the EMU turns all of the other blowers up to high speed. This condition also generates a fault signal:

    –   Turns on the Fault (amber) LED located on the upper right corner on the front of the SW300

    –   Turns on an LED on the EMU that identifies the defective blower

    –   Turns off the SHELF_OK signal

    –   Activates the audible alarm

    The EMU monitors the FAN_INPLACE signals originating from each bank of four blowers and detects if a blower is not installed or connected. If a blower is not installed or connected, the EMU turns all of the other blowers up to high speed. This condition also generates a fault signal:

    –   Turns on the Fault (amber) LED located on the upper right corner on the front of the SW300

    –   Turns on a bank of LEDs on the EMU (thereby identifying the bank with the missing blower)

    –   Turns off the SHELF_OK signal

    –   Activates the audible alarm

*   Monitors the power supplies—The EMU monitors the POWER_OK signals originating from all power supply SBBs. The EMU performs the following actions if less than four power supply SBBs are functioning properly:

    –   Turns off the SYSTEM_POWER_OK signal going from the EMU

    –   Turns off the System OK (green) LED on the EMU

    –   Turns on the Shelf Fault (amber) LED on the EMU

    –   Turns off the System OK (green) LED located on the upper right corner on the front of the SW300

    –   Turns on the Fault (amber) LED located on the upper right corner on the front of the SW300

- – Turns off the SHELF_OK signal

- – Activates the audible alarm

- – Resets the host controller(s)

If one power supply SBB fails, but four or more power supply SBBs are still functioning, the EMU generates a fault condition and performs the following actions:

- – Turns on the Shelf Fault (amber) LED on the front of the EMU

- – Turns on the Fault (amber) LED located on the upper right corner on the front of the SW300

- Senses cabinet temperature—The EMU senses two different temperatures: warning and reset state. Warnings take place when the temperature is above 35°C (95°F). The EMU generates a fault condition and performs the following actions:

- – Turns on the Temperature (amber) LED on the EMU

- – Turns on the Fault (amber) LED located on the upper right corner on the front of the SW300

- – Turns the dual speed blowers up to high speed

The SW300 is held in a reset state when the temperature is above 50°C (122°F). The EMU performs the following actions:

- – Turns off the System OK (green) LED located on the upper right corner on the front of the SW300

- – Turns off System OK (green) LED on the EMU

- – Turns on the Fault (amber) LED on the EMU

- – Turns off the SYSTEM_POWER_OK signal

- Monitors the power supply voltage—The EMU monitors the +12 V dc and +5 V dc cabinet power supplies and if the respective voltage drops below +9.2 V dc or + 3.9 V dc, the EMU performs the following actions:

- – Turns off the System OK (green) LED located on the upper right corner on the front of the SW300

- – Turns off the System OK (green) LED on the EMU

- – Turns off the SYSTEM_POWER_OK signal

- – Activates the audible alarm

1.3.4 HS Array Controllers

The card cage assembly contains two slots for **controller** and cache memory modules. These slots provide the mechanical mounting, power, and signal interfaces for the units they house. This assembly allows for the mounting of two controllers to provide redundancy.

---------------------------------- **Note** ----------------------------------

This manual covers minimal controller functionality. All other information on controllers, such as a list of storage devices controlled by individual controllers, warm swap procedures, and controller-terminal connections is covered in the specific controller documentation.

The HS-controllers provide a connection between a host computer and an array of SCSI–2 compatible storage devices. A terminal is plugged into the controller during subsystem installation to set initial controller parameters. See the *StorageWorks Array Controllers HS Family of Array Controllers User's Guide* for details.

The SW300 can be configured for controller dual redundancy. See the HS controller documentation to determine warm swap procedures for each controller.

As shown in Table 1–2, the SW300 enclosure supports the following HS controllers:

Table 1–2 HS Controllers

Controller	Interface	Storage Device Buses
HSD30	Digital standard system system interconnect (DSSI)	Six 8-bit single-ended SCSI–2
HSJ30	Computer Interconnect (**CI**™) bus	Six 8-bit single-ended SCSI–2
HSJ40	CI bus	Six 8-bit single-ended SCSI–2
HSZ10	Fast, wide, differential SCSI	Five 8-bit single-ended SCSI–2
HSZ15	Fast, wide, differential SCSI	Five 8-bit single-ended SCSI–2
HSZ40	Fast, wide, differential SCSI	Six 8-bit single-ended SCSI–2

For a list of the storage devices controlled by individual controllers, see the *StorageWorks Array Controller Operating Firmware Release Notes*.

1.3.5 Dual Speed Blowers

As shown in Figure 1–4, the SW300 enclosure has eight rear-mounted blowers that pull air from the front of the cabinet to the rear. Connectors on the backplane provide the +12 V dc of power to operate the blowers. Logic signals allow the status of the shelf blowers to be monitored by the EMU. All operational blowers are turned up to high speed when the following conditions exist:

- If a high warning temperature condition is detected by the EMU
- If a blower is defective or removed
- If a blower's speed falls below the set point

Figure 1–4 Dual Speed Blowers (Cabinet Removed for Clarity)

BLOWER 5

BLOWER 1

BLOWER 6

BLOWER 2

BLOWER 7

BLOWER 3

BLOWER 8

BLOWER 4
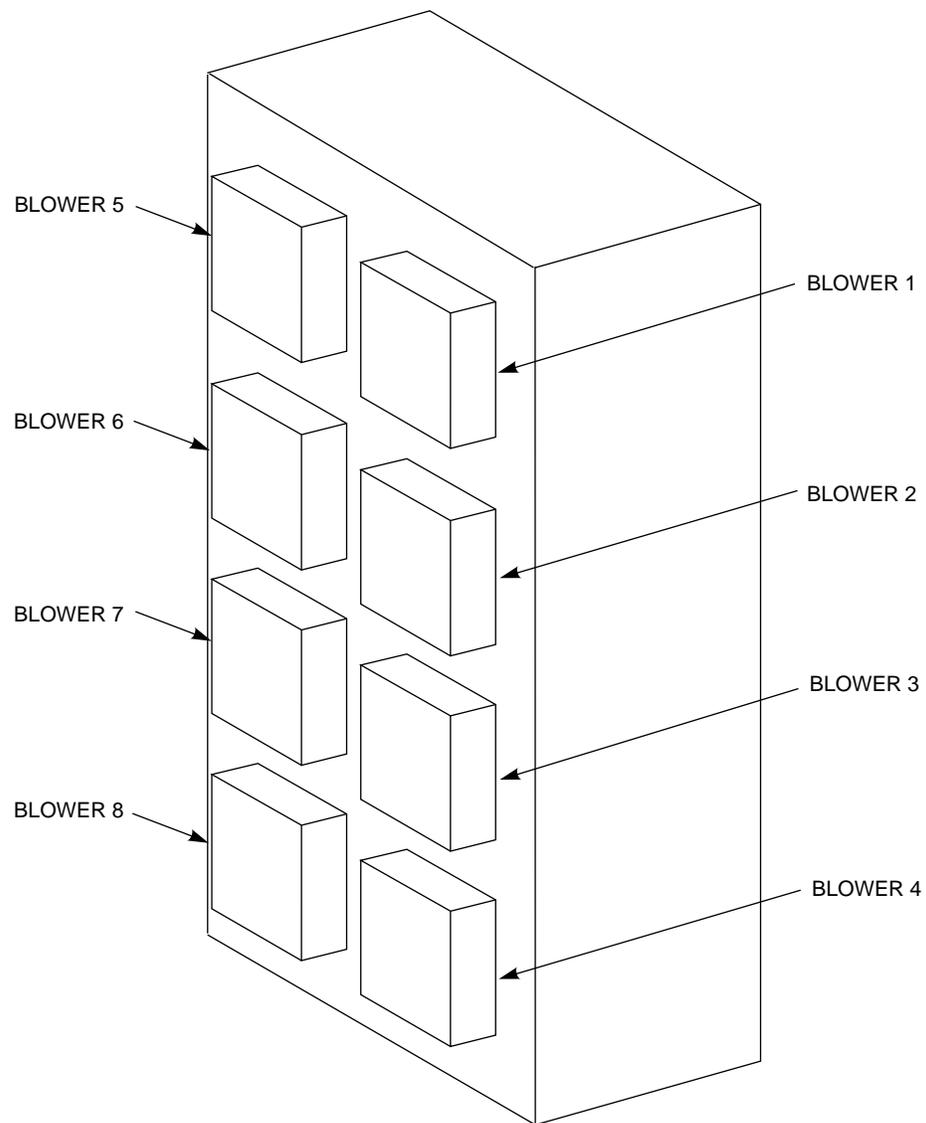
CXO-4269A-MC

1.3.6 Power Supply SBBs

The power supply SBB (BA35X–HD), shown in Figure 1–5, converts ac input from the ac power entry controller to +5 V dc and +12 V dc for use by the SW300 components. The SW300 enclosure provides connections for up to eight power supply SBBs. A minimum of four operable power supply SBBs is required for system operation.

The SW300 enclosure is designed for 4+1 redundant power supply. In this configuration, the four power supply SBBs on power supply bus A are provided with additional redundancy by the power supply SBB located in the top shelf of power supply bus B. This power supply SBB is connected to the black power cord. Power is provided to the SW300 enclosure until such time as there are less than four operating power supply SBBs. If this condition is reached, the SW300 enclosure will be held in a reset state.

With 4+4 full redundant power supplies, the SW300 enclosure can sustain multiple power supply faults. When 4+4 full redundant power supplies are used, input power may be connected to two separate utility power grids. In this configuration, the power supply SBBs on power supply bus A are connected to black power cords. The power supply SBBs on power supply bus B are connected to grey power cords. See Chapter 3 for further discussion of power configurations.

Figure 1–5 3½-Inch Power Supply SBB

COMMON POWER
SUPPLY STATUS
LED (GREEN)

POWER SUPPLY
STATUS LED
(GREEN)
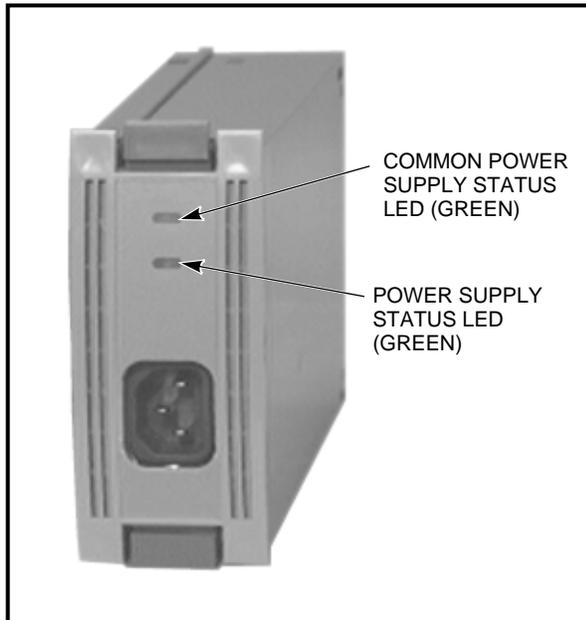
CXO-4325A-PH

1.3.7 Storage Device SBBs

The storage devices come in either a 3½-inch or a 5¼-inch SBB, as shown in Figures 1–6 and 1–7 respectively. The SW300 enclosure provides space for 24 3½-inch SBBs, 8 5¼-inch SBBs, or combinations of each. A 3½-inch SBB occupies one slot in a shelf. A 5¼-inch SBB requires three slots in a shelf.

The disk drive SCSI bus address for 5¼-inch SBBs is usually assigned based upon the shelf backplane connector but also can be assigned manually in some SBBs. See the *StorageWorks Solutions Shelf and SBB User's Guide*.

The disk drive SCSI bus address for 3½-inch SBBs is usually assigned based upon the shelf backplane connector.

Not all storage devices are supported by each type of HS array controller. See the current HS array controller model-specific software product descriptions (SPDs) and release notes for detailed information.

For a list of the various StorageWorks storage devices that can be utilized in the SW300, see the *StorageWorks Solutions Configuration Guide*.

Figure 1–6 3½-Inch SBB

DEVICE
ACTIVITY
(GREEN)
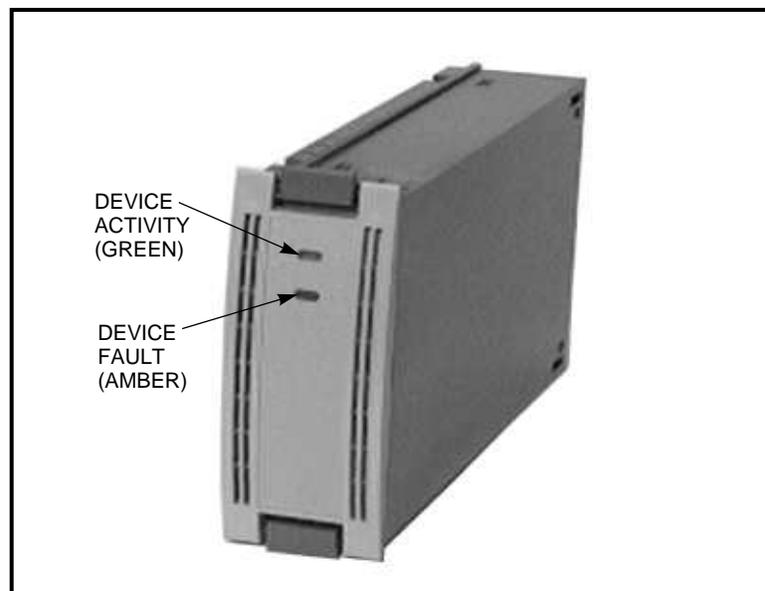
DEVICE
FAULT
(AMBER)

CXO-3671A-PH

Figure 1–7 5¼-Inch SBB

DEVICE
ACTIVITY
(GREEN)
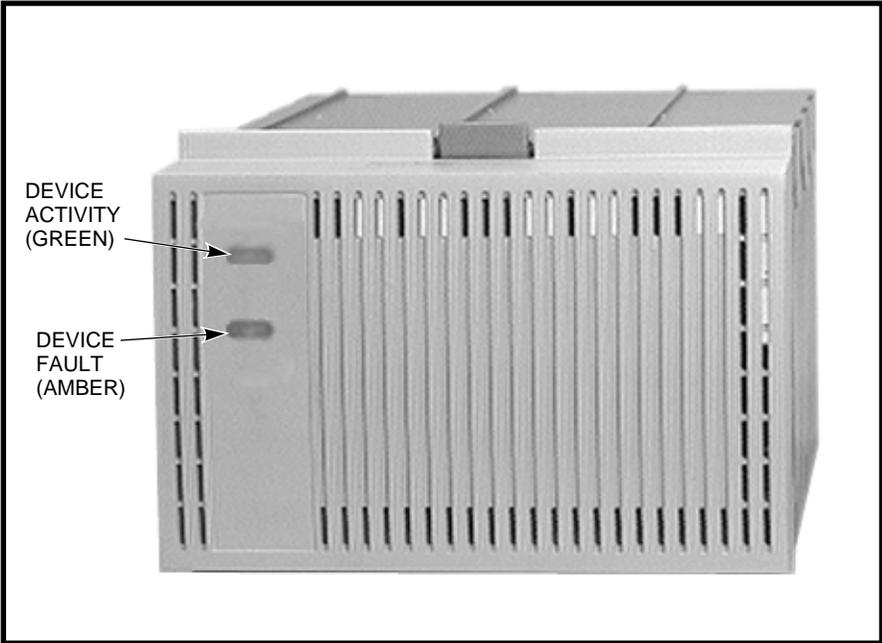
DEVICE
FAULT
(AMBER)

CXO-4308A-PH

1.4 SW300 SCSI Buses

The six single-ended SCSI-2 buses run vertically and attach to four devices per SCSI bus (IDs 0 through 3). The two HS array controllers device side, SCSI initiator IDs are preset by slot location to IDs 6 and 7, as shown in Figure 1–8.

Figure 1–8   SW300 SCSI Buses

CXO-4315A-MC

2
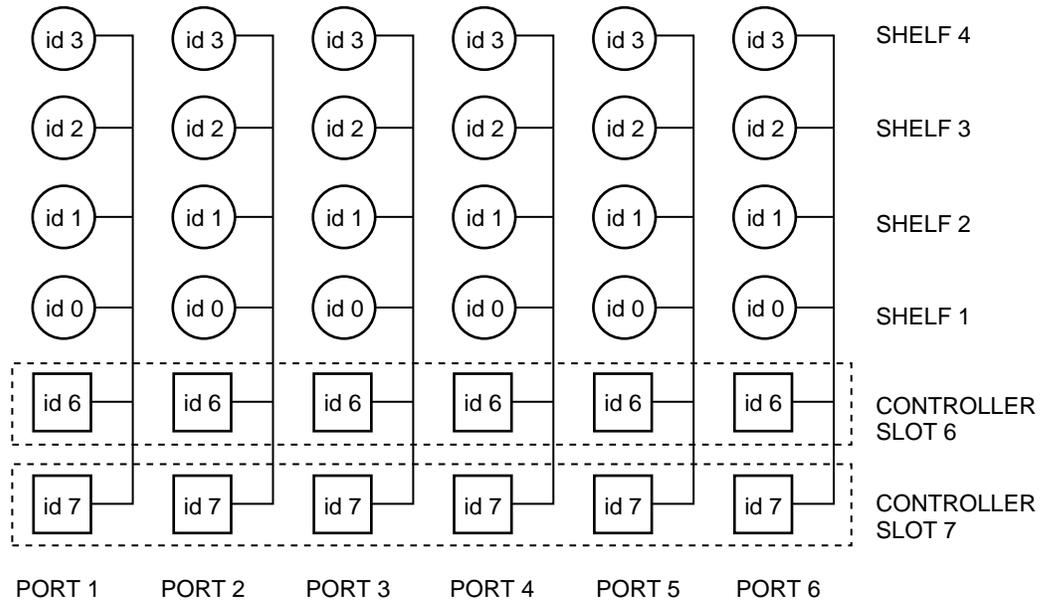
Unpacking and Installation Instructions

This chapter describes the site preparation, unpacking, installation, and power-up procedures for the SW300-series redundant array of independent disks (RAID) enclosure.

2.1 Site Preparation

SW300-series enclosures are intended for installation in Federal Communications Commission (FCC) Class A environments. Before installing the SW300 enclosure, make sure adequate space is provided around the enclosure for opening the front door and for adequate airflow. See Figure 2–1 for specific space requirements.

Figure 2–1 Minimum Installation Clearance Measurements

```
        476.25 mm
        (18.34 in)

         ┌──┐ ┌──┐
         │          │          ▲
         │          │          │
         │  SW300   │       482.60 mm
         │          │       (19.00 in)
         │          │          │
FRONT    │          │          ▼
DOOR     ├──────────┘          ▲
         │                     │
         │                  482.60mm
         │                  (19.00 in)
         │                     │
         │                     ▼

              CXO-4316A-MC
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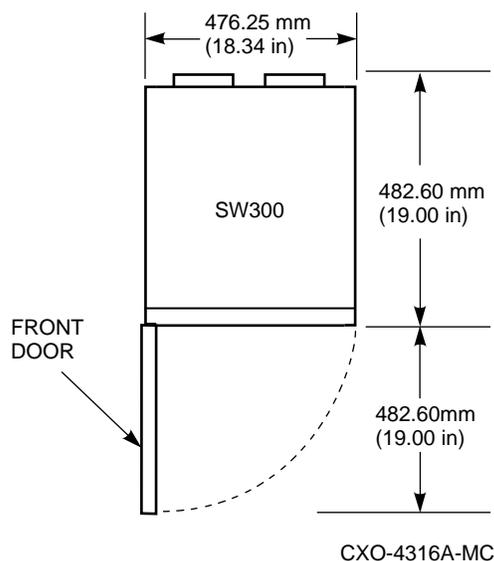
2.2 Unpacking the SW300 Enclosure

SW300-series enclosures are packed in a corrugated carton attached to a wooden shipping pallet, as shown in Figure 2–2. Unpack the SW300 enclosure as follows:

_____ **Note** _____

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

_____

1. Remove the shipping straps.

2. Remove the top cover.

3. Remove the ramp from the top of the shipping carton and set it aside.

4. Remove the two foam cushions from the top of the SW300 container.

5. Remove the cardboard packaging surrounding the SW300.

6. Remove the plastic barrier bag.

7. Once the SW300 is unpacked, examine the front door, right and left side panels, top panel, and undercarriage for any apparent damage. Report such problems immediately to your Digital representative.

Figure 2–2   Unpacking the SW300 Enclosure
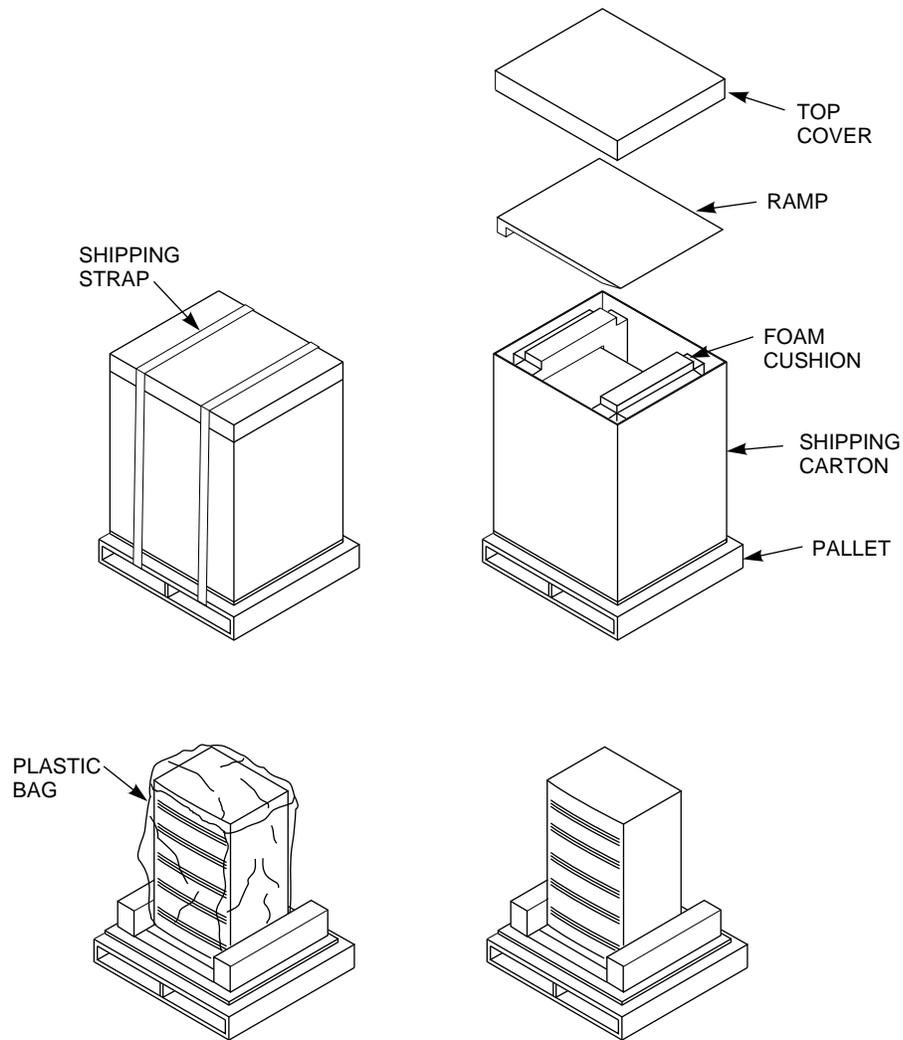
CXO-4317A-MC

2.3 Removing the SW300 Enclosure from the Pallet

Use the following procedure to remove the SW300 enclosure from the shipping pallet:

WARNING

Serious personnel injury may result if correct safety precautions are not taken during the removal procedure.

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1. Attach the ramp by fitting the ramp lip into the groove on the pallet, as shown in Figure 2–3.

Figure 2–3 Shipping Pallet Ramp Installation
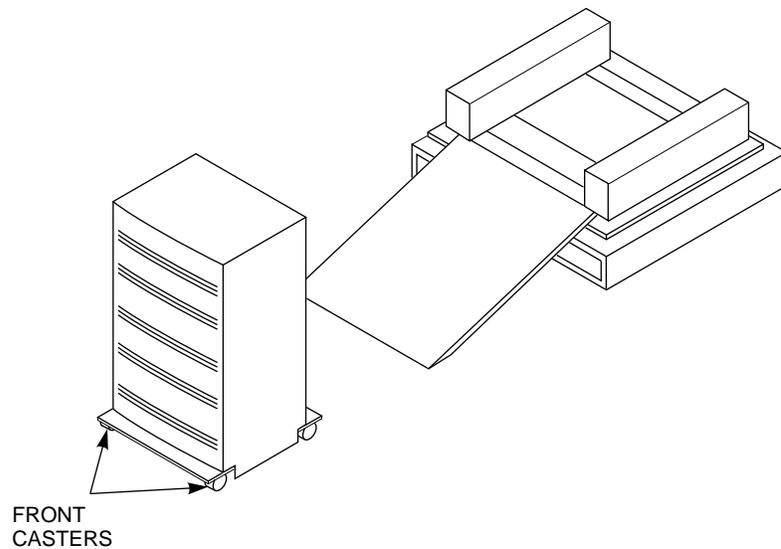
FRONT
CASTERS

CXO-4318A-MC

2. Lift the lock lever on each front caster to the up position so the SW300 enclosure can be moved.

WARNING

Three people are recommended to unload the SW300 from the shipping pallet. Failure to use sufficient personnel may result in personnel injury and equipment damage.

CAUTION

Do not drop the SW300 from a height greater than two inches or serious structural damage can result.

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3. Grasping the sheet metal base assembly, carefully lift the rear of the SW300 enclosure over the "hump" in the middle of the pallet and roll the SW300 enclosure off the pallet and down the ramp to the floor. If any further lifting

of the SW300 enclosure is required, grasp the sheet metal base assembly on the side and carefully lift it.

4. Retain the shipping container and all packing materials.

2.4 Placing the SW300 Enclosure

Use the following procedure to move the SW300 enclosure to its designated site:

—————————————— **WARNING** ——————————————

To prevent damage to the SW300 enclosure and injury to personnel, make sure to provide a clear path for the casters.

————————————————————————————————

1. Roll the SW300 enclosure to its installation location.

2. If required, depress the lock on each front caster to prevent the SW300 enclosure from moving.

2.5 Power Cords

—————————————— **Note** ——————————————

The SW300 enclosure is not shipped with power cords.

————————————————————————————————

You need to supply your own power cords. Order country-specific 13-20 amp input power cords, as listed in Table 2–1.

Table 2–1   Country-Specific Power Cords

Country	Voltage	Amperes	Plug	Meters (Feet)	Order No.
Australia	250 V ac	16	AS 3112 - 1981	2.5 (8.2)	BN05C–2E
Canada	125 V ac	13	NEMA 5–15	2.4 (8.0)	BN20A–2E
Central Europe	250 V ac	16	CEE 7/7 (Schuko)	2.5 (8.2)	BN03F–2E
Denmark	250 V ac	16	Afsnit 107	2.5 (8.2)	BN27K–2E
Europe–Central	250 V ac	16	CEE 7/7 (Schuko)	2.5 (8.2)	BN03F–2E
India	250 V ac	16	BS 546	2.5 (8.2)	BN27P–2E
Ireland	250 V ac	13	BS 1363	2.5 (8.2)	BN02C–2E
Israel	250 V ac	16	SI 32	2.5 (8.2)	BN24U–2E
Italy	250 V ac	16	CEI 23–16/VII	2.5 (8.2)	BN27J–2E
Japan	125 V ac	13	NEMA 5–15	2.4 (8.0)	BN20A–2E
New Zealand	250 V ac	16	AS 3112—1981	2.5 (8.2)	BN05C–2E
South Africa	250 V ac	16	BS 546	2.5 (8.2)	BN27P–2E
Switzerland	250 V ac	16	SEV 1011	2.5 (8.2)	BN27G–2E
United Kingdom	250 V ac	13	BS 1363	2.5 (8.2)	BN02C–2E
United States	125 V ac	13	NEMA 5–15	3.0 (9.8)	BN20A–2E

2.6 Applying Power

Use the following procedure to apply power:

1. Verify that the on/off switch on each ac power entry controller is set to the off (0) position.

2. Verify that all power cables are attached to the appropriate power supply StorageWorks building blocks (SBBs).

3. Verify that all external cables are attached to the controller.

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

5. Connect the power cord to an ac power entry controller.

6. Connect each power cord plug to a wall outlet receptacle.

7. Apply power to the enclosure by setting the on/off switch on each ac power entry controller to the on (|) position.

8. Verify the power is on by checking the light emitting diodes (LEDs) on the power supply SBBs, environmental monitor unit (EMU), and controller. These LEDs should be displayed as follows:

   - Power supply SBBs—both LEDs (green) are on

   - EMU—SYSTEM OK (green) is on

   - Controller—reset (green) is flashing

   - SW300 cabinet—System OK (green) is on

   For further information on SBB LEDs, see Chapter 4.

   _____ **Note** _____

   For further information on controller LEDs and configuration, see the *StorageWorks Array Controllers HS Family of Array Controllers User's Guide*.

   _____

9. Configure the controllers.

   _____ **Note** _____

   For information concerning storage device configuration, see the *StorageWorks Solutions Shelf and SBB User's Guide*.

   _____

10. Configure the storage devices.

3

Configuration Rules and Restrictions

This chapter describes configuration rules and restrictions for the SW300-series redundant array of independent disks (RAID) enclosure. When specific rules and restrictions are not provided, references are given to the proper StorageWorks documentation.

3.1 System Configurations

Table 3–1 lists the operating configurations for the SW300 enclosure.

Table 3–1 Configurations

Field Replaceable Unit	Minimum	Maximum
StorageWorks Building Block (SBB) Shelf Power Supplies (BA35X–HD)	4	8
3½-Inch Storage SBBs (SWXBA–BA (fixed media) or SWXBA–BB (removable device))	1	24
5¼-Inch Storage SBBs (SWXBB–BA)	0	8
HS-series Controllers with Cache Memory[1]	1	2
Environmental Monitor Units (EMUs) (BA35X–EA)	1	2
AC Power Entry Controllers (BA35X–HE)	1	2
Dual Speed Blowers (BA35X–MD)	8	8

[1]Includes HSD30, HSJ30, HSJ40, HSZ10, HSZ15, and HSZ40 controllers.

3.2 Input Power Cord Routing and System Redundancy

The SW300 can be configured with dual ac power redundancy. The optional dual power redundancy configuration consists of both ac power cords from the ac power entry controllers being plugged into a primary ac power source (wall outlet) and an auxiliary ac power source (the same or another wall outlet).

For complete power redundancy, an option is to provide independent, external power sources. Thus, one ac power entry controller receives ac input power from one circuit while the second ac power entry controller receives it from a different circuit.

3.3 Power Configurations

Table 3–2 lists the power configurations for the SW300 enclosure.
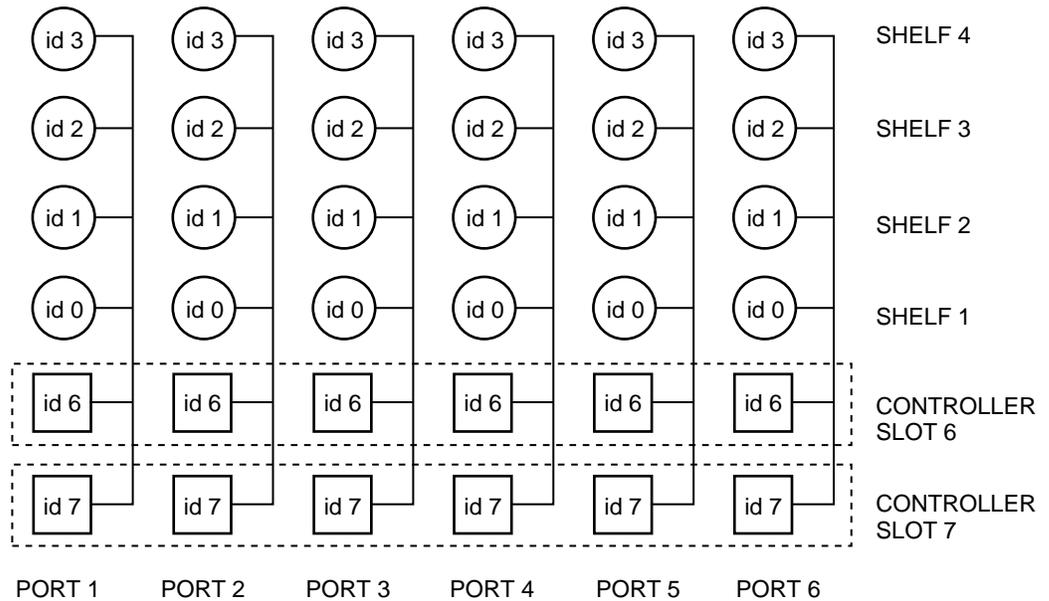
Table 3–2 Power Configurations

	Power Cords		
	Input[1]	Black[2]	White[3]
Single AC Input Assembly (Power Supply Bus A)			
Basic (SBB shelf power supplies in Slot A of each shelf)[4]	1	4	0
Redundant (*n*+1) (SBB shelf power supplies in Slot A of each shelf and Slot B, top shelf)[4]	1	5	0
Dual AC Power Entry Controller (Power Supply Buses A and B)			
SBB shelf power supplies in Slots A and B of each shelf[4]	2	4	4

[1]From the wall outlet to the SW300.

[2]Black ac power cords are connected to the ac power entry controller A.

[3]Grey ac power cords are connected to the ac power entry controller B.

[4]Each SBB shelf power supply requires a separate ac power cord.

3.4 SW300 SCSI Buses

The six single-ended SCSI–2 buses run vertically and attach to four devices per SCSI bus (IDs 0 through 3). The two HS array controllers device side, SCSI initiator IDs are preset by slot location to IDs 6 and 7, as shown in Figure 3–1.

Figure 3–1   SW300 SCSI Buses


```
                                                              SHELF 4
  id 3    id 3    id 3    id 3    id 3    id 3

  id 2    id 2    id 2    id 2    id 2    id 2         SHELF 3

  id 1    id 1    id 1    id 1    id 1    id 1         SHELF 2

  id 0    id 0    id 0    id 0    id 0    id 0         SHELF 1

  id 6    id 6    id 6    id 6    id 6    id 6         CONTROLLER
                                                       SLOT 6

  id 7    id 7    id 7    id 7    id 7    id 7         CONTROLLER
                                                       SLOT 7

 PORT 1  PORT 2  PORT 3  PORT 4  PORT 5  PORT 6
```

CXO-4315A-MC

3.5 Recommended Loading Sequence

The recommended loading sequence for the SW300 enclosure is as follows:

1. Install a controller in slot 7.

2. Install a controller in slot 6.

3. Install storage device SBBs left to right, bottom to top. Therefore, the first storage device SBB should be installed in port 1, ID 0, on shelf 1, as shown in Figure 1–8. The second storage device SBB should be installed in port 2, ID 0, in Shelf 1, and so on with the last SBB installed in port 6, ID 3, in shelf 4.

3.6 HS Array Controller Configurations

For information on redundant array of independent disks (RAID) and other controller configurations, see the *StorageWorks Array Controllers HS Family of Array Controllers User's Guide*.
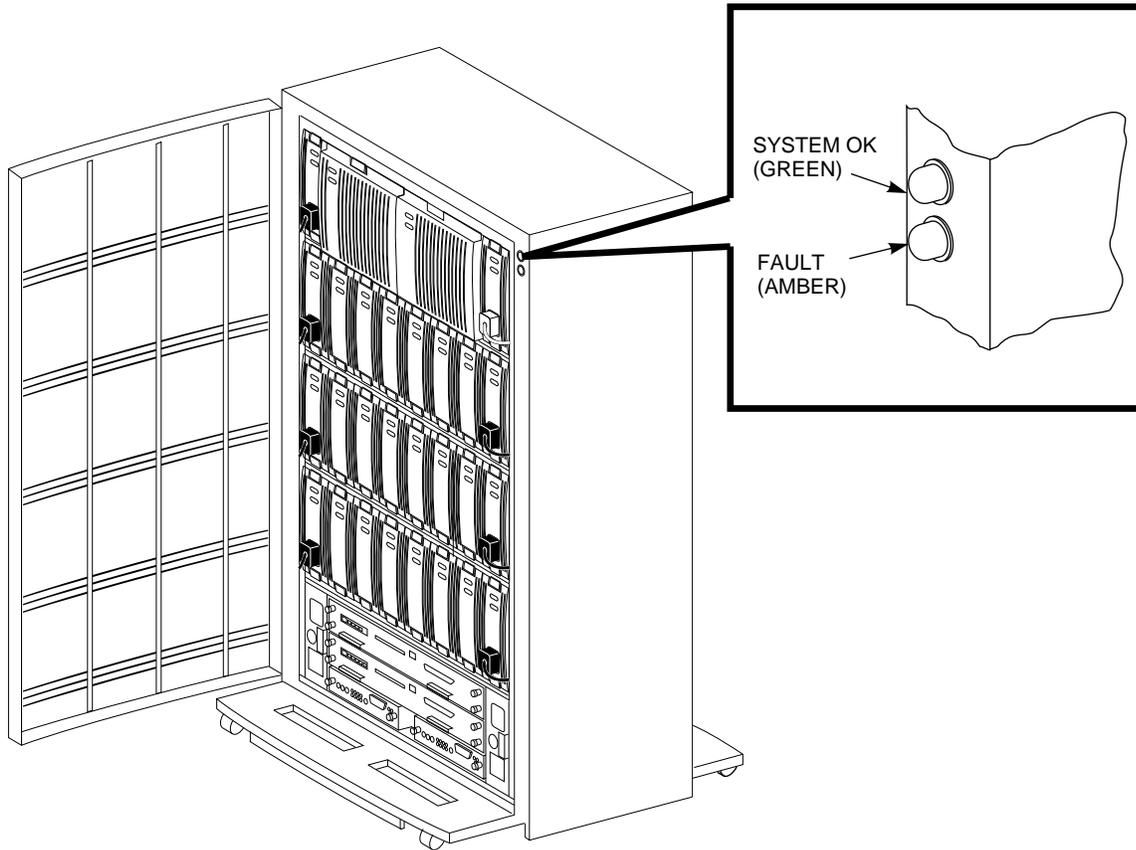
4

Error Analysis and Fault Isolation

This chapter describes the errors, faults, and significant events that can occur during the SW300-series redundant array of independent disks (RAID) enclosure's initialization and normal operation. A description of the events and how to respond to a specific event is provided.

The error and event descriptions isolate failures to the field replaceable unit (FRU). This information helps increase your knowledge of system functions and assists you with your report to repair personnel.

4.1 SW300 Front Panel Fault Notification

Figure 4–1 depicts the two light emitting diodes (LEDs) on the SW300 cabinet. See Table 4–1 to determine the error codes on the SW300 cabinet front panel.

Figure 4–1 SW300 Light Emitting Diodes

SYSTEM OK
(GREEN)

FAULT
(AMBER)

CXO-4309A-MC

Table 4–1 SW300 Front Panel Fault Notification

When the ...	Is ...	The subsystem ...
System OK (green) LED Fault (amber) LED	ON OFF	Is in the normal operating state.
System OK (green) LED	OFF	The subsystem does not have power applied or is in a Reset state. 1. Check that ac power is applied. 2. Check the EMU control panel LEDs to determine which FRU has failed. 3. Check the system has at least four operational power supply SBBs. 4. Check for any error messages on the terminal (if one is attached)
Fault (amber) LED	ON	Has a failed FRU. Check the EMU control panel LEDs to determine which FRU has failed.

4.2 Environmental Monitor Unit (EMU) Functions

Once the SW300 enclosure is powered up, it will operate normally until a fault condition is detected by the EMU.

In addition to the fault bus functions provided by the fault clock, fault data, and device swap signals, the EMU performs the following functions during routine operations:

- Monitors and controls the cabinet blowers
- Monitors the power supplies
- Senses cabinet temperature
- Monitors the power supply voltage

If the EMU detects a fault condition, it will respond as follows:

- Turns on the appropriate LED on the EMU panel
- Turns on the Fault (amber) LED located on the upper right corner on the front of the SW300
- Activates the audible alarm

For further discussion on EMU functions, refer to Chapter 1.

4.3 EMU Control Panel LEDs and Fault Notifications

As shown in Figure 4–2, the front panel LEDs display information when the SW300 enclosure is powered up or encounters a problem. Table 4–2 lists the EMU control panel buttons and LEDs, their functions, and error code meanings.

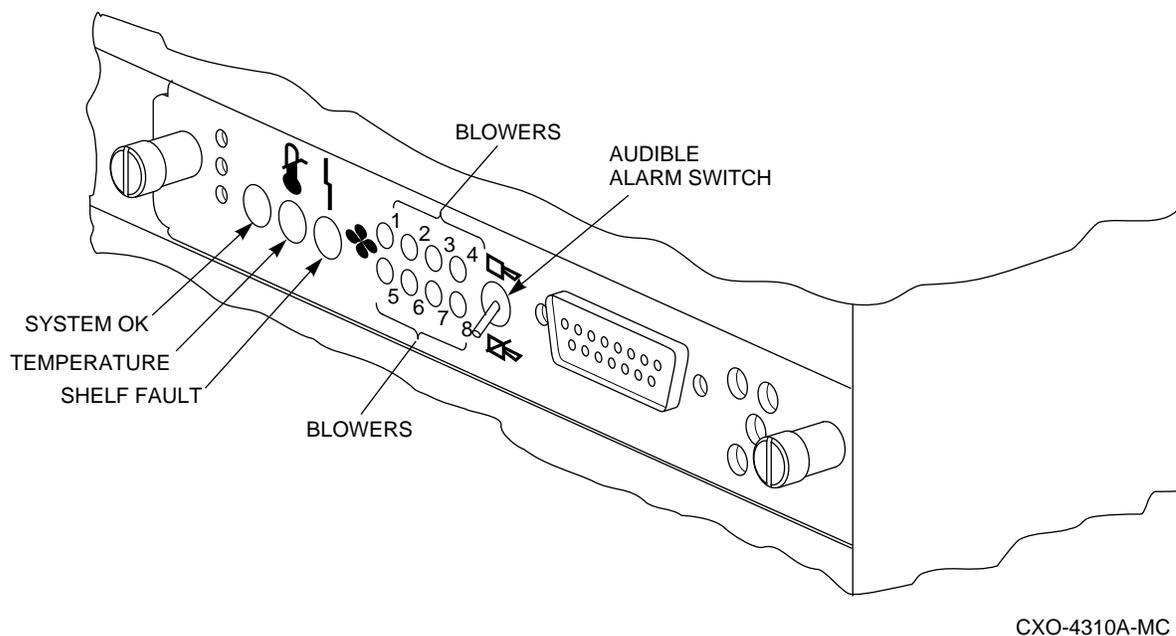**Figure 4–2 EMU Control Panel LEDs and Switches**

CXO-4310A-MC

Table 4–2 EMU Control Panel LEDs/Switches and Description of Errors

When the ...	Is ...	The subsystem ...
System OK (green) LED Shelf Fault (amber) LED Blower 1 through 8 (amber) LEDs Temperature (amber) LED Audible Alarm switch	ON OFF OFF OFF OFF	Is in the normal operating state.
Audible Alarm	ON	Has a failed FRU. Check the EMU control panel LEDs to determine which FRU has failed.
System OK (green) LED	OFF	Has a failed FRU and one or more of the following error conditions exist: • The temperature is above the maximum safe operating level. • The +12 V dc power supply output is out of regulation • The +5 V dc power supply output is out of regulation • Fewer than four power supply SBBs are operational
ANY blower LED	ON	Has an individual blower failure.
Blower 1, 2, 3, and 4 (amber) LEDs	ON	Has one of the four blowers either not installed or not connected.
Blower 5, 6, 7, and 8 (amber) LEDs	ON	Has one of the four blowers either not installed or not connected.
Temperature (amber) LED	ON	Operating temperature is too high. The blowers will operate at high speed to reduce the temperature.
Shelf Fault (amber) LED	ON	Has one or more of the following faults: • A power supply SBB has failed (verify if any individual power supply SBB LEDs are off to confirm) • Fewer than four power supply SBBs are operational.

4.4 HS Array Controller LEDs and Fault Notification

The operator control panel (OCP), normal operation, and fault notification are discussed using a typical HSZ40 controller for reference.

4.4.1 HSZ40 Operator Control Panel

The HS controller OCP contains the following:

- One reset button (//) with an embedded green LED

- One button per SCSI port

- Six amber LEDs[1]

Figure 4–3 shows the HSZ40 controller OCP. Buttons and LEDs serve different functions with respect to controlling the SCSI ports and/or reporting fault and normal conditions. Button and LED functions are discussed in the following sections.

Figure 4–3 HS Controller Operator Control Panel
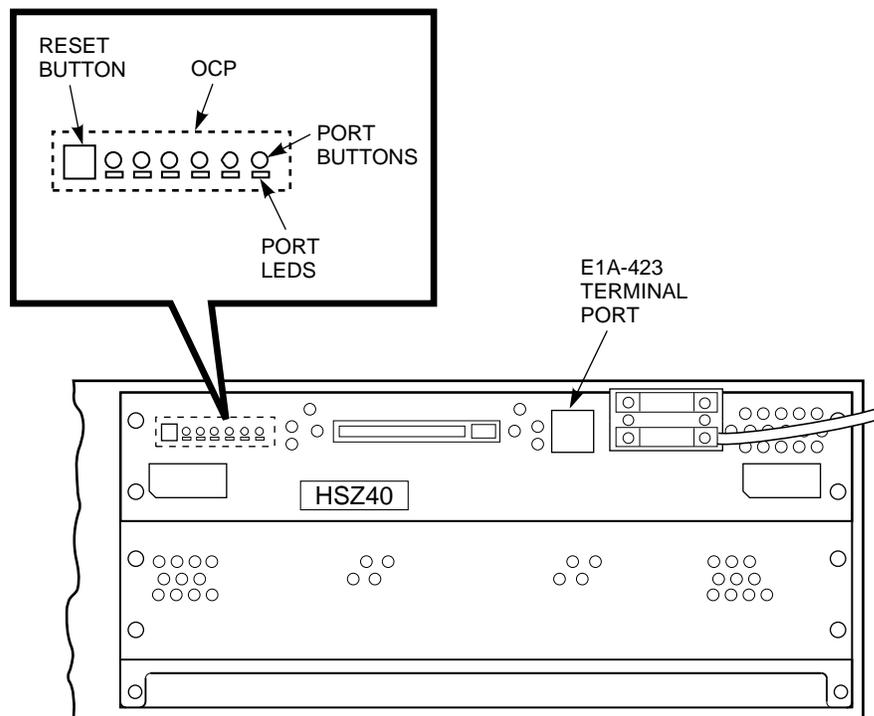
CXO-4311A-MC

4.4.2 HSZ40 Normal Operation

The reset (green) LED (//) reflects the state of the controller and the host interface. Once controller initialization completes and its firmware is functioning, the green button constantly flashes. Pressing the green button during this normal operation resets the controller.

---

[1] The HSJ-series controller has the amber LEDs embedded in the port buttons.

Under normal operation, the amber LEDs indicate the state of the respective SCSI–2 buses. When the devices on the buses are functioning correctly, the amber LEDs will not be lit or flashing.

Pressing one of the port buttons at this time will light its corresponding amber LED and **quiesce** its SCSI–2 port. A port must be quiesced to remove or warm swap a device on the SCSI–2 bus for that port. For further information regarding StorageWorks building block (SBB) warm swaps, see the *StorageWorks Array Controllers HS Family of Array Controller Service Manual*.

4.4.3 HSZ40 Fault Notification

The OCP LEDs display information when the HS controller encounters a problem with a device configuration, a device, or the controller itself.

For definitions of error codes, see the *StorageWorks Array Controllers HS Family of Array Controller Service Manual*.

4.5 Storage Device SBB LEDs and Fault Notification

The storage device SBBs come in either a 3½-inch or a 5¼-inch as shown in Figures 4–4 and 4–5 respectively. Each storage SBB has two LEDs that display the SBB's status. These LEDs have three states: on, off, and flashing.

- The upper (green) LED is the Device Activity LED and is on or flashing when the SBB is active.

CAUTION

Removing a storage SBB when the upper LED is on or flashing can cause the loss or corruption of data.
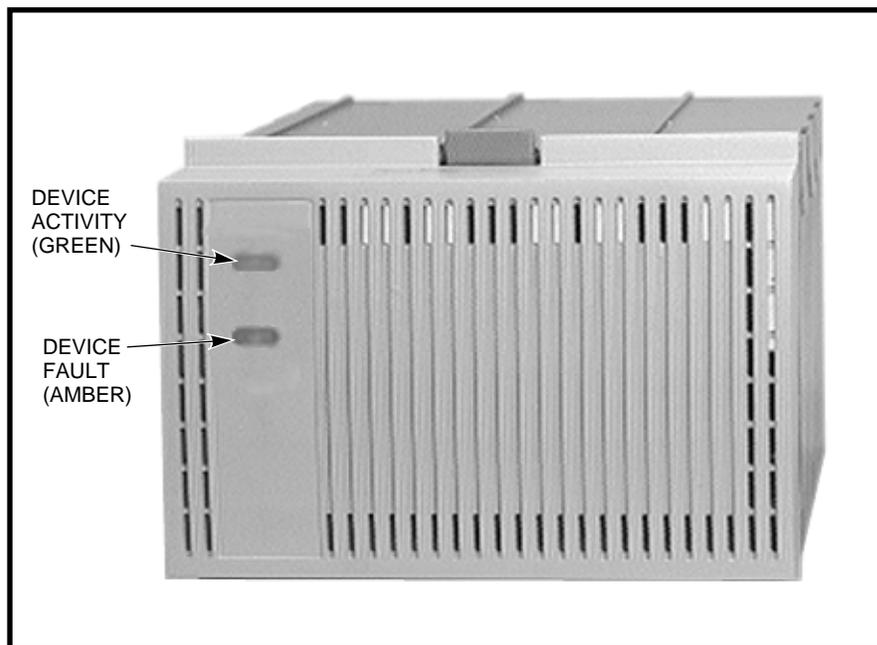

- The lower (amber) LED is the Device Fault LED and indicates an error condition or configuration problem when it is either on or flashing.

Figure 4–4 3½-Inch Storage SBB

DEVICE
ACTIVITY
(GREEN)

DEVICE
FAULT
(AMBER)
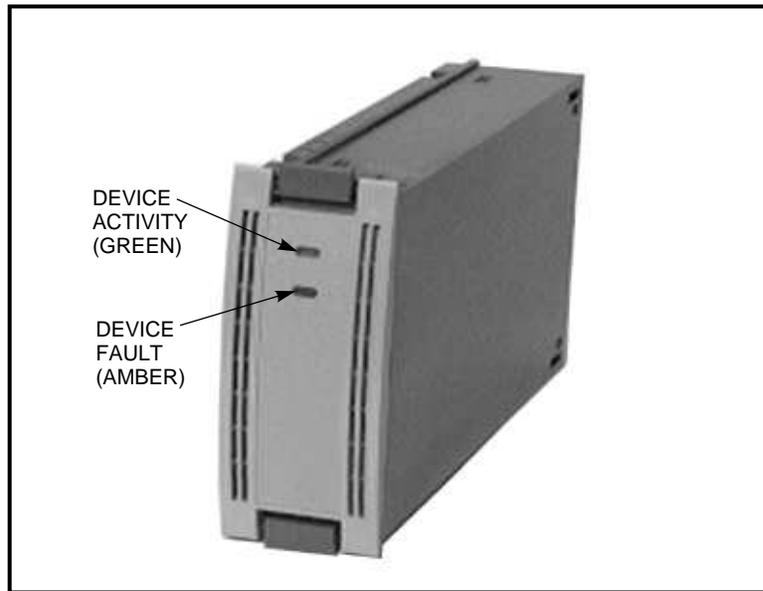
CXO-3671A-PH

Figure 4–5 5¼-Inch SBB

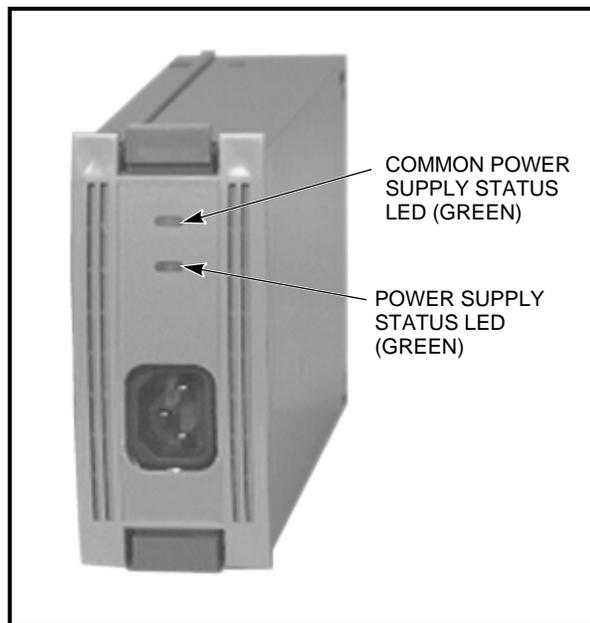DEVICE
ACTIVITY
(GREEN)

DEVICE
FAULT
(AMBER)

CXO-4308A-PH

4.6 Power Supply SBB LEDs and Fault Notification

Each power supply SBB has two LEDs that display the power supply status,
as shown in Figure 4–6. The upper (green) LED is the Common Power Supply
Status LED. The lower (green) LED is the Power Supply Status LED.

- When the upper LED is on, all the power supplies on its power bus are functioning properly.

- When the upper LED is off, at least one of the power supply SBBs on its power bus is not functioning properly.

- When the lower LED is off, either there is an input power problem or the power supply is not functioning.

Figure 4–6 3½-Inch Power Supply SBB

COMMON POWER
SUPPLY STATUS
LED (GREEN)

POWER SUPPLY
STATUS LED
(GREEN)

CXO-4325A-PH

4.7 Dual Speed Blower Fault Notification

The SW300 has eight rear-mounted blowers that cool the controllers and storage devices. Connectors on the backplane provide the +12 V dc power to operate the blowers. When a blower fails, the appropriate blower LED is illuminated on the EMU to identify which blower has malfunctioned.

5

Removal and Installation Procedures

This chapter describes the procedures to remove and install the following field replaceable units (FRUs) in the SW300-series redundant array of independent disks (RAID) enclosure:

- StorageWorks building block (SBB) power supply or storage device
- Environmental monitor unit (EMU)
- Controller
- Dual speed blower
- AC power entry controller

5.1 Removing a Power Supply SBB

There are two methods for replacing power supply SBBs: the **hot-swap** method and the **cold-swap** method. You must determine the appropriate replacement method prior to replacing a power supply SBB.

The light emitting diodes (LEDs) on the front of the SBB indicate the status, either operational or non-operational.

- For power supply SBBs, the hot-swap method can be used providing that device is not active (that is, both LEDs are off).
- The cold-swap method is normally used during initial installation. The power is removed from the enclosure assembly and all devices are inactive. None of the devices is operational until the power is restored.

Use the following procedure to replace a power supply SBB:


CAUTION

The power supply SBB can be damaged if dropped. When removing or replacing a power supply SBB, always use both hands to support its weight.

To prevent **electrostatic discharge (ESD)** damage to an SBB, do not touch the SBB connector.

---

1. Disconnect the power cord from the front of the power supply SBB.
2. Make sure that both LEDs on the power supply SBB are off.
3. As shown in Figure 5–1, press the two mounting tabs together to release the power supply SBB from the shelf.

4. Use both hands and pull the power supply SBB out of the shelf.

Figure 5–1 Removing a Power Supply SBB (Cabinet Removed for Clarity)

CXO-4314A-MC
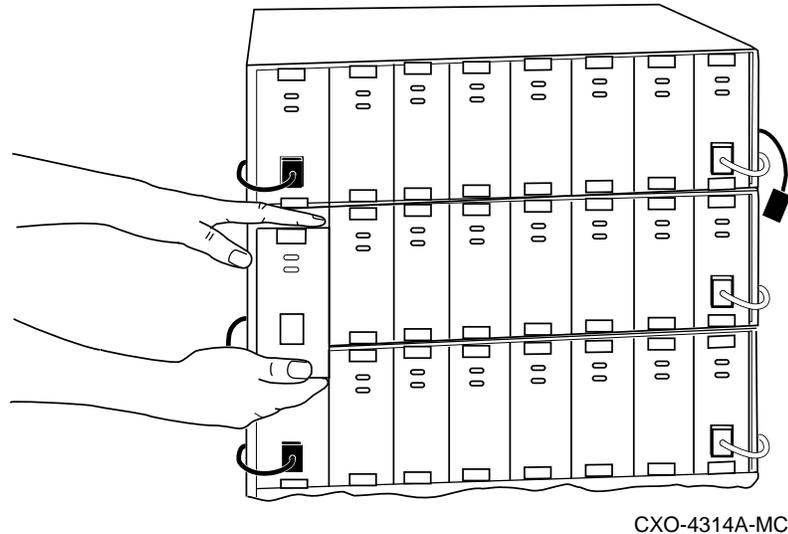
5.2 Installing a Power Supply SBB

Use the following procedure to install a power supply SBB:

1. Insert the replacement power supply SBB into the guide slots and push it in until it is fully seated and the mounting tabs engage the shelf.

2. Connect the power cord to the power supply SBB.

3. After input power is applied, observe the power supply SBB LEDs to make sure the power supply is functioning properly. Both status LEDs should be on.

5.3 SBB Warm Swap

An SBB warm swap involves quickly removing and replacing a disk drive, tape drive, or other storage SBB. SBBs can be removed safely without taking the system or controller off line or adversely affecting activity on the rest of the system. Using warm swap also preserves data integrity. However, before removing a device, either the controller or the operator must determine that the swap is necessary. The SBB warm swap procedure also can be used to add a device to an empty shelf slot.

- The controller determines that a device is bad by trying to access the device, receiving no response from the device, or detecting excessive errors from the device.

- The operator decides to remove a device by examining the controller's operator control panel (OCP) codes, the SBB LEDs, system messages, or system error log information.

5.4 Removing a Storage Device SBB

_____ CAUTION _____

Warm swap supports removing and replacing only *one* SBB at a time.
Should another SBB need to be swapped, the entire warm swap procedure
must be repeated.

The steps in this section must be followed in their exact order to be sure
of the following:

- Preserve data integrity (especially for devices with older SCSI
  interface designs).

- Reduce chances of making a port unusable for a long period, which
  can render several devices inaccessible.

- Prevent the controller from performing unpredictably.

_____

Removing or replacing a storage SBB is reported to the controller or host by
the C_SWAP signal. The transition of this normally high signal to a low signal
indicates that a storage SBB has been removed or inserted. Upon receipt of this
signal, the controller can respond as described in Table 5–1.

Table 5–1 Controller Response to the C_SWAP Signal

Replacement Action	Controller Response
Removing a storage device when data is not being transferred	None
Removing a storage device during a data transfer operation	Verify data validity
Installing a storage device	Begin the storage device configuration process

Use the following procedure to replace a storage device SBB:

_____ CAUTION _____

Be sure that the replacement device is the same model as the one being
replaced unless the system is reconfigured.

Be sure the Device Activity (green) LED on the SBB is out. Removing a
storage device SBB when the upper LED is on or flashing can cause the
loss or corruption of data.

To prevent **electrostatic discharge (ESD)** damage to an SBB, do not
touch the SBB connector.

_____

1. The device must be dismounted from the host *before* proceeding. (For
   example, enter the DISMOUNT command if using the Open VMS operating
   system.)

   See the operating system documentation for procedures necessary for
   dismounting a device.

2. Quiesce the SBB's port by pressing and holding the controller port button for the SBB. Continue holding the button until all controller amber OCP LEDs light.

_____ **Note** _____

Only one port can be quiesced at any time.

If the button is not held long enough, or multiple buttons are pushed in quick succession, *all* buttons are ignored (no ports are quiesced). The button must be pressed and held again to quiesce the port.

_____

3. Wait until the chosen controller port LED flashes alternately with the other port LEDs (this indicates I/O has stopped). The alternating pattern flashes for approximately 30 seconds, during which time the SBB can be removed.

If the pattern does not appear after a minute or two, another shelf is asserting a fault signal that prevents any quiesce function on this controller. To correct the problem, the suspect shelf must be located and all devices must be removed.

4. To remove the SBB, press its two mounting tabs together to release it from the shelf, and pull it out using both hands (see Figure 5–2). While the controller OCP LEDs are flashing, any remaining SBBs on the quiesced port will flash their status LEDs.

Figure 5–2 Removing a Storage Device SBB (Cabinet Removed for Clarity)
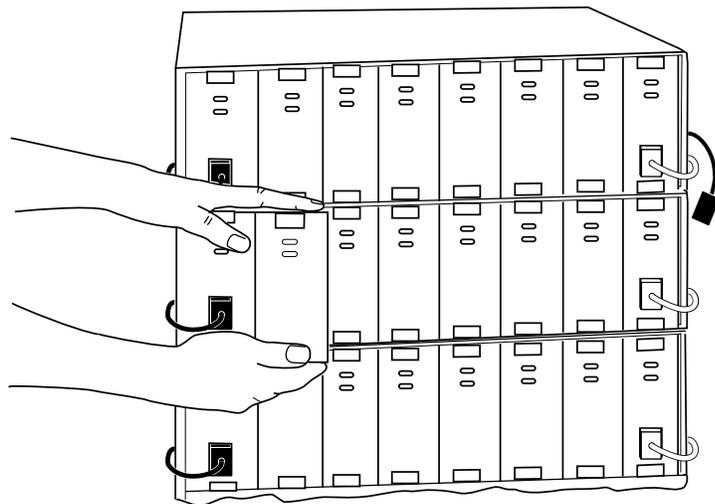
CXO-4312A-MC

_____ **Note** _____

The length of time required for I/O to stop can vary from zero seconds to several minutes, depending on load, device type, and cache status.

_____

When the SBB is removed, the LED pattern on the controller OCP changes to solid amber, and normal operation on the ports resume. At this time, the removed SBB's port LED on the controller OCP turns on. The LED stays on until the SBB is returned to its slot or until another SBB is inserted in the slot. The remaining port LEDs on the controller OCP turn off.

5.5 Installing a Storage Device SBB

Use the following procedure to install a storage device SBB:

_____ **CAUTION** _____

Use a replacement device of the same type as the removed device. Otherwise, subsystem failures such as the establishment of **stripesets** can occur.

_____

1. Quiesce the SBB's port by pressing and holding the port button on the controller. Continue holding the button until all controller amber OCP LEDs are on.

_____ **Note** _____

Only one port can be quiesced at any time.

If the button is not held long enough, or multiple buttons are pushed in quick succession, *all* buttons are ignored (no ports are quiesced). The button must be pressed and held again to quiesce the port.

_____

2. Wait until the chosen controller port LED flashes alternately with the other port LEDs (this indicates I/O has stopped). The alternating pattern flashes for approximately 30 seconds, during which time the SBB can be inserted.

    If the pattern does not appear after a minute or two, another shelf is asserting a fault signal that prevents any quiesce function on this controller. To correct the problem, the suspect shelf must be located and all devices must be removed.

    While the controller OCP LEDs are flashing, any SBBs on the quiesced port will flash their status LEDs.

_____ **Note** _____

The length of time required for I/O to stop can vary from zero seconds to several minutes, depending on load, device type, and cache status.

_____

3. Holding the SBB in both hands, insert it into the guide slots and firmly push it into the shelf until the mounting tabs snap into place.

4. Observe the status LEDs for the following indications: the Device Activity (green) LED is either on, flashing, or off. The Device Fault (amber) LED is off.

5. Restore the device to the configuration. See the *StorageWorks Array Controllers HS Family of Array Controllers Service Manual*.

For additional information on storage device replacement, see the *StorageWorks Solutions Shelf and SBB User's Guide*.

5.6 Removing an Environmental Monitor Unit

Use the following procedure to remove an EMU:

_____ **Note** _____

This component can be removed and installed while power is on. If the system contains a redundant EMU, then one EMU can be hot swapped without affecting system operation.

_____

1. Loosen the two captive retaining screws with a flat-blade screwdriver.
2. Use a gentle back-and-forth rocking motion to loosen the EMU from the backplane.
3. Pull the EMU straight out to disconnect it from the backplane.

5.7 Installing an Environmental Monitor Unit

Use the following procedure to install an EMU:

_____ **Note** _____

This component can be removed and installed while power is on.

_____

1. Insert the replacement EMU into the guide slots and push it in until it is seated.
2. Use a gentle back-and-forth rocking motion to help seat the EMU into the backplane. Press firmly on the EMU until it is fully seated.
3. Tighten the two captive retaining screws with a flat-blad screwdriver.

5.8 Removing a Controller

Use the following procedure to remove a controller:

_____ **Note** _____

This component can be removed and installed while power is on.

_____

1. Perform necessary procedures to shut down the controller and remove accessory components. See the *StorageWorks Array Controllers HS Family of Array Controllers Service Manual*.
2. Loosen the four captive retaining screws with a 3/32-inch Allen wrench (HSJ-series controllers) or a flat-blade screwdriver (HSD- and HSZ-series).
3. Use a gentle up-and-down rocking motion to loosen the controller from the backplane.
4. Pull the controller straight out to disconnect it from the backplane and place it on an approved ESD work surface or mat.

5.9 Installing a Controller

Use the following procedure to install a controller:

_____ **Note** _____

This component can be removed and installed while power is on.
_____

1. Slide the controller into the slot using its slot's rightmost rails as guides.

2. Use a gentle up-and-down rocking motion to help seat the controller into the backplane.

3. Press firmly on the controller until it is seated.

4. Tighten the four captive retaining screws on the front bezel with a 3/32-inch Allen wrench (HSJ-series controllers) or a flat-blade screwdriver (HSD- and HSZ-series).

5. Perform necessary procedures to start up the controller and install accessory components. See the *StorageWorks Array Controllers HS Family of Array Controllers Service Manual*.

5.10 Removing a Dual Speed Blower

_____ **CAUTION** _____

Do not remove a failed blower until a replacement is available. Removing a defective blower without a replacement causes cooling air to vent through blower mounting space.
_____

Use the following procedure to remove a dual speed blower (see Figure 5–3):

_____ **Note** _____

This component can be removed and installed while power is on.
_____

1. Press the upper and lower blower mounting tabs together to release the blower.

2. Pull the blower straight out.

Figure 5–3 Removing a Dual Speed Blower (Cabinet Removed for Clarity)

CXO-4336A-MC
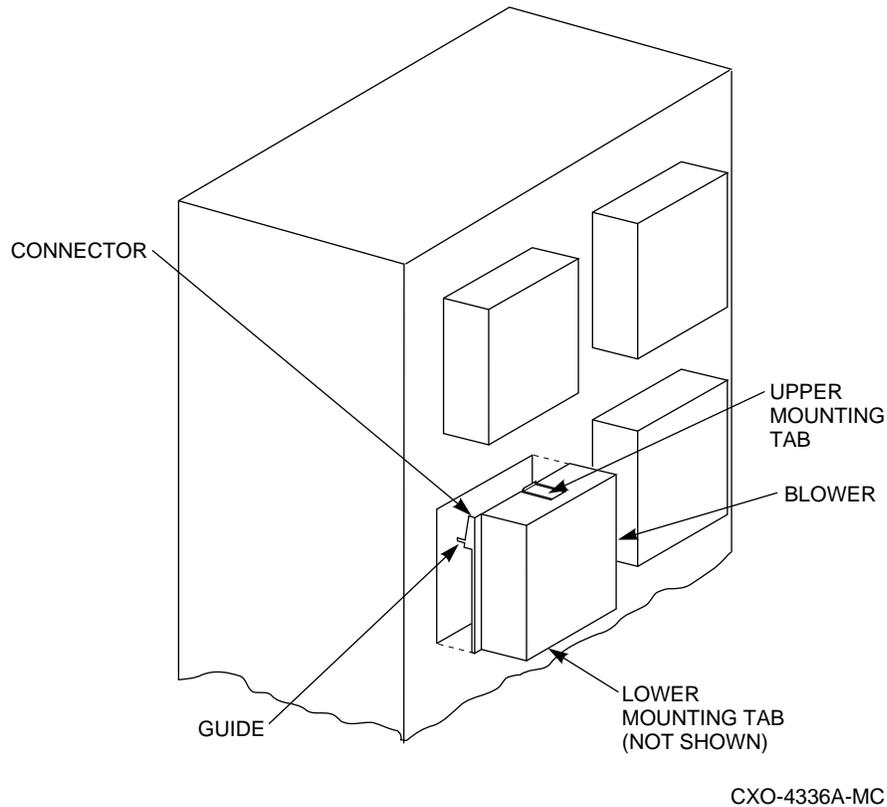
5.11 Installing a Dual Speed Blower

Use the following procedure to install a dual speed blower:

1. Orient the replacement blower so the connector and guide pin line up with the blower opening on the rear panel.

2. Push the blower straight in, making sure the upper and lower mounting tabs snap in place.

5.12 Removing an AC Power Entry Controller

_____ WARNING _____

The following procedure is to be performed only by qualified service personnel. Failure to comply may result in personnel injury or death as a result of electric shock.

_____

Use the following procedure to remove an ac power entry controller:

1. Press the on/off switch on the ac power entry controller to the off (0) position.

2. Disconnect the ac input power cord.

3. Unscrew the two captive retaining screws securing the ac power entry controller to the SW300 enclosure.

4. Pull the ac power entry controller from the SW300 enclosure.

5.13 Installing an AC Power Entry Controller

Use the following procedure to install an ac power entry controller:

1. Verify the on/off switch on the replacement ac power entry controller is in the off (0) position.

2. Insert the replacement ac power entry controller into the SW300 enclosure and secure with the two captive retaining screws.

3. Connect the ac input power cord.

4. Press the on/off switch on the ac power entry controller to the on (|) position.

Glossary

array controller

A device that exercises control over the SCSI bus, for example, an HSZ40 disk array controller.

CI

A Digital trademark for the Digital Computer Interconnect bus.

cold-swap

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

See also **warm-swap** and **hot-swap**.

controller

A hardware line device that manages communications over a line. Controllers can be point-to-point, multipoint, or multiple line controllers.

electrostatic discharge

See **ESD**.

ESD

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

host

The primary or controlling computer in a multiple computer network.

hot-swap

A method of device replacement whereby the complete system remains online and active during device removal or insertion. The device being removed or inserted is the only device that cannot perform operations during this process.

See also **cold-swap** and **warm-swap**.

quiesce

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

RAID

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

SBB

System building block. A modular carrier plus the individual mechanical and electromechanical interface required to mount it into a standard shelf. Any device conforming to shelf mechanical and electrical standards is considered an SBB.

SCSI

Small Computer System Interface. This interface defines the physical and electrical parameters of a parallel I/O bus used to connect computers and a maximum of seven SBBs. The StorageWorks™ modular storage system implementation uses SCSI–2, which permits the synchronous transfer of 8-bit data at rates of up to 10 MB/s.

stripesets

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

warm-swap

A method of device replacement whereby the complete system remains online during device removal or insertion. The system bus may be halted for a brief period of time, during device insertion or removal. No booting or loading of code is permitted except on the device being inserted.

See also **cold-swap** and **hot-swap**.

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