SAxxx Storage Array

Configuration Guide

Order Number: EK–SAXXX–CG. D01

This manual describes the SAxxx family of storage arrays: the SA550, SA600, SA650, SA800, SA850, and SA900. It also explains how to install storage arrays, replace major cabinet parts, install add-ons, and upgrade storage arrays.

Digital Equipment Corporation
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Preface

This manual contains an overview of the SA™xxx storage array family and describes installation procedures for various configurations. Specifically, the storage arrays discussed in this guide are the SA550, SA600, SA650, SA800, SA850, and SA900.

Intended Audience

Installation instructions in this manual are for Digital Multivendor Services engineers installing either SAxxx storage arrays or add-on storage devices. Digital Multivendor Services engineers must have training in the following:

- RA70™/BA27 (RA7x), RA82™, and RA90™/RA92™ disk drive installation
- Electrostatic discharge (ESD) procedures
- DIGITAL Storage Architecture (DSA) level 1
- DSA troubleshooting
- VAXsimPLUS™ software
- ESE50 solid state disk installation
- TA™857 tape drive installation
- TA™867 tape drive installation

To be qualified to install a storage array, a DSE must have successfully completed the courses listed in Table 1.

Table 1 Safety Courses

Course Title	Course Number
AC Power and Grounding	EY–B730–PO
Electrical Safety	EY–B737E–PO
Electrical Safety and Lockout/Tagout Procedures	EY–E038E–SO

Documentation Conventions

The following conventions are used in this manual:

TA8x7	Refers to the TA857 and TA867 tape drives collectively.
RA7x	Refers to the RA70, RA710™, RA720™, and RA730™ disk drives collectively.
RA8x	Refers to the RA800™, RA810™, and RA82 disk drives collectively.
RA9x	Refers to the RA90 and RA92 disk drives collectively.
SA7x	Refers to the SA700™, SA710™, SA720™, and SA730™ enclosures collectively.
SAxxx	Refers to the SA550, SA600, SA650, SA800, SA850, and SA900 storage arrays collectively.
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.

Related Documents

Table 2 lists documentation available to supplement this guide.

Table 2 SAxxx Storage Array Related Documentation

Document Title	Document Order Number
Cabinet Management Program Installation Guide	EK–CABMA–IN
RA7x Disk Drive Service Manual	EK–ORA7X–SM
RA82 Disk Drive User Guide	EK–ORA82–UG
RA90/RA92 Disk Drive User Guide	EK–ORA90–UG
RA90/RA92 Disk Drive Service Manual	EK–ORA9X–SM
SA7x Enclosure Service Manual	EK–OSA7X–SM
SA7x Enclosure User Guide	EK–OSA7X–UG
RA7x/SA7x Pocket Reference Guide	EK–RSA7X–PG
SA482 Storage Array User Guide	EK–SA482–UG
881 Power Controller User Guide	EK–881PC–UG
SA900 Support Print Set	EM–01436
SA900 Field Maintenance Print Set	MP–01436
Tx857 Series Magazine Tape Subsystem Owner	EK–TF857–OM
Tx867 Series Magazine Tape Subsystem Owner	EK–TX867–OM
SA100 Storage Subsystem Installation and User's Guide	EK–SA100–IM

WARNING

Unless you are a Digital Multivendor Services engineer or have received the *formal* training as specified, do not attempt to accomplish the procedures described in the installation sections of this manual. Otherwise, you may damage the equipment or cause injury to yourself or others.

1

Introducing the Storage Arrays

This chapter describes the characteristics and maximum configurations of an SAxxx storage array, and how to determine the storage capacity of a storage array. Chapter 2 contains complete technical descriptions of each storage array discussed in this chapter.

1.1 Storage Array Characteristics

The characteristics of a storage array are determined by the following:

- Cabinet type
- Power source
- Storage devices installed

1.1.1 Storage Array Cabinets

Table 1–1 lists the general characteristics of the storage array cabinets.

Table 1–1 Storage Array Cabinets

Cabinet Model	Item	Description
H9646	Levels	4
	Power controller	881A, 881B, or 887B
	Storage arrays	SA550, SA600, SA650,
	Physical specifications:	SA800, SA850
	Height	
	Width	152.4 cm (60 in)
	Depth	55.9 cm (22 in)
		91.4 cm (36 in)
H9A00	Levels	5
	Power controller	881A, 881B, or 887B
	Storage arrays	SA900
	Physical specifications:	
	Height	182.9 cm (66.9 in)
	Width	61.0 cm (24 in)
	Depth	108.0 cm (42.5 in)

1.1.2 General Storage Array Configurations

Table 1–2 lists the general storage array configurations and references the tables that define the authorized configurations.

Figure 1–1 shows fully populated storage arrays.

Table 1–2 Storage Array Configurations

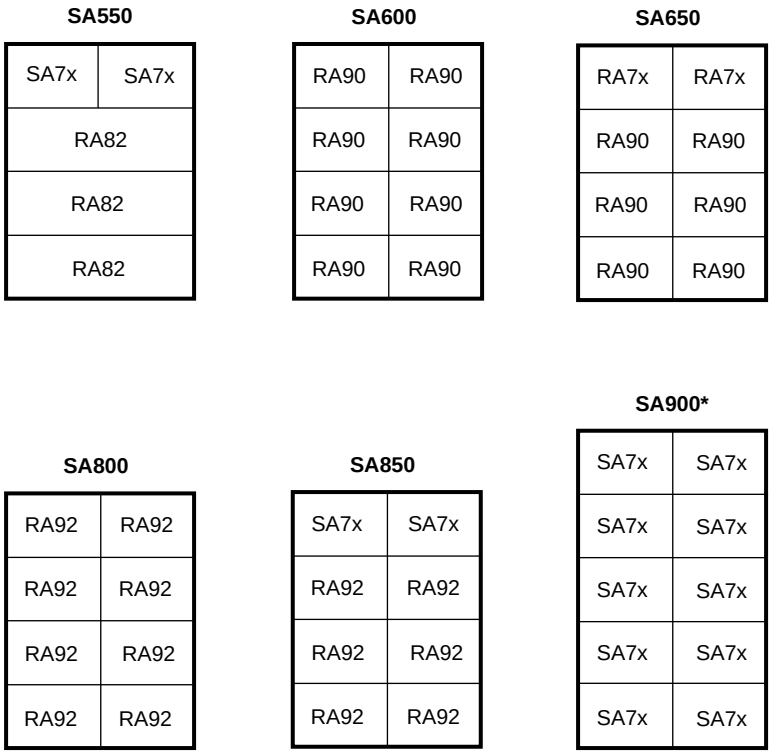
	Storage Devices						
Array	**RA82**	**RA9x**	**SA7x**	**ESE50**	**TA857**	**TA867-AA/AB**	**Authorized Configuration**
SA550	2 3	None	1 2	None	None	None	Table 2–2
SA600	None	1 2 4 8	None	4†	None	None	Table 2–9
SA650	None	2 4 6	1 1 2	4†	None	None	Table 2–14
SA800	None	1 2 4 8	None	4†	None	None	Table 2–9
SA850	None	2 4 6	1 1 2	4†	None	None	Table 2–14
SA900	None	6 10 – – – –	4 – 10 – – –	– – – 4† – –	– – – – 3 –	– – – – – 3†	Table 2–19

†Field installation only

1.2 Storage Capacities

Table 1–3 lists the storage capacity of each storage device that can be installed in an SA550, SA600, SA650, SA800, SA850, or SA900 storage array. To calculate the total storage capacity of a storage array, add the capacities of all storage devices installed in the array.

Figure 1–1 Fully Populated Storage Array



*THE SA900 CAN CONTAIN RA90/RA92 DISK DRIVES
OR SA7X ENCLOSURES

CXO-3572A-MC

Table 1–3 Storage Device Capacities

Storage Device	Type	Formatted Storage Capacity
RA82	Fixed disk drive	0.623 GB
RA90	Fixed disk drive	1.22 GB
RA92	Fixed disk drive	1.51 GB
SA70	Enclosure	
1 – RA70	Fixed disk drive	0.28 GB
2 – RA70	Fixed disk drive	0.56 GB
3 – RA70	Fixed disk drive	0.84 GB
4 – RA70	Fixed disk drive	1.12 GB
SA71	Enclosure	
1 – RA71	Fixed disk drive	0.70 GB
2 – RA71	Fixed disk drive	1.4 GB
3 – RA71	Fixed disk drive	2.1 GB
4 – RA71	Fixed disk drive	2.8 GB
SA72	Enclosure	
1 – RA72	Fixed disk drive	1.0 GB
2 – RA72	Fixed disk drive	2.0 GB
3 – RA72	Fixed disk drive	3.0 GB
4 – RA72	Fixed disk drive	4.0 GB
ESE50	Solid state disk	
Models AA/AB		0.12 GB
Models BA/BB		0.6 GB
Models DA/DB		1.0 GB
TA857	Tape subsystem	
7 cartridges	CompacTape™ III	18.2 GB
TA867	Tape subsystem	
7 cartridges	CompacTape™ III	42.0 GB

2

Storage Array Descriptions

This chapter contains technical descriptions of the SA550, SA600, SA650, SA800, SA850, and SA900 storage arrays, the storage devices (for instance, enclosures, disk drives, tape systems, solid state disks, and so forth), and the cabinets in their various configurations.

Each SAxxx storage array includes a cabinet, storage devices, and a power controller as described in the following sections.

2.1 H9646 Cabinet

The H9646 cabinet is a four-level cabinet that can be configured as one of several different storage arrays depending on the storage devices (SA7x enclosures, RA82 disk drives, RA9x disk drives) and the power controller model installed.

2.2 H9A00 Cabinet

The H9A00 cabinet is a five-level cabinet that can be configured as one of several different storage arrays depending on the storage devices (SA7x enclosures, RA82 disk drives, RA9x disk drives, ESE50 solid state disks, TA8x7 tape storage subsystem) and the power controller model installed.

2.3 SA7x Enclosure

The SA7x family of enclosures includes the SA70, SA71, SA72, and SA73. The model number specifies the type RA7x disk drive installed in the enclosure. An SA70 enclosure contains RA70 drives; the SA71 contains RA71 drives; and the SA72 contains RA72 drives. Each enclosure can contain from one to four disk drives. The SA7x enclosure provides power, cooling, and control for the independently powered and operated RA7x disk drives. See Appendix C for a complete listing of the SA7x enclosure and RA7x disk drive configurations.

2.4 RA7x Disk Drive

The RA7x family of disk drives includes the RA70, RA71, RA72, and RA73. The capacities of the RA7x disk drives are listed in Table 1–3.

See the *RA7x Disk Drive Service Manual* for more information.

2.5 RA82 Disk Drive

The RA82 disk drive has a capacity of 623 MB (780 MB unformatted) and can be installed in an H9646 cabinet without an enclosure.

See the *RA82 Disk Drive User Guide* and the *SA482 Storage Array User Guide* for more information.

2.6 RA9x Disk Drive

The RA90 and RA92 disk drives are physically identical, but have different capacities, as follows.

- The RA90 has a capacity of 1.22 GB (1.62 GB unformatted).
- The RA92 has a storage capacity of 1.51 GB (1.99 GB unformatted).

See the *RA90/RA92 Disk Drive User Guide* for more information.

2.7 ESE50 Solid State Disk

The ESE50 solid state disk (SSD) is a member of the DIGITAL Storage Architecture/Standard Disk Interconnect (DSA/SDI™) family and is, therefore, completely compatible with all DSA/SDI controllers.

The ESE50 SSD is a random-access, low-latency storage device that uses dynamic random-access memory (DRAM) technology. It is contained in a half-rack enclosure identical to the RA9x disk drive. The ESE50 SSD has its own power and data retention capabilities. It connects to and operates on the SDI bus and may be used with controllers implementing this bus. The SSD operator control panel (OCP) is the same as the RA9x OCP.

See the *ESE50 SSD User Guide* for more information.

2.8 TA8x7-Series Storage Subsystems

The TA8x7-series storage subsystems consists of a magazine tape system and an SCSI/SDI adapter-interface.

Note

A maximum of three TA8x7 series storage subsystems can be installed in an SA900 storage array.

2.8.1 TZ857-Series Magazine Tape Subsystem

The TZ857 magazine tape subsystem is an electromechanical device that uses from one to seven CompacTape III cartridges to store from 2.6 GB to 18.2 GB of data.

The TZ857 magazine tape subsystem can load and unload tape cartridges to and from a tape drive for unattended backup, as well as performing single cartridge operations. The TZ857 subsystem performs automatic, sequential tape operations.

In addition, the TZ857 subsystem executes operating system commands, qualifiers, and parameters to store data from user disk areas to the tape drive.

See the *Tx857 Series Magazine Tape Subsystem Owner's Manual* for more information.

2.8.2 TZ867-Series Magazine Tape Subsystem

The TZ867 magazine tape subsystem is an electromechanical device that uses from one to seven CompacTape III cartridges to store from 6 GB to 42 GB of data.

The TZ867 magazine tape subsystem can load and unload tape cartridges to and from a tape drive for unattended backup, as well as performing single cartridge operations. The TZ867 subsystem performs automatic, sequential tape operations.

In addition, the TZ867 subsystem executes operating system commands, qualifiers, and parameters to store data from user disk areas to the tape drive.

See the *Tx867 Series Magazine Tape Subsystem Owner's Manual* for more information.

2.8.3 SCSI/SDI Adapter-Interface

The TZ8x7 series tape drives use Small Computer System Interface (SCSI) logic control and data signals. The adapter-interface converts information from SCSI format to SDI format and vice-versa. The external SDI cable is connected directly from either the Port A or Port B adapter-interface connector to the controller. **The external interface cable is not connected to the SA900 I/O bulkhead.**

See the *SA100 User's Manual* for more information.

2.9 Power Controller

The power controller links the internal and external power sources with power cords. It controls power distribution with bus connectors, a fuse, circuit breaker, and the Bus/Off/On switch.

- The 881A power controller is used for 120 Vac (60 Hz) storage arrays.
- The 881B power controller is used for 240 Vac (50 Hz) storage arrays.

Note

Some European markets use the 887B power controller which is electrically the same as the 881B although its physical configuration is slightly different.

See the *881 Power Controller User Guide* for more information.

2.10 Environmental Specifications

The environmental specifications shown in Table 2–1 are applicable to all storage arrays.

Table 2–1 Environmental Specifications

Condition	Specification
	Optimum Operating Environment
Temperature	+18° to +24° C (+65° to +75° F)
Rate of Change	3° C (5.4° F)
Step Change	3° C (5.4° F)
Relative Humidity	40% to 60% (noncondensing) with a step change of 10% or less (noncondensing)
Altitude	From sea level to 2400 m (8000 ft)
Air Quality	Maximum particle count **not to exceed** 500,000 particles per cubic ft of air at a size of .5 micron or larger
Inlet Air Volume	.026 cubic m per second (50 cubic ft per minute)
	Operating Environment – Maximum Range
Temperature	+10° to +40° C (+50° to +104° F). Derate 1.8° C for each 1,000 m (1.0° F for each 1,000 ft) of altitude. Maximum temperature gradient 20° C/hr (36° F/hr)
Relative Humidity	10% to 85% (noncondensing) Maximum wet bulb temperature: 28° C (82° F) Minimum dew point: 2° C (36° F)
	Nonoperating or Storage Environment – Maximum Range
Temperature	
Nonoperating	–40° to +66° C (–40° to +151° F)
Storage	+18° to +29° C (+65° to +85° F)
Relative Humidity	
Nonoperating	10% to 80% (noncondensing) 8% to 95% if in original shipping container
Storage	50% (noncondensing)
Altitude	From 300 m (1000 ft) below sea level to 4900 m (16,000 ft) above sea level

2.11 SA550 Storage Array Description

Several SA550 storage array configurations using various combinations of SA7x enclosures and RA82 disk drives can be installed in an H9646 cabinet. Figure 2–1 shows a typical SA550 storage array.

The following items are installed in all SA550 storage arrays to accommodate add-on SA7x enclosures:

- Mounting rails
- Internal SDI cables
- Power cords
- Bulkhead connections

SA550 storage arrays are not configured to accommodate add-on RA82 disk drives. Add-on RA82 disk drives are shipped with all installation materials and cables.

See the *SA482 Storage Array User Guide* for RA82 add-on installation instructions.

See Section 5.10 in this manual for SA7x add-on installation instructions.

2.11.1 SA550 Storage Array Configurations

Table 2–2 lists the three authorized SA550 storage array configurations HA/HD, JA/JD, and UA/UD that comply with DSA requirements and that can be used with any SDI controller protocol and cable.

Table 2–2 SA550 Storage Array Configurations

SA550 Model	SA7x Enclosures	RA7x Disk Drives	RA82 Disk Drives	Power Controller	Voltage	Storage Capacity
SA550–HA SA550–HD	1	4	2	881A 881B	120 Vac 240 Vac	2.37 GB
SA550–JA SA550–JD	2	8	3	881A 881B	120 Vac 240 Vac	4.11 GB
SA550–UA SA550–UD	0	0	0	881A 881B	120 Vac 240 Vac	0.0 GB

The UA/UD configuration is unique in that it is specifically designed for the installation of RA82 disk drives at the customer's site in a cabinet with SA7x enclosures. The RA82 disk drives must be installed before any SA7x enclosures are installed. Therefore, the UA/UD models are shipped **without** any storage devices installed. The installation sequence for the SA550 storage array is shown in Table 2–3.

Table 2–3 SA550 Add-On Installation Sequence

RA82	Installation Location	SA7x	Installation Location
First RA82	SA550 level 2	First SA7x	SA550 top left
Second RA82	SA550 level 1	Second SA7x	SA550 top right
Third RA82	SA550 level 0		

CAUTION

Do not install any SA7x enclosures in an SA550 storage array until the RA82 fixed disk drives are installed.

2.11.2 SA550 Storage Array Specifications

Tables 2–4 through 2–7 list the physical and electrical specifications for the SA550 storage array. Refer to Table 2–1 for a listing of the environmental specifications. For the SA7x and RA82 specifications, see the *SA7x Enclosure User Guide* and the *RA82 Disk Drive User Guide*.

Figure 2–1 SA550–JA/SA550–JD Storage Array

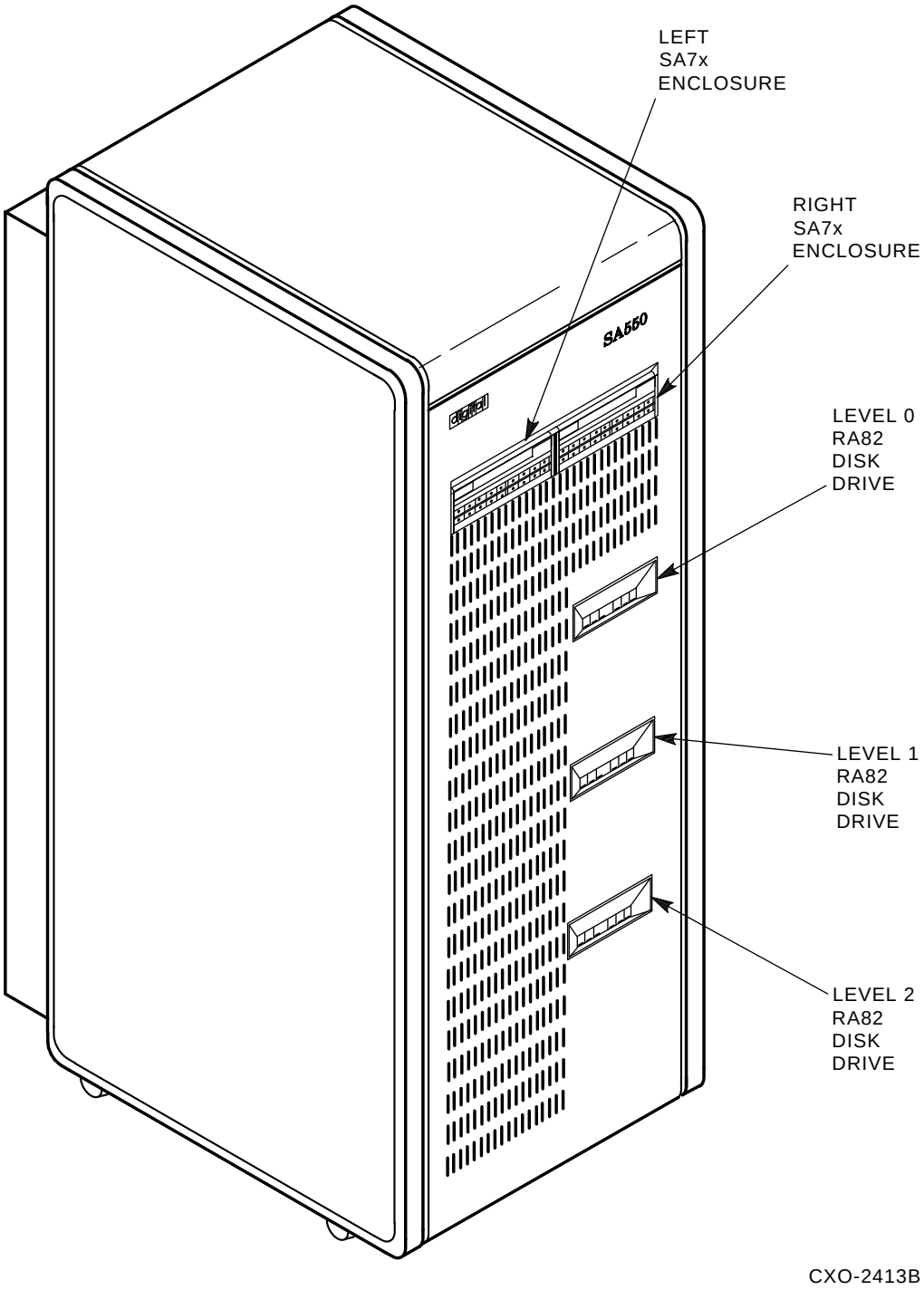


Table 2–4 SA550 Storage Array Physical Specifications

Model	Height	Width	Depth	Installed Weight	Shipping Weight
SA550–HA SA550–HD	156.2 cm (61.5 in)	55.9 cm (22.0 in)	91.4 cm (36.0 in)	307 kgs (677 lbs)	375 kgs (826 lbs)
SA550–JA SA550–JD	156.2 cm (61.5 in)	55.9 cm (22.0 in)	91.4 cm (36.0 in)	408 kgs (900 lbs)	476 kgs (1049 lbs)
SA550–UA SA550–UD	156.2 cm (61.5 in)	55.9 cm (22.0 in)	91.4 cm (36.0 in)	185.4 kgs (412 lbs)	253 kgs (561 lbs)

Table 2–5 SA550 Storage Array General Electrical Specifications

Specification	110-120 Vac 60 Hz	220-240 Vac 50 Hz
Inrush Current per Drive	**SA550–HA** 30 amperes peak @ 120 Vac **SA550–JA** 36.6 amperes peak @ 120 Vac	**SA550–HA** 13.8 amperes peak @ 240 Vac **SA550–JA** 17.2 amperes peak @ 240 Vac
Power Factor	**All Models** – 0.7	**All Models** – 0.58
Power Controller Data	**All Models**	**All Models**
Model	881A	881B
Cabinet Plug Type	NEMA L21-30P	IEC309
Power Cord Length	4.42 m (14.5 ft)	4.42 m (14.5 ft)

The storage arrays are not line-frequency dependent. The input currents (that is, startup, PH1, PH2, PH3, and neutral) are for nominal voltages of either 120 Vac or 240 Vac to neutral. These correspond directly to 208 Vac or 416 Vac phase-to-phase, respectively. Nominal voltages of 110 Vac and 220 Vac have proportionally higher phase currents on a ratio of 120:110 and 240:220 to the current specified in Tables 2–6 and 2–7.

Table 2–6 SA550 Electrical Specifications—120/208 Vac 60 Hz

	Input Current (Amps)					Power Dissipation	
Model	Start-Up	PH1	PH2	PH3	Neutral	Watts	BTUs/Hr
SA550–HA	0.5	0.5	0.0	0.0	0.5	50	171
SA550–JA	6.8	0.5	0.0	3.4	3.4	291	993
SA550–UA	6.8	0.5	0.0	3.4	3.4	291	993

Table 2–7 SA550 Electrical Specifications—240/416 Vac 50 Hz

	Input Current (Amps)					Power Dissipation	
Model	Start-up	PH1	PH2	PH3	Neutral	Watts	Kilojoules/Hr
SA550–HD	0.5	0.3	0.0	0.0	0.3	50	180
SA550–JD	3.9	0.3	0.0	1.5	1.5	291	1048
SA550–UD	3.9	0.3	0.0	1.5	1.5	291	1048

2.12 SA600 and SA800 Description

The multiple SA600 and SA800 storage array configurations are composed of various combinations of RA9x disk drives. The SA600 storage array contains only RA90 disk drives and the SA800 storage array contains only RA92 disk drives. These disk drives are installed in an H9646 cabinet and receive their power through a power controller. Figure 2–2 shows a typical SA600- and SA800-series storage array. The SA600, SA650, SA800, and SA850 storage arrays are basically the same. Table 2–8 lists the primary differences between these units.

Table 2–8 Primary Differences: SA600, SA650, SA800, and SA850 Storage Arrays

Storage Array	Storage Devices
SA600	RA90 fixed disk drive
SA650	RA90 fixed disk drive SA7x enclosure
SA800	RA92 fixed disk drive
SA850	RA92 fixed disk drive SA7x enclosure

The sequence and procedures for adding storage devices is the same for *all* storage array models.

These storage arrays have the following items installed to accommodate add-on RA9x disk drives:

- Mounting rails
- Internal SDI cables
- Power cords
- Bulkhead connections

The instructions for installing add-on RA9x disk drives in these storage arrays are contained in Section 5.5.

2.12.1 SA600 and SA800 Configurations

Table 2–9 lists the approved SA600 and SA800 storage array configurations. All these configurations comply with DSA requirements and can be used with any SDI controller protocol and cable. (See Figure 5–5 for the add-on sequence for RA9x disk drives in an H9646 cabinet.)

Figure 2–2 SA600- and SA800-Series Storage Arrays

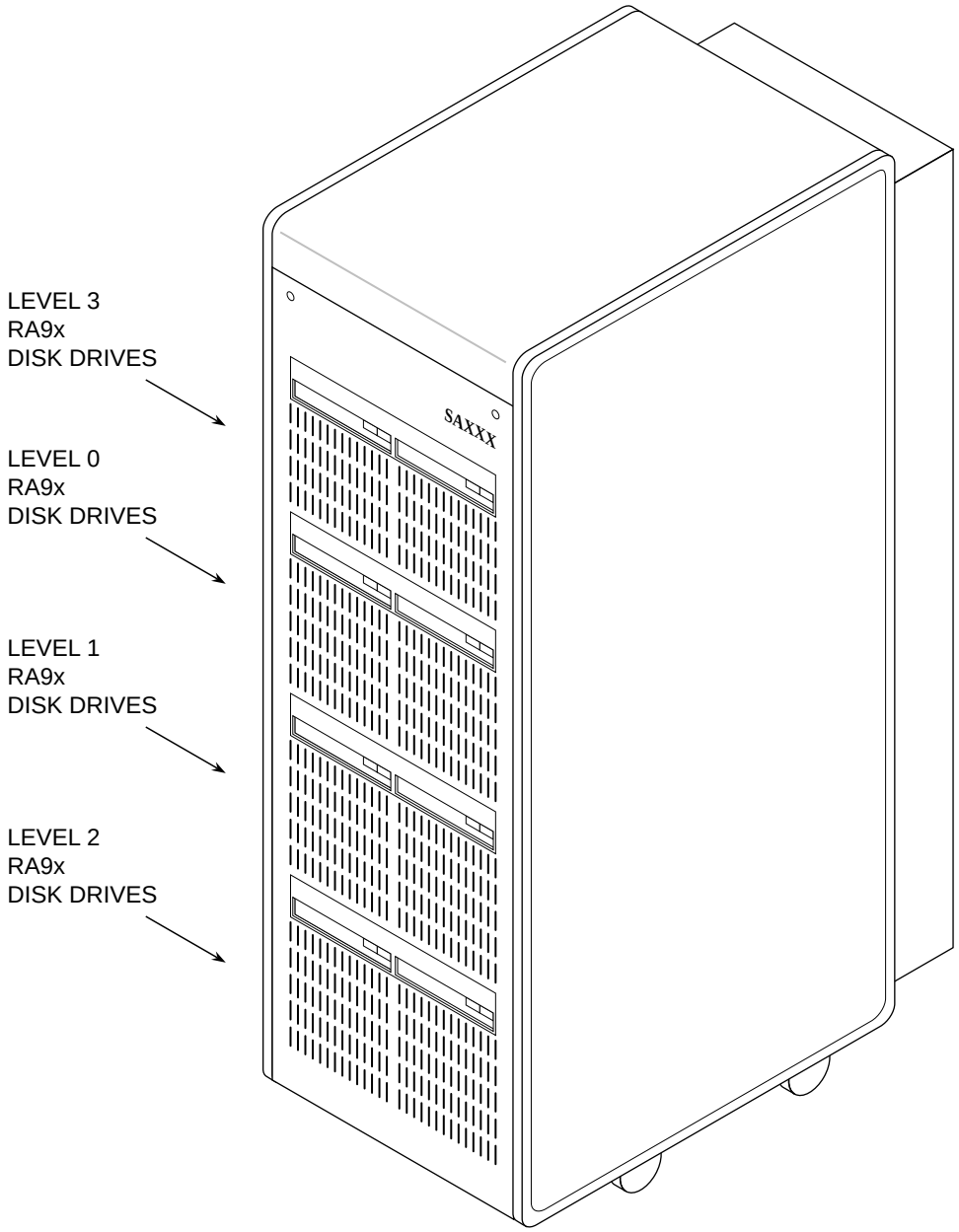


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Table 2–9 SA600 and SA800 Configurations

Model	RA90 Disk Drives	RA92 Disk Drives	Power Controller	Voltage	Storage Capacity
SA600–CA SA600–CD	1	0	881A 881B	120 Vac 240 Vac	1.22 GB
SA600–FA SA600–FD	2	0	881A 881B	120 Vac 240 Vac	2.44 GB
SA600–HA SA600–HD	4	0	881A 881B	120 Vac 240 Vac	4.88 GB
SA600–JA SA600–JD	8	0	881A 881B	120 Vac 240 Vac	9.76 GB
SA800–CA SA800–CD	0	1	881A 881B	120 Vac 240 Vac	1.51 GB
SA800–FA SA800–FD	0	2	881A 881B	120 Vac 240 Vac	3.02 GB
SA800–HA SA800–HD	0	4	881A 881B	120 Vac 240 Vac	6.04 GB
SA800–JA SA800–JD	0	8	881A 881B	120 Vac 240 Vac	12.08 GB

2.12.2 SA600 and SA800 Storage Array Specifications

Tables 2–10 through 2–13 list the physical and electrical specifications for the SA600/SA800 storage arrays. Refer to Table 2–1 for a listing of the environmental specifications. The RA9x disk drive specifications are listed in the *RA90/RA92 Disk Drive User Guide.*

Table 2–10 SA600 and SA800 Physical Specifications

Model	Height	Width	Depth	Installed Weight	Shipping Weight
SA600–CA SA600–CD SA800–CA SA800–CD	156.2 cm (61.5 in)	55.9 cm (22.0 in)	91.4 cm (36.0 in)	175 kgs (388 lbs)	243 kgs (537 lbs)
SA600–FA SA600–FD SA800–FA SA800–FD	156.2 cm (61.5 in)	55.9 cm (22.0 in)	91.4 cm (36.0 in)	208 kgs (459 lbs)	776 kgs (608 lbs)
SA600–HA SA600–HD SA800–HA SA800–HD	156.2 cm (61.5 in)	55.9 cm (22.0 in)	91.4 cm (36.0 in)	273 kgs (603 lbs)	332 kgs (734 lbs)
SA600–JA SA600–JD SA800–JA SA800–JD	156.2 cm (61.5 in)	55.9 cm (22.0 in)	91.4 cm (36.0 in)	402 kgs (888 lbs)	469 kgs (1037 lbs)

Table 2–11 SA600 and SA800 General Electrical Specifications

Specification	110-120 Vac 60 Hz	220-240 Vac 50 Hz
Inrush Current per Drive	12.8 amperes peak @ 132 Vac	14.5 amperes peak @ 240 Vac
Power Factor	0.7	0.58
Power Controller Data		
Model	881A	881B
Cabinet Plug Type	NEMA L21-30P	IEC309
Power Cord Length	4.42 m (14.5 ft)	4.42 m (14.5 ft)

The storage arrays are not line-frequency dependent. The input currents (that is, startup, PH1, PH2, PH3, and neutral) are for nominal voltages of either 120 Vac or 240 Vac to neutral. These correspond directly to 208 Vac or 416 Vac phase-to-phase, respectively. Nominal voltages of 110 Vac and 220 Vac have proportionally higher phase currents on a ratio of 120:110 and 240:220 to the current specified in Tables 2–12 and 2–13.

Table 2–12 SA600 and SA800 Electrical Specifications—120/208 Vac 60 Hz

	Input Current (Amps)					Power Dissipation	
Model	Start-Up	PH1	PH2	PH3	Neutral	Watts	BTUs/Hr
SA600–CA	6.0	3.6	0.0	0.0	3.6	332	1133
SA600–FA	6.0	3.6	3.1	0.0	4.3	614	2096
SA600–HA	11.5	6.7	3.1	3.1	7.2	1178	4021
SA600–JA	16.5	6.7	9.3	9.3	13.3	2306	7870
SA800–CA	6.0	3.6	0.0	0.0	3.6	332	1133
SA800–FA	6.0	3.6	3.1	0.0	4.3	614	2096
SA800–HA	11.5	6.7	3.1	3.1	7.2	1178	4021
SA800–JA	16.5	6.7	9.3	9.3	13.3	2306	7870

Table 2–13 SA600 and SA800 Electrical Specifications—240/416 Vac 50 Hz

	Input Current (Amps)					Power Dissipation	
Model	Start-Up	PH1	PH2	PH3	Neutral	Watts	Kilojoules/Hr
SA600–CD	3.6	2.2	0.0	0.0	2.2	333	1199
SA600–FD	3.6	2.2	1.9	0.0	4.8	616	2281
SA600–HD	6.9	4.1	1.9	1.9	4.9	1182	4255
SA600–JD	9.9	4.1	5.7	5.7	9.0	2314	8330
SA800–CD	3.6	2.2	0.0	0.0	2.2	333	1199
SA800–FD	3.6	2.2	1.9	0.0	4.8	616	2281
SA800–HD	6.9	4.1	1.9	1.9	4.9	1182	4255
SA800–JD	9.9	4.1	5.7	5.7	9.0	2314	8330

2.13 SA650 and SA850 Storage Array Descriptions

The multiple SA650 and SA850 storage array configurations are composed of combinations of SA7x enclosures and RA9x disk drives.

- The SA650 storage array contains only RA90 disk drives and SA7x enclosures.
- The SA850 storage array contains only RA92 disk drives and SA7x enclosures.

RA9x disk drives are installed in an H9646 cabinet and receive their power through a power controller. Figure 2–3 shows a typical SA600-series storage array.

These storage arrays have the following items installed to accommodate add-on RA9x disk drives:

- Mounting rails
- Internal SDI cables
- Power cords
- Bulkhead connections

The instructions for installing add-on RA9x disk drives in these storage arrays are contained in Section 5.5.

2.13.1 SA650 and SA850 Configurations

Table 2–14 lists the approved SA650 and SA850 storage array configurations. All these configurations comply with DSA requirements and can be used with any SDI controller protocol and cable. The add-on sequence for RA9x disk drives and the SA7x enclosures in a H9646 cabinet are shown in Figure 5–6.

Table 2–14 SA650 and SA850 Configurations

Model	SA7x Enclosure	RA7x Disk Drives	RA90 Disk Drives	RA92 Disk Drives	Power Controller	Voltage	Storage Capacity
SA650–FA SA650–FD	1	4	2	0	881A 881B	120 Vac 240 Vac	3.55 GB
SA650–HA SA650–HD	1	4	4	0	881A 881B	120 Vac 240 Vac	5.98 GB
SA650–JA SA650–JD	2	8	6	0	881A 881B	120 Vac 240 Vac	9.54 GB
SA850–FA SA850–FD	1	4	0	2	881A 881B	120 Vac 240 Vac	4.14 GB
SA850–HA SA850–HD	1	4	0	4	881A 881B	120 Vac 240 Vac	7.16 GB
SA850–JA SA850–JD	2	4	0	2	881A 881B	120 Vac 240 Vac	11.27 GB

2.13.2 SA650 and SA850 Specifications

Tables 2–15 through 2–18 list the physical and electrical specifications for the SA650/SA850 storage arrays. Refer to Table 2–1 for a listing of the environmental specifications. The storage device specifications are listed in the following manuals:

- *RA90/RA92 Disk Drive User Guide*
- *SA7x Enclosure User Guide*

Figure 2–3 SA650/SA850 Storage Array

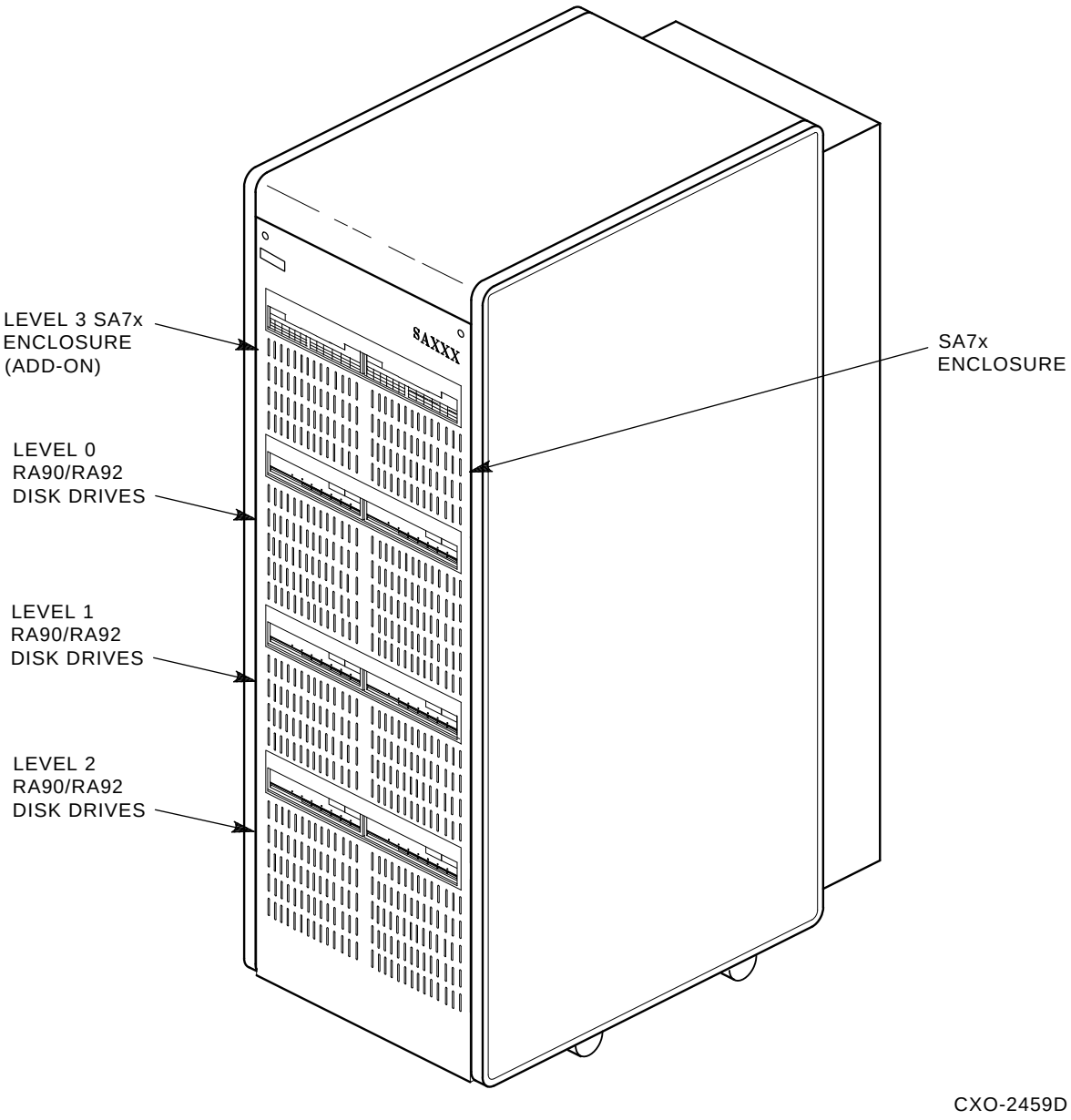

Table 2–15 SA650 and SA850 Physical Specifications

Model	Height	Width	Depth	Installed Weight	Shipping Weight
SA650–FA SA650–FD SA850–FA SA850–FD	156.2 cm (61.5 in)	55.9 cm (22.0 in)	91.4 cm (36.0 in)	257 kgs (565 lbs)	325 kgs (714 lbs)
SA650–HA SA650–HD SA850–HA SA850–HD	156.2 cm (61.5 in)	55.9 cm (22.0 in)	91.4 cm (36.0 in)	318 kgs (703 lbs)	396 kgs (852 lbs)
SA650–JA SA650–JD SA850–JA SA850–JD	156.2 cm (61.5 in)	55.9 cm (22.0 in)	91.4 cm (36.0 in)	470 kgs (1039 lbs)	538 kgs (1188 lbs)

Table 2–16 SA650 and SA850 General Electrical Specifications

Specification	110-120 Vac 60 Hz	220-240 Vac 50 Hz
Inrush Current per Drive	12.8 amperes peak @ 132 Vac	14.5 amperes peak @ 240 Vac
Power Factor	0.7	0.58
Power Controller Data		
Model	881A	881B
Cabinet Plug Type	NEMA L21-30P	IEC309
Power Cord Length	4.42 m (14.5 ft)	4.42 m (14.5 ft)

The storage arrays are not line-frequency dependent. The input currents (that is, startup, PH1, PH2, PH3, and neutral) are for nominal voltages of either 120 Vac or 240 Vac to neutral. These correspond directly to 208 Vac or 416 Vac phase-to-phase, respectively. Nominal voltages of 110 Vac and 220 Vac have proportionally higher phase currents on a ratio of 120:110 and 240:220 to the current specified in Tables 2–17 and 2–18.

Table 2–17 SA650 and SA850 Electrical Specifications—120/208 Vac 60 Hz

	Input Current (Amps)					Power Dissipation	
Model	Start-up	PH1	PH2	PH3	Neutral	Watts	BTUs/Hr
SA650–FA	12.3	0.5	3.1	7.3	7.2	939	3205
SA650–HA	17.8	3.6	3.1	10.4	10.3	1503	5130
SA650–JA	17.8	6.7	10.4	10.4	14.5	2392	8164
SA850–FA	12.3	0.5	3.1	7.3	7.2	939	3205
SA850–HA	17.8	3.6	3.1	10.4	10.3	1503	5130
SA850–JA	17.8	6.7	10.4	10.4	14.5	2392	8164

Table 2–18 SA650 and SA850 Electrical Specifications—240/416 Vac 50/60 Hz

	Input Current (Amps)					Power Dissipation	
Model	Start-Up	PH1	PH2	PH3	Neutral	Watts	Kilojoules/Hr
SA650–FD	7.2	0.3	1.9	4.0	4.4	941	3388
SA650–HD	10.5	2.2	1.9	5.9	6.6	1507	5425
SA650–JD	10.5	4.1	5.9	5.9	9.3	2398	8633
SA850–FD	7.2	0.3	1.9	4.0	4.4	941	3388
SA850–HD	10.5	2.2	1.9	5.9	6.6	1507	5425
SA850–JD	10.5	4.1	5.9	5.9	9.3	2398	8633

2.14 SA900 Storage Array Description

There are several SA900 storage array configurations composed of combinations of SA7x enclosures, RA92 disk drives, ESE50 SSDs, and TA857 tape storage systems. These storage devices are installed in a five-level H9A00 cabinet and receive power through a power controller. Figure 2–4 shows an SA900 storage array.

There is **no standard SA900 configuration**, therefore, SA900 storage arrays **are not** shipped with mounting rails, internal SDI cables, or bulkhead connectors for any add-on storage devices. The hardware required is shipped with the individual storage device. Instructions for installing the following add-ons are contained in Chapter 5:

- RA9x disk drives (Section 5.7)
- SA7x enclosures (Section 5.11)
- ESE50 SSDs (Section 5.8)
- TA8x7 tape storage system (Section 5.12)

2.14.1 SA900 Storage Array Configurations

Table 2–19 lists the factory configurations for the SA900 storage arrays. All configurations comply with DSA requirements and can be used with any SDI controller protocol and cable. Figures 2–5 and 5–18 show factory configurations and the storage device add-on sequence, respectively.

Note

There are no SA900 factory configurations that include the ESE50. The ESE50 is a field add-on only.

Figure 2–4 SA900 Storage Array

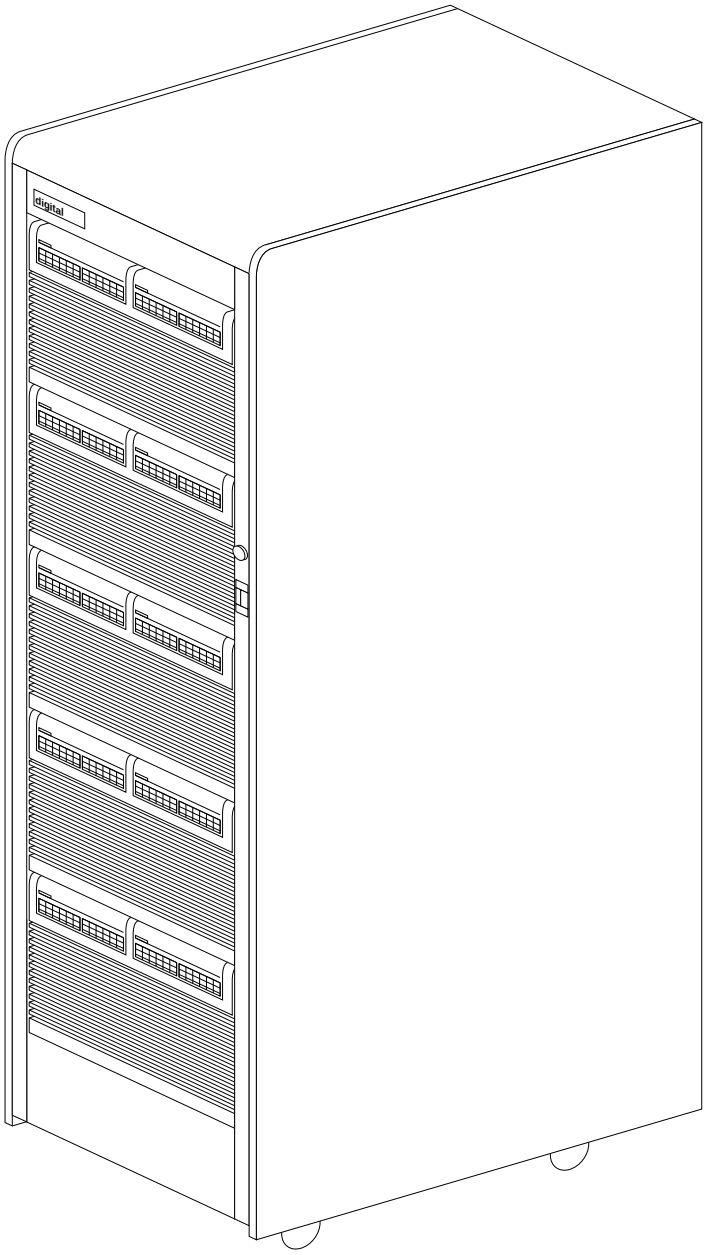

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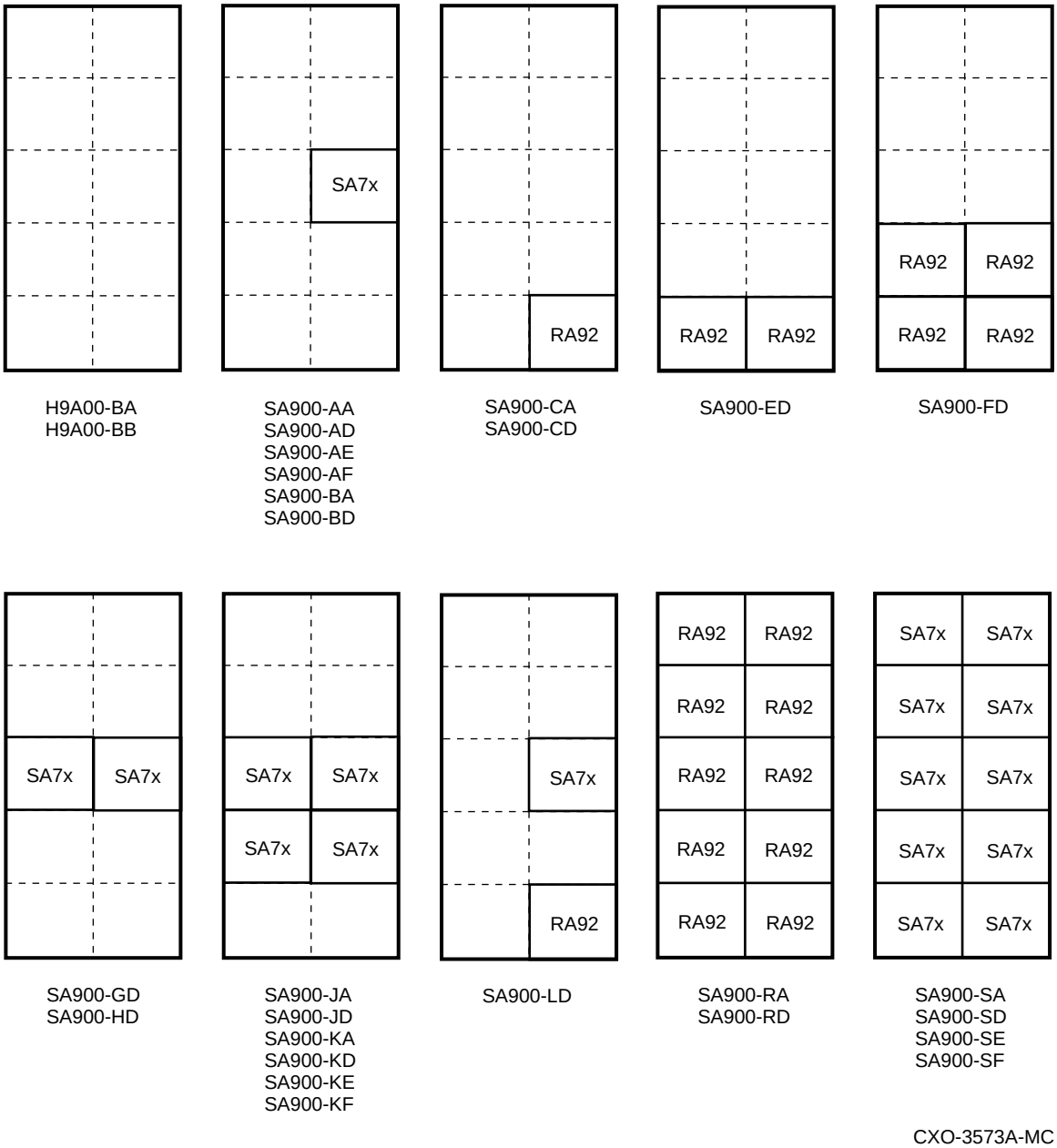
Table 2–19 SA900 Factory Configurations

Model	Storage Devices	Qty	Power Controller	Voltage	Storage Capacity
H9A00–BA H9A00–BB	None	0	881A 881B	120 Vac 240 Vac	0.0 GB
SA900–AA SA900–AD	SA72–HK	1	881A 881B	120 Vac 240 Vac	4.0 GB
SA900–AE SA900–AF	SA73–HK	1	881A 881B	120 Vac 240 Vac	8.0 GB
SA900–BA SA900–BD	SA71–HK	1	881A 881B	120 Vac 240 Vac	2.8 GB
SA900–CA SA900–CD	RA92–KA	1	881A 881B	120 Vac 240 Vac	1.5 GB
SA900–ED	RA92–KA	2	881B	240 Vac	3.0 GB
SA900–FD	RA92–KA	4	881B	240 Vac	6.0 GB
SA900–GD	SA71–HK	2	881B	240 Vac	5.6 GB
SA900–HD	SA72–HK	2	881B	240 Vac	8.0 GB
SA900–JA SA900–JD	SA71–HK	4	881A 881B	120 Vac 240 Vac	11.2 GB
SA900–KA SA900–KD	SA72–HK	4	881A 881B	120 Vac 240 Vac	16.0 GB
SA900–KE SA900–KF	SA73–HK	4	881A 881B	120 Vac 240 Vac	32.0 GB
SA900–LD	SA71–HK RA92–KA	1 1	881B	240 Vac	1.5 GB 2.8 GB 4.3 GB
SA900–RA SA900–RD	RA92–KA	10	881A 881B	120 Vac 240 Vac	15.0 GB
SA900–SA SA900–SD	SA72–HK	10	881A 881B	120 Vac 240 Vac	40.0 GB
SA900–SE SA900–SF	SA73–HK	10	881A 881B	120 Vac 240 Vac	80.0 GB
SA900–TE SA900–TF	TA857–AA TA857–AB	1	881A 881B	120 Vac 240 Vac	18.2 GB
SA900–TG SA900–TH	TA857–AA TA857–AB	2	881A 881B	120 Vac 240 Vac	36.4 GB
SA900–TJ SA900–TK	TA857–AA TA857–AB	3	881A 881B	120 Vac 240 Vac	54.6 GB

Figure 2–5 SA900 Factory Configurations



H9A00-BA
H9A00-BB

SA900-AA
SA900-AD
SA900-AE
SA900-AF
SA900-BA
SA900-BD

SA900-CA
SA900-CD

SA900-ED

SA900-FD

SA900-GD
SA900-HD

SA900-JA
SA900-JD
SA900-KA
SA900-KD
SA900-KE
SA900-KF

SA900-LD

SA900-RA
SA900-RD

SA900-SA
SA900-SD
SA900-SE
SA900-SF

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2.14.2 SA900 Specifications

Tables 2–20 through 2–23 list the physical and electrical specifications for the SA900 storage array. Refer to Table 2–1 for a listing of the environmental specifications. Specifications for the storage devices are contained in the following publications:

SA7x Enclosure User Guide
SA7x Enclosure Service Manual
RA7x Disk Drive Service Manual
RA90/RA92 Disk Drive User Guide
Tx857 Series Magazine Tape Subsystem Owner's Manual
Tx867 Series Magazine Tape Subsystem Owner's Manual
SA100 Storage Subsystem Service Guide [1]

Table 2–20 SA900 Physical Specifications

Model	Height	Width	Depth	Installed Weight	Shipping Weight
H9A00–BA H9A00–BB	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	163 kgs (360 lbs)	243 kgs (535 lbs)
SA900–AA SA900–AD	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	201 kgs (442 lbs)	280 kgs (617 lbs)
SA900–AE SA900–AF	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	201 kgs (442 lbs)	280 kgs (617 lbs)
SA900–BA SA900–BD	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	201 kgs (442 lbs)	280 kgs (617 lbs)
SA900–CA SA900–CD	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	198 kgs (436 lbs)	277 kgs (611 lbs)
SA900–ED	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	232 kgs (512 lbs)	312 kgs (687 lbs)
SA900–FD	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	301 kgs (663 lbs)	380 kgs (838 lbs)
SA900–GD	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	237 kgs (523 lbs)	317 kgs (698 lbs)
SA900–HD	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	237 kgs (523 lbs)	317 kgs (698 lbs)
SA900–JA SA900–JD	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	311 kgs (685 lbs)	391 kgs (860 lbs)
SA900–KA SA900–KD	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	311 kgs (685 lbs)	391 kgs (860 lbs)
SA900–KE SA900–KF	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	311 kgs (685 lbs)	391 kgs (860 lbs)
SA900–LD	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	235 kgs (518 lbs)	315 kgs (693 lbs)
SA900–RA SA900–RD	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	508 kgs (1117 lbs)	587 kgs (1292 lbs)
SA900–SA SA900–SD	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	533 kgs (1172 lbs)	612 kgs (1347 lbs)

(continued on next page)

[1] Adapter-interface portion of the TA857 tape storage subsystem.

Table 2–20 (Cont.) SA900 Physical Specifications

Model	Height	Width	Depth	Installed Weight	Shipping Weight
SA900–SE SA900–SF	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	533 kgs (1172 lbs)	612 kgs (1347 lbs)
SA900–TE SA900–TF	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	201 kgs (442 lbs)	280 kgs (617 lbs)
SA900–TG SA900–TH	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	238 kgs (524 lbs)	317 kgs (699 lbs)
SA900–TJ SA900–TK	170 cm (66.9 in)	61.0 cm (24.0 in)	108 cm (42.5 in)	275 kgs (606 lbs)	355 kgs (781 lbs)

Table 2–21 SA900 General Electrical Specifications

Specification	110-120 Vac 60 Hz	220-240 Vac 50 Hz
Inrush Current per Drive	60 amperes peak @ 132 Vac	70 amperes peak @ 264 Vac
Power Factor	0.7	0.58
Power Controller Data		
Model	881A	881B, 887B
Cabinet Plug Type	NEMA L21-30P	IEC309
Power Cord Length	4.42 m (14.5 ft)	4.42 m (14.5 ft)

The storage arrays are not line-frequency dependent. The input currents (that is, startup, PH1, PH2, PH3, and neutral) are for nominal voltages of either 120 Vac or 240 Vac to neutral. These correspond directly to 208 Vac or 416 Vac phase-to-phase, respectively. Nominal voltages of 110 Vac and 220 Vac have proportionally higher phase currents on a ratio of 120:110 and 240:220 to the current specified in Tables 2–22 and 2–23.

Table 2–22 SA900 Electrical Specifications—120/208 Vac 60 Hz

	Input Current (Amps)					Power Dissipation	
Model	Start-Up	PH1	PH2	PH3	Neutral	Watts	BTUs/Hr
H9A00-BA	0.5	0.5	0.0	0.0	0.5	50	171
SA900–AA	6.8	0.5	0.0	3.4	3.4	291	993
SA900–AE	6.8	0.5	0.0	3.4	3.4	291	993
SA900–BA	6.8	0.5	0.0	3.4	3.4	291	993
SA900–CA	6.0	3.6	0.0	0.0	3.6	332	1133
SA900–JA	13.5	3.6	6.2	3.1	7.4	1014	3461
SA900–KA	13.5	3.6	6.2	3.1	7.4	1014	3461
SA900–KE	13.5	3.6	6.2	3.1	7.4	1014	3461
SA900–RA	22.5	22.9	9.3	9.3	16.6	2870	9796
SA900–SA	27.5	14.0	10.1	10.1	18.0	2460	8396
SA900–SE	27.5	14.0	10.1	10.1	18.0	2460	8396
SA900–TE	2.1	0.5	0.8	1.3	1.3	235	804
SA900–TG	4.2	1.8	1.6	1.3	2.1	420	1436
SA900–TJ	6.3	2.6	1.6	2.6	2.9	605	2069

Table 2–23 SA900 Electrical Specifications—240/416 Vac 50 Hz

	Input Current (Amps)					Power Dissipation	
Model	Start-Up	PH1	PH2	PH3	Neutral	Watts	Kilojoules/Hr
H9A00–BB	0.5	0.3	0.0	0.0	0.3	50	180
SA900–AD	3.9	0.3	0.0	1.5	1.5	291	1048
SA900–AF	3.9	0.3	0.0	1.5	1.5	291	1048
SA900–BD	3.9	0.3	0.0	1.5	1.5	291	1048
SA900–CD	3.6	2.2	0.0	0.0	2.2	333	1199
SA900–ED	3.6	2.3	1.9	0.0	2.9	616	2218
SA900–FD	6.9	4.1	3.8	0.0	5.6	1182	4255
SA900–GD	3.9	0.3	1.5	1.5	2.3	532	1915
SA900–HD	3.9	0.3	1.5	1.5	2.1	532	1915
SA900–JD	7.8	1.8	3.0	1.5	3.8	1014	3650
SA900–KD	7.8	1.8	3.0	1.5	3.8	1014	3650
SA900–KF	7.8	1.8	3.0	1.5	3.8	1014	3650
SA900–LD	3.9	2.2	0.0	1.5	2.7	574	2066
SA900–RD	13.5	7.9	5.7	5.7	11.3	2880	10,368
SA900–SD	15.9	6.3	4.5	4.5	9.0	2460	8856
SA900–SF	15.9	6.3	4.5	4.5	9.0	2460	8856
SA900–TF	1.2	0.5	0.4	0.8	0.8	235	846
SA900–TH	2.4	1.3	0.8	0.8	1.3	420	1512
SA900–TK	3.6	1.7	0.8	1.6	1.8	605	2178

3

Installing a Storage Array

This chapter explains how to install a storage array. All the configurations discussed in this chapter, **except** the SA550–UA/SA550–UD storage arrays, have storage devices installed and the internal cabling connected at the factory. See Chapter 5 for a description of the procedures for installing add-on storage devices and upgrading storage arrays.

The SA550–UA and SA550–UD storage arrays are used for mounting RA8x disk drives. See the *Cabinet Management Program Installation Guide* for installation instructions.

The procedures in this chapter are applicable to the following cabinet types:

- H9646—The four-level cabinet used for the SA550, SA600/SA800, and SA650/SA850 storage arrays
- H9A00—The five-level cabinet used for the SA900 storage array

Installing a storage array is a multistep process. The steps you complete are determined by the type of storage array. In addition to the standard safety and electrostatic discharge precautions you should always use, completion of the following steps may be required:

1. Unpacking the cabinet (see Section 3.3)
2. Assembling the H9A00 cabinet (see Section 3.4) [1]
3. Connecting the **external** SDI cables (see Section 3.5)
4. Recording RA7x disk drive serial numbers (see Section 3.6) [1]
5. Selecting the input line voltage (see Section 3.7)
6. Installing OCP label (see Section 3.8)[1]
7. Connecting power (see Section 3.9)
8. Verifying proper operation of the storage devices as described in the user or service manuals

[1] This step is not required for all installations.

Always observe the following precautions:

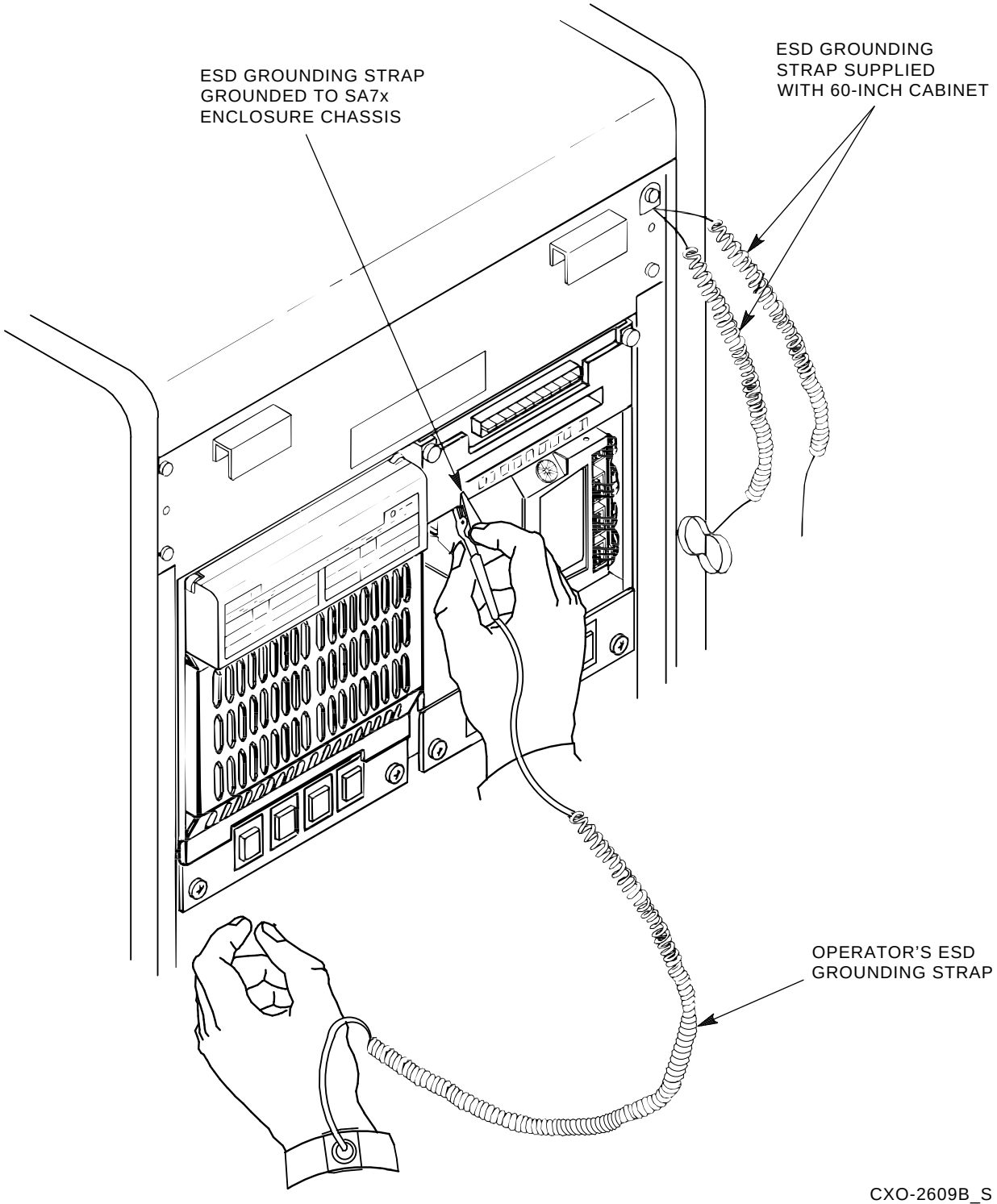
WARNING

Hazardous voltages are present inside the storage cabinet and enclosures. You must be a qualified Digital Multivendor Services engineer to install storage arrays or storage devices. Otherwise, you may injure yourself or others and you may damage the equipment. To be considered a qualified Digital Multivendor Services engineer, you must have successfully completed the electrical safety courses listed in Table 1.

CAUTION

Do not attempt to install the storage array unless you have received training in electrostatic discharge (ESD) procedures and have taken proper precautions against ESD. Wear an ESD grounding strap properly connected to a known ground, such as the SA7x enclosure chassis (see Figure 3–1), or the ESD ground bolts in the SA900 storage array. The SA900 grounding bolt is in the second mounting hole from the top in the right-hand mounting strip, both front and rear.

Figure 3–1 Using the ESD Grounding Strap



3.1 Tools

You need the following tools to install the storage arrays:

- #1 Phillips screwdriver
- #2 Phillips screwdriver
- 1/8-inch hex wrench
- 5/32-inch hex wrench
- 1/4-inch flat-bladed screwdriver

3.2 Site Requirements

The storage array must be installed in a computer room environment that meets the following guidelines:

- The computing environment must be Class A. (See Chapter 2 for a description of the environmental guidelines.)
- The **minimum space** required in front of and behind the storage array is 86 cm (3 ft). This space is required for air flow, cooling, and servicing the storage array.
- The installation floor must safely bear the weight of the storage array as defined in Chapter 2.

3.3 Unpacking a Storage Array Cabinet

The storage array cabinet is sealed in a barrier bag with desiccant and packed in a cardboard box. The box is attached to a wooden shipping pallet. Figures 3–2 and 3–3 show how storage arrays are packed for shipment.

CAUTION

Disk drives and enclosures must be environmentally stabilized in their protective barrier bags at the site. Failure to environmentally stabilize the equipment may result in damage to the drive media or electronic components. For more information about environmental stabilization, see Appendix A.

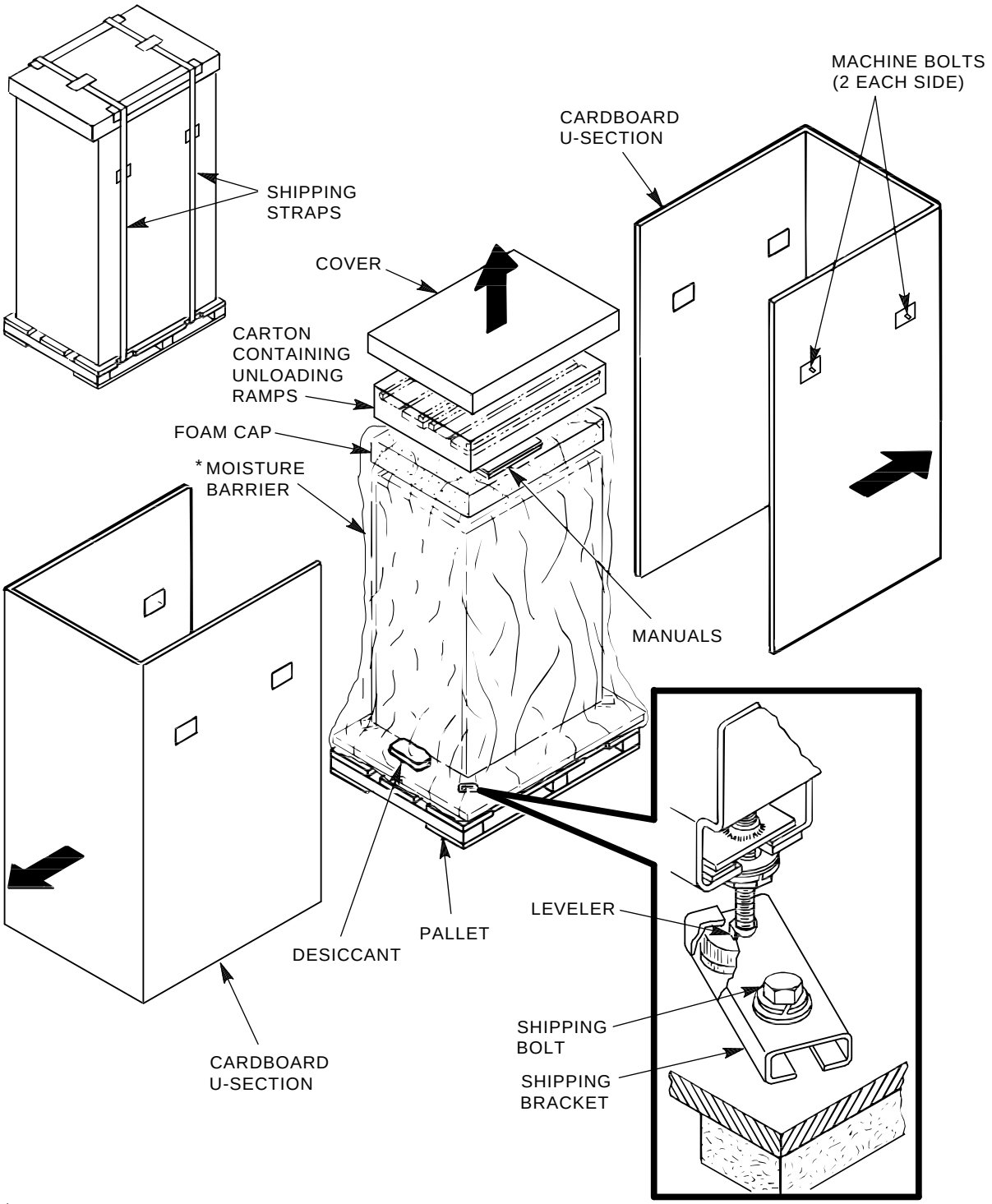
Use the following procedure to unpack the storage array cabinet:

WARNING

You may injure yourself or others if you handle the cabinet improperly or do not meet proper safety conditions. Wear safety glasses while unpacking the storage array.

1. Inspect the shipping carton for damage. Report any damage to the local carrier and either Digital Multivendor Services or the nearest Digital sales office.

Figure 3–2 H9646 Shipping Container



*DO NOT OPEN UNTIL THE THERMAL STABILIZATION PROCEDURE IS COMPLETE.

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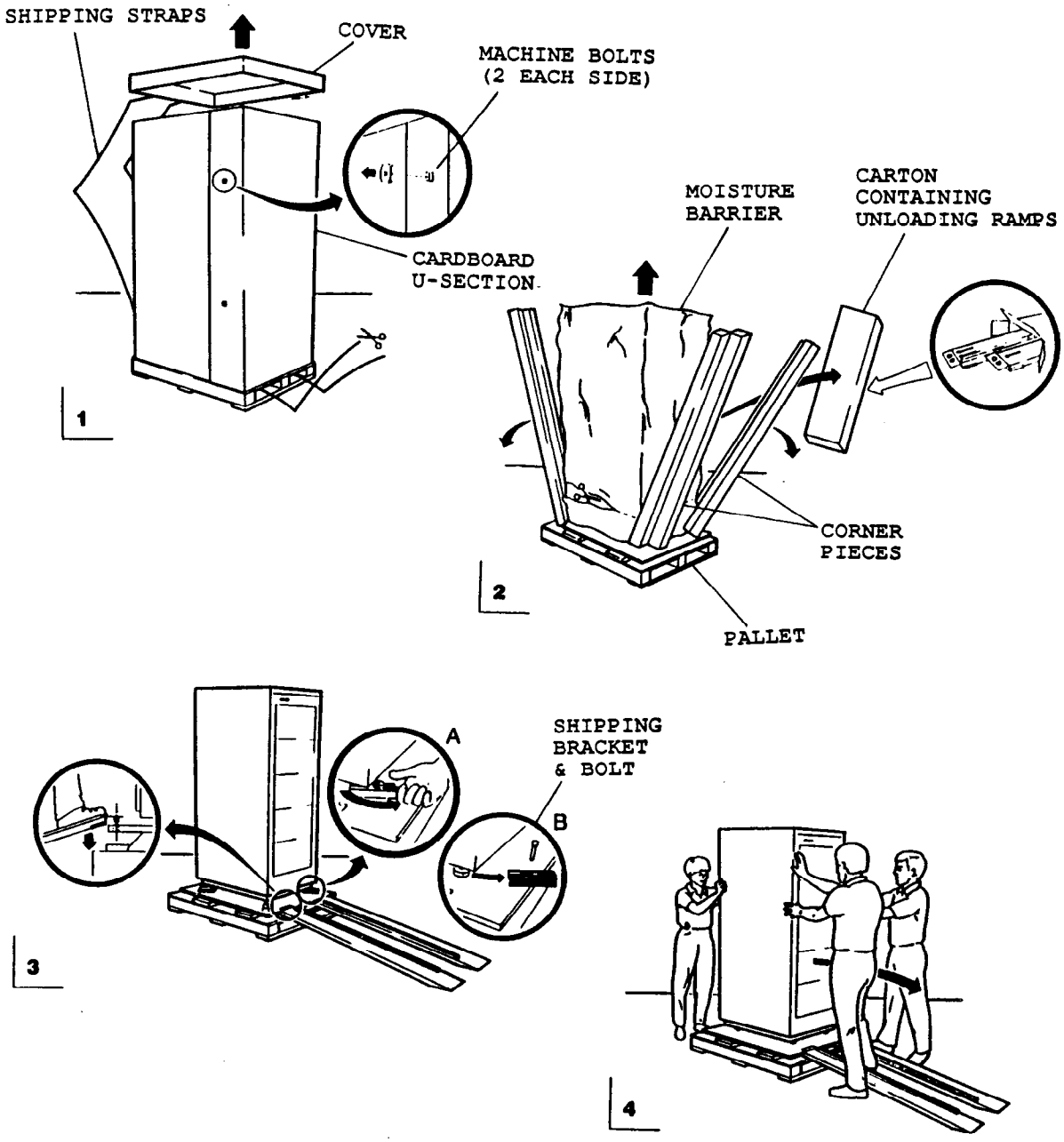
Figure 3–3 H9A00 Shipping Container



2. Remove the outer shipping carton.

CAUTION

Do not remove the desiccant bag or open the sealed moisture barrier until the storage array is environmentally stabilized. Failure to comply may result in degraded equipment performance.

3.3.1 Installing the Unloading Ramps

Unloading the cabinet from the shipping pallet requires using a set of unloading ramps. There are two ramp types: one for the H9646 and one for the H9A00. **Unless otherwise noted**, the following procedures apply to both ramp types:

1. Slide the two ramps out of the carton.
2. Inspect the ramps, ramp side rails, and metal hardware for the following:
   - Any cracks in the ramp that are more than 25 percent of the ramp's depth
   - Knots or knotholes that penetrate the thickness of the ramp and are greater than 50 percent of the width of the ramp
   - Loose, missing, or broken ramp side rails
   - Loose, missing, or bent metal hardware

CAUTION

Do not use the ramp when any of these conditions exist.

You must either order a new ramp (part numbers are listed in Appendix B) or use an alternate means for unloading the cabinet.

3. Fully extend each ramp. For the H9646 cabinet, insert the steel dowel into the slot on each ramp, as shown in Figure 3–4.
4. Attach the unloading ramps to the pallet by fitting the metal prongs into the pallet holes.
   - For the H9646 cabinet, the holes are at the rear of the pallet.
   - For the H9A00 cabinet, the holes are at the front of the pallet.

3.3.2 Unloading the Storage Array

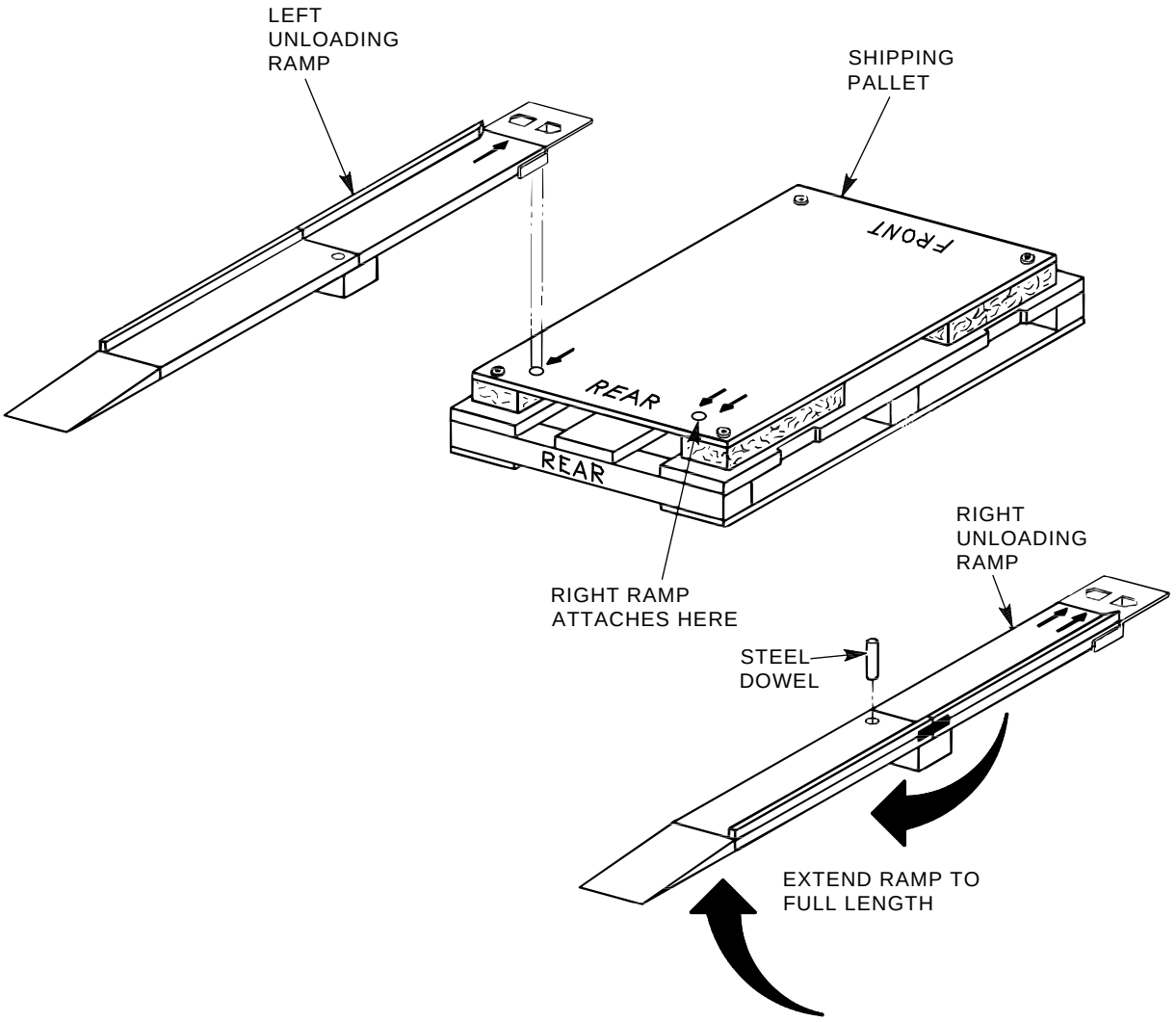
Use the following procedure to unload the cabinet:

WARNING

The desiccant bag is a potential hazard during the unloading process and must be removed *before* unloading the cabinet from the shipping pallet. Three people are required to unload the cabinet from the shipping pallet. Serious injury could result if the cabinet is improperly handled.

1. Remove the shipping bolts. (Refer to Figures 3–2 or 3–3.)

Figure 3–4 H9646 Unloading Ramps



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2. Remove the shipping brackets from the cabinet levelers.
3. Loosen the locknuts on all four leveler feet, as shown in Figure 3–5.
4. Screw the cabinet levelers up *as far as they will go.*
5. Tighten the locknuts on all four leveler feet.

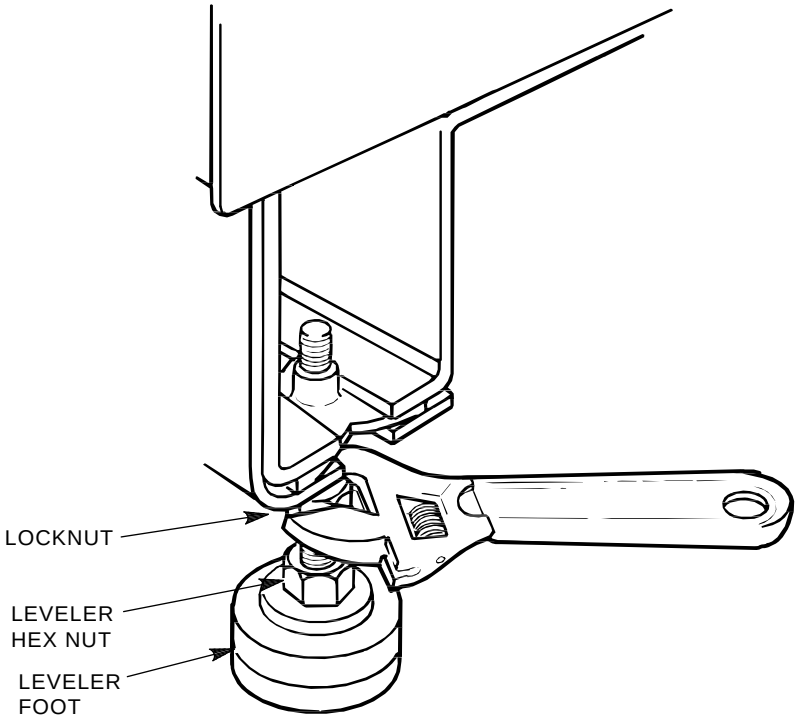
WARNING

Cabinet levelers must be fully raised to ensure they clear the floor when the cabinet reaches the end of the unloading ramp.

If the cabinet levelers *do not* clear the floor, they can cause the cabinet to tip over. Injury may result.

6. Carefully roll the cabinet down the ramps as shown in Figure 3–6.

Figure 3–5 Adjusting the Cabinet Leveler Feet



7. Move the cabinet to its final position.

3.3.3 Leveling the Cabinet

With the cabinet in its final location, use the following procedure to level the cabinet:

1. Loosen the locknuts on all four leveler feet (refer to Figure 3–5).
2. Turn each leveler hex nut clockwise until the leveler foot contacts the floor.
3. Adjust all four feet until the cabinet is level and the load is removed from all casters. Ensure that the casters spin freely.

3.4 Assembling the H9A00 Cabinet

When the H9A00 cabinet is shipped:

- The sliding side panels are pressed back into the cabinet, flush with the vertical I/O bulkhead.
- The top and bottom filler panels are packed outside the cabinet.
- The rear panel is secured to the vertical I/O bulkhead with four 10-32 x 1/2-inch screws.

Figure 3–6 Unloading the Cabinet

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- Keys to the cabinet front panel are taped to the outside of the panel.

Installing an H9A00 cabinet requires you to:

1. Remove the rear panel.
2. Install the filler panels.
3. Extend the sliding side panels.
4. Secure the filler panels to the sliding side panels.

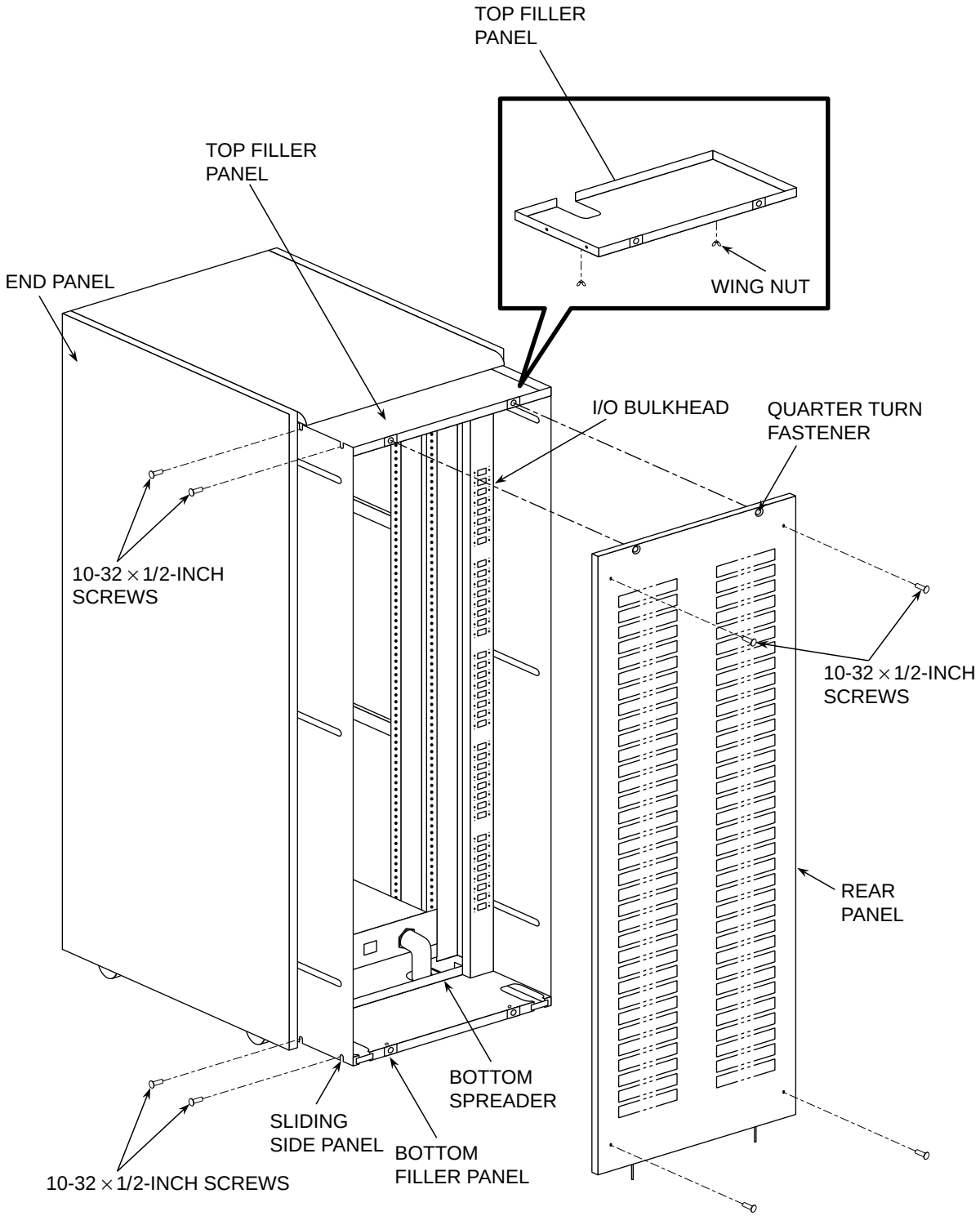
The position of the rear panel is described in Section 3.4.3.

3.4.1 Rear Panel

Use the following procedure and see Figure 3–7 to assemble the H9A00 cabinet rear panel:

1. Remove the rear panel. Use a #2 Phillips screwdriver to remove the four 10-32 x 1/2-inch screws that secure the rear panel to the I/O bulkhead. Discard these screws.

Figure 3–7 H9A00 Rear Panel Assembly



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2. Remove the red shipping brackets from the storage devices.

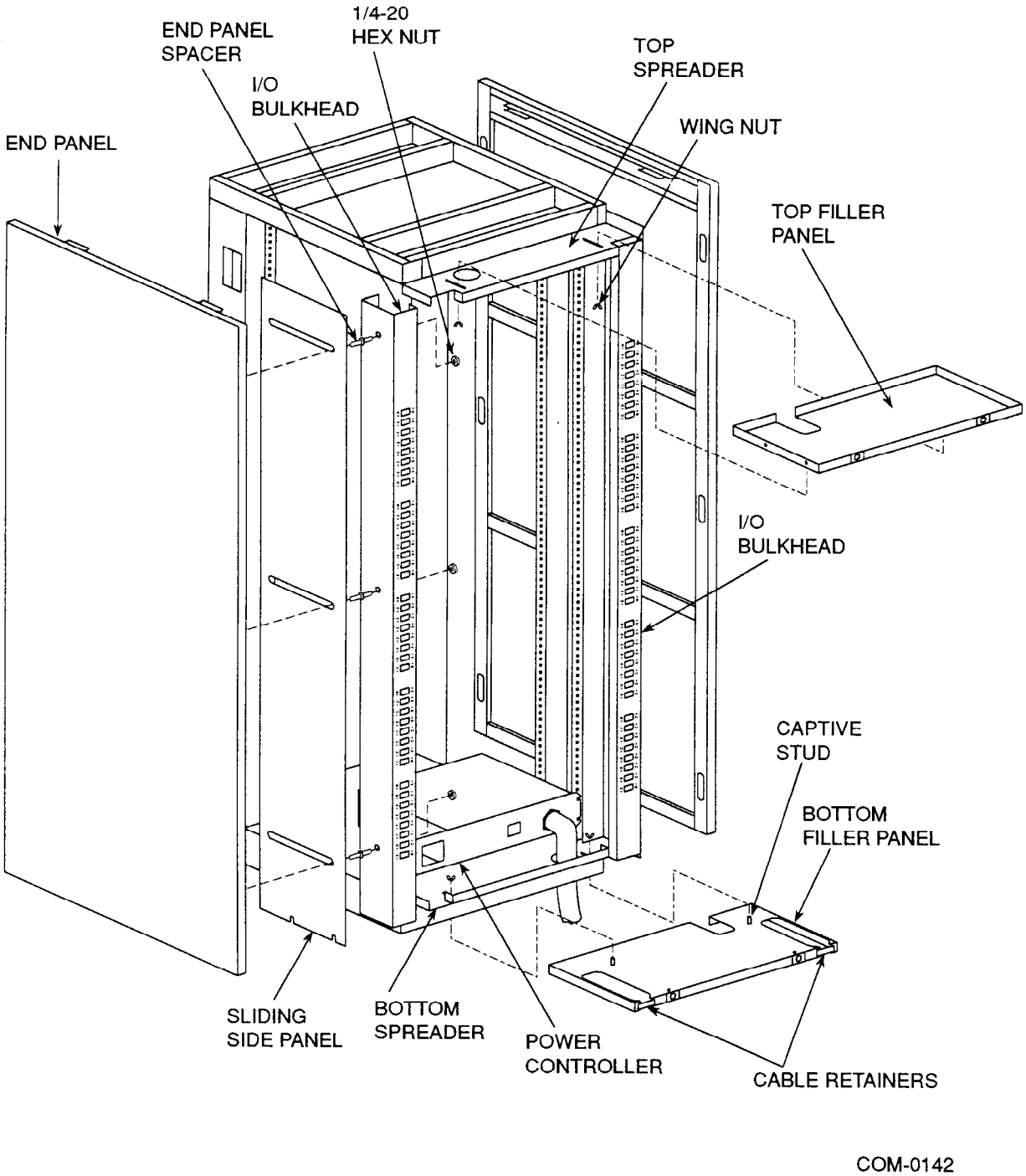
   See the *SA482 Storage Array User Guide* for procedures for removing RA82 shipping brackets and packing materials.

3. Remove the two filler panels packed outside the cabinet and unwrap the panels.

   Each filler panel includes four 10-32 x 1/2-inch screws and two captive studs with wing nuts. Two screws will be inserted in either end of the filler panel. The captive studs are located on top of each panel as shown in Figure 3–8.

   The filler panels are not identical. One panel has two rectangular cable openings; the other is solid. The position of the panels is determined by cable routing. To route cables out the top, install the cable filler panel in the top position; to route cables out the bottom, install the cable filler panel in the bottom position.

Figure 3–8 H9A00 Cabinet Parts (Rear View)



3.4.2 Installing the Filler Panels

Locate the top and bottom spreaders shown in Figure 3–8. These bracing structures are connected to the top and bottom of the cabinet. Use the following steps to connect the filler panels to the spreaders as shown in Figure 3–7:

1. Place the top filler panel on the top spreader as shown in Figure 3–8.
2. Remove the wing nuts from the captive studs on the filler panel.
3. Push the two captive studs through the two slots on the spreader.
4. Move the filler panel toward you until the captive studs stop at the ends of the slots.
5. Tighten the wing nuts on the captive studs.
6. Place the bottom filler panel on the bottom spreader as shown in Figure 3–8.
7. Remove the two wing nuts from the captive studs on the bottom filler panel.
8. Push the captive studs through the appropriate slots on the spreader.
9. Move the filler panel toward you until the captive studs stop at the ends of the slots.
10. Tighten the wing nuts on the captive studs.

3.4.3 Positioning the Side Panels

Use the following procedures to position the side panels:

1. Loosen the six 1/4-20 hex nuts located on the top, middle, and bottom of the sliding side panels as shown in Figure 3–8.
2. Pull the sliding side panels toward you until the U-shaped holes at the top and bottom of the panels line up with the screw holes on the sides of the filler panels as shown in Figure 3–7.
3. On each sliding panel, insert the 10-32 x 1/2-inch screws into the two U-shaped holes at the top and bottom and tighten them.

   The final position of the cabinet rear panel assembly is determined by the number of storage devices installed.

   a. For a fully populated storage array (for example, with 10 SA7x enclosures), leave the rear panel assembly fully extended.

   b. When the cabinet is partially populated, push the rear panel assembly as far into the cabinet as necessary.
4. Position the two sliding panels and tighten the three 1/4-20 hex nuts on each panel.
5. Loosen the four wing nuts on the filler panels.
6. Push the rear panel assembly back into the cabinet and tighten the wing nuts.
7. Tighten the six 1/4-20 hex nuts on the two sliding side panels.

3.4.4 Installing the Rear Panel

Use the following procedure to install the rear panel:

1. Lift the rear panel into place by fitting the two pins on the bottom of the panel into the two slots in the filler panel as shown in Figure 3–9.
2. Push the top of the panel into place and turn the fasteners one-quarter turn clockwise with a hex wrench to lock.

3.5 Connecting SDI Cables

Internal SDI cables are inside the storage array cabinet and connect storage devices to an I/O port on the I/O bulkhead. **External** SDI cables connect one storage device port on the I/O bulkhead to a server or controller. Internal SDI cables and power cords are installed at the factory for configured storage arrays. Installing and connecting these cables is only required for add-ons (see Chapter 5).

This section explains how to connect external cables to each of the storage arrays. Cable placement is different for each storage array.

3.5.1 H9646 Cabinet External SDI Cable Connections

The SA550, SA600, SA650, SA800, and SA850 storage array internal SDI cables are already connected to the I/O bulkhead.

Two sets of external cables are required for dual porting. Be sure to tighten the cable connector captive screws to the I/O bulkhead. Table 3–1 lists the SDI cables. Figures 3–10, 3–11, and 3–12 show the external SDI cable connectors on the I/O panel for the SA550, the SA600/SA800, and the SA650/SA850 storage arrays, respectively.

Table 3–1 H9646 SDI Cables

External SDI Cables	Standard Part Number	Fire Code Part Number
3.7 m (12 ft) cable	BC26V–12/BC26G–12	BC26J–12
7.6 m (25 ft) cable	BC26V–25/BC26G–25	BC26J–25
15.2 m (50 ft) cable	BC26V–50/BC26G–50	BC26J–50
24.4 m (80 ft) cable	BC26V–80/BC26G–80	BC26J–80

Figure 3–9 H9A00 Rear Panel Installation

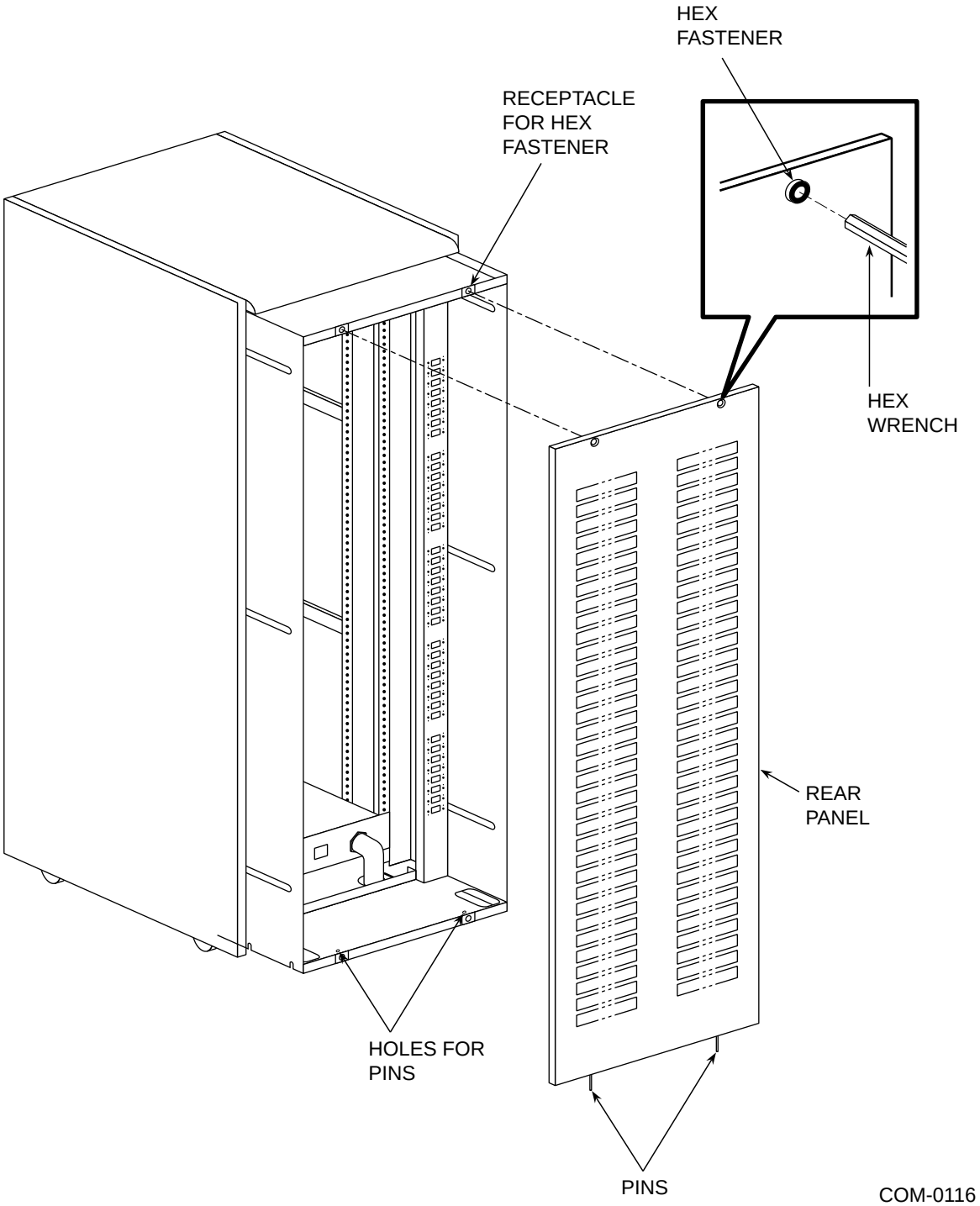


Figure 3–10 SA550 External SDI Cable Connections

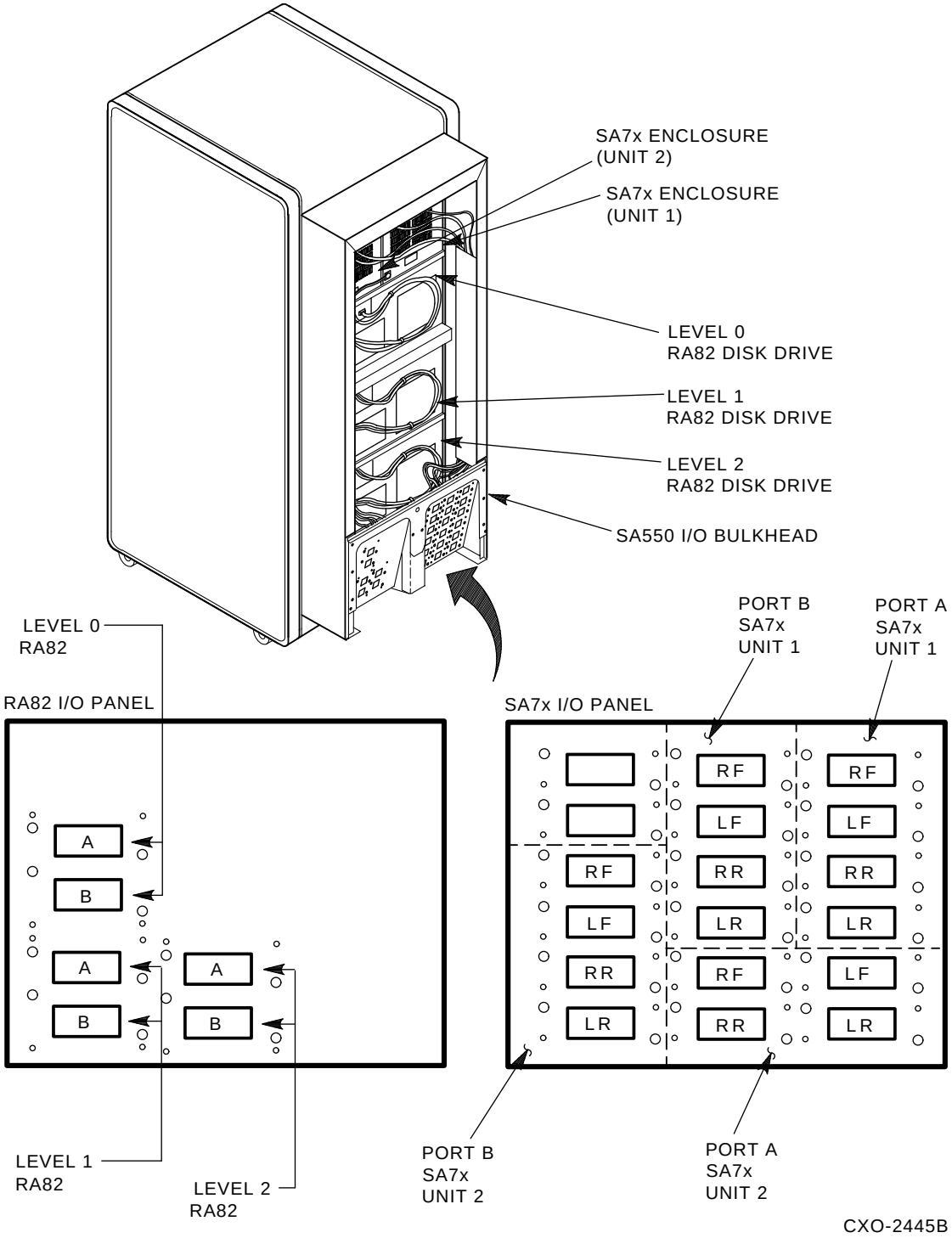


Figure 3–11 SA600/SA800 External SDI Cable Connections

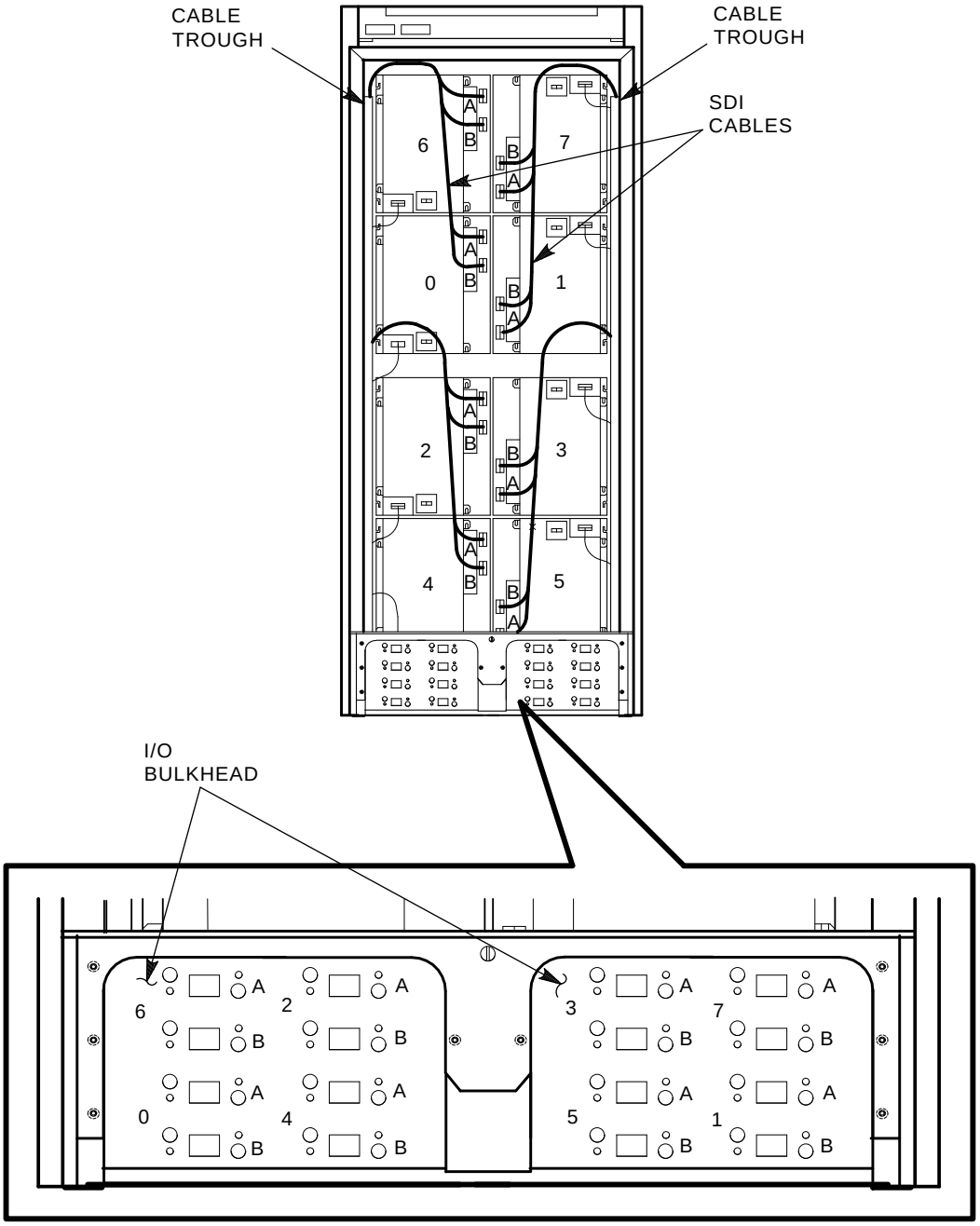


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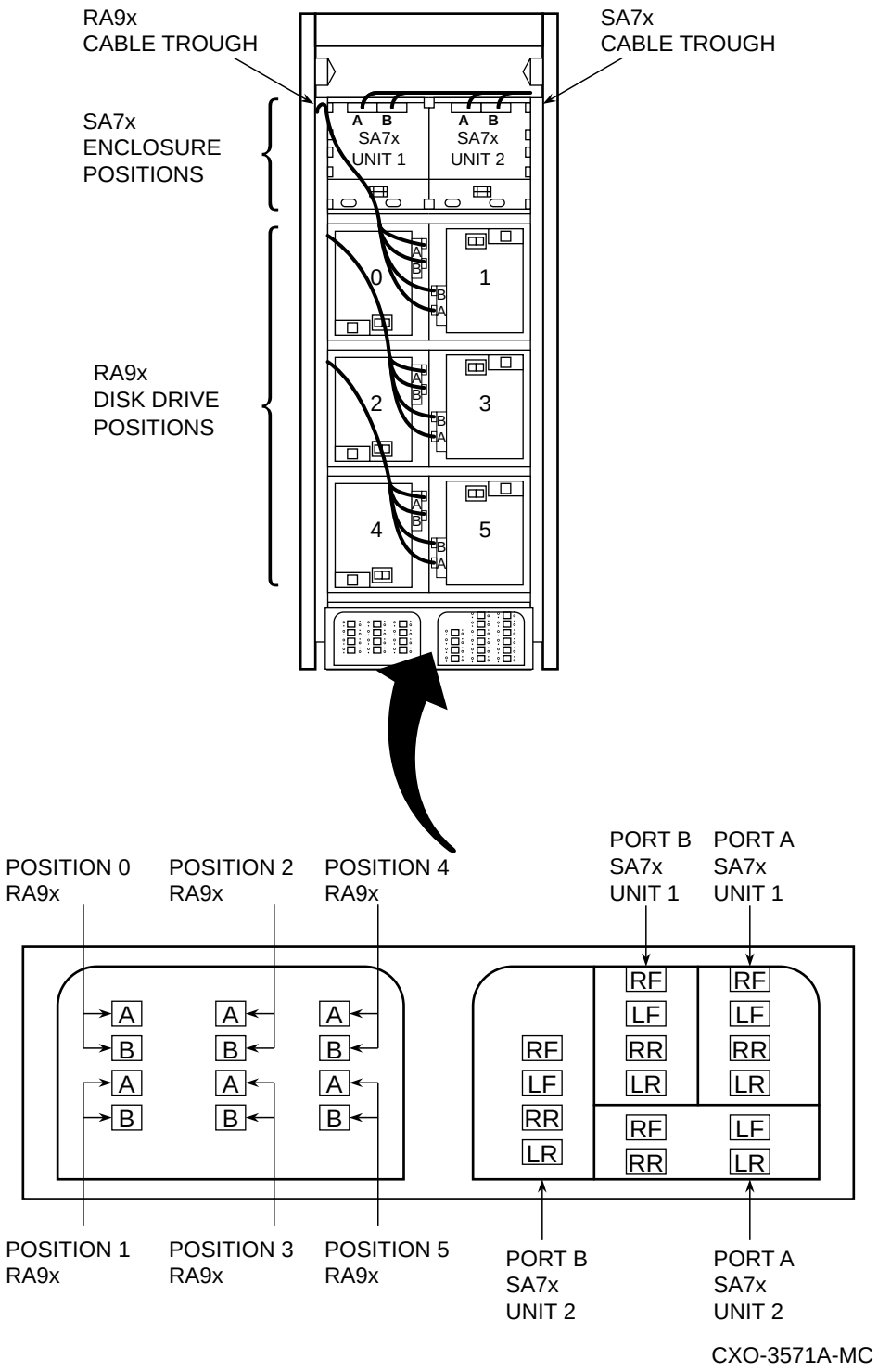
Figure 3–12 SA650/SA850 External SDI Cable Connections



3.5.2 H9A00 SDI Cable Connections

The H9A00 cabinet includes a left and a right vertical I/O bulkhead. To access these bulkheads, you must first remove the cabinet's rear panel. (Refer to Figure 3–9.)

Figures 3–13 and 3–14 show the I/O bulkhead locations for connecting RA9x and SA7x external SDI cables, respectively, to the SA900 storage array.

After connecting the external SDI cables, route them through the two slots in the filler panel. To feed cables through the slots more easily:

1. First remove the cable retainers by removing the two screws that secure each retainer. (Refer to Figure 3–8.)
2. Push the cables back into the slots.
3. When all cables are positioned in the slots, replace the cable retainers.

Table 3–2 lists the external SDI cables. For dual porting, two sets of cables are required.

Table 3–2 H9A00 External SDI Cables

External SDI Cables	Standard Part Number	Fire Code Part Number
3.7 m (12 ft) cable	BC26V–12 or BC26G–12	BC26J–12
7.6 m (25 ft) cable	BC26V–25	BC26J–25
7.6 m (25 ft) cable [1]	BC27V-25	None
15.2 m (50 ft) cable	BC26V–50	BC26J–50
24.4 m (80 ft) cable	BC26V–80	BC26J–80

[1] TA8x7 series storage systems only

Table 3–3 describes the SA7x enclosure internal SDI cable connections to the Port A and Port B I/O bulkhead connectors as shown in Figure 3–14. Early model cabinets used color coded wires. Newer models use a label on the connector that identifies the RA7x position.

Table 3–3 SA7x Enclosure Internal SDI I/O Bulkhead Connections

RA7x Position	I/O Connector	Wire Color	Label
Right front	1 (top)	White	RF
Left front	2	Red	LF
Right rear	3	Black	RR
Left rear	4 (bottom)	Yellow	LR

Figure 3–13 SA900-RD External SDI Cable Connections

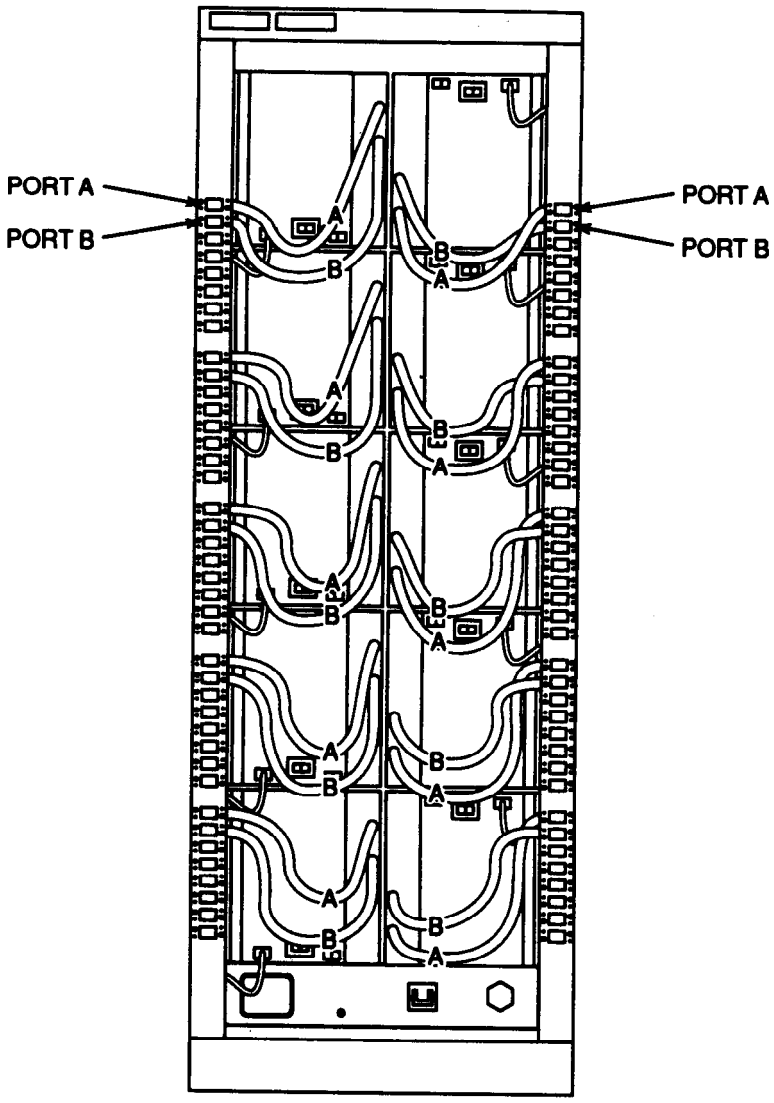
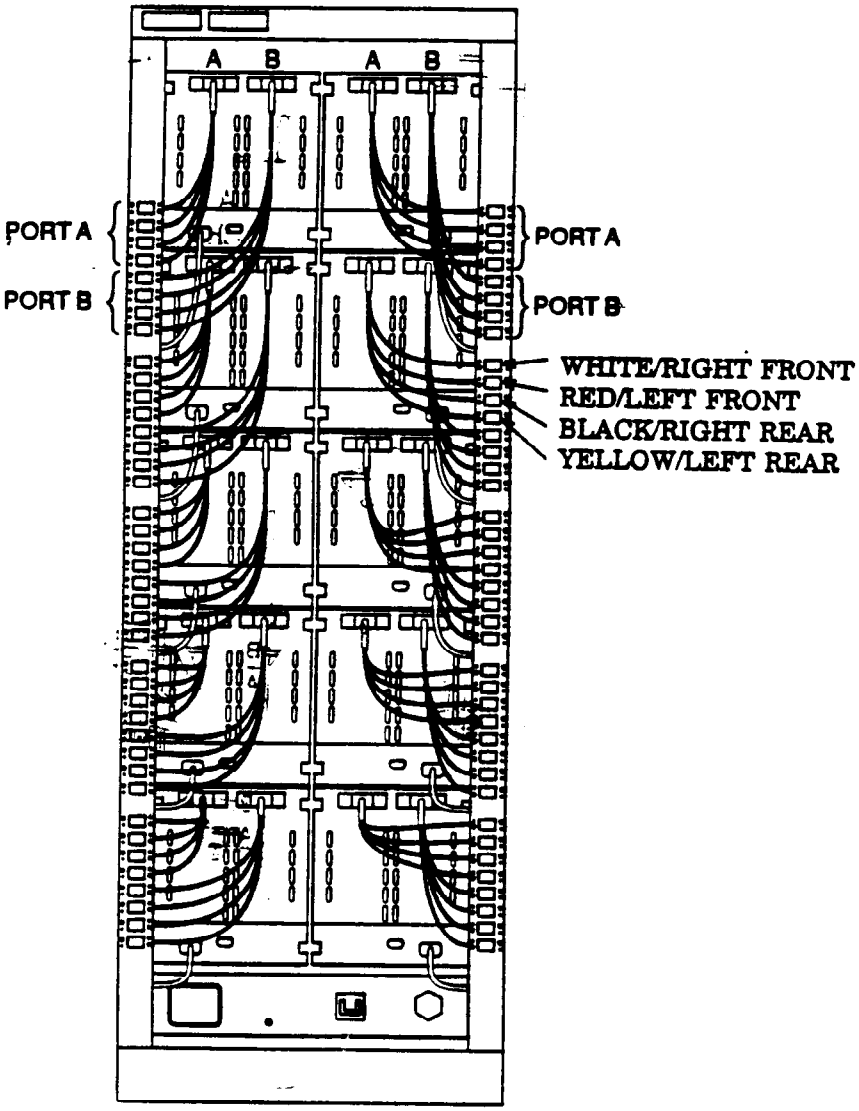


Figure 3–14 SA900-SD External SDI Cable Connections



3.6 RA7x Disk Drive Serial Numbers

The RA7x disk drive serial number appears on two labels: one on the drive itself and the other on the front of the SA7x enclosure. As shown in Figure 3–15, the label on the enclosure front panel defines the location of the drive in the enclosure.

These labels are installed at the factory, but you must verify that the labels are installed on the drive and in the proper location on the enclosure.

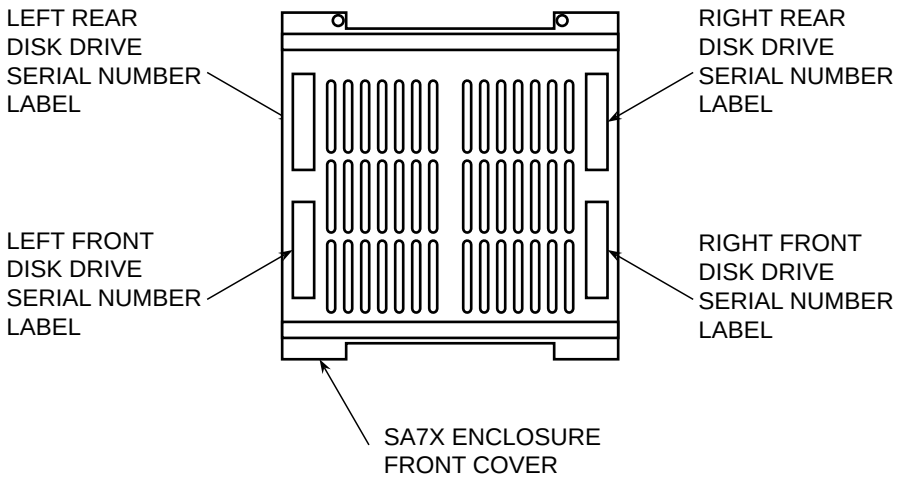
The serial number contains the following information:

- Manufacturing location code (two characters)
- Date code (three digits)
- Component serial number (five digits)

For Labor Activity Reporting System (LARS), record only the manufacturing location code, and the component serial number. Perform the following steps to obtain the code and serial number:

1. Complete ESD precautions to include wearing an ESD grounding strap properly connected to a known ground.
2. Remove the front and rear enclosure covers.
3. Remove the first disk drive from the enclosure using the procedures described in the *SA7x Enclosure Service Manual*.
4. Verify that the serial numbers on the disk drive and the enclosure are the same.
5. Verify that the enclosure serial number label is in the correct position.
6. Record the drive and HDA serial numbers in the site log and LARS.
7. Replace the drive in its assigned position.
8. Repeat Steps 3 through 7 for all drives.
9. Replace the front and rear enclosure covers.

Figure 3–15 RA7x Disk Drive Serial Number Location

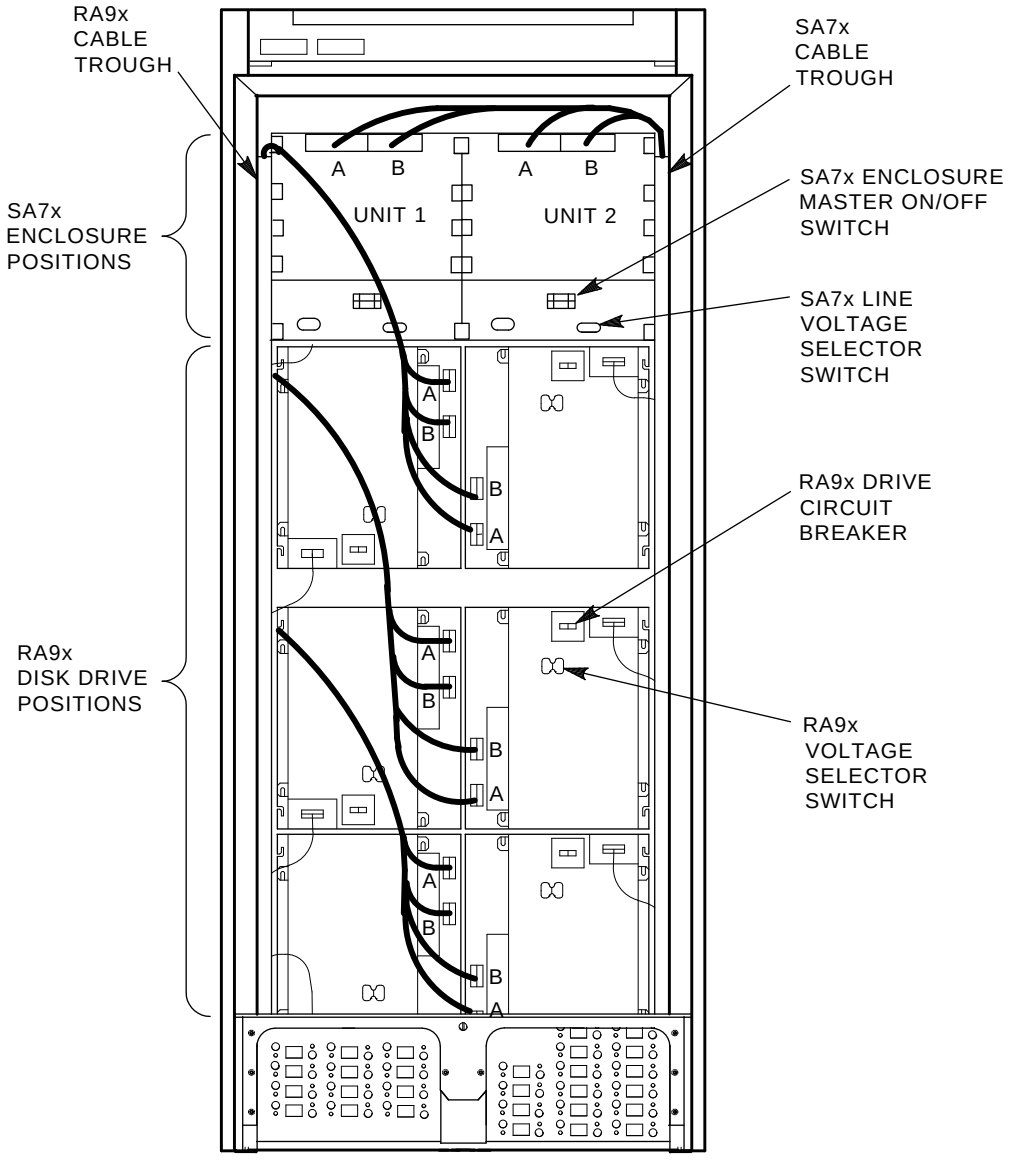


3.7 Selecting the Line Input Voltage

Each storage device has a Line Voltage Selector switch that is to be set to the local line input voltage, either 120 Vac (60 Hz) or 240 Vac (50 Hz). You are responsible for setting the Line Voltage Selector switch to the appropriate voltage. Use the following procedure to set the correct voltage:

1. On each storage device, set the Master On/Off switch or the circuit breaker, shown in Figure 3–16, to the off (0) position.
2. On the SA7x enclosure, set all four drive power switches, shown in Figure 3–17, to off.
3. Use a small screw driver to place the Line Voltage Selector switch on each storage device to the input line voltage.

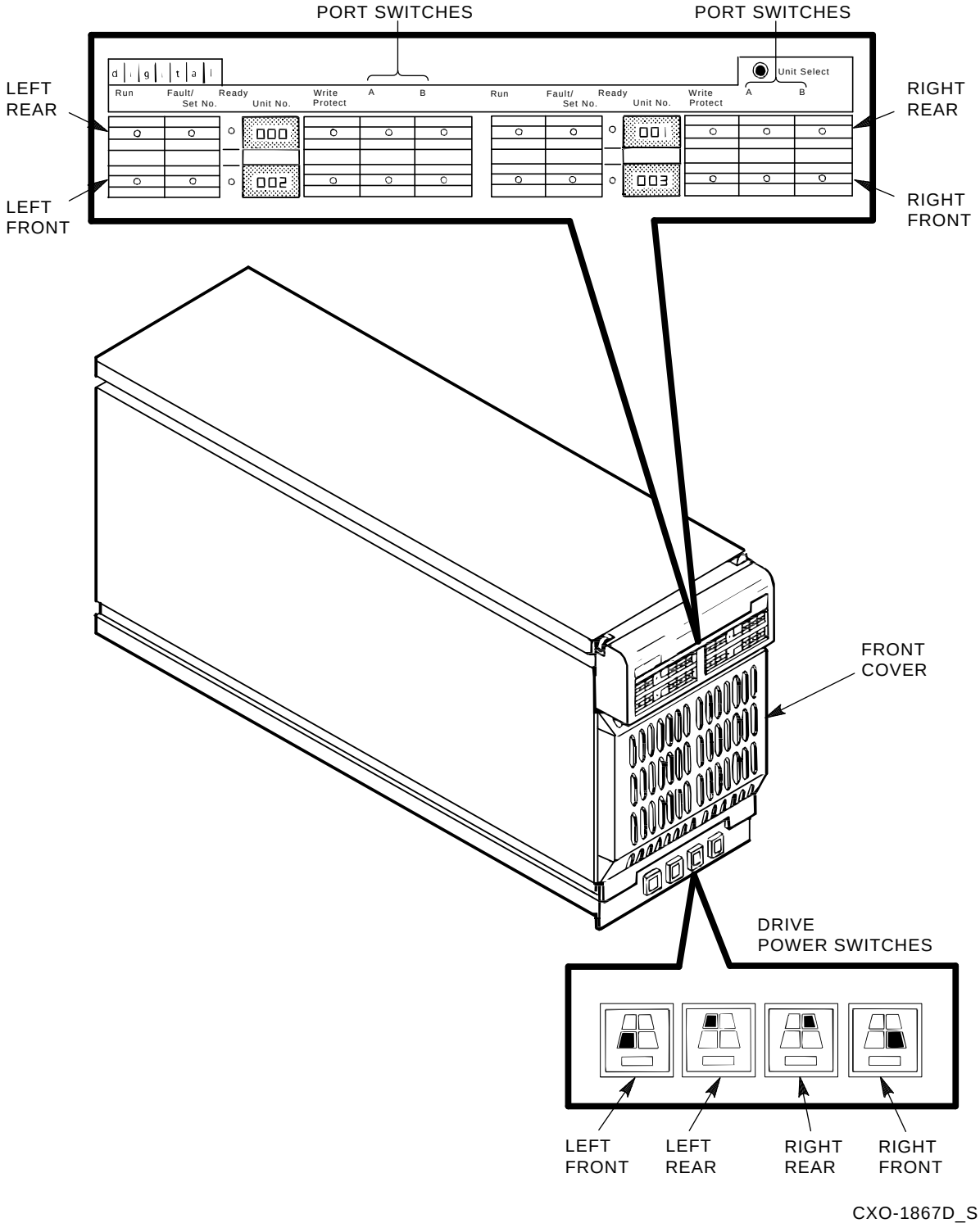
Figure 3–16 Power and Line Voltage Selector Switches



NOTE: HEAVY LINES INDICATE INTERNAL SDI CABLES.

CXO-2464C

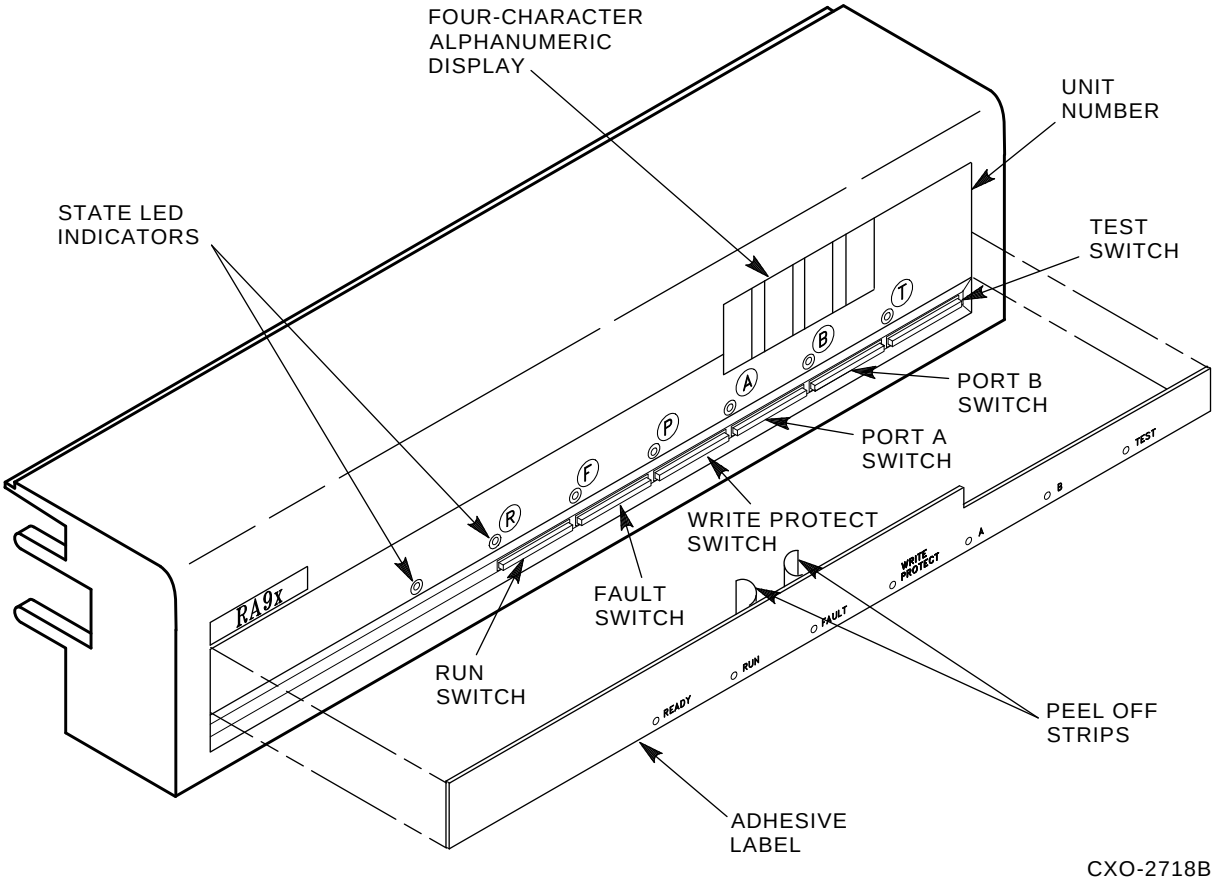
Figure 3–17 SA7x Drive Power Switches



3.8 Installing the OCP Label

The standard OCP labels are in English. A package of self-adhesive labels in other languages is also supplied. To change the labels, simply place the appropriate label over the English label and press into place, as shown in Figure 3–18.

Figure 3–18 OCP Label



3.9 Connecting the 881 Power Controller

All storage arrays are shipped with the internal power cords installed and connected. This section describes the 881 power controller and explains how to safely connect power to the storage array. The types of storage array power controllers are as follow:

- The 881A power controller is used for 120 Vac 60 Hz installations.
- The 881B power controller is used for 220 Vac 50 Hz installations.

Note

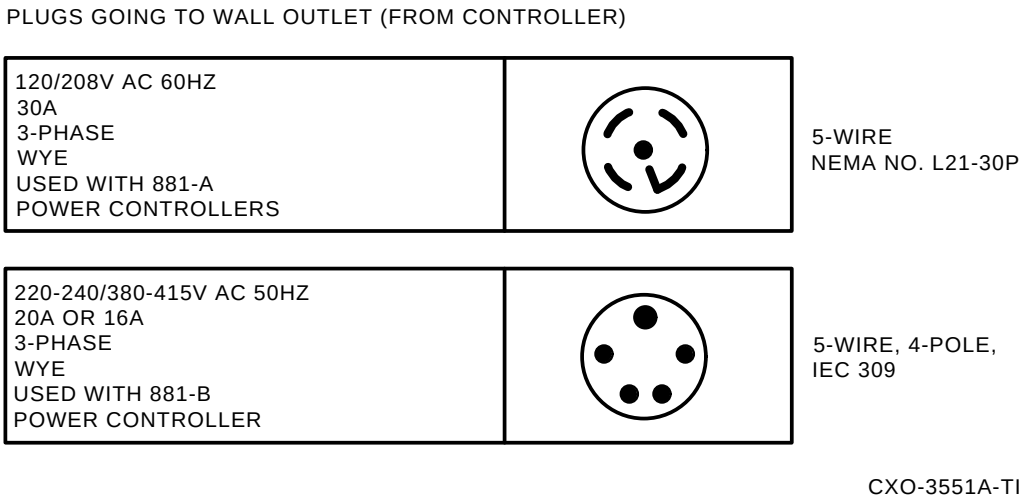
Some European markets use the 887B power controller which is electrically the same as the 881B although its physical configuration is slightly different.

Complete safety and tag-out procedures are explained in the Digital safety courses listed in Table 1. For maximum safety, **always** use the following tag-out procedures:

- Turn off site power at the main circuit breaker.
- Place a tag-out tag on the circuit breaker.
- Connect the power controller power cord to the outlet.
- Turn on site power at the main circuit breaker when you have finished with the installation.
- Remove the tag-out tag.
- Connect the power controller power cord to the outlet and turn it on.
- Turn on all components in the cabinet.

Figure 3–19 shows the 881 power connector configurations and specifications.

Figure 3–19 881 Power Connector Configurations



3.10 Applying Power

Use the following procedure to turn on the power controller:

1. Ensure that the power on/off switches on all storage devices are in the off positions. (Refer to Figure 3–16.)
2. On SA7x enclosures, ensure that the front panel drive power switches are in the off positions.

3. Place the power controller circuit breaker (CB1) shown in Figure 3–20 in the off (down) position.
4. The Bus/Off/On switch is a three-position switch that distributes power to the ac outlets on the rear of the controller.

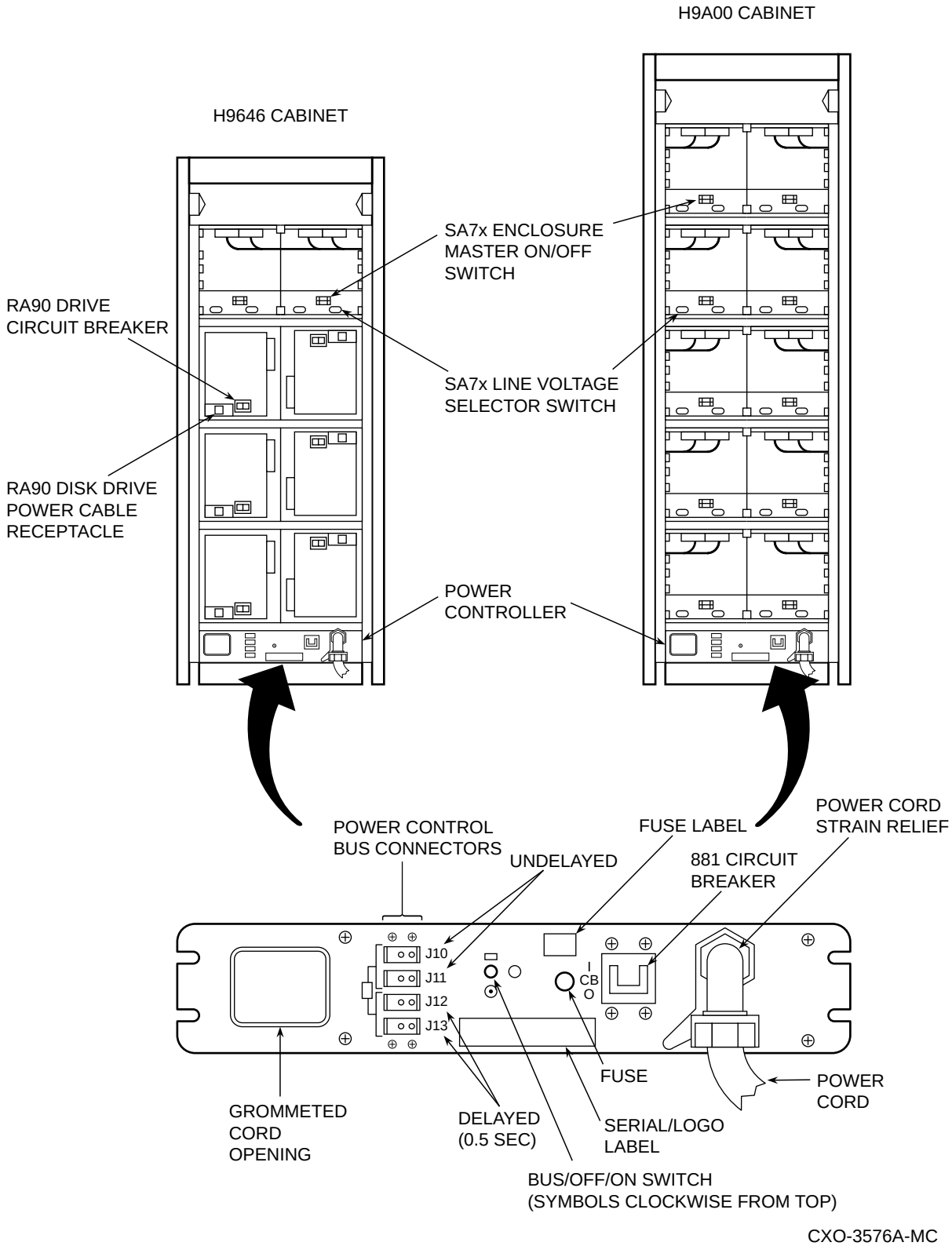
   The top position of this switch is the Bus position and is used for remote operation. See the *881 Power Controller User Guide* for a full description of this mode of operation.

   The center position is the off position.

   The bottom position is the on position.

   Set the switch to the off (center) position.
5. Connect the power cord to the external power source.
6. Set the circuit breaker to the on (up) position.
7. Set the Bus/Off/On switch to the on (down) position.
8. Turn on the storage devices.

Figure 3–20 Storage Array Power Controls



4

Removing and Replacing Cabinet Components

This chapter explains how to remove and replace storage array cabinet components which include the following:

- I/O bulkheads
- Power controllers

The procedures for installing storage devices are documented in Chapter 5.

Removing or replacing cabinet parts require you to observe the following safety precautions:

WARNING

Hazardous voltages are present inside the storage cabinet and enclosures. You must be a qualified Digital Multivendor Services engineer to perform installation procedures. Otherwise, you may injure yourself or others, and you may damage the equipment.

When you install a new component, for maximum safety, use the following procedures for disconnecting and connecting the power source:

- Turn off the power control on all components in the cabinet.
- Turn off the power controller and disconnect it from the outlet.
- Turn off site power at the main circuit breaker.
- Place a tag-out tag on the circuit breaker.
- When you have finished with the installation, turn on site power at the main circuit breaker.
- Remove the tag-out tag on the circuit breaker.
- Connect the power controller power cord to the outlet and turn it on.
- Turn on all components in the cabinet.

Complete safety and tag-out procedures are presented in the Digital safety courses listed Table 1.

CAUTION

Do not attempt to install a storage array unless you have received training in electrostatic discharge (ESD) procedures and have taken proper precautions against ESD. Wear an ESD grounding strap properly connected to a known ground.

- An ESD strap is shipped with each H9646 cabinet.
- Two ESD bolts for connecting grounding straps are located in each H9A00 cabinet.

4.1 H9646 Replacement Procedures

This section describes how to remove and replace the I/O bulkhead and the power controller. Replacing either of these components require you to remove and replace the front and rear panels.

4.1.1 H9646 Front Panel

To remove the H9646 front panel, see Figure 4–1 and use the following procedure:

1. Unlock the two quarter-turn fasteners at the top of the panel. Use a hex wrench to turn the fasteners counterclockwise.
2. Grasp the panel by its edges, tilt it toward you, and lift it approximately 2 inches. Remove the panel and store it in a safe place.

To replace the H9646 front panel:

1. Lift the front panel into place and lower it straight down until the tabs on the panel's lower edge engage with the corresponding slots on the support bracket located at the base of the cabinet.
2. Hold the panel flush with the cabinet and turn the fasteners one-quarter turn clockwise to lock.

4.1.2 H9646 Rear Panel

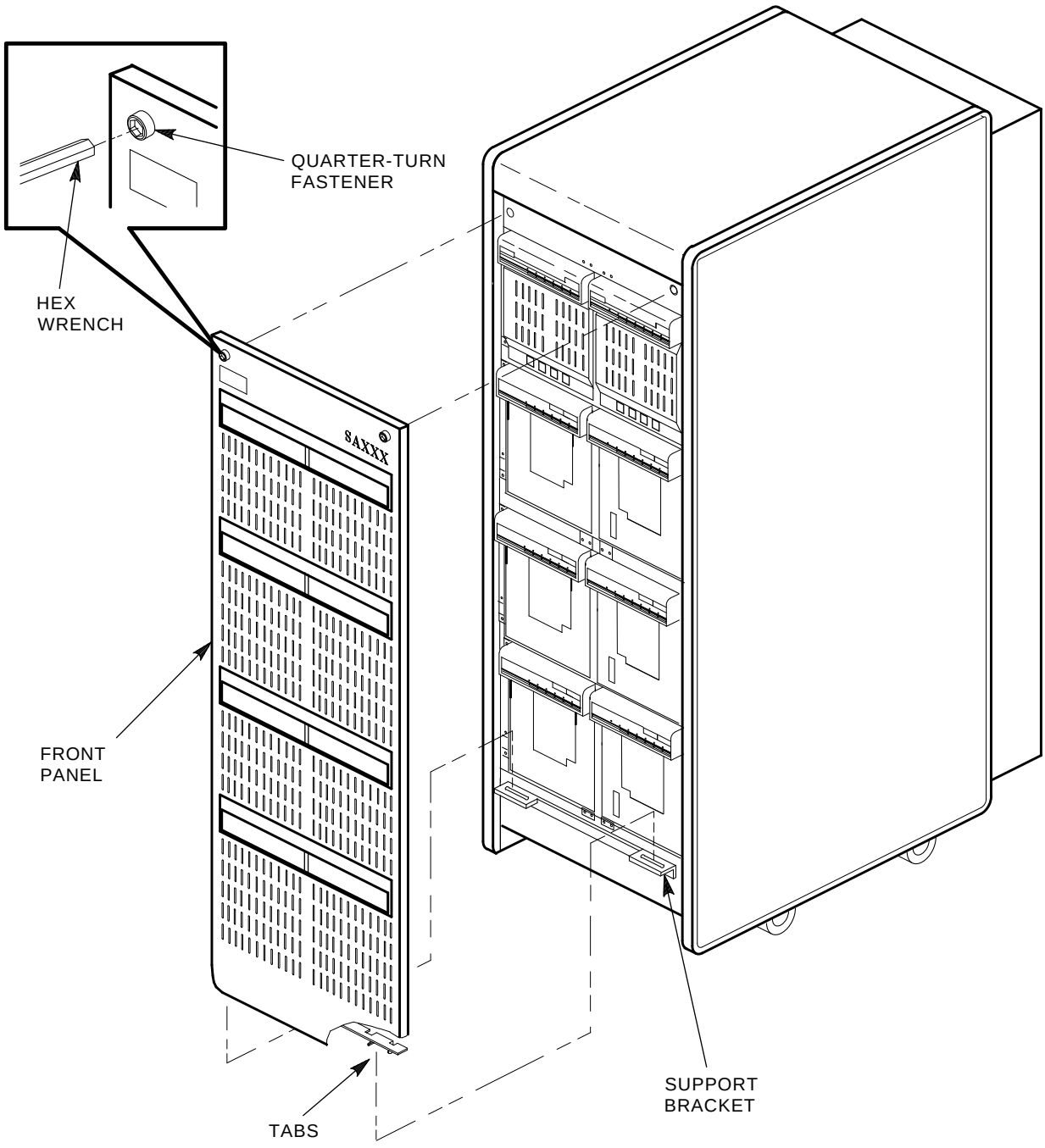
To remove the H9646 rear panel, see Figure 4–2 and use the following procedure:

1. Unlock the two quarter-turn fasteners at the top of the panel. Use a hex wrench to turn the fasteners counterclockwise.
2. Grasp the panel by its edges, tilt it toward you, and lift it up to disengage the pins at the bottom. Remove the panel and store it in a safe place.

To replace the H9646 rear panel:

1. Lift the rear panel into place and fit the pins into the holes located at the top of the I/O bulkhead.
2. Push the top of the panel into place and turn the fasteners one-quarter turn clockwise to lock.

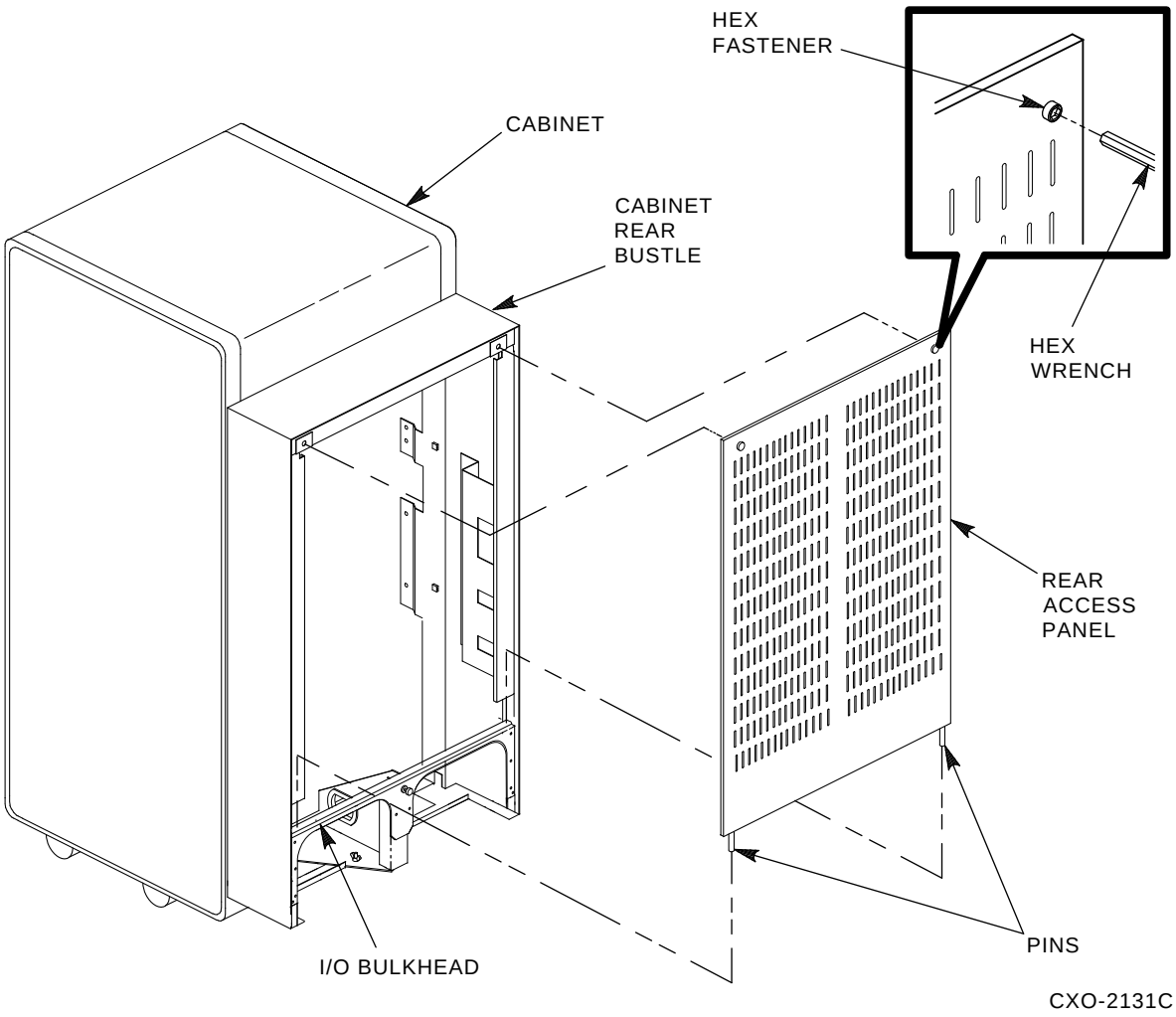
Figure 4–1 H9646 Front Panel



4.1.3 Replacing the I/O Bulkhead

The H9646 I/O bulkhead consists of an RA9x I/O panel and an SA7x I/O panel. See Figure 4–3 and use the following procedure to remove the I/O bulkheads:

Figure 4–2 H9646 Rear Panel



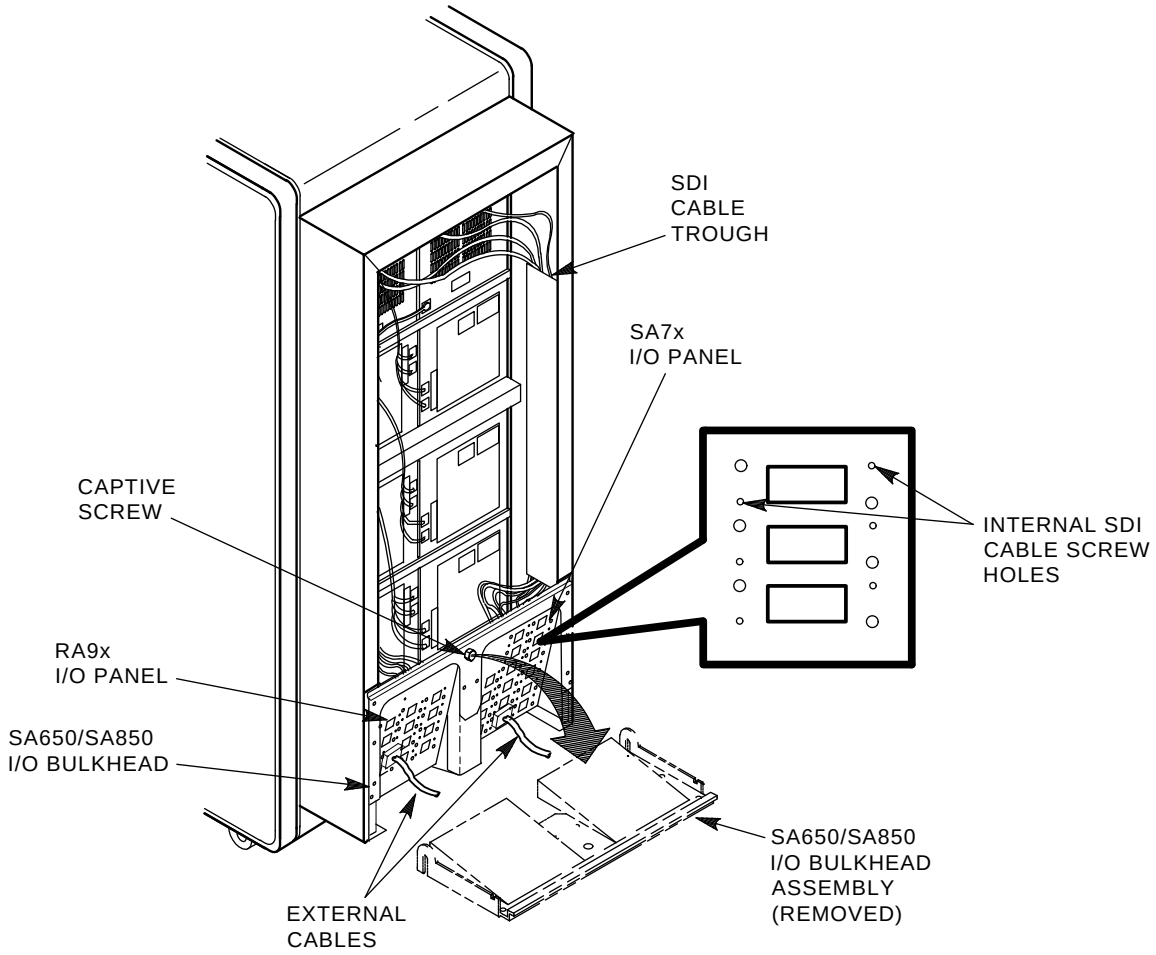
1. Remove the cabinet rear panel. (See Section 4.1.2.)
2. Record both the external and internal SDI cables connections.
3. Disconnect all external SDI cables from the rear of the bulkhead.
4. Unfasten the captive screw in the center of the bulkhead. Rotate the bulkhead out and down from the unit.
5. Remove the bulkhead by lifting it straight up until the bottom slots clear the pins in the I/O frame.
6. Disconnect the internal SDI cables.

Use the following procedure to replace the I/O bulkhead:

1. Connect the internal SDI cables.

2. Place the bottom slots of the bulkhead over the pins in the frame and rotate the bulkhead upward.
3. Fasten the captive screw in the center of the bulkhead to secure it to the cabinet frame.
4. Connect all external SDI cables.
5. Replace the cabinet rear panel. (See Section 4.1.2.)

Figure 4–3 Removing the I/O Bulkhead



4.1.4 Replacing the Power Controller

Use the following procedure to remove the power controller located in the bottom of the H9646 cabinet behind the I/O bulkhead:

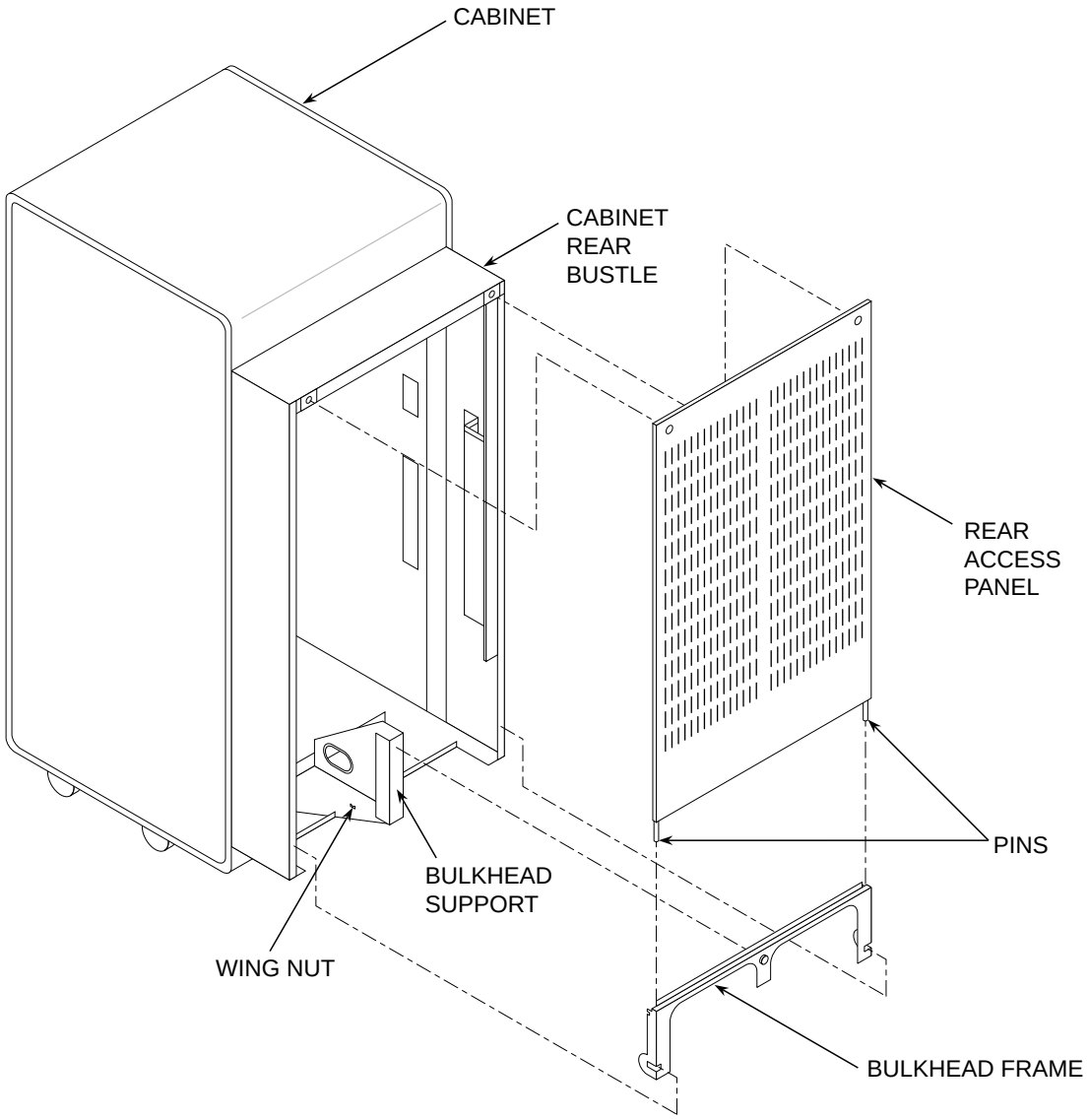
1. Take all storage devices in the cabinet off line and spin them down.
2. Remove the cabinet rear panel.
3. Set the power on/off switch on all storage devices to the off position.
4. Set the power controller Bus/Off/On switch to the off (center) position.
5. Set the power controller circuit breaker (CB1) to the off (down) position.
6. Unplug the power cord from the power source.
7. Remove the I/O bulkhead **without** disconnecting the SDI cables.

   Unfasten the captive screw in the center of the bulkhead and rotate the bulkhead out and down from the unit. (Refer to Figure 4–3.)
8. Lift the bulkhead straight up until the bottom slots clear the pins in the I/O frame.
9. The bulkhead support, shown in Figure 4–4, is secured by one wing nut on each side. Remove these wing nuts and lift the bulkhead support out of the cabinet. **Keep the wing nuts in a safe place.**
10. Remove the two screws on each side that secure the power controller to the cabinet frame as shown in Figure 4–6. **Keep the screws in a safe place.**
11. Slide the power controller forward until you can reach the power cords connected to the left side, shown in Figure 4–5.
12. Record the power cord connections.
13. Disconnect all power cords from the power controller.
14. Pull the power controller's external power cord up through the hole in the base of the cabinet bustle.
15. Lift the power controller up and out of the cabinet.

Refer to Figures 4–4 and 4–6 and use the following procedure to install a power controller:

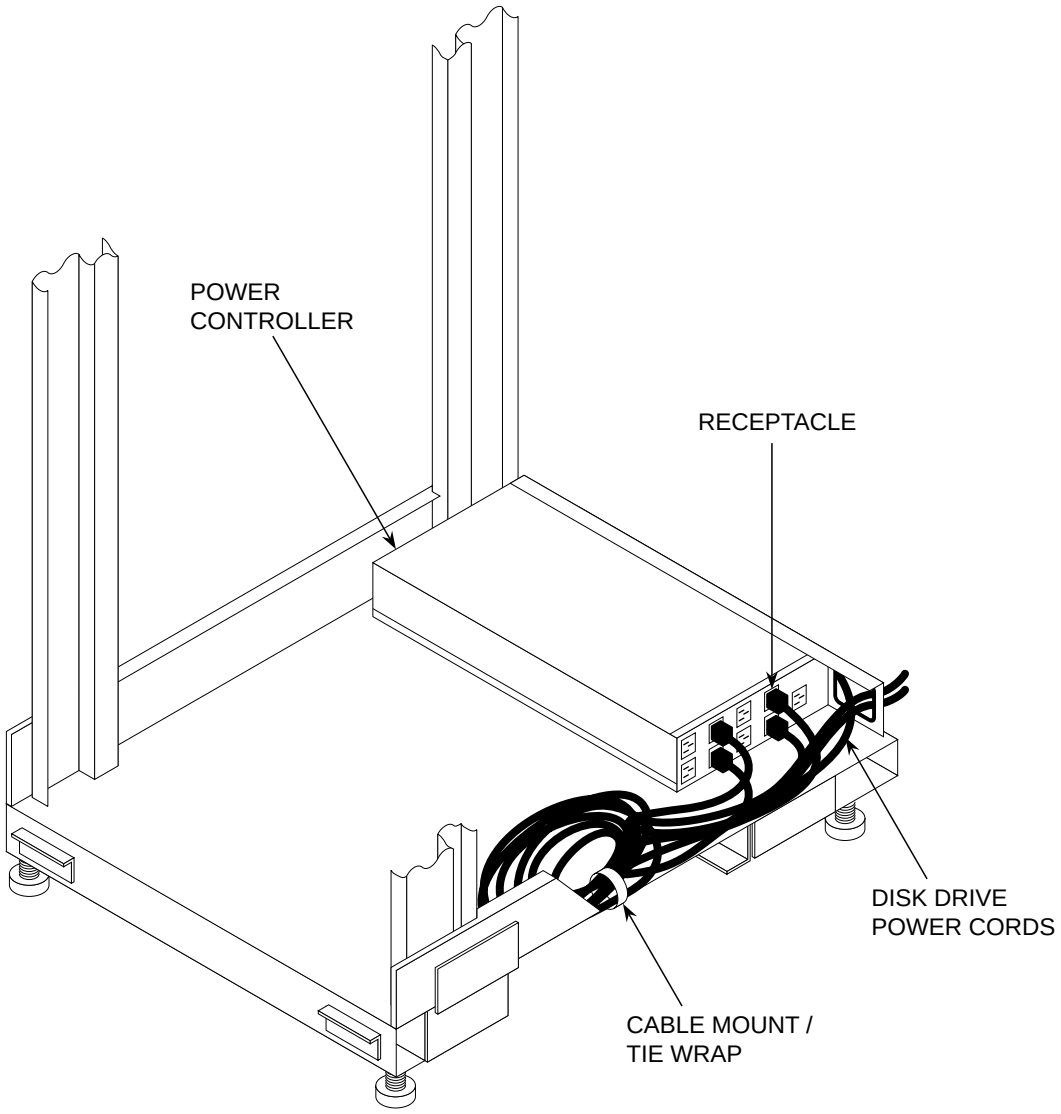
1. Lift the power controller into the cavity at the base of the cabinet.
2. Route the external power cord through the hole in the cabinet bustle base.
3. Position the power controller so that the mounting screw holes align with the frame rail mounting holes.
4. Install the screws to connect the power controller to the frame, as shown in Figure 4–6.
5. Replace the bulkhead support and install one wing number on each side. (Refer to Figure 4–4.)

Figure 4–4 I/O Bulkhead Support



6. Place the bottom slots of the I/O bulkhead over the pins in the frame and rotate it upward.
7. Fasten the captive screw in the center of the bulkhead to secure it to the cabinet frame.
8. Connect the storage device power cords to the **same receptacles** on the controller. This is necessary to ensure that phase balance is maintained. (Refer to Figure 4–5.)
9. Connect the power controller power cord to the power source.

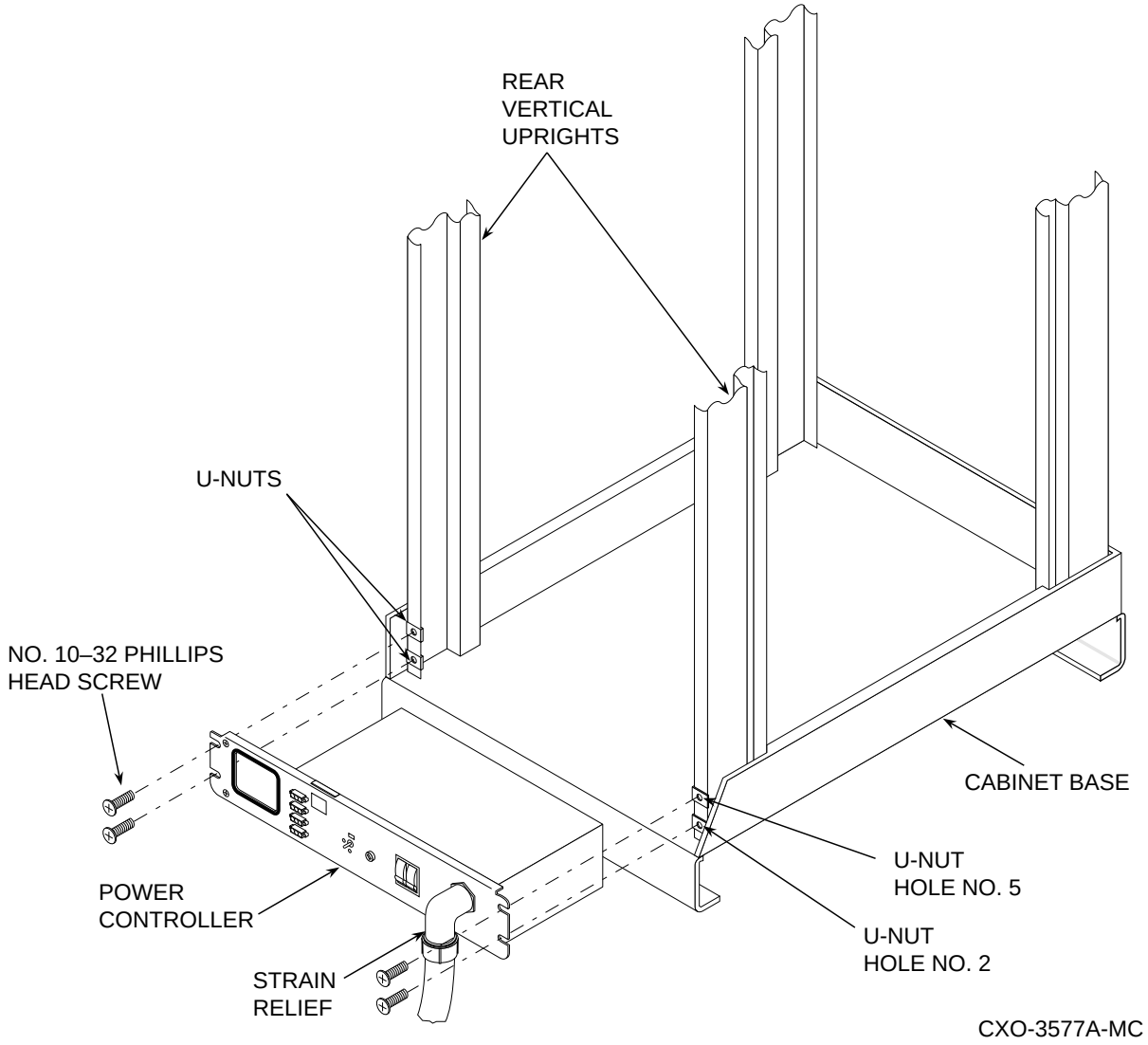
Figure 4–5 Power Controller Power Cord Connections



COM-0119

10. Set the power controller circuit breaker (CB1) to the on (up) position.
11. Set the Bus/Off/On switch on the power controller to the on (bottom) position.
12. Turn on all storage devices and place them on line.
13. Check out each storage device for proper operation as described in the user guide or service manual.
14. Replace the cabinet rear panel. (See Section 4.1.2.)

Figure 4–6 H9646 Cabinet Power Controller



4.2 H9A00 Replacement Procedures

The only replaceable H9A00 storage array cabinet component is the power controller. Replacing this unit requires you to open the front panel and remove the rear panel.

4.2.1 H9A00 Panels

The H9A00 cabinet front panel is hinged like a door. Use the key to unlock the panel and swing it open. When you are done servicing the unit, close the front panel and lock it.

The main circuit breaker and other controls are located inside the H9A00 cabinet rear panel. See Figure 4–7 and use the following procedure to remove the H9A00 rear panel:

1. Unlock the two quarter-turn fasteners at the top of the panel. Use a hex wrench to turn the fasteners counterclockwise.
2. Grasp the panel by its edges, tilt it toward you, and lift it up to disengage the pins at the bottom. Remove and store the panel in a safe place.

To replace the H9A00 rear panel:

1. Lift the panel into place, and fit the pins into the holes located at the top of the filler panel.
2. Push the top of the panel into place, and turn the fasteners one-quarter turn clockwise to lock.

4.2.2 Replacing the Power Controller

Use the following procedure to remove the power controller from the H9A00 cabinet.

WARNING

To prevent injury when lifting an object weighing more than 18.2 kgs (40 lbs.), use at least two people to remove and install enclosures.

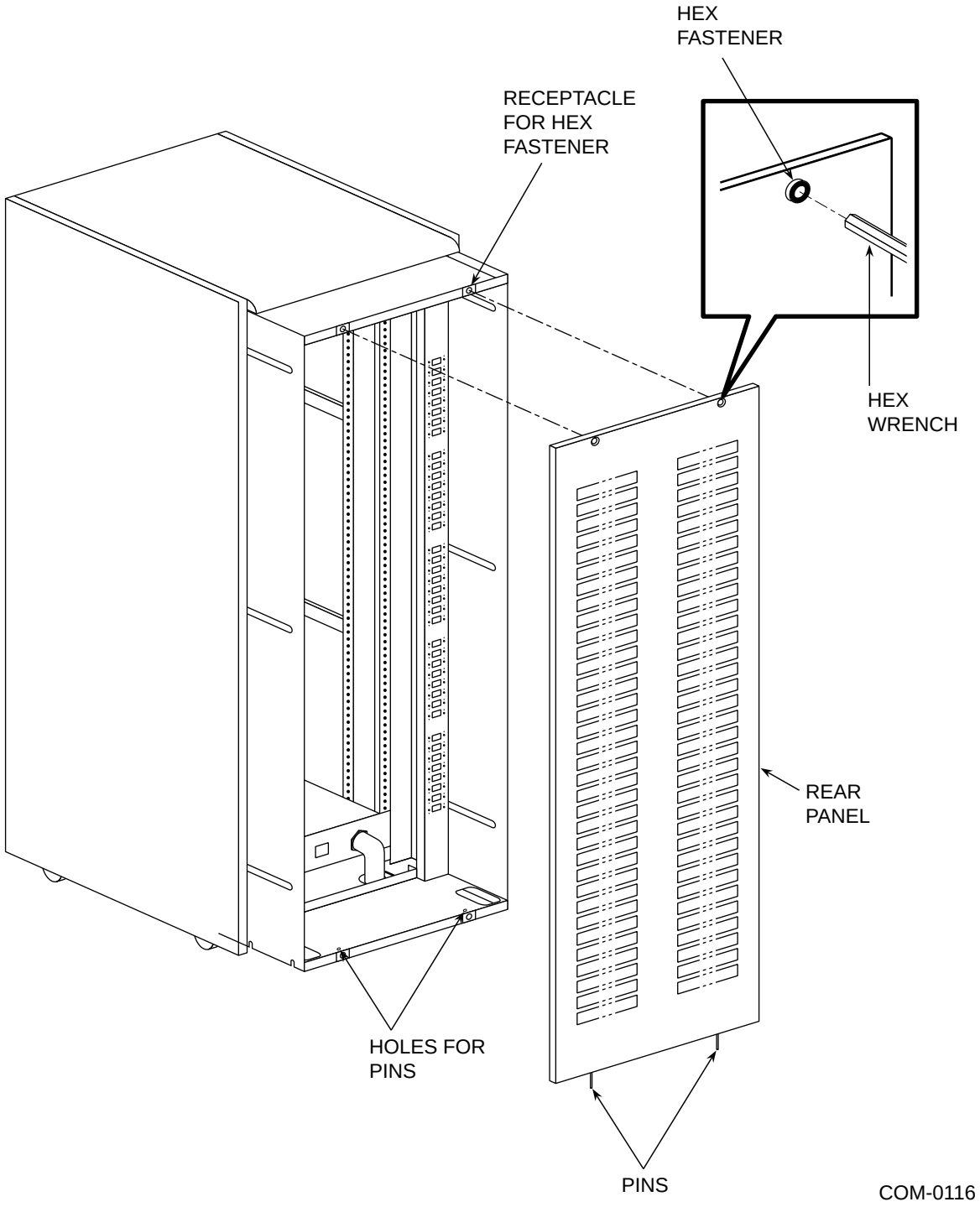
1. Take all storage devices in the cabinet off line and spin them down.
2. Remove the cabinet rear panel.
3. Set the power on/off switch on all storage devices to the off position.
4. Set the Bus/Off/On switch on the power controller to the off (center) position.
5. Set the power controller circuit breaker (CB1) to the off (down) position.
6. Unplug the power cord from the power source.
7. Remove the four screws that secure the power controller to the cabinet frame. (Refer to Figure 4–6.) **Keep these screws in a safe place.**

Note

Proceed to Step 12 if there are no enclosures installed in either of the bottom positions.

8. Disconnect the power cords from the bottom enclosures. Disconnect and remove the enclosure internal SDI cables.
9. Open and remove the cabinet front door.
10. Remove the mounting screws from the front of the enclosure. **Keep these screws in a safe place.**
11. Slide each of the bottom enclosures to the front and remove them from the cabinet.
12. Cut the cable tie that secures the coiled power cords to the base of the cabinet.

Figure 4–7 H9A00 Rear Panel Installation



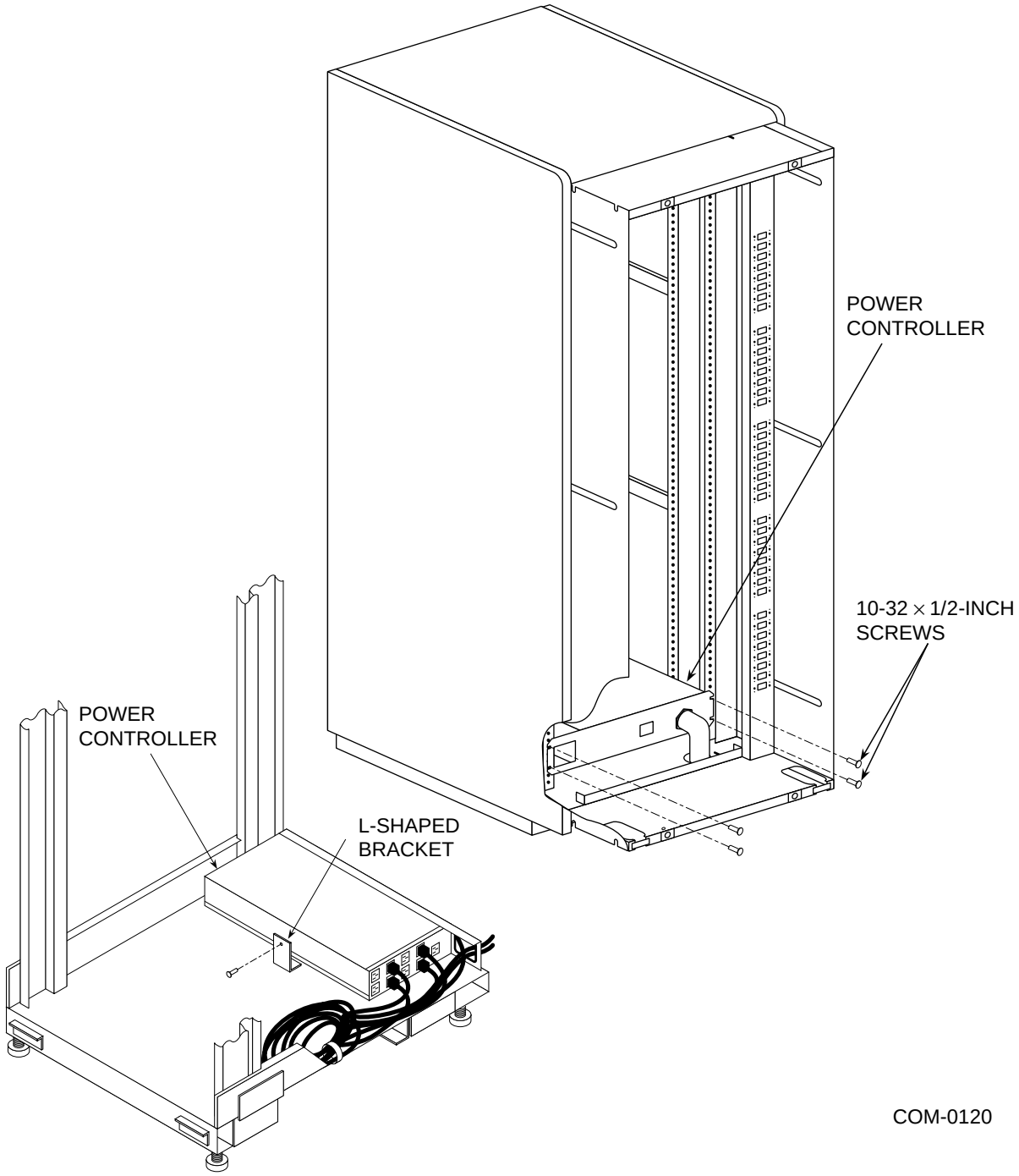
13. Slide the power controller out the rear of the cabinet.
14. Record the positions of the power cord connections.

15. Disconnect all power cords from the power controller and pull them through the opening in the power controller.
16. Remove the kepnut that secures the grommet bracket around the power cable. Remove the grommet bracket. **Keep the kepnut and the bracket in a safe place.**
17. Pull the external power cable up through the hole in the base of the cabinet bustle.
18. Lift the power controller up and out of the cabinet.
19. Remove the L-shaped bracket from the power controller by removing the allen screw that attaches it to the controller. **Keep the bracket and screw in a safe place.**

Use the following procedure to replace the power controller:

1. Install the L-shaped mounting bracket on the power controller. (Refer to Figure 4–8.)
2. Lift the power controller into the cavity at the base of the cabinet.
3. Position the controller so that you can connect the power cords on the left side of the controller.
4. Route the external power cord through the hole in the cabinet bustle base. Install the grommet bracket and secure it with the kepnut.
5. Position the power controller so that the mounting screw holes are aligned.
6. Install the four screws to connect the power controller to the frame. (Refer to Figure 4–6.)
7. Pass the power cords through the opening in the power controller and connect the storage device power cords to the **same receptacles** on the controller. This is necessary to ensure phase balance is maintained. (Refer to Figure 4–8.)
8. Coil excess power cord towards the front of the cabinet. Secure the cables with a cable tie, then connect the cable tie to the cable tie mount in the base.
9. Reinstall any enclosures that were removed, secure them with the mounting screws, and connect the internal SDI cables and the power cords.
10. Connect the power controller power cord to the power source.
11. Set the power controller circuit breaker (CB1) to the on (up) position.
12. Set the Bus/Off/On switch on the power controller to the on (bottom) position.
13. Turn on all storage devices and place them on line.
14. Check out each storage device for proper operation as described in the user guide or service manual.
15. Lift the rear panel into place and fit the pins into the holes located at the top of the filler panel.
16. Push the top of the panel into place and turn the fasteners one-quarter turn clockwise to lock.

Figure 4–8 H9A00 Power Controller



5

Storage Array Add-Ons and Upgrades

This chapter explains how to install add-on storage devices [1] and upgrade storage arrays.

"Add-ons" are storage devices installed in an existing storage array without changing its basic configuration. For example, you can add two RA90 disk drives to the SA600–FA storage array, creating an SA600–HA storage array, without moving existing storage devices or cables.

"Upgrading" a storage array involves changing the configuration by installing enclosures in a storage array that previously had no enclosures. For example, you can add SA7x enclosures to an SA600 storage array, creating an SA650. During this procedure, storage devices already installed may have to be moved and the SDI cables and power cords rerouted.

Add-ons can include one or more of the following devices:

- RA9x disk drives
- SA7x enclosures
- ESE50 solid state disk drive
- TA8x7 tape storage subsystem

The term "storage devices" is the collective name for all of these devices.

Specifically, this chapter explains how to perform the following:

- Unpack storage devices upon delivery and pack them for shipment or storage.
- Use a Digital-approved lifting device to install enclosures and large disk drives.
- Install RA9x disk drives in the SA600/SA800, SA650/SA850, and SA900 storage arrays.
- Install ESE50 solid state disk drives in the SA900 storage array.
- Install SA7x enclosures in the SA550, SA650, SA850, and SA900 storage arrays.
- Install TA8x7 storage subsystems in SA900 storage arrays.
- Upgrade an SA600 or SA800 storage array to an SA650 or SA850 storage array.

[1] Instructions for installing RA82 disk drives are contained in the *SA482 Storage Array User Guide*.

5.1 Required Tools

Installation and upgrade procedures require the following tools:

- #1 Phillips screwdriver
- #2 Phillips screwdriver
- 1/8-inch hex wrench
- 5/32-inch hex wrench
- 1/4-inch flat-bladed screwdriver
- Torque screwdriver, 3.63–4.54 kgs (8–10 lb) range.

5.2 Installation Precautions

Observe the following safety precautions when installing storage devices and enclosures in storage arrays:

WARNING

Hazardous voltages are present inside the storage array cabinet and installed components. You must be a qualified Digital Multivendor Services engineer to install storage arrays or storage devices. Otherwise, you may injure yourself or others and you may damage the equipment.

When you install a new component, for maximum safety, use the following procedure for disconnecting and connecting the power source:

- Turn off the power control on all components in the cabinet.
- Turn off the power controller and disconnect it from the outlet.
- Turn off site power at the main circuit breaker.
- Place a tag-out tag on the circuit breaker.
- When you have finished with the installation, turn on site power at the main circuit breaker.
- Remove the tag-out tag on the circuit breaker.
- Connect the power controller power cord to the outlet and turn it on.
- Turn on all components in the cabinet.

Complete safety and tag-out procedures are presented in the Digital safety courses listed in the preface of this document.

WARNING

Some storage arrays require the use of a cabinet stabilizer foot to prevent the storage array cabinet from becoming unstable when installing a storage device. Failure to extend the cabinet stabilizer foot before lifting the device into the cabinet may cause personal injury and damage to the equipment. The cabinet stabilizer foot is shown in Figure 5–1.

CAUTION

Do not attempt to install a storage device or storage array unless you have received training in electrostatic discharge (ESD) procedures and have taken proper precautions against ESD. Wear an ESD grounding strap properly connected to a known ground. An ESD strap is shipped with each H9646 cabinet. Two ESD bolts for connecting grounding straps are located in each H9A00 cabinet; one each in the second hole from the top in both the front and rear right-hand mounting rail.

CAUTION

Storage devices must be environmentally stabilized in their protective barrier bags at the site before operation. Failure to environmentally stabilize the equipment may result in damage to the drive media or electronic components. For more information about environmental stabilization, see Appendix A.

5.3 Unpacking and Packing Equipment

This section explains how to unpack storage devices at the customer's site and how to pack equipment for shipment or storage. Figure 5–2 shows how the RA9x disk drive is packed for shipment.

5.3.1 Unpacking Storage Devices

Complete the following procedure when unpacking equipment:

1. Check packaging for external damage.
2. Read and save any packing information.
3. Keep all receipts in case of damage or problems with the equipment.

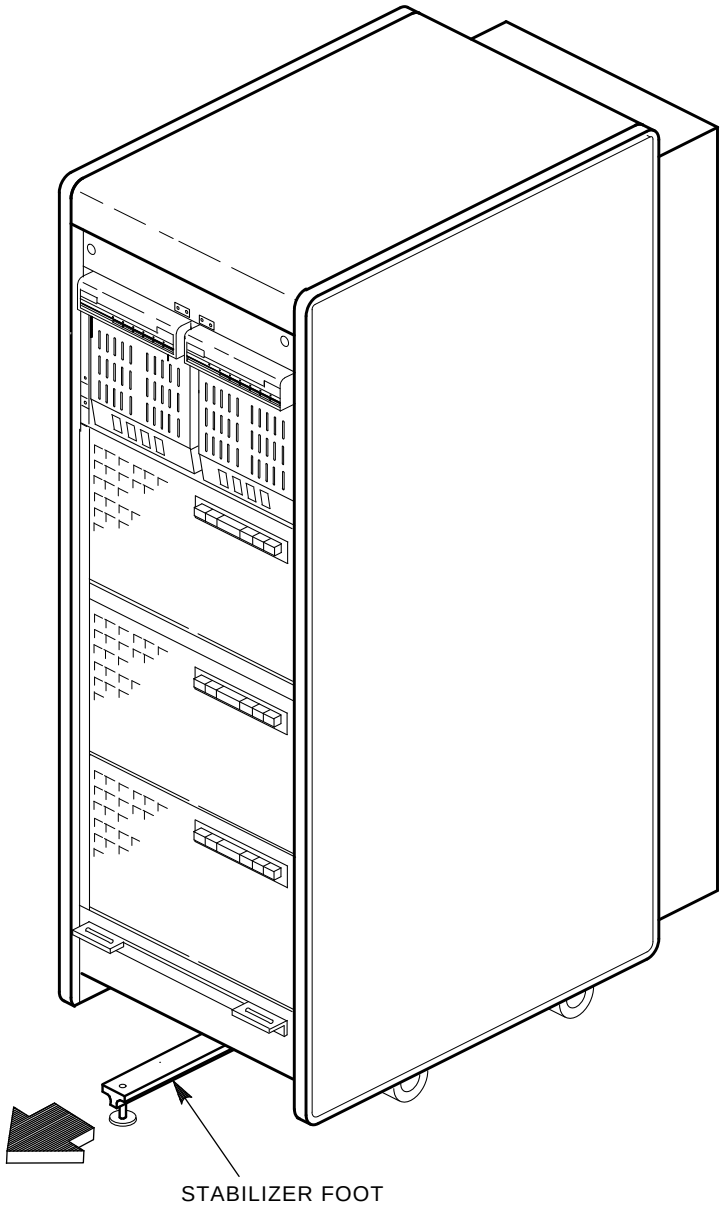
Unpack the storage device using the following procedure:

1. Remove the shipping straps.
2. Open the container.
3. Remove and save the packing material.

WARNING

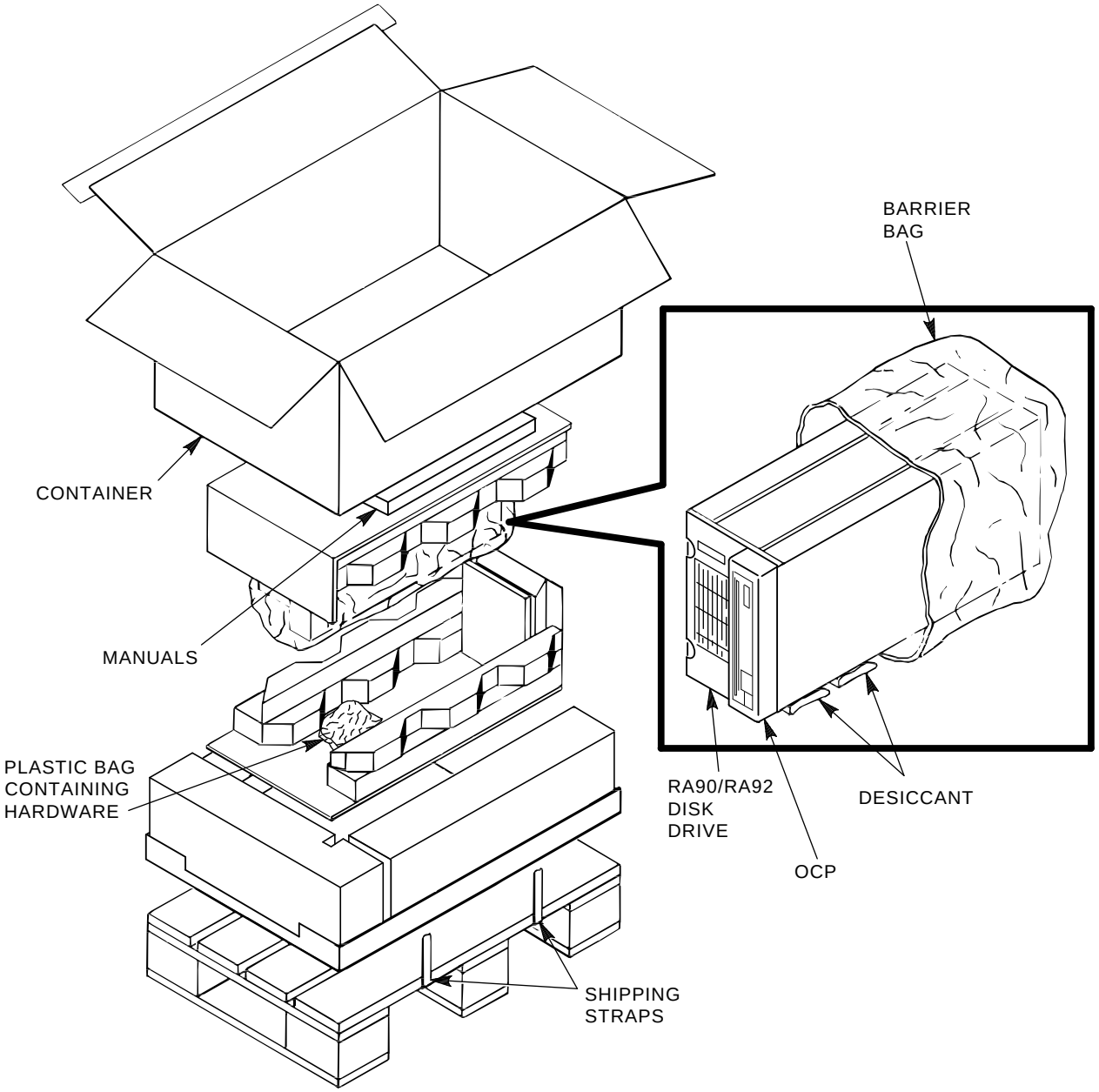
Do not use the cardboard handles to lift the storage device from the shipping container. You may injure yourself or others or damage the equipment. A disk drive can weigh as much as 31.8 kilograms (70 pounds) and a fully populated enclosure can weigh 40 kilograms (88 pounds). To prevent injury when lifting an object weighing more than 18.2 kgs (40 lbs), use at least two people or a Digital-approved lifting device.

Figure 5–1 Extending the Cabinet Stabilizer Foot



4. Lift the unit from the shipping container.
5. Locate the installation hardware bag packed with the storage device and set it aside.
6. Environmentally stabilize the storage device using the standards in Appendix A.
7. Cut and remove the protective barrier bag from the storage device.

Figure 5–2 RA9x Disk Drive Packaging



5.3.2 Packing Storage Devices

Use the original shipping containers to pack storage devices for shipment or storage. Each piece of equipment must be sealed in a barrier bag with the number of desiccant bags as follows:

RA9x HDA	1 bag
RA7x HDA	1 bag
RA9x disk drive	2 bags
SA7x enclosure	2 bags
H9646 cabinet	15 bags
H9A00 cabinet	15 bags

Use the following procedure to pack equipment:

Note

HDAs must be *first* enclosed in a polyethylene cushioned bag.

1. Insert equipment into the moisture barrier bag.
2. Insert the required quantity of desiccant into the moisture barrier bag.
3. Fold the moisture barrier bag and seal it with tape.
4. Pack the equipment as it was originally shipped.

5.4 Using a Digital-Approved Lifting Device

WARNING

To prevent injury, always use either a Digital-approved lifting device or two people when lifting an object weighing more than 18.2 kgs (40 lbs).

The procedure for using a Digital-approved lifting device to lift a storage device is as follows:

1. Place the lifting device in an upright position with the lift platform facing away from the operator.
2. Make sure sufficient open space for extending the lift platform.
3. Support the top of the lifting device with one hand. With the other hand, raise the lift platform holding latch from the cross bar to release it.
4. Lower the lift platform to its service position.
5. Check the hinges at the base of the lift platform to make sure they are fully extended and locked.
6. Release the safety strap and move it off to one side so it will not become tangled.
7. Move the lifting device to the storage device and center the lift platform under the unit.
8. Slide the storage device to the back of the lift platform.

9. Secure the safety strap around the storage device.
10. Lower the lift platform to no more than 12 inches off the floor.
11. Transport the storage device to the cabinet.
12. Crank the lift platform up to the storage device installation level in front of the cabinet.

Note

Make sure that the storage device will clear the internal SDI cables and power cords when it is inserted in the cabinet.

13. Remove the safety strap from the storage device and slide it into the cabinet, ensuring that it is securely seated on the cabinet guide rails.
14. Move the lifting device away from the cabinet. The cabinet guide rails will support the weight of the storage device.

5.5 Installing an RA9x Disk Drive in SA600, SA650, SA800, and SA850 Storage Arrays

All mounting hardware, internal SDI cables, and power cords are factory installed for RA9x disk drive in SA600, SA650, SA800, and SA850 storage arrays. After installing the disk drive, you are required only to connect the SDI cables and power cords.

Note

Unless specifically noted otherwise, the RA9x installation procedures are the same for the SA600, SA650, SA800, and SA850 storage arrays.

Section 5.5.1 is only applicable to SA600 storage arrays.

The procedures starting in Section 5.5.2 apply to all storage arrays.

5.5.1 Removing the SA600 Stabilizer Plates

SA600 storage arrays shipped with a single drive (that is, SA600–CA and SA600–CD) have stabilizer plates installed to make sure cabinet stability. As shown in Figure 5–3, the two 11.4 kilogram (25 pound) iron stabilizer plates (weights) are installed in position 1. You must remove these stabilizer plates before installing a disk drive in position 1. **Do not remove the stabilizer plates until you are ready to install a storage device in position 1.**

Use the following procedure to remove the stabilizer plates shown in Figure 5–3:

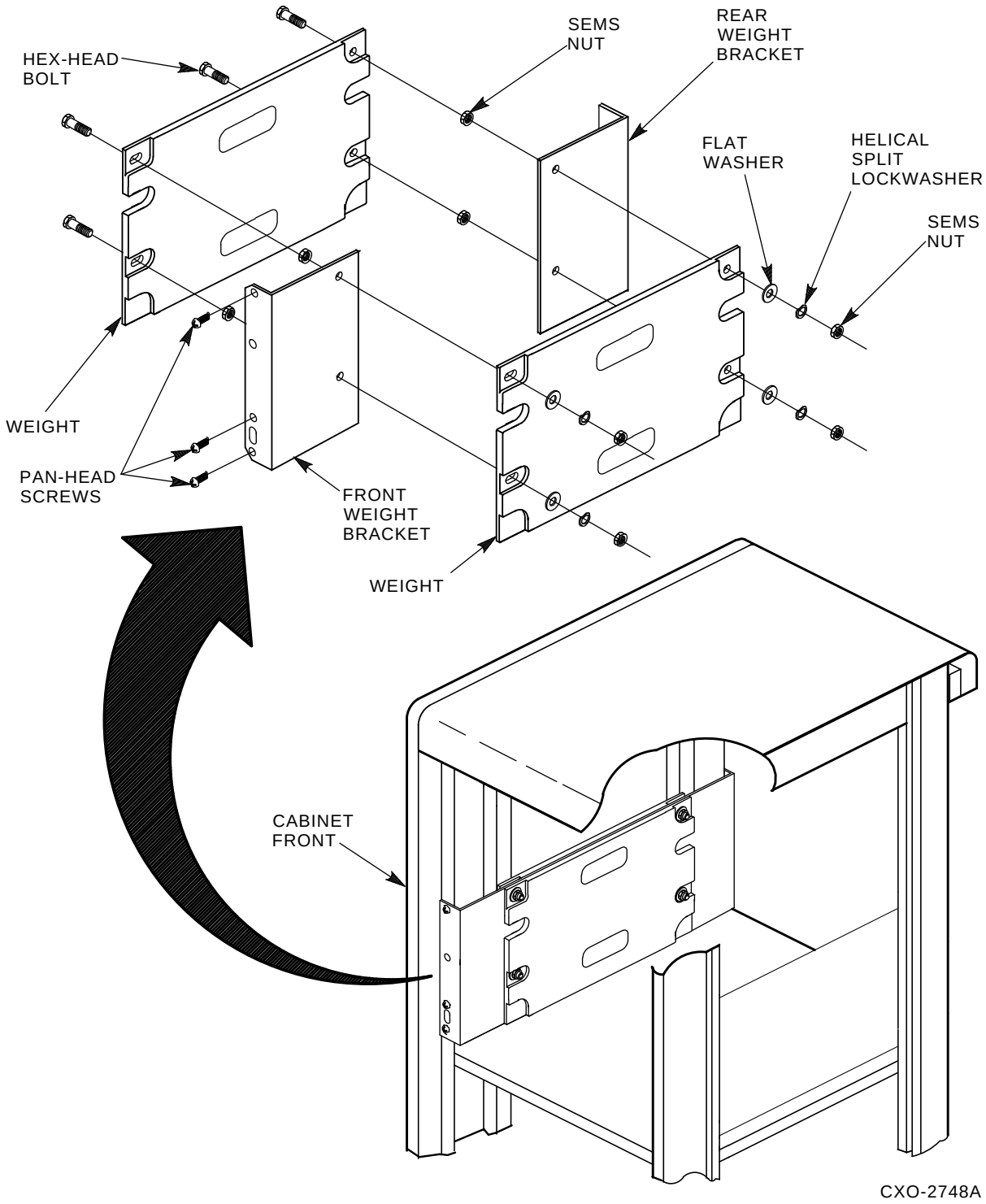
WARNING

Wear proper safety shoes during this procedure. Otherwise, you may injure yourself.

1. Remove the front and rear cabinet panels. (Refer to Sections 4.1.1 and 4.1.2.)
2. Remove the four 1/4-inch nuts, helical split lock washers, and flat washers that secure the first weight.

3. Carefully remove the first weight.
4. Remove the three Phillips pan-head screws from the rear weight bracket.
5. Remove the three Phillips pan-head screws from the front weight bracket.
6. Carefully remove the second weight.

Figure 5–3 SA600 Stabilizer Plates



5.5.2 Preparing for Installation

The following procedure for installing RA9x disk drives is applicable to SA600, SA650, SA800, and SA850 storage arrays.

The RA9x add-on kit includes the following items:

- RA9x disk drive
- Hardware mounting kit
- Guide rail plate assembly
- Power cord
- Port identification labels

Use the following procedure to prepare for installing an RA9x disk drive:

1. To protect the operator control panel (OCP) during installation, remove it by gently pulling it straight out from the front of the disk drive, as shown in Figure 5–4. Put the OCP in a safe place while completing the remainder of the installation.
2. Figures 5–5 and 5–6 define the recommended sequence for adding storage devices to the cabinets. The number assigned to each cabinet location is the recommended sequence for adding units. Use these figures to determine the device cabinet position. The first SA7x enclosure is always mounted in the top left position (as viewed from the front) in an SA650 or SA850 storage array.
3. Remove the front and rear cabinet panels as described in Sections 4.1.1 and 4.1.2.
4. Take off the front panel bezel filler from the device cabinet position by removing the four U-clips from the back side of the front door that hold the bezel filler in place. The bezel filler will come free.
5. Connect the two chassis retaining brackets to the disk drive using the four short pan-head screws (8-32 x 1/4-inch) and washers as shown in Figure 5–7.

   Each hardware package contains four chassis retaining brackets:

   - Two for an H9646 storage array cabinet installation
   - Two for an H9A00 storage array installation

   Figure 5–7 shows the chassis retaining brackets used for this installation.
6. Remove the chassis stabilizer bracket shown in Figures 5–8, 5–9, and 5–10 from the cabinet by removing the two serrated hex-head bolts. Set these parts aside.

Figure 5–4 Removing the OCP

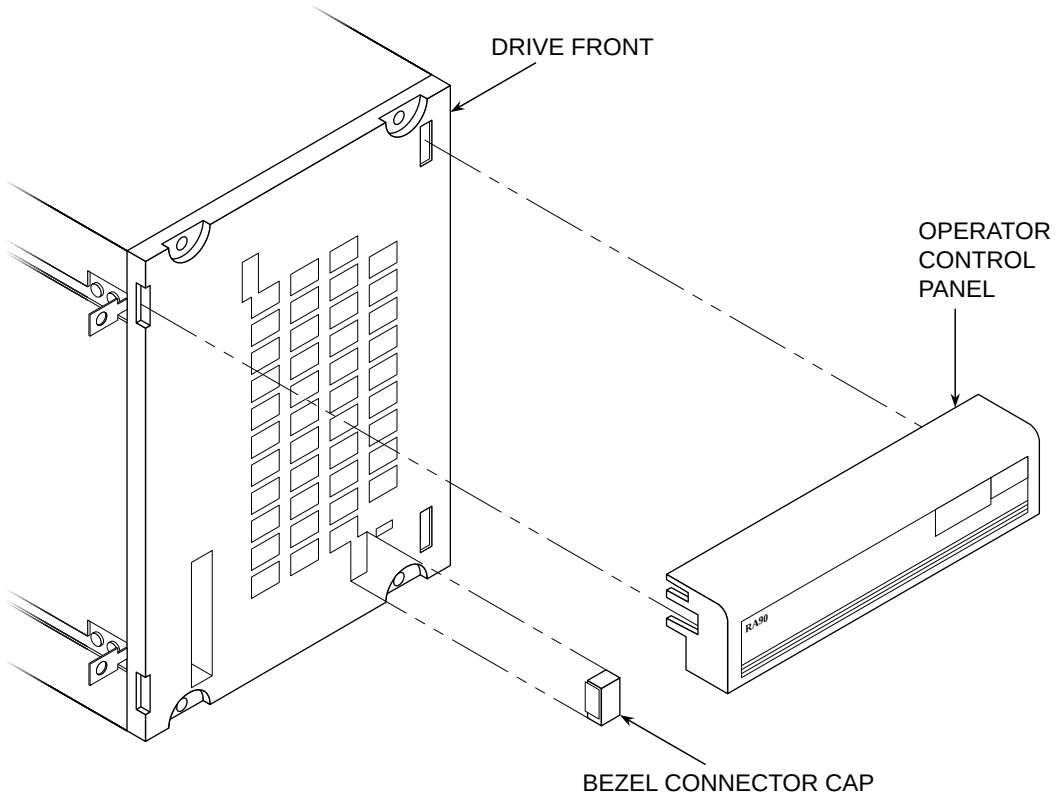


Figure 5–5 RA9x Add-On Sequence—SA600/SA800 Storage Array (Front View)

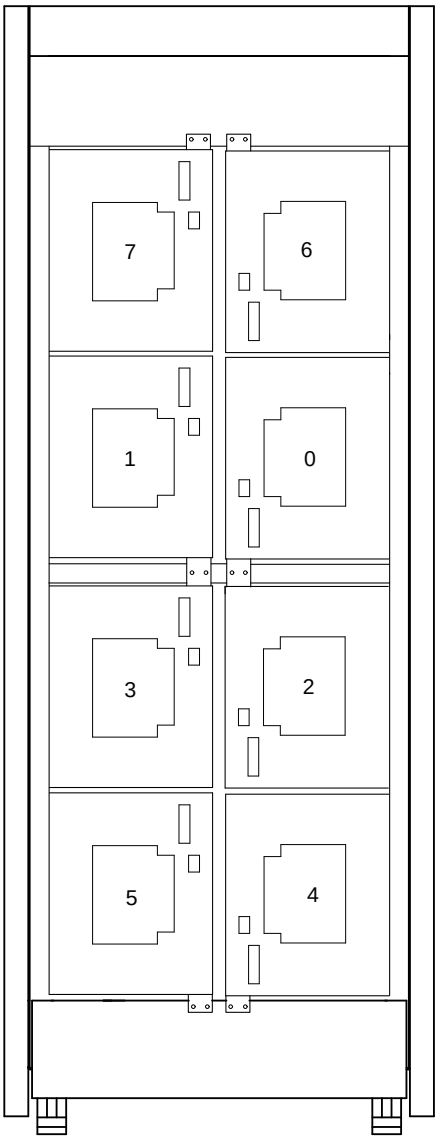


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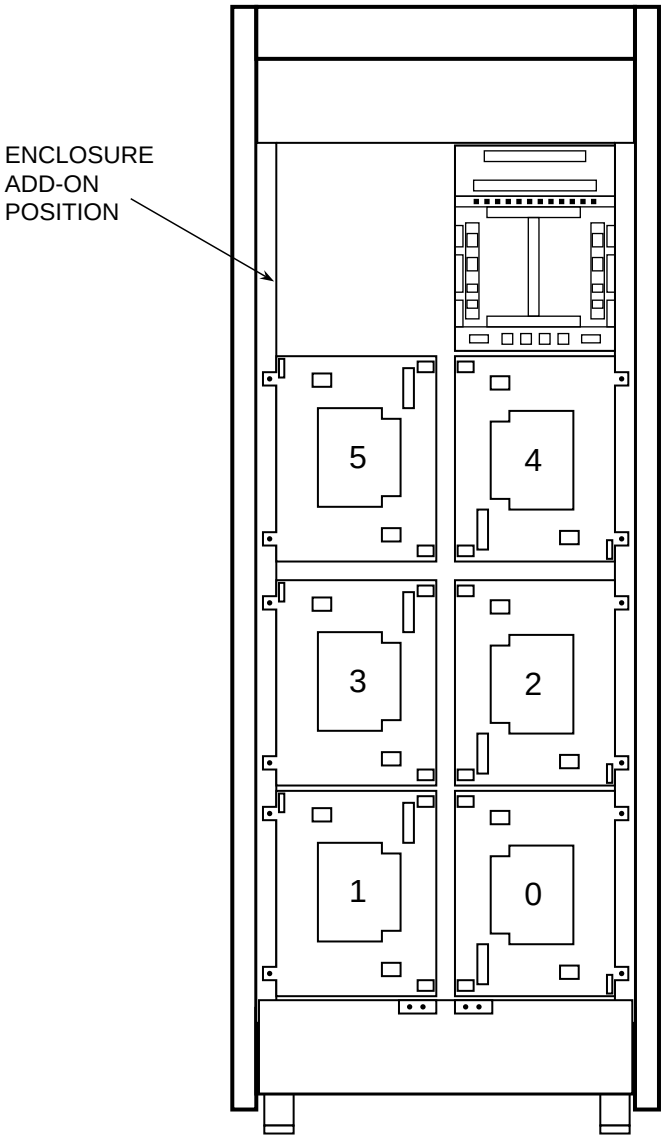
Figure 5–6 RA9x Add-on Sequence—SA650/SA850 (Front View)



COM-0102

Figure 5–7 SA6xx and SA8xx Chassis Retaining and Stabilizer Brackets

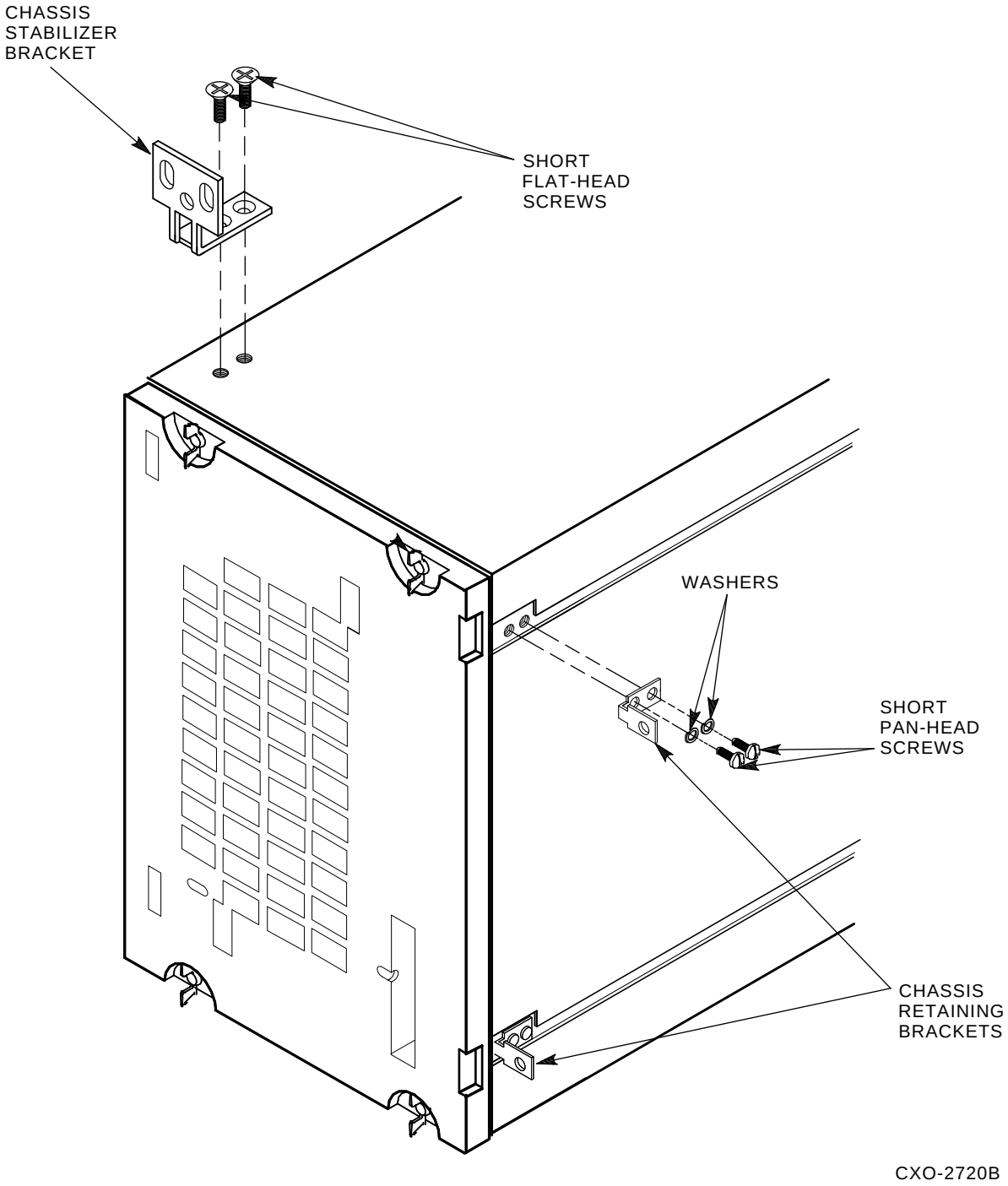


Figure 5–8 SA600/SA800 Chassis Stabilizer Brackets

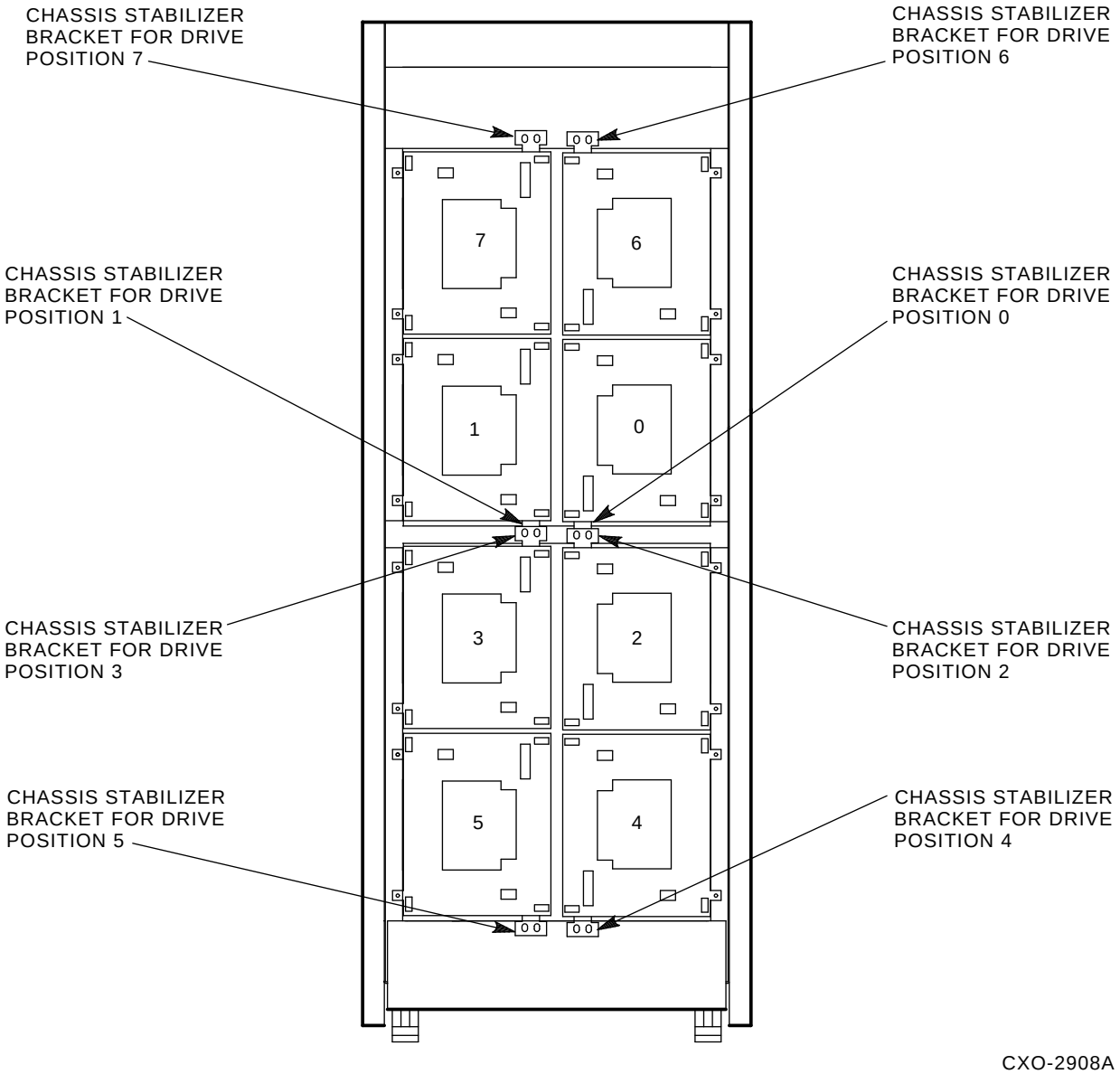


Figure 5–9 SA650/SA850 Chassis Stabilizer Brackets

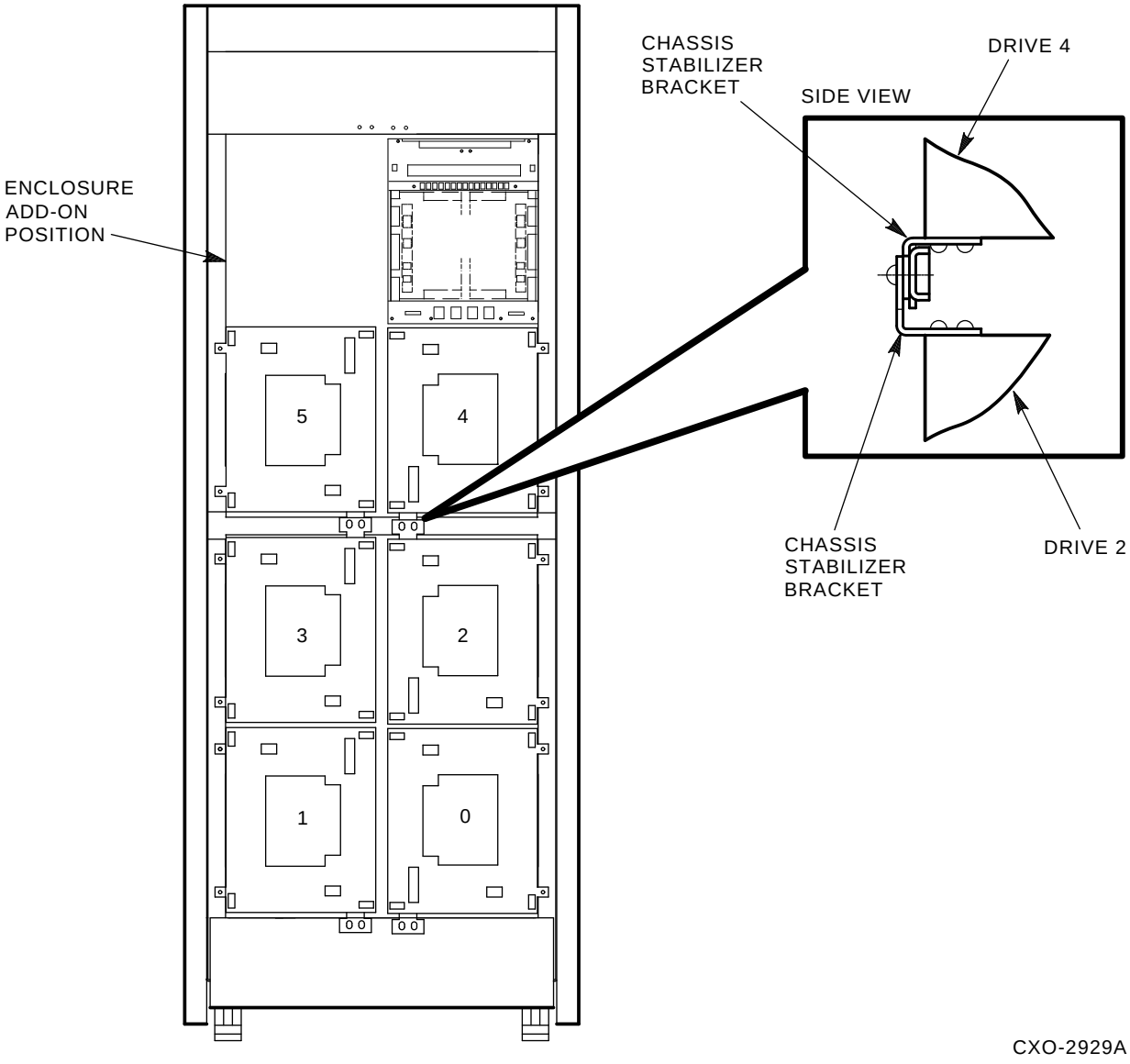
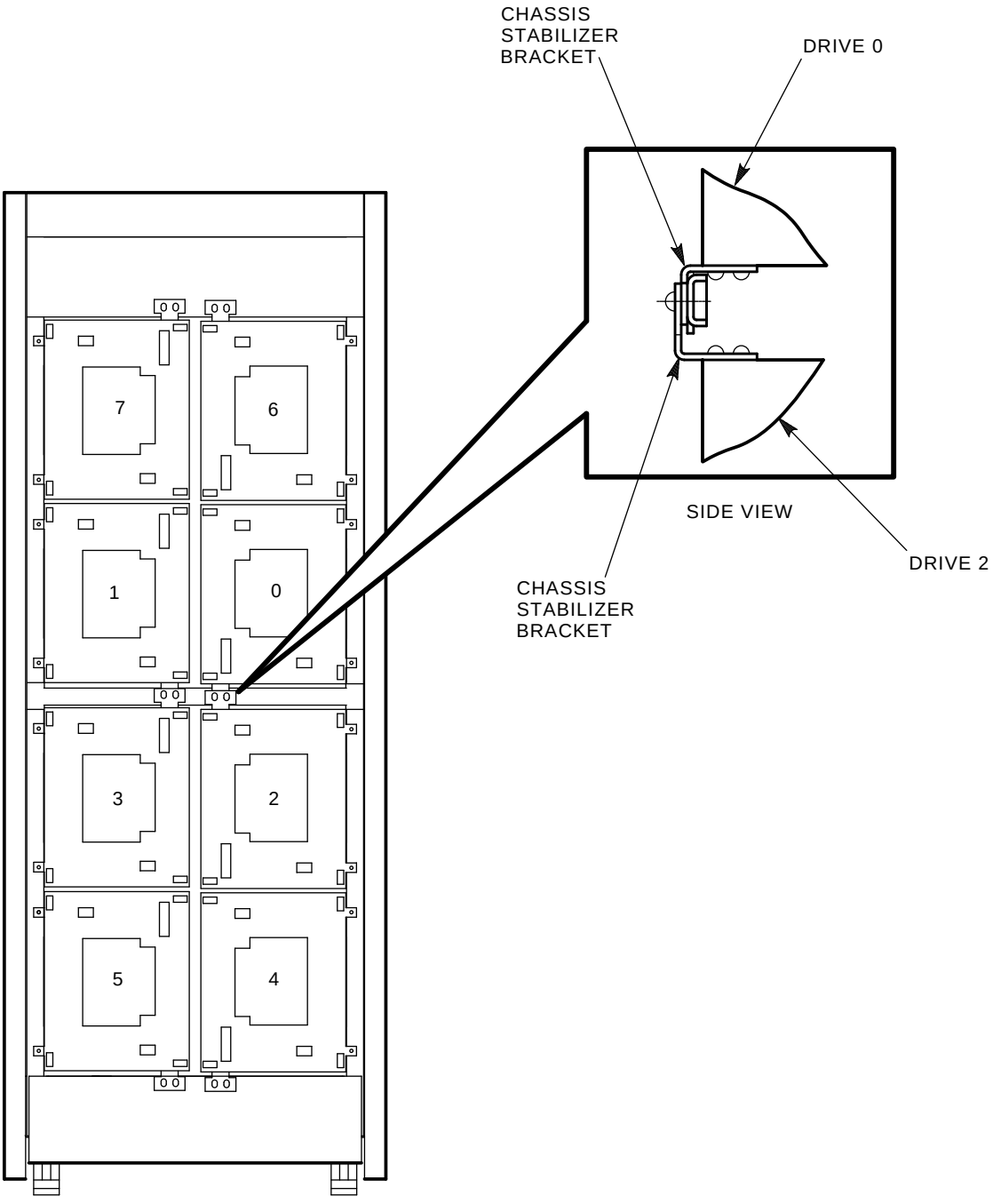


Figure 5–10 SA600/SA800 Chassis Stabilizer Brackets—Mounting



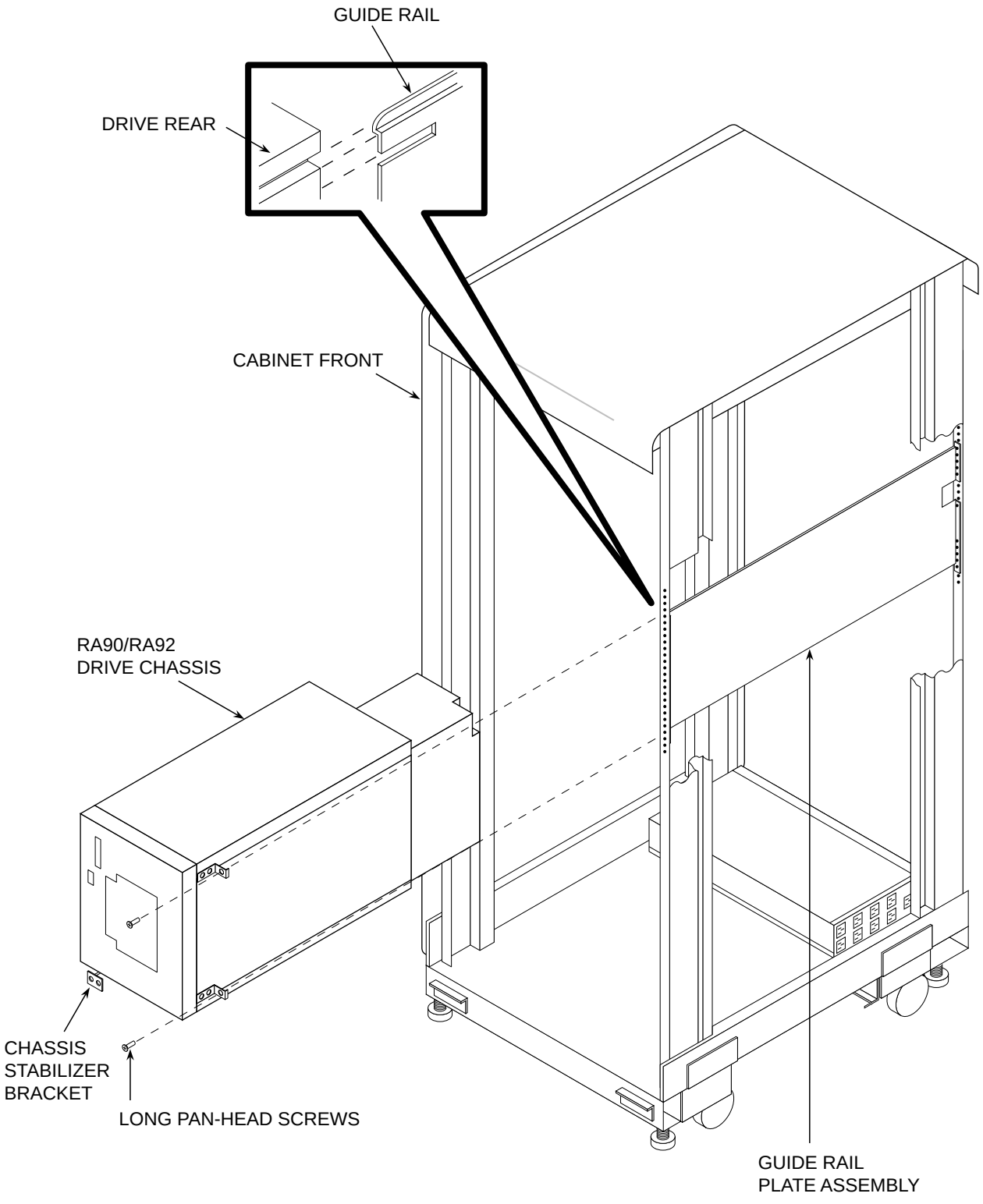
5.5.3 Installing the Disk Drive

Use the following procedure to install the disk drive in the storage array:

1. Lift the disk drive into position at the front of the cabinet with the aid of a Digital-approved lifting device as described in Section 5.4 or with two people. Turn the disk drive so its side grooves are facing toward the cabinet guide rails.
2. Seat the disk drive side grooves securely on the cabinet guide rails as shown in Figure 5–11, and slide the disk drive all the way back into the cabinet.
3. Remove the lifting device.
4. Connect the chassis stabilizer bracket to either the top or bottom of the disk drive (refer to Figures 5–9 or 5–10), using the two short, flat-head beveled screws (8-32 x 1/4-inch). (Refer to Figure 5–7.)
5. Connect the chassis retaining brackets on the side of the disk drive to the cabinet with the long pan-head screws (10-32 x 3/4-inch) that came with the disk drive as shown in Figure 5–11.
6. Reattach the chassis stabilizer bracket to the cabinet using the serrated hex-head bolts.
7. Replace the OCP at the top of the drive.

   If the bezel connector cap is in the way, remove it and replace the OCP. Then move the bezel connector cap to the bottom connector. (Refer to Figure 5–4.)

Figure 5–11 Installing an RA9x Disk Drive



5.5.4 Installing SDI Cables and Power Cords

The storage arrays are shipped with internal SDI cables and power cords for storage devices. You need only to connect the internal SDI cables, power cords, and external SDI cables. External SDI cables are ordered separately and shipped with the add-on. (Table 3–1 lists the external SDI cables.)

Use the following procedure to connect SDI cables and power cords:

1. On the rear of the RA9x disk drive, make sure that the Line Voltage Selector switch is in the proper position (120 Vac or 240 Vac), and that the RA9x drive circuit breaker is off.
2. Connect the SDI cables to the Port A and Port B connectors on the rear of the RA9x disk drive.
   - Figure 5–12 shows the cable connections for the SA600/SA800 storage array.
   - Figure 5–13 shows the cable connections for the SA650/SA850 storage array.
3. Connect the power cord to the rear of the RA9x disk drive.
4. Connect the power cord to power controller as shown in the following figures:
   - Figure 5–14 shows the power cord connections for the SA600/SA800 storage array.
   - Figure 5–15 shows the power cord connections for the SA650/SA850 storage array.
5. Connect the external SDI cables to the storage array, as shown in Figures 5–12 and 5–13.

   Be sure to tighten the captive screws when connecting the external cables to the bulkhead.

5.5.5 Completing the Installation

Complete the installation as follows:

1. Restore power to the cabinet as explained in Section 3.9.
2. Turn on all storage devices in the cabinet.
3. Spin up all drives and put them on line.
4. Check out all storage devices as described in the component user guide or service manual.
5. Replace the rear panel and front panel as described in Sections 4.1.1 and 4.1.2.

Figure 5–12 SA600/SA800 SDI Cabling

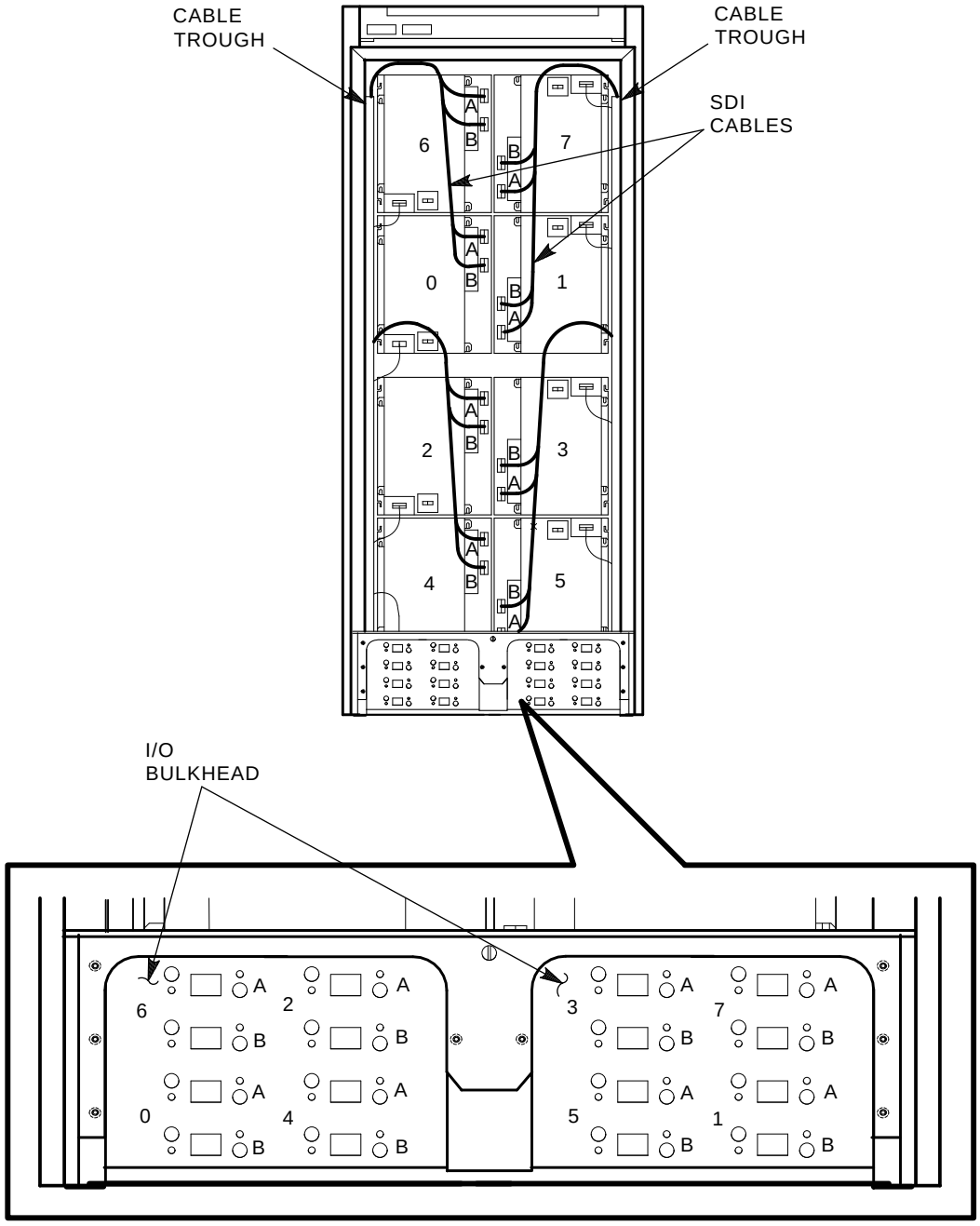


Figure 5–13 SA650/SA850 Cabling

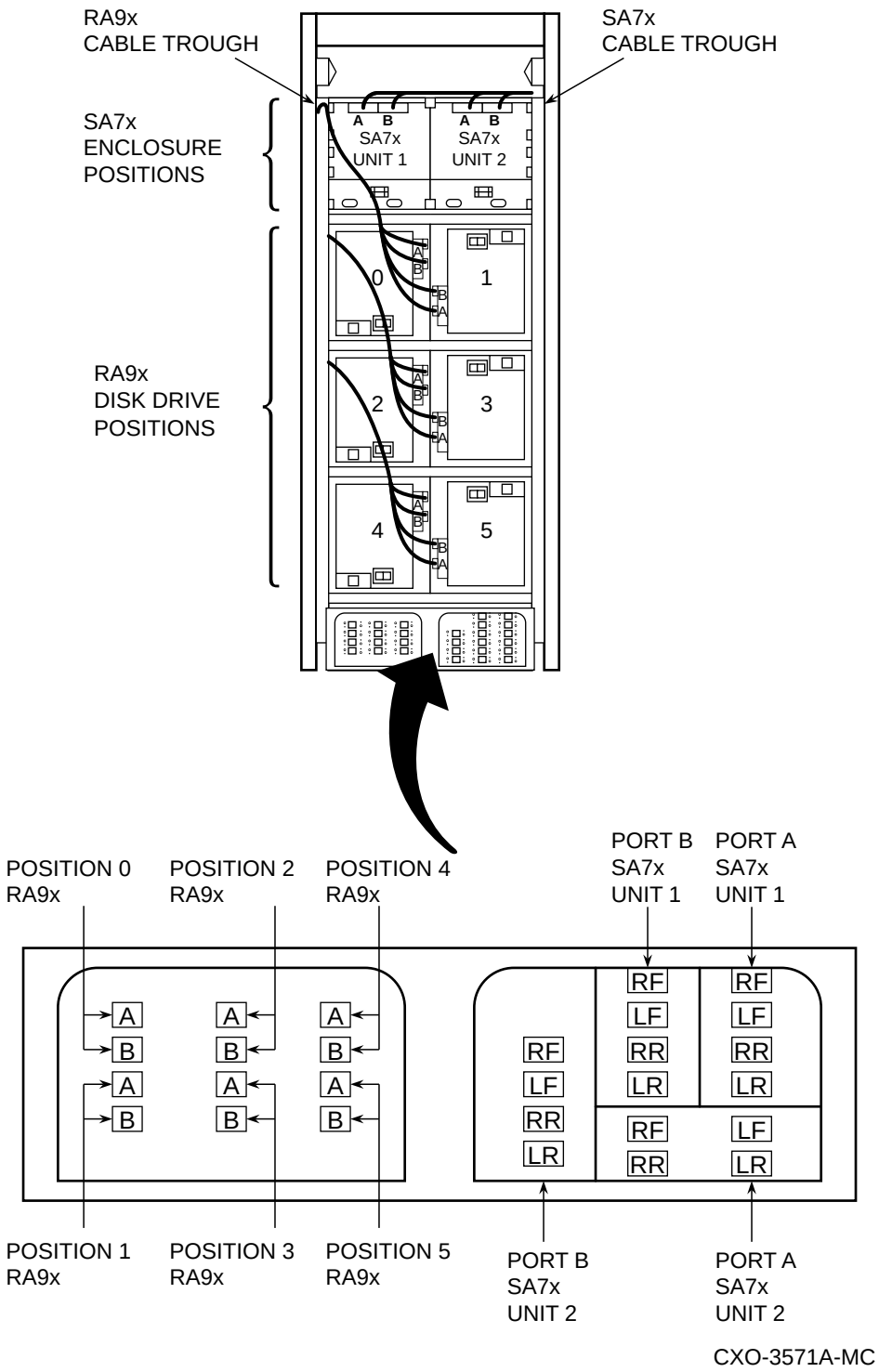


Figure 5–14 SA600/SA800 Power Cords

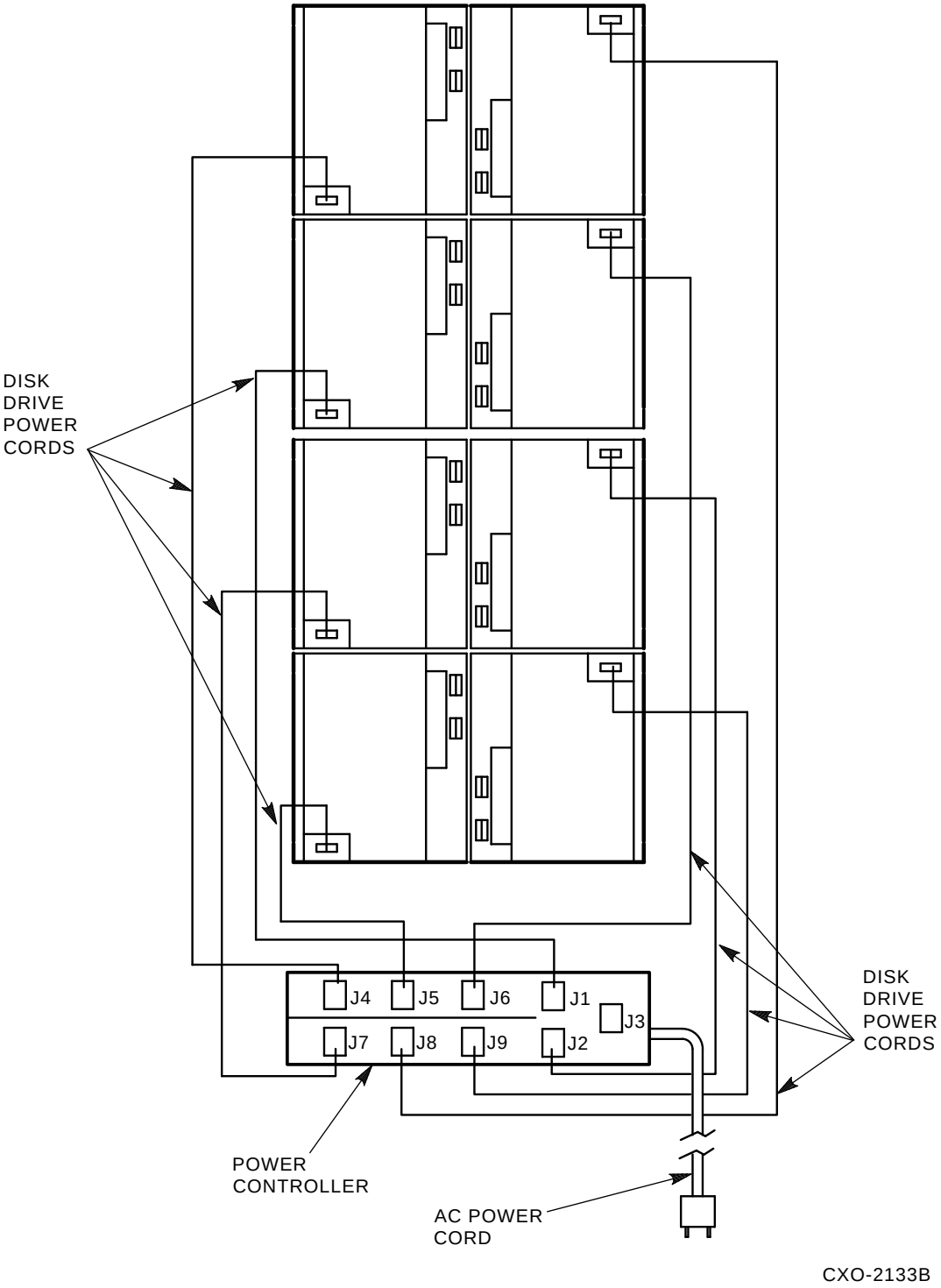
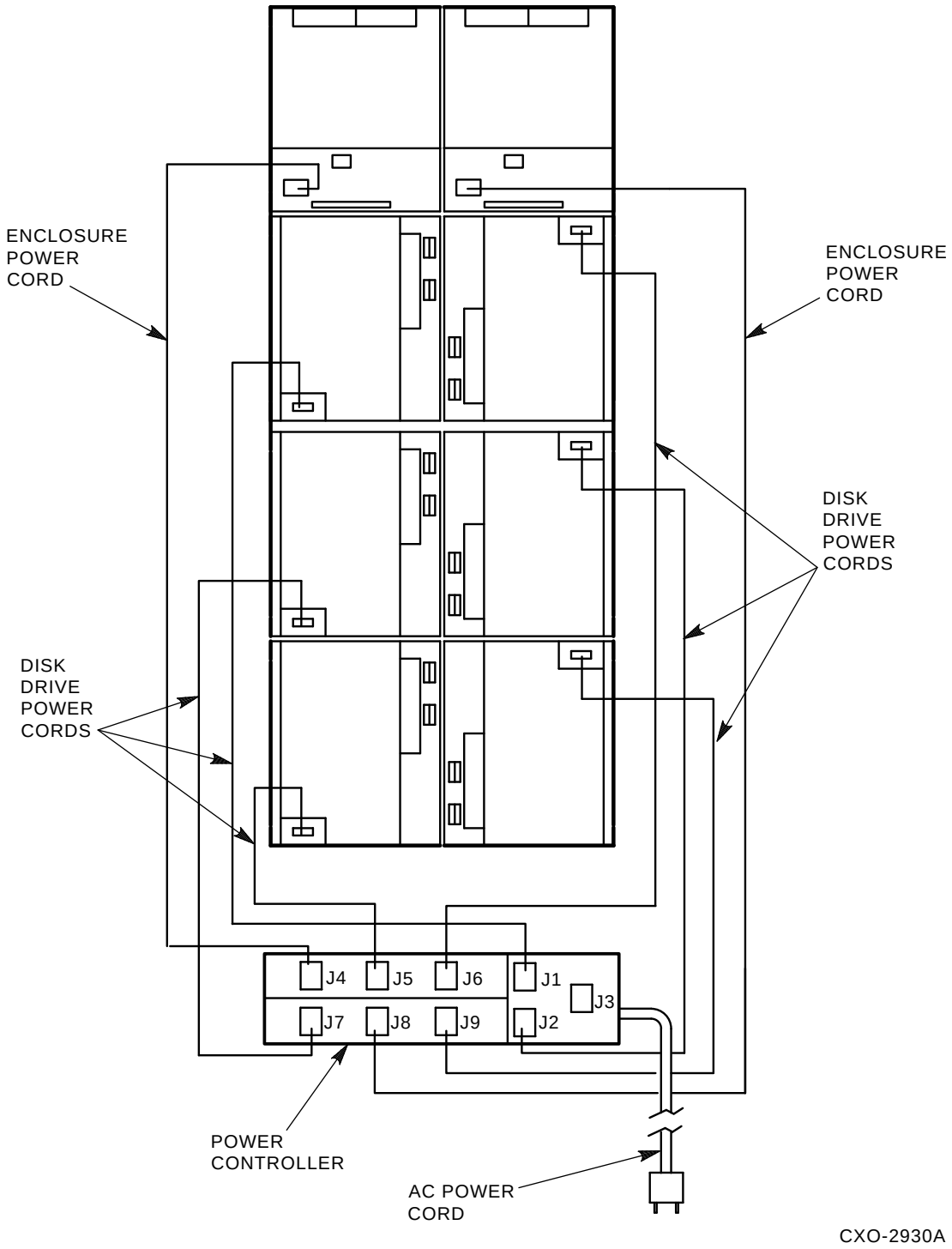


Figure 5–15 SA650/SA850 Power Cords



5.6 Guide Rail Plate Assembly Installation

5.6.1 Preparing the SA900 Cabinet

Each enclosure is mounted in the cabinet with one guide rail plate assembly as shown in Figure 5–16. The guide rail plate is attached to the cabinet's internal vertical uprights, and it supports the enclosure from one side. Grooves machined into the side of the enclosure mate with flanges along the sides of the chassis rail, allowing the enclosure to slide onto the guide rail plate from the front of the cabinet.

On one end of the guide rail plate is an adjustable mounting bracket. The mounting bracket has four screws that when loosened, allow the guide rail plate to be placed into the cabinet and then extended to make a secure fit.

WARNING

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

Prior to performing any of the SA900 procedures, remove ac power from cabinet components. If the cabinet is installed and operating, spin down all disk drives and halt tape drives in the cabinet. Switch the circuit breaker on the front of the cabinet power controller to the ◯ (off) position.

5.6.2 Guide Rail Plate Installation

Two round standoffs on each end of the guide rail plate are used to locate the guide rail plate along the cabinet vertical uprights. The round standoffs are inserted into the front and rear cabinet vertical upright mounting holes to position the guide rail plate while it is fastened to the cabinet. Guide rail plate installation procedures for both left and right enclosure mounting positions are presented in Sections 5.6.3 and 5.6.4.

If an ESD bolt is mounted to the vertical upright in your selected installation position, remove the ESD bolt until your installation is complete, then fasten it to an open space on the cabinet vertical upright.

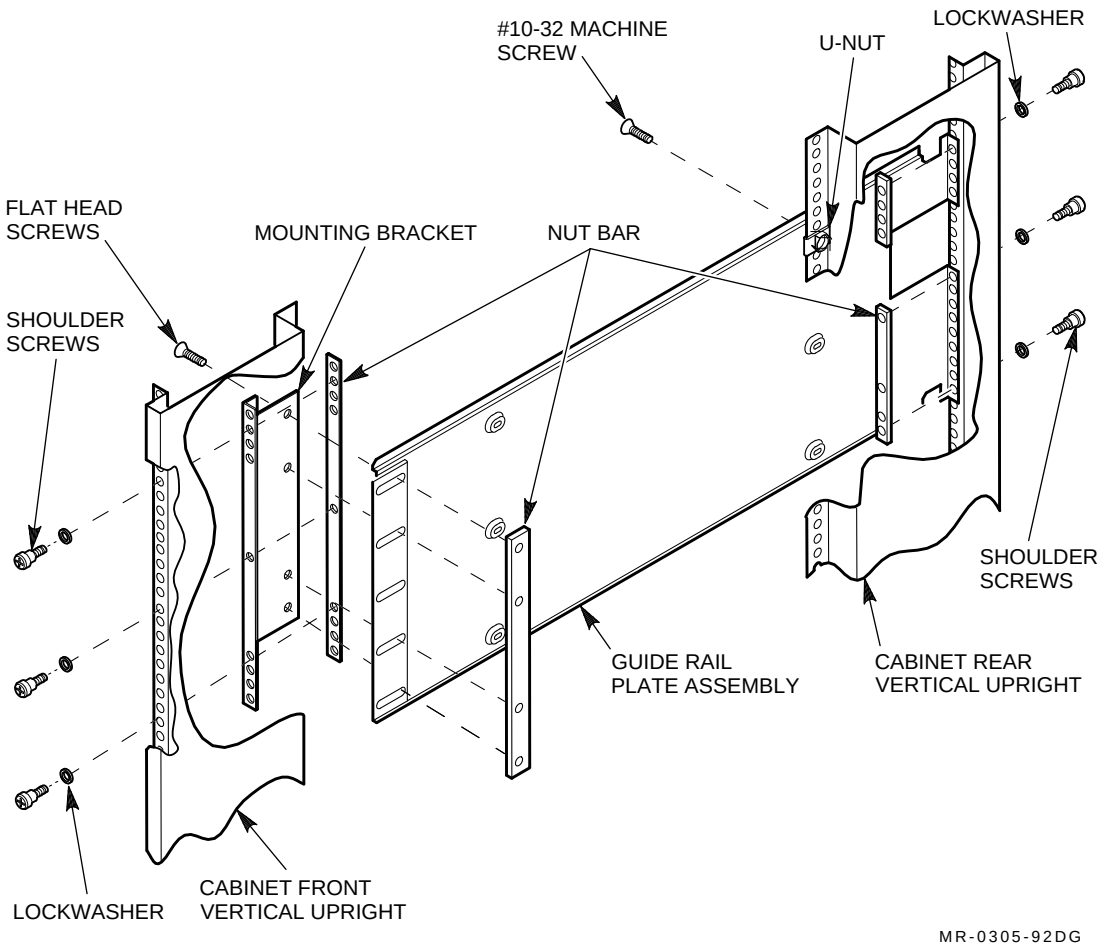
5.6.3 Left Position Guide Rail Plate Installation

Note

The following instructions are for installing an SA7x enclosure. Other enclosures use different position numbers as shown in Figure 5–18.

Install the guide rail plate in the left position within the cabinet as follows (see Figure 5–16):

Figure 5–16 Guide Rail Assembly Installation for SA900 Storage Array



WARNING

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

1. Turn the cabinet power off as described in Section 5.6.1
2. This procedure installs an enclosure in add-on sequence position 3. (See Figure 5–18 to select the optimum add-on sequence position for your installation.)
3. Open the front cabinet door.
4. Remove the rear panel.
5. From the cabinet door, remove the bezel filler that corresponds to add-on sequence position 3, as follows:
   a. Remove the four U-clips securing the bezel filler to the door.

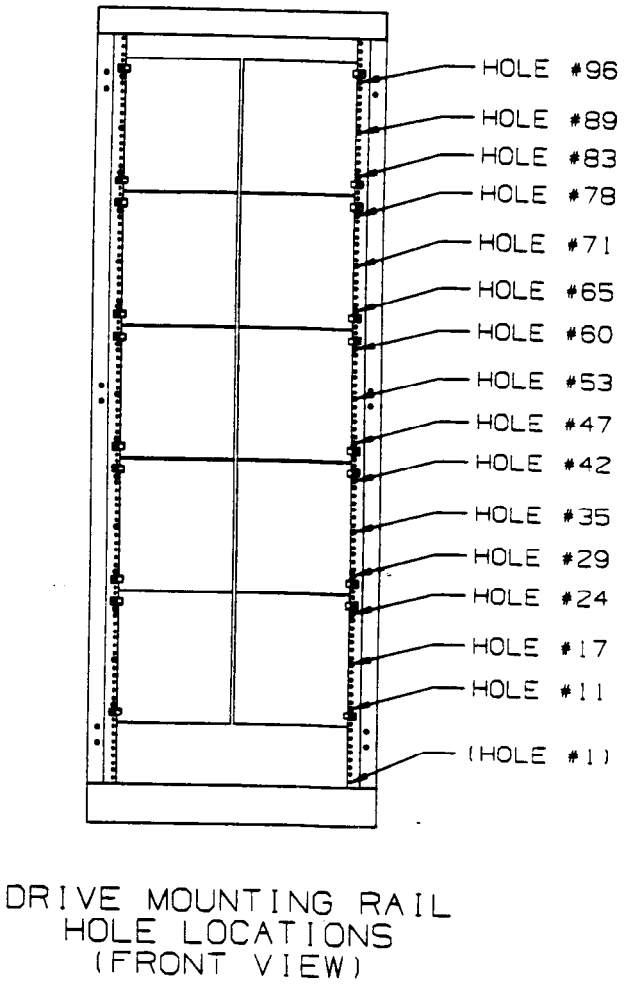
b. Remove the bezel filler.

WARNING

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

6. Install the guide rail plate in add-on sequence position 3. Add-on sequence position 3 corresponds to mounting hole numbers 65, 71 and 78 as shown in Figure 5–17.
   a. From the rear of the cabinet, position the guide rail plate with the mounting bracket to the rear, making sure that the arrow on the mounting bracket is pointing up.
   b. Insert the two front round stand-offs into the cabinet so that hole 71 becomes the center mounting hole in the guide rail plate.
   c. While supporting the guide rail plate against the cabinet front vertical upright, extend the mounting bracket to engage the two rear round stand-offs into hole numbers 64 and 79 on the cabinet rear vertical upright.
   d. Insert and tighten the shoulder screws and lockwashers in mounting holes 65, 71, and 78.
   e. From the front, insert and tighten the three shoulder screws and lockwashers in mounting holes 65, 71, and 78.
   f. Insert and tighten a flathead screw through the top hole in the guide plate to the U-nut mounted on the cabinet front vertical upright.
   g. From the rear, insert and tighten two flathead screws through the top and bottom guide rail plate holes to the two U-nuts mounted on the cabinet rear vertical upright.
   h. Tighten the four mounting bracket screws.

Figure 5–17 SA900 Mounting Rail Holes



5.6.4 Right Position Guide Rail Plate Installation

Install the guide rail plate in the right position within the cabinet as follows (refer to Figure 5–16):

WARNING

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

1. Turn the cabinet power off as described in Section 5.6.1.
2. This procedure installs an enclosure in add-on sequence position 2. Refer to Figure 5–18 to select the optimum add-on sequence position for your installation.

3. Open the front cabinet door and remove the rear panel.
4. From the cabinet door, remove the bezel filler that corresponds to add-on sequence position 2.
   a. Remove the four U-clips securing the bezel filler to the door.
   b. Remove the bezel filler.

WARNING

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

Note

Removing the door latch in step 5 applies only to installing guide rail plates in position 2.

5. Remove two mounting screws and kepnuts securing the door latch to cabinet and remove the door latch.
6. Install the guide rail plate in add-on sequence position 2. Add-on sequence position 2 corresponds to mounting hole numbers 65, 71, and 78 as shown in Figure 5–17.
   a. From the front of the cabinet, position the guide rail plate with the mounting bracket to the front, making sure that the arrow on the mounting bracket is pointing up.
   b. Insert the two rear round stand-offs into the cabinet so that hole 71 becomes the center mounting hole in the guide rail plate.
   c. While supporting the guide rail plate against the cabinet rear vertical upright, extend the mounting bracket to engage the two front round stand-offs into hole numbers 64 and 79 on the cabinet front vertical upright.

Note

If installing in other than position 2, insert a shoulder screw in the middle mounting hole.

   d. Attach the door latch and secure with two mounting screws and kepnuts in mounting holes 71, and 78.
   e. From the rear, insert and tighten the three shoulder screws and lockwashers in mounting holes 65, 71, and 78.
   f. Insert and tighten two flathead screws through the top and bottom guide rail plate holes to the two U-nuts mounted on the cabinet front vertical upright.

g. From the front, insert and tighten a flathead screw through the top hole in the guide rail plate to the U-nut mounted on the cabinet front vertical upright.

h. Tighten the four flathead mounting bracket screws as shown in Figure 5–16.

5.7 Installing an RA9x Disk Drive in an SA900 Storage Array

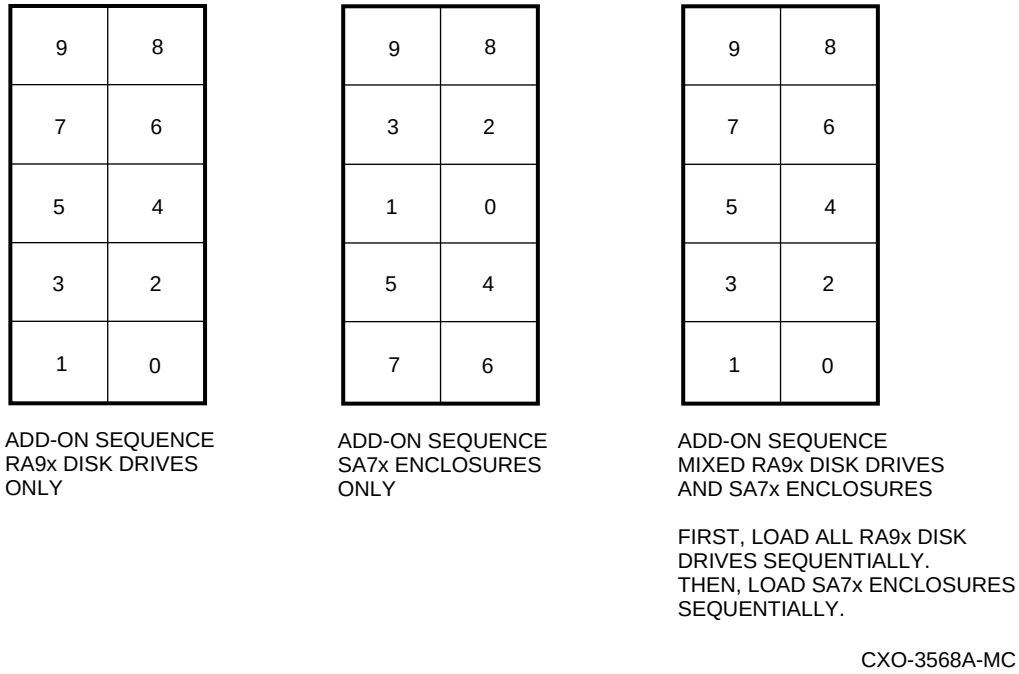
This section explains how to install RA9x disk drives in the SA900 storage array.

All internal SDI cables and power cords are factory installed for storage devices installed at the factory. You must install and route internal SDI cables and power cords for any storage device and install the mounting hardware.

WARNING

To maintain cabinet stability, always install components in the order shown in Figure 5–18. Failure to comply may cause the cabinet to tip over causing personnel injury and equipment damage.

Figure 5–18 Storage Device Add-On Sequence for the SA900 Storage Array (Front View)



5.7.1 Preparing for Installation

The RA9x add-on kit includes the following items:

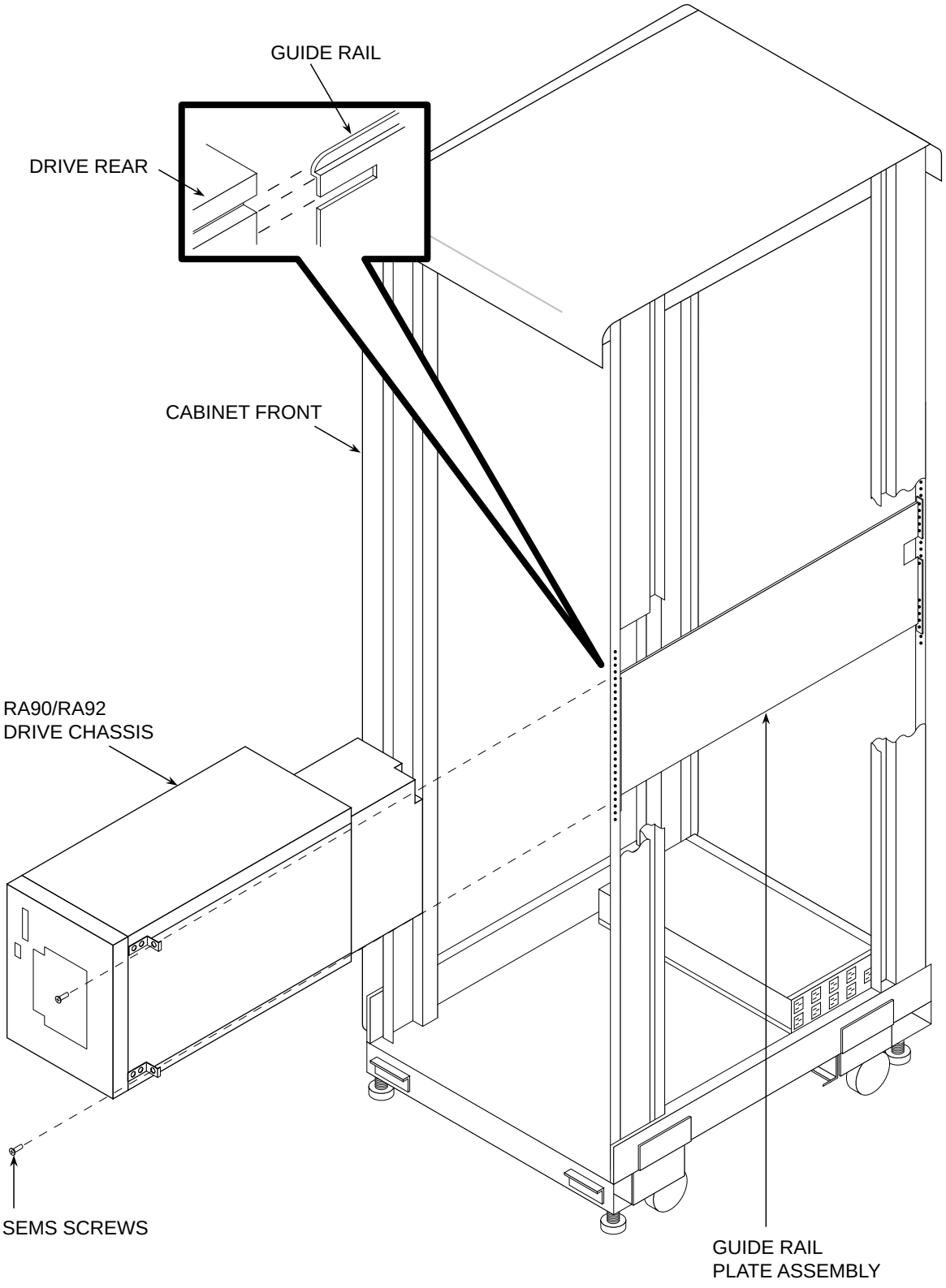
- RA9x disk drive
- Hardware mounting kit
- Guide rail plate assembly
- Power cord
- Internal SDI cables
- Port identification labels

5.7.2 Installing the Disk Drive

Use the following procedure to install the RA9x disk drive in the SA900 storage array:

1. Install the guide rail plate assembly in the disk drive location. (Refer to Section 5.6.)
2. Lift the disk drive into position at the front of the cabinet with the aid of a Digital-approved lifting device as described in Section 5.4 or with two people. Turn the disk drive so its side grooves are facing toward the cabinet guide rails.
3. Seat the side grooves of the disk drive securely on the cabinet guide rails as shown in Figure 5–19 and slide the disk drive all the way back into the cabinet.

Figure 5–19 Installing the Add-On Disk Drive



4. Remove the lifting device.
5. Using the long pan-head screws (10-32 x 3/4-inch) that came with the disk drive, connect the chassis retaining brackets (mounted on the side of the disk drive) to the cabinet. (Refer to Figure 5–19.)
6. Replace the OCP at the top of the drive. If the bezel connector cap is in the way, remove it and replace the OCP. Then move the bezel connector cap to the bottom connector as shown in Figure 5–4.

5.7.3 Installing SDI Cables and Power Cords

The SA900 storage array is shipped with internal SDI cables and power cords installed for the installed storage devices. When you install RA9x disk drives you must install the internal SDI cables and power cords. External SDI cables are ordered separately and shipped with the add-on. (Table 3–2 lists the external SDI cables.)

Storage devices are connected by SDI cables to one of the five sets of eight connectors on each bulkhead.

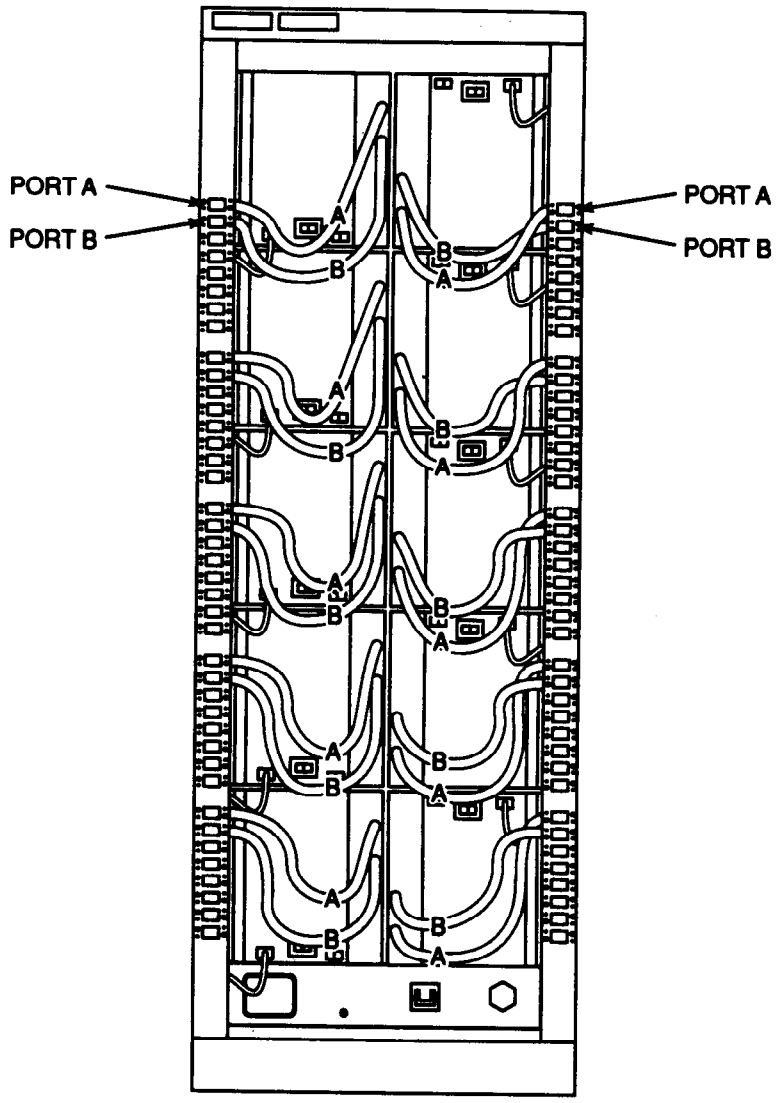
- The RA9x drive uses two SDI cables.
- The SA7x enclosure uses two special one-to-four cables.
- Each cable has four bulkhead connectors.

The H9A00 cabinet includes a left and a right vertical I/O bulkhead. (See Figure 5–20.) The SA900 storage array can accommodate a maximum of 10 RA9x disk drives or 10 SA7x enclosures for a maximum of 80 ports. A total of ten devices can be connected to the I/O bulkheads.

Use the following procedure to install and connect SDI cables and power cords:

1. On the rear of the RA9x disk drive, make sure that the Line Voltage Selector switch is in the proper position (120 Vac or 240 Vac) and that the RA9x drive circuit breaker is off.
2. Install the internal SDI cables, shown in Figure 5–20, as follows:
   a. Connect cables from drives and enclosures on the left side of the cabinet to the left vertical I/O bulkhead.
   b. Connect cables from drives and enclosures on the right side of the cabinet to the right vertical I/O bulkhead.
   c. Connect the internal SDI cable connectors to the Port A and Port B connectors on the rear of the RA9x disk drive.
   d. Connect the RA9x Port A cable to the I/O bulkhead connectors and secure with two 6-32 x 3/8-inch sems screws. Port A is always the top connector in each group of eight connectors (Figure 5–20).
   e. Connect the RA9x Port B cable to the I/O bulkhead connectors and secure with two 6-32 x 3/8-inch sems screws. Port B is always the second connector from the top in each group of eight connectors.
3. Connect the power cords, shown in Figure 5–21, to the rear of the RA9x disk drive.

Figure 5–20 SA900 RA9x SDI Cabling



Route the power cords from the storage devices on the right side of the cabinet down the right vertical I/O bulkhead.

Route the power cords from the storage devices on the left side of the cabinet down the left vertical I/O bulkhead.

4. Connect the power cord to the appropriate connector on the power controller as shown in Figure 5–21.

   Coil excess power cord in front of the power controller.

5. Connect the external SDI cables to the vertical I/O bulkhead. Be sure to tighten the connector captive screws to the bulkhead.

6. Slide the external SDI cable through the either the left or right cable slot in the bottom filler panel.

   For easy access to the cable slot, you can remove the cable retainers on the filler panel. Replace the cable retainers after routing the cables.

5.7.4 Completing the Installation

Complete the installation as follows:

1. Restore power to the cabinet as explained in Section 3.9.
2. Turn on all storage devices in the cabinet.
3. Spin up all drives and put them on line.
4. Check out all storage devices as described in the component user guide or service manual.
5. Make sure that the rear panel will clear the external cables.

   If necessary, adjust the rear panel assembly to provide additional clearance as described in Steps 6 through 10.
6. Loosen the three 1/4-20 hex nuts located on the top, middle, and bottom of each sliding side panel, as shown in Figure 5–22.
7. Loosen the two wing nuts on both the top filler panel and the bottom filler panel.
8. Position the rear panel assembly (that is, the sliding panel, the top filler panel, and bottom filler panel) so that it will clear the SDI cables.
9. Tighten the wing nuts on the top and bottom panel.
10. Tighten the three 1/4-20 hex nuts on each sliding panel.
11. Replace the rear panel, as shown in Figure 5–23, and close the front panel.

Figure 5–21 SA900 RA9x Power Cords

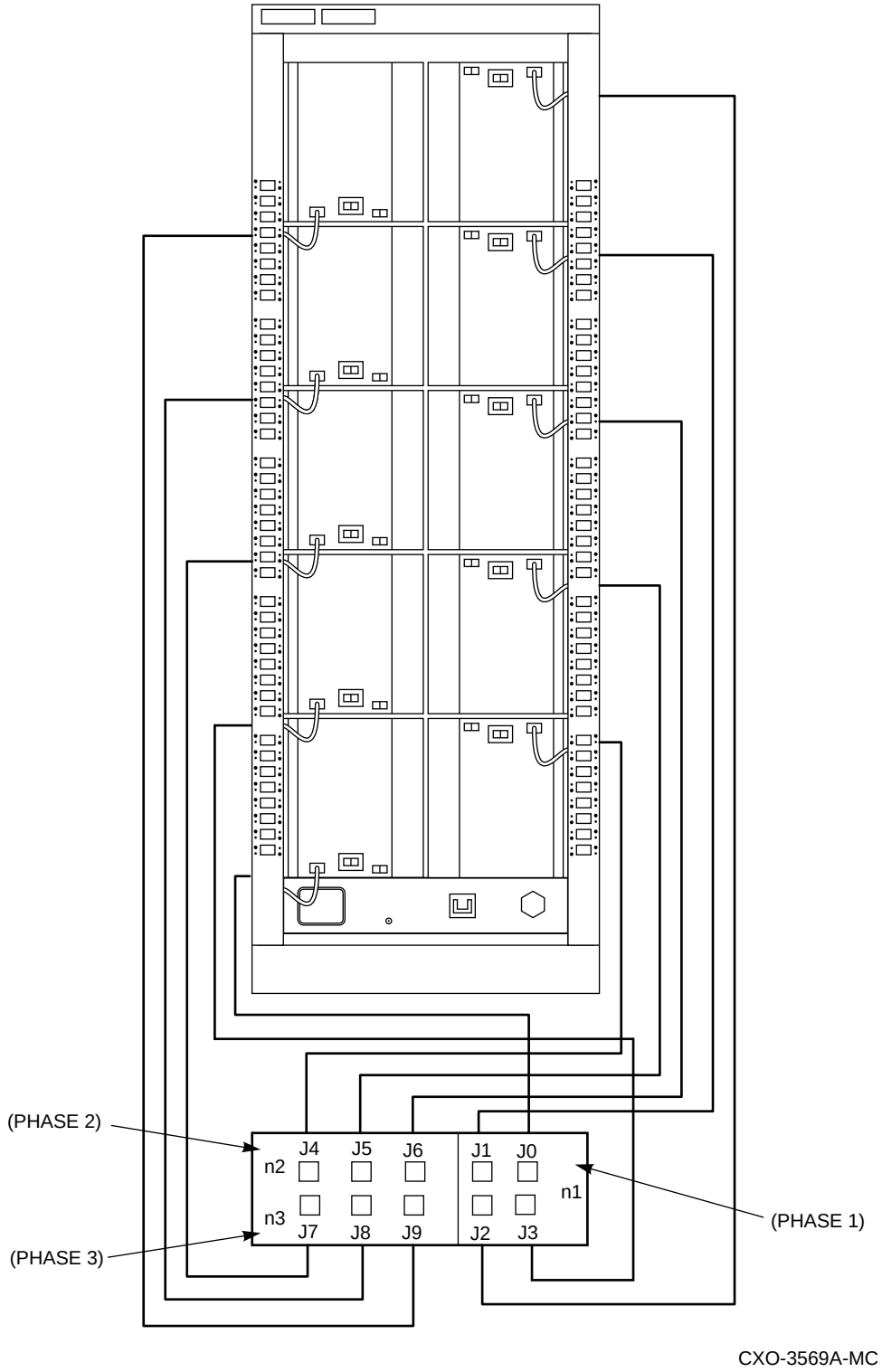


Figure 5–22 H9A00 Rear Panel Assembly Parts

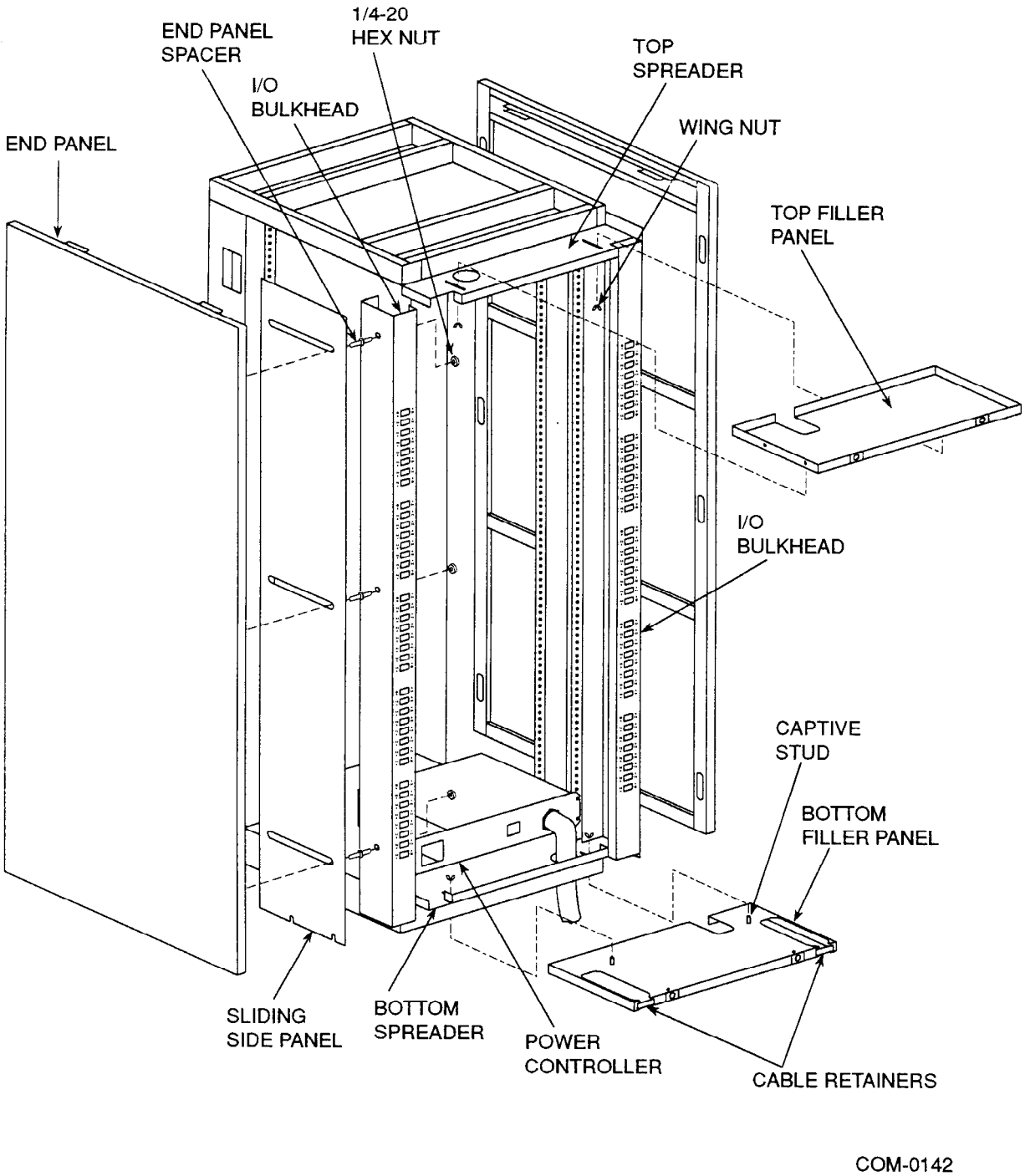
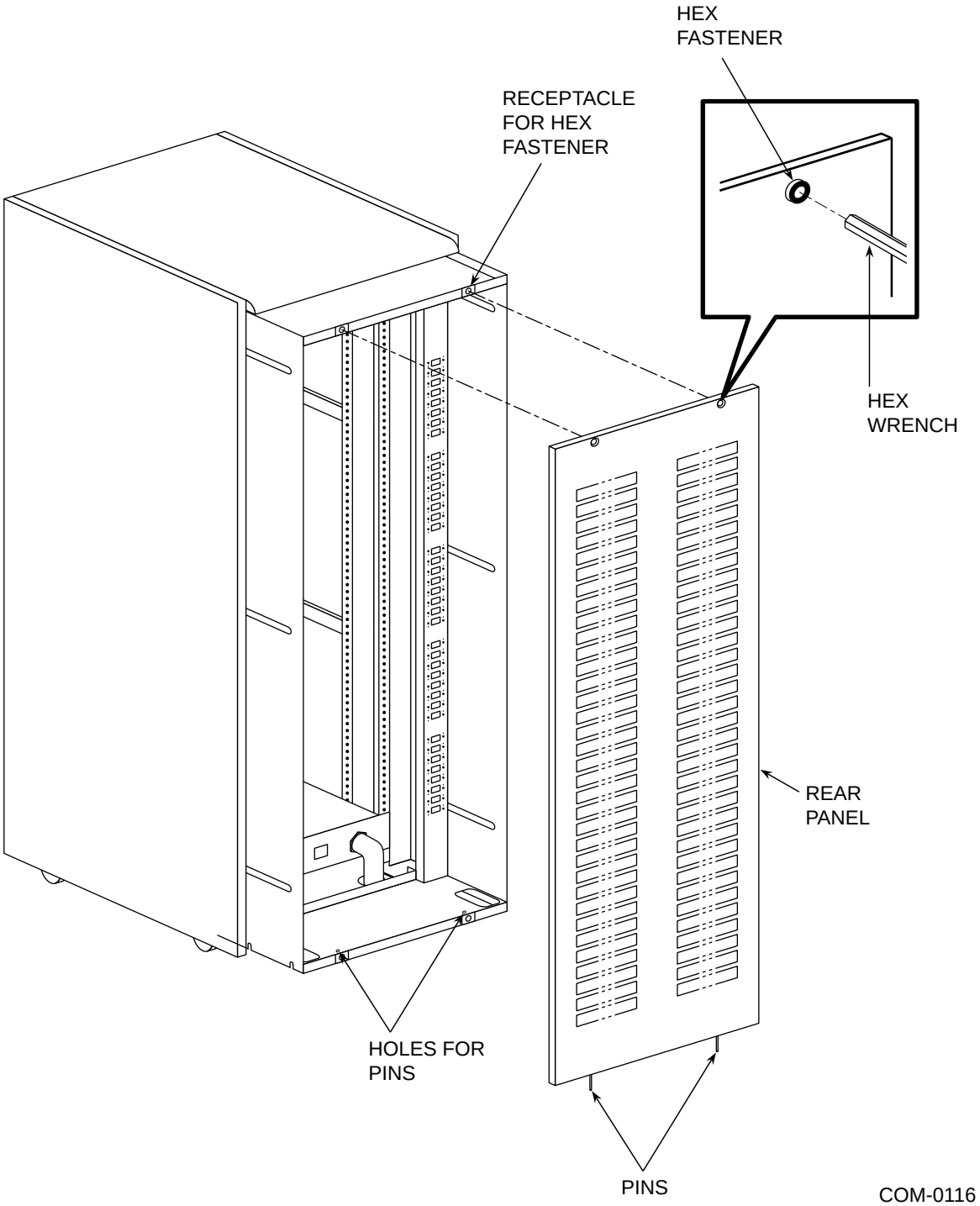


Figure 5–23 H9A00 Rear Panel



5.8 Adding an ESE50 SSD

When installing an ESE50 solid-state disk (SSD) in the SA900 storage array cabinet, the CK–SA900–L2 installation kit is required. When installing an ESE50 in an SA600 or SA800 series storage array cabinet, please refer to Section 5.5 of this manual. Installation of an ESE50 in the SA600 or SA800 series cabinet is identical to the RA9x disk drive.

BC26V–xx, BC26G–xx, or BC26J–xx external SDI cables are required when mounting an ESE50 in any of the above cabinets. If your configuration is dual ported, you will have to order two cables.

The following section explains how to install an add-on ESE50 in the SA900 storage array.

5.9 Preparing for Installation

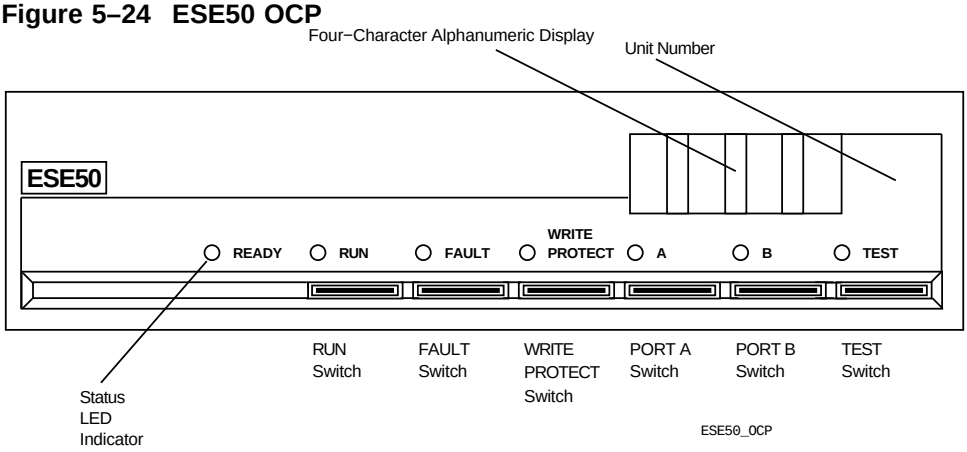
The CK–SA900–L2 installation kit includes the following items:

- Screw shield (6)
- Power cord (1)
- SDI cable (2)
- Bar nut (1)
- Rail chassis assembly (1)
- Bracket rail assembly (1)
- Bar insert nut (1)
- Bracket d-lock (2)
- Bar stabilizer (1)
- Screws (9)
- OCP label (1)

Use the following procedure to prepare for installation of the ESE50 in the SA900 storage array cabinet:

1. Remove the OCP, shown in Figure 5–24, from the front of the ESE50 by gently pulling it straight out to protect the OCP during installation. Put the ESE50 OCP in a safe place while completing the remainder of the installation.
2. Determine which cabinet position the ESE50 will occupy. Refer to Figure 5–18 for the recommended RA9x add-on sequence. Each cabinet location is assigned a number which is the sequence in which devices are added.

Figure 5–24 ESE50 OCP



5.9.1 Installing the ESE50 SSD

Use the following procedure to install the ESE50 SSD in the SA900 storage array:

1. Lift the SSD into position at the front of the cabinet with the aid of a Digital-approved lifting device or with two people. Turn the SSD so its side grooves are facing toward the cabinet guide rails. (Refer to Figure 5–11.)
2. Seat the side grooves of the SSD securely on the cabinet guide rails and slide the SSD all the way back.
3. Remove the lifting device.
4. Using the two 10-32 x 3/4-inch pan-head screws that come with the SSD, connect the two chassis retaining brackets (mounted on the side of the SSD) to the cabinet.
5. Replace the OCP. The OCP should be installed at the top of the drive. If a bezel connector cap is in the way, remove it before replacing the OCP. Move the cap to the bottom connector.

5.9.2 Installing SDI Cables and Power Cords

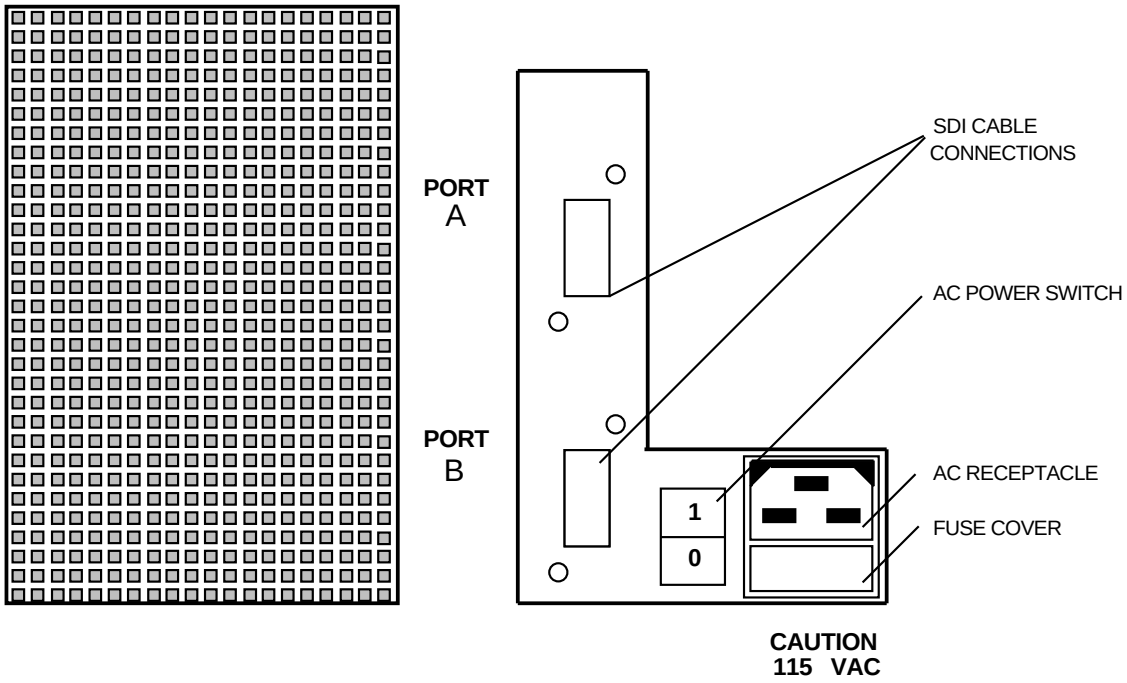
All internal SDI cables and power cords are factory installed for storage devices installed at the factory. You must install and route internal SDI cables and power cords for any storage device and install the mounting hardware.

The H9A00 cabinet includes a left and a right vertical I/O bulkhead. (Refer to Figure 5–20.) Storage devices are connected by SDI cables to one of the five sets of eight connectors on each bulkhead. A total of ten devices can be connected to the I/O bulkheads. The ESE50s use two SDI cables; the SA7x enclosure uses two special one-to-four cables. Each cable terminates with four connectors that connect to the bulkhead. The SA900 storage array can accommodate up to 10 SA7x enclosures, RA9x disk drives, ESE50s (a maximum of four ESE50s) or a combination of these for a maximum of 80 ports.

To install and connect SDI cables and power cords, use the following procedure:

1. Make sure that the Line Voltage Selector switch is in the proper position and that the ESE50 AC Power switch, as shown in Figure 5–25, is off. (See Section 3.7 for information about setting the Line Voltage Selector switch.)

Figure 5–25 ESE50 Rear Panel



WARNING: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE AND RATING OF FUSES.

CAUTION: DISCONNECT POWER BEFORE CHANGING FUSE.
ATTENTION: COUPER LE COURANT AVANT DE REMPLACER LE FUSIBLE.

2. Install the internal SDI cables as follows:
   - Connect cables from drives and enclosures on the left side of the cabinet to the left vertical I/O bulkhead and secure with two 6-32 x 3/8-inch sems screws.
   - Connect cables from drives and enclosures on the right side of the cabinet to the right vertical I/O bulkhead and secure with two 6-32 x 3/8-inch sems screws. (Refer to Figure 5–20.)
3. Connect SDI cables connectors to the Port A and Port B connections on the rear of the ESE50. Connect the other end of the cable connectors to the vertical I/O bulkhead.
4. Connect the ESE50 Port A cable to the top port of a group of eight; connect the ESE50 Port B cable to the next-to-the-top port of a group of eight.
5. Connect the power cords as shown in Figure 5–21.

   Connect the power cord to the rear of the ESE50.
6. Route the power cords from the SSD and enclosure on the right side of the cabinet down the right vertical I/O bulkhead.

7. Route the power cords from the SSDs and enclosures on the left side of the cabinet down the left vertical I/O bulkhead.
8. Connect the opposite end of the power cord to the appropriate connector on the power controller.
9. Coil any excess power cord in front of the power controller.
10. Connect the external SDI cables to the vertical I/O bulkhead. Be sure to tighten the captive screws on the connectors at the bulkhead.
11. Slide the external SDI cable through the appropriate slot in the filler panel. If necessary, remove the cable retainers on the filler panel to more easily access the slot. Then, replace the cable retainers.

5.9.3 Completing the Installation

Complete the installation as follows:

1. Restore power to the cabinet as explained in Section 3.9.
2. Turn on all storage devices in the cabinet.
3. Spin up all drives and place them on line.
4. Check out all storage devices as described in the component user guide or service manual.
5. Make sure that the rear panel will clear the external cables. If necessary, adjust the side panels to provide additional clearance as described in Section 3.4 .
6. Replace the rear panel and close the front panel. (Refer to Figure 3–9.)

5.10 Installing an SA7x Enclosure in SA550, SA650, and SA850 Storage Arrays

This section explains how to install an SA7x enclosure in the SA550, SA650, and SA850 storage arrays. The procedures for installing an enclosure in these storage arrays are **almost** identical.

The SA7x enclosure is shipped in a sealed shipping container, as shown in Figure 5–26. Complete the procedures described in Section 5.3.1 before proceeding.

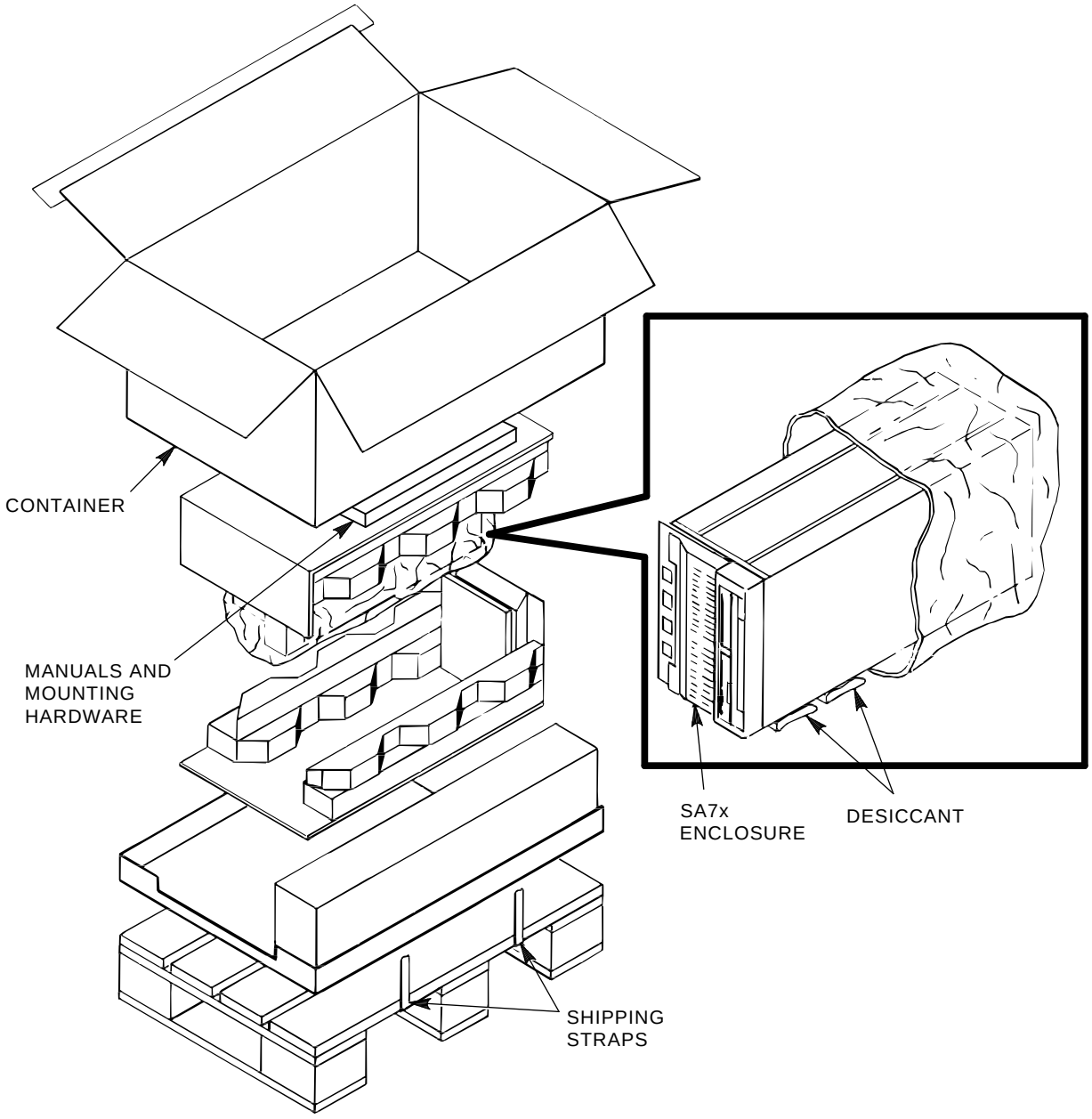
All mounting hardware, internal SDI cables, and power cords are factory installed for SA7x add-ons in the SA550, SA650, and SA850 storage arrays. After installing the enclosure, you are required only to connect the SDI cables and power cords.

5.10.1 Preparing for Installation

The SA550, SA650, and SA850 storage arrays are shipped with the SA7x enclosure guide rail plates installed for the add-ons. Each add-on SA7x enclosure has a hardware mounting kit which contains two sets of brackets:

The top and bottom chassis retaining brackets shown in Figure 5–29 are for the H9646 cabinet. These brackets mate to the chassis retainer attached to the SA7x enclosure guide rail.

Figure 5–26 SA7x Enclosure Packing



The first add-on SA7x enclosure always occupies the top left position (when facing the cabinet front). Figure 5–27 shows an example of the enclosure position.

Use the following procedure to prepare for SA7x enclosure installation:

1. To protect the OCP during installation, remove it from the enclosure front panel by pulling it straight out. Put the OCP in a safe place while completing the remainder of the installation.
2. Remove the front and rear cabinet panels. (See Sections 4.1.1 and 4.1.2.)
3. Remove the bezel filler in the front panel position.

   On an SA650 or SA850 storage array, remove the six U-clips from the back side of the front panel and remove the bezel filler.

   On an SA550 storage array, remove the nuts from the back of the bezel filler and pull out the bezel filler.
4. If the cabinet has a stabilizer foot installed, extend it. (Refer to Figure 5–1.)
5. Position both the steel inserts shown in Figure 5–28 on either the left or right side of the enclosure.
6. Position the guide rail inserts for a SA550, SA650, and SA850 storage arrays left side installation.

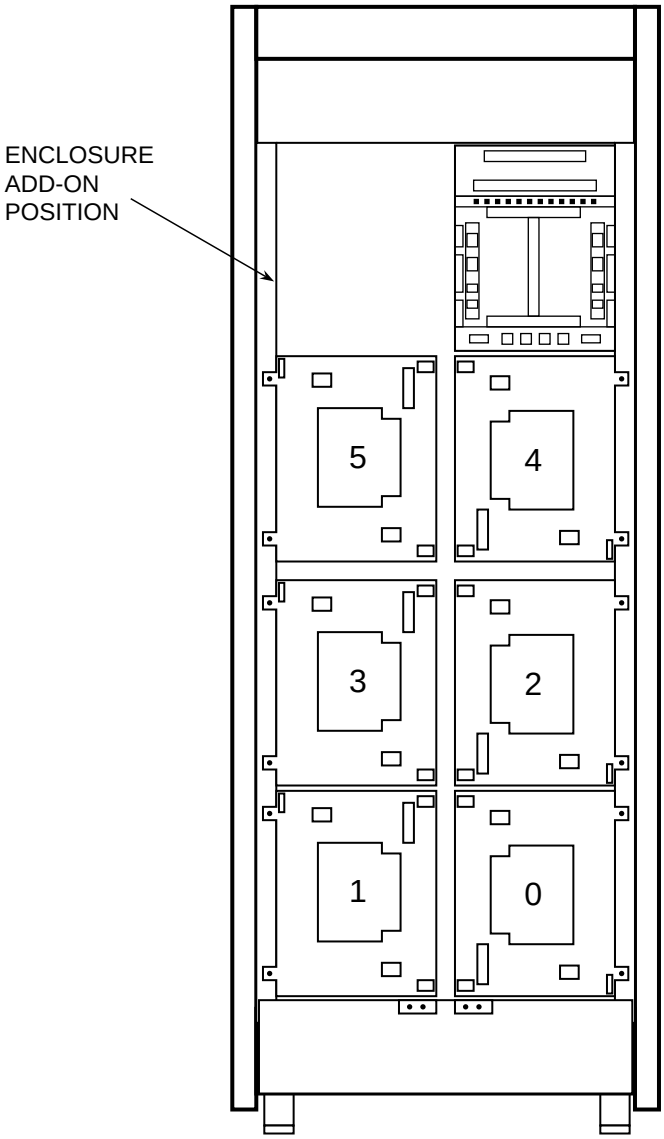
   Note

   If the SA550, SA650, or SA850 storage array is to be installed on the right side, proceed to step 7.

   a. Loosen the two rear cover captive screws (or two screws) and remove the rear cover.
   b. Remove the two upper right chassis retainer screws and remove the retainer bracket.
   c. Slide the upper right insert out the rear of the enclosure.
   d. Slide the insert into the upper left side of the enclosure.
   e. Install the retainer bracket and insert and tighten the two chassis retainer screws.
   f. Install the rear cover and insert and tighten the two rear cover captive screws (or two screws).
7. Position the guide rail inserts for a SA550, SA650, or SA850 storage array right-side installation.
   a. Loosen the two power supply captive screws and remove the power supply.
   b. Remove the two lower left chassis retainer screws and remove the retainer bracket.
   c. Slide the lower left insert out the rear of the enclosure.
   d. Slide the insert into the lower right side of the enclosure.
   e. Install the retainer bracket and insert and tighten the two chassis retainer screws.
   f. Install the power supply and tighten the two captive screws.
8. Connect the top and bottom chassis retaining brackets to the cabinet's front vertical upright, as shown in Figure 5–29.

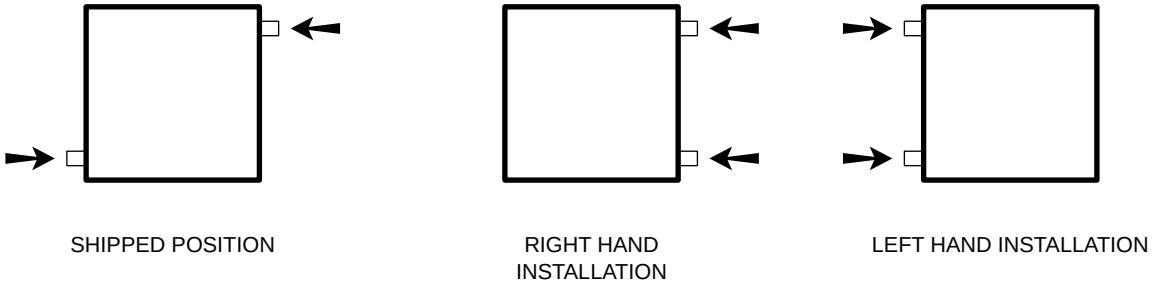
9. Remove the chassis stabilizer bracket from the cabinet by removing the two serrated hex-head bolts. Set these parts aside. (Refer to Figures 5–8 and 5–9.)

Figure 5–27 Disk Drive Add-On Sequence—SA650 (Front View)



COM-0102

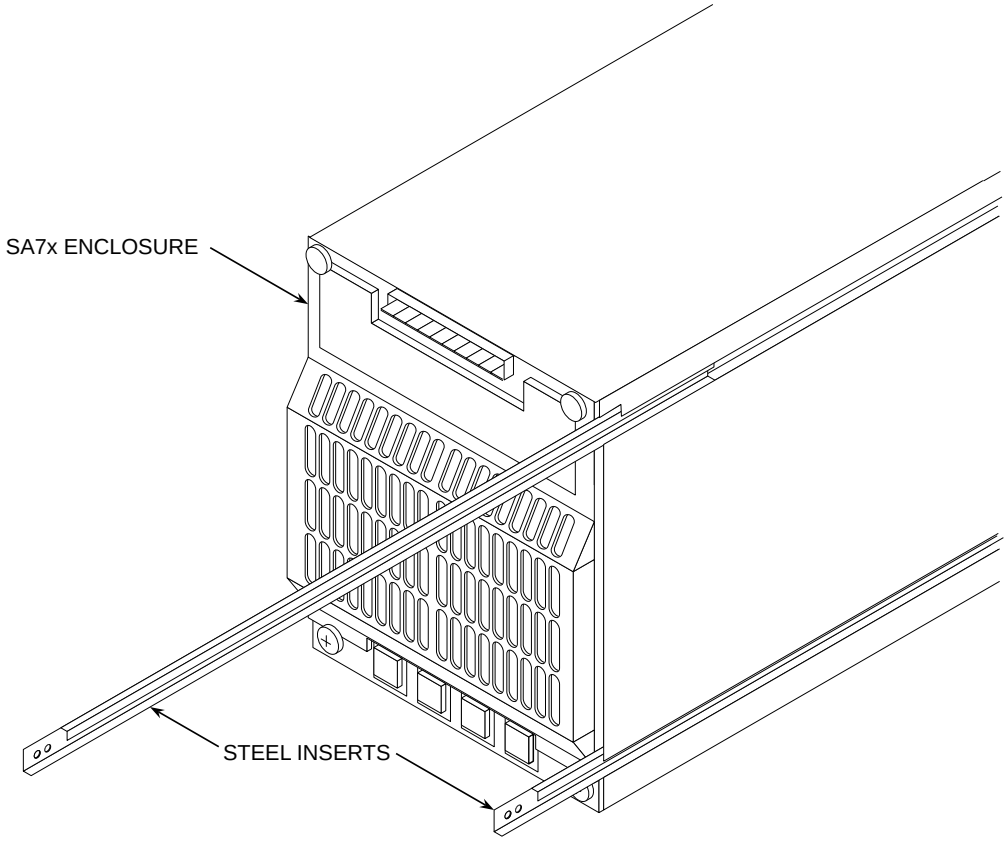
Figure 5–28 SA7x Enclosure Guide Rail Inserts



SHIPPED POSITION

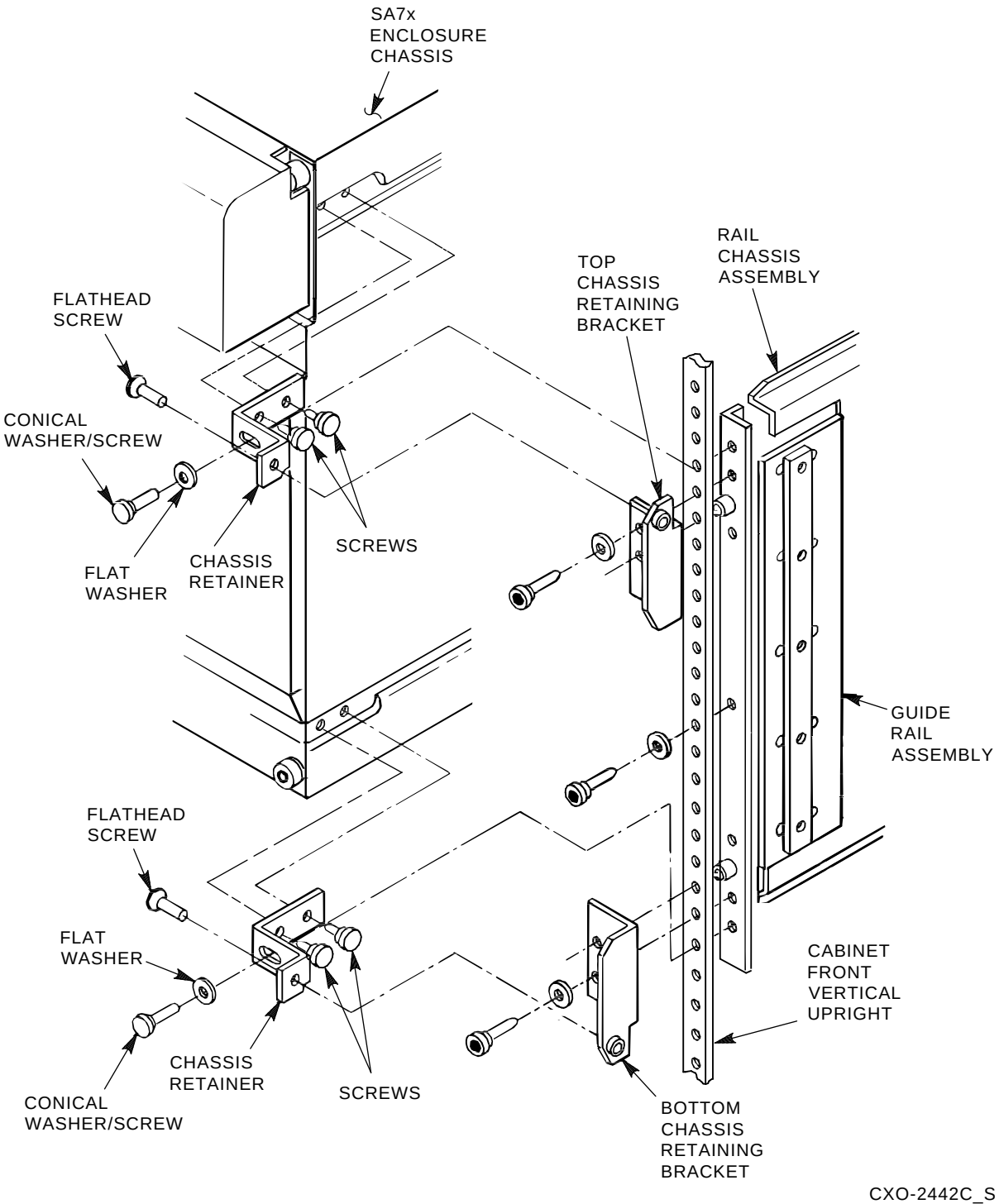
RIGHT HAND INSTALLATION

LEFT HAND INSTALLATION



COM-0149

Figure 5–29 SA7x Front Clamping Assembly



5.10.2 Installing the Enclosure

Use the following procedure to install an enclosure in the storage array:

1. Lift the enclosure into position at the front of the cabinet with the aid of a Digital-approved lifting device or with two people. (See Section 5.4.) Turn the enclosure so its side grooves are facing toward the cabinet rails, as shown in Figure 5–30.

   WARNING

   A fully-populated enclosure, with four disk drives and a power supply, weighs up to 40 kilograms (88 pounds) and can injure you if you lift it improperly. If a lifting device is not available, two people are required to lift and install the enclosure, or one person can lift it by first lightening its weight. To lighten the weight, remove the disk drives and power supply. (See the *SA7x Enclosure Service Manual* for instructions.)

2. Seat the enclosure side grooves securely on the cabinet guide rails as shown in Figure 5–30, and slide the enclosure all the way back into the cabinet.
3. Remove the lifting device.
4. Install two 10-32 x 5/8-inch flat-head screws through the chassis retainers and into the chassis retaining brackets. Tighten them securely. The specified torque is 8 to 10 inch-pounds. (Refer to Figure 5–29.)
5. Install two 10-32 x 5/8-inch conical washer/screws and flat washers that secure the chassis retainer to the cabinet front vertical upright. (Refer to Figure 5–29.) Tighten them securely.
6. To secure the rear of the enclosure to the cabinet rear vertical upright, assemble the rear clamping parts (rear retainer chassis bracket, wedge block, flat washer, helical washer, and screw) as shown in Figure 5–31. Tighten the screws securely.

   Figure 5–32 provides a full view of the guide rail plate and clamping assemblies.
7. To mount the OCP, you must adjust the mounting bracket on the SA7x. The diagram affixed to the mounting bracket shows the proper alignment. To align the bracket, use the following procedure:
   a. Loosen the upper two Phillips head mounting screws.
   b. Remove the lower Phillips head mounting screw.
   c. Slide the bracket left or right to position the hole in the bracket over the hole in the SA7x.
   d. Insert the lower mounting screw.
   e. Tighten the upper two mounting screws.

Figure 5–30 SA7x Enclosure Installation

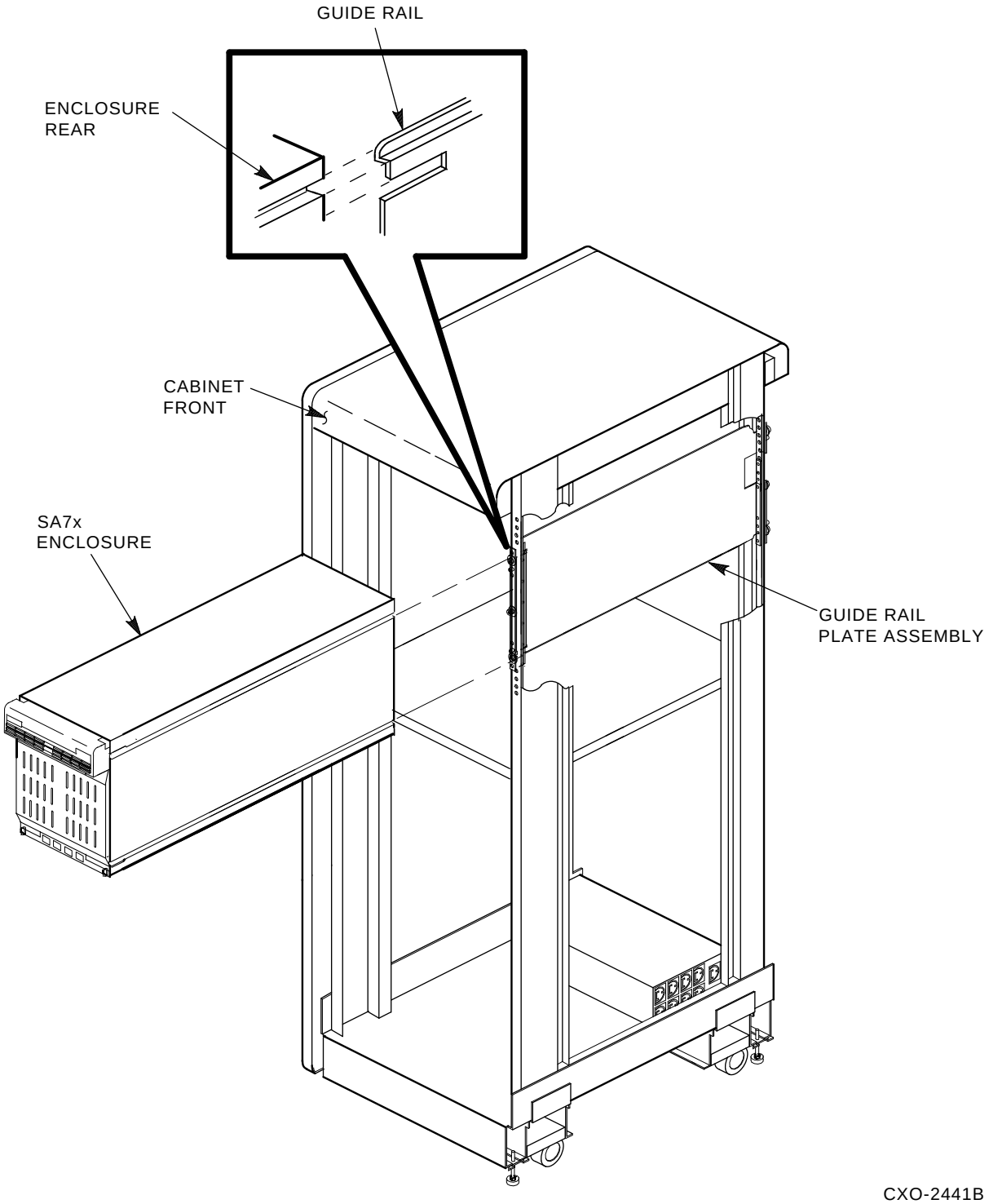


Figure 5–31 SA550, SA650, and SA850 Rear Clamping Assembly

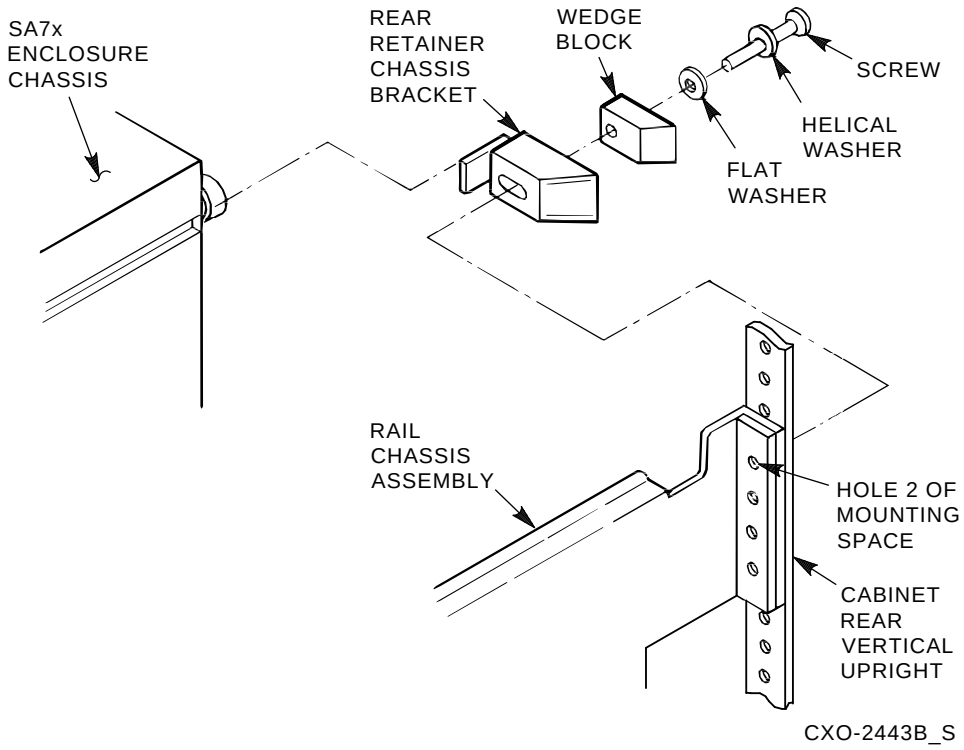
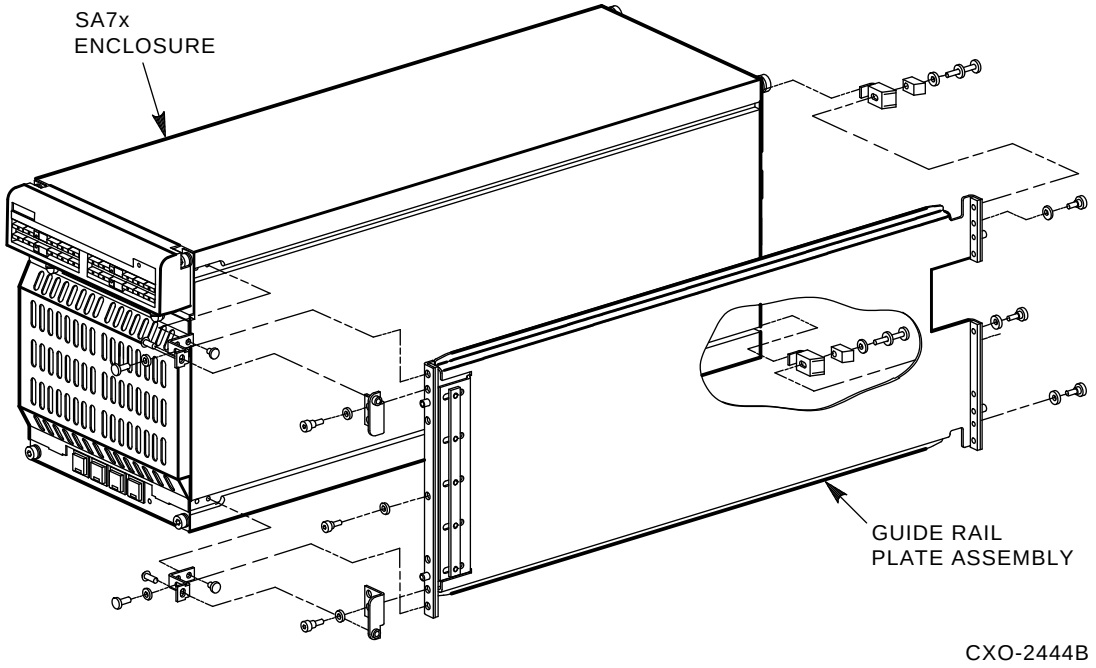


Figure 5–32 Guide Rail Plate and Clamping Assemblies



8. Grasp the OCP in one hand and align the OCP connector pins with the OCP clip fasteners on TB1. Push the OCP straight in until it locks in place.

5.10.3 Installing SDI Cables and Power Cords

The SA550, SA650, and SA850 storage arrays are shipped with internal cables and power cords installed for all storage devices, including add-ons. Therefore, when you install add-on SA7x enclosures in the existing storage array, you need only to connect internal SDI cables and power cords. When external SDI cables are required, they are ordered separately and shipped with the add-on. (Table 3–1 lists the external SDI cables.)

Use the following procedure to connect internal SDI cables and power cords in SA550, SA650, and SA850 storage arrays:

1. Make sure that the Line Voltage Selector switch is in the proper position and that the Master On/Off switch is off. (See Section 3.7 for information about setting the Line Voltage Selector switch.)
2. Connect the SDI cable connectors to the Port A and Port B connections on the rear of the SA7x enclosure.

   Internal SDI cable connections for the SA550 storage array are shown in Figure 5–33.

   Internal SDI cable connections for the SA650/SA850 storage array are shown in Figure 5–34.
3. Connect the power cord to the rear of the SA7x enclosure.

   Power cord connections for the SA550 storage array are shown in Figure 5–35.

   Power cord connections for the SA650/SA850 storage array are shown in Figure 5–36.
4. Connect the external SDI cables in the storage array. Be sure to tighten the captive screws when connecting the external cables to the bulkhead.

Figure 5–33 SA550 Internal SDI Cabling

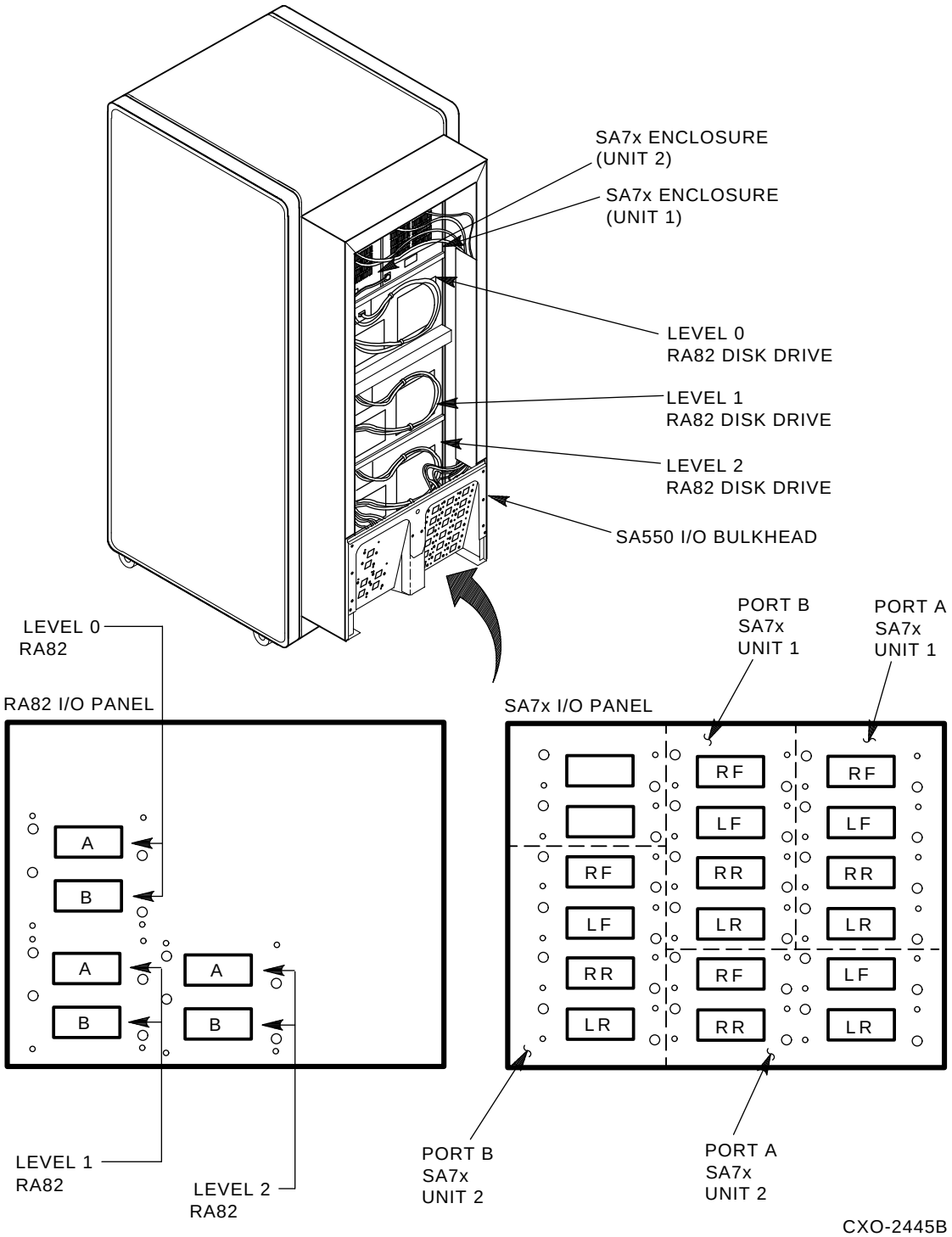


Figure 5–34 SA650/SA850 Internal SDI Cabling

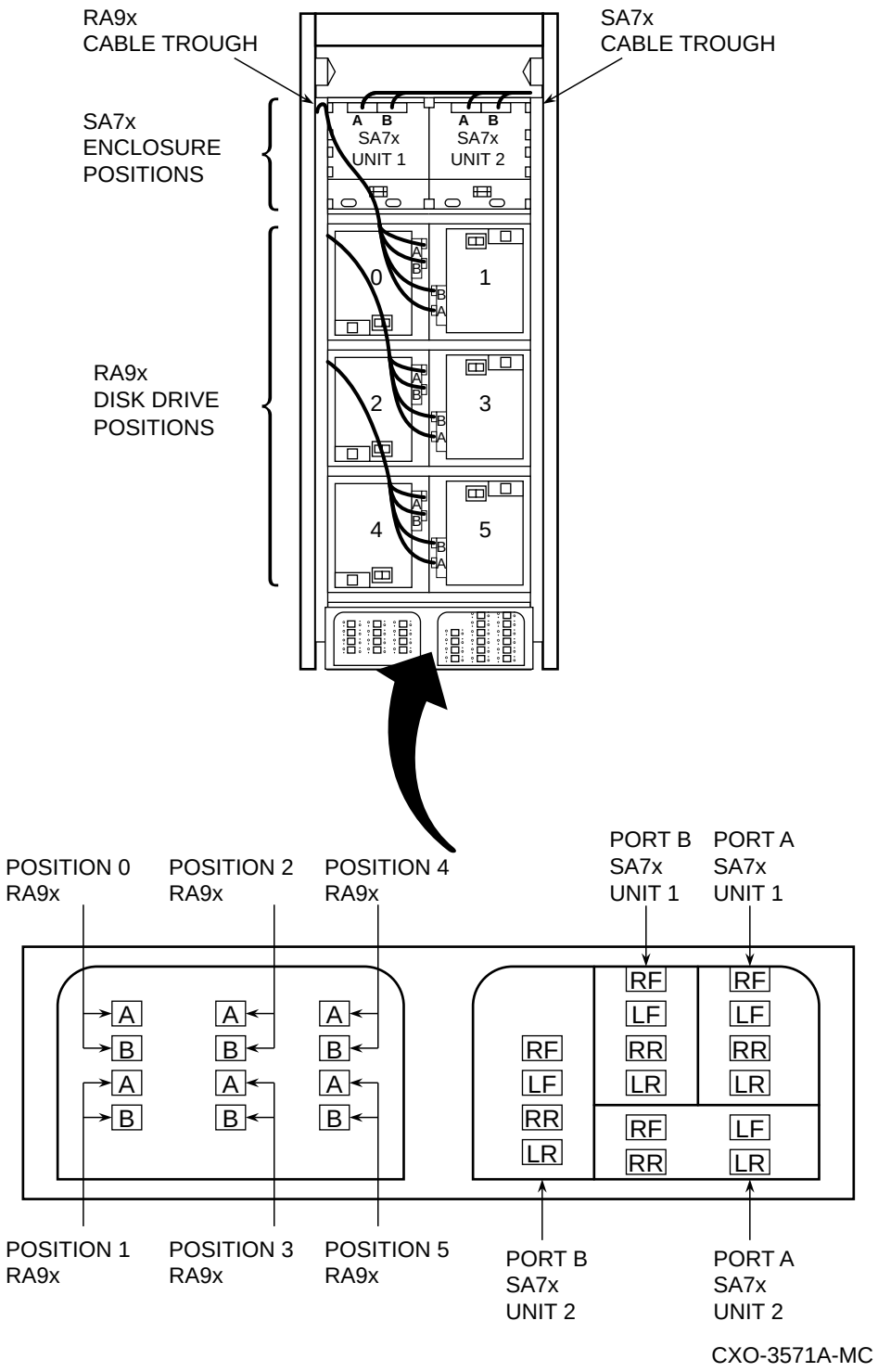


Figure 5–35 SA550 Power Cord Connections

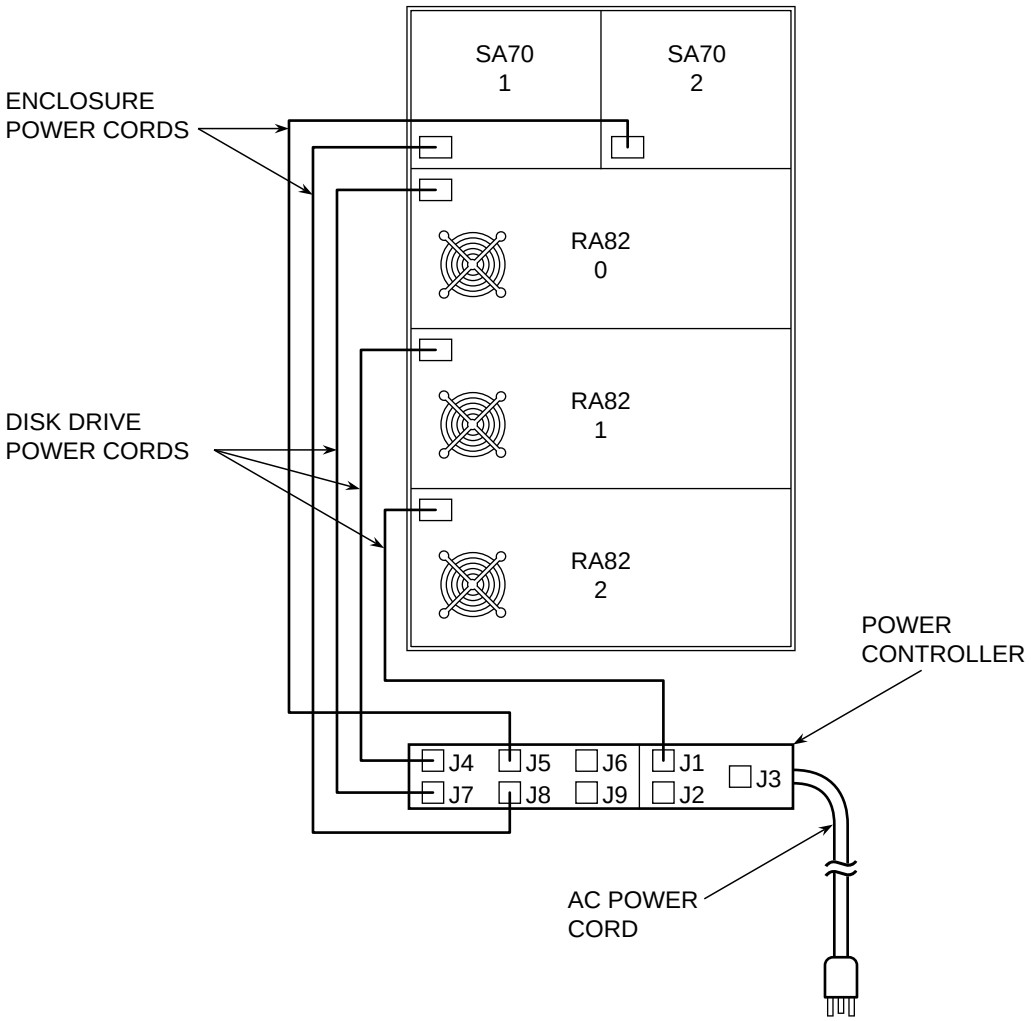
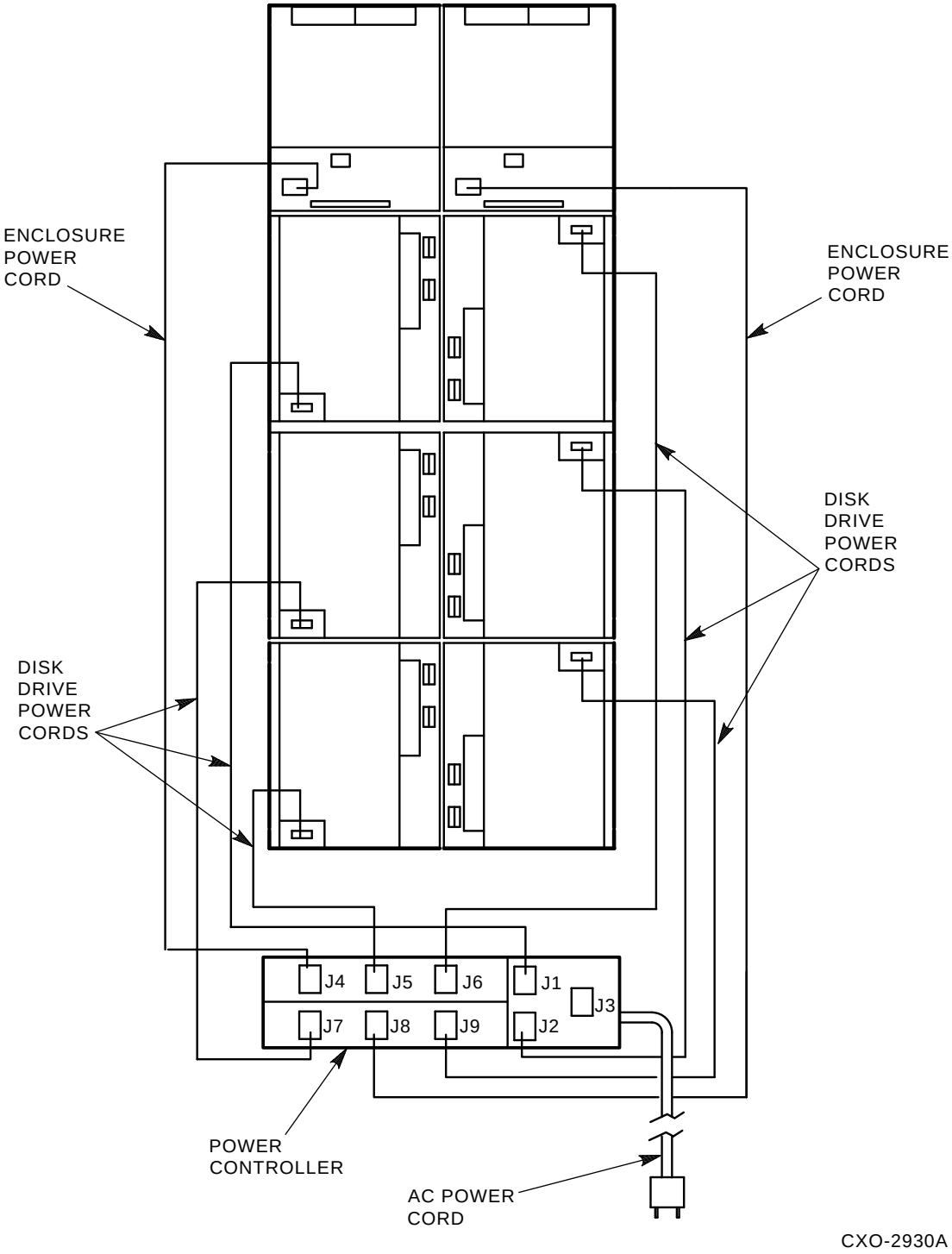


Figure 5–36 SA650/SA850 Power Cord Connections



5.10.4 Completing the Installation

When you have finished connecting SDI cables and power cords, complete the installation as follows:

1. Restore power to the cabinet as explained in Section 3.9.
2. Turn on all storage devices installed in the cabinet. Spin up all drives and place them back on line. Then, complete the appropriate checkout procedure. (See the appropriate component user guide or service manual for instructions.)
3. Replace the front and rear cabinet panels. (See Section 4.1.)

5.11 Installing an SA7x in an SA900 Storage Array

This section explains how to install an SA7x enclosure in an SA900 storage array.

WARNING

To maintain cabinet stability, always install components in the order shown in Figure 5–18. Failure to comply may cause the cabinet to tip over causing personnel injury and equipment damage.

5.11.1 Preparing for Installation

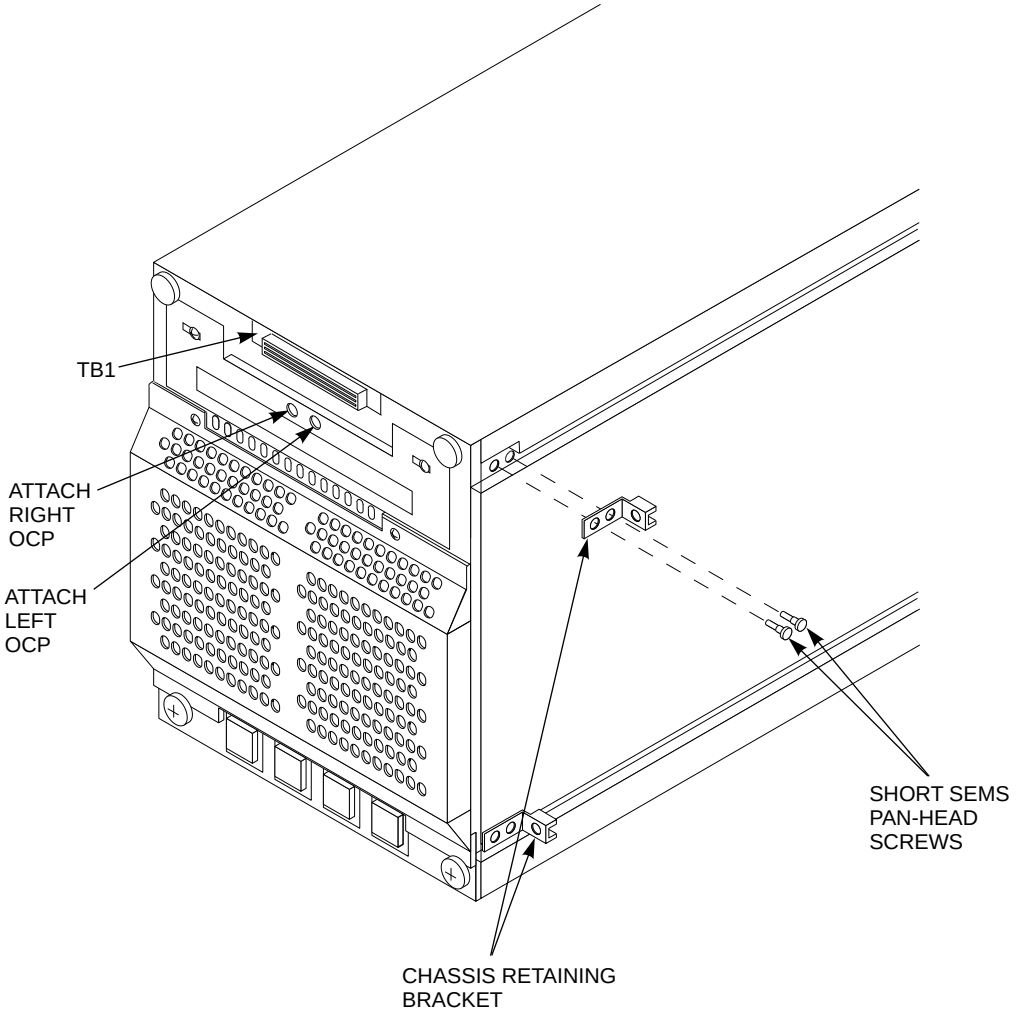
Internal SDI cables and power cords are installed in SA900 storage arrays only when a storage device is installed. The internal SDI cables and power cords are shipped with each add-on and you must install them. The contents of the SA7x add-on kit are as follows:

- SA7x enclosure
- Guide rail plate assembly
- Hardware mounting kit
- Internal SDI cables
- Power cord

The hardware mounting kit includes two sets of chassis retaining brackets.

The chassis retaining brackets shown in Figure 5–37 are for the H9A00 cabinet. They attach to SA7x enclosure guide rail and the cabinet frame.

Figure 5–37 SA900 Chassis Retaining Brackets



5.11.2 Installing the SA7x Enclosure

Use the following procedure to install the SA7x enclosure into a SA900 cabinet:

WARNING

The fully-populated enclosure, with four disk drives and a power supply, weighs up to 40 kilograms (88 pounds) and can cause serious injury if lifted improperly. If a lifting device is not available, two people are required to lift and install the enclosure. One person can install the enclosure if the disk drives an power supply are removed to lighten the load. (Refer to the *SA7x Enclosure Service Manual* for instructions.)

1. Install the guide rail plate assembly in the disk drive location. (Refer to Section 5.6.)

2. Lift the SA7x enclosure to the installation position (see Figure 5–38).
   a. Lift the enclosure to the front of the cabinet with the aid of a Digital-approved lifting device or with two people.
   b. Turn the enclosure so its side grooves are facing toward the cabinet rails. (Refer to Figure 5–38).
3. Seat the enclosure into the cabinet.
   a. Slide the enclosure side grooves into the cabinet guide rails as shown in Figure 5–38, and push the enclosure all the way to the rear of the cabinet.
   b. Remove the lifting device.
   c. Using the two 10-32 x 1/2-inch screws that came with the enclosure, connect the two chassis retaining brackets (mounted on the side of the enclosure) to the cabinet. Tighten them securely. The recommended torque is 8 to 10 inch-pounds. (Refer to Figure 5–38.)
4. Install the OCP for a SA900 cabinet left side installation.

Note

If the SA900 cabinet is to be installed on the right side, proceed to step 5.

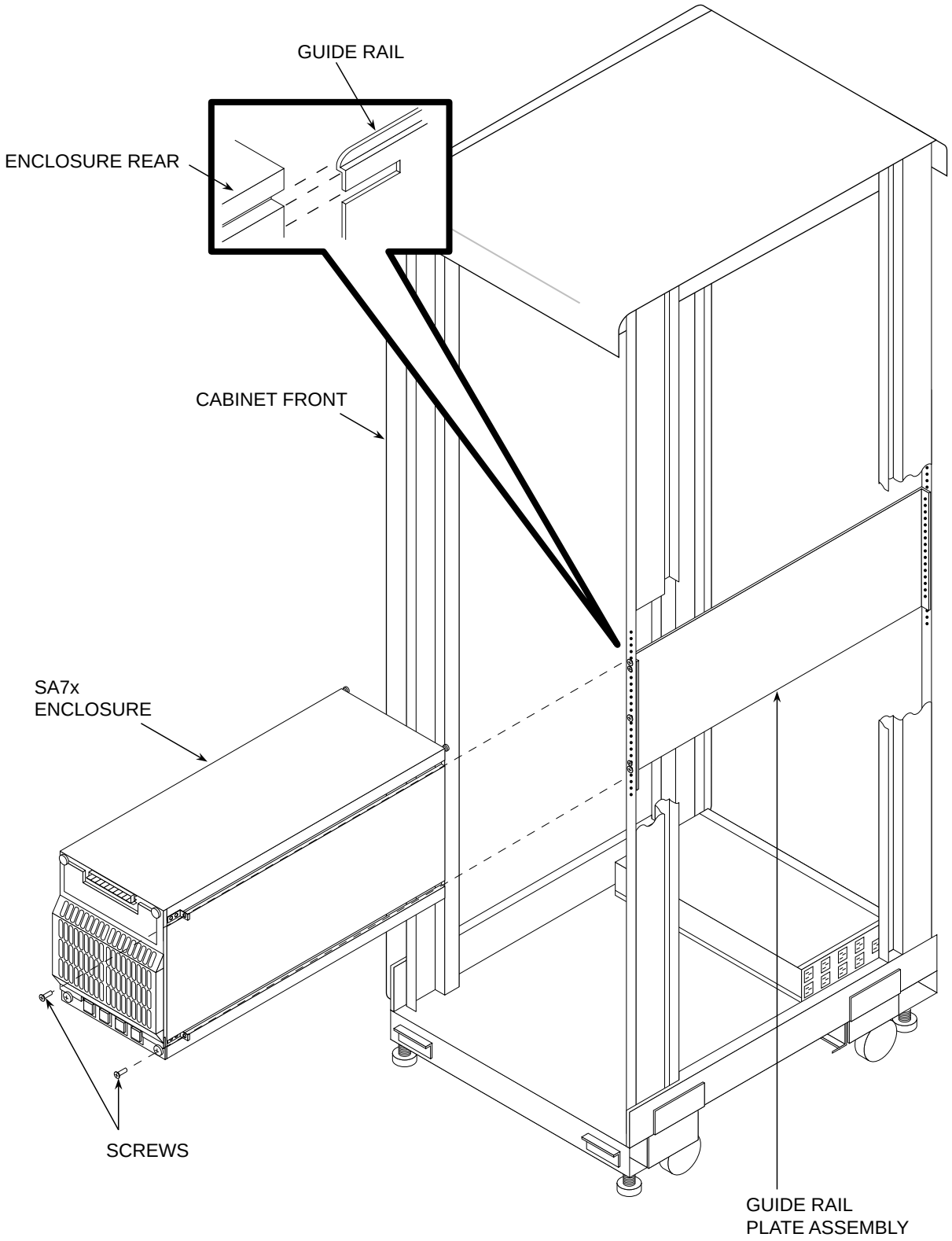
   a. Check that the three enclosure connector (TB1) mounting screws are tight.
   b. Align the OCP with the TB1 and push until the OCP is secure.
5. Install the OCP for a SA900 cabinet right-side installation.
   a. Loosen the two outer screws on TB1.
   b. Remove the center screw under "Attach Left Control Panel" on TB1 and slide TB1 to the left.
   c. Insert and tighten the center screw under "Attach Right Control Panel" on TB1.
   d. Tighten the two outer screws on TB1.

CAUTION

Do not bend the alignment or connector pins when installing the OCP. The panel should fit without being forced.

   e. Align the OCP with the TB1 and push until the OCP is secure.

Figure 5–38 Installing the SA7x Enclosure in the SA900



5.11.3 Installing SDI Cables and Power Cords

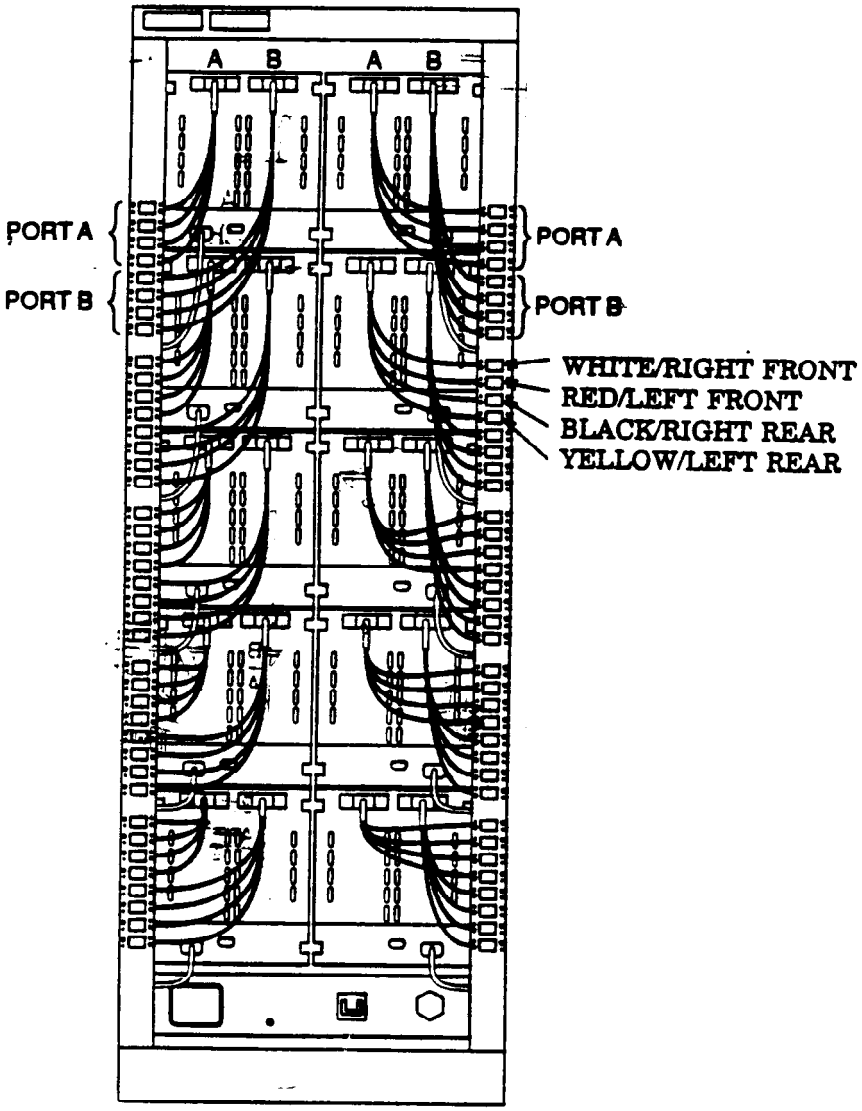
The SA900 storage array is shipped with internal cables and power cords for storage devices installed at the factory. However, when you install SA7x enclosures, you must install the internal SDI cables and connect the power cords. If external SDI cables are required, they are ordered separately and shipped at the same time the add-on is shipped. (Table 3–2 lists the external SDI cables.)

The H9A00 cabinet includes a left and a right vertical I/O bulkhead as shown in Figure 5–39. Storage devices are connected by SDI cables to one of the five sets of eight connectors on each bulkhead. A total of 10 devices can be connected to the I/O bulkheads. The RA9x drive uses two SDI cables; the SA7x enclosure uses two special one-to-four cables. Each cable terminates with four connectors. The SA900 storage array can accommodate a maximum of 10 RA9x disk drives or 10 SA7x enclosures or 80 ports.

Use the following procedure to install and connect SDI cables and power cords:

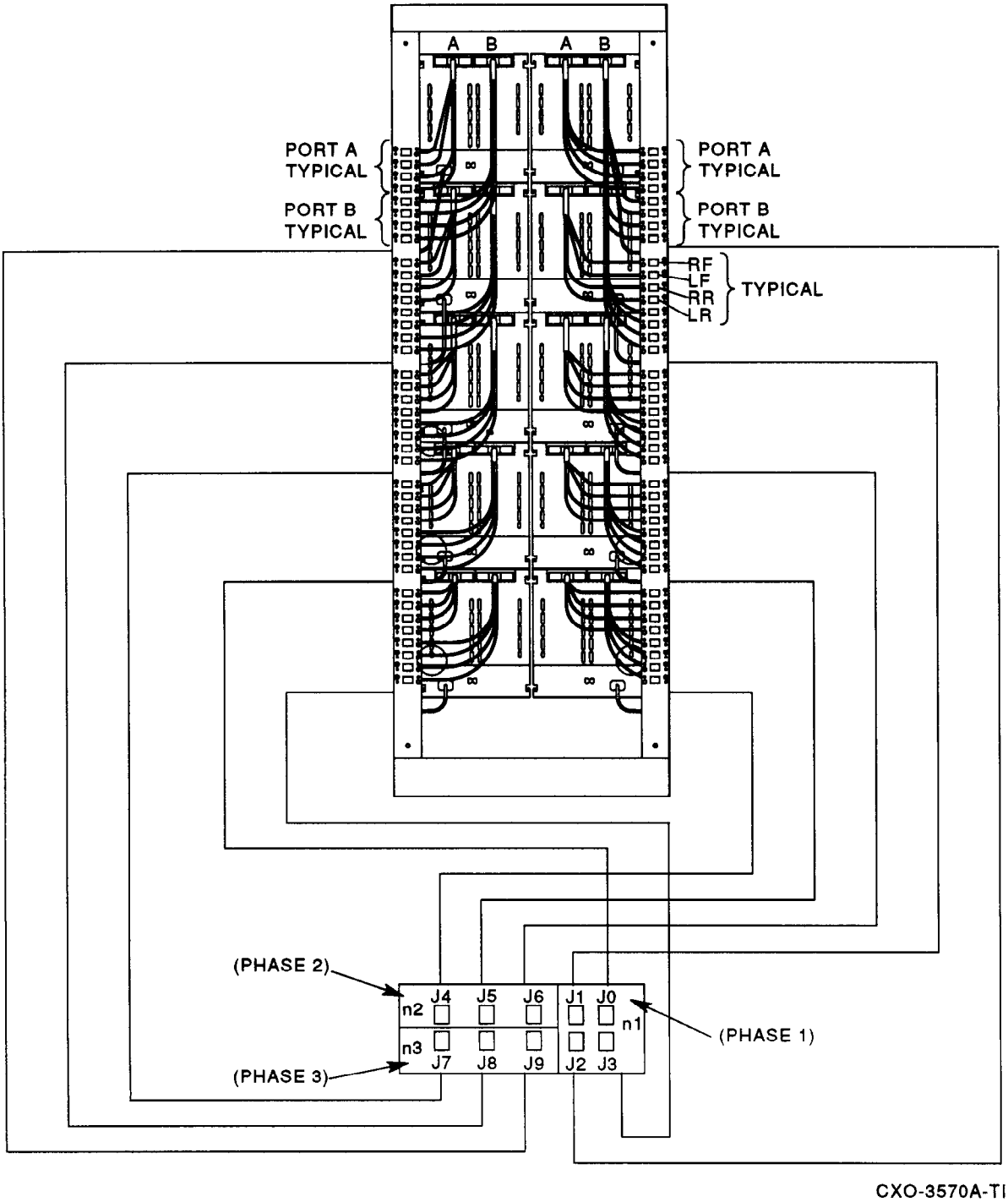
1. Make sure that the Line Voltage Selector switch is in the proper position and the Master On/Off switch on the enclosure is off. (See Section 3.7 for information about setting the Line Voltage Selector switch.)
2. Install the cables from the drives and the enclosures on the left side of the cabinet to the left vertical I/O bulkhead; install the cables from the drives and the enclosures on the right side of the cabinet to the right vertical I/O bulkhead. (See Figure 5–39.)
3. Connect the SDI cable connectors to the Port A and Port B connections on the rear of the SA7x enclosure. Connect the other end of the cable connectors to the vertical I/O bulkhead and secure with two 6-32 x 3/8-inch sems screws. (The top four ports in each group of eight correspond to Port A, and the bottom four ports in each group of eight correspond to Port B.)
4. Connect the power cords to the rear of the SA7x enclosure. (See Figure 5–40.)

Figure 5–39 SA900 SDI Cable Connections



5. Route the power cords from the storage devices on the right side of the cabinet down the right vertical I/O bulkhead.
6. Route the power cords from the storage devices on the left side of the cabinet down the left vertical I/O bulkhead.
7. Connect the power cord to the power controller connector specified in Figure 5–40.

Figure 5–40 SA900 Power Cords—SA7x Enclosures



8. Coil any excess power cord in front of the power controller.
9. Connect the external SDI cables in the SA900 storage array. Be sure to tighten the captive screws when connecting the external cables to the bulkhead.
10. Slide the external SDI cables through the appropriate slot on the filler panel. If necessary, remove the cable retainers on the filler panel to more easily access the slot. Then, replace the cable retainers.

5.11.4 Completing the Installation

Complete the installation as follows:

1. Restore power to the cabinet as explained in Section 3.9.
2. Turn on all storage devices in the cabinet.
3. Spin up all drives and place them on line.
4. Check out all storage devices as described in the component user guide or service manual.
5. Make sure that the rear panel will clear the external cables. If necessary, adjust the side panels to provide additional clearance as described in Section 3.4.
6. Replace the rear panel and close the front panel. (Refer to Figure 3–9.)

5.12 Installing a TA8x7 Series Storage Subsystem

Note

Use these procedures to install either a TA857 or a TA867 storage subsystem.

A TA8x7 series storage subsystem is actually two components:

- The magazine tape subsystem (TZ8x7)
- The SCSI/SDI adapter

When shipped from the factory, the adapter and the tape subsystem are located in the center of the SA900 cabinet. Figure 5–41 lists the add-on sequence numbers for TA8x7 series storage subsystems. These are the only authorized positions. Make sure to fill the empty positions in the sequence order. If the positions are already filled by other components, move the components to another position.

Installation Restrictions

TA8x7 storage subsystems are only installed in SA900 storage arrays. They are not installed in any other storage array.

Your responsibilities for installing a TA8x7 series storage subsystem includes the following:

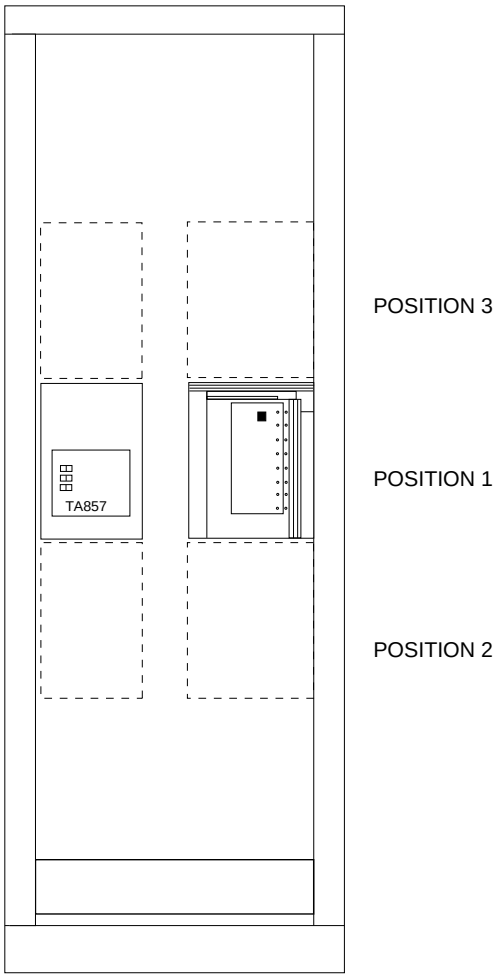
- You must install and route the **external** SDI/STI cable between the adapter-interface and the HSC controller, including those installed at the factory.
- You must install the mounting hardware.

- You must install and route the internal SCSI/SDI cables and the power cords.

WARNING

To maintain cabinet stability, always add the components in the order shown in Figure 5–41. Failure to comply may cause the cabinet to tip over causing personnel injury and equipment damage.

Figure 5–41 TA8x7 Series Storage Subsystem Add-On Sequence



CXO-3553A-MC

5.12.1 Preparing for Installation

Use the following procedure to prepare for installing TA8x7 storage subsystems:

1. Remove the rear cabinet panel and front door.
2. Remove the grill from the front door. From the back side of the front door, remove the four screws that hold the grill to the front door opening. The grill will come free.

Note

The following steps are performed from the rear side of the front door.

3. Install the trim weldment on the same side as the door latch and secure with two screws (8-32 x 1/4-inch).
4. Install the bezel weldment with the opening nearest to the inner edge of the door.
5. Install the bezel stiffner onto the bezel weldment under the lip of the door, aligning the screws holes over the four studs and secure with four kepnuts (8-32).
6. Install the two guide rail plate assemblies in the tape drive and adapter locations. (Refer to Section 5.6.)

5.12.2 Installing the TA8x7 Series Storage Subsystem

Use the following procedure to install TA8x7 storage subsystem in an SA900 storage array:

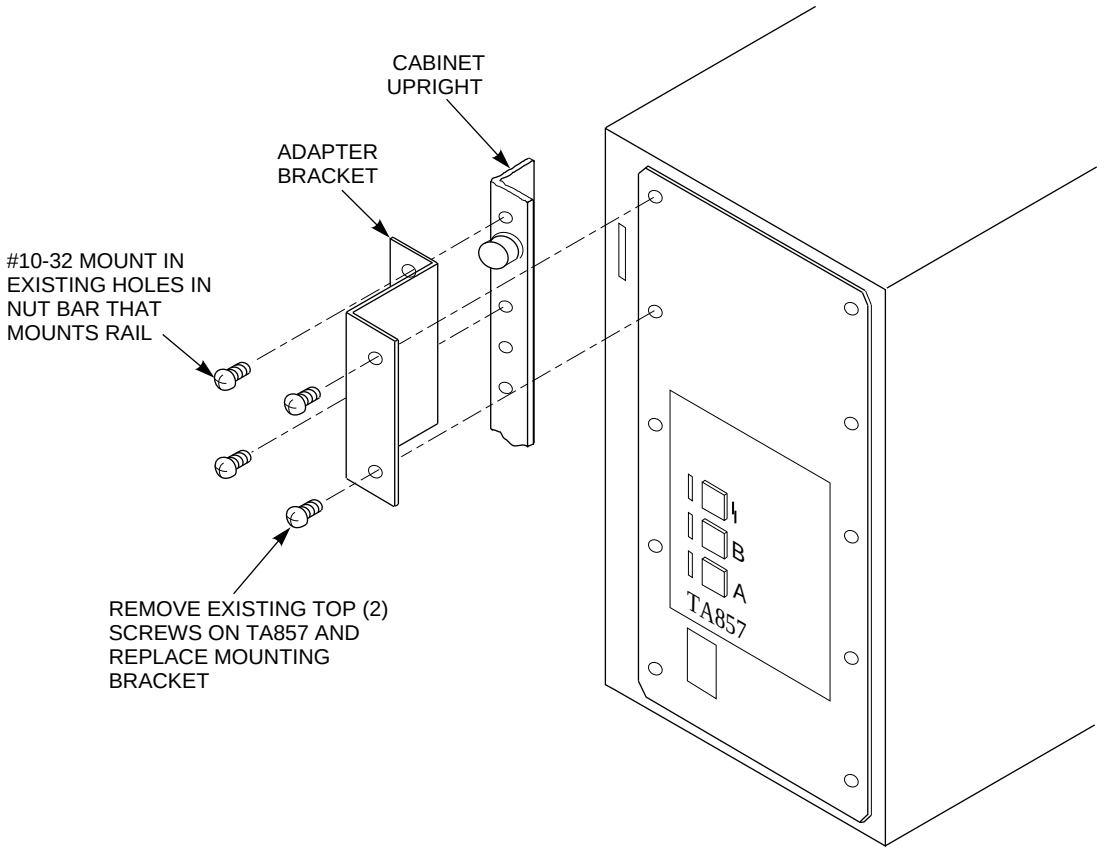
WARNING

To prevent injury when lifting an object weighing approximately 24.95 kgs (55 lbs), use at least two people or a Digital-approved lifting device.

1. Lift the TZ8x7 tape subsystem into position at the front of the cabinet, place it on the right side of the cabinet, and slide it part way into the cabinet. (Refer to Figure 5–11.)
2. Using the same procedure as in Step 1, place the SCSI/SDI adapter-interface on the left side of the cabinet.
3. Seat the side grooves of both components securely on the cabinet guide rails (see Figure 5–42) and slide them part way into the cabinet.
4. Remove the lifting device.
5. Connect the two chassis retaining brackets to the TZ8x7 using the short pan-head screws (10-32 x 1/4-inch) and inserting the screws into the front pair of holes, as shown in Figure 5–37.
6. Slide the TZ8x7 tape subsystem into the cabinet and secure with the long pan-head screws (10-32 x 3/4-inch) to connect the chassis retaining brackets to the cabinet.
7. Remove the top two screws from the left front of the adapter.
8. Secure the adapter bracket with the two screws. Refer to Figure 5–42.

9. Push the adapter into the cabinet so that the adapter bracket aligns with the mounting holes and secure with the two pan-head screws (10-32 x 3/4-inch).
10. Install the front door.
11. Close the front door and check for alignment. The TZ8x7 tape subsystem should be flush with the front of the door and the adapter flush with the recess port.

Figure 5–42 Installing Mounting Brackets



5.12.3 Installing Cables

For all TA8x7 storage subsystem installations, you must install the following items:

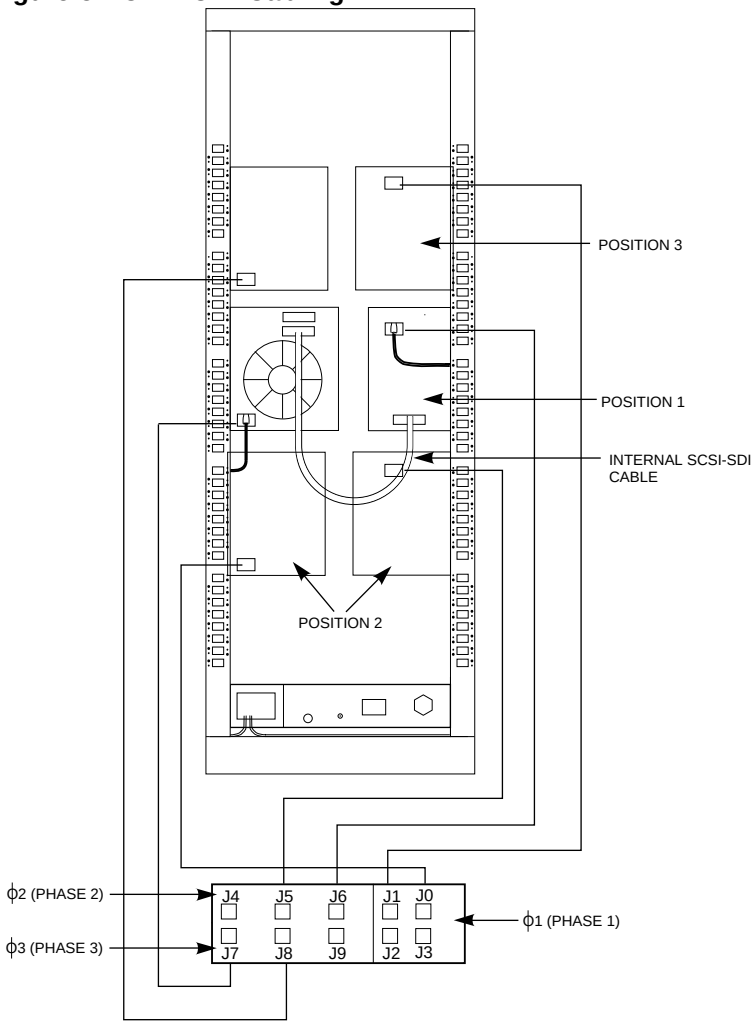
- The 7.6 meter (25 foot) external SDI/STI cable between the adapter-interface and the SDI/STI controller
- The internal SCSI-SDI cable between the adapter-interface and the TZ8x7 tape subsystem
- The power cords from the power controller to the TZ8x7 tape subsystem and the adapter-interface

Each TA8x7 storage subsystem is shipped with these four cables.

Use the following procedure to connect the TA8x7 cables:

1. Make sure the circuit breaker for the TZ8x7 tape subsystem is in the off position.
2. Make sure voltage settings on the rear of the TZ8x7 subsystem match the cabinet. These switches are not settable.
3. Connect the power cords to the TZ8x7 tape subsystem and the SCSI/SDI adapter-interface to the power controller, as shown Figure 5–43.
4. Connect the SCSI/SDI adapter cable to the adapter-interface SCSI/SDI bus connector, as shown in Figure 5–43. Only one SCSI/SDI cable connector is compatible with the SCSI/SDI bus connector.

Figure 5–43 TA8x7 Cabling



CXO-3554A-MC

5. Connect the other end of the SCSI/SDI adapter cable to the bottom connector on the TZ8x7 tape subsystem.

6. Connect the SCSI terminator into the upper connector on the TZ8x7 tape subsystem.
7. Connect the the 7.6 meter (25 foot) SDI/STI external interface cable to either the Port A (left) or the Port B (right) connector on the adapter-interface.
8. Route the external SDI cable behind the right bulkhead and out the bottom of the cabinet. Connect to the controller connector on the bulkhead.

5.12.4 Completing the Installation

Complete the following installation procedure:

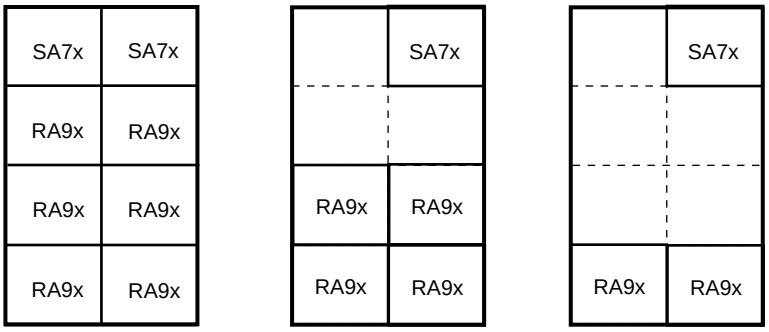
1. On the rear of the TZ8x7 tape subsystem, set the SCSI node ID on the DIP switches.
2. Restore power to the cabinet as explained in Section 3.9.
3. Turn on all disk drives, tape drives, and SCSI/SDI adapter-interfaces.
4. Spin up all drives and place them on line.
5. Verify that all devices are functioning properly by completing the checkout procedures described in the appropriate device user guide or service manual.
6. Replace the rear cabinet panel.

5.13 Upgrading an SA600/SA800 Storage Array to an SA650/SA850 Storage Array

This section contains instructions for upgrading the SA600 or SA800 storage array to an authorized SA650 or SA850 storage array configuration.

SA600/SA800 storage arrays have internal SDI cables and power cords factory installed for eight RA90 or RA92 disk drives, respectively. To upgrade to an SA650 or SA850 storage array configuration, you must remove the factory installed SDI cabling and the RA9x drives installed in the **top level positions**. Figure 5–44 shows the tested and **authorized** SA650 and SA850 storage array configurations.

Figure 5–44 SA650/SA850 Authorized Configurations (Front Views)



Note

Before starting the upgrade, read and comply with the information in Section 5.2.

The upgrade kit listed in Appendix B includes the items listed below for upgrading an SA600 or SA800 storage array to an SA650 or SA850 storage array, respectively:

- SA7x enclosure
- Guide rail plate assembly
- Hardware mounting kit
- Internal SDI cables
- Power cord

5.13.1 Preparing for the Upgrade

Preparing to upgrade a storage array involves removing the panels, turning off the power, and disconnecting the SDI cables as described in the following procedure:

1. Remove the front cabinet panel.

   Use a hex wrench to turn the two quarter-turn fasteners at the top of the panel counter-clockwise.

2. Grasp the panel by the edges, tilt it toward you and lift it up approximately two inches. Remove the panel and store it in a safe place.

3. Remove the rear cabinet panel

Use a hex wrench to turn the two quarter-turn fasteners at the top of the panel counter-clockwise.

4. Grasp the panel by the edges, tilt it toward you and lift it up to disengage the pins at the bottom. Remove the panel and store it in a safe place.
5. Remove all power from the cabinet and the disk drives.

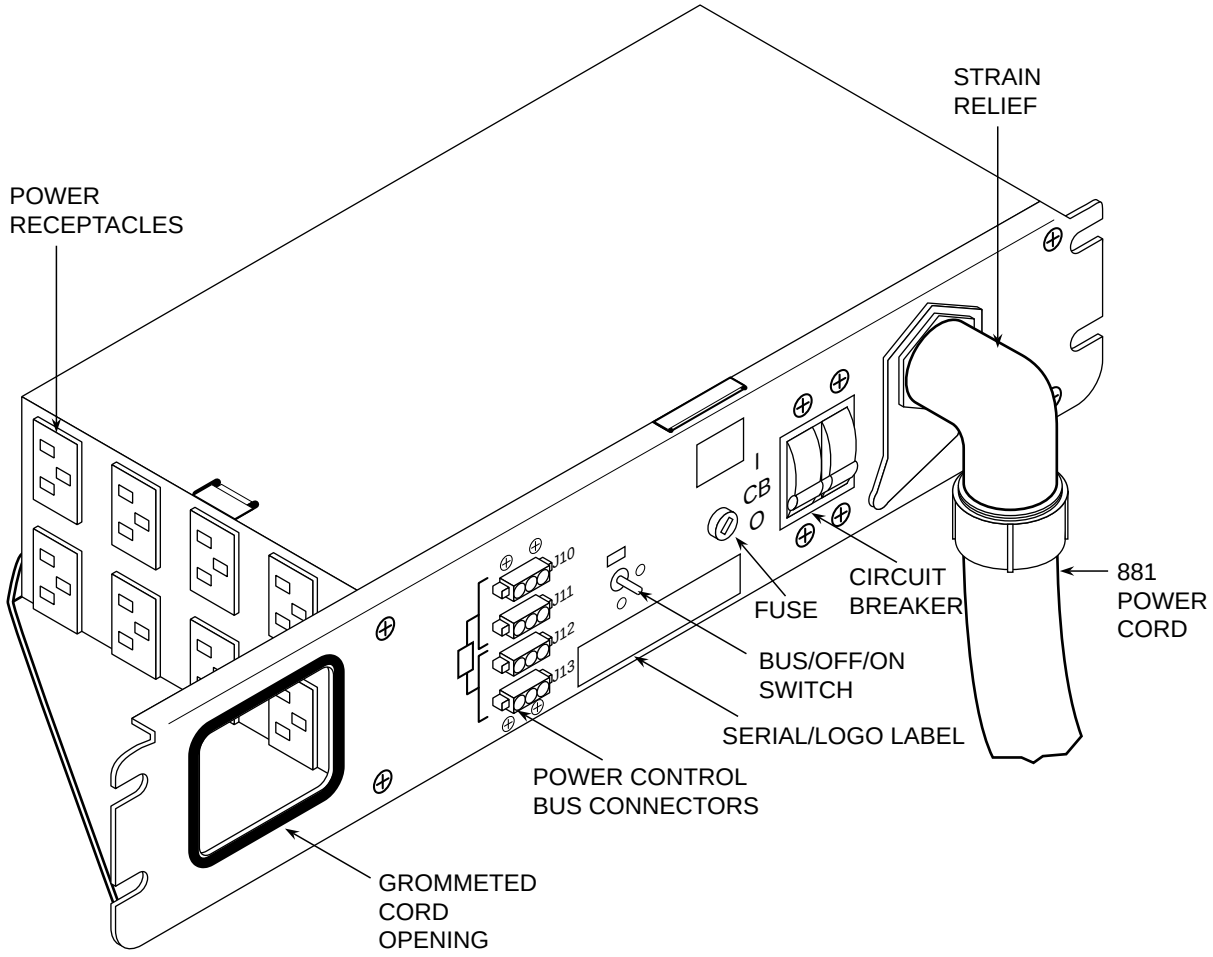
   Place the disk drive circuit breakers to the off position.
6. Set the circuit breaker in the off (center) position on the power controller circuit breaker, as shown in Figure 5–45.
7. Set the Bus/Off/On switch in the off (down) position.

Note

Record internal and external SDI cable connections before proceeding.

8. Disconnect all external SDI cables.
9. Disconnect the **top level position** internal SDI cables from the rear of the disk drives.
10. Disconnect the **top level position** power cords from the disk drives.
11. Disconnect **all** internal SDI cables from the bulkhead panel.
12. Lift the cable troughs upward and toward the cabinet front.
13. Remove **top level position** disk drive internal SDI cables.
14. Unfasten the captive screw in the center of the I/O bulkhead assembly and rotate the bulkhead assembly out and down from the cabinet.
15. Lift the bulkhead assembly straight up until its bottom slots clear the I/O frame pins as shown in Figure 5–46.

Figure 5–45 Power Controller



5.13.2 Removing RA9x Disk Drives

This following **optional** procedure is accomplished whenever there is an RA9x disk drive in either top position of the storage array. If this is not the case, proceed to upgrading the I/O bulkhead as described in Section 5.13.3.

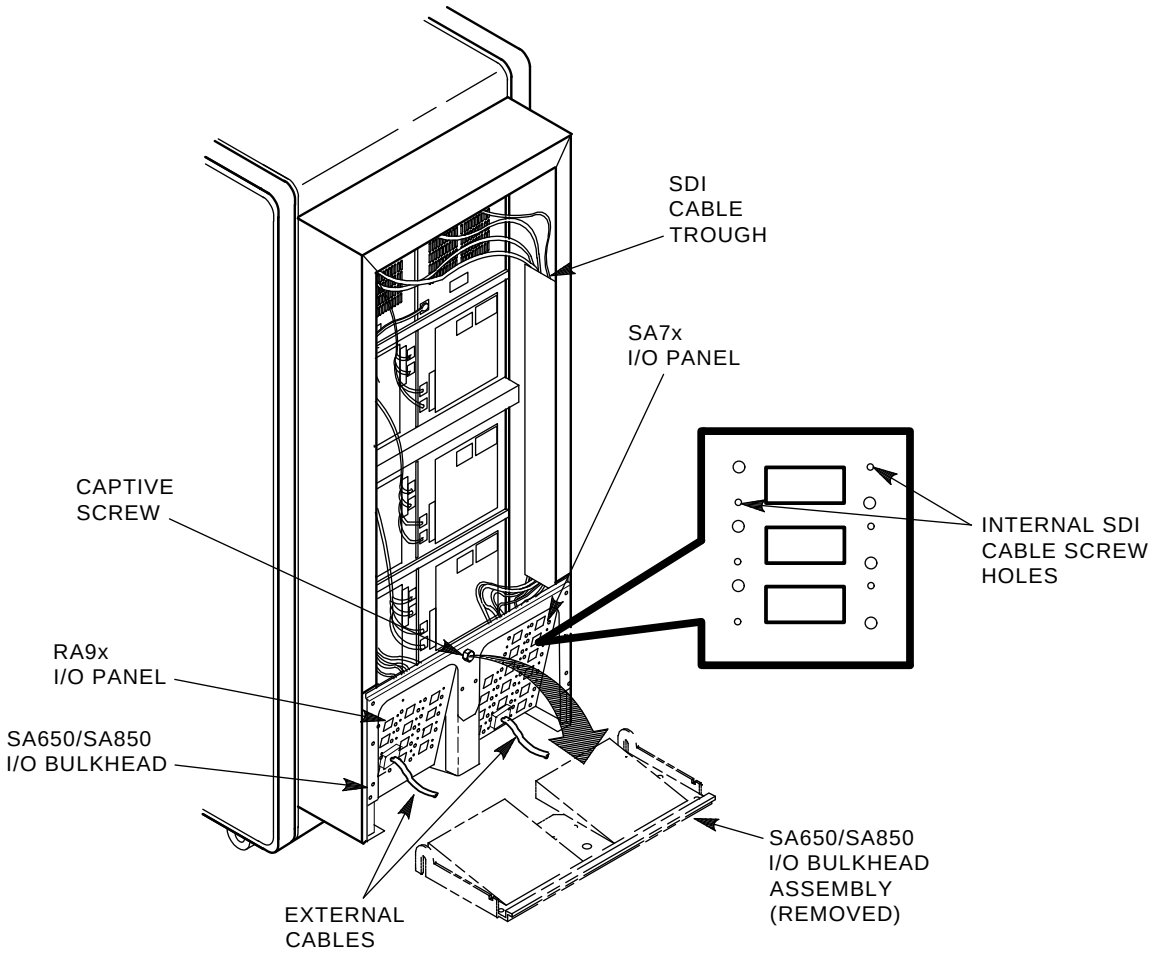
1. At the front of the drive, remove the screws, chassis stabilizer brackets, and chassis retaining brackets and pull the drive forward slightly.
2. From the front of the cabinet, pull the drive forward and remove it using a Digital-approved lifting device or with two people.

5.13.3 Upgrading the I/O Bulkhead

1. Remove the two disk drive I/O panels. Save the 12 #6 screws (six on each panel) for installing the upgrade panel assembly.
2. Install the new RA9x I/O bulkhead panel and the new SA7x I/O bulkhead panel in the I/O bulkhead assembly with the 12 #6 screws you previously removed.

3. Connect internal SDI cables for all RA9x drives as shown on the configuration label shown in Figure 5–47.

Figure 5–46 SA650/SA850 I/O Bulkhead



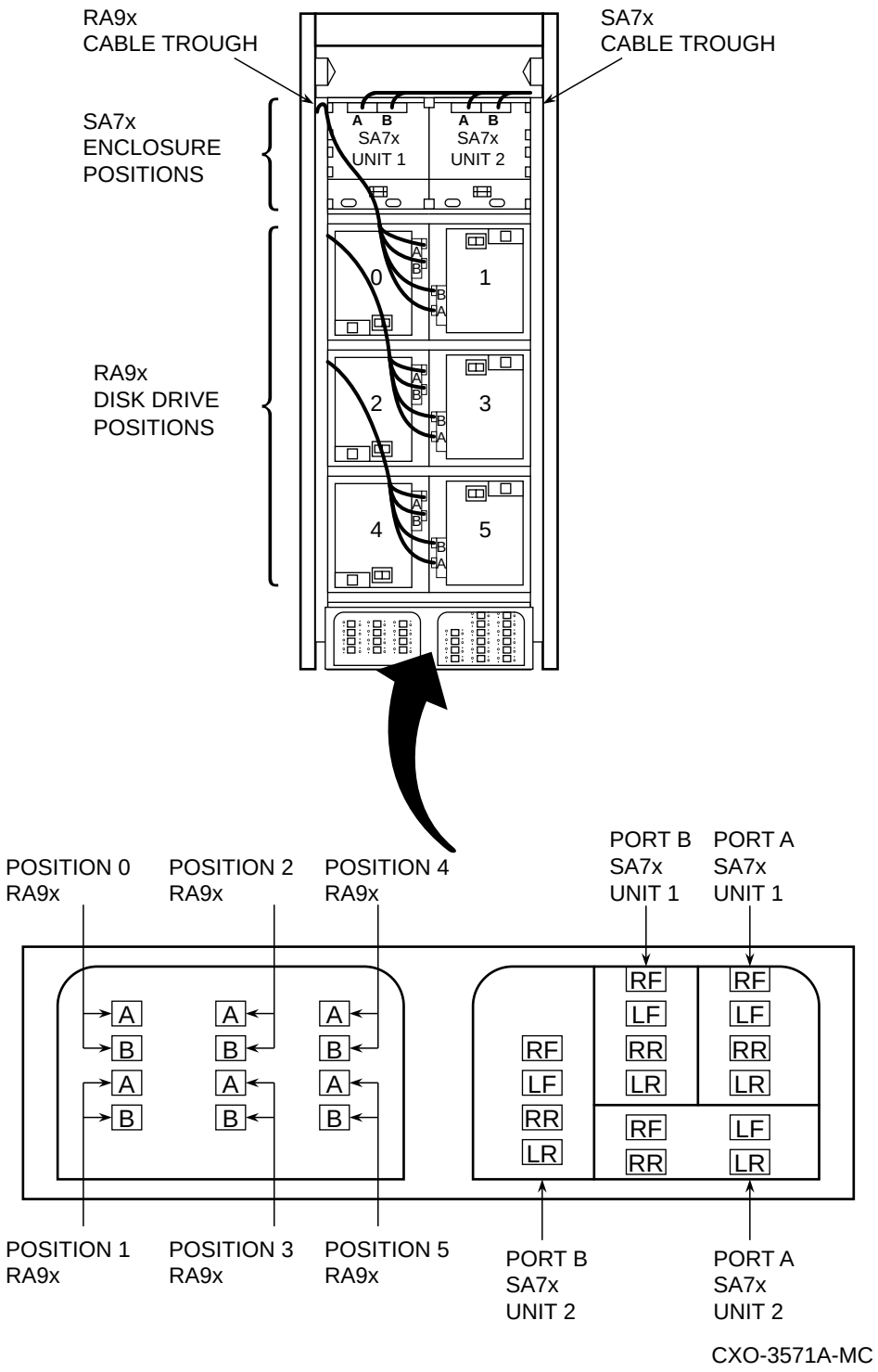
5.13.4 Installing the SA7x Enclosure

Use the following procedure to install the guide rail plate assembly in the SA7x enclosure position, as shown in Figure 5–48:

Note

The spacer shown in Figure 5–48 is not used for this installation.

Figure 5–47 SA650/SA850 SDI Cabling



1. Position the guide rail plate on the left or right side of the cabinet frame, depending on which side the enclosure will be installed.
2. Use three shoulder screws and lock washers to connect the back of the guide rail plate to the back of the cabinet frame. Fasten the screws into the nut bar behind the frame.
3. Use four 10-32 x 5/8-inch flat-head screws to connect the mounting bracket and mounting rail to the front cabinet frame. Fasten the screws into the nut bar in front of the mounting rail.
4. Use three 10-32 x 7/16-inch shoulder screws and lock washers to connect the front of the mounting bracket to the front of the cabinet frame. Fasten the screws into the nut bar behind the frame.
5. Install the SA7x enclosures as explained in (Section 5.10).

5.13.5 Installing SDI Cables and Power Cords

Use the following procedure to install the SDI cables and power cords as shown in Figures 5–47 and 5–49:

1. Connect the SDI cables to the Port A and Port B connectors on the rear of the SA7x enclosure.
2. Lift up and push back the cable trough on the right.
3. Route the SA7x internal SDI cables through the cable trough on the right.
4. Connect SA7x internal SDI cables to the SA7x I/O panel as shown on the configuration label in Figure 5–47.
5. Make sure that the SA7x front panel drive power switches and the rear panel Master On/Off power switch are off.
6. Make sure that the line voltage selection is in the correct position (120 Vac or 240 Vac).
7. Connect the power cord to the SA7x enclosure.
8. Verify that the enclosure power cord is connected to either J7 or J8 on the power controller as shown in Figure 5–49.

Figure 5–48 Assembling the Guide Rail Mounting Assembly

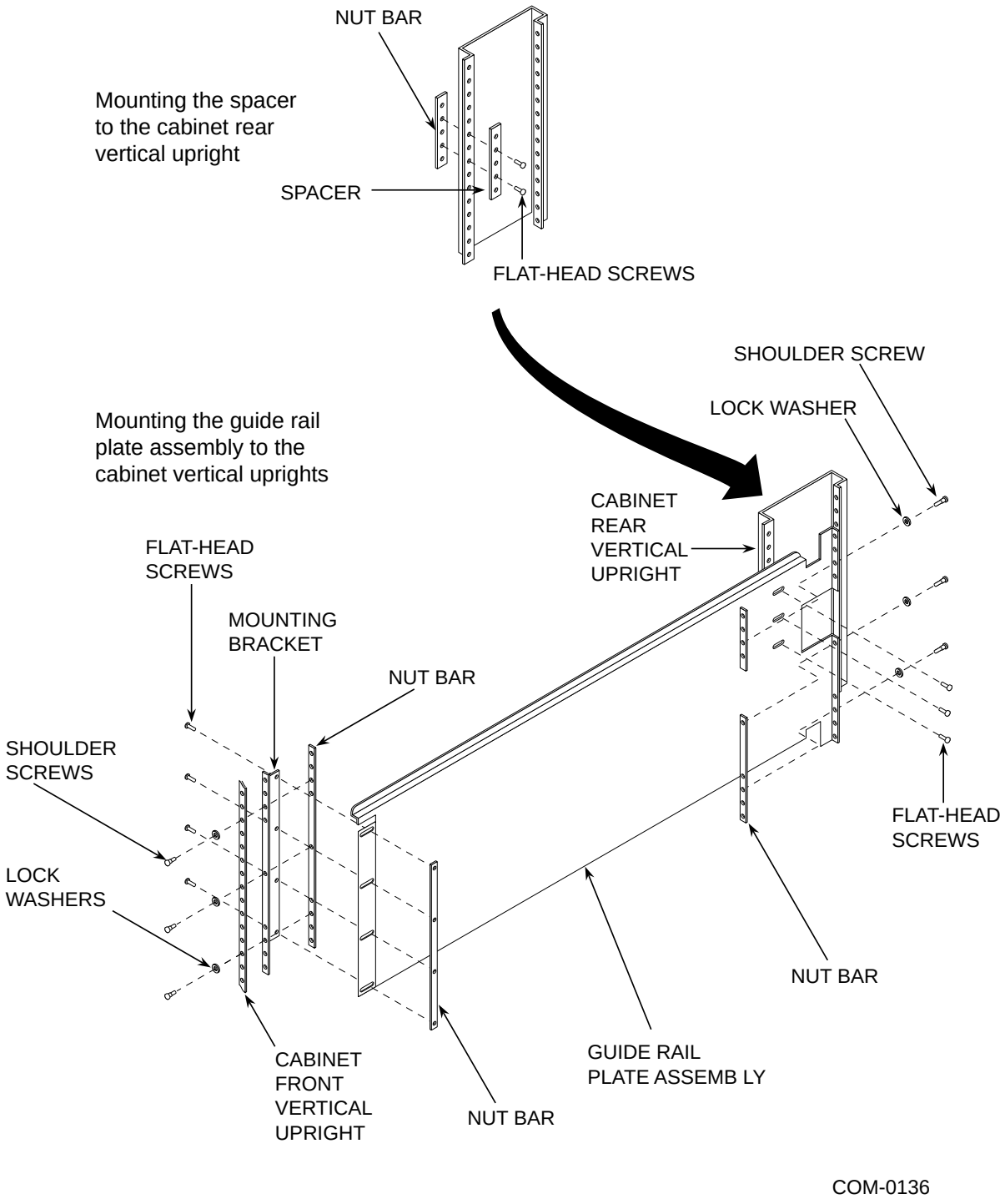
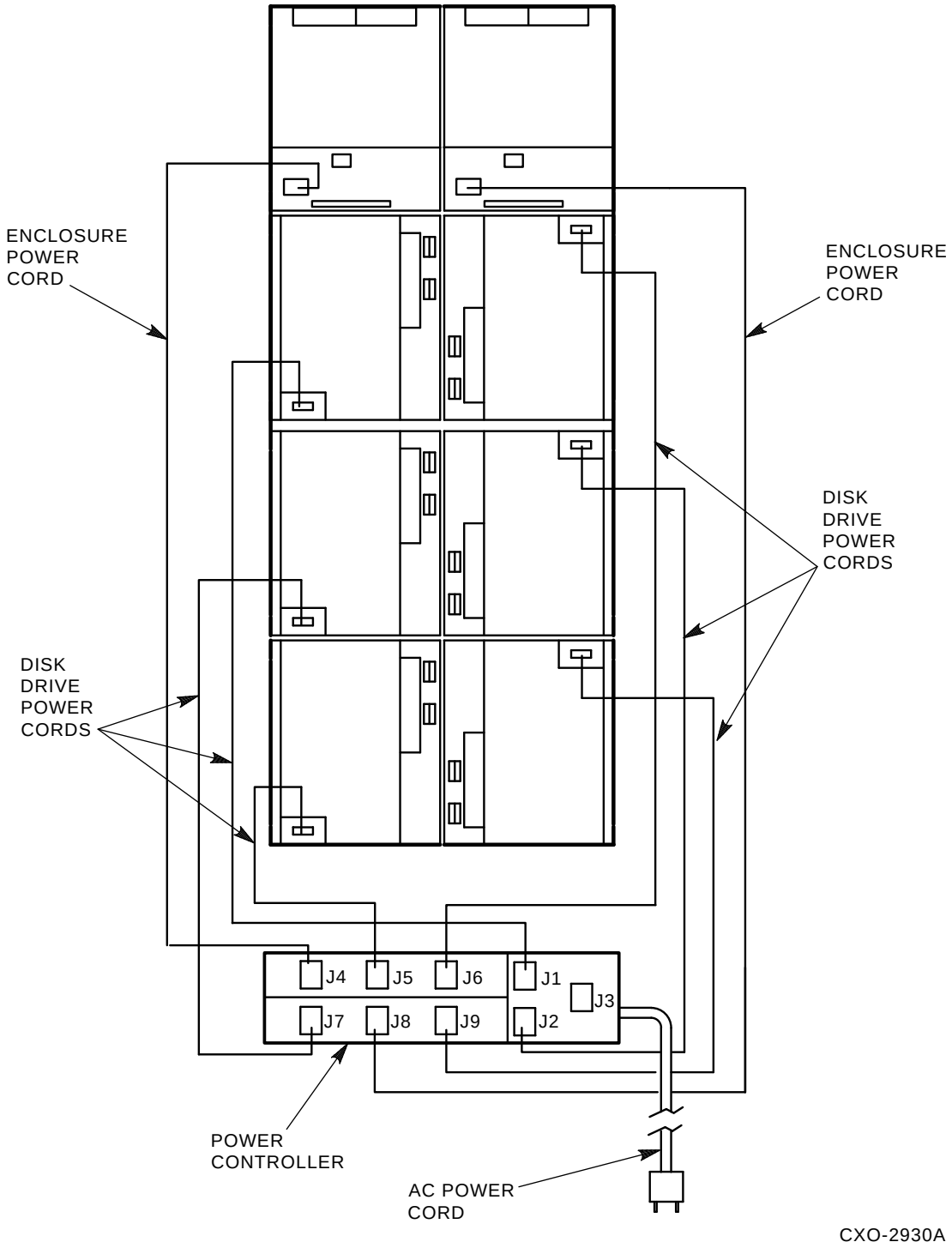


Figure 5–49 SA650/SA850 Power Cord Connections



5.13.6 Completing the Upgrade

The following procedure is the final phase of the upgrade procedure:

1. Replace the I/O bulkhead by pivoting it upward until it seats against the bulkhead frame and securing it with the captive screw. (Refer to Figure 5–46.)
2. Place the power controller circuit breaker to the on (up) position.
3. Set the power controller Bus/Off/On switch to the on (middle) position.
4. Set the SA7x enclosure Master On/Off switch to on.
5. Set the RA9x disk drives circuit breakers to on.
6. Spin up all drives and place them on line.
7. Check out all devices as described in their respective user guides or service manuals.
8. Replace the rear panel by lifting it into place and fitting the pins into the holes located at the top of the I/O bulkhead.
9. Push the top of the panel into place and use the hex wrench to turn the two fasteners one-quarter turn clockwise.
10. Lift the front panel into place and lower it straight down until the tabs on the panel's lower edge engage with the corresponding slots on the support bracket in the cabinet base.
11. Hold the panel flush with the cabinet and turn the fasteners one-quarter turn clockwise to lock.
12. If the unit has "SA600" already silk screened to the door, apply the new stick-on SA650 medallion over the SA600 label. Remove the backing on the SA650 medallion, position the template over the SA600 label, and install the new medallion in the template slot.
13. If the unit already has an SA600 or SA800 medallion, remove it by unscrewing the two wing nuts on the rear side of the door. Install the new SA650 or SA850 medallion using the wing nuts.
14. Affix the new configuration label over the existing SA600/SA800 configuration label.
15. Fill in the product conversion label and affix it to the rear of the unit adjacent to the existing labels.

A

Environmental Stabilization

Always ensure environmental stabilization of the disk drive or prior to installation or before operation if the disk drive has been removed from its normal operating site. Otherwise, the drive media or associated electronics may be damaged. Environmental stabilization includes temperature and humidity stabilization.

When condensation is visible on the outside of the disk drive, stabilize the disk drive or enclosure in the operating environment for six hours or until the condensation is no longer visible, whichever is longer. Do not insert the disk drive into the SA7x enclosure until it is fully stabilized.

When there is no condensation visible on the drive, Table A–1 lists the correct thermal stabilization times.

Table A–1 Thermal Stabilization Specifications

Temperature Range Degrees C	Temperature Range Degrees F	Minimum stabilization time
60 to 66	l40 to 151	3 hours
50 to 59	122 to 139	2 hours
40 to 49	104 to 121	1 hour
30 to 39	86 to 103	30 minutes
18 to 29	65 to 85	No stabilization required
10 to 17	50 to 64	30 minutes
0 to 9	32 to 49	1 hour
–10 to –1	14 to 31	2 hours
–20 to –11	–4 to 13	3 hours
–30 to –21	–22 to –5	4 hours
–40 to –31	–40 to –21	5 hours

B

Storage Array Part Numbers

Table B–1 lists cable part numbers. Table B–2 lists the assembly part numbers for the storage arrays.

Table B–1 Cable Part Numbers

Power Cord	Part Number
2.74 m (9 ft)	17–00442–19

Internal SDI Cables	Part Number
H9646 Cabinet	
RA9x—1.68 m (5.5 ft)	17–01482–01
RA7x—1.68 m (5.5 ft)	17–01699–01
H9A00 Cabinet	
RA9x—.76 m (2.5 ft)	17–01482–06
RA7x—.76 m (2.5 ft)	17–01699–03

External SDI Cables	Standard Part Number	Fire Code Part Number
H9646 Cabinet		
3.7 m (12 ft) cable	BC26V–12/BC26G–12	BC26J–12
7.6 m (25 ft) cable	BC26V–25/BC26G–25	BC26J–25
15.2 m (50 ft) cable	BC26V–50/BC26G–50	BC26J–50
24.4 m (80 ft) cable	BC26V–80/BC26G–80	BC26J–80
H9A00 Cabinet		
3.7 m (12 ft) cable	BC26V–12/BC26G–12	BC26J–12
7.6 m (25 ft) cable	BC26V–25/BC26G–25	BC26J–25
7.6 m (25 ft) cable	BC27V–25[1]/N/A	N/A
15.2 m (50 ft) cable	BC26V–50/BC26G–50	BC26J–50
24.4 m (80 ft) cable	BC26V–80/BC26G–80	BC26J–80

[1]TA857 and TA867 storage subsystems only.

Table B–2 SAxxx Assembly Part Numbers

Power Controllers	Part Number
881A power controller	30–24374–01
881B power controller	30–24374–02
887B power controller	30–32959–01
Deskidding Ramps	**Part Number**
H9646 Cabinet	
Left ramp	99–07689–01
Right ramp	99–07689–02
H9A00 Cabinet	
Left ramp	99–08897–02
Right ramp	99–08897–01
Filters	**Part Number**
SA550 storage array	12–13121–37 12–13121–28
SA600 storage array	12–13121–31
SA650 storage array	12–13121–32
SA800 storage array	
SA850 storage array	
SA900 storage array	12–13121–33
RA9x Field Add-On Kits	**Part Number**
SA900	70–29378–02
SA7x Field Add-On Kits	**Part Number**
SA550 storage array	70–29379–04
SA600 storage array	70–27967–01 70–29379–04
SA650 storage array	70–29379–04
SA800 storage array	70–27967–01 70–29379–04
SA850 storage array	70–29379–04
SA900 storage array	70–29379–01
Lifting Device	**Part Number**
Digital-approved lifting device	FC–10117–AC

C

RA7x and SA7x Configurations

Tables C–1 and C–2 show authorized RA7x disk drive and SA7x enclosure configurations.

The description column of the RA7x configuration table contains the following information:

- Authorized installation:
  Factory installation—Only installed at the factory.
  Field add-on—Only installed in the field.
- Enclosure:
  Enclosures in which the disk drive may be installed.

Table C–1 RA7x Fixed Disk Configurations

RA7x Disk Drive	Description	Minimum Storage Capacity
RA70–A	Field add-on: SA70 options in storage arrays.	0.28 GB
RA70E–SA	Factory installation: MicroVAX 3500, 3600, and 3900	0.28 GB
RA70E–SF	Field add-on: MicroVAX 3500, 3600, and 3900	0.28 GB
RA71–AF	Factory installation: SA71 enclosure	0.70 GB
RA71–AK	Field add-on: SA71 enclosure	0.70 GB
RA72–AF	Factory installation: SA71 enclosure	1.0 GB
RA72–AK	Field add-on: SA72 enclosure	1.0 GB
RA73–AF	Factory installation: SA73 enclosure	2.0 GB
RA73–AK	Field add-on: SA73 enclosure	2.0 GB

The description column of Table C–2 contains the following information:

- Authorized installation:
  Factory installation—Only installed at the factory.
  Field add-on—Only installed in the field.
- Storage Array:
  Systems and storage arrays in which the disk drive or enclosure may be installed.

Table C–2 SA7x Configurations

Enclosure	Description	RA70 Disk Drive	RA71 Disk Drive	RA72 Disk Drive	RA73 Disk Drive	Minimum Storage Capacity
SA70–HK	Field add-on SA550/SA650/SA850[1] 120-240 Vac, 50-60 Hz	2	0	0	0	0.56 GB
SA70–JK	Field add-on SA550/SA650/SA850[1] 120-240 Vac, 50-60 Hz	4	0	0	0	1.12 GB
SA70–LK	Storage array building block DECsystem 5800/VAX 6000[2] 120-240 Vac, 50-60 Hz	2	0	0	0	0.56 GB
SA70–MK	Storage array building block DECsystem 5800/VAX 6000[2] 120-240 Vac, 50-60 Hz	4	0	0	0	1.12 GB
SA71–CK	Field add-on SA550/SA650/SA850 120-240 Vac, 50-60 Hz	0	1	0	0	0.70 GB
SA71–EK	Field add-on SA900 120-240 Vac, 50-60 Hz	0	1	0	0	0.70 GB
SA71–FK	Field add-on SA900 120-240 Vac, 50-60 Hz	0	4	0	0	2.8 GB
SA71–GK	Factory installation SA900 120-240 Vac, 50-60 Hz	0	1	0	0	0.70 GB
SA71–HK	Factory installation SA900 120-240 Vac, 50-60 Hz	0	4	0	0	2.8 GB
SA71–JK	Field add-on SA550/SA650/SA850 120-240 Vac, 50-60 Hz	0	4	0	0	2.8 GB
SA71–LK	Field add-on SA600/SA800 120-240 Vac, 50-60 Hz	0	1	0	0	0.70 GB
SA71–MK	Field add-on SA600/SA800 120-240 Vac, 50-60 Hz	0	4	0	0	2.8 GB
SA72–CK	Field add-on SA550/SA650/SA850 120-240 Vac, 50-60 Hz	0	0	1	0	1.0 GB
SA72–EK	Field add-on SA900 120-240 Vac, 50-60 Hz	0	0	1	0	1.0 GB

[1] To install in an SA600 or SA800 storage array, *first* upgrade the storage array as described in Chapter 5.

[2] Adding the first SA7x to a VAX 6000™ or DECsystem™ 5800 system without internal storage devices requires an upgrade kit:
60 Hz system – Upgrade Kit 62X34–UA
50 Hz system – Upgrade Kit 62X34–UB

(continued on next page)

Table C–2 (Cont.) SA7x Configurations

Enclosure	Description	RA70 Disk Drive	RA71 Disk Drive	RA72 Disk Drive	RA73 Disk Drive	Minimum Storage Capacity
SA72–FK	Field add-on SA900 120-240 Vac, 50-60 Hz	0	0	4	0	4.0 GB
SA72–GK	Factory installation SA900 120-240 Vac, 50-60 Hz	0	0	1	0	1.0 GB
SA72–HK	Factory installation SA900 120-240 Vac, 50-60 Hz	0	0	4	0	4.0 GB
SA72–JK	Field add-on SA550/SA650/SA850 120-240 Vac, 50-60 Hz	0	0	4	0	4.0 GB
SA72–LK	Field add-on SA600/SA800 120-240 Vac, 50-60 Hz	0	0	0	1	1.0 GB
SA72–MK	Field add-on SA600/SA800 120-240 Vac, 50-60 Hz	0	0	4	0	4.0 GB
SA73–CK	Field add-on SA550/SA650/SA850 120-240 Vac, 50-60 Hz	0	0	1	0	2.0 GB
SA73–EK	Field add-on SA900 120-240 Vac, 50-60 Hz	0	0	0	1	2.0 GB
SA73–FK	Field add-on SA900 120-240 Vac, 50-60 Hz	0	0	0	4	8.0 GB
SA73–GK	Factory installation SA900 120-240 Vac, 50-60 Hz	0	0	0	1	2.0 GB
SA73–HK	Factory installation SA900 120-240 Vac, 50-60 Hz	0	0	0	4	8.0 GB
SA73–JK	Field add-on SA550/SA650/SA850 120-240 Vac, 50-60 Hz	0	0	0	4	8.0 GB
SA73–LK	Field add-on SA600/SA800 120-240 Vac, 50-60 Hz	0	0	0	1	2.0 GB
SA73–MK	Field add-on SA600/SA800 120-240 Vac, 50-60 Hz	0	0	0	4	8.0 GB

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