SAx05 Storage Array User Guide

Order Number EK–SAx05–UG–001

This guide explains how to install and operate the SAx05 storage array family, which consists of the SA705 and SA905 storage arrays.

Digital Equipment Corporation

December 1991

The postpaid Reader's Comment Card included in this document requests the user's critical evaluation to assist in preparing future documentation.

FCC NOTICE: The equipment described in this manual generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such radio frequency interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case the user at his own expense may be required to take measures to correct the interference.

This document was prepared and published by Educational Services Development and Publishing, Digital Equipment Corporation.

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About This Manual

The *SAx05 Storage Array User Guide* explains how to install and operate the SAx05 storage array family, which consists of the SA705 and SA905 storage arrays. This guide is intended for end users of the SAx05 storage arrays.

CAUTION
Digital recommends that the SAx05 storage arrays be installed by qualified Customer Services engineers only.

Organization of This Guide

The *SAx05 Storage Array User Guide* is organized as follows:

- Chapter 1 provides an overview of and specifications for each of the major components of the SAx05 storage array.
- Chapter 2 explains how to unpack and install the SAx05 storage array.
- Chapter 3 contains various operating procedures and a detailed description of the switches and indicators located on the front and rear of the SA70R–AK enclosure.
- Chapter 4 contains procedures for handling the RA7x–RK removable disk drives.
- Chapter 5 explains how to install an additional SA70R–AK enclosure in an SAx05 storage array.
- Chapter 6 explains how to verify if a problem exists in the SA70R–AK enclosure before calling Customer Services.
- Appendix A contains environmental stabilization information.
- Appendix B lists the minimum software/hardware versions required to support RA71/RA72 disk drives.

Conventions Used in This Guide

The following notations are used in this guide:

- **Note**—Identifies information that is of special interest.
- **Caution**—Identifies information that pertains to the protection of the equipment.
- **Warning**—Identifies information that pertains to personal safety.

The following terms (arranged alphabetically) are used to reference products:

- **Canister**—Identifies the housing used for the RA7x–RK removable disk drives.
- **H9646 cabinet**—Refers to the cabinet portion of the SA705 storage array.
- **H9A00 cabinet**—Refers to the cabinet portion of the SA905 storage array.
- **H9xxx cabinets**—Refers to both H9646 and H9A00 cabinets.

- **RA70–RK removable disk drive**—Refers to a type of disk drive used in the SA70R–AK enclosure. The RA70–RK consists of an RA70 disk drive mounted in a metal canister.
- **RA71–RK removable disk drive**—Refers to a type of disk drive used in the SA70R–AK enclosure. The RA71–RK consists of an RA71 disk drive mounted in a metal canister.
- **RA72–RK removable disk drive**—Refers to a type of disk drive used in the SA70R–AK enclosure. The RA72–RK consists of an RA72 disk drive mounted in a metal canister.
- **RA7x–RK removable disk drives**—Refers to all three types of removable disk drives: the RA70–RK, RA71–RK, and RA72–RK.
- **SA70R–AK enclosure**—Refers to the enclosure used in the SAx05 storage arrays. Each SA70R–AK enclosure accommodates up to four RA7x–RK removable disk drives.
- **SA705 storage array**—Refers to the entire SA705 system, including the H9646 cabinet, SA70R–AK enclosures, and RA7x–RK removable disk drives.
- **SA905 storage array**—Refers to the entire SA905 system, including the H9A00 cabinet, SA70R–AK enclosures, and RA7x–RK removable disk drives.
- **SAx05 storage arrays**—Refers to both SA705 and SA905 storage arrays.

Related Documentation

The following table lists, in alphabetical order, related documentation available from Digital Equipment Corporation:

Document Title	Order Number
881 Power Controller User Guide	EK–881PC–UG
SA705 Field Maintenance Print Set	MP–01432–01

1
Introducing the SAx05 Storage Arrays

1.1 About This Chapter

This chapter provides an overview of the SAx05 storage array family and lists the available configurations. This chapter also provides an overview of each of the components of the SAx05 storage array. These components are:

- The H9xxx cabinets
- The SA70R–AK enclosure
- The RA7x–RK removable disk drives

Specifications for the SAx05 storage arrays and their components are included at the end of this chapter.

1.2 SAx05 Storage Array Family Overview

The SAx05 storage array family consists of the SA705 and SA905 storage arrays. Each SAx05 storage array consists of three main components:

- **H9xxx Cabinet:** The H9xxx family of cabinets includes the H9646, which is a four-level cabinet, and the H9A00, which is a five-level cabinet. The H9646 cabinet is a component of the SA705 storage array. The H9A00 cabinet is a component of the SA905 storage array. Refer to Section 1.4 for an overview of the H9xxx cabinets.
- **SA70R–AK Enclosure:** The SA70R–AK enclosure provides power, control, and cooling for up to four removable disk drives. It is a component of both SAx05 storage arrays. Refer to Section 1.5 for an overview of the SA70R–AK enclosure.
- **RA7x–RK Removable Disk Drive:** The RA7x–RK family of removable disk drives includes the RA70–RK, RA71–RK, and RA72–RK. RA7x–RK removable disk drives are designed for use in an SA70R–AK enclosure and can be easily removed from the enclosure for transportation or storage. Refer to Section 1.6 for an overview of the RA7x–RK removable disk drives.

The SAx05 storage arrays comply with Digital Storage Architecture (DSA) requirements and can be used with any SDI (Standard Disk Interconnect) protocol controller and cable.

1.3 SAx05 Configurations

The SAx05 storage arrays are available in the following configurations:

- SA705–JA/JD (120 Vac/240 Vac)—Consists of one H9646 cabinet with four SA70R–AK enclosures. Each SA70R–AK enclosure contains four RA70–RK removable disk drives. (Refer to Figure 1–1.)

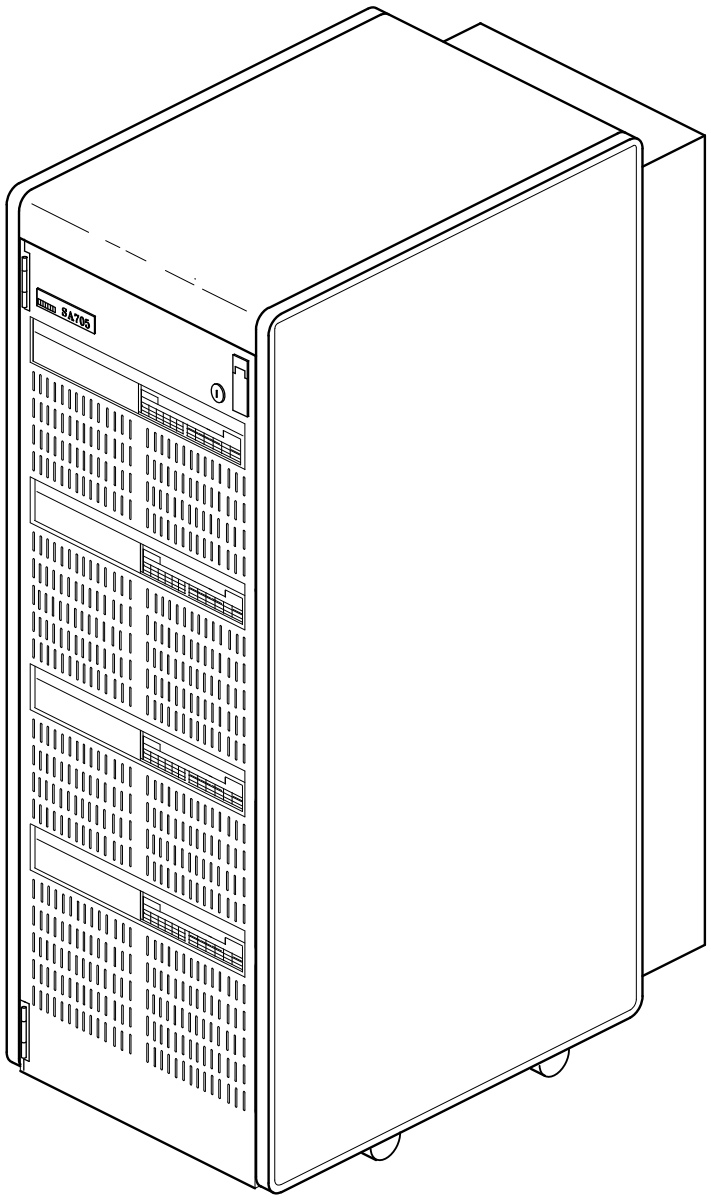

Figure 1–1 SA705–JA/JD Storage Array

- SA705–HA/HD (120 Vac/240 Vac)—Consists of one H9646 cabinet with two SA70R–AK enclosures. One enclosure contains four RA70–RK removable disk drives; the other contains none. The SA705–HA/HD will accommodate additional SA70R–AK enclosures and RA70–RK removable disk drives.

- SA905–AA/AD (120 Vac/240 Vac)—Consists of one H9A00 cabinet with one SA70R–AK enclosure. The enclosure contains two RA72–RK removable disk drives. The SA905–AA/AD will accommodate additional SA70R–AK enclosures and RA7x–RK removable disk drives. (See Figure 1–2.)

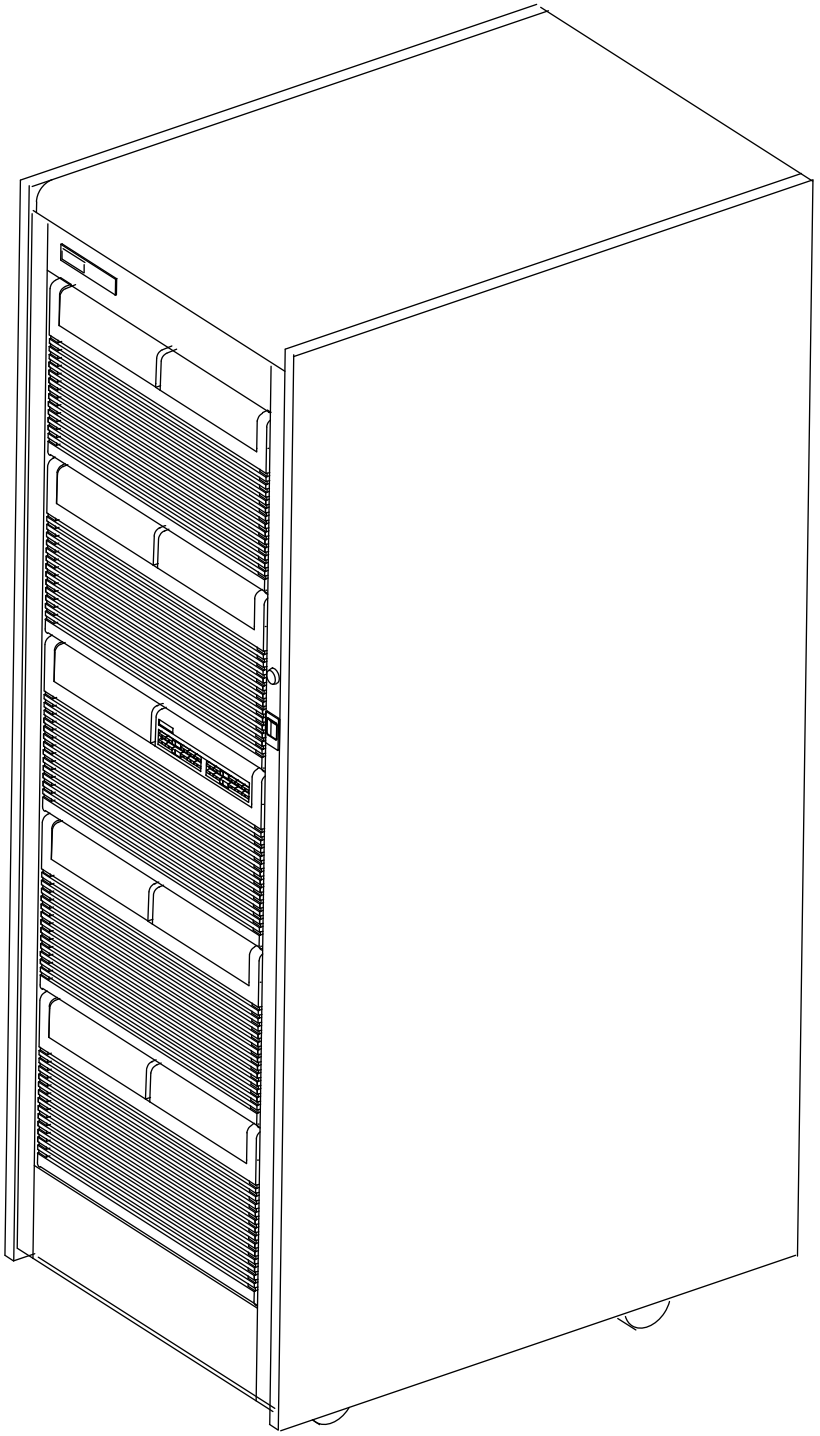

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Figure 1–2 SA905–AA/AD Storage Array

- SA905–BA/BD (120 Vac/240 Vac)—Consists of one H9A00 cabinet with one SA70R–AK enclosure. The enclosure contains two RA71–RK removable disk drives. The SA905–BA/BD will accommodate additional SA70R–AK enclosures and RA7x–RK removable disk drives.

Table 1–1 summarizes the available component configurations for the SAx05 storage array family.

Table 1–1 SAx05 Configurations

	Cabinet		Enclosures	Removable Disk Drives		
Configuration	**H9646**	**H9A00**	**SA70R–AK**	**RA70–RK**	**RA71–RK**	**RA72–RK**
SA705–JA (120 Vac)	1	–	4	16	–	–
SA705–JD (240 Vac)	1	–	4	16	–	–
SA705–HA (120 Vac)	1	–	2	4	–	–
SA705–HD (240 Vac)	1	–	2	4	–	–
SA905–AA (120 Vac)	–	1	1	–	–	2
SA905–AD (240 Vac)	–	1	1	–	–	2
SA905–BA (120 Vac)	–	1	1	–	2	–
SA905–BD (240 Vac)	–	1	1	–	2	–

1.4 H9xxx Cabinets Overview

The SAx05 storage arrays use two types of cabinets: the SA705 uses a slightly modified H9646 (described in Section 1.4.1), and the SA905 uses a slightly modified H9A00 (described in Section 1.4.2).

Each H9xxx cabinet is equipped with a power controller that supplies power to all enclosures in the cabinet. The rear panel of each H9xxx cabinet is removable to allow access to the power controller, cables, and rear panels of all enclosures. The H9xxx locking cabinet front door is also removable to allow for installation and replacement of SA70R–AK enclosures.

The H9xxx cabinets meet the following environmental and safety standards:

- Digital Standard 102 for environment
- Digital Standard 103 for electromagnetic emissions
- Digital Standard 104 for computer room noise level
- Digital Standard 119 for product safety
- National and international regulatory agency requirements, including FCC, UL, IEC, CSA, and VDE

Contact your Digital Sales representative or Customer Services engineer if you have specific questions related to the above standards.

1.4.1 H9646 Cabinet

The H9646 cabinet is a four-level cabinet that houses one to four SA70R–AK enclosures and an 881 power controller. The H9646 cabinet is a component of the SA705 storage array

The basic H9646 cabinet used in other Digital storage arrays has been slightly modified for use with the SA705. Modifications include a bottom panel installed on the front of the cabinet (for cosmetic purposes), hinges installed on the cabinet front door (for easier access to removable disk drives), and a lock installed on the cabinet front door (for security).

1.4.2 H9A00 Cabinet

The H9A00 cabinet is a five-level cabinet that houses one to five SA70R–AK enclosures and an 881 power controller. The H9A00 cabinet is a component of the SA905 storage array.

The basic H9A00 cabinet used in other Digital storage arrays has been slightly modified for use with the SA905. Modifications include trim rails and a bottom panel installed on the front of each cabinet (for cosmetic purposes).

1.5 SA70R–AK Enclosure Overview

The SA70R–AK enclosure provides power, control, and cooling for up to four RA7x–RK removable disk drives. Figure 1–3 shows an exploded view of the SA70R–AK enclosure. The major subassemblies of the SA70R–AK enclosures are as follows:

- Chassis
- Operator control panel (OCP)
- Transition board assemblies (TB1–M and TB2)
- Power supply
- Fan assemblies (two)
- Cable harness
- Canister lock/release mechanisms (four)
- Canister ready indicators (four)
- RA7x–RK removable disk drives (up to four)
- SDI cables

Each RA7x–RK removable disk drive fits into one of four recessed positions in the front of the enclosure. The canister is secured in the enclosure by the canister lock/release mechanism. The OCP is mounted on the front of the enclosure above the canisters and plugs into the internal transition board assembly #1 (TB1–M). TB1–M connects the OCP to transition board assembly #2 (TB2). TB2 sits internally above the canisters and transfers drive signals to the OCP through TB1–M. The power supply and fan assemblies are mounted in the rear of the enclosure behind the canisters. A cable harness containing interconnecting cables and internal SDI cables runs through the enclosure chassis.

NOTE

The TB1–M used in the SA70R–AK enclosure is not interchangeable with the TB1 used in the SA7x enclosure. The boards are of different designs and operate correctly only when installed in the appropriate enclosure.

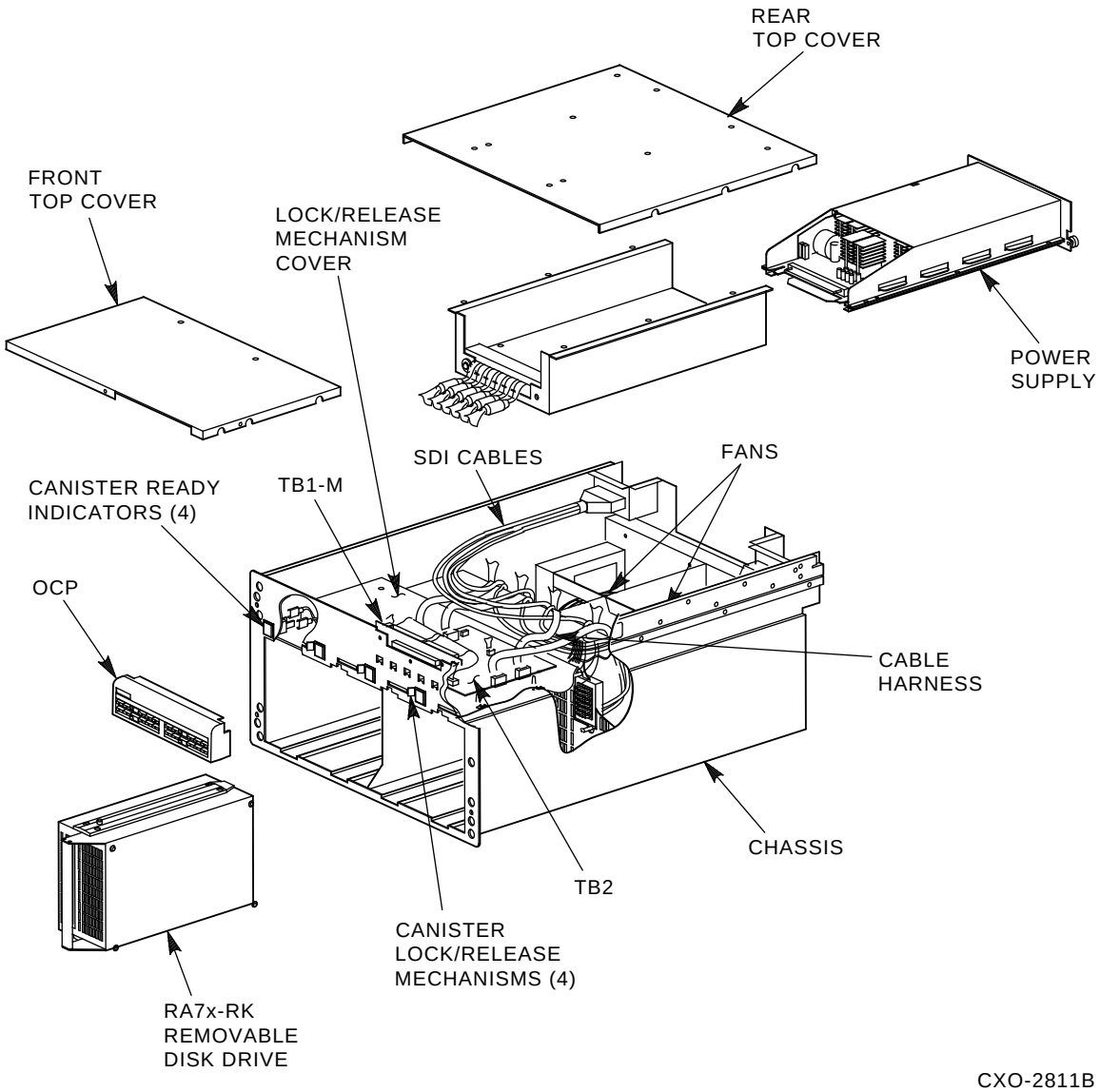

Figure 1–3 Exploded View of the SA70R–AK Enclosure

The enclosure power supply provides operating power to the major subassemblies of the enclosure. The power switch for the enclosure is located on the rear panel of the enclosure.

Each RA7x–RK removable disk drive is powered and controlled independently. You can operate a disk drive with other disk drive positions unoccupied or while maintenance is being performed on another drive. The power switch for each disk drive is activated automatically (by a microswitch in the canister lock/release mechanism on the enclosure) when you insert the canister into the enclosure. The power switch is deactivated when you move the lock/release handle to the right to remove the canister. Next to each canister lock/release handle on the front of the enclosure is a canister ready indicator that lights when the RA7x–RK removable disk drive is powered up and ready for operation. Indicator symbols show which set of switches and indicators on the OCP correspond to that particular drive position.

The RA7x–RK removable disk drives are operated from four sets of switches and indicators on the OCP. Each control set operates one disk drive in the enclosure.

Two fan assemblies circulate cooling air throughout the interior of the SA70R–AK enclosure. The air is drawn into the enclosure through the front and is exhausted at the rear. The fans operate at two speeds. When the temperature exceeds 29°C (85°F) the fans operate at high speed; otherwise, they operate at normal speed. Also, if one fan is not operating, the other fan accelerates to high-speed.

Additional information about the SA70R–AK enclosure subassemblies can be found in <REFERENCE>(desc_chap).

1.6 RA7x–RK Removable Disk Drives Overview

The RA7x–RK family of removable disk drives includes the RA70–RK, RA71–RK, and RA72–RK. The RA7x–RK disk drives are designed for the SAx05 storage arrays. They can be installed into and removed from the SA70R–AK enclosure on a regular basis. Once removed from the enclosure, these disk drives can be stored or transported. A canister carrying case (part number RA70X–AK) is available for transporting a disk drive off site.

The RA7x–RK disk drive consists of an RA70, RA71, or RA72 disk drive mounted in a metal canister. The disk drive canister features modular components that can be replaced with minimum downtime.

CAUTION
The RA7x–RK removable disk drives are designed to be inserted in SA70R–AK enclosures only. Attempting to insert RA7x–RK removable disk drives into other configurations may damage the equipment.

1.6.1 RA70–RK Removable Disk Drive

The RA70–RK removable disk drive is a UL-listed accessory disk drive for use in the SA70R–AK enclosure in an SAx05 storage array. Each RA70–RK consists of one RA70 disk drive mounted in a metal canister. The RA70 disk drive is a Winchester technology drive with a formatted storage capacity of 280 megabytes (MB). See Figure 1–4 for an exploded view of the RA70–RK removable disk drive.

1.6.2 RA71–RK/RA72–RK Removable Disk Drive

The RA71–RK and RA72–RK removable disk drives are UL-listed accessory disk drives for use in the SA70R–AK enclosure in an SA905 storage array. Each RA71–RK consists of one RA71 disk drive mounted in a metal canister; each RA72–RK consists of one RA72 disk drive mounted in a metal canister.

The RA71 and RA72 disk drives are physically identical but electronically different. The RA71 disk drive has a formatted storage capacity of 700 megabyte (MB); the RA72 disk drive has a formatted storage capacity of 1 gigabyte (GB). See Figure 1–5 for an exploded view of the RA71–RK/RA72–RK removable disk drive.

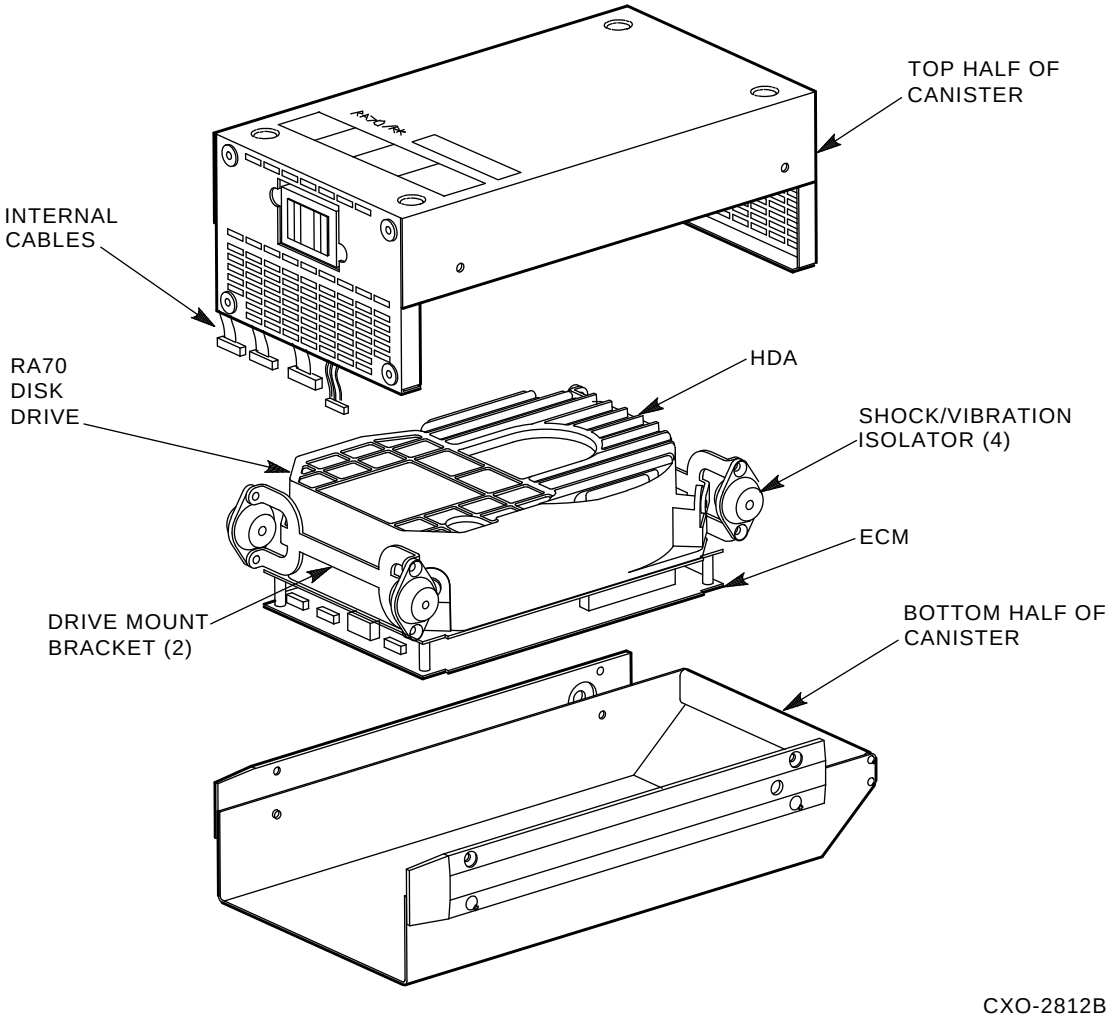

Figure 1–4 Exploded View of the RA70–RK Removable Disk Drive

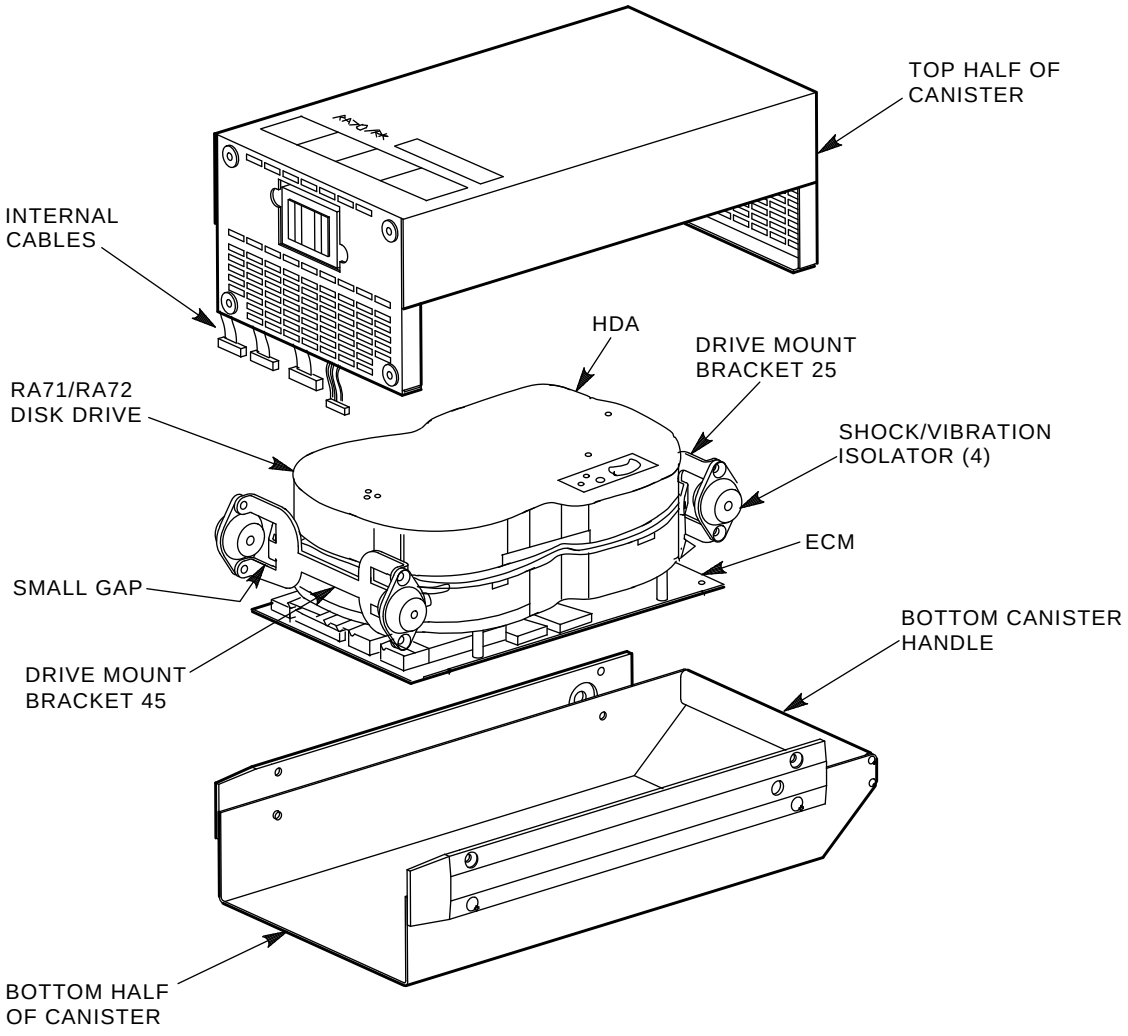

Figure 1–5 Exploded View of the RA71–RK/RA72–RK Removable Disk Drive

1.7 Specifications

Tables 1–2, 1–3, and 1–4 list specifications that apply to the entire storage array.

- Table 1–2 lists the recommended environmental ranges for optimum storage array performance and reliability.
- Table 1–3 lists the physical characteristics of the storage arrays.
- Table 1–4 lists the electrical specifications for the storage arrays.

Table 1–5 lists SA70R–AK enclosure specifications. Table 1–6 lists RA7x–RK removable disk drive specifications.

Table 1–2 Recommended Environmental Ranges for SAx05 Storage Arrays

Characteristic	Min.	Max.	Units
Operating temperature	18 65	24 75	degrees Celsius degrees Fahrenheit
Operating temperature rate of change	– –	3 5.4	degrees per hour Celsius degrees per hour Fahrenheit
Operating temperature step change	– –	3 5.4	degrees Celsius degrees Fahrenheit
Operating relative humidity	40	60	percent relative humidity (non-condensing)
Operating relative humidity rate of change	–	10	percent relative humidity (non-condensing) per hour
RA7x–RK storage temperature	18 65	29 85	degrees Celsius degrees Fahrenheit
RA7x–RK storage humidity	–	50	percent relative humidity (non-condensing)

NOTE
Maximum environmental limits for enclosures and disk drives are contained in Tables 1–5 and 1–6, respectively. Exceeding the maximum environmental limits described in these tables may void Digital warranties.

Table 1–3 SAx05 Storage Array Physical Characteristics

Model	Characteristic	Specification
SA705–JA, SA705–JD	Height Width Depth Weight	156 cm (61.5 inches) 55.9 cm (22 inches) 91.4 cm (36 inches) 387 kg (854 lbs)
SA705–HA, SA705–HD	Height Width Depth Weight	156 cm (61.5 inches) 55.9 cm (22 inches) 91.4 cm (36 inches) 213 kg (469 lbs)
SA905–AA, SA905–AD, SA905–BA, SA905–BD	Height Width Depth Weight	170 cm (66.94 inches) 61 cm (24 inches) 87 cm (34.25 inches) 108 cm (42.5 inches) with rear panel fully extended 203 kg (447 lbs)

Table 1–4 SAx05 Storage Array Electrical Specifications

Parameter	SA705 Storage Array	SA905 Storage Array
Inrush Current:		
101–120 Vac	98 amperes peak	55 amperes peak
220–240 Vac	98 amperes peak	55 amperes peak
Power Factor:		
101–120 Vac	0.62	0.62
220–240 Vac	0.71	0.71
Power Cord Length:		
(maximum)	4.4 meters (14.4 feet)	4.4 meters (14.4 feet)
Cabinet Plug Type:		
881A (101–120 Vac)	5-wire, NEMA L21–30P	5-wire, NEMA L21–30P
881B (220–240 Vac)	IEC 309	IEC 309

Electrical Specifications by Model

		Input Current (Amps)						
Model	**Nominal Voltage[1]**	**Start-Up Current**	**PH1**	**PH2**	**PH3**	**Neutral**	**Power Dissipation**	**BTUs/Hour [Kj/Hour][2]**
SA705–JA	50/60	10.9	3.7	3.7	7.4	9.0	1095 W	3737
SA705–JD	50/60	4.7	3.2	1.6	1.6	3.9	1081 W	[3892]
SA705–HA	50/60	5.5	3.7	0.0	3.7	5.2	548 W	1869
SA705–HD	50/60	2.4	1.6	0.0	1.6	2.3	541 W	[1946]
SA905–AA	50/60	6.8	0.5	3.4	0.0	3.4	291 W	993
SA905–AD	50/60	3.9	0.3	1.5	0.0	1.5	291 W	[1048]
SA905–BA	50/60	6.8	0.5	3.4	0.0	3.4	291 W	993
SA905–BD	50/60	3.9	0.3	1.5	0.0	1.5	291 W	[1048]

[1]The SAx05 storage arrays are not line frequency dependent. Currents are for nominal voltages of 120 Vac phase to neutral corresponding to 208 Vac phase to phase, **or** for 240 Vac phase to neutral corresponding to 416 Vac phase to phase. Nominal voltages of 101 Vac and 220 Vac will have proportionately higher phase currents, by the rate of 120/101 or 240/220, to the currents specified in this table.

[2]Bracketed figures in this column indicate kilojoules per hour.

Table 1–5 SA70R–AK Enclosure Specifications

Characteristic	Specification
Capacity:	
Number of disk drive positions	4
Formatted storage capacity:	
With four RA70–RK disk drives	1.1 GB
With two RA71–RK disk drives	1.4 GB
With two RA72–RK disk drives	2.0 GB
Physical Characteristics:	
Height	26.4 cm (10.4 inches)
Width	44.5 cm (17.5 inches)
Depth	72.4 cm (28.5 inches)
Weight (empty)	29.5 kg (65 lbs)
With four RA70–RK disk drives	56.7 kg (125 lbs)
With two RA71–RK disk drives	39.5 kg (87 lbs)
With two RA72–RK disk drives	39.5 kg (87 lbs)
Maximum Environmental Limits:	
Temperature:	
Operating	+10°C to +40°C (+50°F to +104°F)
Nonoperating	-40°C to +66°C (-40°F to +150°F)
Relative humidity:	
Operating	10% to 80% (non-condensing)
Nonoperating	8% to 80% (non-condensing)
Altitude:	
Operating	2,438 m (8000 ft)
Nonoperating	4,877 m (16,000 ft)
General:	
Acoustic noise (with four RA7x–RK removable disk drives)	Complies with Digital Standard 102 and Digital Standard 104
Shock and vibration	Complies with Digital Standard 102
Rated canister insertion/removal life	10,000 cycles (one insertion and removal equals one cycle)

Table 1–6 RA7x–RK Removable Disk Drive Specifications

Removable Disk Drive	Characteristic	Specification
Capacity:		
RA70–RK	Data storage (formatted)	280 MB
RA71–RK	Data storage (formatted)	700 MB
RA72–RK	Data storage (formatted)	1 GB
Physical Characteristics:		
RA70–RK	Height	10 cm (4 inches)
	Width	16.8 cm (6.6 inches)
	Depth	32 cm (12.6 inches)
	Weight	6.8 kg (15 lbs)
RA71–RK, RA72–RK	Height	10 cm (4 inches)
	Width	16.8 cm (6.6 inches)
	Depth	32 cm (12.6 inches)
	Weight	4.99 kg (11 lbs)
Maximum Environmental Limits Outside of SA70R–AK Enclosures:		
RA7x–RK	Non-operating temperature	-40°C to +66°C (-40°F to +150°F)
	Non-operating humidity	8% to 80% relative humidity (non-condensing)
	Non-operating altitude	15,420 m (50,000 ft)
	Non-operating drop	Free fall drop from a height of 4 inches onto any surface (six surfaces total). Tip over from any angle up to 90° onto any of the four product surfaces along the length of the product. The actual tip over point is the angle where the product center of gravity (CG) will cause the canister to tip over from its own weight.
Maximum Environmental Limits in RA70X–AK Carrying Case:		
RA7x–RK	Non-operating temperature	-40°C to +66°C (-40°F to +150°F)
	Non-operating humidity	8% to 80% relative humidity (non-condensing)
	Non-operating altitude	15,420 m (50,000 ft)
	Non-operating drop	Free fall drop test from a height of 36 inches onto any surface (six surfaces total).
	X-ray exposure	Exposure to airport-type x-ray equipment is acceptable.

Table 1–6 (Cont.) RA7x–RK Removable Disk Drive Specifications

Removable Disk Drive	Characteristic	Specification
General:		
RA7x–RK	Rated canister insertion/removal life	10,000 cycles (one insertion and removal equals one cycle)

2
Unpacking and Installing the SAx05 Storage Arrays

2.1 About This Chapter

This chapter explains how to unpack and install the SAx05 storage array. Procedures discussed in this chapter include:

- Unpacking the storage array
  - Installing the deskidding ramps on the shipping pallet
  - Deskidding the storage array
  - Leveling the cabinet
- Assembling the H9A00 cabinet rear panel assembly (SA905 only)
- Affixing operator control panel labels
- Connecting external SDI cables
- Selecting line input voltage to the enclosure
- Applying power to the storage array
- Performing a post-installation checkout
- Setting the drive unit numbers
- Deinstalling and repacking the storage array

CAUTION
Digital recommends that the SAx05 storage arrays be installed by qualified Customer Services engineers only.

2.2 Required Tools

The following tools are needed to install the SAx05 storage array:

- 7/16 inch wrench
- 9/16 inch wrench
- 3/4 inch wrench
- #1 Phillips screwdriver
- #2 Phillips screwdriver
- 1/8 inch hex wrench
- 5/32 inch hex wrench

2.3 Environmental Considerations

The SAx05 storage array must be operated within the environmental ranges listed in Table 1–2. Consider the following when choosing a location for the SAx05 storage array:

- Allow at least 3 feet of space in front of and behind the storage array for adequate air flow and access to the I/O bulkhead and power switches located at the rear of the cabinet.
- Install the SAx05 storage array in a Class A computing environment.
- Have adequate power reserves to support the planned number of SAx05 cabinets and SA70R–AK enclosures. Refer to Table 1–4 for electrical specifications.
- Ensure that the floor of the installation site can safely support the weight of the storage array. Refer to Table 1–3 for storage array weight specifications.

2.3.1 Stabilizing the SAx05 Storage Array

The SAx05 storage array must be environmentally stabilized in the site environment prior to operation. Refer to Appendix A for more information about environmental stabilization.

CAUTION
Failure to environmentally stabilize this equipment may result in damage to the drive media or electronic components at power-up.

2.4 Unpacking the SAx05 Storage Array

The SAx05 storage array is packed in a corrugated carton attached to a wooden shipping pallet. It is sealed in a barrier bag with desiccant for environmental protection. Figure 2–1 shows the contents of the SA705 shipping container.

NOTE
The SA905 is packaged differently but the unpacking procedure is the same for both storage arrays unless otherwise noted.

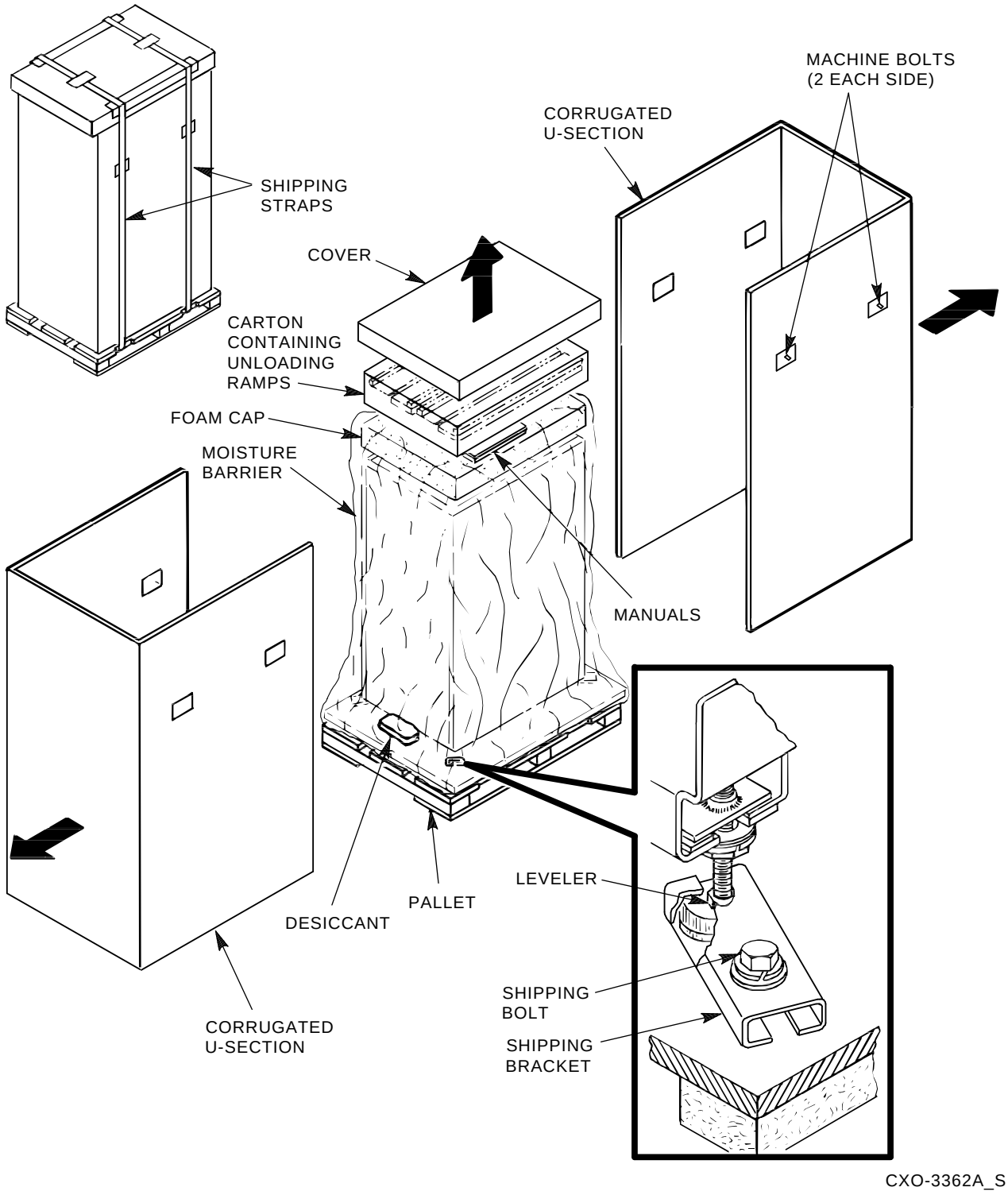

Figure 2–1 Contents of the SA705 Storage Array Shipping Container

To unpack the SAx05 storage array, use the following procedure:

WARNING
Wear safety glasses during the unpacking procedure. Serious personal injury may result if the cabinet is improperly handled or proper safety precautions are not taken.

1. Inspect the shipping carton for signs of external damage. Report any damage to the local carrier and to Digital's local Customer Services or Sales office.
2. Cut the shipping straps and remove the outer shipping carton. Leave the sealed barrier bag with desiccant in place until environmental stabilization time has elapsed. (Refer to Appendix A for environmental stabilization procedures.)

NOTE
Save all packing material in case it is necessary to store or reship the storage array.

2.4.1 Installing the Deskidding Ramps on the Shipping Pallet

Use the following procedure to install the deskidding ramps on the shipping pallet:

NOTE
Although the ramps used for the SA705 (H9646 cabinet) are different than the ramps used for the SA905 (H9A00 cabinet), this procedure applies to both ramp types unless otherwise noted.

1. Slide the two ramps out of their carton.
2. Inspect the ramps, ramp side rails, and metal hardware for defects described in the following list:
   - Cracks across or lengthwise 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.

   If any of these conditions exist, *DO NOT USE THE RAMP*. Investigate alternate means for deskidding the cabinet or order a new ramp. (Refer to <REFERENCE>(parts_appen) for ramp part numbers.)
3. Fully extend each ramp. If the ramps you are installing are for the SA705 storage array, insert the steel dowel into the slot on each ramp, as shown in Figure 2–2. (Ramps for the SA905 do not have steel dowels.)
4. Attach the deskidding ramps to the pallet by fitting the metal prongs into the holes on the pallet.

   NOTE
   The holes on the SA705 pallet are located at the rear of the pallet; the holes on the SA905 pallet are located at the front of the pallet.

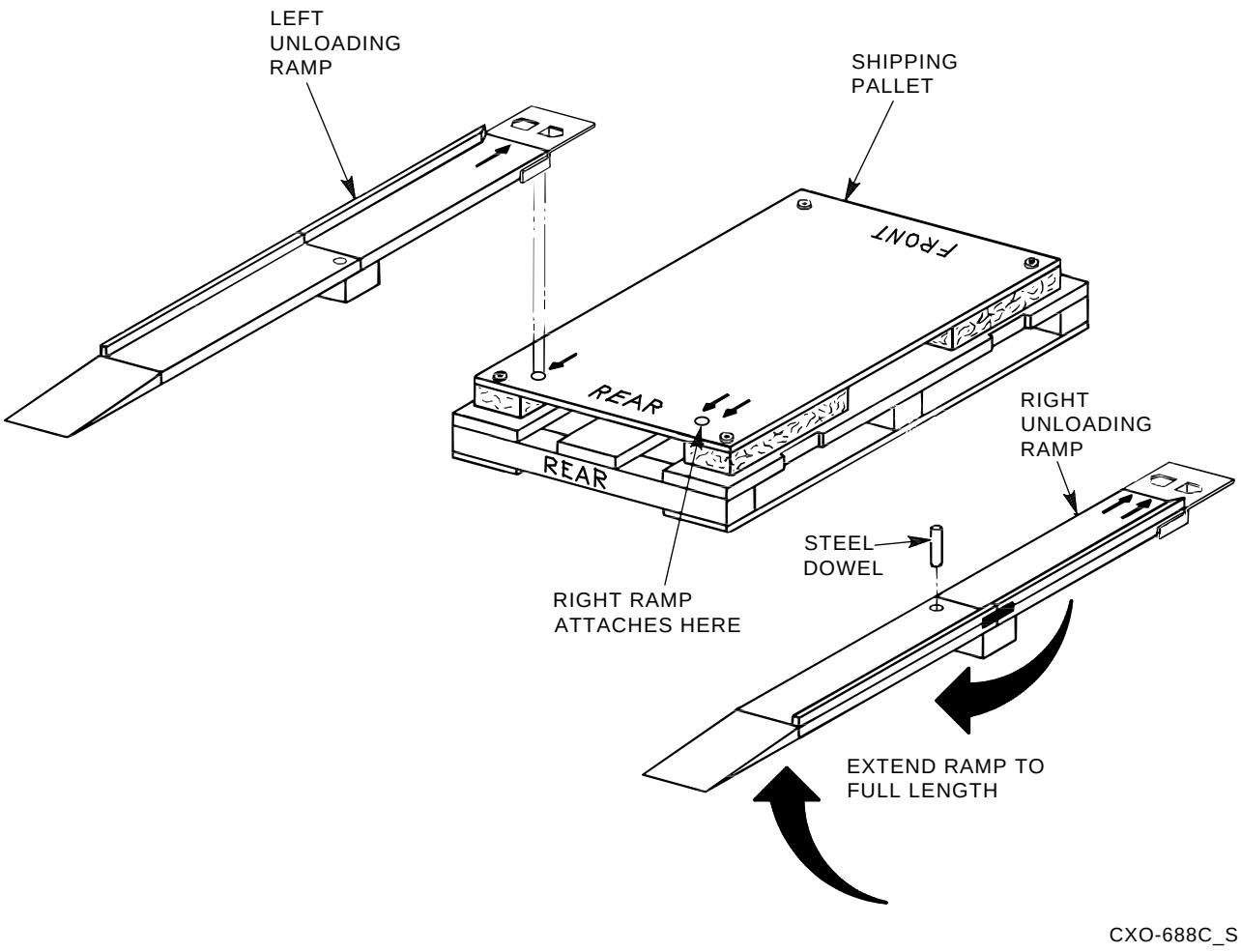

Figure 2–2 Deskidding Ramps for the SA705 Storage Array

2.4.2 Deskidding the SAx05 Storage Array

Use the following procedure to deskid the cabinet:

WARNING
Three people are required to unload the cabinet from the shipping pallet. Serious injury could result if the cabinet is improperly handled.

Locate and remove the 15 desiccant bags before deskidding the cabinet. The desiccant bags are a potential hazard during the cabinet deskidding process.

1. Remove the shipping bolts. (See Figure 2–1.)

2. Remove the shipping brackets from the cabinet levelers.
3. Screw the cabinet levelers up *as far as they will go.*

WARNING
If cabinet levelers are not *fully* raised, they will contact the floor when the cabinet reaches the end of the ramps and may cause the cabinet to tip over. Personal injury may result.

4. Carefully roll the cabinet down the ramps. (See Figure 2–3.)
5. Move the cabinet into its final position.

CXO-924A_S

Figure 2–3 Deskidding the Cabinet

2.4.3 Leveling the Cabinet

After the cabinet has been moved into its final location, use the following procedure to adjust the leveler feet (see Figure 2–4):

1. Loosen the locknuts on all four leveler feet.
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. Verify that the casters spin freely.

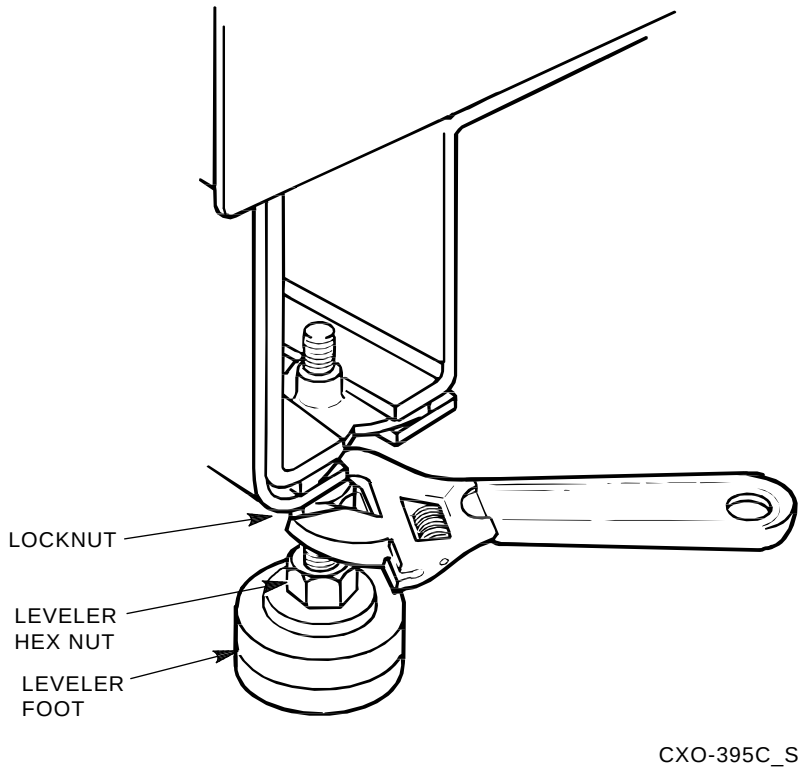

Figure 2–4 Adjusting the Leveler Feet

2.5 Assembling the H9A00 Cabinet Rear Panel Assembly

When the H9A00 cabinet (a component of the SA905) is shipped, the rear panel assembly is packed as follows:

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

Use the following procedure to assemble the H9A00 cabinet rear access panel (see Figure 2–5):

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.

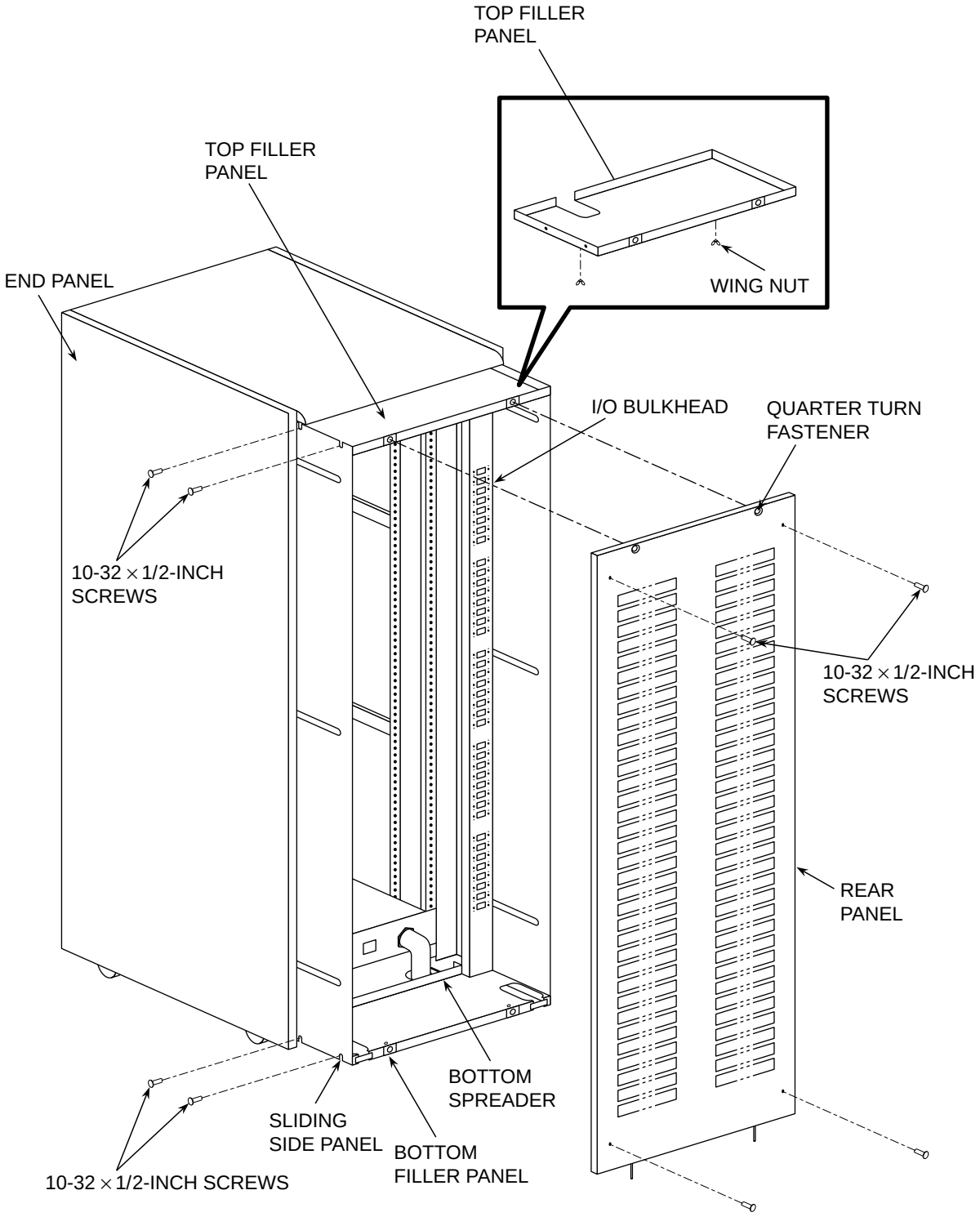

Figure 2–5 Assembling the H9A00 Cabinet Rear Panel Assembly

2. Unpack the two filler panels.
3. Remove and save the four 10-32 x 1/2-inch screws (two on each side) and the two wing nuts from each filler panel.
4. Install the filler panels by connecting them to the top and bottom spreaders, as follows:

   NOTE
   One filler panel has two rectangular openings; the other panel is solid. If cables will exit at the bottom of the cabinet and be routed under a false floor in the computer room, install the filler panel with the rectangular openings at the *bottom* of the cabinet, and the solid panel at the top. If cables will exit at the top of the cabinet and be routed through the computer room ceiling, install the filler panel with the rectangular openings at the *top* of the cabinet and the solid panel at the bottom.

   a. Place the appropriate filler panel on top of the top spreader.
   b. Push the two captive studs on the filler panel through the two slots in the spreader.
   c. Move the filler panel toward you until the captive studs stop at the ends of the slots.
   d. Install and tighten the two wing nuts on the captive studs.
   e. Repeat this procedure to connect the bottom filler panel to the spreader.
5. Loosen the three 1/4-20 x 3/4-inch screws located on the top, middle, and bottom of each side panel.
6. Pull the side panels toward you until the U-shaped screw holes at the top and bottom of the side panels line up with the screw holes on the sides of the filler panels.
7. Reinstall the eight 10-32 x 1/2-inch screws (four from each filler panel) to secure the side panels. Insert two at the top and two at the bottom of each side panel and tighten.
8. Determine how far the cabinet rear access panel will need to be extended. This decision depends on the number of enclosures and drives installed in the cabinet:

   - If the cabinet is fully populated, the rear access panel must be fully extended to accommodate the cables.
   - If only a few enclosures and drives are installed, the rear access panel can be partially extended.

   To use a fully extended rear access assembly, leave the assembly fully extended and tighten the three 1/4-20 x 3/4-inch screws on each of the two side panels.

   To use a partially extended rear access assembly, perform the following procedure:

   a. Loosen the two wing nuts on each filler panel.
   b. Gently push the rear access panel back into the cabinet until you encounter resistance.
   c. Retighten the wing nuts.
   d. Tighten the three 1/4-20 x 3/4-inch screws on each of the two side panels.
9. Install the rear access panel as follows:

   a. Lift the panel into place by fitting the two pins on the bottom of the panel into the two slots in the filler panel.
   b. Push the top of the panel into place, and turn the fasteners one-quarter turn clockwise with a 5/32 hex wrench to lock.

2.6 Affixing Operator Control Panel Labels

SAx05 storage arrays are shipped with English labels on the operator control panel (OCP). However, a packet of self-adhesive labels in several languages is included in the shipping package. If necessary, select the appropriate label from the packet and affix it to the OCP on top of the English label.

2.7 Connecting External SDI Cables

SDI (Standard Disk Interconnect) cables include external cables, internal cabinet cables, and internal enclosure cables. All internal cabinet SDI cables and power cords are factory-installed for preconfigured SA70R–AK enclosures. You will not need to install these cables unless you are installing an add-on enclosure. Refer to Chapter 5 for information about installing add-ons.

Figure 2–6 shows the configurations for connecting the external SDI cables to the SA705 I/O bulkhead. Figure 2–7 shows the configurations for connecting the external SDI cables to the SA905 I/O bulkheads. Secure all external cables to the I/O bulkhead with the connector retaining screws.

2.8 Selecting Line Input Voltage to the SA70R–AK Enclosure

The SA70R–AK enclosure power supply can be set to operate from either 120 Vac at 60 Hz or 220/240 Vac at 50 Hz. The power supply is set to 240 Vac (50 Hz) at the factory and must be reset to 120 Vac (60 Hz) for some installations. The line input voltage setting on the enclosure must be the same as the voltage rating for the 881 power controller in the SAx05 cabinet. The 881–A power controller is rated at 120 Vac; the 881–B power controller is rated at 240 Vac.

CAUTION

If the voltage selector switch on the SA70R–AK enclosure is set to 120 Vac (60 Hz) and 240 Vac (50 Hz) is used, severe damage to the power supply will occur at power up.

Use the following procedure to select the proper line input voltage for the SA70R–AK enclosure:

1. Verify that the power switch on the rear panel of the enclosure is off (0).
2. Locate the line voltage selector switch through the rear panel of the enclosure. See Figure 2–8 for the location of the line voltage selector switch.
3. Verify that the line voltage selector switch is set at the same voltage rating as the 881 power controller (120 Vac for the 881–A power controller; 240 Vac for the 881–B power controller). If the setting is incorrect, use a small screwdriver to change the setting.

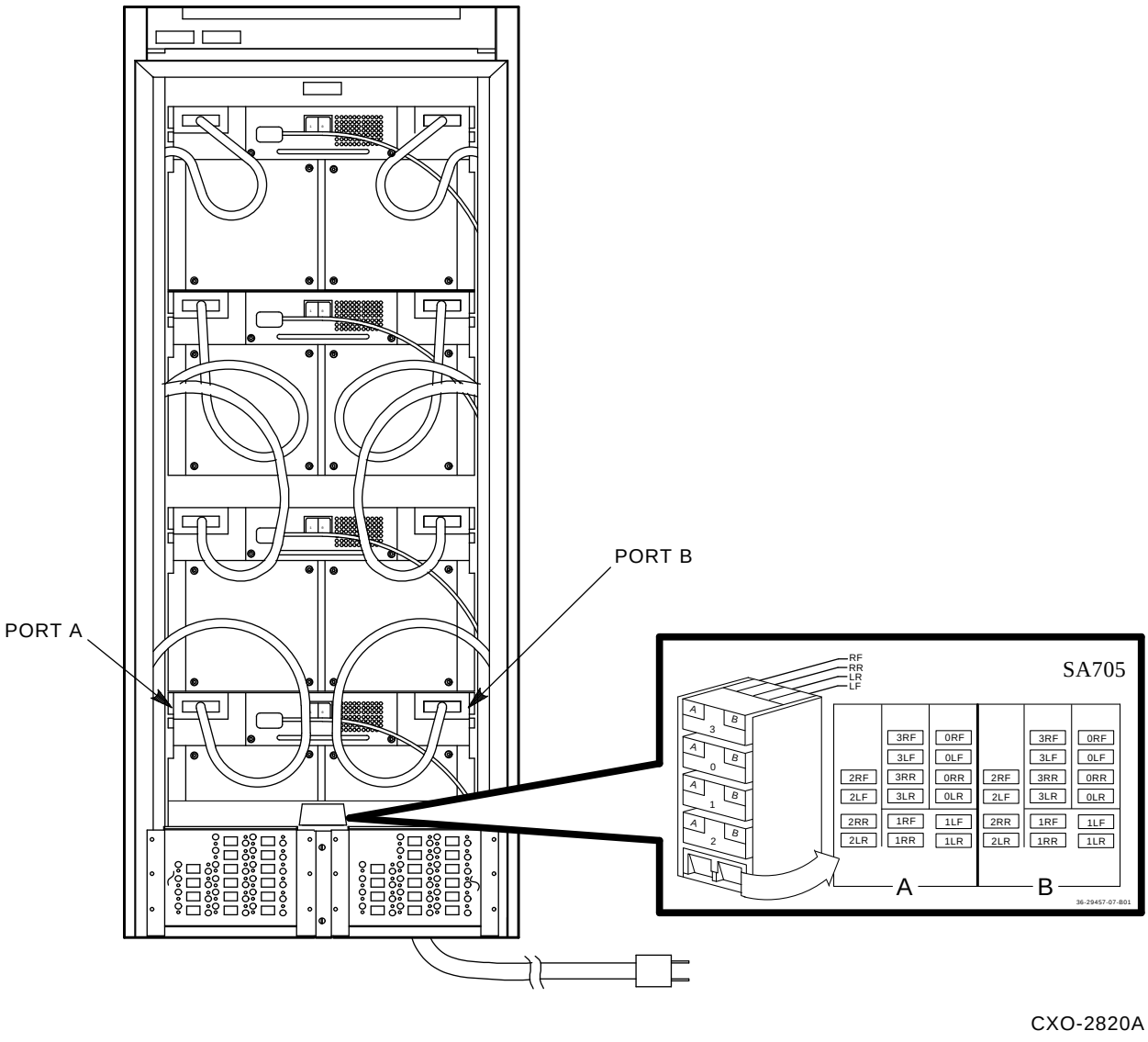

Figure 2–6 SDI Cables Configuration for the SA705 Storage Array

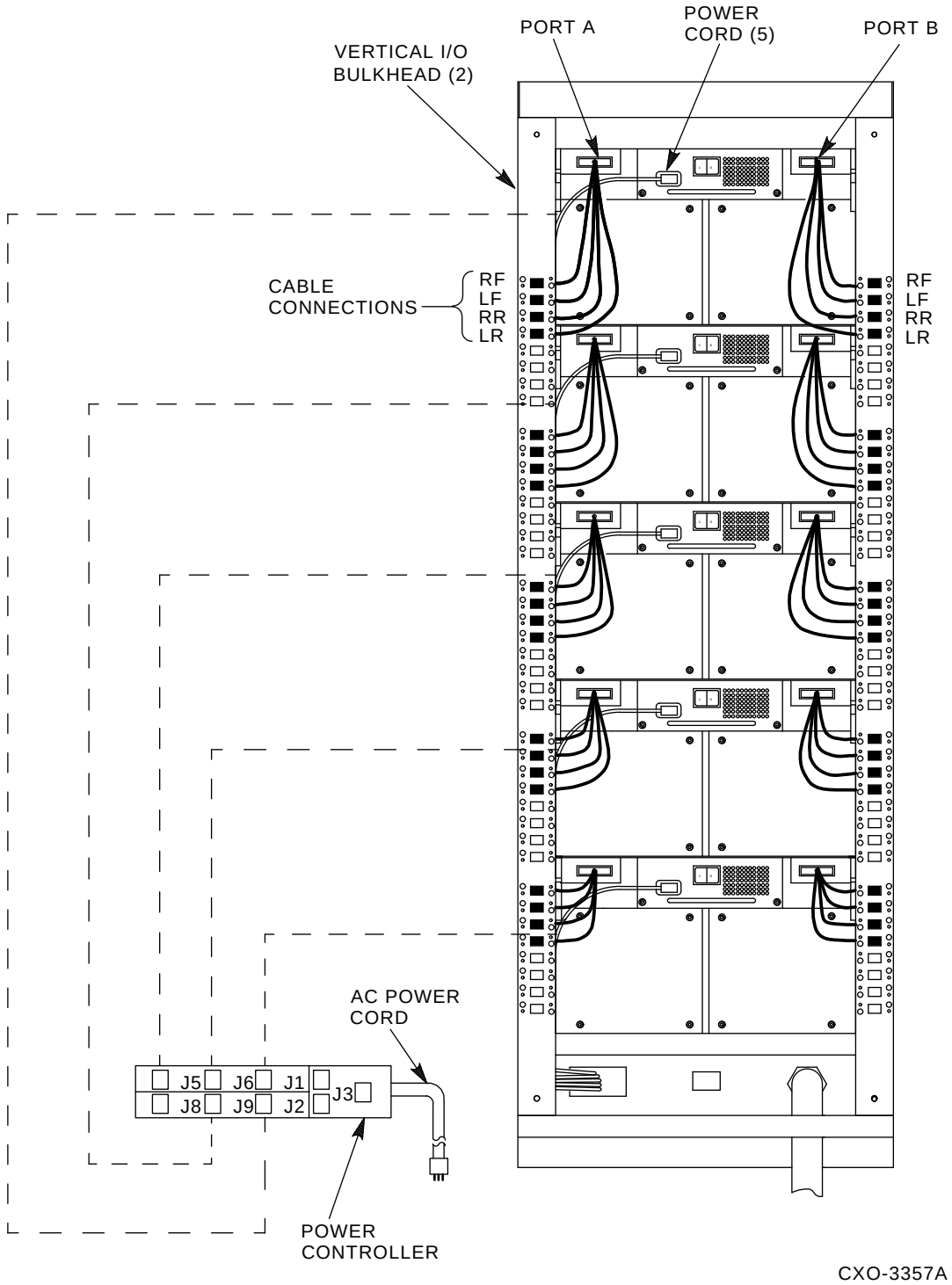

Figure 2–7 SDI Cables Configuration for the SA905 Storage Array

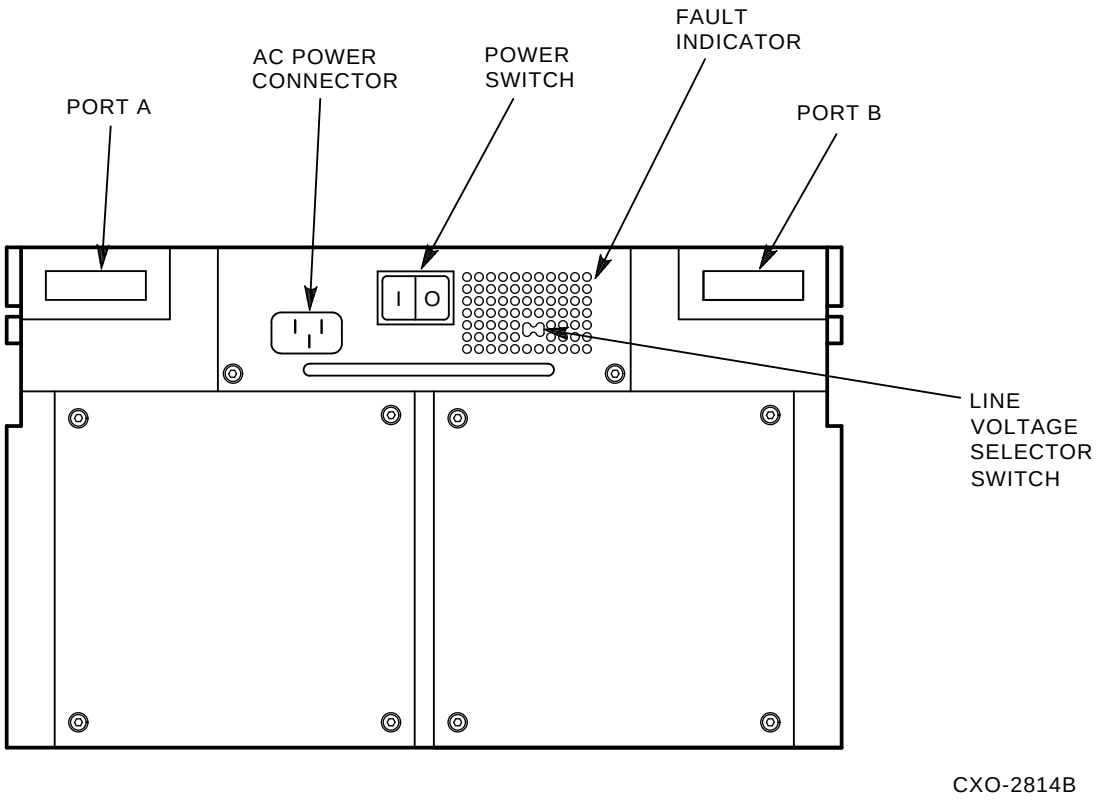

Figure 2–8 Line Voltage Selector Switch Location

2.9 Applying Power to the SAx05 Storage Array

Figure 2–9 shows the possible power connector configurations and the specifications for each type of connector that you may encounter in an SAx05 storage array installation. The SAx05 storage array is shipped with power cords installed and connected for preconfigured SA70R–AK enclosures.

CAUTION
Before applying power to the SAx05 storage array:

- **Verify that all power sources are the correct voltage and frequency for the equipment. (Refer to Table 1–4.)**
- **Verify that the line voltage selector switch on each enclosure is set to the proper line voltage. (Refer to Section 2.8 for instructions.)**

Use the following procedure to apply power to the SAx05 storage array and SA70R–AK enclosures:

1. Locate the power switch on each SA70R–AK enclosure (see Figure 2–8) and verify that it is in the off (0) position.
2. Locate the circuit breaker on the rear of the 881 power controller. (Figure 2–10 shows an 881 power controller in an SA705 storage array.) Verify that the circuit breaker handle is in the off (0) position.

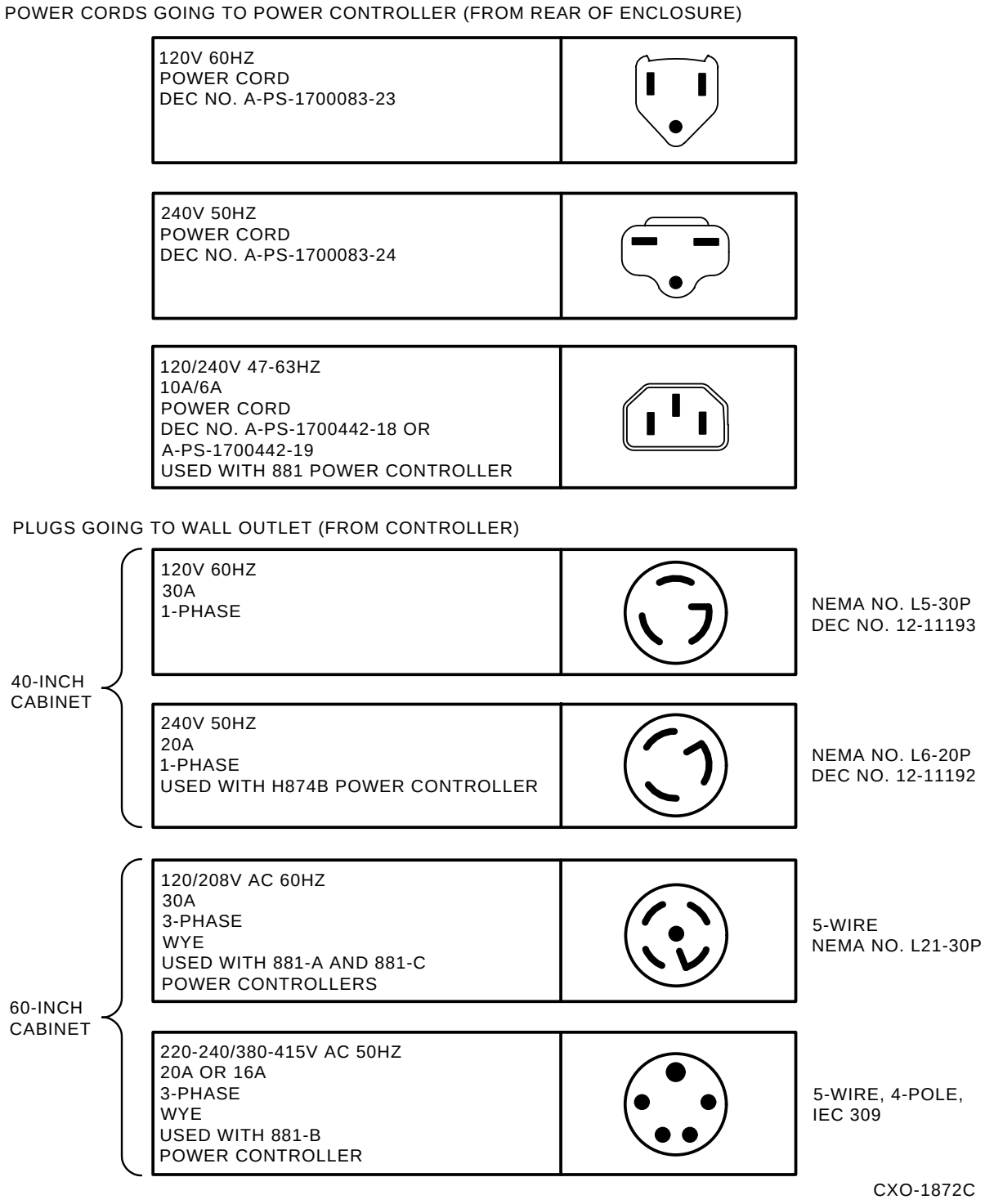

Figure 2–9 Power Connector Configurations

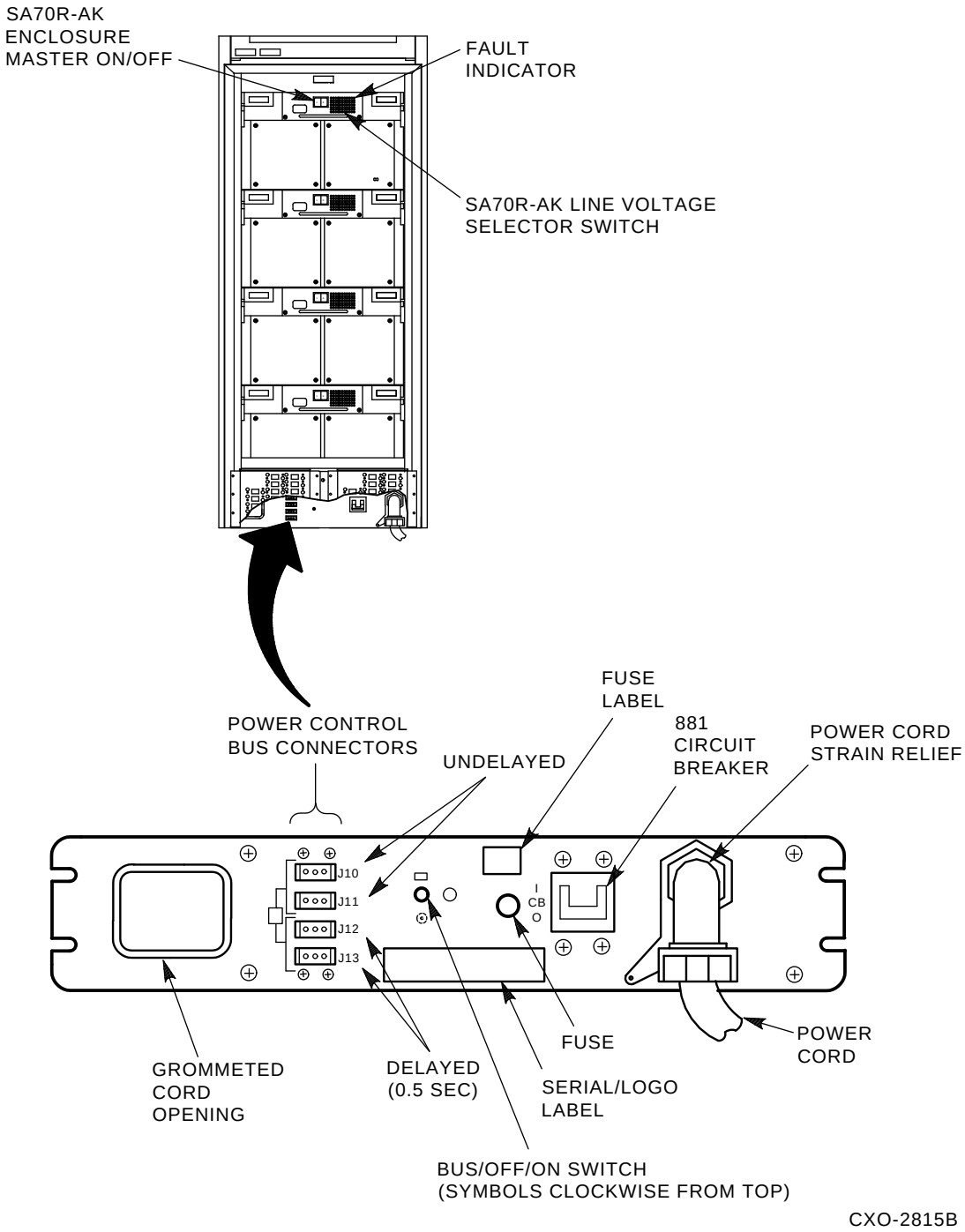

Figure 2–10 881 Power Controller in an SA705 Storage Array

3. Locate the Bus/Off/On switch on the rear of the 881 power controller (see Figure 2–10). Set the Bus/Off/On switch to the on (lower) position. This switch controls the distribution of power to the nine outlets inside the grommeted cord opening on the rear of the power controller. International symbols are used to indicate switch positions as follows:
   - The top symbol corresponds to the Bus position of the switch and is used for remote operation of the controller. If you are using this mode of operation, refer to the *881 Power Controller User Guide* for instructions.
   - The center symbol indicates the off position of the Bus/Off/On switch.
   - The lower symbol indicates the on position of the Bus/Off/On switch.

   NOTE
   Apply techniques learned in the *Electrical Safety and Lockout/Tagout Procedures* course prior to performing the next step.
4. Plug the 881 power cord into a correct external power source.
5. Raise the circuit breaker handle at the rear of the 881 power controller to the on (1) position to apply power to the cabinet.
6. Turn the power switch on the rear panel of each enclosure on (1) to apply power to the enclosures.
7. Perform the post-installation checkout procedure. (Refer to Section 2.10 for instructions.)

2.10 Performing the Post-Installation Checkout Procedure

The post-installation checkout procedure enables you to verify functionality of the power supply, fan assemblies, and OCP for each enclosure, before you begin operation.

After applying power to the SAx05 enclosure, perform the post-installation checkout procedure as follows:

1. Verify power supply operation by making sure all enclosure fans are operating. Do this by checking for airflow out of the rear of each enclosure. If the fans are not operating:
   a. Verify that all power and interface connections on the rear of the enclosure are correct and secure.
   b. Verify that the power supply is firmly seated in its connector.

   NOTE
   If one of the fans is not operating, the two disk drives situated in front of that fan will not operate.
2. Check to see if any of the fault indicators on any of the enclosure rear panels are lit. If a fault indicator is lit:
   a. Turn off power to that enclosure for 10 seconds, then turn the enclosure back on.
   b. If the fault indicator lights again, refer to Chapter 6 and contact your Digital Customer Services engineer.
3. Verify power application to each occupied disk drive position by checking the canister ready indicator lights. If a canister ready indicator is not lit, verify that the disk drive is correctly inserted in the enclosure. (Refer to Section 4.5.)

Applying power to the disk drive starts the drive's internal power-on diagnostics. These diagnostics are signaled at the OCP by the following sequence of indicator lights:

a. All indicators light for about 8 seconds.

b. If the drive completes the power-on diagnostics without detecting a fault, all indicators go out.

c. If the Fault/Set No. indicator remains lit, the drive has detected a fault. Press the Fault/Set No. switch twice to clear the fault. If the indicator remains lit, refer to Chapter 6 for fault recovery procedures.

4. Perform an OCP lamp test to ensure the LED state indicators are working properly. Do this by pressing and holding the Fault/Set No. switch for each occupied drive position; all lamps should momentarily light. If lamps do not light, ensure the OCP is seated properly and power is applied to that disk drive, then try the test again.

5. Set the drive unit number for each disk drive in the storage array. (Refer to Section 2.11.)

2.11 Setting the Drive Unit Numbers During Installation

The drive unit number is the number the system uses to identify the drive. This number is automatically read by the drive at power up and after the number has been reset. You can set the drive unit number for any disk drive at the OCP. Once the number is in the drive, the system controller reads it according to the controller's protocol.

Refer to Section 3.8 for additional information about setting drive unit numbers during routine operation.

Use the following procedure to set the drive unit number during an initial installation (see Figure 2–11):

CAUTION

Be sure that no two disk drives in your system have the same drive unit number. Using the same drive unit number for two disk drives causes a controller fault and results in both drives spinning down.

1. Locate the Unit Select switch in the upper right corner of the OCP. Carefully press the Unit Select switch with a pointed object such as a pen or small screwdriver. The unit select numbers for all powered-on drives in the enclosure flash to indicate that the OCP is in unit select mode.

2. Press the Fault/Set No. switch for the selected drive once to increment the unit number by one. Press and hold the Fault/Set No. switch to rapidly increment the unit number. Set the unit number to any number between 000 and 255.

   NOTE

   You cannot decrement a drive number. Continue holding the Fault/Set No. switch until it increments to 255; it then restarts at 0.

   Repeat this step for each disk drive in all enclosures.

3. When you finish setting the unit numbers, restore the OCP to normal operation by pressing the Unit Select switch again.

Refer to Chapter 3 for a detailed description of the OCP switches and indicators, and instructions for bringing the disk drives on line.

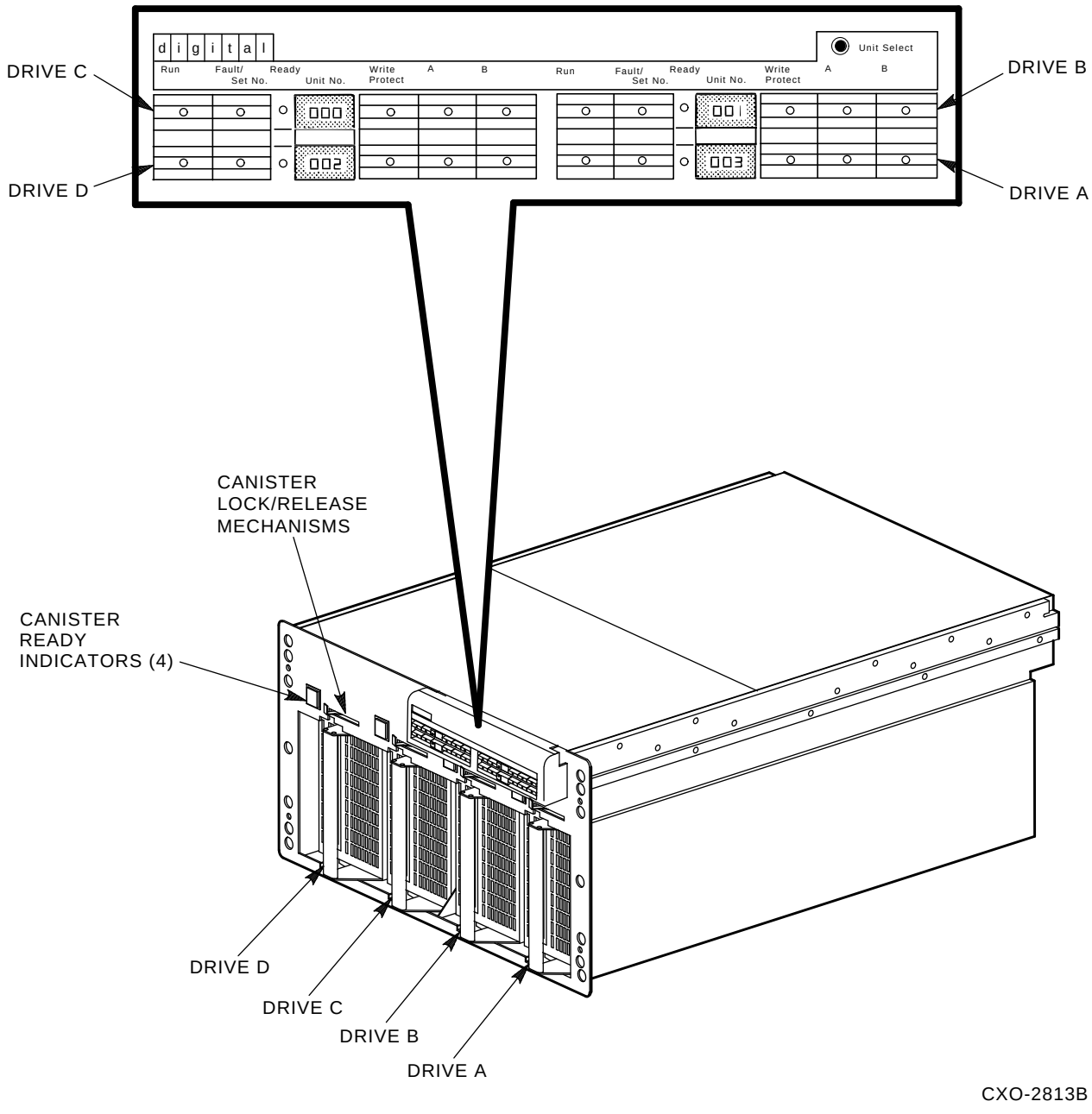

Figure 2–11 Front View of the SA70R–AK Enclosure

2.12 Deinstalling and Repacking the SAx05 Storage Array

If it becomes necessary to store or ship the SAx05 storage array, use the following procedure to deinstall and repack the storage array:

WARNING
Three people are required to load the cabinet onto the shipping pallet. Serious injury could result if the cabinet is improperly handled.

1. Remove power to all enclosures and to the cabinet.
2. Locate all packing material, including the ramps, shipping pallet, shipping brackets and bolts, and corrugated carton. Contact your Digital Customer Services engineer for replacement packing materials, if needed.
3. Install the ramps on the shipping pallet. (Refer to Section 2.4.1.)
4. Screw the cabinet levelers up until the cabinet rests on its casters. (See Figure 2–4.)
5. Carefully push the cabinet onto the shipping pallet. Three people are required for this step.
6. Screw the cabinet levelers down and attach the levelers to the shipping brackets.
7. Attach all packing material, ramps, and the corrugated carton to the cabinet. (See Figure 2–1.)

3
Operating the SAx05 Storage Arrays

3.1 About This Chapter

This chapter provides a detailed description of the switches and indicators located on the front and rear panels of the SA70R–AK enclosure. In addition, this chapter contains the following procedures:

- Opening and closing the cabinet front door
- Removing and reinstalling the cabinet rear access panel
- Bringing a disk drive on line
- Taking a disk drive off line
- Setting the drive unit number during operation

3.2 Opening and Closing the H9xxx Cabinet Front Door

The SA705 storage array uses an H9646 cabinet. The SA905 storage array uses an H9A00 cabinet. The procedures for opening the cabinet doors differ slightly. Choose the procedure that applies to your cabinet type.

3.2.1 Opening and Closing the H9646 Cabinet Front Door

To open the H9646 cabinet front door (see Figure 3–1):

1. Unlock the cabinet front door.
2. Press the top of the latch.
3. Lift the latch and turn it counterclockwise.
4. Open the door.

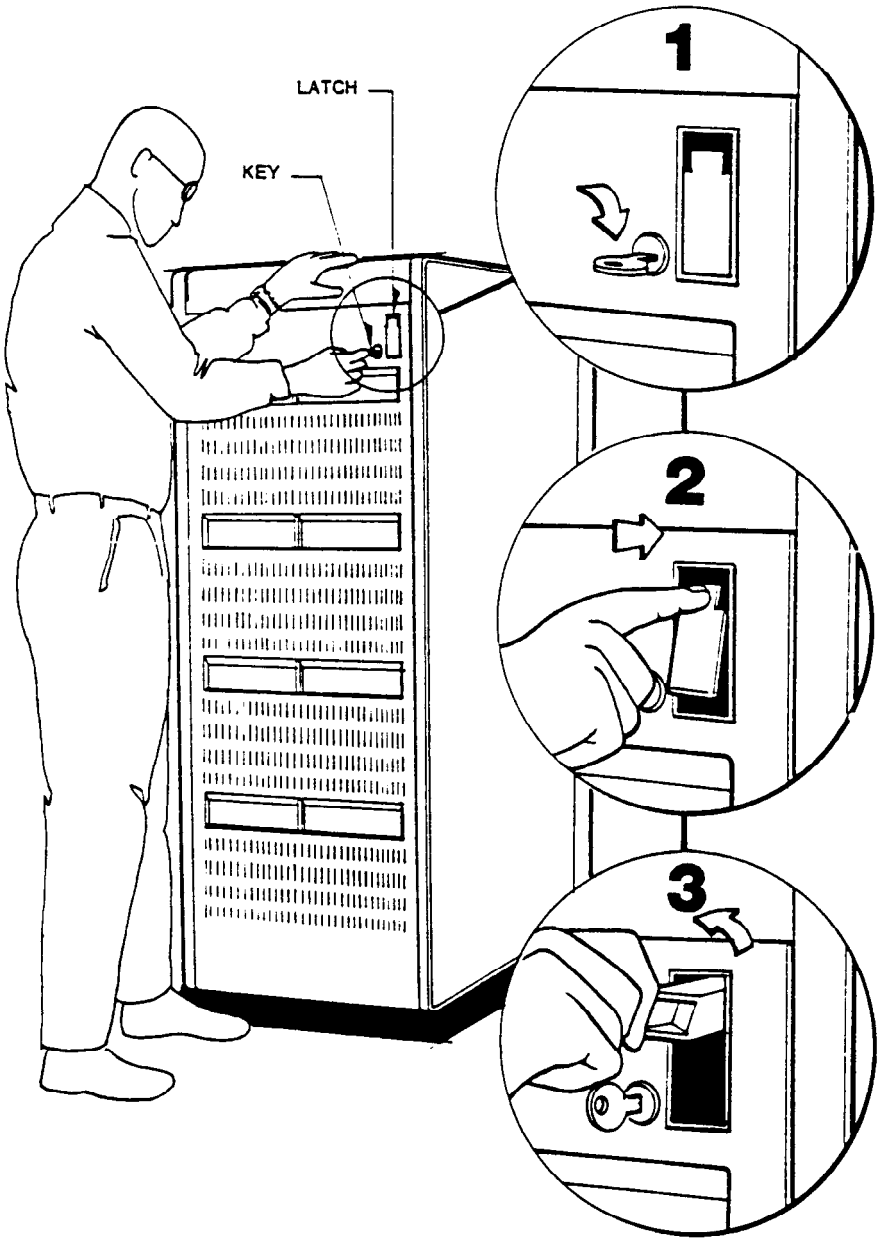

Figure 3–1 Opening the H9646 Cabinet Front Door

To close the H9646 cabinet front door:

1. Place one hand on the latch and apply gentle pressure with the other hand to the middle of the door.
2. When the front surface of the cabinet door is flush with the cabinet side panel, turn the latch clockwise and press the handle down. The latch will not completely recess unless the keyed lock is turned to the unlocked position.
3. Lock the cabinet door and remove the key.

3.2.2 Opening and Closing the H9A00 Cabinet Front Door

To open the H9A00 cabinet front door:

1. Unlock the cabinet front door.
2. Push the latch down and pull the door toward you.

To close the H9A00 cabinet front door:

1. Gently push the door against the door frame until the latch clicks into place.
2. Lock the cabinet door and remove the key.

3.3 Removing and Reinstalling the H9xxx Cabinet Rear Access Panel

To access the switches and indicator located on the rear panel of the SA70R–AK enclosure, you must remove the cabinet rear access panel. The SA705 storage array uses an H9646 cabinet (see Figure 3–2). The SA905 storage array uses an H9A00 cabinet (see Figure 3–3). The procedure for removing the cabinet rear access panel is the same for both cabinet types.

WARNING

Hazardous voltages are present inside the H9xxx cabinet and SA70R–AK enclosures. Only qualified Customer Services engineers should perform installation and service. When performing any operation involving the power source for the cabinet, turn off the 881 power controller. Disconnect the line cord from the source outlet. Perform the operation, then reconnect the line cord.

To remove the H9xxx cabinet rear access panel:

1. Using a 5/32 hex wrench, turn each of the two hex fasteners located at the top of the panel counterclockwise one-quarter turn to unlock.
2. Tilt the panel toward you and lift it up to disengage the two pins at the bottom of the panel.
3. Lift the panel clear of the enclosure and set aside.

To reinstall the H9xxx cabinet rear access panel:

1. Lift the rear access panel into place and fit the two pins at the bottom of the panel into the corresponding holes on the cabinet. (On the H9646 cabinet, the holes are located on the I/O bulkhead; on the H9A00, the holes are located on the bottom filler panel.)
2. Press the top of the panel into place and, using a 5/32 hex wrench, turn each of the two hex fasteners located at the top of the panel one-quarter turn clockwise to lock.

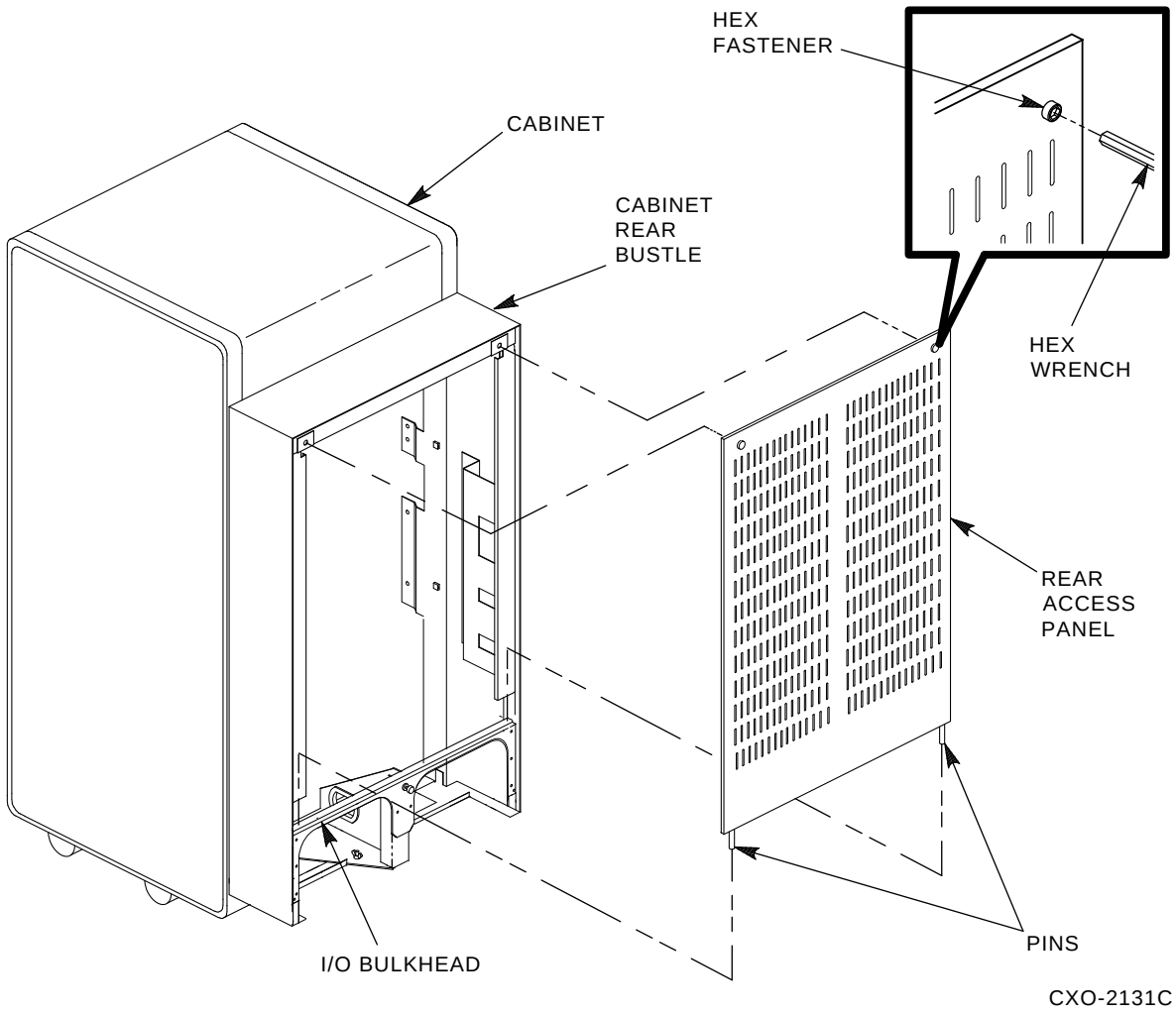

Figure 3–2 Removing the H9646 Cabinet Rear Access Panel

3.4 SA70R–AK Enclosure Front Panel Switches and Indicators

Figure 3–4 shows the front panel of the SA70R–AK enclosure. As you face the enclosure, the operator control panel (OCP) is located at the top right-hand corner of the enclosure. The OCP contains a Unit Select switch and four identical sets of switches and indicators. Each set of switches and indicators is referred to as a *control set* and is dedicated to one of the four disk drive positions in the enclosure. A control set functions only when a disk drive is inserted and powered up in the corresponding drive position. Each OCP switch and indicator is described in Section 3.4.1.

A row of canister ready indicators, one for each disk drive position, is located below the OCP and above the disk drive positions (see Figure 3–4). The canister ready indicators are described in Section 3.4.2.

Table 3–1 summarizes the functions of the SA70R–AK enclosure front panel switches and indicators during normal operation.

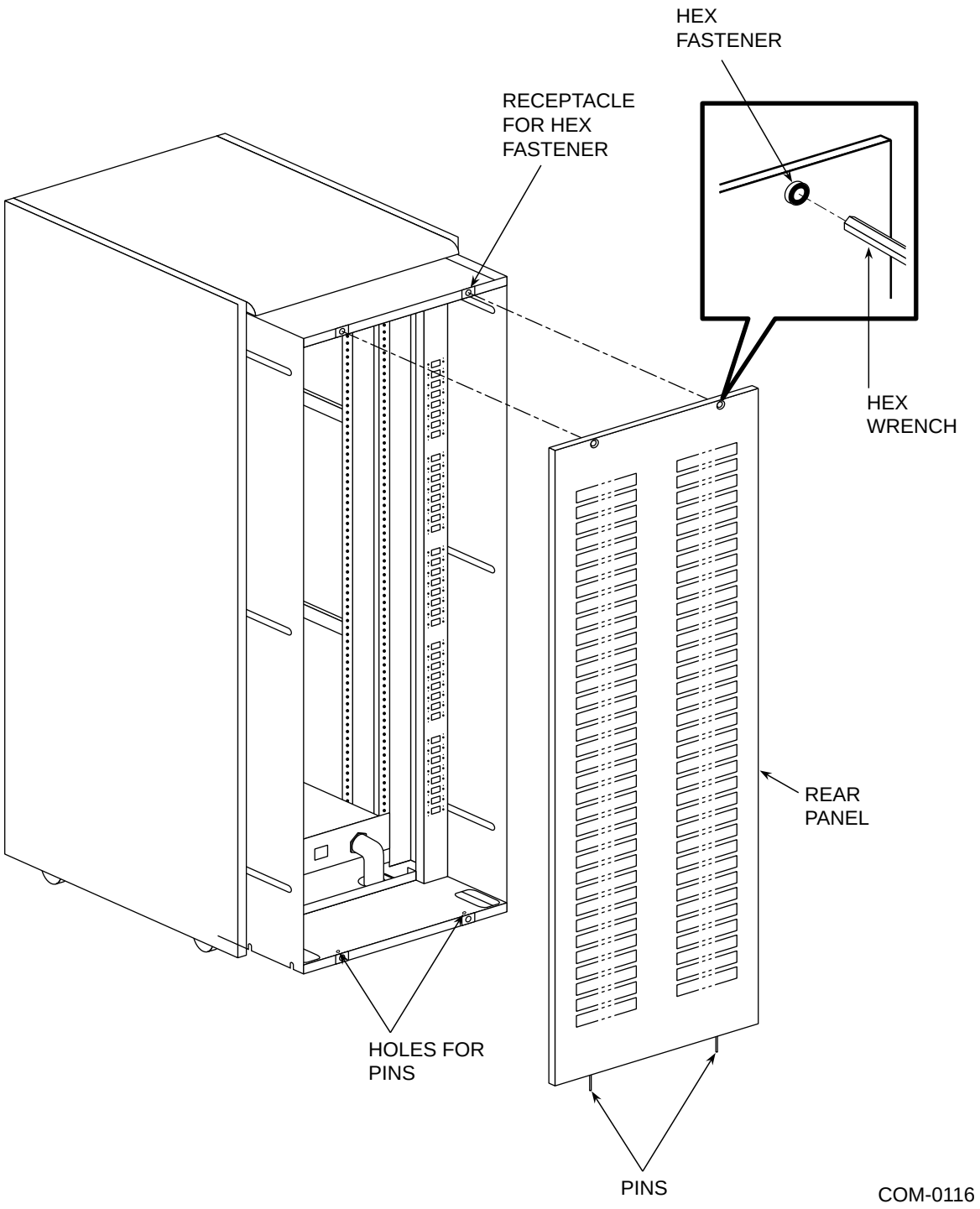

Figure 3–3 Removing the H9A00 Cabinet Rear Access Panel

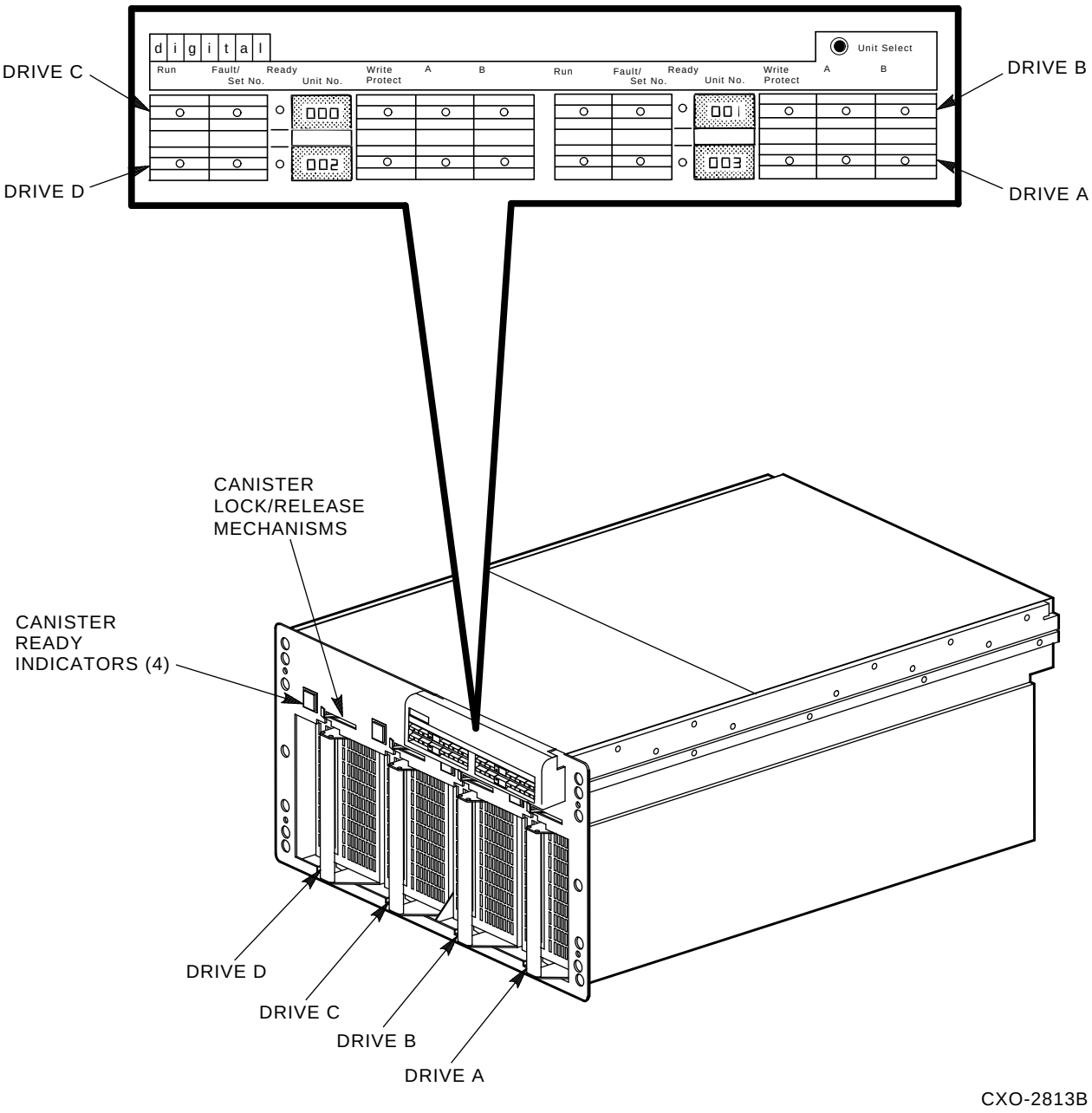

Figure 3–4 SA70R–AK Enclosure Front Panel

Table 3–1 Functions of the SA70R–AK Enclosure Front Panel Switches and Indicators During Normal Operation

Switch/ Indicator	Indicator Color	Switch Function	Indicator Function
OCP Switches and Indicators:			
Run	Yellow	Spins up the drive when pressed.	Lights when the drive has spun up/reached operating speed.
		Spins down the drive when released.	Goes out when the drive has spun down/drive spindle has stopped.
Fault/Set No.	Red	Performs three functions, depending on the mode/drive state:	
		– During normal operation: Performs a lamp test.	Lights during lamp test.
		– During a fault condition: Displays an error code. (Refer to Chapter 6.)	Lights when a fault is detected.
		– When in unit select mode: Sets drive unit number. (Refer to Section 3.8.)	N/A
Ready	Green	N/A	Lights when the drive is read/write ready.
Unit No.	Red	N/A	Displays the drive unit number.
Write Protect	Yellow	Enables write protection when pressed.	Lights to indicate write-protect mode.
A	Yellow	Enables port A for controller selection when pressed.	Lights to show port A is on line to controller.
B	Yellow	Enables port B for controller selection when pressed.	Lights to show port B is on line to controller.
Unit Select	N/A	Enables unit select mode (to set drive unit number) when pressed.	N/A
Canister Ready Indicators (4):			
	Green	N/A	Lights to indicate power to the drive.

3.4.1 OCP Switches and Indicators

The OCP contains a Unit Select switch and four identical sets of switches and indicators, one control set for each disk drive position in the enclosure. (See Figure 3–4.) Table 3–1 summarizes the functions of the SA70R–AK enclosure front panel switches and indicators during normal operation. Each control set is made up of the following switches and indicators:

NOTE
All OCP switches except the Fault/Set No. switch are set when depressed. These switches remain set until you release them by pressing them again. An indicator lights in each switch to show the status of the drive function.

The Fault/Set No. switch is a momentary push button. When you press the switch and hold it, it is set; when you release the switch, it is reset.

- **Run**—Pressing the Run switch causes the drive to spin up. The yellow Run indicator lights after the drive spindle reaches operating speed. Pressing the Run switch again releases the switch and causes the drive to spin down. The yellow Run indicator goes out only after the drive spindle comes to a complete stop.
- **Fault/Set No.**—Pressing and holding the Fault/Set No. switch during normal operation causes all OCP indicators to light as a lamp test. When a fault condition is detected in a disk drive, the red Fault/Set No. indicator lights. Pressing the Fault/Set No. switch once after a drive fault takes the drive off line and causes all indicators in the drive's control set, including the Fault/Set No. indicator, to blink an error condition code. Pressing the Fault/Set No. switch a second time clears the error code and commands the drive to attempt to clear the error and return on line. The Fault/Set No. switch is also used to set the drive unit number, as described in Section 3.8.
- **Ready**—The green Ready indicator lights to show that the drive is ready for read/write operations. This indicator is activated only after the Run switch is set and the yellow Run indicator is lit. The Ready indicator remains on during normal operations but may blink or go out during heavy disk usage. During spinup, the drive performs diagnostics and servo calibrations. The Ready indicator must light within 60 seconds after you press the Run switch; failure to do so indicates a problem in the drive.
- **Unit No.**—The unit number for the disk drive is displayed next to the Ready indicator. The unit number can be set to any number between 000 and 255, as described in Section 3.8. Placement of unit numbers in an actual installation is shown in Figure 3–4 (unit numbers 000 through 003 in this example).
- **Write Protect**—Setting the Write Protect switch disables writing to the drive. This function keeps the drive data from being overwritten and lost. The yellow Write Protect indicator lights to show that a drive is write protected. The drive may also be write protected by a system controller command; this also causes the Write Protect indicator to light.
- **A** and **B**—You enable ports A and B using the port A and port B select switches. Yellow indicators in each switch light to show that the system controller has selected the port.

The Ready and Run indicators remain lit during normal operation, although the Ready indicator may flicker during heavy seek activity. The Write Protect indicator is on if the drive is write protected and off if the drive is write enabled. The port A and B indicators light only while their respective ports are selected by the system controller.

3.4.2 Canister Ready Indicators

A canister ready indicator is located above each of the disk drive positions on the front of the SA70R–AK enclosure. Four conditions are necessary for the indicator to light:

- AC power must be available to the SA70R–AK enclosure.
- The SA70R–AK enclosure power switch must be on.
- The RA7x–RK removable disk drive must be properly inserted in the enclosure.
- Power must be enabled to the disk drive through the microswitch in the canister lock/release mechanism.
- The power supply must be supplying the correct voltage to the disk drive.

The symbol on each canister ready indicator corresponds to the related set of switches and indicators on the OCP.

Inserting an RA7x–RK removable disk drive automatically connects power to that disk drive and causes the drive to run a power-up self test. All OCP indicators light for a few seconds, then go off to indicate a successful test. After inserting the canister, you must press the Run switch on the OCP to spin up the drive. Refer to Chapter 4 for RA7x–RK removable disk drive insertion and removal procedures.

3.5 SA70R–AK Rear Panel Switches and Indicator

Figure 3–5 shows the rear panel of the SA70R–AK enclosure. The rear panel switches and indicator located on the power supply chassis affect the operation of the entire SA70R–AK enclosure. Descriptions of these switches and indicator follow.

WARNING
Hazardous voltages are present inside the SAx05 cabinet and SA70R–AK enclosures. Only qualified Customer Services engineers should perform installation and service. When performing any operation involving the source power for the enclosure, turn off the enclosure power. Disconnect the line cord from the enclosure rear panel. Perform the operation, then reconnect the line cord.

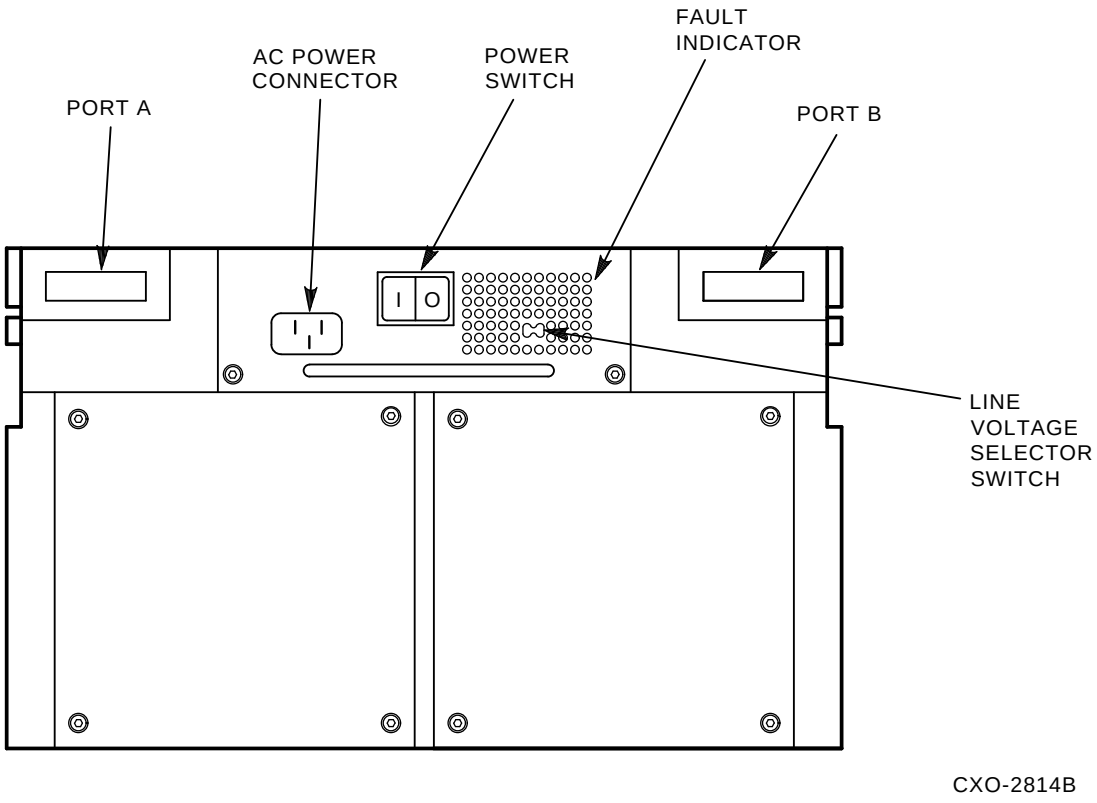

Figure 3–5 SA70R–AK Enclosure Rear Panel

- **Power switch**—The rocker-type power switch for the SA70R–AK enclosure is located in the center of the rear panel. Press the side of the switch labeled 1 (on) to apply power to the SA70R–AK enclosure. Press the side of the switch labeled 0 (off) to remove power from the enclosure.

- **Line voltage selector switch**—As you face the rear panel of the enclosure, the line voltage selector switch is located to the right of the power switch. It is visible through a hole in the rear panel. Your Digital Customer Services engineer sets this switch to the available line voltage during installation. The selected voltage is shown on the switch element. Section 5.8 describes the procedure for selecting the proper line voltage when installing an add-on SA70R–AK enclosure.

  CAUTION
  The SA70R–AK enclosure power supply is universal for both 120 Vac at 60 Hz or 240 Vac at 50 Hz. The supply is factory set to 240 Vac at 50 Hz and must be reset to 120 Vac at 60 Hz for some installations. Selecting the wrong voltage will damage the supply.

- **Fault indicator**—A red fault indicator is visible, when lit, through holes in the upper right-hand corner of the power supply. When the power supply detects an overtemperature or overvoltage condition, it automatically shuts down power to the enclosure and the fault indicator lights. If the fault indicator lights, turn off the enclosure for 10 seconds, then turn the enclosure back on. If the fault indicator lights again, call Digital Customer Services.

3.6 Bringing a Disk Drive On Line

To bring a disk drive on line, perform the following procedure:

NOTE
This procedure assumes the disk drive has already been environmentally stabilized and inserted into the enclosure. While the disk drive is automatically powered up upon insertion, it does not spin up.

If the disk drive is not already in the enclosure, refer to Chapter 4 for instructions on inserting the RA7x–RK removable disk drive into the SA70R–AK enclosure.

1. Spin up the selected drive by pressing the Run switch on the OCP control set for that drive. (See Figure 3–4.) The following sequence of indicator lights occurs during spinup:

   a. The Run indicator lights to show that you have commanded spinup. If you have inserted the RA7x–RK removable disk drive with the Run switch set, you must either momentarily release then reset the Run switch or issue a mount command from your system to initiate spinup. The Run indicator lights to show that spinup was initiated through either of these actions. All other indicators remain off.

   b. When the drive completes spinup, the Ready indicator lights to show that the drive is read/write ready. The Ready indicator then flashes while the internal read/write and seek diagnostics run. Upon completion of the read/write and seek diagnostics, the Ready indicator remains lit.

   c. If the Fault/Set No. indicator remains lit, the drive has detected a fault. Press the Fault/Set No. switch twice to clear the fault. If the indicator remains lit, refer to Chapter 6 for fault recovery procedures.

2. Select port A, port B, and Write Protect, as required, by pressing the appropriate switches. To deselect these functions, press the switches a second time.

3.7 Taking a Disk Drive Off Line

To take a disk drive off line, perform the following procedure:

1. Dismount the disk drive using the proper system commands.
2. Press and release the port A and port B switches on the OCP to deselect both ports of the disk drive. Wait for the port indicators to go out. (See Figure 3–4 for the location of the port A and B switches.)

If you intend to remove the disk drive from the enclosure, you must also spin the drive down as follows:

3. Press and release the appropriate Run switch on the OCP. Wait for the Run indicator to go out.
4. Remove the RA7x–RK removable disk drive from the enclosure. (Refer to Section 4.5.) The canister ready indicator goes out to indicate that power has been removed from that disk drive position.

3.8 Setting the Drive Unit Number During Operation

The drive unit number is the number the system uses to identify the drive. This number is automatically read by the drive at power up and after the number has been reset. You can set the drive unit number for any disk drive at the OCP. Once the number is in the drive, the system controller reads it according to the controller's protocol.

NOTE
The drive unit number is stored on transition board #2 (TB2). The disk drive does not maintain the unit number when the drive is moved to a different position in the enclosure. However, the drive unit number is saved during a power failure by the nonvolatile storage on TB2.

Use the following procedure to set the drive unit number for a selected drive during routine operations:

CAUTION
Be sure that no two disk drives in your system have the same drive unit number. Using the same drive unit number for two disk drives causes a controller fault and results in both drives spinning down.

1. Dismount the selected disk drive and take it off line. (Refer to Section 3.7.)

   NOTE
   It is not necessary to take other drives in the same enclosure off line when setting a drive unit number.

2. Locate the Unit Select switch in the upper right corner of the OCP. Carefully press the Unit Select switch with a pointed object such as a pen or small screwdriver. The unit select numbers for all powered-on drives in the enclosure flash to indicate that the OCP is in unit select mode. When the OCP is in unit select mode, all drives not spun down continue to operate according to the settings of the OCP switches.
3. Set the drive unit number to any number between 000 and 255, as follows:

   CAUTION
   Pressing the Fault/Set No. switch for a disk drive that is on line causes the drive to go off line.

   - To increment the drive unit number by one, press the Fault/Set No. switch once.

- To rapidly increment the unit number, press and hold the Fault/Set No. switch. Once it increments to 255, it will restart at 0.

NOTE
If you do not press the Fault/Set No. switch, the number for that drive remains the same as before you entered the unit select mode.

4. When you finish setting the drive unit number, restore the OCP to normal operation by pressing the Unit Select switch again.
5. Restore the offline drive to its online status. (Refer to Section 3.6.)
6. Remount the disk drive using the proper system commands.

4
Handling the RA7x–RK Removable Disk Drives

4.1 About This Chapter

This chapter describes the Shockwatch mounted on the RA7x–RK disk drive canister and what to do if the Shockwatch is red. It also explains the international symbols that appear on the disk drive canister and discusses the need to environmentally stabilize the disk drive before use.

The procedures for inserting and removing the RA7x–RK removable disk drives are contained in this chapter. Information about transporting and storing the RA7x–RK disk drives is also included.

For more information about operating the RA7x–RK removable disk drives in the SA70R–AK enclosure, refer to Chapter 3.

4.2 Understanding the Shockwatch

A Shockwatch is mounted on every RA7x–RK disk drive canister. The Shockwatch indicates whether the canister has been exposed to a shock that exceeds the disk drive's maximum shock level. If the Shockwatch is red, it is possible that the disk drive is damaged. (See Figure 4–1.)

CAUTION

Digital recommends that you check the Shockwatch before inserting the RA7x–RK removable disk drive into the SA70R–AK enclosure for operation. If the Shockwatch is red, the disk drive may be damaged. Contact your Customer Services engineer any time the Shockwatch is red, even if the disk drive operates correctly.

If the Shockwatch is red, contact your Customer Services engineer and perform the following procedure:

1. Check the canister for visible damage.
   - If canister damage is visible, do not insert the canister into the enclosure.
   - If no canister damage is visible, insert the canister into the enclosure. (Refer to Section 4.5.)
2. Check the drive for faults and errors.
   - If you find faults and errors and the drive is not operable, remove the canister.
   - If you find faults and errors but the drive is operable, copy your data to another disk drive immediately.
   - If you do not find faults and errors, operate the disk drive as normal.

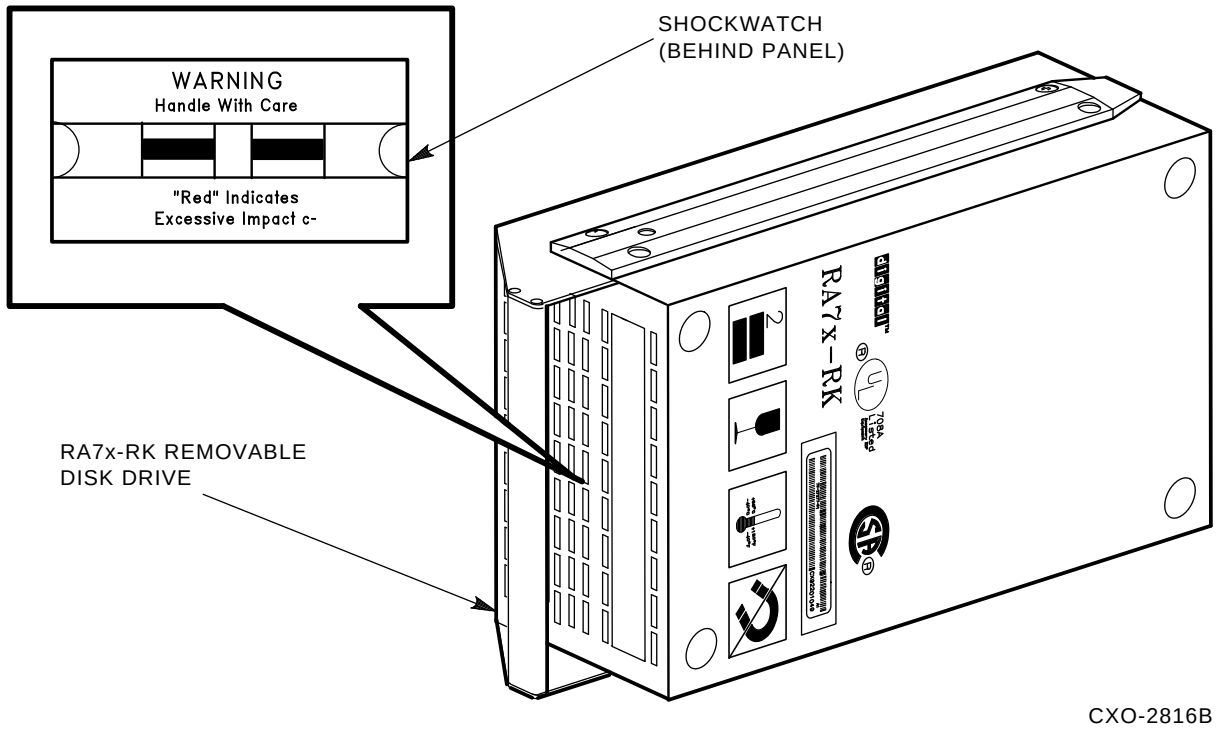

Figure 4–1 The Shockwatch on the RA7x–RK Disk Drive Canister

4.3 Ensuring Environmental Stabilization

If the RA7x–RK removable disk drive has been outside the room where it is normally operated, it is critical that it be environmentally stabilized before being used.

CAUTION
Failure to environmentally stabilize the disk drive may result in damage to the drive media or associated electronics at power-up. Refer to Appendix A for environmental stabilization procedures.

4.4 Understanding RA7x–RK Canister Labels

There are four caution labels affixed to the RA7x–RK removable disk drive canister that use international symbols. (See Figure 4–2.) Reading the labels from left to right:

- The stacking label indicates that you should not stack canisters more than two canisters high.
- The fragile label indicates that the canister is fragile and should not be subjected to rough handling.
- The temperature label indicates that the canister should not be exposed to temperatures that exceed the storage (non-operating) temperature limits for the canister. (Refer to Table 1–6.)
- The magnetic label indicates that you should not expose the canister to strong magnetic fields.

NOTE
Exposure to airport x-ray equipment is acceptable.

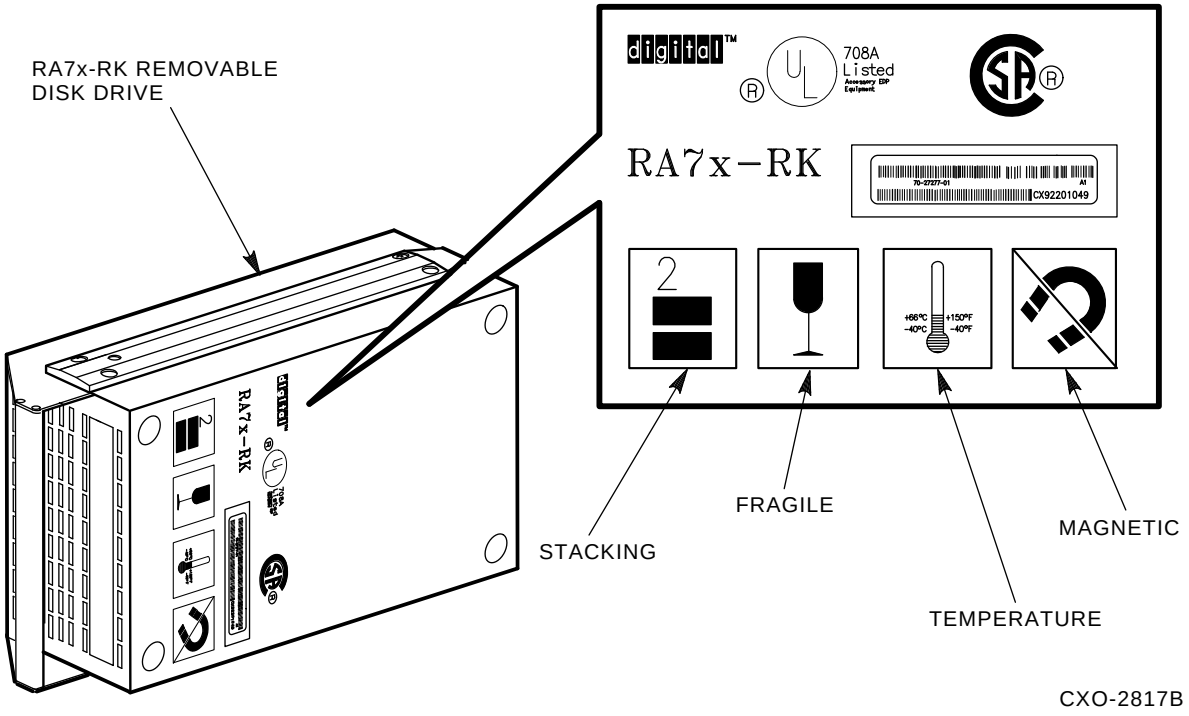

Figure 4–2 The Four International Symbols on the Canister Labels

4.5 Inserting and Removing the RA7x–RK Removable Disk Drive

The RA7x–RK removable disk drive has been designed to allow you to insert and remove it, on a regular basis, from the SA70R–AK enclosure. Inserting or removing a single canister does not affect the online operation of any other disk element. This includes the other disk drives in the same SA70R–AK enclosure, other disk drives inside the SAx05 storage array, and any disk drive that may be connected to the same HSC or other controller.

Under normal conditions, you must take the drive off line and spin it down before removing the canister. This procedure is explained in Section 3.7.

CAUTION
The RA7x–RK removable disk drive is designed to be inserted only in the SA70R–AK enclosure. The SA70R–AK enclosure is designed to accommodate only RA7x–RK removable disk drives. Using these devices in other configurations may damage the equipment.

To insert the RA7x–RK removable disk drive into the SA70R–AK enclosure, refer to Figure 4–3 and follow these steps:

1. Inspect the canister for any signs of physical damage.
2. Inspect the canister Shockwatch for possible damage to the disk drive.

NOTE
Digital recommends that you check the Shockwatch before inserting the RA7x–RK removable disk drive into the SA70R–AK enclosure for operation. If the Shockwatch is red, the disk drive may be damaged. Contact your Customer Services engineer any time the Shockwatch is red, even if the disk drive operates correctly. Refer to Section 4.2 for additional information about the Shockwatch.

3. If the disk drive has been outside its operating environment, ensure that it has been environmentally stabilized.

CAUTION
Always ensure environmental stabilization of the RA7x–RK removable disk drive if it has been removed from the room where it is normally operated. Otherwise, damage to the drive media or associated electronics may result at power-up. Refer to Appendix A for environmental stabilization procedures.

4. Open the cabinet front door. (Refer to Section 3.2.)
5. Grasp the canister handle in one hand while supporting the bottom of the canister with the other hand. If necessary, rotate the canister so the steel alignment pin is on top.
6. Carefully align the canister guide rails with the opening in the SA70R–AK enclosure and gently slide the canister in until it is fully seated. The lock/release handle on the enclosure clicks to the left to indicate that the canister is fully seated and locked in the enclosure. If the handle does not move completely to the left, push the handle to the left.
7. Make sure the canister ready indicator lights to indicate the canister has correct power.
8. Close the cabinet front door. (Refer to Section 3.2.)
9. Spin up the disk drive. (Refer to Section 3.6.)

To remove the RA7x–RK removable disk drive from the SA70R–AK enclosure, refer to Figure 4–3 and follow these steps:

1. Dismount the disk drive using the proper system commands.
2. Take the drive off line and spin it down. (Refer to Section 3.7.)
3. Move the lock/release handle to the right to unlock the canister. (If the enclosure has power, the canister ready indicator lamp goes out when you move the lock/release handle to the right.)
4. Grasp the canister handle and carefully slide the canister out of the opening, placing your other hand on the bottom of the canister to support its weight.
5. Close the cabinet front door. (Refer to Section 3.2.)

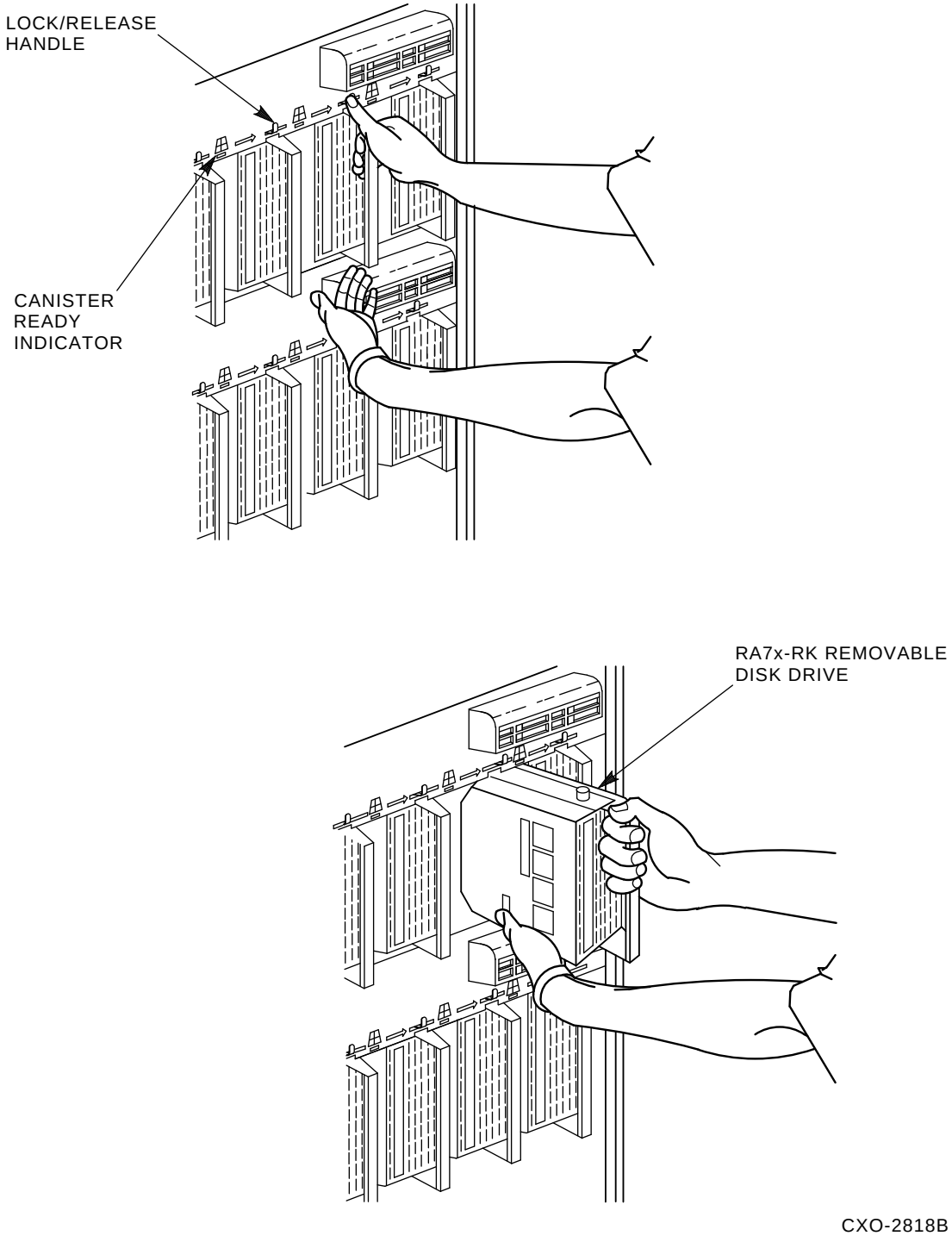

Figure 4–3 Inserting and Removing the RA7x–RK Removable Disk Drive

4.6 Transporting the RA7x–RK

Always use care when handling or transporting the RA7x–RK removable disk drive. If you are transporting the disk drive canister outside its operating environment, always use the RA70X–AK carrying case (Figure 4–4). This case helps protect the canister from environmental extremes, shock, and vibration. The RA70X–AK carrying case accommodates RA70–RK, RA71–RK, and RA72–RK removable disk drives. Refer to Table 1–6 for environmental limits specifications for the RA7x–RK in the RA70X–AK carrying case.

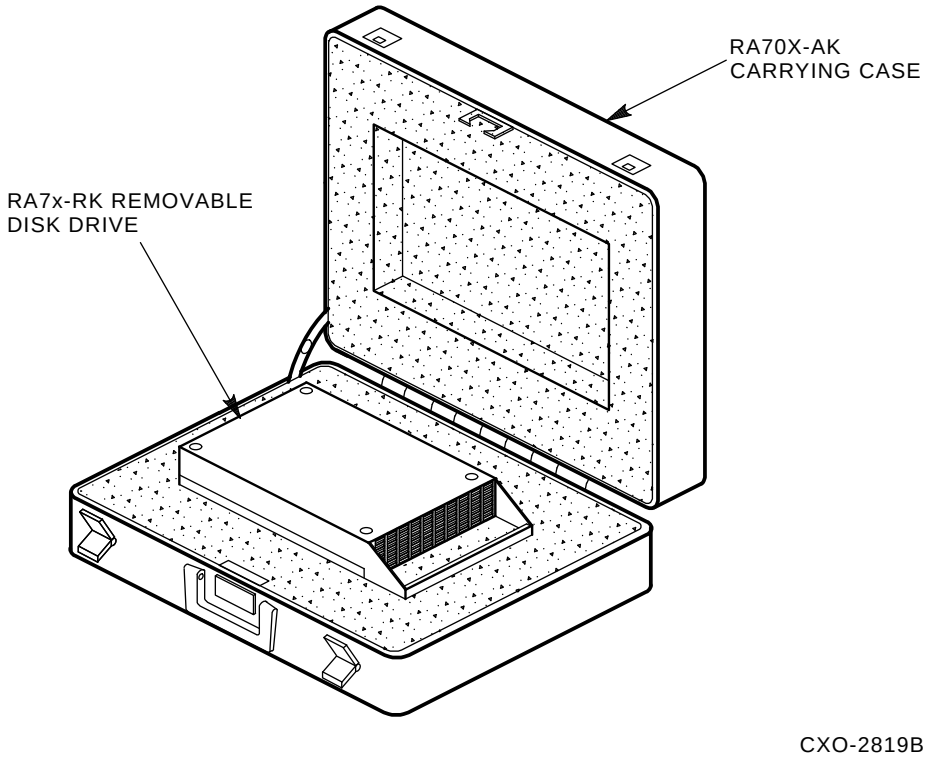

Figure 4–4 RA70X–AK Carrying Case

CAUTION
Always ensure environmental stabilization of the RA7x–RK removable disk drive if it has been removed from its operating environment. Otherwise, damage to the drive media or associated electronics may result at power-up. Refer to Appendix A for environmental stabilization procedures.

4.7 Storing the RA7x–RK Removable Disk Drive

If storing the RA7x–RK removable disk drive outside the SA70R–AK enclosure, Digital recommends that you store it in a low-humidity environment where the temperature range is within +18 degrees C to +29 degrees C (+65 degrees F to +85 degrees F).

Refer to Table 1–2 for recommended environmental limits for disk drive storage and Table 1–6 for maximum environmental limits for disk drive storage.

5
Installing an Additional SA70R–AK Enclosure

5.1 About This Chapter

This chapter explains how to install an additional SA70R–AK enclosure in a vacant position in the SAx05 storage array. Procedures discussed in this chapter include:

- Preparing an existing SAx05 storage array for the installation of an additional SA70R–AK enclosure
- Unpacking the enclosure
- Installing the enclosure
- Installing internal cabinet SDI cables and power cords
- Connecting external SDI cables
- Selecting line input voltage to the enclosure
- Applying power to the enclosure
- Performing a post-installation checkout

CAUTION
Digital recommends that the SA70R–AK enclosure be installed only by qualified Customer Services engineers.

5.2 Required Tools

You will need the following tools to install the SA70R–AK enclosure in an SAx05 storage array:

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

CAUTION
The SA70R–AK enclosure is designed to be installed only in the SAx05 storage array. The SAx05 storage array is designed to accommodate only SA70R–AK enclosures. Using these components in other configurations may damage the equipment.

5.3 Preparing the SAx05 Storage Array

Before installing an SA70R–AK enclosure in an SAx05 storage array, you must perform the following tasks:

- Open and remove the cabinet front door
- Remove the cabinet rear access panel
- Choose a vacant position in which to install the SA70R–AK enclosure, and remove the position cover

These procedures are described in the sections that follow.

5.3.1 Opening and Closing the H9xxx Cabinet Front Door

The SA705 storage array uses an H9646 cabinet. The SA905 storage array uses an H9A00 cabinet. The procedures for opening the cabinet doors differ slightly. Choose the procedure that applies to your cabinet type:

- The procedure for opening and closing the H9646 cabinet front door is described in Section 3.2.1.
- The procedure for opening and closing the H9A00 cabinet front door is described in Section 3.2.2.

5.3.2 Removing and Reinstalling the H9xxx Cabinet Front Door

To allow enough clearance to install an add-on SA70R–AK enclosure in the SA705 storage array, you must remove the H9646 cabinet front door. If installing the enclosure in an SA905 storage array, you do not need to remove the H9A00 cabinet front door; however, the procedure is included here, in case you wish to do so.

5.3.2.1 Removing and Reinstalling the H9646 Cabinet Front Door

The H9646 cabinet front door is attached to the cabinet with two retracting-pin hinges. These hinges include a squeeze actuator to retract the spring-loaded pins. (See Figure 5–1.)

CAUTION

The H9646 cabinet front door has two hinges. To prevent damaging the door, disconnect the bottom hinge first when removing the door; connect the top hinge first when reinstalling the door.

To remove the H9646 cabinet front door:

1. Open the cabinet front door. (Refer to Section 3.2.1.)
2. Locate the *lower* hinge. While steadying the door with one hand, firmly squeeze the actuator to retract the hinge pins. Rotate the activator 90° away from the cabinet to keep the pins in the retracted position.
3. While supporting the door with one hand, use the same procedure to retract the pins in the top hinge.
4. Carefully remove the door from the cabinet.

To reinstall the H9646 cabinet front door:

1. Connect the top hinge first. Rotate the actuator toward the cabinet to extend the hinge pins.
2. While supporting the door with one hand, use the same procedure to connect the bottom hinge.

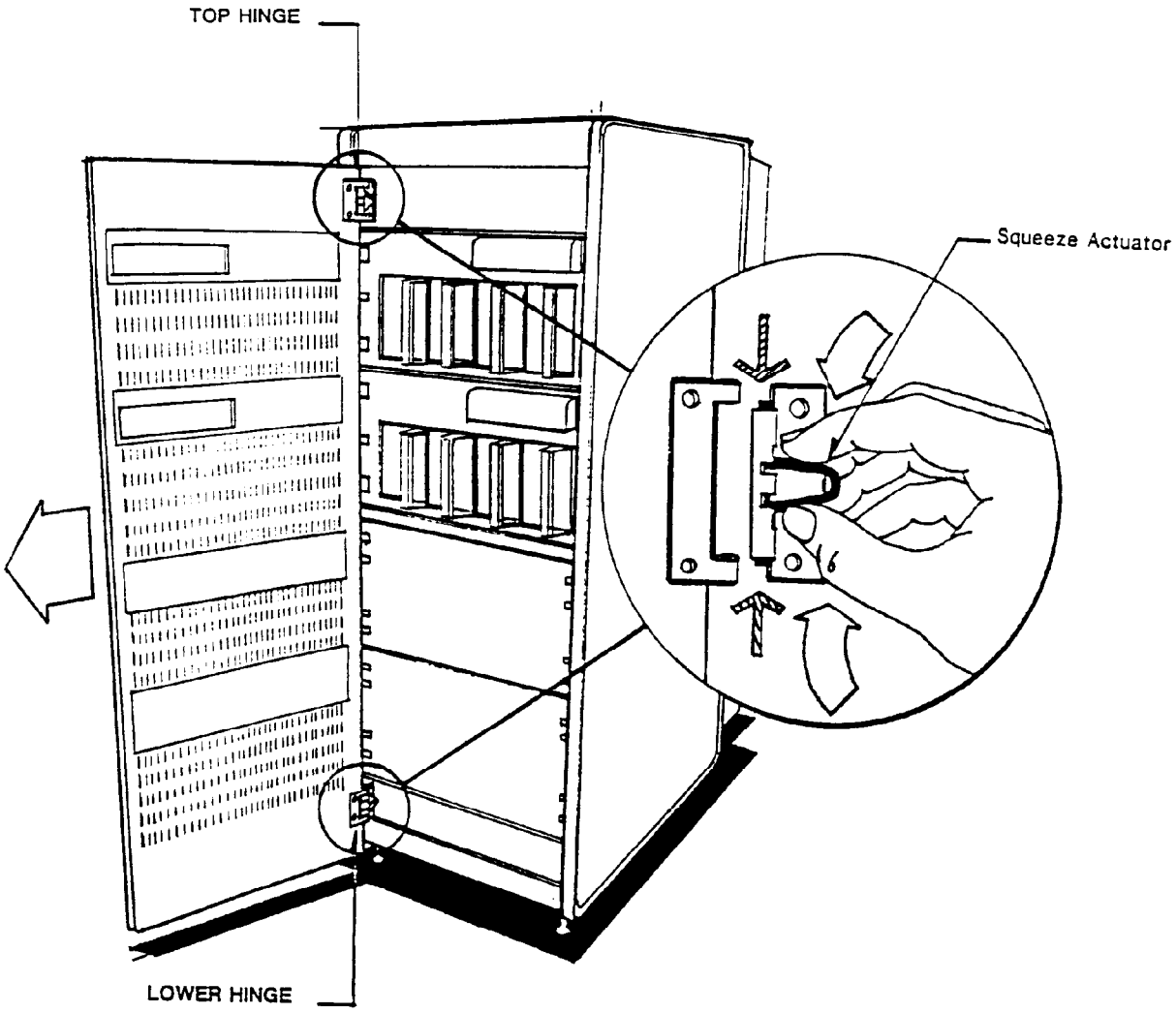

Figure 5–1 Removing the H9646 Cabinet Front Door

5.3.2.2 Removing and Reinstalling the H9A00 Cabinet Front Door

The H9A00 cabinet front door is attached to the cabinet with a retracting hinge pin at the top and a stationary pin at the bottom. (See Figure 5–2.)

To remove the H9A00 cabinet front door:

1. Open the cabinet front door. (Refer to Section 3.2.2.)
2. Locate the hinge pin lever at the top left side of the door.
3. While steadying the door with one hand, press down on the hinge pin lever to retract the hinge pin.

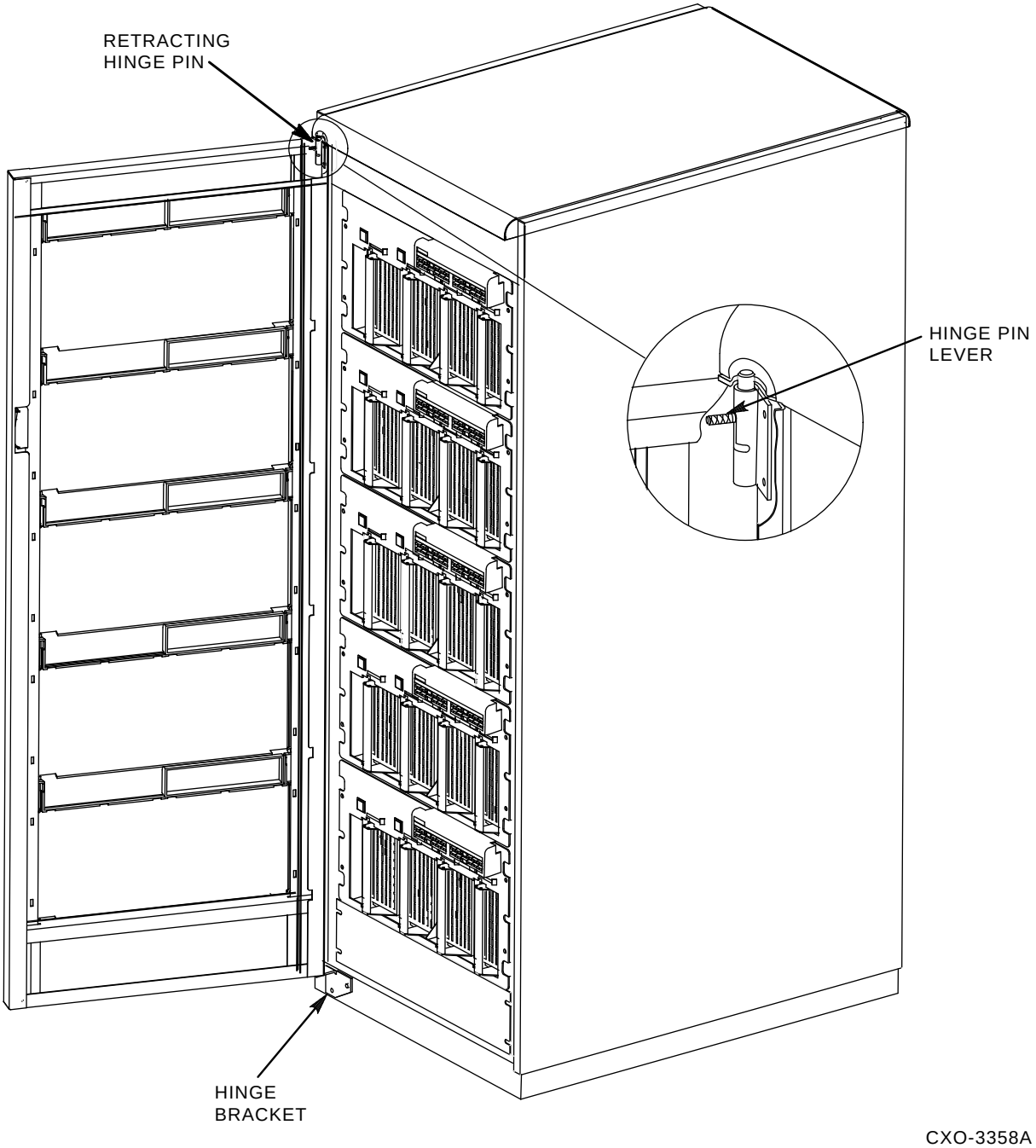

Figure 5–2 Removing the H9A00 Cabinet Front Door

4. Pull the door toward you and away from the cabinet, lifting the door slightly to clear the pin at the bottom of the door.

To reinstall the H9A00 cabinet front door:

1. Set the bottom left corner of the door onto the small black hinge bracket located at the bottom left corner of the cabinet, inserting the stationary pin on the bracket into the corresponding hole on the bottom of the door.
2. Push down on the hinge pin lever at the top left corner of the door to retract the hinge pin.
3. Tilt the top left corner of the door up and toward the cabinet, aligning the retracting hinge pin with the corresponding hole in the cabinet hinge bracket.
4. Release the hinge pin lever, locking the door in place.

5.3.3 Removing and Reinstalling the H9xxx Cabinet Rear Access Panel

The main power switches, power cables, and internal SDI cables are located inside the rear access panel of the H9xxx cabinet. You must remove the cabinet rear access panel to install new SDI cables and power up the new enclosure. Refer to Section 3.3 for instructions on removing the H9xxx cabinet rear access panel.

WARNING
Hazardous voltages are present inside the H9xxx cabinet and SA70R–AK enclosures. Only qualified Customer Services engineers should perform installation and service. When performing any operation involving the power source for the cabinet, turn off the 881 power controller. Disconnect the line cord from the source outlet. Perform the operation, then reconnect the line cord.

5.3.4 Choosing a Vacant Position and Removing the Position Cover

Additional SA70R–AK enclosures must be installed in a certain order, depending upon the type of storage array:

- If you are installing an SA70R–AK enclosure in an SA705 storage array, refer to the loading position priority illustrated in Figure 5–3.
- If you are installing an SA70R–AK enclosure in an SA905 storage array, refer to the loading position priority illustrated in Figure 5–4.

A metal cover is attached to the front of each vacant position in the SAx05 storage array. After establishing which position the add-on SA70R–AK enclosure is to be installed in, remove the four screws that hold the position cover in place. (See Figure 5–5.) Save these screws—they will be used to secure the new SA70R–AK enclosure in place.

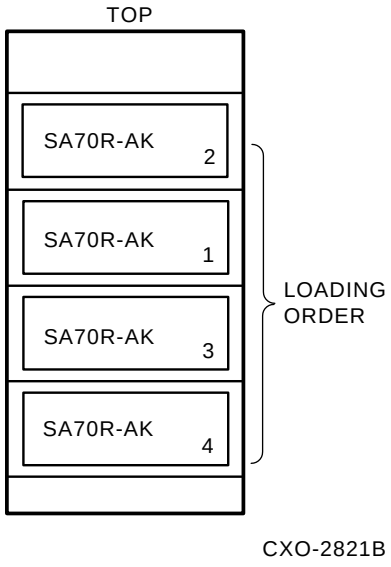

Figure 5–3 Loading Position Priority in the SA705 Storage Array

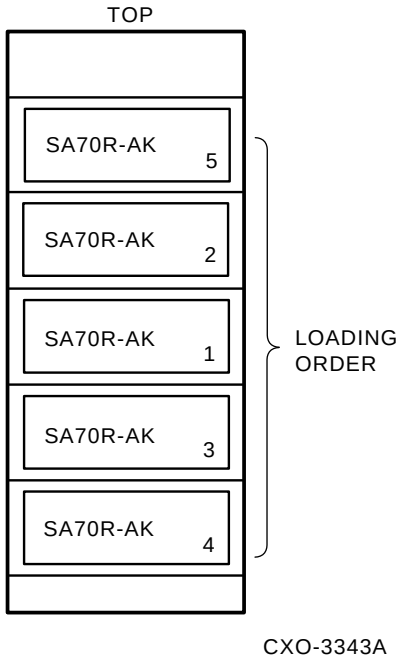

Figure 5–4 Loading Position Priority in the SA905 Storage Array

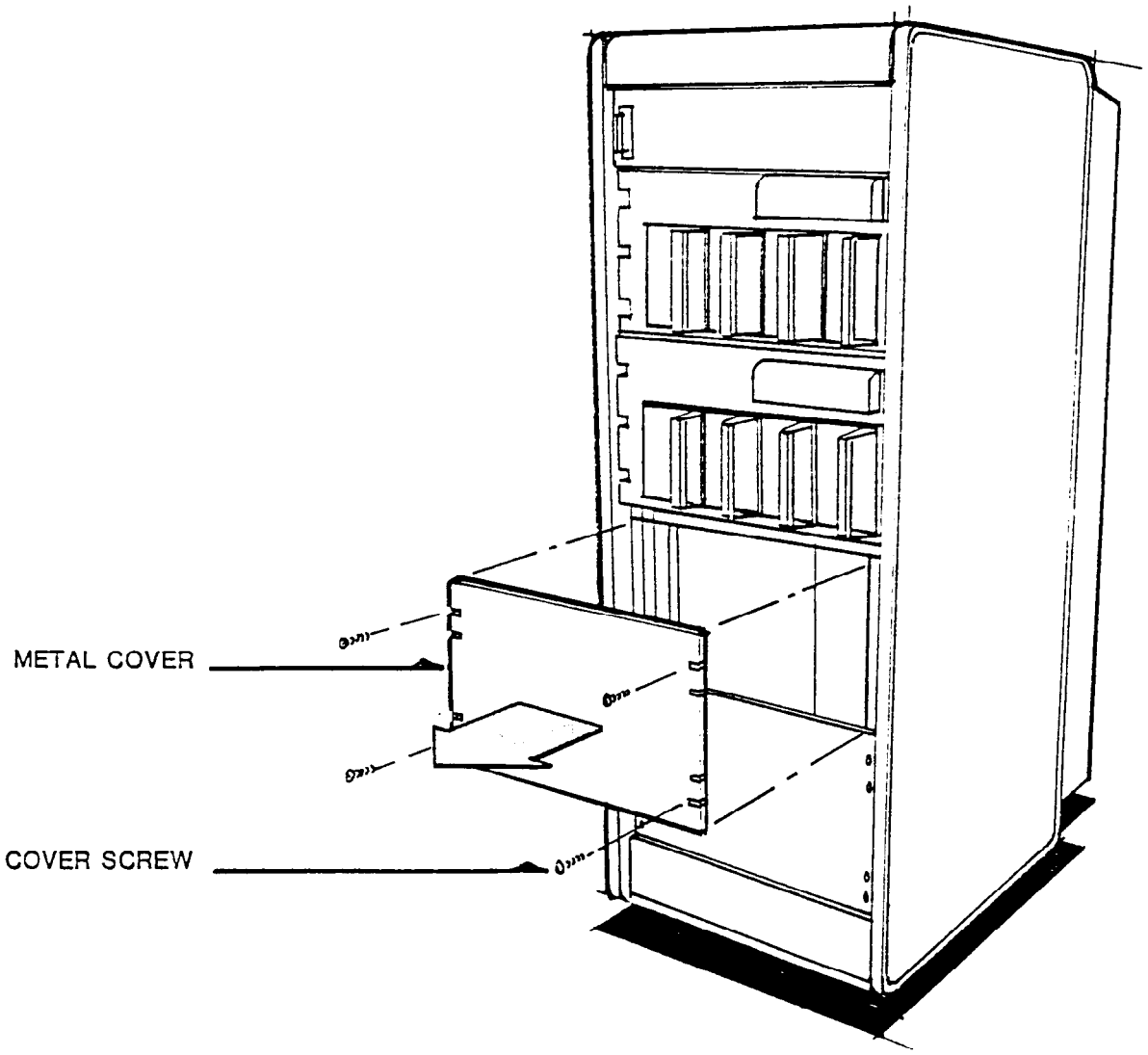

Figure 5–5 Vacant Position Cover

5.4 Unpacking the SA70R–AK Enclosure

The SA70R–AK enclosure is packaged in a corrugated carton. See Figure 5–6 for an illustration of the SA70R–AK enclosure shipping container.

During the unpacking procedure, save all packing material in case it is necessary to reship the SA70R–AK enclosure. To unpack the SA70R–AK enclosure, use the following procedure:

1. Inspect the shipping carton for signs of external damage. Report any damage to the local carrier and to Digital's local Customer Services or Sales office.
2. Cut the shipping straps and remove the enclosure from the shipping container.

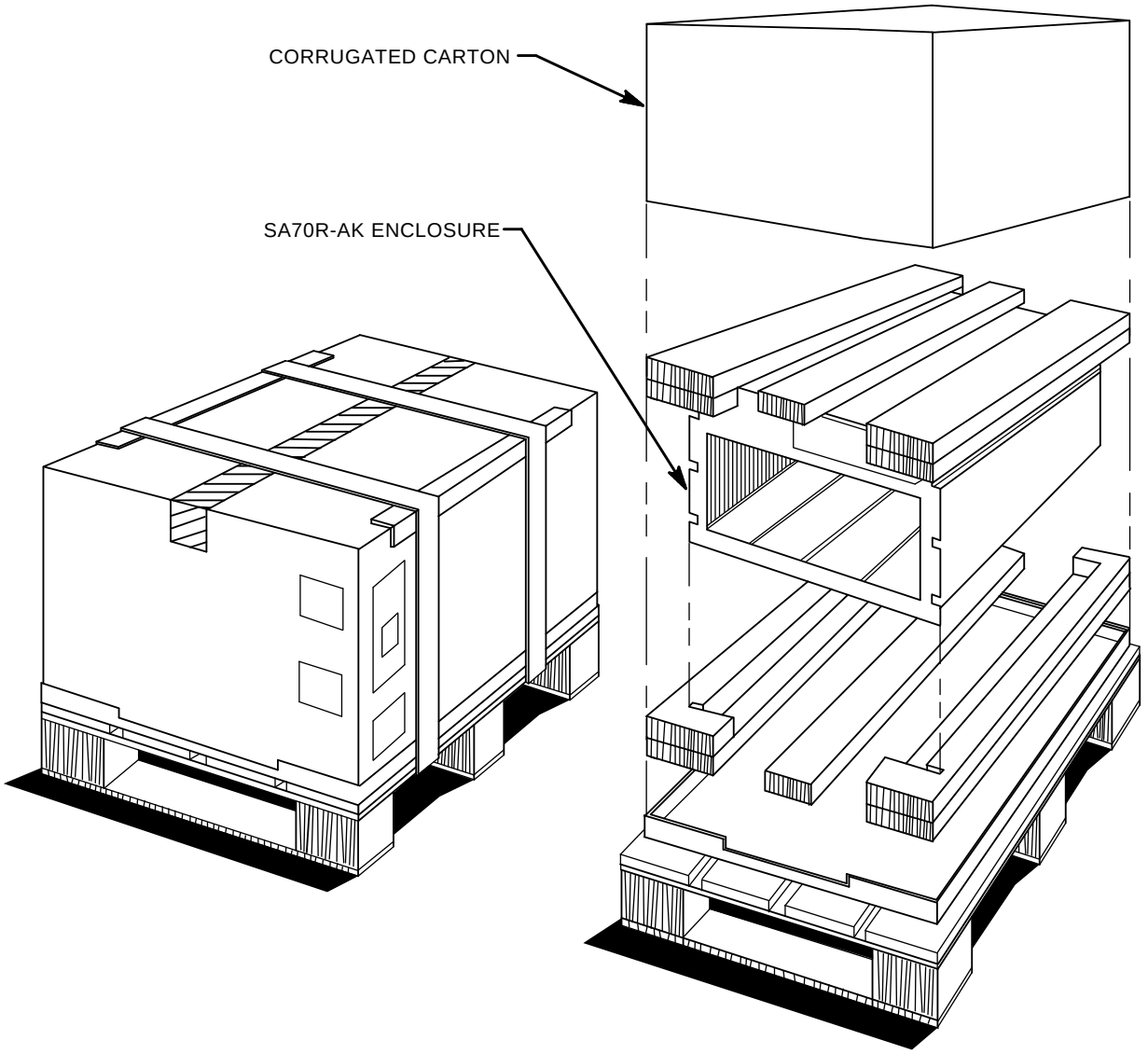

Figure 5–6 Contents of the SA70R–AK Enclosure Shipping Container

5.5 Installing the SA70R–AK Enclosure

Once you have finished preparing the SAx05 storage array, as described in Section 5.3, use the following procedure to install the SA70R–AK enclosure into a vacant position in the SAx05 storage array:

WARNING
An empty SA70R–AK enclosure weighs 29.5 kg (65 lbs). Two people are required to lift and install the SA70R–AK enclosure.

1. With one person on each side of the enclosure, lift the enclosure and align the grooved sides with the mounting rail inside the cabinet. (See Figure 5–7.)

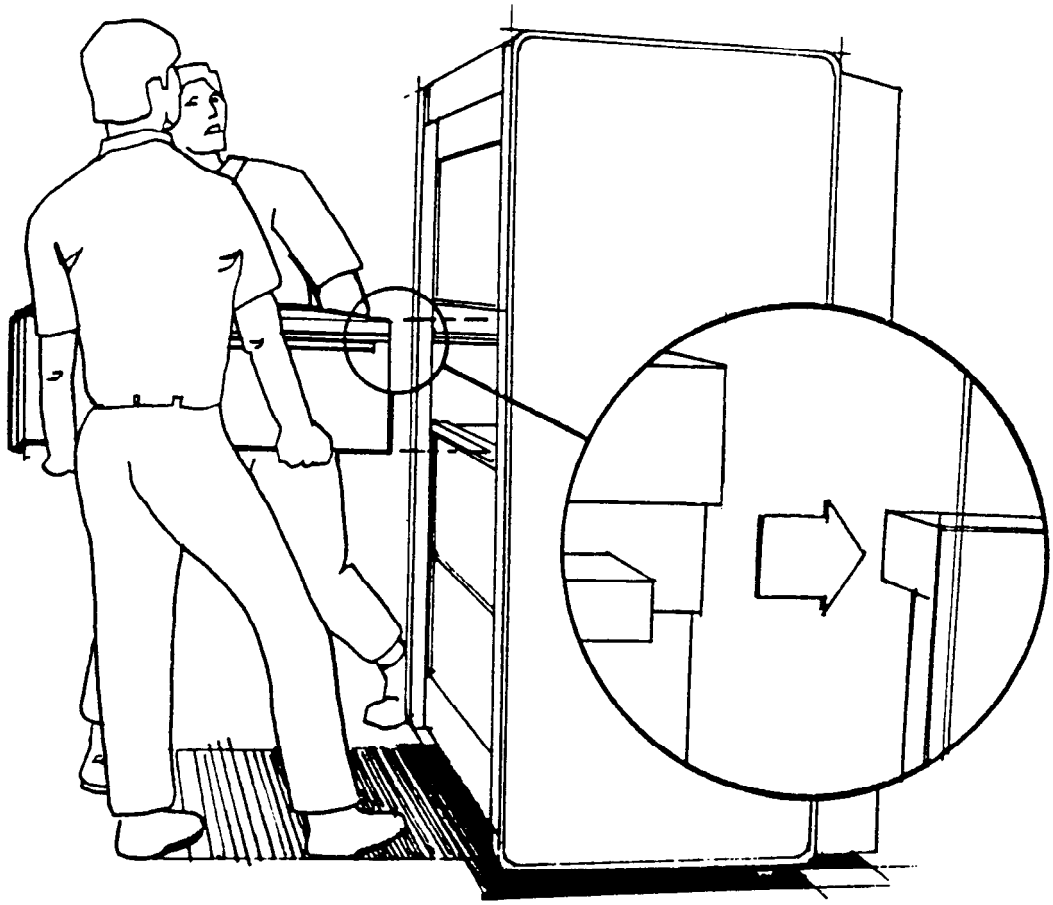

Figure 5–7 Installing the SA70R–AK Enclosure

2. Slide the enclosure in until it is seated against the rear of the cabinet chassis.
3. Secure the enclosure in place with the four screws you removed from the position cover.
4. Insert disk drives. (Refer to Section 4.5.)
5. Reinstall the cabinet front door. (Refer to Section 5.3.2.)

5.6 Installing Internal Cabinet SDI Cables and Power Cords

When you install an add-on enclosure in an SAx05 storage array, you must also install the internal cabinet SDI cables for that enclosure. If you are installing the add-on enclosure in an SA905 storage array, you must also install a power cord for the add-on enclosure. (SA705 storage arrays are shipped with preinstalled power cords for four enclosures (maximum configuration), regardless of the configuration.)

The following sections describe the procedures for installing internal cabinet SDI cables in an SA705 storage array, and internal cabinet SDI cables and a power cord in an SA905 storage array.

5.6.1 Installing Internal Cabinet SDI Cables in an SA705 Storage Array

Each SA70R–AK enclosure uses one power cord and two internal cabinet SDI cables—one for port A and one for port B. Each SDI cable has a single connector at one end that connects to the enclosure, and four connectors at the other end that connect to the I/O bulkhead located at the bottom rear of the H9646 cabinet. The four connectors are labeled for placement at the I/O bulkhead.

Figure 5–8 shows the configurations for SDI cables in an SA705 storage array.

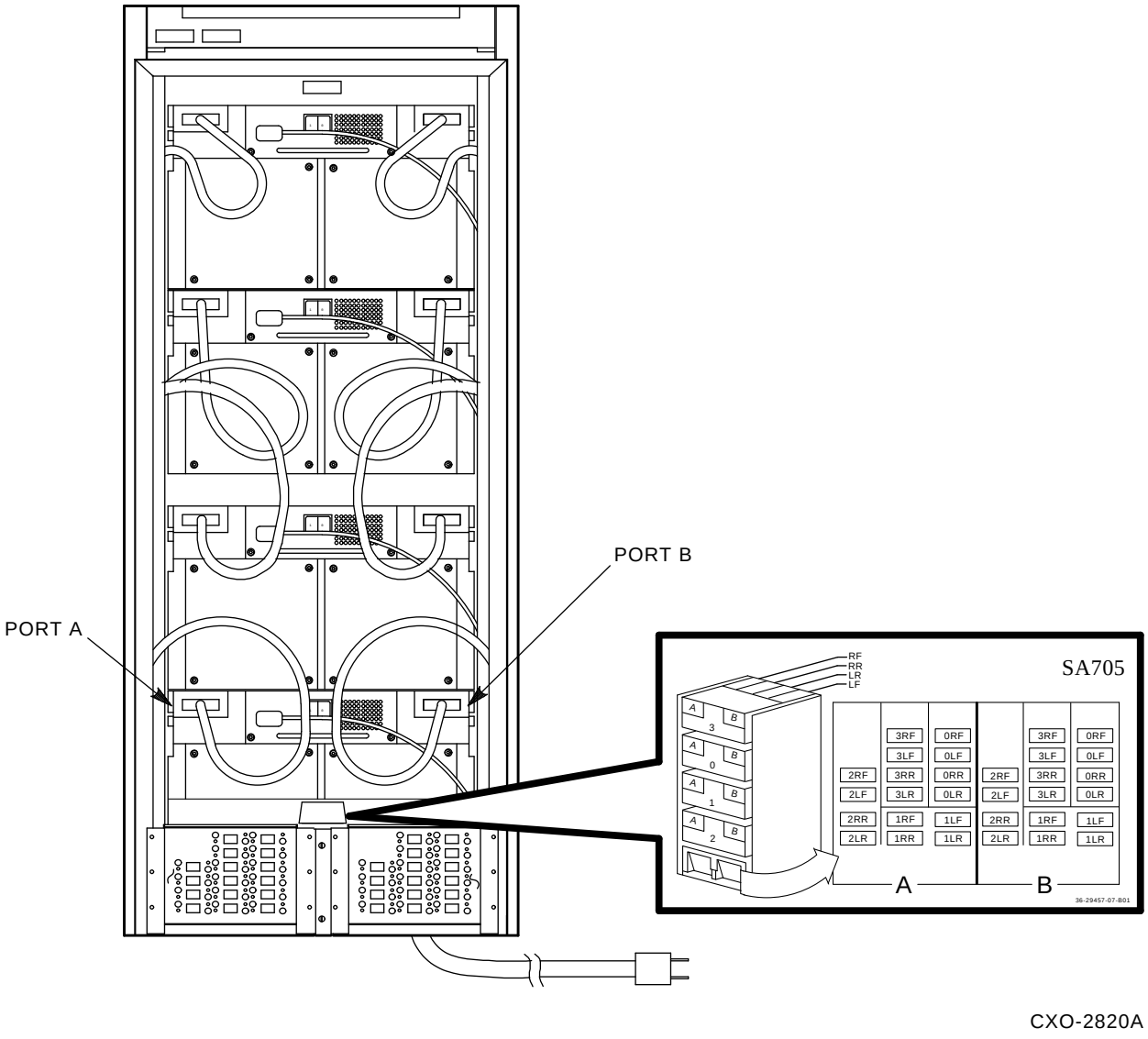

Figure 5–8 SA705 Internal Cabinet SDI Cable Configurations

Use the following procedure to install the two internal cabinet SDI cables (port A and port B) for a newly installed SA70R–AK enclosure in an SA705 storage array:

1. If you have not done so already, remove the cabinet rear access panel. (Refer to Section 3.3.)
2. Using a 5/32 hex wrench, loosen the hex fastener on the I/O bulkhead and rotate the bulkhead downward. This allows you to access the rear of the bulkhead to connect the internal cabinet SDI cables.

3. Locate the cable troughs that extend vertically along the inside of each of the cabinet's two side panels. One trough is for port A SDI cables; the other is for port B SDI cables. Open the cable troughs by first sliding them up, then back toward the front of the cabinet. (See Figure 5–9.)

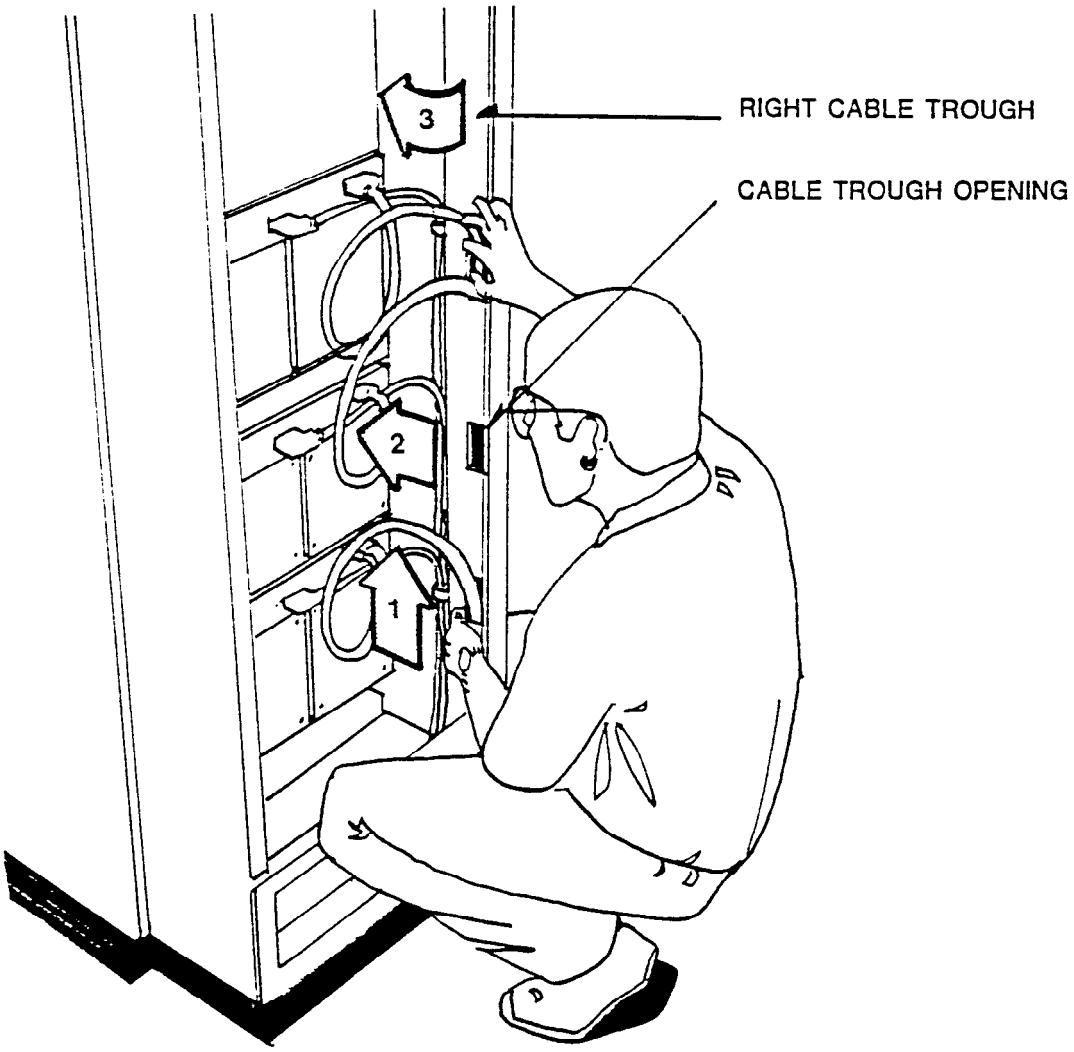

Figure 5–9 H9646 SDI Cable Troughs

4. Insert one cable into the left cable trough and one cable into the right cable trough. The enclosure end of each cable should exit the cable trough at the appropriate opening for the newly installed enclosure.

   NOTE
   Allow adequate slack in the SDI cables at the rear of the enclosure to allow the enclosure to be extended for service without having to disconnect the cables.

5. Connect the preinstalled power cord to the rear of the SA70R–AK enclosure.
6. Close both cable troughs by sliding them toward the rear of the cabinet, then downward.

7. Connect the two SDI cable connectors to the rear of the enclosure—one at Port A, one at Port B. (See Figure 5–8.) Secure each connector to the enclosure with the two retaining screws.
8. Connect each of the four smaller cables extending from the bottom of each SDI cable to the I/O bulkhead. (See Figure 5–8 for I/O bulkhead configurations.)
9. Secure each connector to the I/O bulkhead with two retaining screws. The screws are packaged in a separate bag.
10. Rotate the I/O bulkhead upward and tighten the hex fastener.
11. Reinstall the rear access panel. (Refer to Section 3.3.)

5.6.2 Installing Internal Cabinet SDI Cables and a Power Cord in an SA905 Storage Array

Each SA70R–AK enclosure uses one power cord and two internal cabinet SDI cables—one for port A and one for port B. Each SDI cable has a single connector at one end that connects to the enclosure, and four connectors at the other end that connect to the vertical I/O bulkhead. The four connectors are labeled for placement at the I/O bulkhead.

The H9A00 cabinet has two vertical I/O bulkheads, one on each side of the rear of the cabinet. The I/O bulkhead on the left (facing the rear of the cabinet) is for port A connections; the I/O bulkhead on the right is for port B connections. Each vertical I/O bulkhead has five sets of eight ports.

Figure 5–10 shows the configurations for SDI cables in a fully configured SA905 storage array. Use the following procedure to install the two internal cabinet SDI cables (port A and port B) and power cord for the newly installed SA70R–AK enclosure in an SA905 storage array:

1. If you have not done so already, remove the cabinet rear access panel. (Refer to Section 3.3.)
2. Connect the two SDI cable connectors to the rear of the enclosure—one at port A, one at port B. (See Figure 5–10.) Secure each connector to the enclosure with the two retaining screws.
3. Connect each of the four smaller cables extending from the bottom of each SDI cable to the side I/O bulkheads. (See Figure 5–10 for I/O bulkhead connections.)
4. Secure each connector to the I/O bulkhead with two retaining screws. The screws are packaged in a separate bag.
5. Connect the power cord as follows:
   a. Connect the power cord to the rear of the SA70R–AK enclosure.
   b. Route the power cord down the left side of the cabinet (when facing the rear of the cabinet), along the vertical I/O bulkhead.
   c. Connect the opposite end of the power cord to the appropriate connector on the 881 power controller. (See Figure 5–10 for power cord connections.) Coil any excess power cord in front of the power controller.
   d. Use tie wraps to secure the new power cord to the existing power cords in the cabinet.
6. Reinstall the rear access panel. (Refer to Section 3.3.)

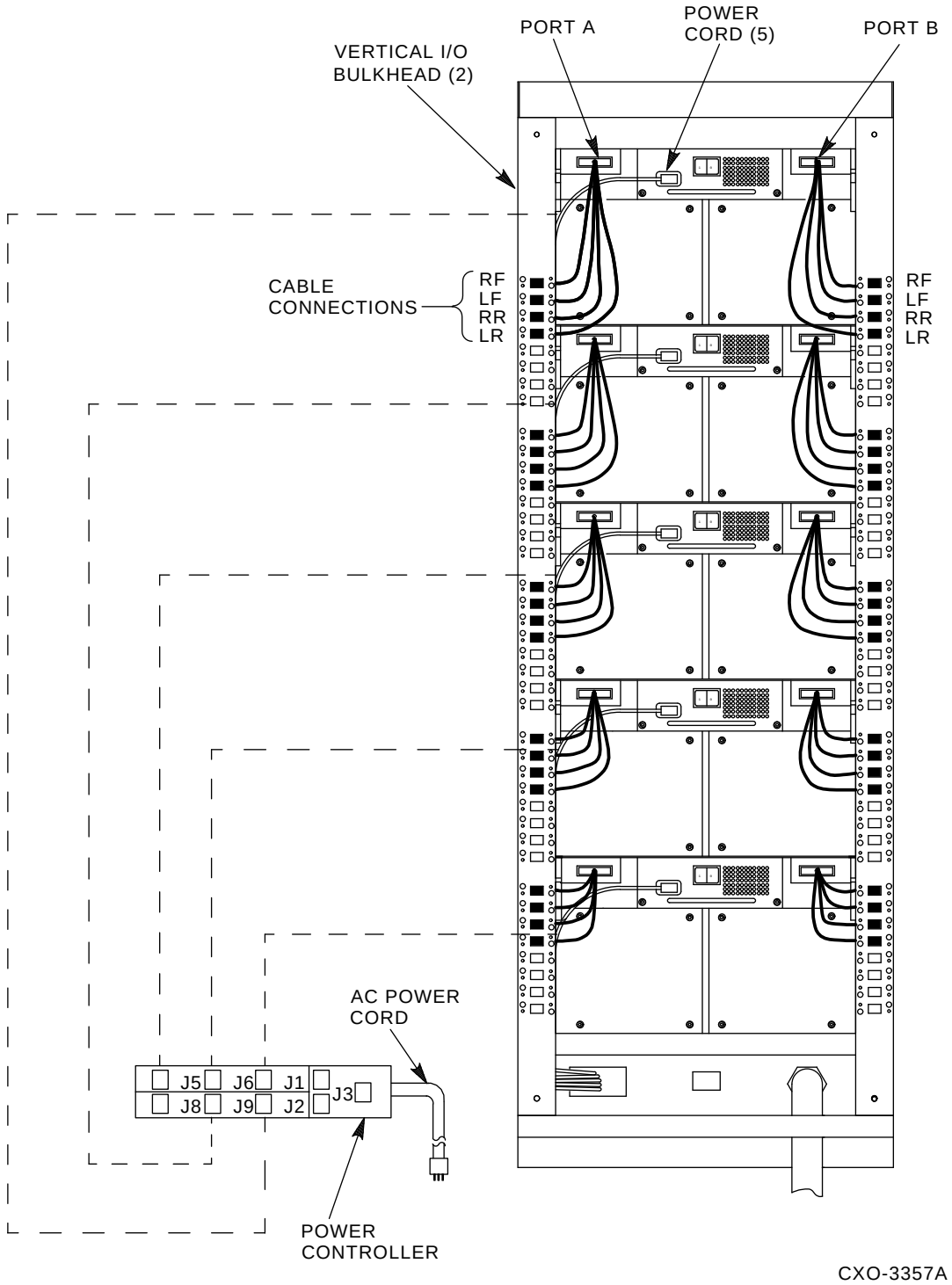

Figure 5–10 SA905 SDI Cable Configurations

5.7 Connecting External SDI Cables

Figure 5–8 shows the configurations for connecting external SDI cables to the SA705 I/O bulkhead. Figure 5–10 shows the configurations for connecting external SDI cables to the SA905 I/O bulkhead. Secure all external cables to the I/O bulkhead with the connector retaining screws.

5.8 Selecting Line Input Voltage to the SA70R–AK Enclosure

Before applying power to the SA70R–AK enclosure, be sure the line input voltage switch on the enclosure power supply has been set to the same voltage rating as the 881 power controller in the SAx05 storage array (120 Vac for the 881–A power controller; 240 Vac for the 881–B power controller). Refer to Section 2.8 for additional information.

5.9 Applying Power to the SA70R–AK Enclosure

Use the following procedure to apply power to the SA70R–AK enclosure:

1. If you have not already done so, remove the cabinet rear access panel. (Refer to Section 3.3.)
2. Turn the enclosure power switch on (1). (See Figure 5–11 for the location of the power switch.)
3. Verify power supply operation by making sure the enclosure fans are operating. Do this by checking for airflow out of the rear of the enclosure.

Refer to Section 4.5 for instructions on inserting RA7x–RK removable disk drives.

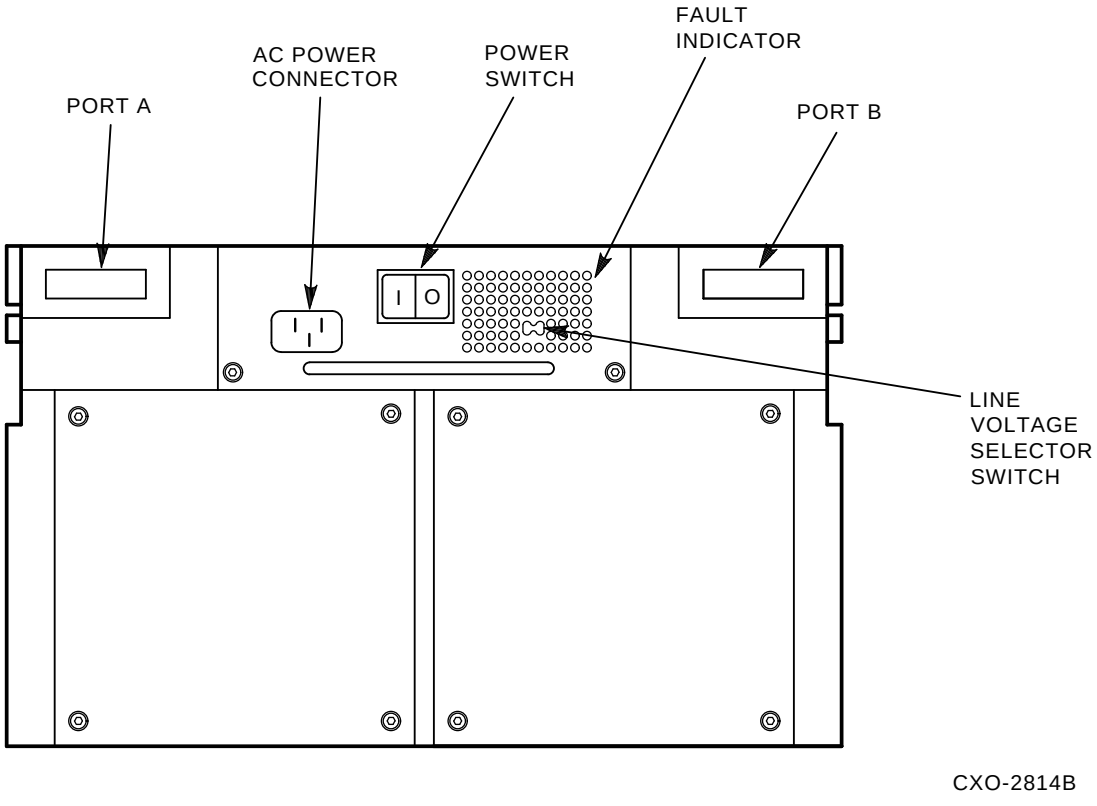

Figure 5–11 SA70R–AK Enclosure Power Switch

5.10 Performing the Post-Installation Checkout

The post-installation checkout enables you to verify functionality of the power supply, OCP, fan assemblies, and disk drives for each enclosure before you begin operation. Perform the post-installation checkout procedure on each newly installed SA70R–AK enclosure after you have inserted the disk drive(s). The post-installation checkout procedure is described in Section 2.10. If you encounter any problems, contact your Digital Customer Services engineer.

6
Troubleshooting

6.1 About This Chapter

This chapter explains how to verify if a problem exists with the SA70R–AK enclosure or RA7x–RK removable disk drive before you call Customer Services. Procedures for recovering from a fault condition are also included.

Table 6–1 lists problems you may encounter and the section in this chapter that discusses how to troubleshoot that problem.

Table 6–1 Problems and Troubleshooting Section References

Problem	Section Reference
The entire enclosure is inoperative.	Refer to Section 6.2.
The canister ready indicators are flashing.	Refer to Section 6.3.
The canister ready indicator does not light when a disk drive is inserted.	Refer to Section 6.4.
The unit numbers on the operator control panel (OCP) are flashing.	Refer to Section 6.5.
The disk drive is not communicating with the controller or not responding to OCP commands.	Refer to Section 6.6.
The enclosure fans are noisier than usual.	Refer to Section 6.7.
The Fault/Set. No. indicator on the OCP is lit.	Refer to Section 6.8.

6.2 Troubleshooting an Inoperative Enclosure

If an enclosure is not operating, check the power supply fault indicator on the rear of the SA70R–AK enclosure. The fault indicator is visible, when lit, through holes in the upper right corner of the enclosure power supply. (See Figure 6–1.) The fault indicator lights red to indicate an overtemperature or overvoltage condition in the power supply.

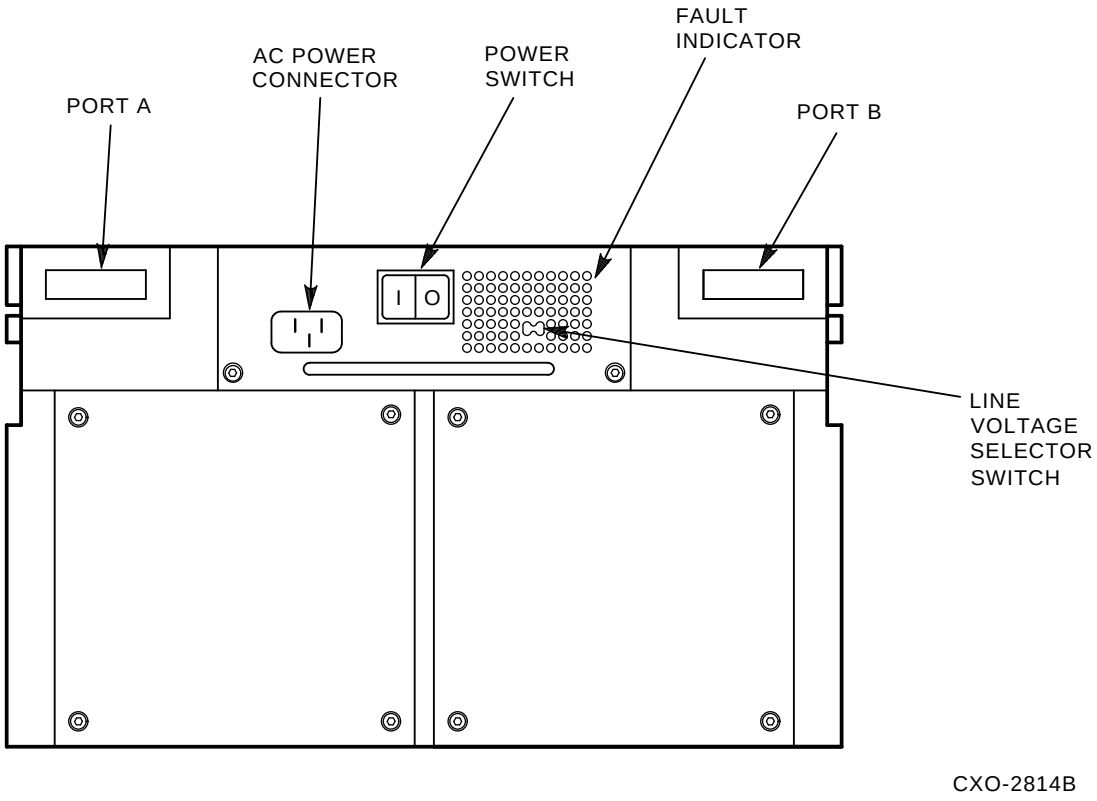

Figure 6–1 Rear View of the SA70R–AK Enclosure

If the fault indicator is lit:

1. Immediately turn off (0) the power switch located on the rear of the enclosure and check for airflow obstructions.
2. If you suspect the enclosure has been exposed to an overtemperature condition, allow the enclosure to cool, then turn it back on. If the enclosure returns to normal operation (the fans operate and the fault indicator does not light), an overtemperature condition is the likely cause of the failure. Refer to Table 1–2 for recommended environmental limits and ensure that the operating site complies with these limits.

   If the enclosure has *not* been exposed to an overtemperature condition, leave the power switch off for 10 seconds, then turn it back on (1).

   a. If the fault indicator does not light, resume normal operation.

   b. If the fault indicator lights, call your Customer Services engineer.

If the red fault indicator is not lit:

1. Verify site power by checking other equipment on the same line and the circuit breakers to the cabinet.
2. Verify that the enclosure power plug is connected to the line outlet in the cabinet.
3. Verify that the storage array's power plug is connected to the site's line voltage outlet.
4. Verify that the line voltage selector switch on the rear panel of the enclosure is set to the correct voltage. (See Figure 6–1 for the location of the line voltage selector switch.)
5. Verify that the 881 power controller and the enclosure power supply are turned on.
6. Check for an overvoltage condition in the power supply by removing power to the disk drives. Do this by releasing the lock/release handle (move the handle to the far right) for each disk drive canister.
   a. If the enclosure fans start, proceed to step 3 in Section 6.3.
   b. If the enclosure fans do not start, contact your Customer Services engineer.

6.3 Troubleshooting Flashing Canister Ready Indicators

Flashing canister ready indicators indicate an overcurrent condition at the power supply output. If the canister ready indicators on the front panel of the enclosure are flashing:

1. Reset the OCP switches as follows:
   a. Deselect both ports A and B.
   b. Press and release the Run switch for that disk drive. (See Figure 6–2.)
   c. Repeat this step for all drives in the enclosure.
2. Remove power to the disk drives by releasing the lock/release handle (move the handle to the far right) for each disk drive.
3. Restore power to the disk drives by pushing them in one at a time.
   a. If the canister ready indicator lights steadily when you insert a disk drive, that drive is not causing the overload.
   b. If the canister ready indicator flashes when you insert the disk drive, that disk drive is probably causing the overload.
4. Insert the disk drive that caused the indicator to flash into a different opening in the enclosure.
   a. If the indicator for that opening flashes, the disk drive is at fault. Remove the defective disk drive and resume operation.
   b. If the indicator for that opening does not flash, the opening that had the flashing indicator is at fault. Call your Customer Services engineer.

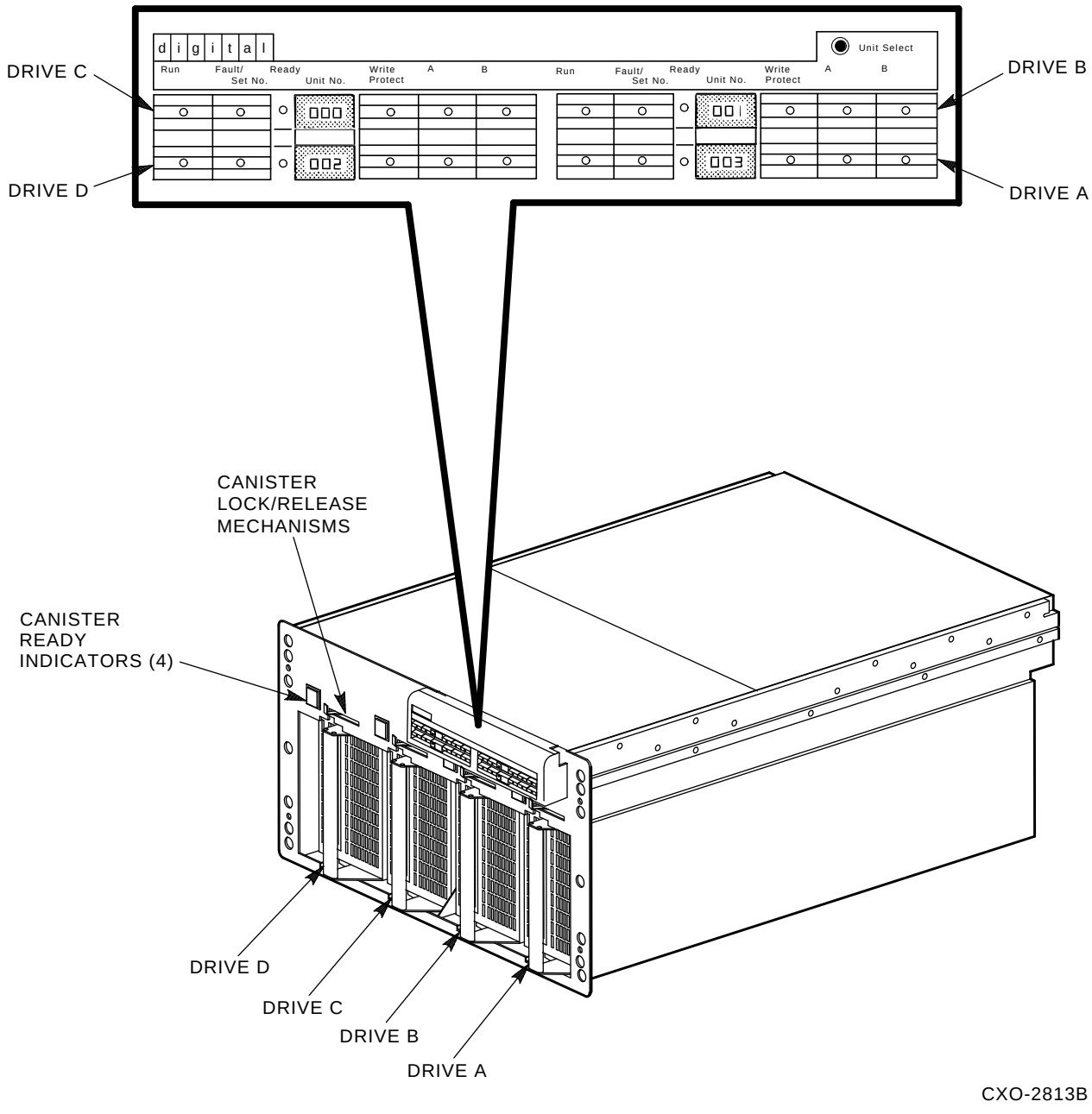

Figure 6–2 Front View of the SA70R–AK Enclosure

6.4 Troubleshooting a Nonlighting Canister Ready Indicator

If a canister ready indicator does not light when you insert a disk drive:

1. Verify that the canister is fully seated in the enclosure and the lock/release handle has moved completely to the left.
2. Verify that the canister ready indicators for other occupied disk drive positions are lit.
   a. If the other canister ready indicators are not lit, verify power to the enclosure as explained in Section 6.2.
   b. If the other canister ready indicators are lit, insert another disk drive in the suspect position.
      - If the canister ready indicator lights, the original disk drive is probably at fault. Do not use the disk drive.
      - If the canister ready indicator does not light, the enclosure is probably at fault. Contact your Customer Services engineer.

6.5 Troubleshooting Flashing Unit Number Indicators

If all the Unit Number indicators on the OCP are flashing, the panel has been placed in the unit select mode. Carefully press the Unit Select switch with a pointed object or small screwdriver to restore normal operation.

6.6 Troubleshooting a Noncommunicating Disk Drive

If a single disk drive is not communicating with the system controller or does not respond to OCP commands (all other drives are normal):

1. Verify that the disk drive is properly inserted in the enclosure.
2. Verify that the appropriate port switch is selected.
3. Record any error code displayed on the OCP, as described in Section 6.8.
4. If the drive was previously on line:
   a. Dismount the drive from the system, take the drive off line, and spin it down by pressing the Run switch.
   b. When the Run indicator goes out, remove power to the drive by fully releasing the lock/release handle (move the handle to the far right). Removing power to the drive for 10 seconds resets the drive's circuits.
   c. After 10 seconds, restore power to the drive by pushing the canister in fully.
5. Verify that the SDI cable connectors from the host system are securely tightened at the cabinet I/O bulkhead.
6. Attempt to bring the disk drive back on line and restore normal operation.
7. If you still cannot bring the disk drive back on line, contact your Customer Services engineer.

6.7 Troubleshooting Noisy Fans

If the enclosure fans seem noisier than usual, they are probably operating at high speed. When the temperature inside the enclosure exceeds 29 degrees C (91 degrees F), the fans automatically switch to high speed operation. Refer to Table 1–2 for recommended environmental limits and verify that your site complies with these limits.

6.8 Recovering from a Drive Fault Condition

The RA7x–RK disk drive contains sophisticated circuits to detect and report fault conditions. These faults are reported to you through an error code displayed on the OCP. Your Customer Services engineer uses these codes and other error reporting mechanisms in the disk drive to pinpoint the source of a fault and return your disk drive to service in a minimal amount of time.

If the Fault/Set No. indicator lights to signal that the disk drive has detected a fault, use the following procedure (see Figure 6–2):

1. Press the Fault/Set No. switch once to display an error code on the OCP. The error code is displayed as flashing indicators.
2. Record which indicators are flashing. Your Customer Services engineer will use this code to isolate the cause of the drive fault.

   NOTE
   While in the fault mode, the OCP indicators do not retain their normal function; they act only as error code indicators until you press the Fault/Set No. a second time.

3. Press the Fault/Set No. indicator again. This commands the drive to clear the fault and return to normal operation.
   a. If the fault clears, you may resume operation. Note the occurrence of the fault in the system log so it can be used in future system fault analysis.
   b. If the fault recurs, call your Customer Services engineer.

A
Environmental Stabilization

Environmental stabilization includes humidity and temperature stabilization. When the RA7x–RK removable disk drive arrives at your site or is temporarily removed from its normal operating environment, it must be environmentally stabilized prior to operation. The RA7x–RK removable disk drive can be stabilized inside or outside the RA70–CK carrying case. However, do not insert the canister into the SA70R–AK enclosure until it is fully stabilized.

CAUTION

Failure to environmentally stabilize the RA7x–RK removable disk drive could result in damage to the drive media or associated electronics at power-up.

Environmental stabilization begins when the equipment enters the room where it is to be operated. If the equipment is new, remove the outer shipping carton and allow environmental stabilization time with the barrier bag still sealed and the desiccant in place. Refer to Table A–1 for minimum stabilization times.

NOTE

If condensation is visible on the outside of the canister, stabilize the disk drive in the operating environment for 6 hours or until the condensation is no longer visible, whichever is longer.

If no condensation is visible on the outside of the canister, refer to Table A–1 for the correct environmental stabilization time.

Table A–1 Minimum Environmental Stabilization Times

IF the canister has been exposed to a temperature range of...	THEN it must be stabilized for a minimum of...
140° to 151° F (60° to 66° C)	3 hours
122° to 139° F (50° to 59° C)	2 hours
104° to 121° F (40° to 49° C)	1 hour
86° to 103° F (30° to 39° C)	30 minutes
65° to 85° F (18° to 29° C)	**No stabilization required**
50° to 64° F (10° to 17° C)	30 minutes
32° to 49° F (0° to 9° C)	1 hour
14° to 31° F (–10° to –1° C)	2 hours
–4° to 13° F (–20° to –11° C)	3 hours
–22° to –5° F (–30° to –21° C)	4 hours
–40° to –21° F (–40° to –31° C)	5 hours

B
Minimum Software/Hardware Version Requirements

The VAX Supervisor programs and related diagnostics (Release 43) listed in Table B–1 represent the *minimum* version of diagnostics required to support RA71/RA72 disk drives running on a VAX computer system.

NOTE
Installation and qualification of RA71/RA72 disk drives on PDP–11 and MicroVAX systems were not clear at the time of publication.

Table B–1 Diagnostics—Minimum Version Required to Support RA71/RA72 Disk Drives

Program Name	Description	Version
VAX Supervisor Programs:		
EBSAA	Supervisor, 8200,8250,8300, 8550 (Bereta)	14.4–PAT1
ELSAA	Supervisor, 5800, 6000-2xx, 6000-3xx	14.4–PAT1
EMSAA	Supervisor, 6000-5xx	14.4–PT1
ERSAA	Supervisor, 6000-4xx	14.4–PAT1
EVSBA	VAX Diagnostic Autosizer	7.5
EVSBB	VAX Online Autosizer	4.0
Related Diagnostics:		
EVRAE	Generic MSCP Exerciser	4.3
EVRLB	UDA/KDB50 Basic Disk Formatter	8.3
EVRLF	UDA/KDB50 Basic Subsystem Diagnostic	10.4
EVRLG	UDA/KDB50 Disk Drive Exerciser	10.3
EVRLJ	VAX UDA/KDB50/KDM70 Exerciser	4.3
EVRLK	VAX Bad Block Replace Utility	4.3
EVRLL	VAX Disk Resident Error Log Utility	3.3
EVRLM	KDM70 EEPROM Update Utility	1.6
EVRLN	DUP Control Program	1.6

The VAX Supervisor programs and diagnostics listed in Table B–1 all recognize RA71/RA72 disk drives. The retired VAX Supervisor programs listed in Table B–2 do not recognize RA71/RA72 disks drives. However, these retired programs will properly test and operate RA71/RA72 disk drives with disk drive diagnostics listed in Table B–1 if the RA71/RA72 disk drive is "attached as an RA70 disk drive" during program setup.

Table B–2 Retired VAX Supervisor Programs

Program Name	Description
ECSAA	Supervisor, 750
EDSAA	Supervisor, 8600,8650
EJSAA	Supervisor, 8820/30/40
ENSAA	Supervisor, 725,730
ESSAA	Supervisor, 780,785
EWSAA	Supervisor, 9000
EZSAA	Supervisor, 8530,8550,8700,8800,8820N

Table B–3 lists the minimum operating systems software required to support RA71/RA72 disk drives.

NOTE
Installation and qualification of RA71/RA72 disk drives on PDP–11 and MicroVAX systems were not clear at the time of publication.

Table B–3 Operating Systems—Minimum Version Required to Support RA71/RA72 Disk Drives

Operating System Software	Version
VMS	5.4-2[1]
VAXsimPLUS	1.6
ULTRIX-32	4.2
VAXELN	4.2
VAX System 5	3.2 (latent support) x.x (next release, full support)

[1]The Error Log Formatter (ERF) version 5.4-2 must be upgraded to version 5.4-2 (0001) to support RA71 and RA72 disk drives.

Table B–4 lists the minimum versions of SDI controller hardware and software required to support the RA71/RA72 disk drives.

Table B–4 SDI Controllers—Minimum Version Required to Support RA71/RA72 Disk Drives

Controller	Version
HSC40 (CRONIC)	HSC Software V6.0
HSC50 (CRONIC)	HSC Software V4.9
HSC60 (CRONIC)	HSC Software V6.0
HSC70 (CRONIC)	HSC Software V6.0
HSC90 (CRONIC)	HSC Software V6.0 K.si Interface Software Version 12 K.sdi Interface Software Version 39/40
KDM70	Software Version 30 (3.0) Hardware Version 17
KDA50	Software Version 8 Hardware Version 4
KDB50	Software Version 20 Hardware Version 28
UDA50A	Software Version 6 Hardware Version 0

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