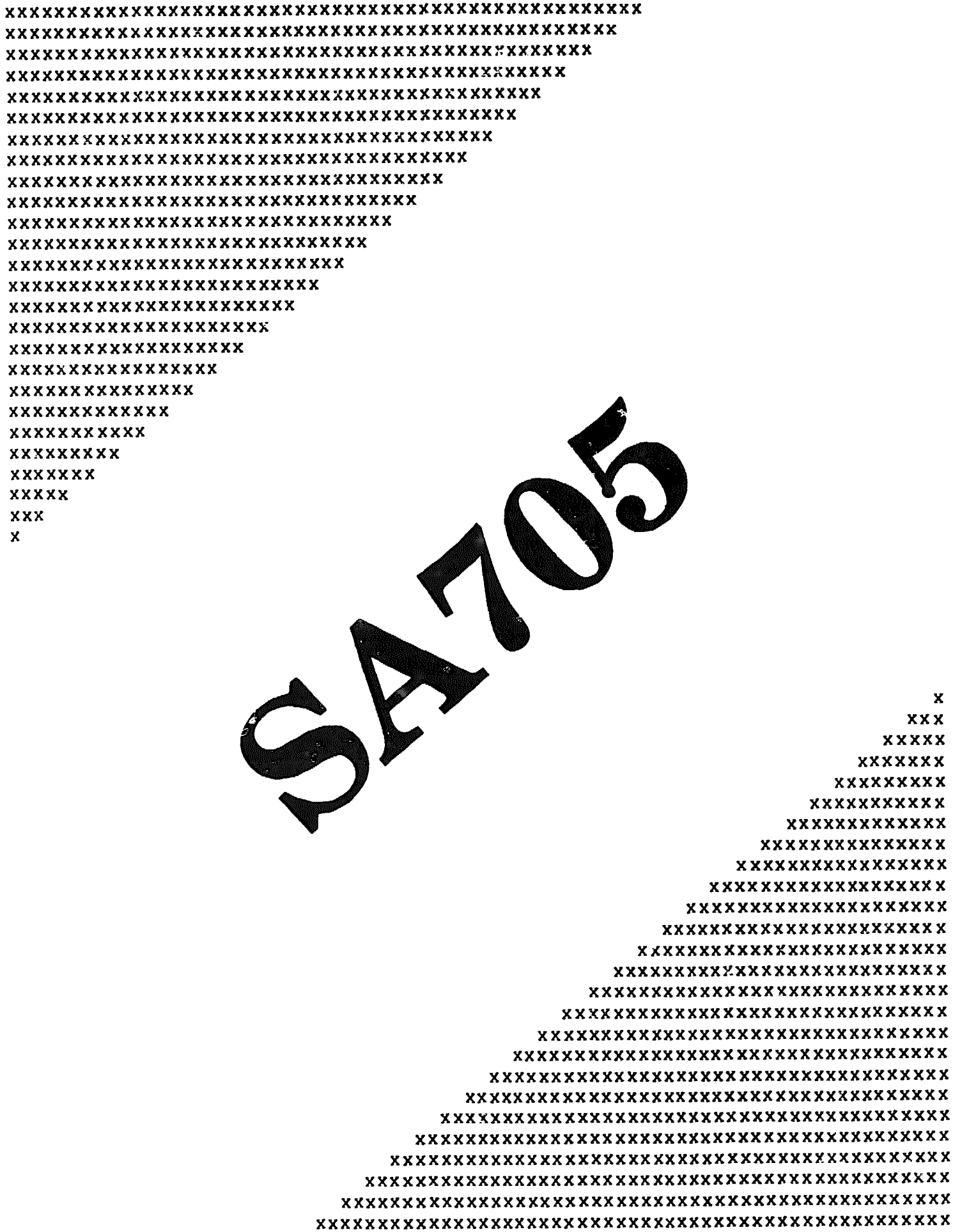
SA705

SA705 User Guide

Order Number. EK–SA705–UG–001

This guide explains how to operate the SA705 storage array family, including the SA705 cabinet, SA70R enclosure, and RA70–RK removable disk drive. It includes installation procedures that should be performed only by customer services engineers.

digital equipment corporation maynard, massachusetts

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Preface

The *SA705 User Guide* explains how to operate the SA705 storage array family, including the SA705 cabinet, SA70R enclosure, and RA70–RK removable disk drive. The guide is intended for end users of the SA705. It includes installation procedures that should be performed only by customer services engineers.

The guide introduces the SA705 by describing and providing specifications for the components in the SA705 family. It then explains how to operate the system and handle the RA70–RK removable disk drive. Next, it explains how to verify whether a problem exists in the SA70R enclosure before you call customer services. Finally, the guide explains how to install the SA705 and additional SA70R enclosures. Appendixes include environmental stabilization procedures and site preparation specifications.

The following notations are used in this guide:

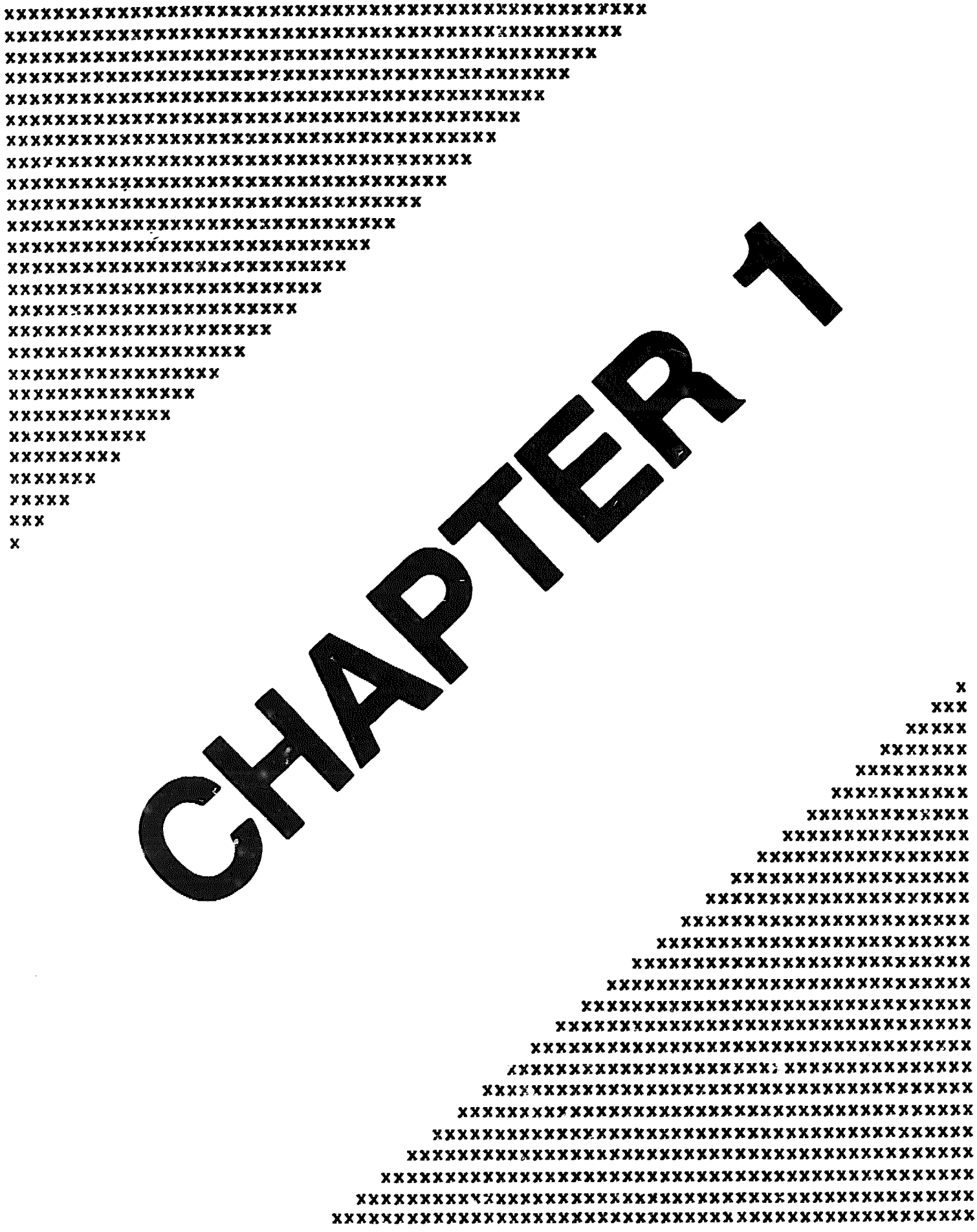
- **Note**—This identifies information that is of special interest.
- **Caution**—This identifies information that pertains to the protection of the equipment.
- **Warning**—This identifies information that pertains to your safety.

The following names are used in this guide:

- SA705 (storage array)—This identifies the entire SA705 system, including the SA705 cabinet, SA70R enclosures, and RA70–RK removable disk drives.
- SA705 cabinet—This identifies the cabinet used in the SA705 storage array. The SA705 cabinet holds up to four SA70R enclosures.
- SA70R enclosure—This identifies the enclosure that is used in the SA705 cabinet. The SA70R holds up to four RA70–RK removable disk drives.
- RA70–RK removable disk drive—This identifies the removable disk drive that is used in the SA70R enclosure. The RA70–RK consists of an RA70 disk drive mounted in a removable canister.
- RA70 disk drive—This identifies the disk drive installed in the RA70–RK removable disk drive canister.
- Canister—This identifies the canister used in the RA70–RK removable disk drive.

The following table lists related documentation available from Digital Equipment Corporation.

Document title	Document number
881 Power Controller User Guide	EK–881PC–UG
SA705 Field Maintenance Print Set	MP–01432–01


CHAPTER 1

Chapter 1

Introducing the SA705

1.1 About this chapter

This chapter provides overviews of the SA705 storage array family, including the SA705 cabinet, SA70R enclosure, and RA70–RK removable disk drive. It includes tables of specifications for each of the components in the SA705 family.

1.2 SA705 storage array family overview

The SA705 storage array family provides rapid access, multi–spindle SA70R enclosures in two shipped configurations. The SA705 JA (120 Vac) and the SA705 JD (240 Vac) storage arrays each consist of one SA705 cabinet with four SA70R enclosures, each containing four RA70–RK removable disk drives. (See Figure 1–1.) The SA705 HA (120 Vac) and SA705 HD (240 Vac) storage arrays each consist of one SA705 cabinet with two SA70R enclosures. One enclosure contains four RA70–RK removable disk drives; the other contains no disk drives. The SA705 HA/HD will accommodate additional SA70R enclosures and RA70–RK removable disk drives.

Each SA705 storage array consists of three main components:

- SA705 cabinet: The cabinet houses one to four SA70R enclosures.
- SA70R enclosure: The enclosure holds one to four RA70–RK removable disk drives.
- RA70–RK removable disk drive: The removable canister holds one RA70 disk drive.

You can easily remove the RA70–RK removable disk drives from the SA70R enclosure for transporting and storing.

The SA705 complies with the Digital Storage Architecture (DSA) requirements and can be used with any Standard Disk Interconnect (SDI) protocol controller and cable.

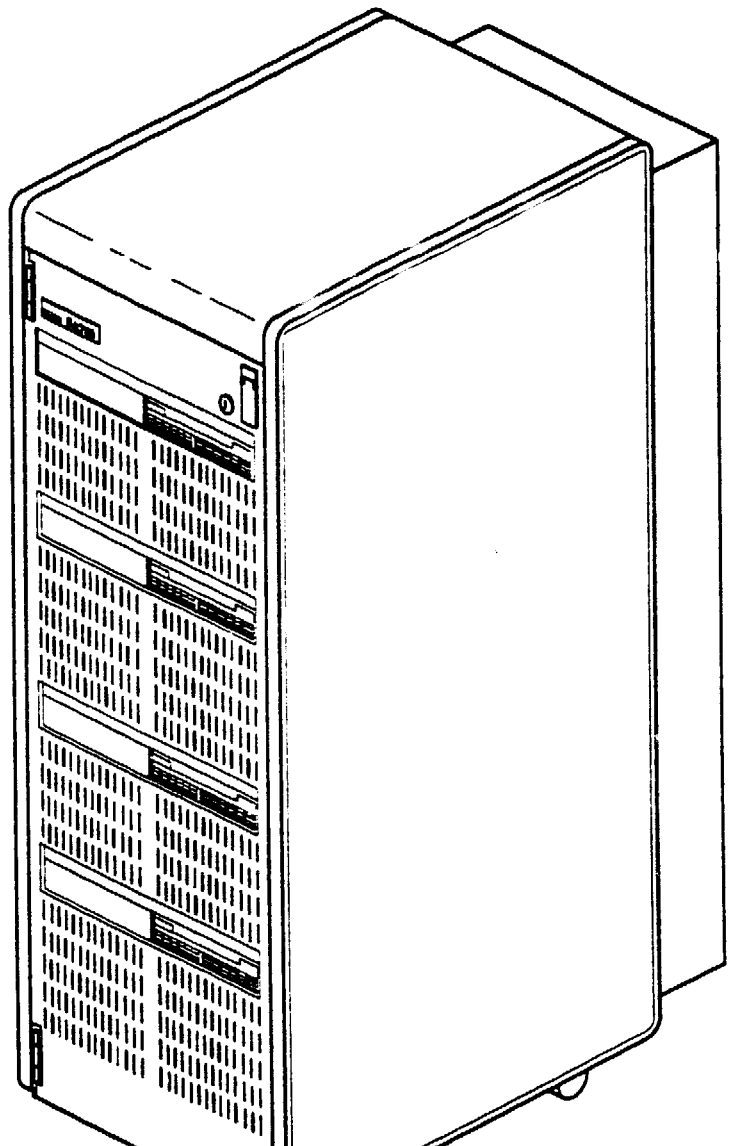
1.3 SA705 configurations

Table 1–1 summarizes the shipped component configurations for the SA705 storage array family.

Table 1–1: SA705 configurations

Configuration	SA705 cabinet	SA70R enclosure	RA70–RK removable disk drive
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

Figure 1–1: SA705 JA/JD storage array



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1.4 SA705 cabinet overview

The SA705 cabinet houses one to four SA70R enclosures and the 881 power controller. The 881 power controller supplies power to all of the enclosures in the cabinet. The rear panel of the cabinet is removable so that you can access the power controller, cables, and the rear panels of all enclosures. The locking cabinet front door is also removable to allow the removal and installation of SA70R enclosures.

The SA705 meets 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

Your Digital sales representative or customer services engineer can answer specific questions related to the above standards.

1.5 SA70R enclosure overview

The SA70R enclosure provides power, control, and cooling for up to four RA70–RK removable disk drives. The specialized canisters allow you to remove and insert the RA70 disk drives into the SA70R enclosure on a regular basis. Each drive is independently powered and operated by the enclosure.

Following are the major subassemblies of the SA70R enclosure:

- Chassis
- Operator control panel (OCP)
- Transition board assemblies (TB1–M and TB2)
- Enclosure power supply
- Fan assemblies (two)
- Cable harness
- Canister lock/release mechanisms (four)
- Canister ready indicators (four)
- RA70–RK removable disk drives (up to four)
- SDI cables (installed in the SA705 cabinet, external to the enclosure)

Figure 1–2 shows an exploded view of the major subassemblies of the SA70R enclosure.

Each RA70–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 interfaces the OCP to TB2. TB2 sits internally above the canisters and interfaces with drive signals through TB1–M to the OCP. 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.

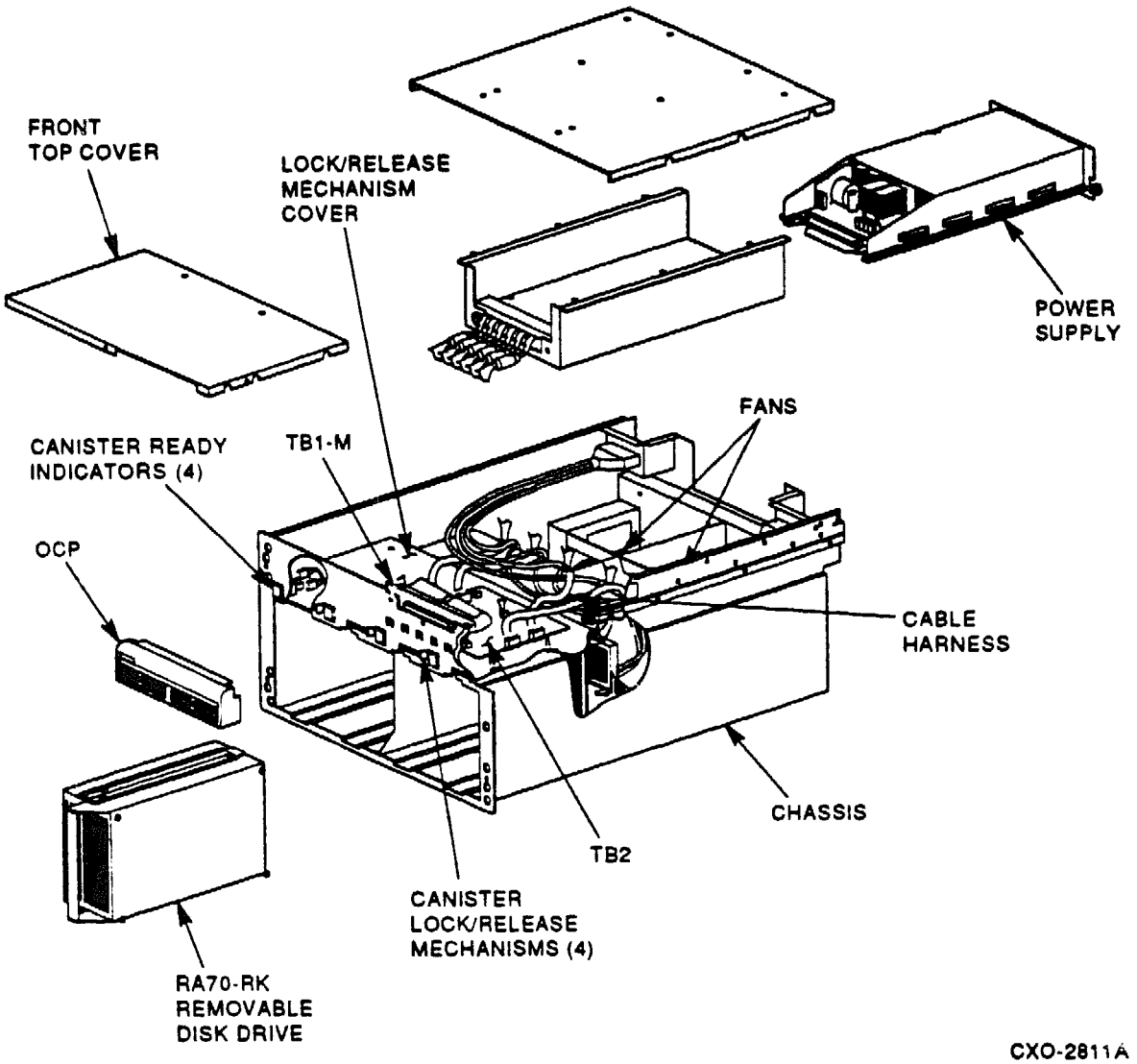
The enclosure power supply provides operating power to the major subassemblies of the enclosure. The rear panel of the enclosure power supply contains the power switch for the enclosure.

Each RA70–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 the canister is inserted 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 to indicate that the RA70–RK removable disk drive is powered up and ready for operation. The indicator includes a symbol that shows which set of switches and indicators on the OCP correspond to that particular drive position.

The RA70–RK removable disk drives are operated from four sets of switches and indicators on the OCP. Each set operates one disk drive in the enclosure.

The fan assemblies circulate cooling air throughout the interior of the SA70R 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 goes into high–speed operation.

Figure 1–2: Exploded view of the SA70R enclosure



1.6 RA70–RK removable disk drive overview

The RA70–RK removable disk drive is a UL listed accessory disk drive designed for the SA705. It allows you to install and remove the RA70 disk drive from the SA70R enclosure on a regular basis. Once removed from the enclosure, the disk drive can be stored or transported. A canister carrying case (RA70X–AK) is available for transporting the disk drive off site.

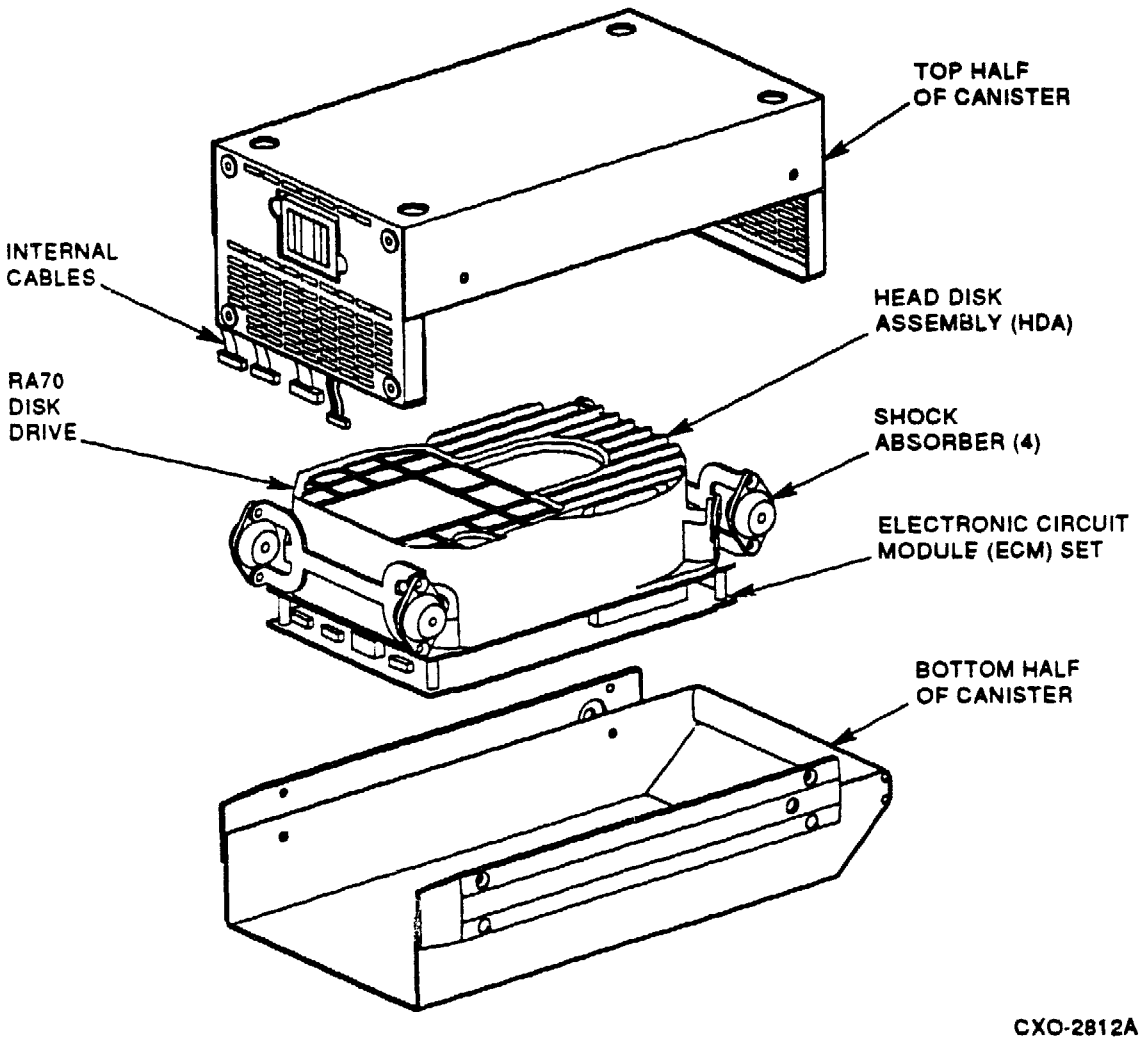
Each RA70–RK contains one RA70 disk drive. The RA70 disk drive is a Winchester technology drive with a formatted storage capacity of 280 megabytes. The disk drive canister features modular components that can be replaced with minimum downtime. See Figure 1–3 for an exploded view of the RA70–RK removable disk drive.

RA70 disk drives can be used with any disk drive controller having an SDI interface, including the KDA50, KDB50 or UDA50 controller modules and HSC controllers. The drive is compatible with the Digital Storage Architecture (DSA) and Digital Standard Disk Format (DSDF).

Caution

The RA70–RK removable disk drive is designed to be inserted only in the SA70R enclosure. The SA70R enclosure is designed to accommodate only RA70–RK removable disk drives. Using these devices in other configurations may damage the equipment.

Figure 1–3: Exploded view of the RA70–RK removable disk drive



1.7 Specifications

Following are tables of specifications for the various components of the SA705 storage array. Additional specifications are provided in Appendix B and Appendix C.

Caution

Exceeding the maximum environmental limits provided in Table 1–3, Table 1–4, and Table 1–5 may void Digital warranties.

Table 1–2: Recommended environmental requirements for SA705/SA70R/RA70–RK

Note

These are the recommended environmental limits for optimum equipment performance and reliability.

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
RA70–RK storage temperature	21 65	29 85	degrees Celsius degrees Fahrenheit
RA70–RK storage humidity	–	50	percent relative humidity (non–condensing)

Table 1–3: SA705 cabinet specifications

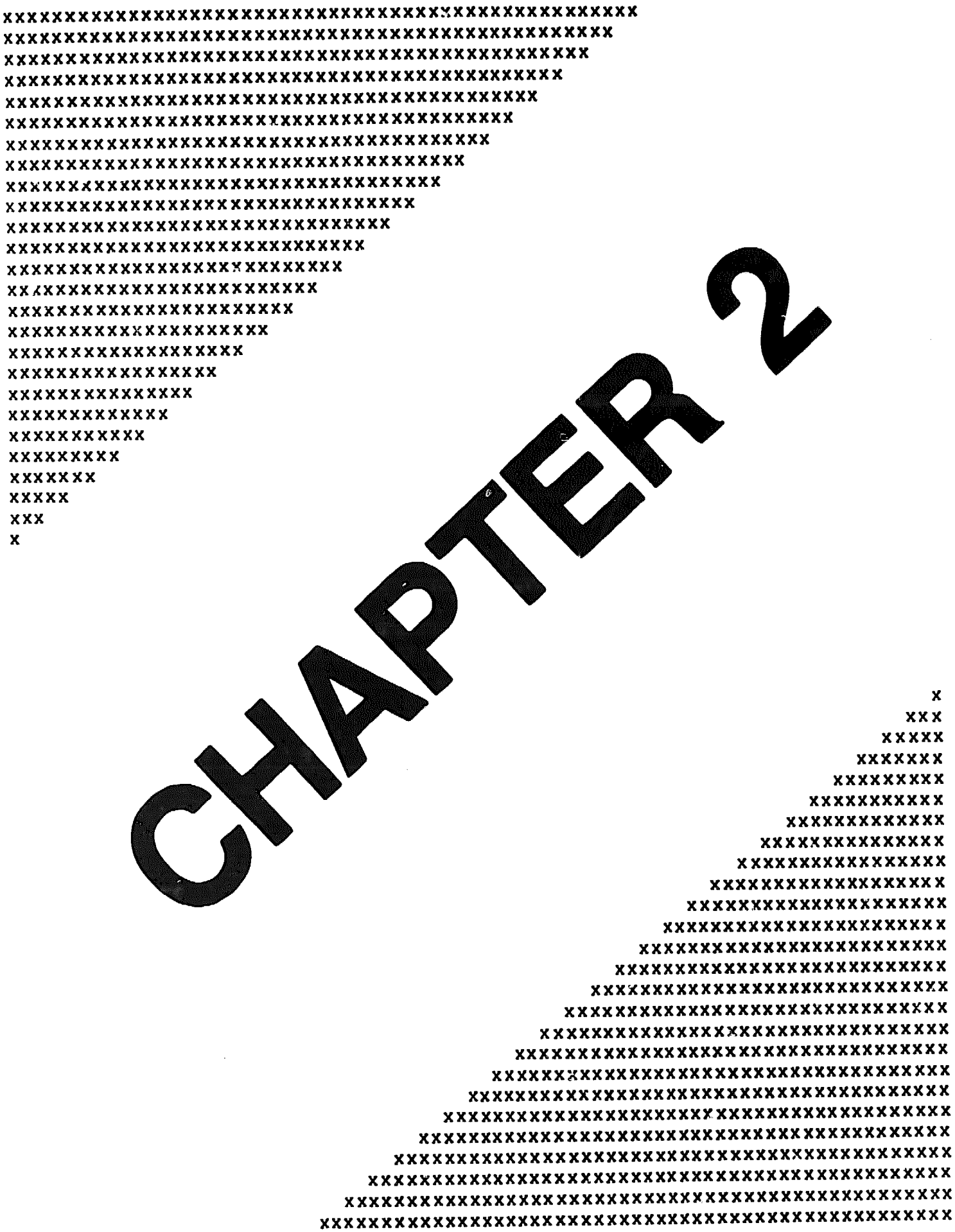
Characteristic	Specification
Physical characteristics:	
Width	55.9 cm (22 in)
Height	156 cm (61.5 in)
Depth	91 cm (36 in)
Weight (maximum configuration)	381 kg (840 lb)
Maximum environmental limits:	
Operating temperature	+10°C to +40°C (+50°F to +104°F)
Operating humidity	10% to 80% relative humidity (non–condensing)
Operating altitude	2,438 m (8,000 ft)
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	4,877 m (16,000 ft)
Input power requirements:	Refer to Appendix B for specific input power requirements.

Table 1–4: SA70R enclosure specifications

Characteristic	Specification
Capacity:	
Number of disk drive positions	4
Formatted storage capacity	1.1 gigabytes when configured with four RA70–RK disk drive canisters
Physical characteristics:	
Width	44.5 cm (17.5 in)
Height	25.4 cm (10.4 in)
Depth	72.4 cm (28.5 in)
Weight (with four RA70–RKs)	56.7 kg (125 lb)
Weight (empty)	29.5 kg (65 lb)
Maximum environmental limits:	
Operating temperature	+10°C to +40°C (+50°F to +104°F)
Operating humidity	10% to 80% relative humidity (non–condensing)
Operating altitude	2,438 m (8,000 feet)
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	4,877 m (16,000 ft)
General:	
SA70 enclosure acoustic noise with four RA70s	Complies with DEC Standard 102 and DEC Standard 104.
Shock and vibration	Complies with DEC Standard 102.
Rated canister insertion/removal life	10,000 cycles (One insertion and removal equals one cycle.)
Input power requirements:	Refer to Appendix C for specific input power requirements.

Table 1–5: RA70–RK removable disk drive specifications

Characteristic	Specification
Capacity:	
Data storage	280 Mbytes
Physical characteristics:	
Width	16.8 cm (6.6 in)
Height	10 cm (4 in)
Depth	32 cm (12.6 in)
Weight	6.8 kg (15 lbs)
Maximum environmental limits outside of SA70R:	
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	1. Free fall drop from a height of 4 inches onto any surface (six surfaces total). 2. Tipover from any angle up to 90° onto any of the four product surfaces along the length of the product. The actual tipover point is the angle where the product CG (center of gravity) will cause the canister to tip over from its own weight.
Maximum environmental limits in RA70X–AK carrying case:	
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 each of the six surfaces.
X–ray exposure	Exposure to airport–type x–ray equipment is acceptable.
General:	
Rated canister insertion/removal life	10,000 cycles (One insertion and removal equals one cycle.)


CHAPTER 2

Chapter 2

Operating the SA705

2.1 About this chapter

This chapter explains how to operate the SA705. It includes a discussion of all the switches and indicators and step–by–step instructions for operating the system. Because the ability to insert, remove, transport, and store the RA70–RK removable disk drive is an important and unique feature of the SA705, these procedures are discussed separately in Chapter 3.

2.2 Understanding the SA70R front panel switches and indicators

Figure 2–1 shows the front panel of the SA70R enclosure. The operator control panel (OCP) is located along the top edge of the enclosure and contains the UNIT SELECT switch and four identical sets of switches and indicators. Each set of switches and indicators is dedicated to one of the four disk drive positions in the enclosure. Figure 2–1 also shows the canister ready indicators for each of the four disk drive positions.

You can use the set of switches and indicators for a disk drive position whenever a disk drive is powered up in that position. Unless you insert an RA70–RK removable disk drive into a disk drive position and power it up, the switches and indicators for that position do not operate.

2.2.1 Operator control panel (OCP) functions

Table 2–1 summarizes operator control panel (OCP) functions during normal operation of the enclosure. The control set for each disk drive position contains ready and unit number indicators and switches for run, fault conditions, write protection, unit number selection, and ports A and B selectors.

All switches except the FAULT/SET NO. switch are set by pressing them in. These switches hold the set position 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.

Figure 2–1: Front panel view of the SA70R enclosure

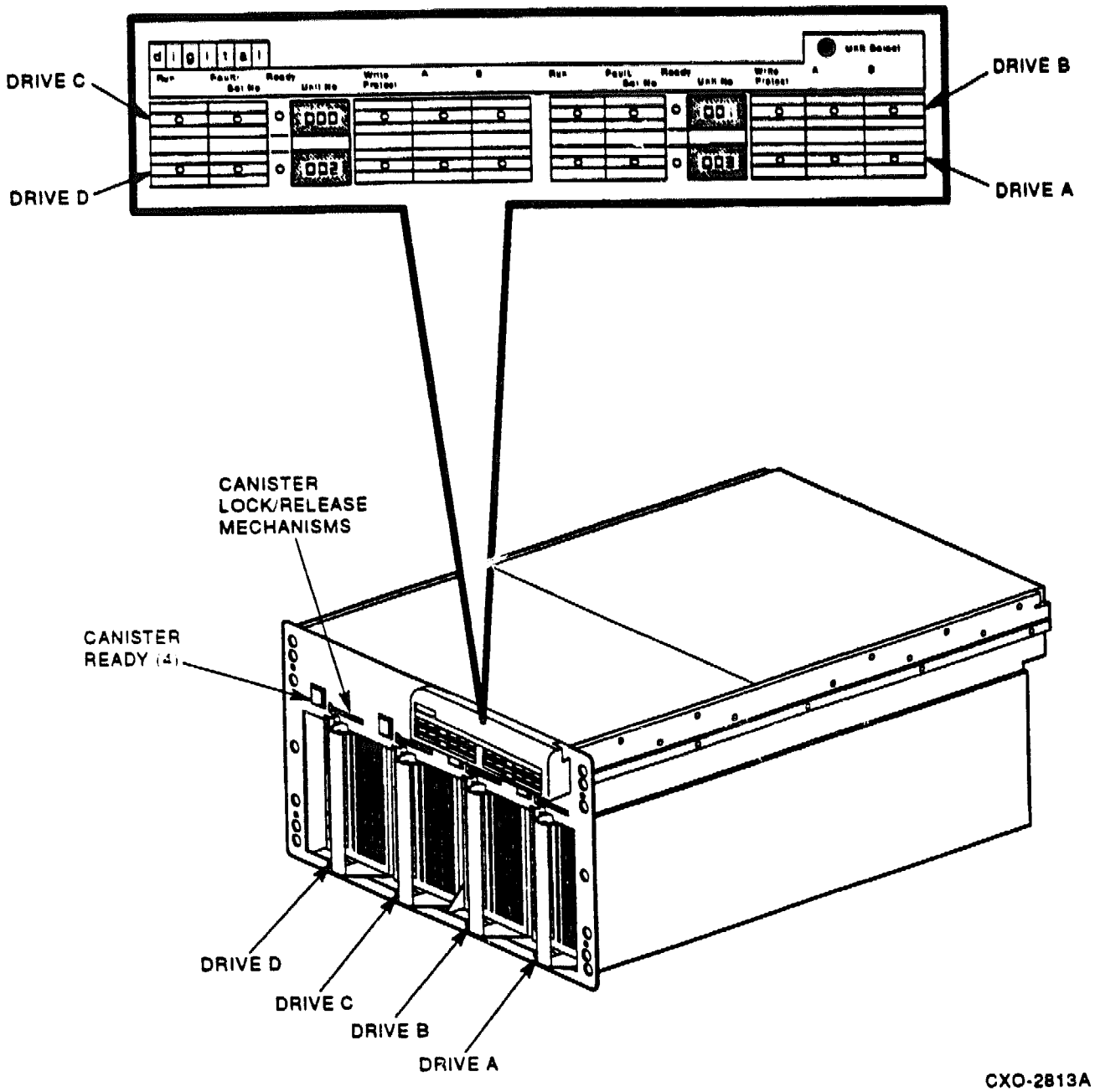


Table 2–1: Summary of SA70R enclosure switch and indicator functions during normal operation

Switch/ Indicator	Indicator color	Switch function	Indicator function
Front Panel			
Operator Control Panel			
RUN	Yellow	Press to spin up the drive.	Lights when the drive has spun up.
		Release to spin down the drive.	Goes out when the drive spindle has stopped.
FAULT/SET NO.	Red	In unit select mode, press to change the drive unit number.	Lamp test. Lights when a fault is detected.
		In fault mode, refer to Chapter 4.	
READY	Green	N/A	Lights when the drive is read/write ready.
UNIT NUMBER	Red	N/A	Displays the drive unit number.
WRITE PROTECT	Yellow	Press to enable write protect.	Lights to indicate write–protect mode.
A	Yellow	Press to enable port A for controller selection.	Lights to show port A is on line to system drive controller.
B	Yellow	Press to enable port B for controller selection.	Lights to show port B is on line to system drive controller.
UNIT SELECT	N/A	Press to enable unit select mode.	N/A
Lower Front Panel			
Canister ready (4)	Green	N/A	Lights to indicate power to the drive.
Rear Panel			
Power Supply Chassis			
Power switch	N/A	Use to apply or remove line voltage from the power supply.	N/A
Line voltage switch	N/A	Use to select between 120 Vac (60 Hz) and 240 Vac (50 Hz) line voltage.	N/A
Fault indicator	Red	N/A	Lights to indicate a fault or overtemperature condition in the enclosure.

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 the disk drive, the red FAULT/SET NO. indicator lights. Pressing the FAULT/SET NO. switch once after a drive fault puts 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. You also use the FAULT/SET NO. to set the drive unit number, as described in Section 2.10.

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 spinup 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 NUMBER— 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 Figure 2–1. Placement of unit numbers in an actual installation is shown in Figure 2–1 (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 written over 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.

2.2.2 Canister ready indicators

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

- AC power must be available to the SA70R enclosure.
- The SA70R enclosure power switch must be on.
- The RA70–RK removable disk drive must be inserted in the enclosure properly.
- Power must be applied to the disk drive through the microswitch in the lock/release mechanism.
- The power supply must supply 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 RA70–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 and 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 3 for RA70–RK removable disk drive insertion and removal procedures.

2.3 Understanding the SA70R rear panel switches and indicator

Two rear panel switches and an indicator are located on the power supply chassis, as shown in Figure 2–2. These switches and indicator affect how the entire SA70R enclosure operates. Table 2–1 contains a summary of the SA70R rear panel switches and indicator.

Warning

Hazardous voltages are present inside the SA705 cabinet and SA70R 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 cord.

Power switch— The rocker–type power switch for the SA70R 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. Press the side of the switch labeled "O" (off) to remove power from the enclosure.

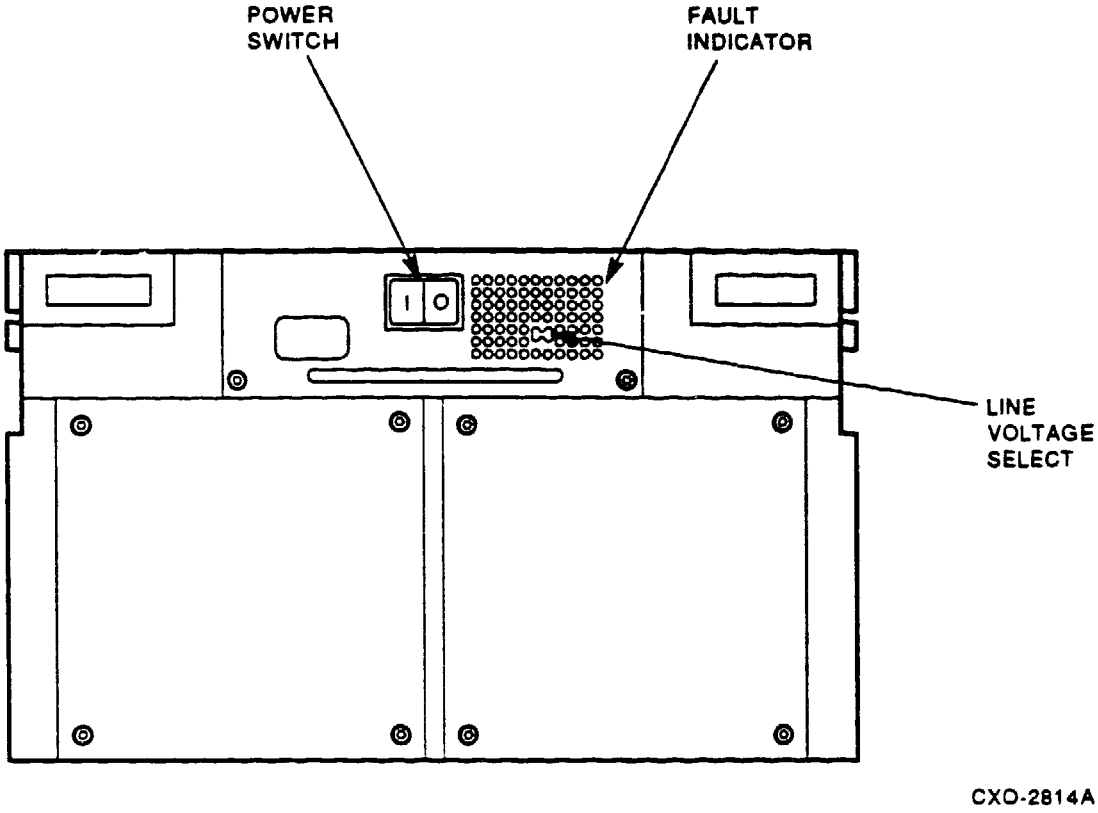
Line voltage switch— As you face the rear panel, the line voltage selector switch is located to the right of the power switch. It is visible through a hole in the rear panel. Your customer services engineer sets this switch to the available line voltage during installation. The selected voltage is shown on the switch element.

Caution

The SA70R 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 customer services.

Figure 2–2: Rear panel view of the SA70R enclosure

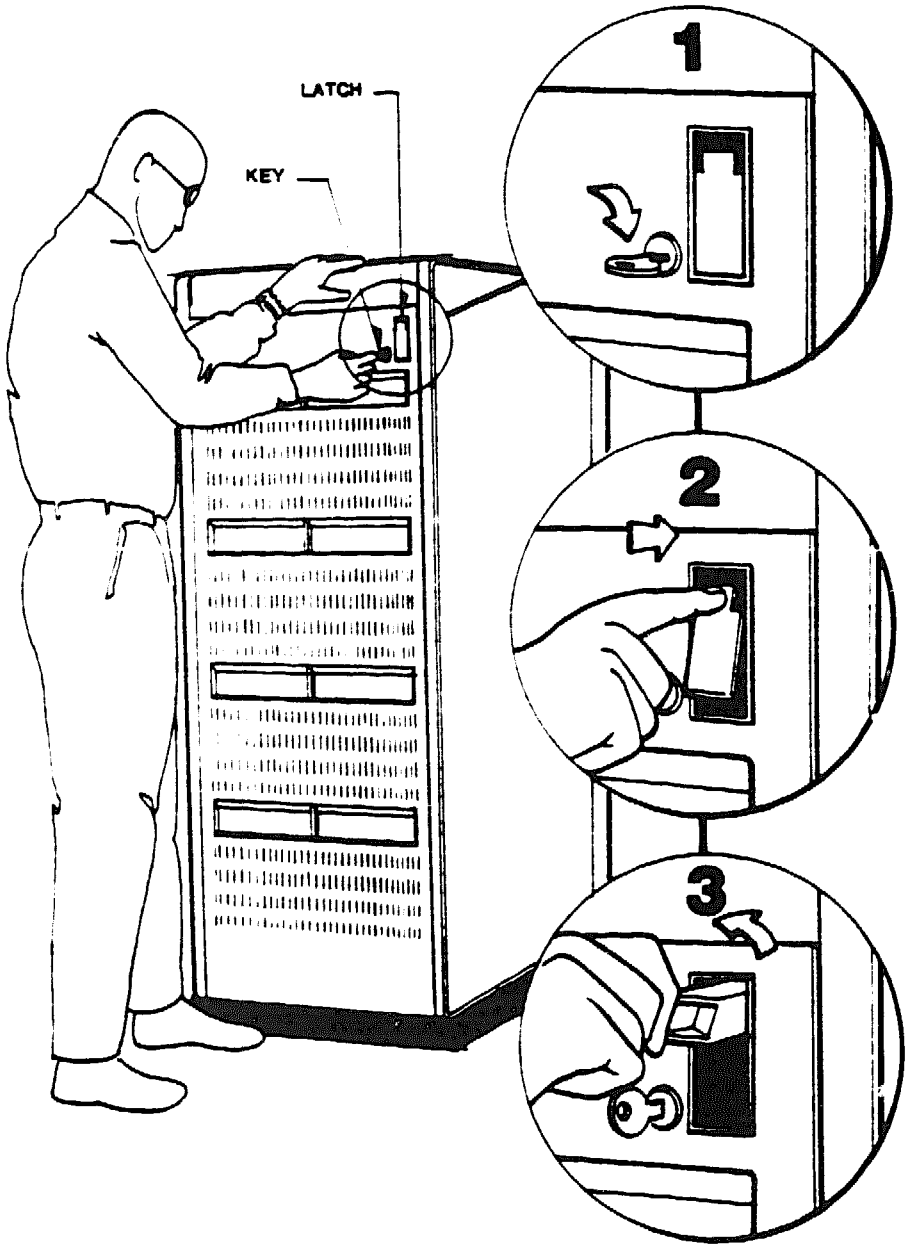


2.4 Opening and closing the SA705 cabinet front door

Always use care when opening or closing the cabinet front door. To open the door, press the top of the latch: then lift the latch and turn it counterclockwise. (See Figure 2–3.) Open the door.

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

Figure 2–3: SA705 cabinet door



2.5 Removing and Installing the SA705 rear access panel

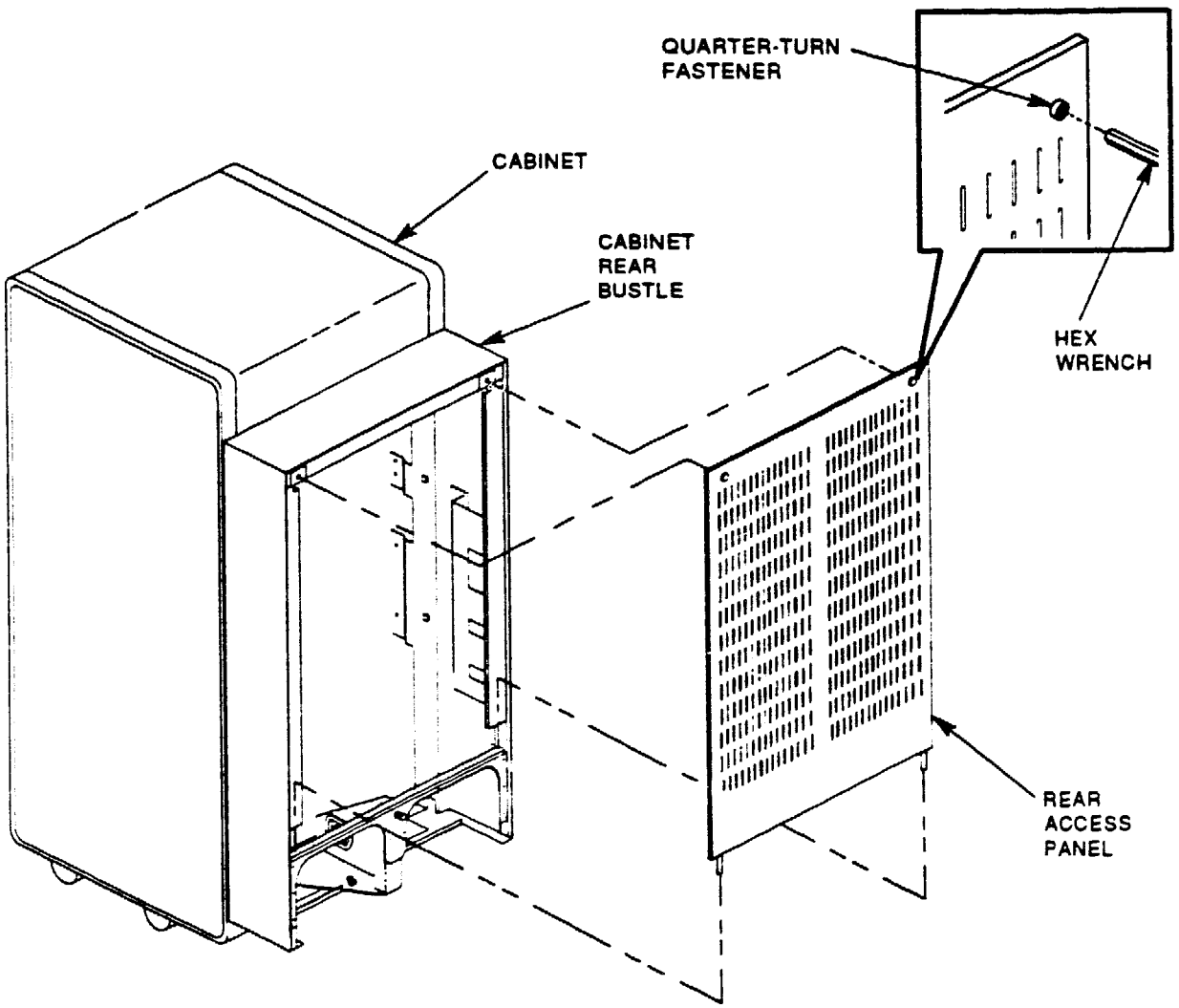
The main power switches, power cables, and interior SDI cables are located inside the rear access panel of the SA705 cabinet. You must remove the cabinet's rear access panel to power up the cabinet and enclosures. Use the following procedure to remove and install the rear access panel. (See Figure 2–4.)

Warning

Hazardous voltages are present inside the SA705 cabinet and SA70R enclosures. Only qualified customer services engineers should perform installation and service. When performing any operation involving the source power for the cabinet, turn off the 881 power controller. Disconnect the line cord from the source outlet. Perform the operation, then reconnect the cord.

1. Turn each of the two hex fasteners located at the top of the panel counterclockwise 1/4 turn to unlock. Tilt the panel toward you and lift it up to disengage the pins at the bottom. Lift the panel clear of the enclosure.
2. To replace the rear access panel, lift it into place and fit the pins into the holes at the top of the I/O bulkhead. Press the top of the panel into place and turn the hex fasteners 1/4 turn clockwise.

Figure 2–4: SA705 rear access panel



2.6 Applying power to the SA705 cabinet and SA70R enclosures

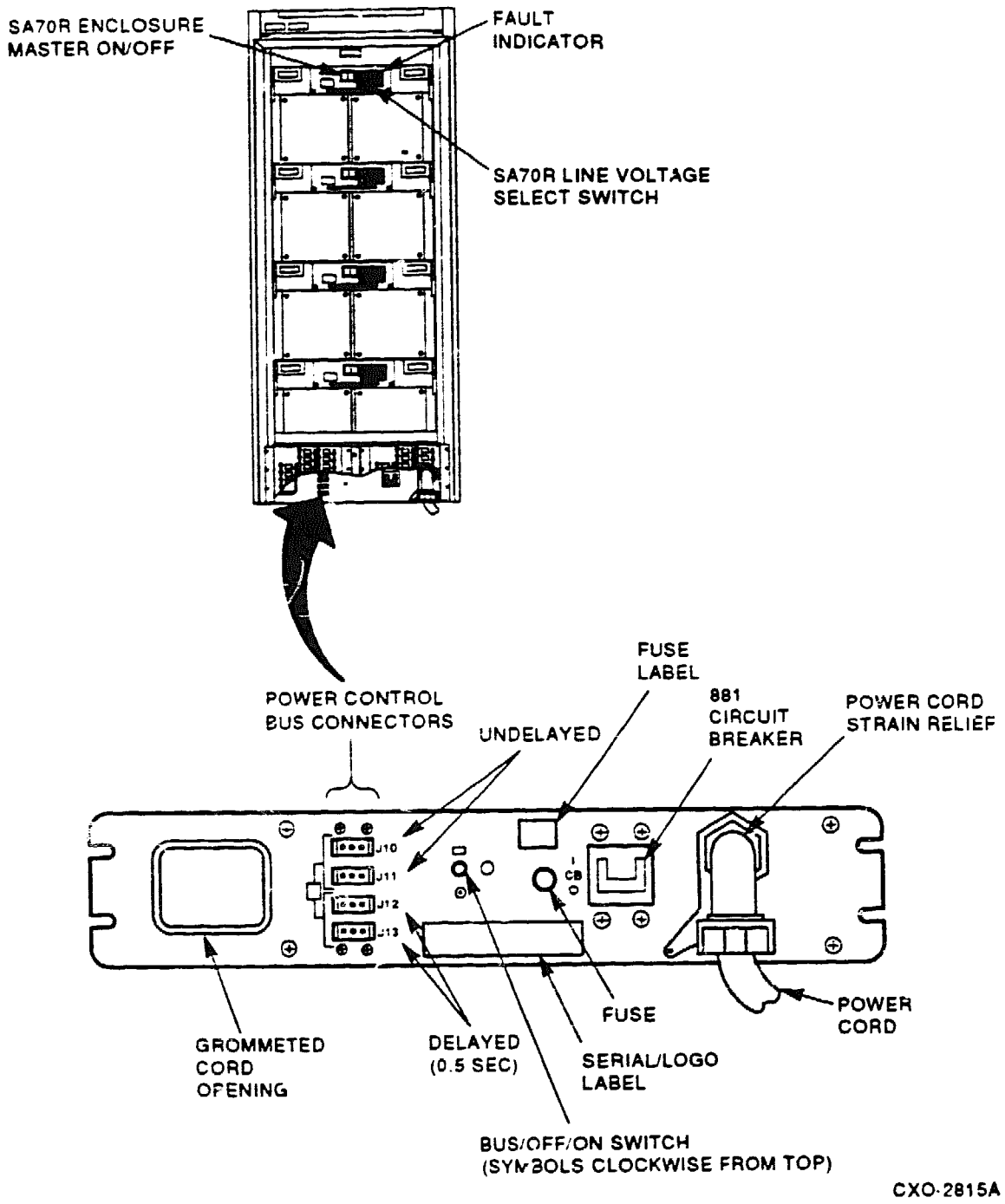
Caution

Before applying power to the SA70R enclosures, ensure that the line voltage selector switch on each enclosure, located behind the SA70R enclosure's rear panel, is set to the proper line voltage. (See Figure 2–5.)

The following procedure explains how to apply power to the SA705 cabinet and SA70R enclosures. Refer to Figure 2–2 and Figure 2–5 while performing this procedure.

1. Remove the rear access panel. (Refer to Section 2.5.)
2. Locate the power switches on the SA70R enclosures. Verify that the switches are in the off position ("O").
3. Locate the circuit breaker on the rear of the 881 power controller. Verify that the circuit breaker handle is in the off position ("O").
4. Set the BUS/OFF/ON switch on the 881 power controller to the on position (switch handle down). This switch controls the distribution of power to the nine outlets inside the grommeted cord opening of the power controller. Note the international symbols on the rear panel of the power controller. 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 is the off position of the switch. The lower symbol is the on position.
5. Raise the circuit breaker at the rear of the 881 power controller to the "1" (on) position to apply power to the cabinet.
6. Press the "1" (on) side of the power switch on the rear panel of each enclosure to apply power to that enclosure.
7. Verify that power is on by checking that the fans are operating. Do this by feeling for airflow out of the rear of the enclosure.
8. Check that none of the fault indicators on any of the enclosure rear panels are lit.
   a. If a fault indicator is lit, turn off power to that enclosure for 10 seconds, then turn the enclosure back on.
   b. If the fault indicator lights again, contact your customer services engineer.
9. Reinstall the rear access panel.

Figure 2–5: Rear SA705 cabinet power controls



2.7 Inserting the RA70–RK removable disk drive

Refer to Chapter 3 for complete procedures and cautions concerning inserting the RA70–RK removable disk drive into the SA70R enclosure.

2.8 Bringing a drive on line

After applying power to the SA70R enclosure, power up and bring each disk drive in the enclosure on line by performing the following steps. (See Figure 2–1.)

1. If the RA70–RK removable disk drive is already inserted in the SA70R enclosure, proceed to Step 4.
2. Open the cabinet door. (Refer to Section 2.4.)
3. Insert an RA70–RK removable disk drive into the SA70R enclosure to automatically power up the drive as described in Chapter 3. If power to the drive is within specifications and the canister has been properly inserted, the canister ready indicator lights. If the indicator does not light, refer to Chapter 4.

Note

Inserting a canister disk drive into the enclosure does not spin up the associated drive.

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 try to clear the fault. If the indicator remains lit, refer to Chapter 4 for fault recovery procedures.

4. Press the RUN switch on the OCP to spin up the drive. (See Figure 2–1.) 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 RA70–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.
   b. All other indicators remain off.
   c. 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.
   d. If the FAULT/SET NO. indicator remains lit, the drive has detected a fault. Press the FAULT/SET NO. switch twice to try to clear the fault. If the indicator remains lit, refer to Chapter 4 for fault recovery procedures.
5. Select port A, port B, and WRITE PROTECT, as required, by pressing the appropriate switch. You deselect these functions by pressing the switch a second time.
6. If necessary, close the cabinet door.

You can start one drive at a time, in any order, using the above procedure.

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 port B indicators light only while their respective ports are selected by the system controller.

2.9 Taking a drive off line

To take a drive off line:

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

To take a drive off line for drive removal:

1. Dismount the disk drive using the proper system commands.
2. Press and release the port A and B switches to deselect both ports of the disk drive. Wait for the port indicators to go out.
3. Press and release the appropriate RUN switch on the OCP. Wait for the RUN indicator to go out.
4. Remove the RA70–RK removable disk drive from the enclosure. (Refer to Section 3.5.) The canister ready indicator goes out to indicate that power has been removed from the drive.

2.10 Setting the drive unit numbers

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

You must take a drive off line before changing its unit number. You do not need to take any other drives in the enclosure off line while setting that specific drive unit number. You also do not need to spin down the selected disk to change the unit number. When the OCP is in unit select mode, all drives not spun down continue to operate according to the settings of the OCP switches.

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. The drive unit number is saved during a power fail by the nonvolatile storage on TB2.

Use the following procedure to set the drive unit number for a drive:

1. Dismount the disk drive using the proper system commands.
2. Take the desired drive off line. (Refer to Section 2.9.)
3. Locate the UNIT SELECT switch in the upper right corner of the OCP. Press the switch with 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. (See Figure 2–1.)
4. Press the FAULT/SET NO. switch once for the selected drive to increment the unit number by one. Press and hold the FAULT/SET NO. switch to rapidly increment the unit number for that drive. Set the unit number to any number between 000 and 255.

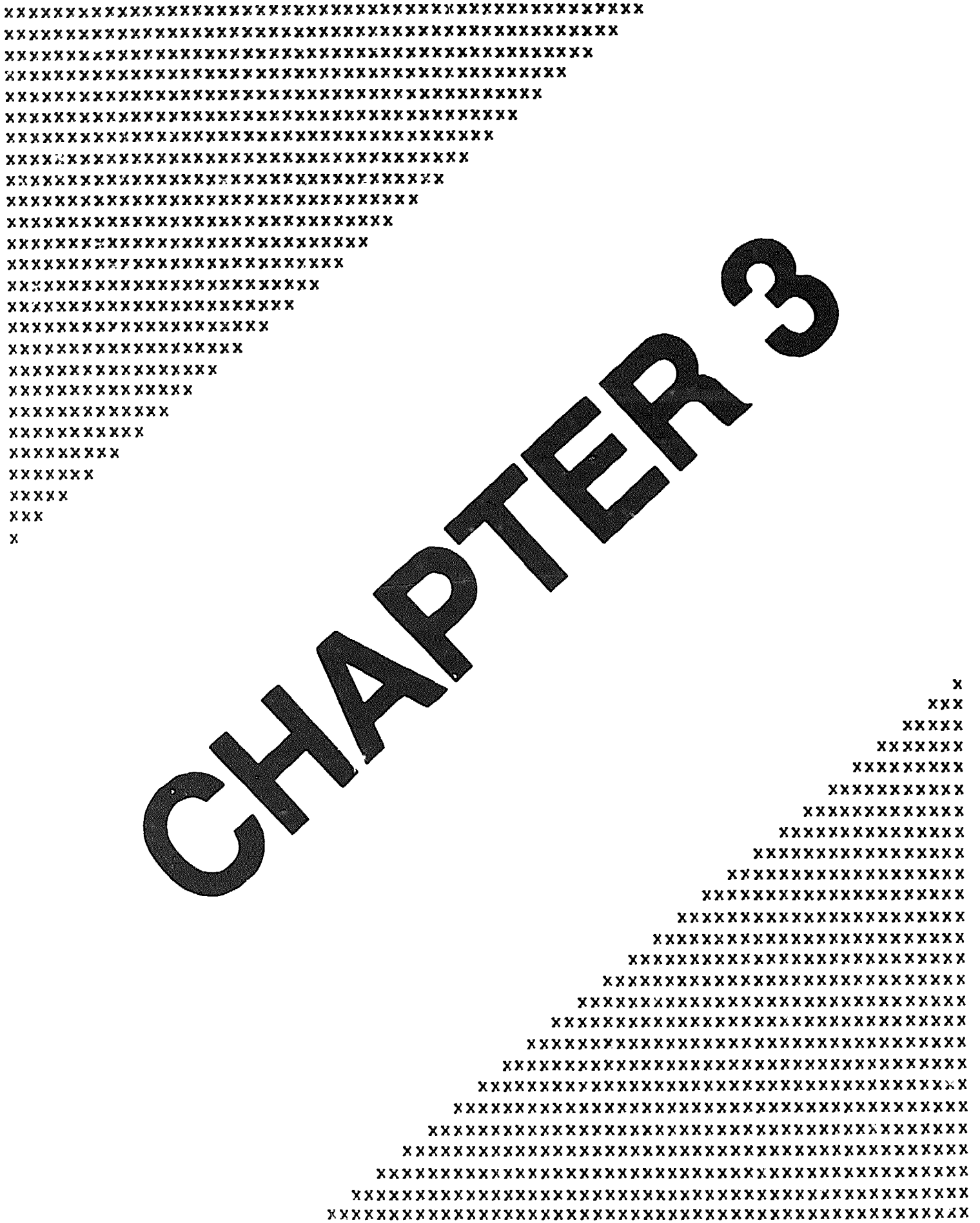
Note

Pressing the FAULT/SET NO. switch for a disk drive that is on line causes the drive to go off line.

5. Repeat the above step for all disk drives for which you are changing numbers. If you do not press the FAULT/SET NO. switch, the number remains the same as before you entered the unit select mode.
6. When you finish setting the drive unit numbers, restore the OCP to normal operation by pressing the UNIT SELECT switch again.
7. Restore the off-line drive to its on-line status. (Refer to Section 2.8.)
8. Remount the disk drive using the proper system commands.

Note

You cannot decrement a drive unit number. Continue holding the FAULT/SET NO. button until it increments to 255; it then restarts at 0.


CHAPTER 3

Chapter 3

Handling the RA70–RK removable disk drive

3.1 About this chapter

This chapter describes the Shockwatch™ mounted on the RA70–RK disk drive canister and discusses the need to environmentally stabilize the disk drive before use. It also identifies the international labels affixed to the canister. It then explains the procedures for inserting, removing, transporting, and storing the disk drive. For more information about operating the RA70–RK removable disk drive in the SA70R enclosure, refer to Chapter 2.

3.2 Understanding the Shockwatch

A Shockwatch is mounted on every RA70–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 3–1.)

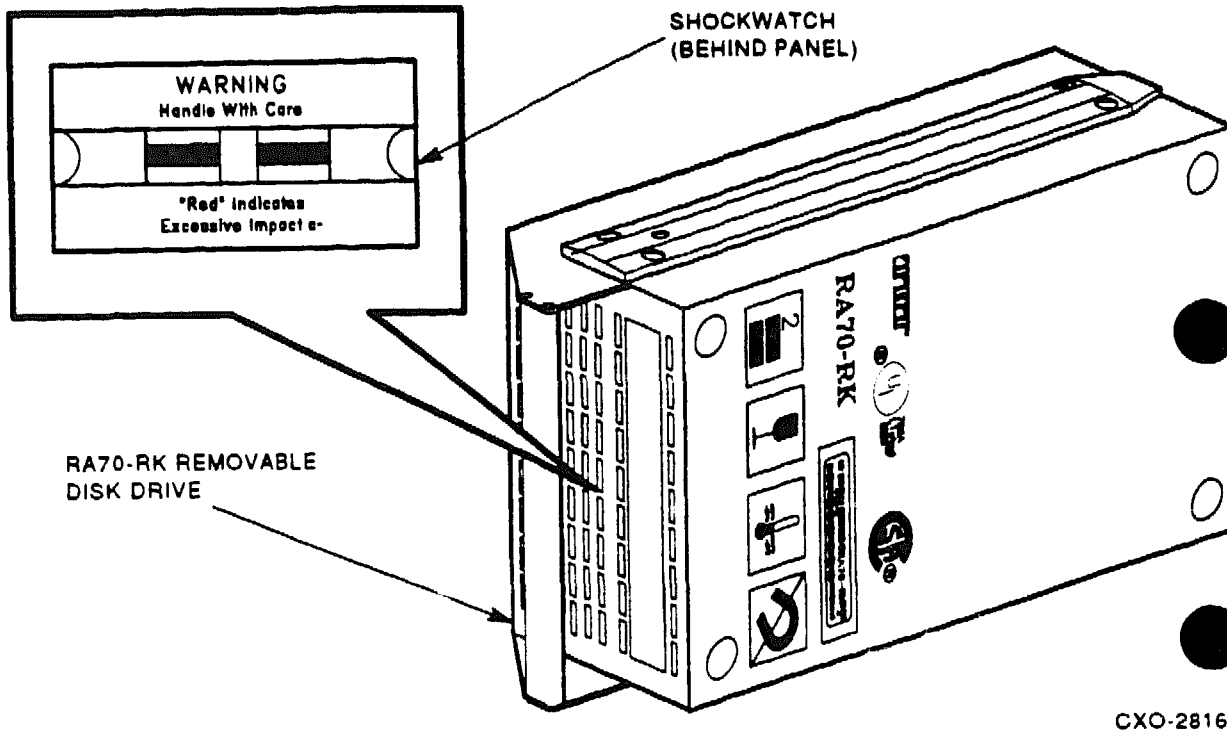
Caution

Digital recommends that you check the Shockwatch before inserting the RA70–RK removable disk drive into the SA70R 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 use the following procedure:

1. If major canister damage is visible, do not insert the canister into the enclosure.
2. If no major canister damage is visible, insert the disk drive into the enclosure. (Refer to Section 3.5.) Check the drive for unusual faults and errors.
3. If you find unusual faults and errors and the drive is not operable, remove the canister.
4. If you find unusual faults and errors but the drive is operable, copy your data to another disk drive immediately.
5. If you do not find unusual faults and errors, operate the disk drive as normal.

Figure 3–1: The Shockwatch on the RA70–RK disk drive canister



3.3 Ensuring environmental stabilization

If the RA70–RK removable disk drive has been outside the room where it is normally operated, it is critical that it be environmentally stabilized before you use it. Failure to stabilize the disk drive could result in damage to the drive media or associated electronics on power up. Refer to Appendix A for stabilization procedures.

Caution

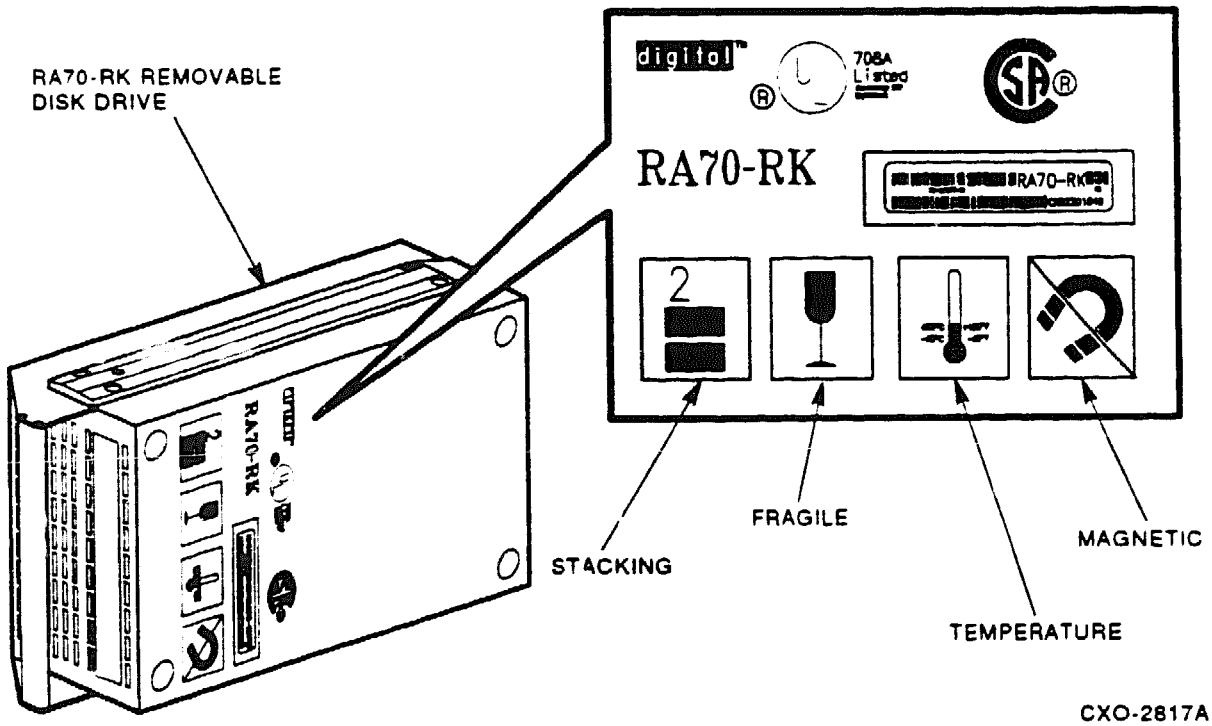
Always ensure environmental stabilization of the RA70–RK removable disk drive if it has been removed from the room where it is normally operated. Otherwise, damage to the drive media or associated electronics on power up could result. Refer to Appendix A for stabilization procedures.

3.4 Understanding RA70–RK labels

There are four caution labels affixed to the RA70–RK removable disk drive canister that use international symbols. (See Figure 3–2.) Reading the labels from left to right:

- The first label cautions you not to stack canisters more than two canisters high.
- The second label cautions you that the canister is fragile and should not be subjected to rough handling.
- The third label cautions you not to exceed the storage (non–operating) temperature limits for the canister.
- The fourth label cautions you not to expose the canister to strong magnetic fields. (Exposure to airport–type x–ray equipment is acceptable.)

Figure 3–2: The four international symbols on the canister labels



3.5 Inserting and removing the RA70–RK removable disk drive

The RA70–RK removable disk drive has been designed to allow you to insert and remove it, on a regular basis, from the SA70R enclosure that is installed in the SA705. Inserting or removing a single canister does not affect the on–line operation of any other disk element. This includes the other disk drives in the same SA70R enclosure, other disk drives inside the SA705 cabinet, 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 down the drive before removing the canister. This procedure is explained in Section 2.9.

Caution

The RA70–RK removable disk drive is designed to be inserted only in the SA70R enclosure. The SA70R enclosure is designed to accommodate only RA70–RK removable disk drives. Using these devices in other configurations may damage the equipment.

Caution

Digital recommends that you check the Shockwatch before inserting the RA70–RK removable disk drive into the SA70R 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 3.2 for additional information about the Shockwatch.

Caution

Always ensure environmental stabilization of the RA70–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 on power up could result. Refer to Appendix A for stabilization procedures.

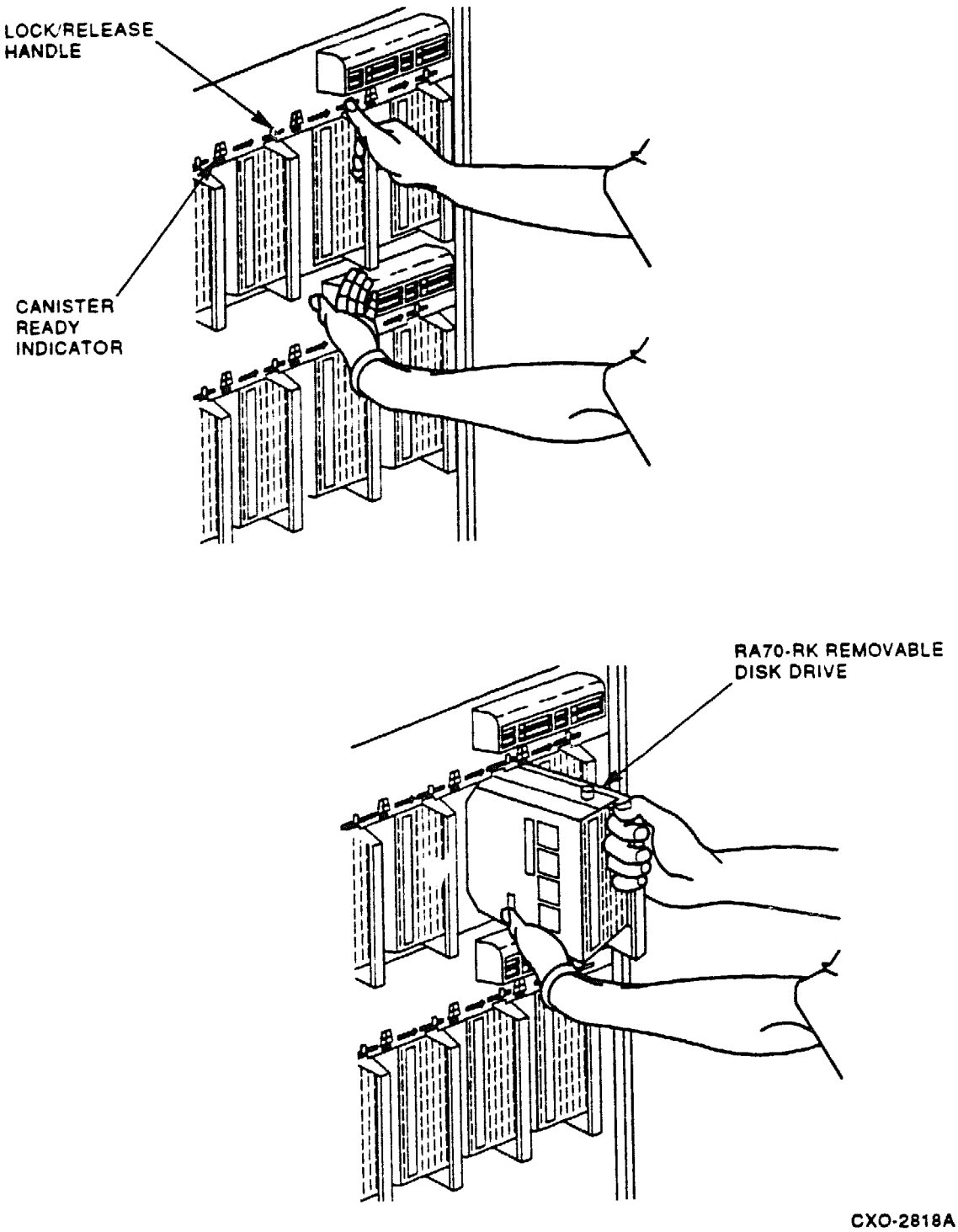
To insert the RA70–RK removable disk drive into the SA70R enclosure, refer to Figure 3–3 and follow these steps:

1. Inspect the canister for any signs of physical damage. Also inspect the canister Shockwatch for possible damage to the disk drive. (Refer to Section 3.2.)
2. If the disk drive has been outside its operating environment, ensure that it has been environmentally stabilized. Refer to Appendix A for stabilization procedures.
3. Open the cabinet door. (Refer to Section 2.4.)
4. 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.
5. Carefully align the canister guide rails with the opening in the SA70R 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 into the enclosure. If the handle does not move completely to the left, push the handle to the left. If the enclosure has power, the canister ready indicator lights to indicate the canister has correct power.)
6. Close the cabinet door.

To remove the RA70–RK disk drive from the enclosure, refer to Figure 3–3 and follow these steps:

1. Dismount the disk drive using the proper system commands.
2. Take the drive off line and spin down the drive as explained in Section 2.9.
3. Open the cabinet door.
4. Move the lock/release handle to the right to unlock the canister. (If the enclosure has power, the canister ready indicator goes out when you move the lock/release handle to the right.)
5. Grasp the canister handle and carefully slide the canister out of the opening. Place your other hand on the bottom of the canister to help support its weight as you remove it from the enclosure.
6. Close the cabinet door.

Figure 3–3: Inserting and removing the RA70–RK removable disk drive



3.6 Transporting the RA70–RK in the RA70X–AK carrying case

Always use care when handling or transporting the RA70–RK removable disk drive. If you are transporting the disk drive canister a relatively long distance or outside its operating environment, always use the RA70X–AK carrying case (Figure 3–4). This case helps protect the canister from environmental extremes, shock, and vibration. Refer to Table 1–5 for environmental limits specifications for the RA70–RK in the RA70X–AK carrying case.

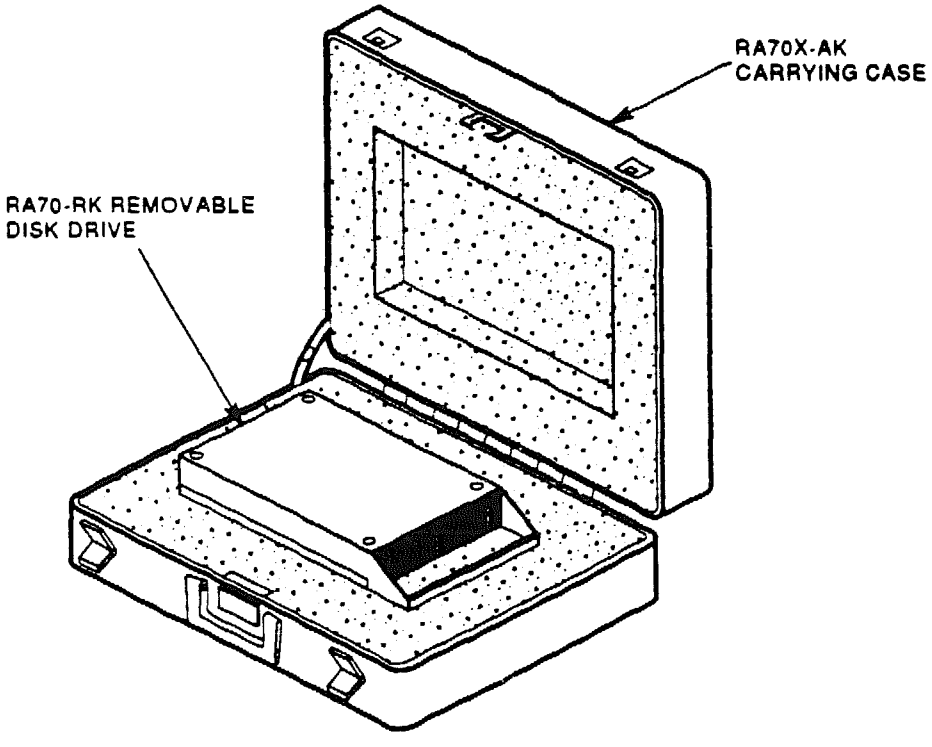
Caution

Digital recommends that you check the Shockwatch before inserting the RA70–RK removable disk drive into the SA70R enclosure for operation. If the Shockwatch is red, the disk drive may be damaged. Refer to Section 3.3 for additional information about the Shockwatch.

Caution

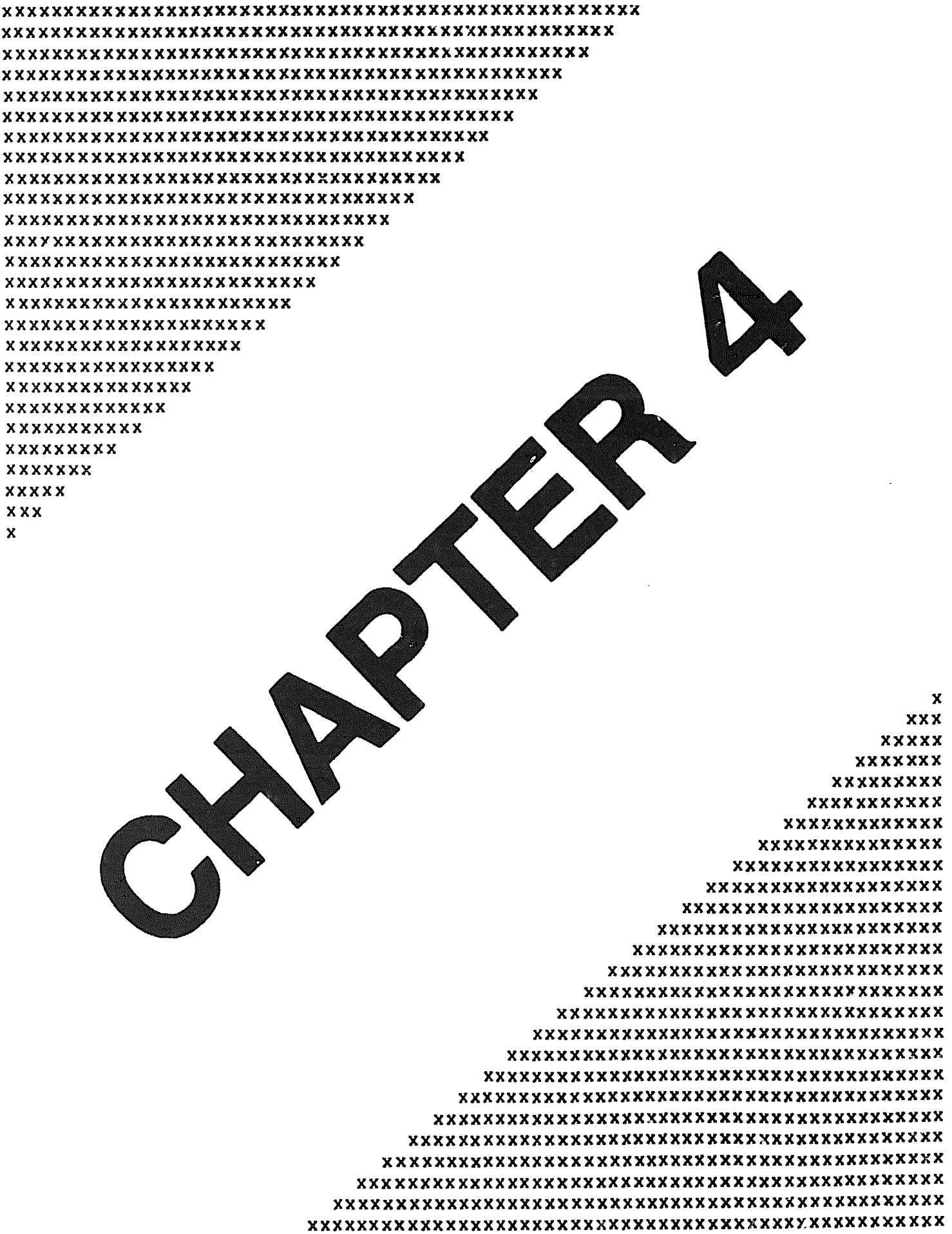
Always ensure environmental stabilization of the RA70–RK removable disk drive if it has been removed from its operating environment. Otherwise, damage to the drive media or associated electronics on power up could result. Refer to Appendix A for stabilization procedures.

Figure 3–4: RA70X–AK carrying case



3.7 Storing the RA70–RK removable disk drive

You can store the RA70–RK removable disk drive outside the SA70R enclosure. Always use care when handling the canister. Always use the RA70X–AK carrying case when transporting the disk drive to an off–site storage location. Digital recommends that you store the RA70–RK removable disk drive in a +18°C to +29°C (+65°F to +85°F), low–humidity environment. See Table 1–2 for recommended environmental limits specifications for disk drive storage. See Table 1–5 for maximum environmental limits specifications for disk drive storage.


CHAPTER 4

Chapter 4

Troubleshooting the SA70R enclosure

4.1 About this chapter

This chapter explains how to verify whether a problem exists in the SA70R enclosure before you call customer services. It also includes procedures you can use to recover from a fault condition.

4.2 Troubleshooting the SA70R enclosure

If your SA70R enclosure or an installed RA70–RK removable disk drive does not operate properly, check the following items before calling your customer services engineer:

Warning

Hazardous voltages are present inside the SA705 cabinet and SA70R 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 cord.

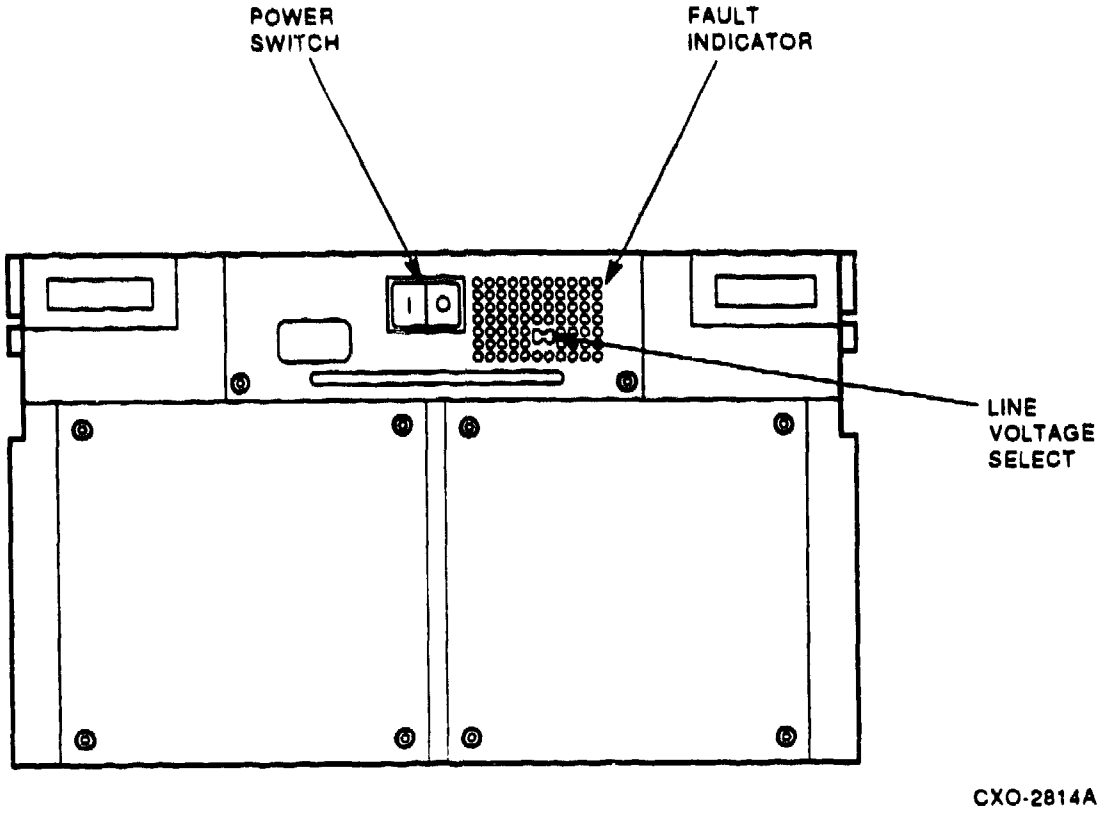
4.2.1 Troubleshooting a dead enclosure

If the entire enclosure is dead, first check the red fault indicator at the rear of the enclosure. The fault indicator is visible, when lit, through holes in the upper right corner of the enclosure's power supply. (See Figure 4–1.) The fault indicator lights to indicate an overtemperature or overvoltage condition in the power supply.

If the red fault indicator is lit:

1. Immediately turn off ("O") the enclosure power switch located on the rear of the enclosure power supply.
2. Check if the enclosure has been exposed to an overtemperature environmental condition at your facility. If the enclosure has been exposed to an overtemperature condition, correct the condition. Refer to Table 1–2 for recommended environmental limits.
3. 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.

Figure 4–1: Rear panel view of the SA70R enclosure



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 power plug of the cabinet is connected to the line voltage outlet of the installation
4. Verify that the line voltage selector switch on the rear panel of the power supply is set to the correct line voltage. (See Figure 4–1.)
5. Check for an overcurrent condition in the power supply by removing power to the disk drives. Do this by fully releasing the lock/release handle (move the handle to the far right) for each disk drive.
   a. If the enclosure fans start, proceed to Step 3 in Section 4.2.2.
   b. If the enclosure fans do not start, contact your customer services engineer.

4.2.2 Troubleshooting flashing canister ready indicators

If the canister ready indicators on the front panel of the enclosure are flashing, an overcurrent condition at the output of the power supply is the likely cause of the failure.

1. Reset the operator control panel (OCP) switches. First, deselect both A and B ports. Then press and release the RUN switch for that disk drive. (See Figure 4–2.) Repeat this step for all the drives in the enclosure.
2. Remove power to the disk drives by fully 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 the canisters in fully one at a time.
   a. If the canister ready indicator lights steadily when you insert the disk drive, that drive is not causing the overload.
   b. If the canister ready indicator flashes when you insert the disk drive, you have found the cause of 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.
5. Call your customer services engineer.

4.2.3 Troubleshooting a nonlighting canister ready indicator

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

1. Verify that you are inserting a Digital RA70–RK removable disk drive.
2. Verify that the the canister is fully seated in the enclosure and the lock/release handle has moved completely to the left.
3. 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 4.2.1.
   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.

4.2.4 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.

4.2.5 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 appropriate port switch is selected.
2. Record any error code displayed on the OCP as described in Section 4.3.
3. If the drive was on line previously:
   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).
   c. After 10 seconds, restore power to the drive by pushing the canister in fully. (Removing power to the drive for 10 seconds resets the drive's circuits.)
4. Verify that the SDI cable connectors from the host system are securely tightened at the cabinet I/O bulkhead.
5. Attempt to bring the disk drive back on line and restore normal operation.
6. If you cannot bring the disk drive back on line, contact your customer services engineer.

4.2.6 Troubleshooting noisy fans

If the fans seem noisier than usual, it is most likely that the fans have gone into high–speed operation. When the temperature inside the enclosure exceeds 29°C (91°F), the fans automatically switch from normal–speed to high–speed operation. Verify proper temperature at the operating site. Refer to Table 1–2 for recommended environmental limits. If you still suspect the fans, contact your customer services engineer.

4.3 Recovering from a drive fault condition

The RA70 disk drive contains sophisticated circuits to detect and report fault conditions. These faults are reported to you through a 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 the least amount of time.

Use the following procedure if the FAULT/SET NO. indicator lights to signal that the disk drive has detected a fault. (See Figure 4–2.)

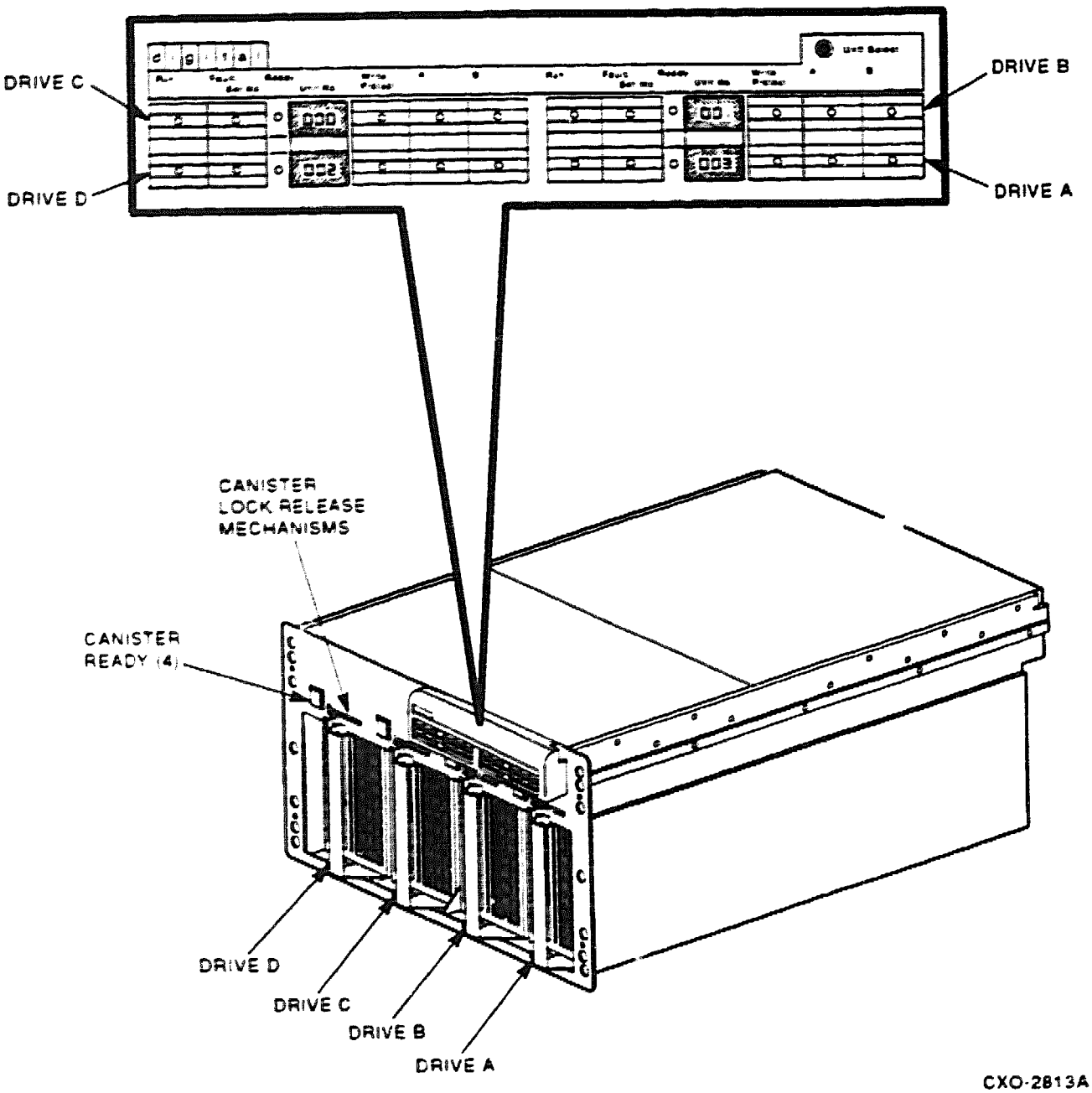
1. Press the FAULT/SET NO. switch once. This causes the drive to display an error code on the OCP.
2. The error code is displayed as flashing indicators on the OCP. Record which indicators are flashing. Your customer services engineer uses this code to isolate the cause for the drive fault.

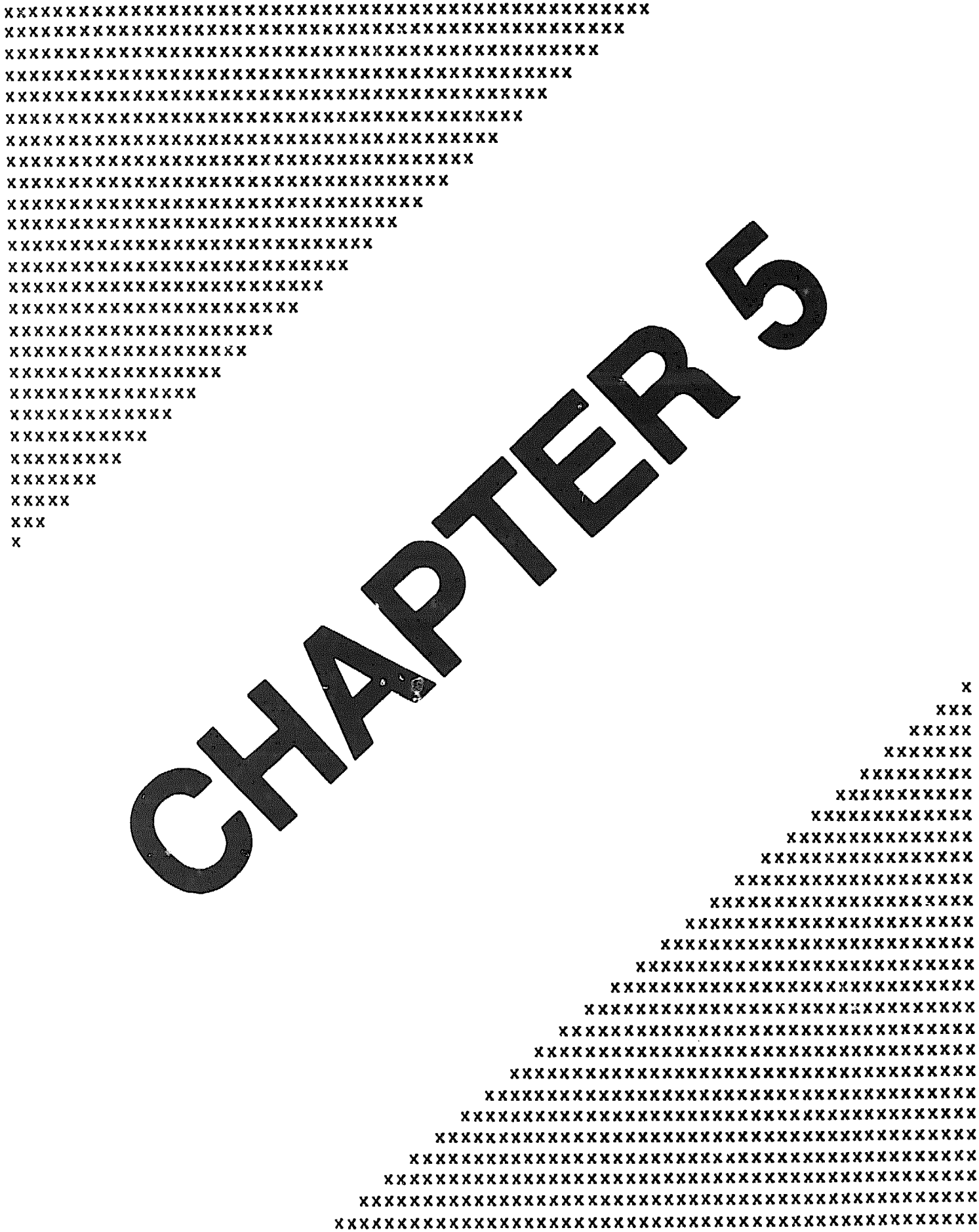
Note

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 may be used in future system fault analysis.
   b. If the fault recurs, call your customer services engineer.

Figure 4–2: Front panel view of the SA70R enclosure




CHAPTER 5

Chapter 5

Installing and de–installing the SA705

5.1 About this chapter

This chapter explains how to unpack and install the SA705, perform a post–installation checkout, and de–install and repack the SA705.

The SA705 is shipped with all configured SA70R enclosures, RA70–RK removable disk drives, and internal cables installed in the SA705 cabinet. To install an additional SA70R enclosure in a vacant SA705 cabinet position, refer to Chapter 6. To remove or insert RA70–RK removable disk drives, refer to Chapter 3.

Caution

Digital recommends that the SA705 be installed only by qualified customer services engineers.

5.2 Required tools

You need the following tools to install the SA705:

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

5.3 SA705 configurations

Table 1–1 shows the shipping configurations for the SA705 storage array family. SA705s are shipped in these configurations. The SA705 cabinet accommodates only SA70R enclosures.

Caution

The SA70P enclosure is designed to be installed only in the SA705 cabinet. The SA705 cabinet is designed to accommodate only SA70R enclosures. Using these components in other configurations may damage the equipment.

5.4 Environmental considerations

You must operate the SA705 within the environmental limits listed in Table 1–2. In general, keep the following points in mind when planning the location of the enclosure:

- There must be adequate space around the cabinet to access the I/O bulkhead at the rear of the cabinet and the power switches located inside the rear access panel.
- The enclosure must be located in the cleanest environment possible for maximum reliability and performance.
- Floor loading is 56.7 kg (125 lbs) for each fully loaded SA70R enclosure (includes four RA70–RK removable disk drives) in the installation, plus the weight of the cabinet. (This weight should not be a problem in an average installation.)
- Refer to Figure C–4 for airflow and air–quality requirements for SA70R enclosures. Take special care to ensure this airflow is not interrupted either at the front (intake) or at the rear (exhaust) of the cabinet. Allow at least 3 feet of space between the cabinet and adjacent equipment or structures.

5.4.1 Site preparation

To minimize problems during installation, it is important that the site be fully prepared to accommodate the SA705. Refer to Appendix B and Appendix C for complete information about site preparation.

5.4.2 Power and safety

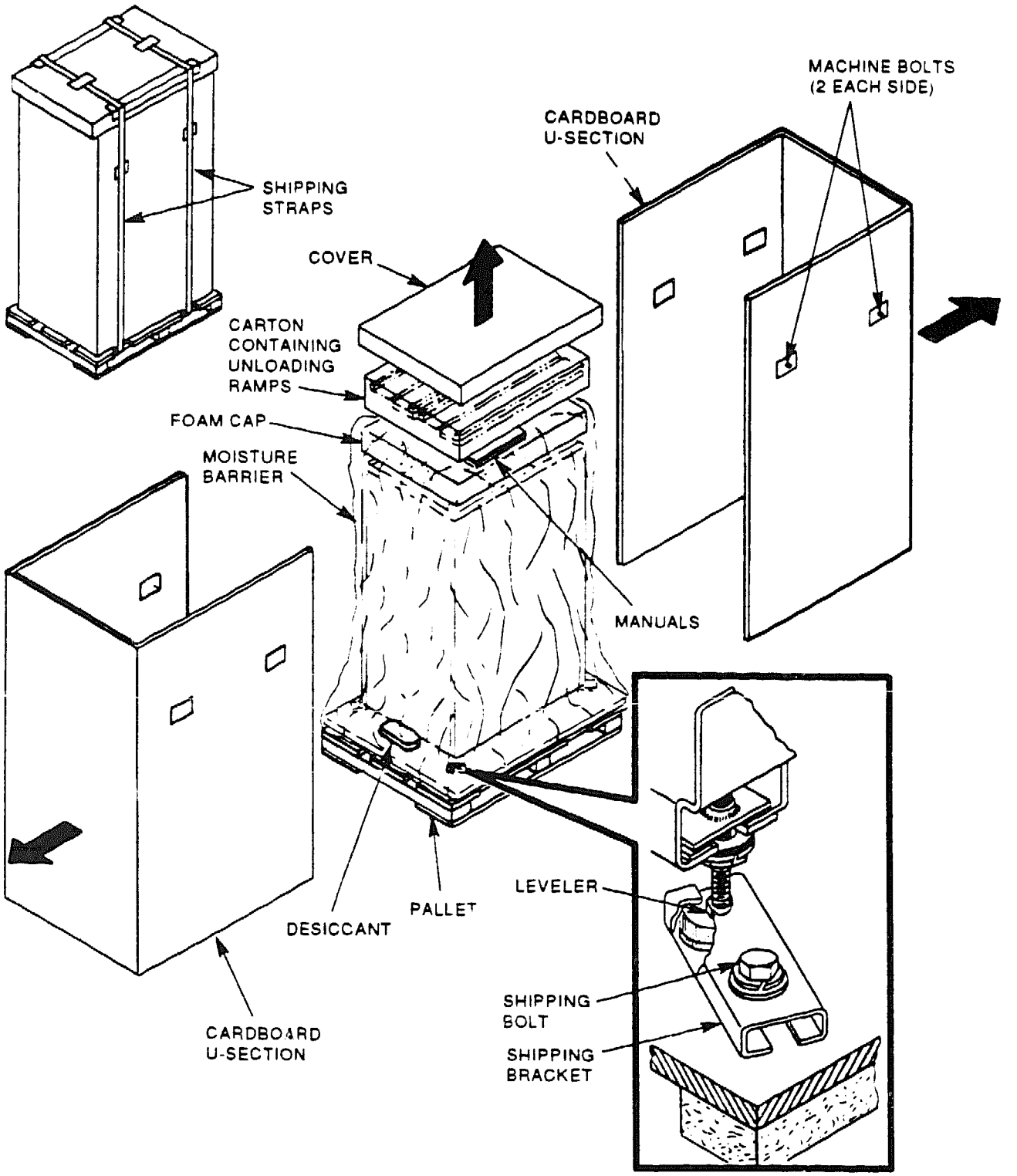
The SA705 does not present any unusual fire or safety hazards. Verify that your installation has adequate power reserves to support the planned number of SA705 cabinets and SA70R enclosures.

Warning

Hazardous voltages are present inside the SA705 cabinet and the SA70R enclosures. Only qualified customer services engineers should perform installation and service. When performing any operation involving the source power for the cabinet, turn off the 881 power controller. Disconnect the line cord from the source outlet. Perform the operation, then reconnect the cord.

Before powering up the equipment, verify that all power sources are the correct voltage and frequency for the equipment. Verify that the line voltage selector switch on the 881 power supply and on the enclosure power supplies are correctly set.

Figure 5–1: Contents of the SA705 storage array shipping container



5.5 Unpacking and de–skidding the SA705

The SA705 is packaged with all configured SA70R enclosures, RA70–RK removable disk drives, and necessary cables installed in the SA705 cabinet. The cabinet is packed in a cardboard carton attached to a wooden shipping pallet. It is sealed in a barrier bag with desiccant for environmental protection. Save all packing material in case you need to reship the SA705. Figure 5–1 shows the contents of an SA705 shipping container.

Warning

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

Caution

Ensure environmental stabilization of the SA705 in the site environment before operating the system. Failure to environmentally stabilize the equipment, particularly the disk drives, could damage the drive media or associated electronics at power up.

Environmental stabilization starts when the equipment enters the room where it is to be installed. Remove the outer shipping carton and allow environmental stabilization time with the environmental bag still sealed and the desiccant in place. Refer to Appendix A for environmental stabilization procedures.

Caution

During all installation procedures, inspect the ramps, ramp side rails, and metal hardware for defects. These defects could be any one of or combination of the following:

- Cracks across or lengthwise in the ramp that are more than 25% of the ramp's depth.
- Knots or knotholes that penetrate the thickness of the ramp and are greater than 50% of the width of the ramp.
- Loose, missing, or broken ramp side rails.
- Loose, missing, or bent metal hardware.

If any of the above conditions exist, *do not use the ramp*. Find another way to de–skid the cabinet or order a new ramp. The part number for the left ramp is 99–07689–01. The part number for the right ramp is 99–07689–02.

Note

Before unpacking the SA705, inspect the shipping carton for signs of external damage. Report any damage to the Digital customer services or sales office and the local carrier.

Use the following procedure to de–skid the SA705:

1. Remove the two unloading ramps.
2. Remove the cardboard carton and packing material.
3. Examine the equipment for physical damage.
4. Remove the shipping bolts. (See Figure 5–1.)
5. Remove the shipping brackets from the cabinet levelers.
6. Fully extend the unloading ramps and fit the steel dowel into the ramp lock as shown in Figure 5–2.
7. Attach the unloading ramps to the pallet by fitting the grooved end of each ramp over the metal mating strip on the pallet. (See Figure 5–2.)

8. Screw the cabinet levelers all the way up until the cabinet coasters rest on the pallet. (See Figure 5–1.)
9. Carefully roll the cabinet down the ramps, using three people. (See Figure 5–3.)
10. Move the cabinet into position.
11. Loosen the locknuts on all four leveler feet. (See Figure 5–4.)
12. Turn each leveler hex nut clockwise until the leveler foot contacts the floor.
13. Adjust all four feet until the cabinet is level and the load is removed from the casters. Verify that the casters spin freely.

Figure 5–2: Ramp installation of the shipping pallet

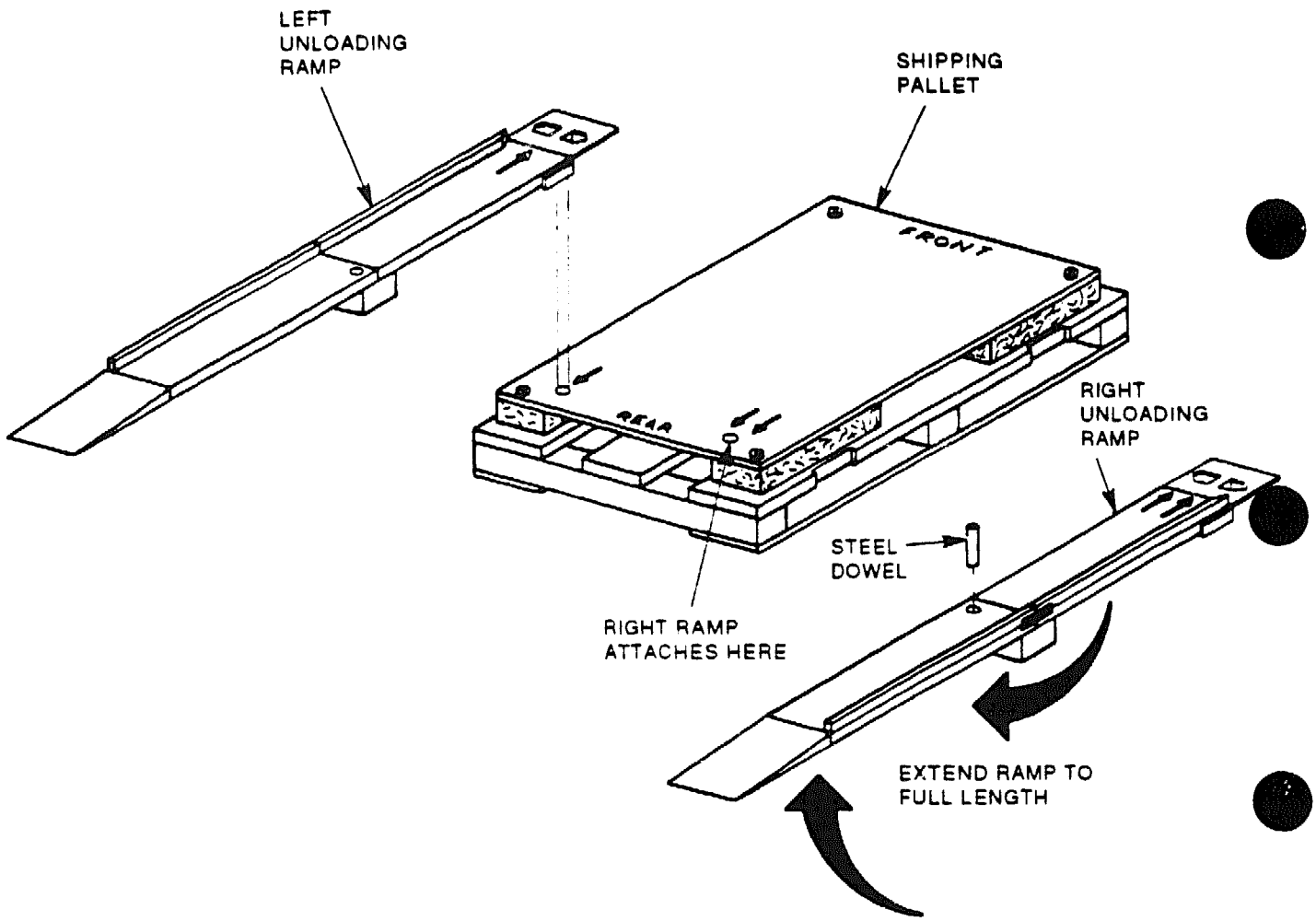
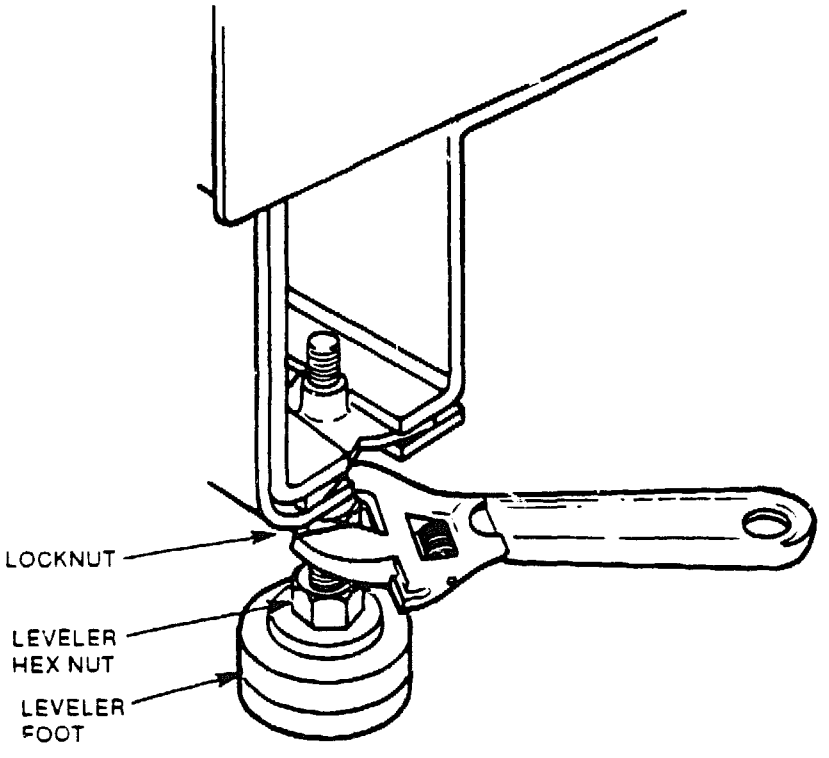


Figure 5–3: Cabinet de–skidding

CXO-924A_S

Figure 5–4: Adjusting the leveler feet



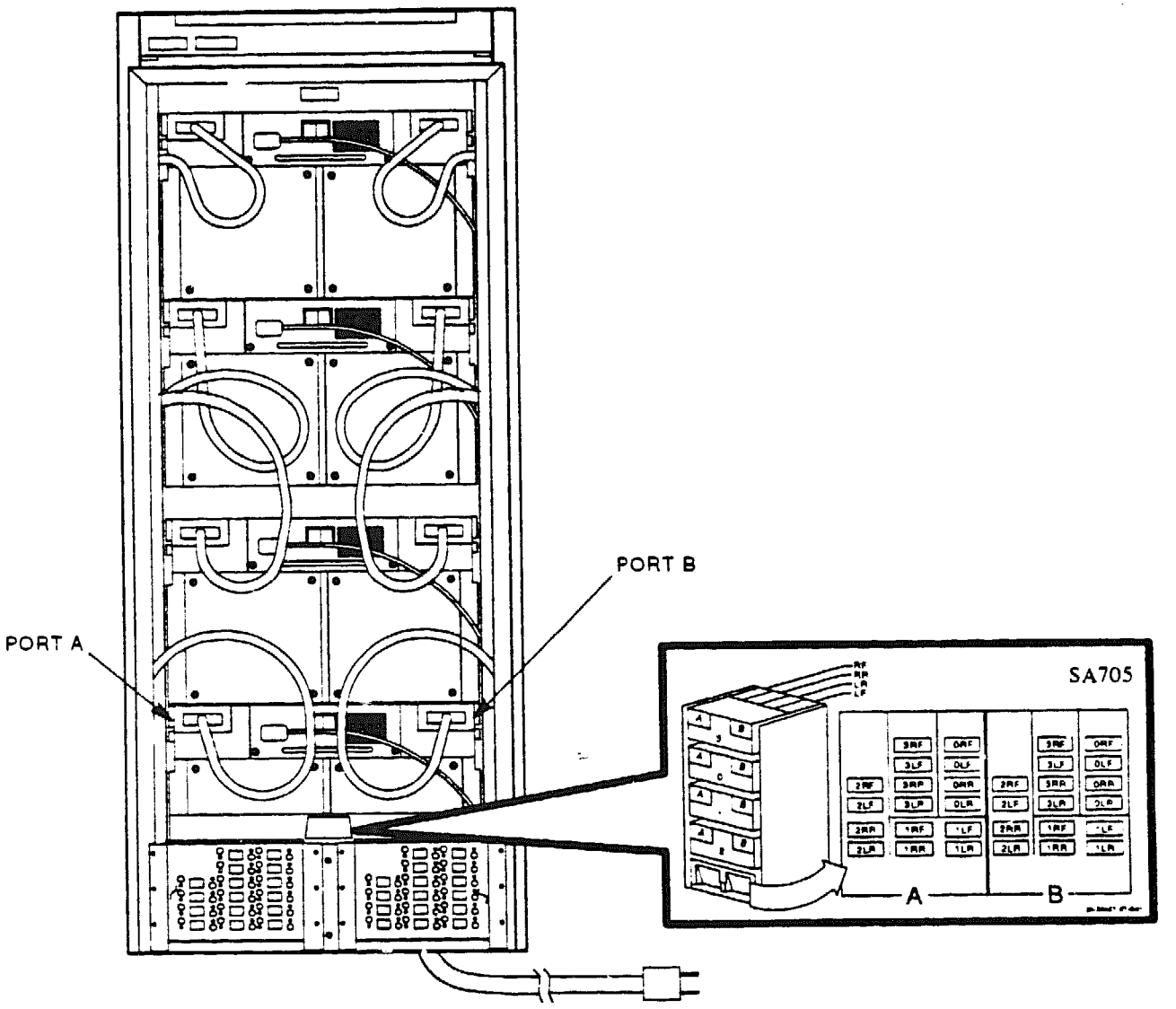
5.6 Affixing OCP labels

All OCP labels on the shipped SA705s are in English. Included in the shipping package is a packet of labels in several languages. If necessary, select the appropriate label from the packet and affix it to the OCP on top of the English label. The labels are self–adhesive.

5.7 Connecting external SDI cables

Standard disk interconnect (SDI) cables connect the host system to the individual components in the SA705. The SA705 is shipped with all internal SDI cables installed. Figure 5–5 shows the configurations for connecting the external cables to the I/O bulkhead. Secure all external cables to the I/O bulkhead with the connector retaining screws.

Figure 5–5: SDI cables configurations



5.8 Connecting and applying power to the SA705

Figure 5–6 shows the possible power connector configurations and the specifications for each type of connector that you may encounter in an SA705 storage array installation. The SA705 is shipped with all internal power cables installed and connected.

Caution

Before applying power to the SA70R enclosures, ensure that the line voltage selector switch on each enclosure, located behind the enclosure's rear panel, is set to the proper line voltage. (See Figure 5–7 and Figure 5–8.)

The following procedure explains how to apply power to the SA705 cabinet and SA70R enclosures. Refer to Figure 5–7 while performing this procedure.

1. Remove the rear access panel. (Refer to Section 2.5.)
2. Locate the power switches on the SA70R enclosures. Verify that the switches are in the off position ("O").
3. Locate the circuit breaker on the rear of the 881 power controller. Verify that the circuit breaker handle is in the off position ("O").
4. Set the BUS/OFF/ON switch on the 881 power controller to the on position (switch handle down). This switch controls the distribution of power to the nine outlets inside the grommeted cord opening of the power controller. Note the international symbols on the rear panel of the power controller. 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 is the off position of the switch. The lower symbol is the on position.
5. Raise the circuit breaker at the rear of the 881 power controller to the "1" (on) position to apply power to the cabinet.
6. Press the "1" (on) side of the power switch on the rear panel of each enclosure to apply power to that enclosure.
7. Verify that power is on by checking that the fans are operating. Do this by feeling for airflow out of the rear of the enclosure.
8. If you are not going to perform the post-installation checkout at this time, reinstall the rear access panel.

Figure 5–6: Power connector configurations

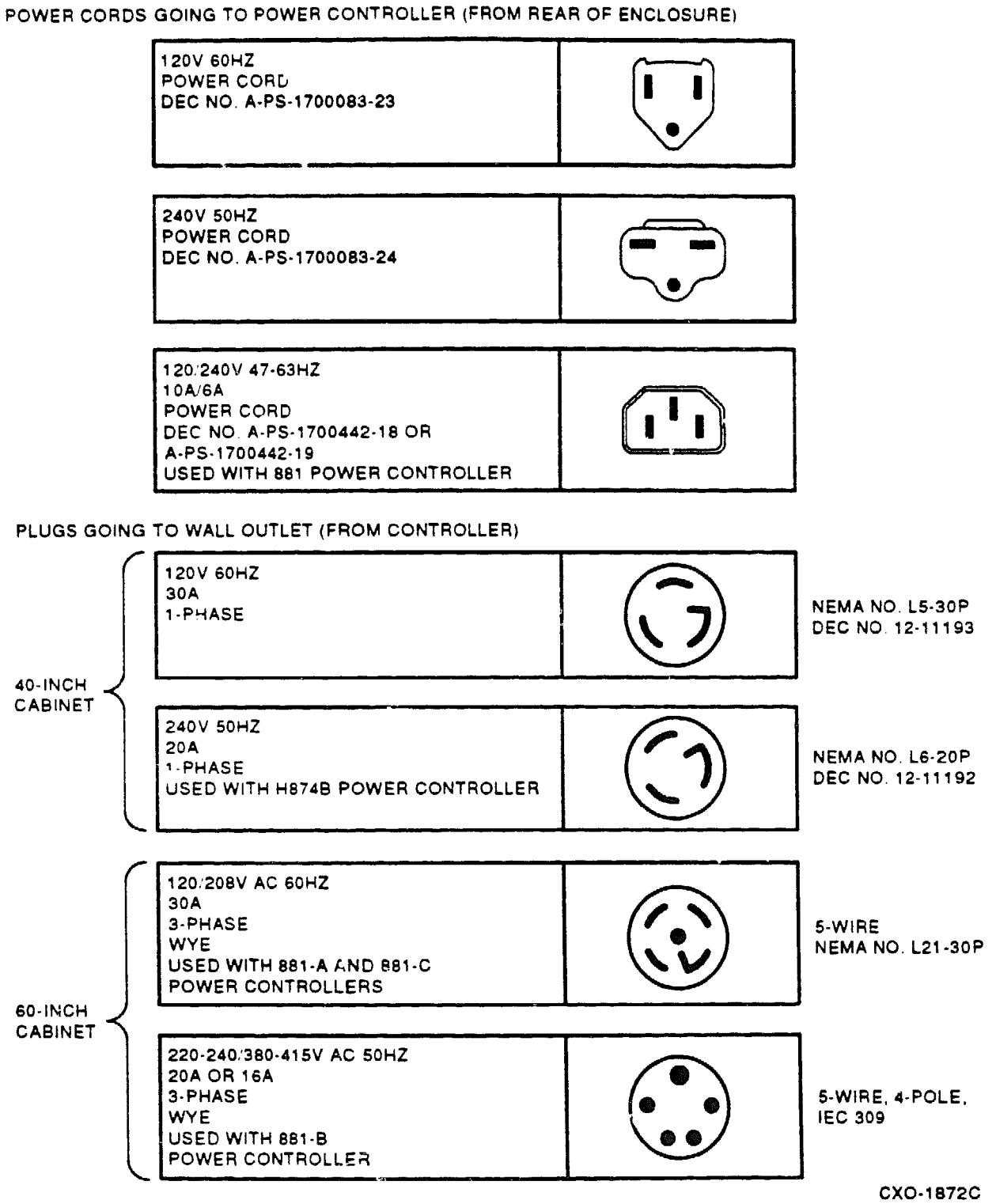


Figure 5–7: Rear SA705 cabinet power controls

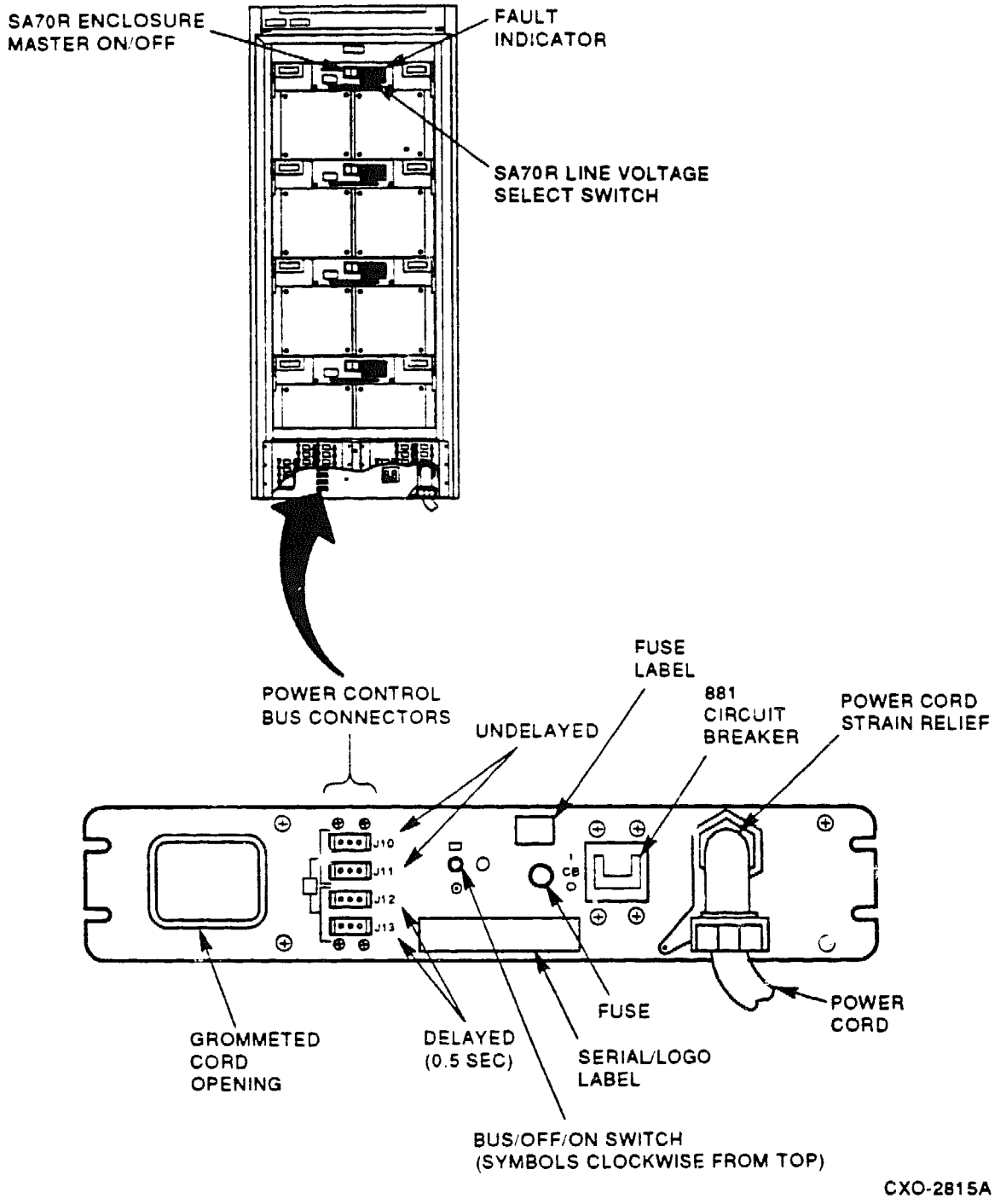
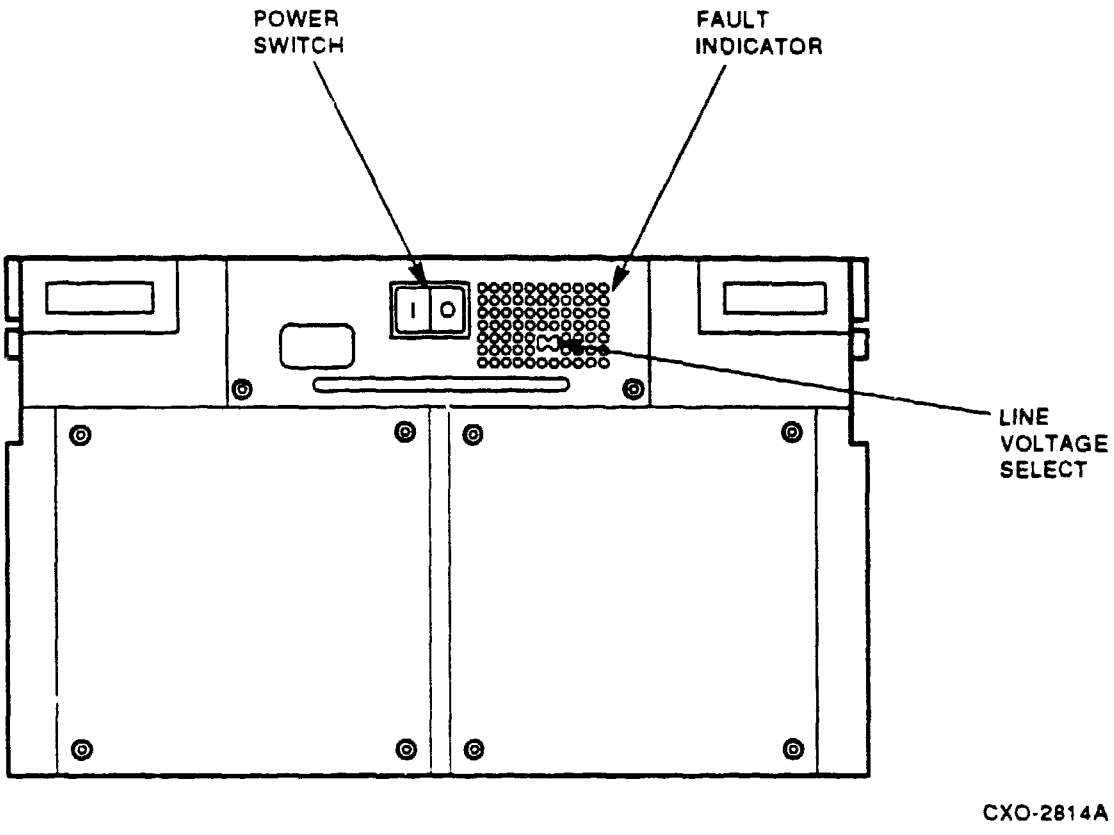


Figure 5–8: Rear panel view of the SA70R enclosure



5.9 Performing the post-installation checkout

Perform the following checkout for all SA70R enclosures in the SA705 cabinet. This checkout enables you to verify normal operation of the power supply, operator control panel, fan assemblies, and disk drives for each enclosure before you begin operation.

Use the following procedure to check all SA70R enclosures. If you encounter any problems, contact your Digital customer services engineer.

1. Open the cabinet door (Section 2.4) and, if you have not done so already, remove the rear access panel (Section 2.5).
2. Verify that all power and interface connections to the rear of the enclosure are correct and secure.
3. Verify that the line voltage select switch on the enclosure power supply is set to the proper source voltage. (Refer to Section 6.8.)
4. Verify that the 881 power controller is on. (Refer to Section 5.8.)
5. Verify that the enclosure power switch is on ("1"). (See Figure 5–7.)

6. Verify power supply operation by checking that the enclosure fans are operating. Do this by feeling for airflow out the rear of the enclosure. If the fans are not operating, check the power connections and 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 the non–operating fan will not operate.

7. Verify power application to each occupied disk drive position by noting that the canister ready indicator lights. If the indicator does not light, verify that the disk drive is correctly inserted in the enclosure. (Refer to Section 3.5.)

8. Set the drive unit number for each disk drive in the enclosure. (Refer to Section 5.10.)

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 on the same controller causes a controller fault and results in both drives spinning down.

9. Perform the following steps for each disk drive in the enclosure. (See Figure 5–9.)

   a. Press the RUN switch on the OCP for the selected disk drive position. This starts the drive motor of the drive in that position. When the READY indicator lights, the drive has completed its internal diagnostics and is ready for operation. If the FAULT/SET NO. indicator lights, press and release the FAULT/SET NO. switch twice. (Refer to Chapter 4.)

   b. Verify that the associated OCP indicators light by pressing and holding the FAULT/SET NO. switch to perform a lamp test.

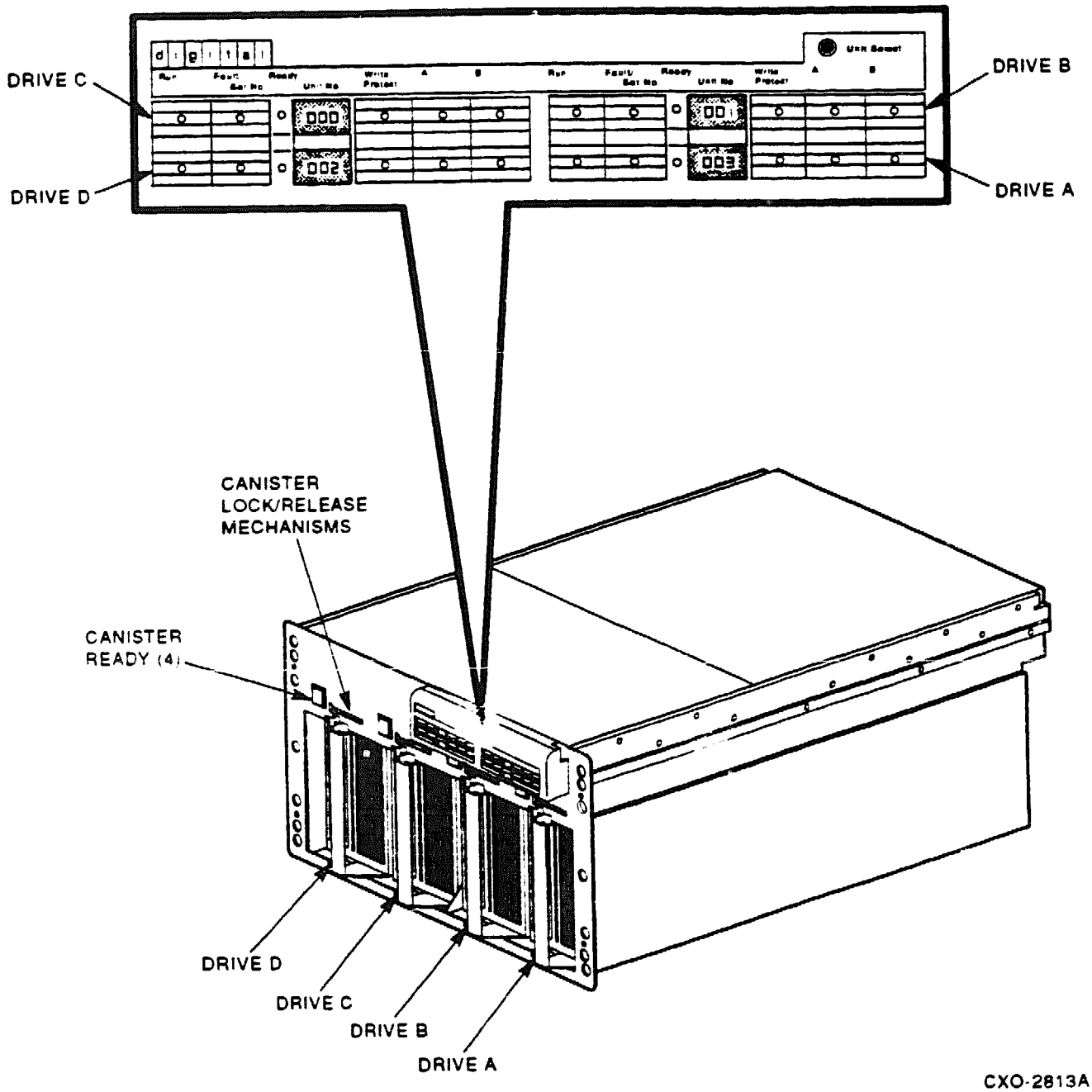
   c. Select port A or port B and WRITE PROTECT by pressing the appropriate switches. The WRITE PROTECT indicator lights when the switch is set; the port indicators light only when the host system controller has selected the associated ports for read/write operations.

   d. Deselect the WRITE PROTECT switch by pressing it again.

10. Run the applicable host system controller diagnostics to verify proper operation of the disk drives.

11. After you finish checking all the enclosures, reinstall the rear access panel and close the cabinet door.

Figure 5–9: Front panel view of the SA70R enclosure



5.10 Setting the drive unit numbers during installation

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

Refer to Section 2.10 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 5–5.)

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.

1. Locate the UNIT SELECT switch in the upper right corner of the OCP. Carefully press the UNIT SELECT switch with a pointed object 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 on 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.
3. Repeat the above step for all the disk drives in each enclosure.
4. When you finish setting the unit numbers, restore the operator control panel to normal operation by pressing the UNIT SELECT switch again.

Note

You cannot decrement a drive number. Continue holding the FAULT/SET NO. button until it increments to 255. It then restarts at 0.

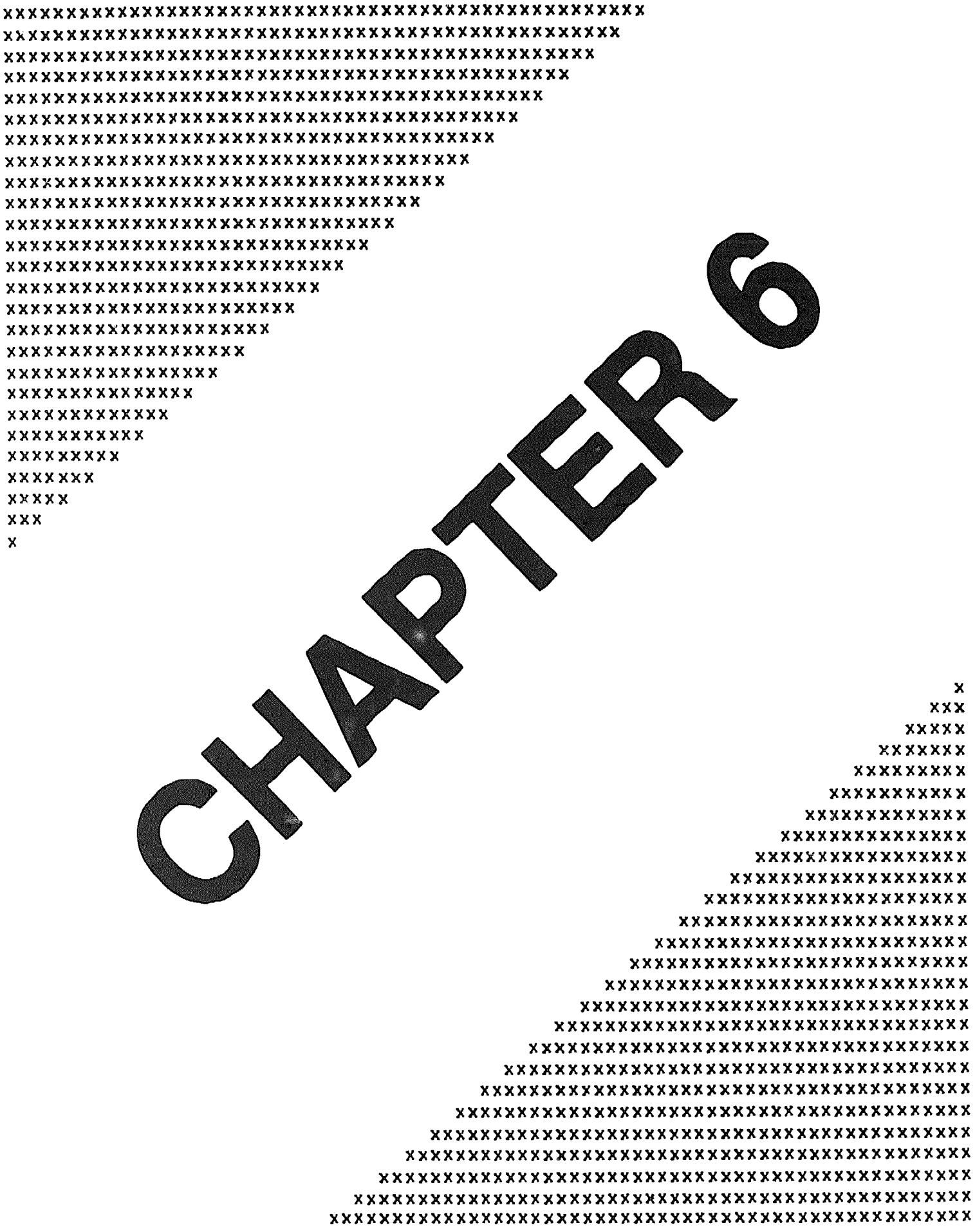
5.11 De–installing and repacking the SA705

Use the following procedure to de–install and repack the SA705. Refer to Section 5.5 for procedures related to those mentioned in this section.

Warning

Three people are required to load the storage array 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 cardboard carton. Contact your customer services engineer for replacement packing materials.
3. Assemble and attach the ramps to the pallet. (See Figure 5–2.)
4. Screw the cabinet levelers up until the cabinet rests on its rollers. (See Figure 5–4.)
5. Carefully push the cabinet onto the pallet, using three people.
6. Screw the cabinet levelers down and attach the levelers to the shipping brackets.
7. Attach all packing material, ramps, and the cardboard container to the cabinet. (See Figure 5–1.)


CHAPTER 6

Chapter 6

Installing an additional SA70R enclosure

6.1 About this chapter

This chapter explains how to install an additional SA70R enclosure in a vacant position in the SA705 cabinet. First it explains how to prepare an existing SA705 cabinet for the installation of an additional SA70R enclosure. Then it explains how to unpack and install the enclosure and SDI cables. Finally, it explains how to power up the enclosure and perform a post-installation checkout.

Caution

Digital recommends that the SA70R enclosure be installed only by qualified customer services engineers.

6.2 Required tools

You will need the following tools to install the SA70R enclosure in the SA705 cabinet:

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

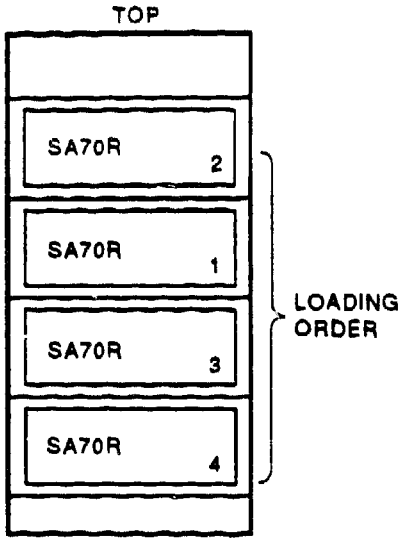
6.3 SA705 configurations

Table 6–1 shows the shipping configurations for the SA705 storage array family. If you are installing an SA70R enclosure in one of the vacant positions in the SA705 HA/HD configuration, refer to the loading position priority illustrated in Figure 6–1. Install additional SA70R enclosures only in the order shown here.

Caution

The SA70R enclosure is designed to be installed only in the SA705 cabinet. The SA705 cabinet is designed to accommodate only SA70R enclosures. Using these components in other configurations may damage the equipment and invalidate compliance regulations.

Figure 6–1: Loading position priority in the SA705 cabinet



6.4 Preparing the SA705 cabinet

To prepare the SA705 cabinet for the installation of an SA70R enclosure, you must remove the cabinet door and rear access panel. You must also remove the position cover from the vacant position into which you are going to install the enclosure.

6.4.1 Removing and installing the SA705 cabinet door

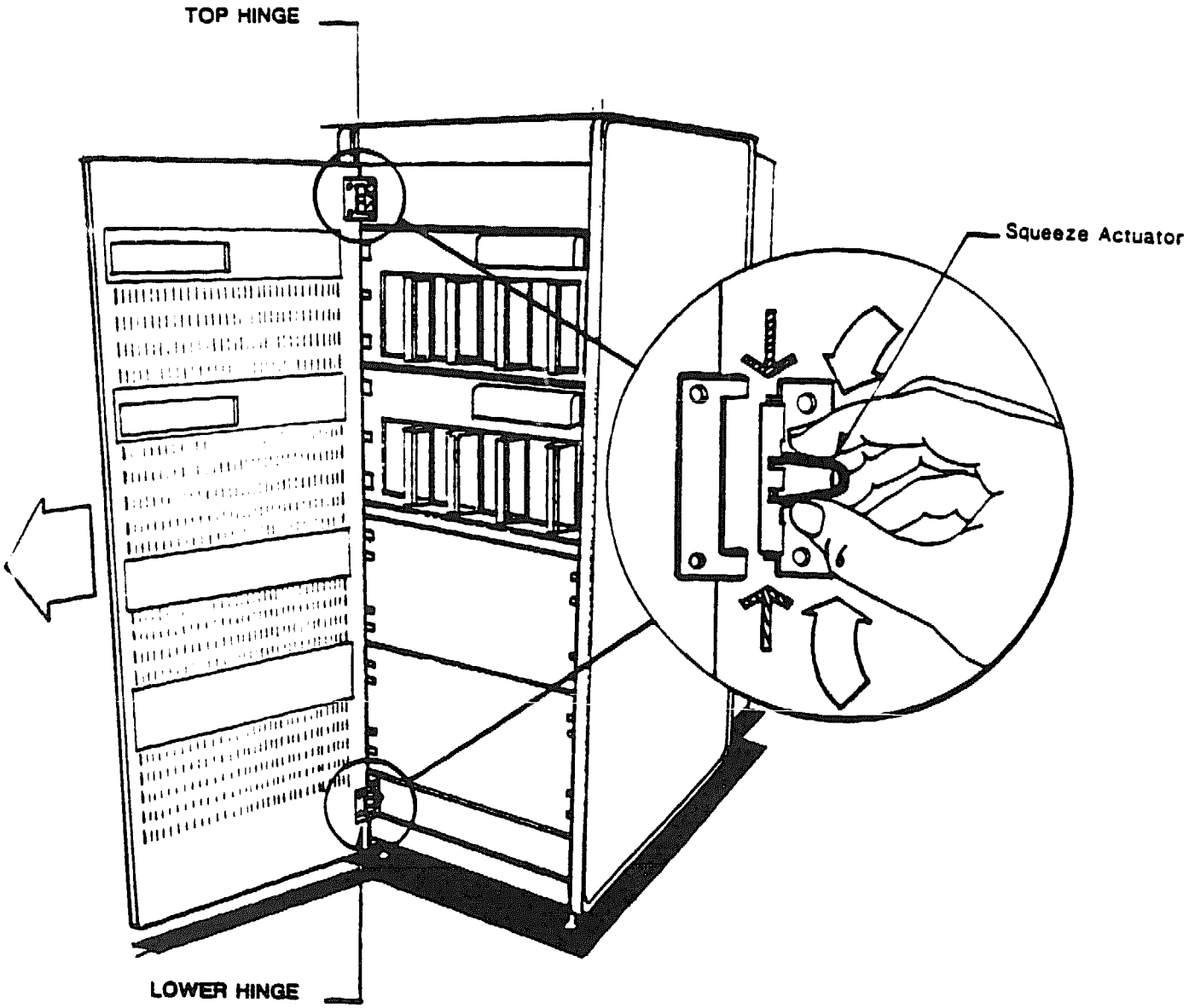
To allow enough clearance to install an SA70R enclosure in the SA705 cabinet, you must remove the cabinet door. The cabinet door is attached to the cabinet with two retracting–pin hinges. These hinges include a squeeze actuator to retract the spring–loaded pins. Use the following procedure to remove and install the cabinet door. (See Figure 6–2.)

Caution

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

1. Open the cabinet door. (Refer to Section 2.4.)
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.
5. To reinstall the door, connect the top hinge first. Rotate the actuator toward the cabinet to extend the hinge pins. Repeat for the bottom hinge.

Figure 6–2: Retracting-pin hinges for the cabinet door



6.4.2 Removing and installing the SA705 rear access panel

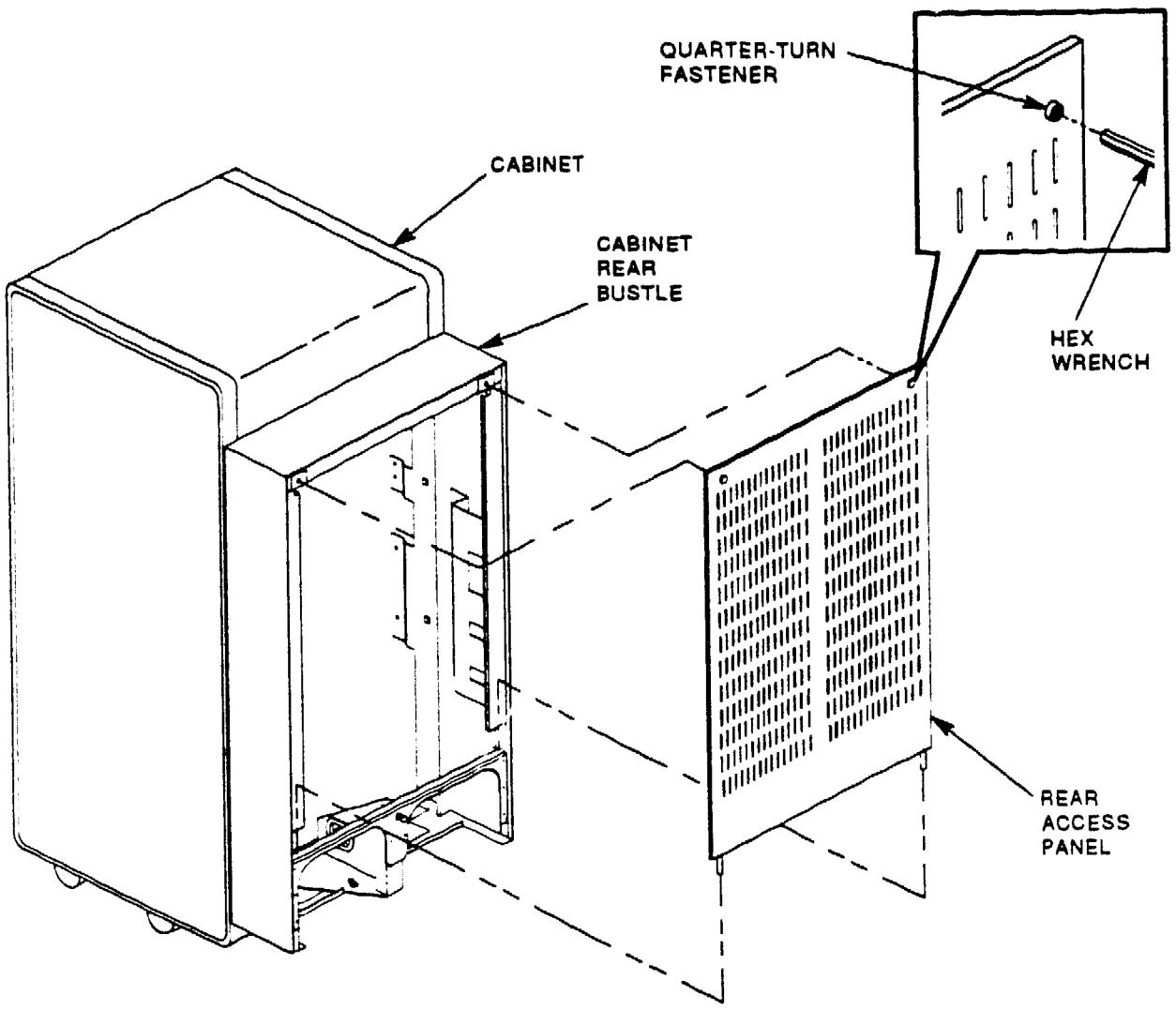
The main power switches, power cables, and interior SDI cables are located inside the rear access panel of the SA705 cabinet. You must remove the cabinet's rear access panel to install new SDI cables and power up the new enclosure. Use the following procedure to remove and install the rear access panel. (See Figure 6–3.)

Warning

Hazardous voltages are present inside the SA705 cabinet and SA70R 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 cord.

1. Turn each of the two hex fasteners located at the top of the panel counterclockwise 1/4 turn to unlock. Tilt the panel toward you and lift it up to disengage the pins at the bottom. Lift the panel clear of the enclosure.
2. To replace the rear access panel, lift it into place and fit the pins into the holes at the top of the I/O bulkhead. Press the top of the panel into place and turn the hex fasteners 1/4 turn clockwise.

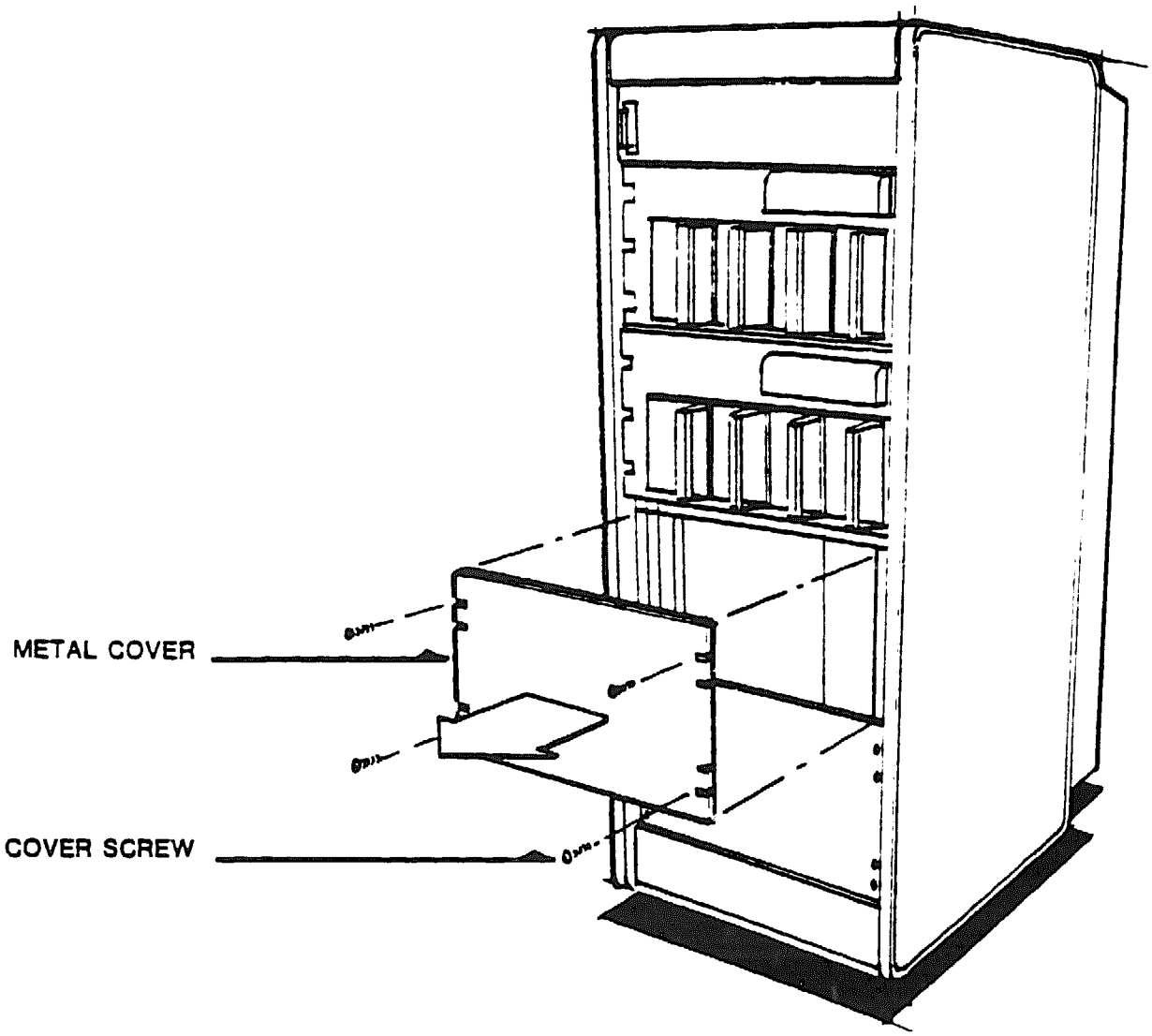
Figure 6–3: SA705 rear access panel



6.4.3 Removing the vacant position cover

A metal cover is attached to the front of each vacant position in the SA705 cabinet. Select the position you are going to use and remove the four screws that hold the cover in place. Save the cover screws to secure the new SA70R enclosure in place. (See Figure 6–4.)

Figure 6–4: Vacant position cover



6.5 Unpacking and installing the SA70R enclosure

Warning

An empty SA70R enclosure weighs 29.5 kg (65 lbs). Loaded with four RA70–RK disk drive canisters, the enclosure weighs 56.7 kg (125 lbs). For your safety and the safety of the equipment, always remove all canisters from the enclosure before handling the enclosure. Always use two people to lift and install the enclosure.

6.5.1 Unpacking the SA70R enclosure

The SA70R enclosure is packaged in a cardboard carton. Save all packing material in case you need to reship the enclosure. See Figure 6–5 for an illustration of the SA70R enclosure and its shipping container.

Caution

Ensure environmental stabilization of the SA70R in the site environment before operating the system. Failure to environmentally stabilize the equipment could damage the drive media or associated electronics at power up.

Environmental stabilization starts when the equipment enters the room where it is to be installed. Remove the outer shipping carton and allow the appropriate environmental stabilization time. Refer to Appendix A for environmental stabilization procedures.

Note

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

6.5.2 Installing the SA70R enclosure

Refer to Figure 6–6 and use the following procedure to install the SA70R enclosure in a vacant position in the SA705 cabinet:

1. If you have not already done so, remove the cabinet door and vacant position cover. (Refer to Section 6.4.1 and Section 6.4.3.)
2. Use two people to lift the enclosure. Carefully align the enclosure with the cabinet opening and slide it in until it seats against the rear of cabinet chassis.
3. Secure the enclosure in place with the four screws from the position cover.
4. Replace the cabinet door.

Figure 6–5: SA70R enclosure shipping container

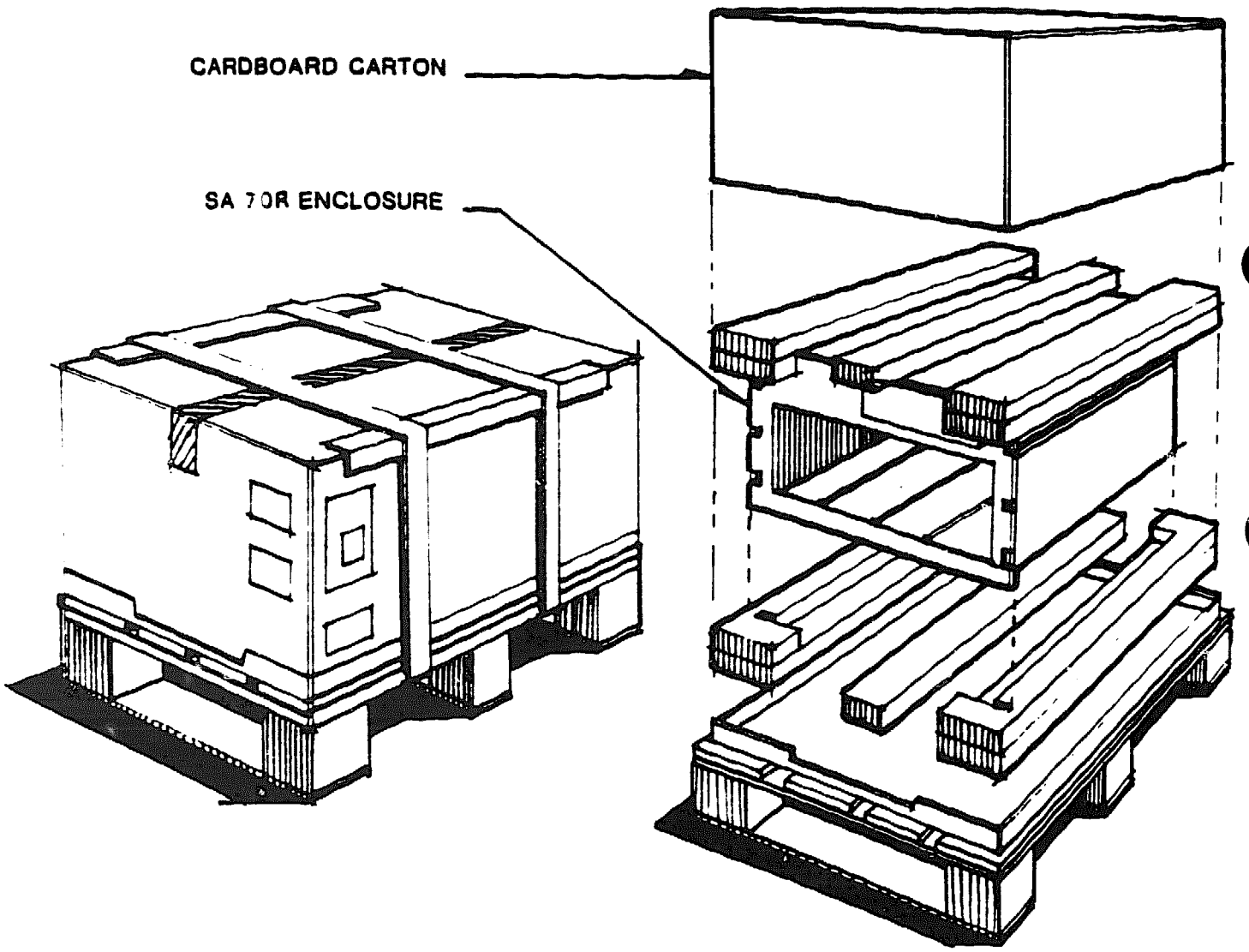
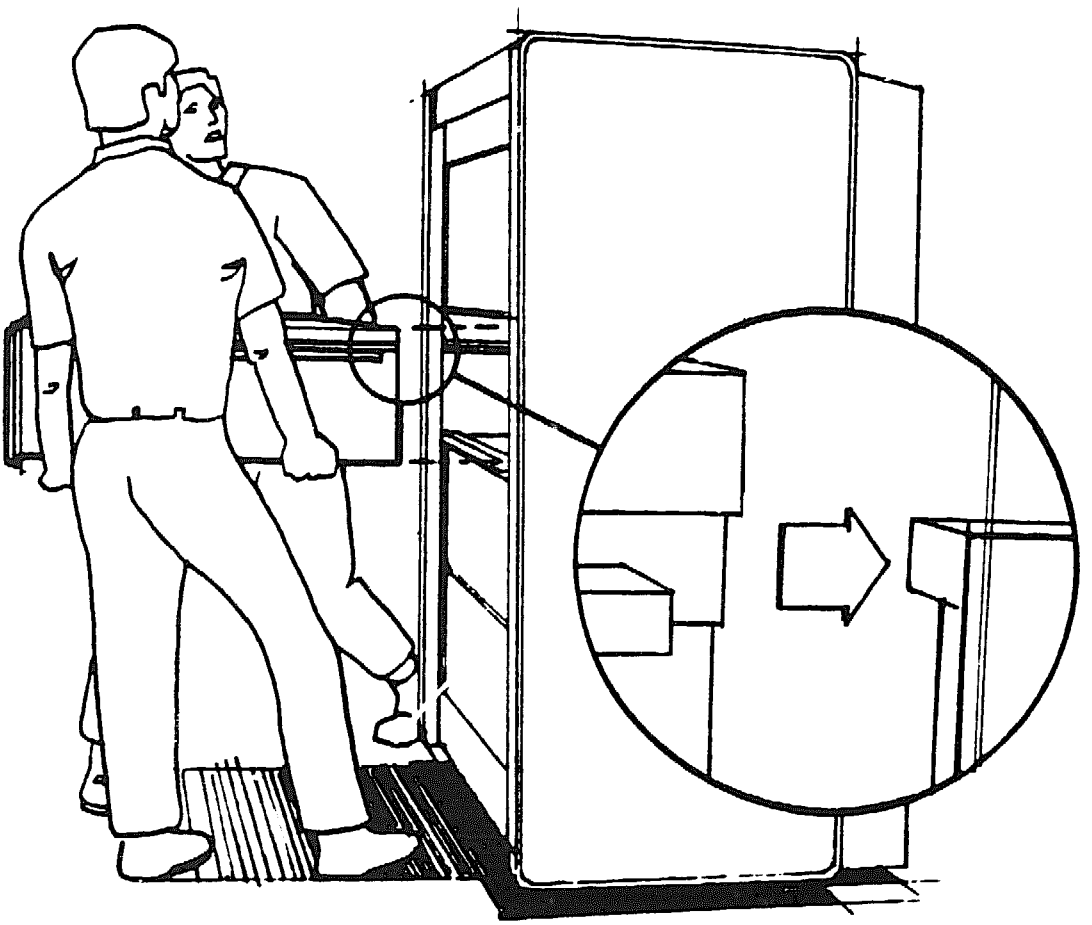


Figure 6–6: Installing the SA70R enclosure



6.6 Installing the cabinet SDI cables

Standard disk interface (SDI) cables connect the host system to the individual drives in the SA70R enclosure. SDI cables include external cables, cabinet cables, and internal enclosure cables. A705 cabinets are shipped with cabinet SDI cables installed for all factory-installed enclosures. When you install a new enclosure, you must also install new cabinet SDI cables for that enclosure. SA70R enclosures are shipped with all internal SDI cables installed.

There are two cabinet SDI cables (port A and port B) for each enclosure in the cabinet. These cables run from the I/O bulkhead at the bottom rear of the cabinet to the two bulkheads at the rear of the enclosure. The enclosure end of each cable is a single connector. The I/O bulkhead end of each cable branches into four smaller cables, each with its own connector. Each of the smaller cables is labeled for placement at the I/O bulkhead.

Figure 6–7 shows the configurations for SDI cables.

Use the following procedure to install the two cabinet SDI cables (port A and port B) for the newly installed SA70R enclosure.

1. If you have not done so already, remove the cabinet's rear access panel. (Refer to Section 6.4.2.)
2. 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 cabinet SDI cables.
3. Locate the cable troughs that extend vertically along the inside of the each of the cabinet's two side panels. There is a trough on each side of the cabinet. One is for the port A SDI cable; the other is for the port B SDI cable. Open the cable trough by first sliding it up and then sliding it toward the front of the cabinet. (See Figure 6–8.)
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. Close each of the cable troughs by first sliding it toward the rear of the cabinet and then sliding it downward.
6. Connect each of the cable connectors to the rear of the enclosure. Secure each connector to the enclosure with the two retaining screws.
7. Connect each of the four smaller cables extending from the bottom of each SDI cable to the I/O bulkhead. See Figure 6–7 for I/O bulkhead configurations. Secure each connector to the I/O bulkhead with two retaining screws. The screws are packaged in a separate bag.
8. Rotate the I/O bulkhead upward and tighten the hex fastener.
9. If you are not going to continue installation procedures at this time, reinstall the rear access panel.

Figure 6–7: SDI cables configurations

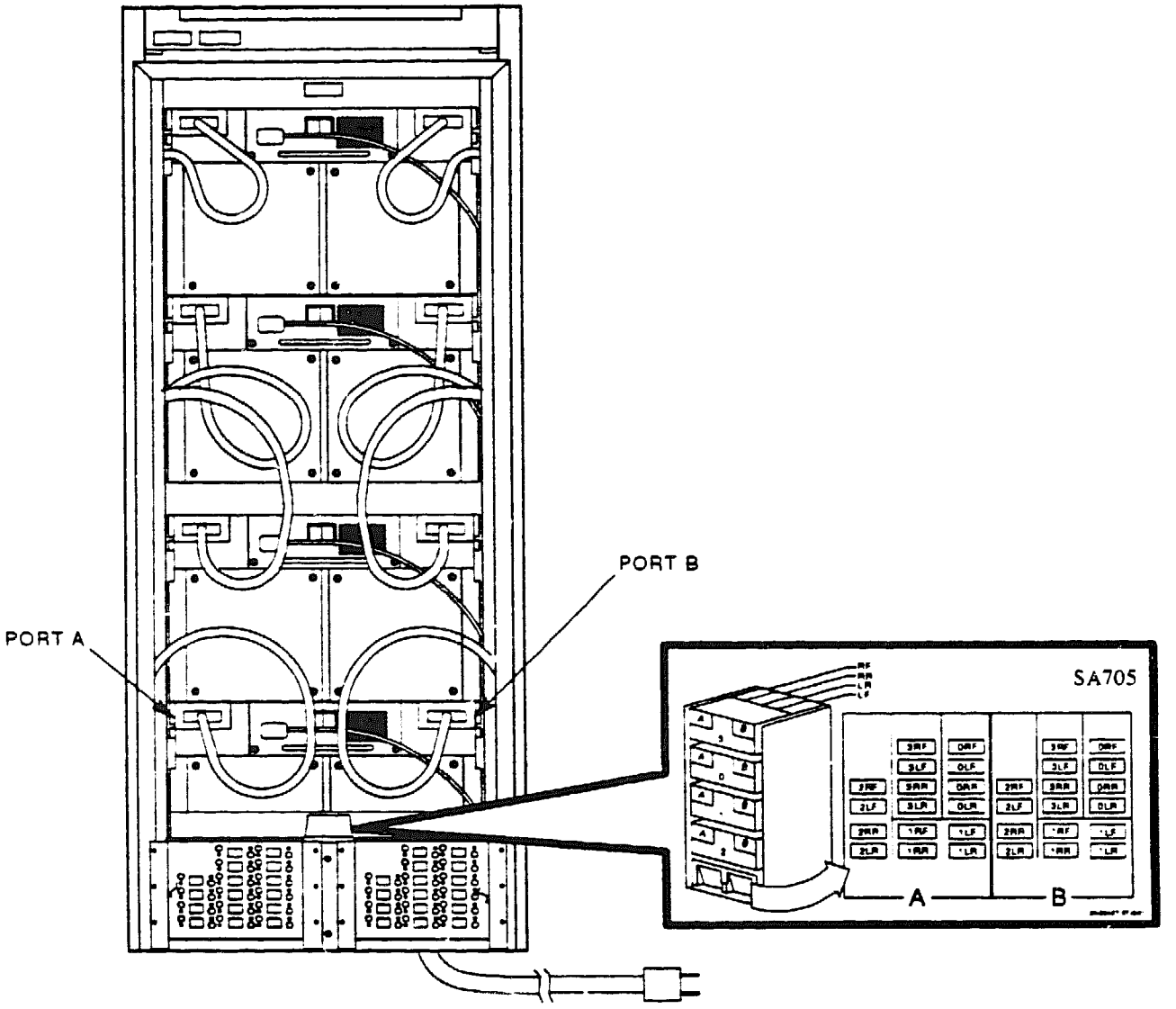
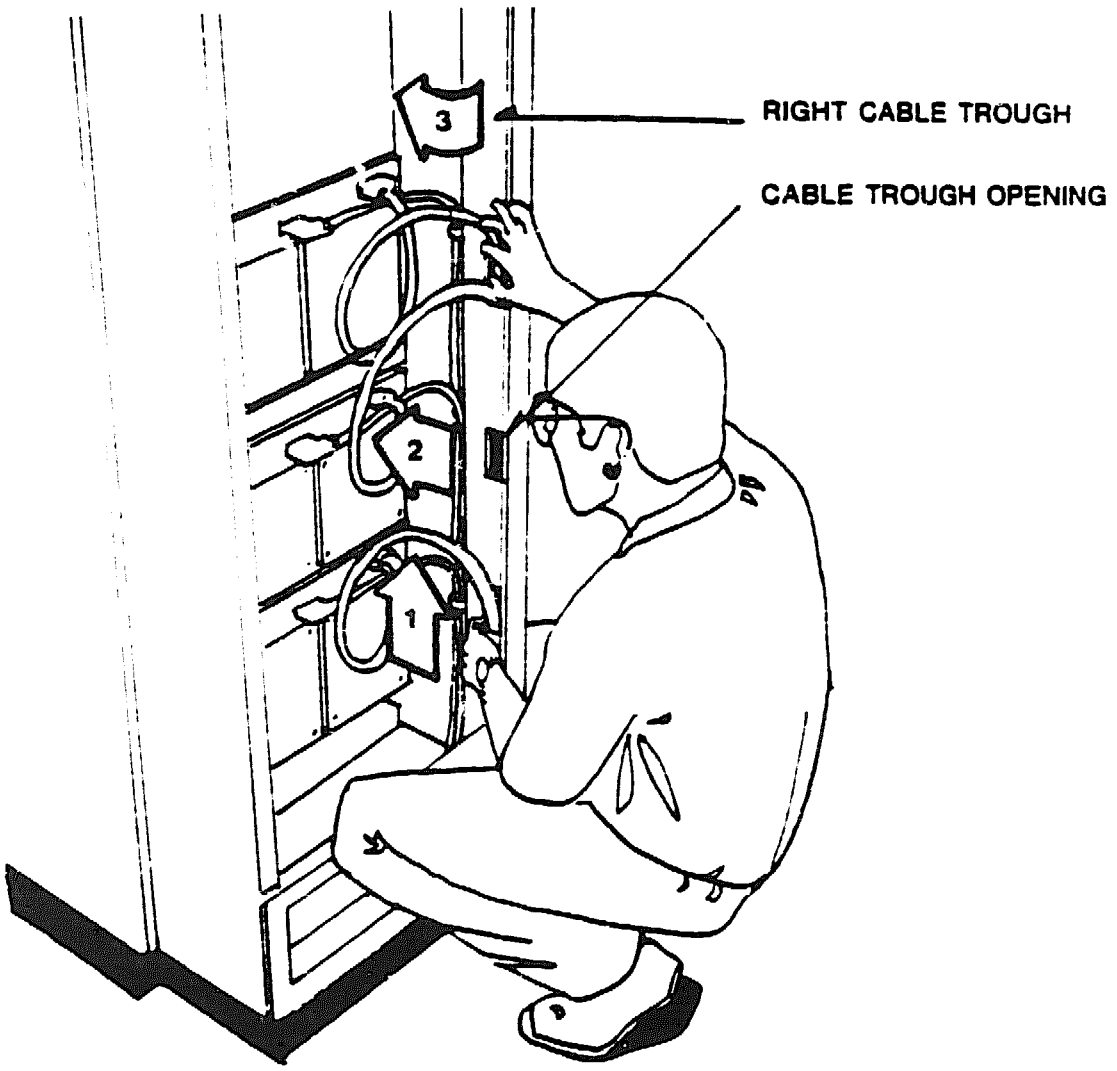


Figure 6–8: SDI cable trough



6.7 Connecting external SDI cables

Standard disk interconnect (SDI) cables connect the host system to the individual components in the SA705. Figure 6–7 shows the configurations for connecting the external cables to the I/O bulkhead. Secure all external cables to the I/O bulkhead with the connector retaining screws.

6.8 Selecting line input voltage to the SA70R enclosure

You can set the SA70R enclosure power supply to operate from either 120 Vac at 60 Hz or 220/240 Vac at 50 Hz. The line input voltage setting on the enclosure must be the same as the voltage rating for the 881 power controller in the SA705 cabinet.

Refer to Figure 6–9 and Figure 6–10 and use the following procedure to select the line input voltage for the SA70R enclosure:

Caution

The SA70R 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 level will damage the power supply.

1. If you have not done so already, remove the cabinet's rear access panel. (Refer to Section 6.4.2.)
2. Verify that the enclosure power switch on the rear panel of the enclosure is off ("O").
3. Locate the line voltage selector switch through the rear panel of the enclosure. Verify that it is at the same voltage rating as the 881 power controller. If it is not, use a small screwdriver to change the setting.
4. If you are not going to continue installation procedures at this time, reinstall the rear access panel.

6.9 Connecting power to the SA70R enclosure

Power cords for all load positions in the cabinet are already installed, regardless of whether the load positions are filled or not. Refer to Figure 6–9 and Figure 6–10 and use the following procedure to connect power to the enclosure:

1. If you have not done so already, remove the rear access panel (Refer to Section 6.4.2.)
2. Verify that the enclosure power switch at the rear of the enclosure is off ("O").
3. Plug the power cord for the selected position into the line voltage connector on the rear panel of the enclosure.
4. Apply power to the enclosure by pressing the "1" (on) side of the power switch on the rear panel of the enclosure.
5. Verify that the power is on by checking that the enclosure fans are operating. Do this by feeling for airflow out of the rear of the enclosure.
6. If you are not going to continue installation procedures at this time, reinstall the rear access panel.

Figure 6–9: Rear SA705 cabinet power controls

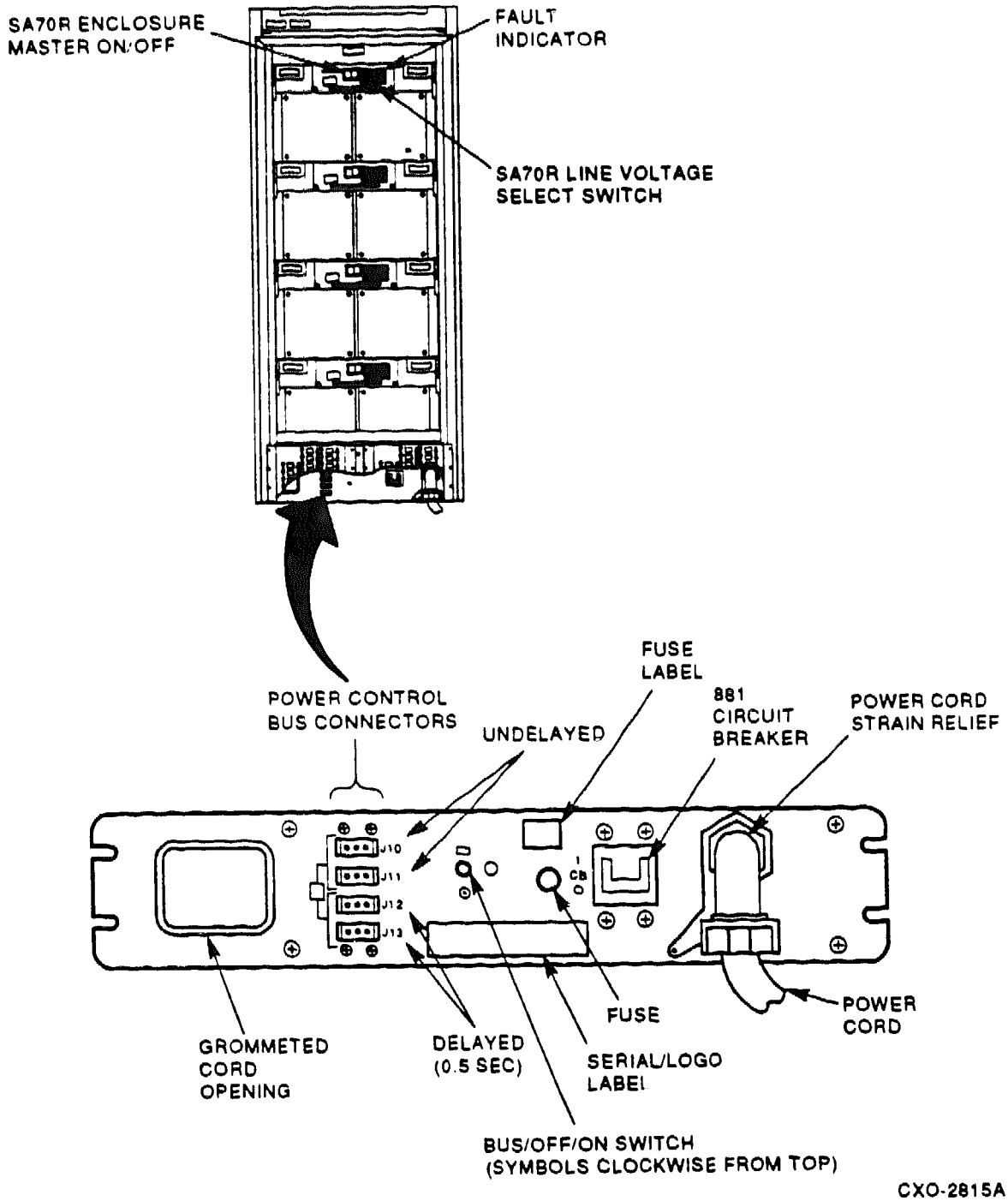
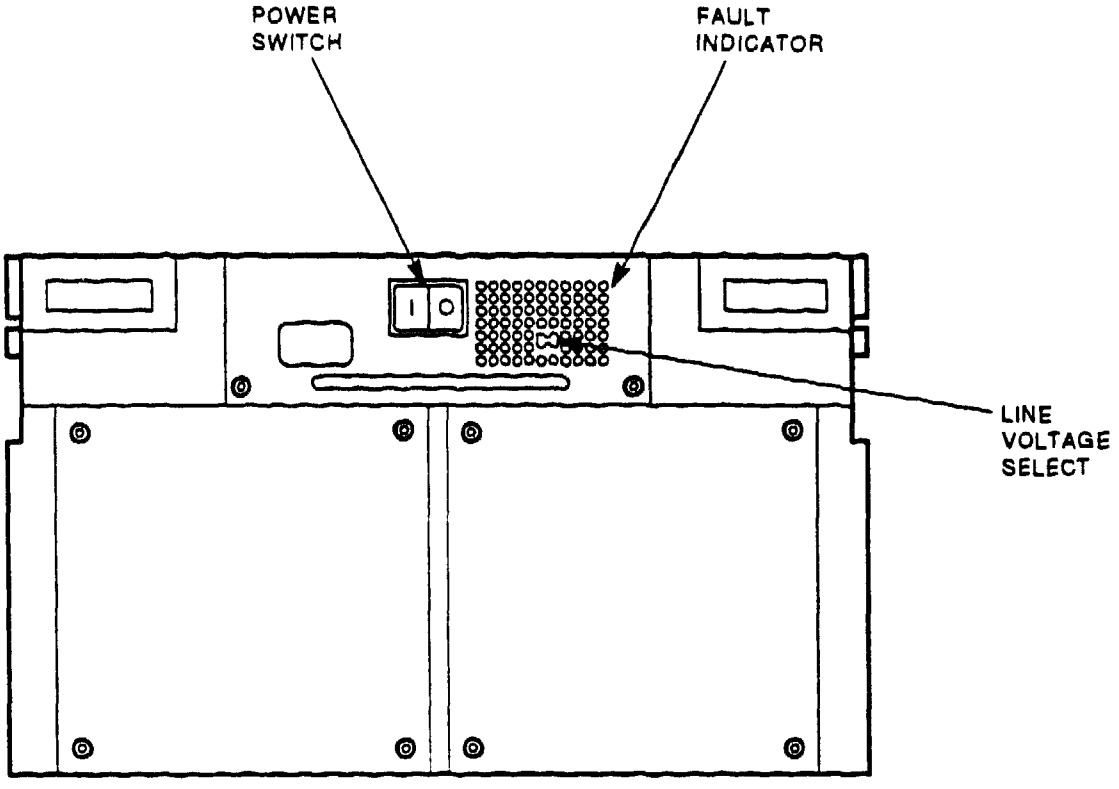


Figure 6–10: Rear panel view of the SA70R enclosure



6.10 Performing the post–installation checkout

Perform the following checkout on the newly installed SA70R enclosure in the SA705 cabinet. This checkout enables you to verify normal operation of the power supply, operator control panel (OCP), fan assemblies, and disk drives for the enclosure before you begin operation.

Use the following procedure to check the newly installed SA70R enclosure. If you encounter any problems, contact your Digital customer services engineer.

1. Open the cabinet door (Section 2.4) and, if you have not done so already, remove the rear access panel (Section 6.4.2).
2. Insert all RA70–RK removable disk drives into the enclosure. (Refer to Section 3.5.)
3. Verify that all power and interface connections to the rear of the enclosure are correct and secure.
4. Verify that the line voltage select switch on the enclosure power supply is set to the proper source voltage. (Refer to Section 6.8.)
5. Verify that the 881 power controller is on. (Refer to Section 5.8.)
6. Verify that the enclosure power switch is on ("1"). (See Figure 6–9.)

7. Verify power supply operation by checking that the enclosure fans are operating. Do this by feeling for airflow out the rear of the enclosure. If the fans are not operating, check the power connections and 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 the non–operating fan will not operate.

8. Verify power application to each occupied disk drive position by noting that the canister ready indicator lights. If the indicator does not light, verify that the disk drive is correctly inserted in the enclosure. (Refer to Section 3.5.)

9. Set the drive unit number for each disk drive in the enclosure. (Refer to Section 5.10.)

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 on the same controller causes a controller fault and results in both drives spinning down.

10. Perform the following steps for each disk drive in the enclosure. (See Figure 6–11.)

    a. Press the RUN switch on the OCP for the selected disk drive position. This starts the drive motor of the drive in that position. When the READY indicator lights, the drive has completed its internal diagnostics and is ready for operation. If the FAULT/SET NO. indicator lights, press and release the FAULT/SET NO. switch twice. (Refer to Chapter 4.)

    b. Verify that the associated OCP indicators light by pressing and holding the FAULT/SET NO. switch to perform a lamp test.

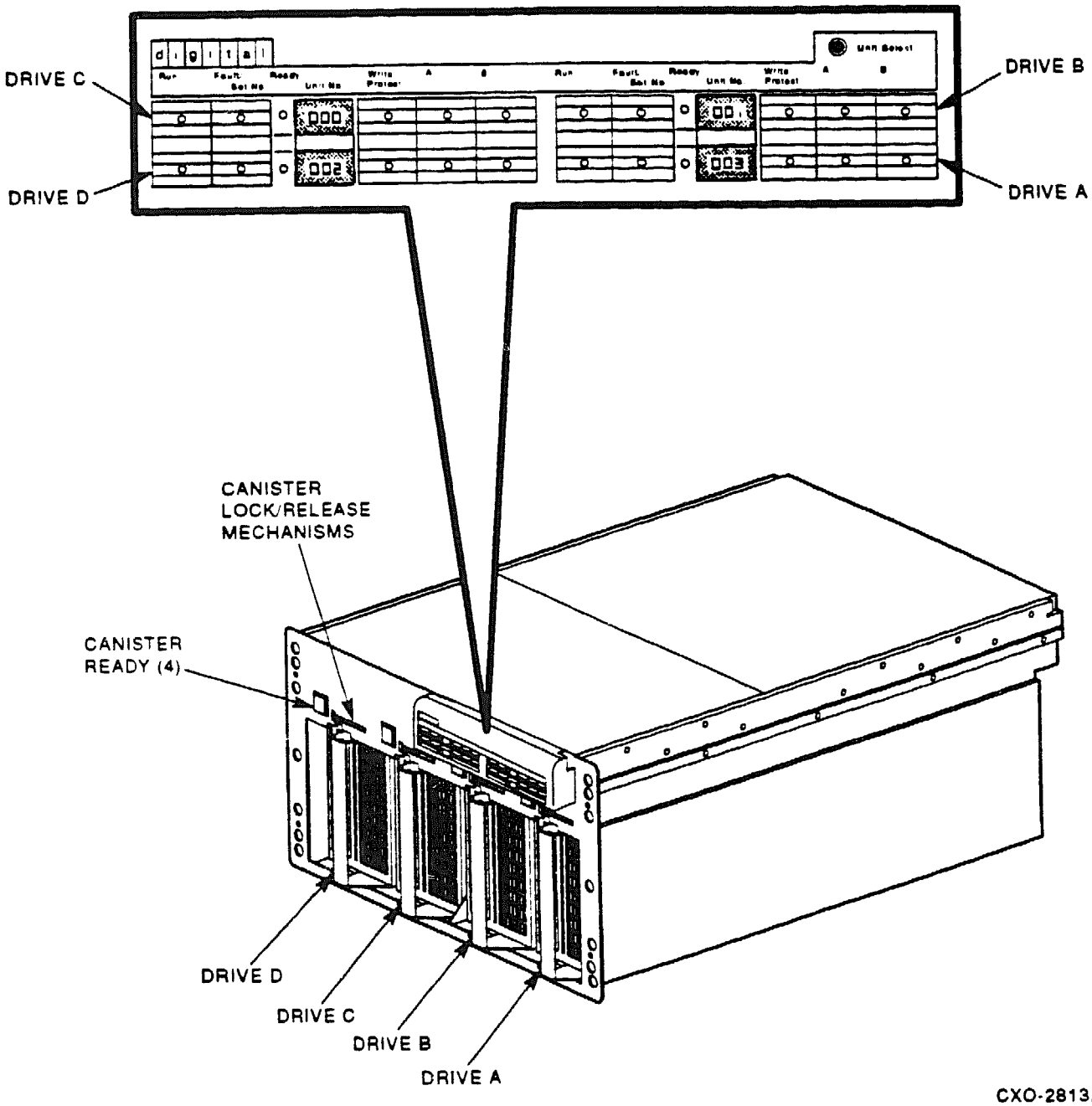
    c. Select port A or port B and WRITE PROTECT by pressing the appropriate switches. The WRITE PROTECT indicator lights when the switch is set; the port indicators light only when the host system controller has selected the associated ports for read/write operations.

    d. Deselect the WRITE PROTECT switch by pressing it again.

11. Run the applicable host system controller diagnostics to verify proper operation of the disk drives.

12. After you finish checking the enclosure, reinstall the rear access panel and close the cabinet door.

Figure 6–11: Front panel view of the SA70R enclosure




APPENDIX A

Appendix A
Environmental stabilization

Always ensure environmental stabilization of the RA70–RK removable disk drive before operation if the disk drive has been removed from its normal operating site. Otherwise, damage to the drive media or associated electronics on power up could result. Environmental stabilization includes humidity and temperature stabilization.

If there is condensation visible on the outside of the canister, stabilize the disk drive in the operating environment for six hours or until the condensation is no longer visible, whichever is longer. The disk drive can be stabilized in or outside the RA70–CK carrying case. However, do not insert the disk drive into the SA70R enclosure until it is fully stabilized.

If there is no condensation visible on the outside of the canister, refer to the following table for the correct thermal stabilization time. The disk drive can be stabilized in or outside the SA70R enclosure. However, do not spin up the drive until it is fully stabilized.

Table A–1: Thermal stabilization specifications

Temperature range degrees C	Temperature range degrees F	Minimum stabilization time
60 to 66	140 to 151	3 hours
50 to 59	122 to 139	2 hours
40 to 49	104 to 121	1 hour
30 to 39	86 to 103	30 minutes
18 to 29	**65 to 85**	**No stabilization required.**
10 to 17	50 to 64	30 minutes
0 to 9	32 to 49	1 hour
–10 to –1	14 to 31	2 hours
–20 to –11	–4 to 13	3 hours
–30 to –21	–22 to –5	4 hours
–40 to –31	–40 to –21	5 hours


APPENDIX B

Appendix B

SA705 storage array site preparation specifications

Figure B–1: SA705 physical specifications

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL
Mounting Code		F.S.			
Height		156		centimeters	cm
		61.5		inches	in
Width		55.9		centimeters	cm
		22		inches	in
Depth		91		centimeters	cm
		36		inches	in
Weight Max. Config.		381		kilograms	kg
		840		pounds	lb
Shipping Height		203		centimeters	cm
		80		inches	in
Shipping Width		76		centimeters	cm
		30		inches	in
Shipping Depth		107		centimeters	cm
		42		inches	in
Shipping Weight Max. Config.		440		kilograms	kg
		970		pounds	lb

Figure B–2: SA705 physical specifications (cont.)

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL
Shipping Code	SK				
Point Load			95.3	kilograms	kg
			210	pounds	lb
Minimum Service /Operation Clearance Required front	91			centimeters	cm
	36			inches	in
rear	91			centimeters	cm
	36			inches	in
left side	N/A			meters	m
	N/A			inches	in
right side	N/A			meters	m
	N/A			inches	in

SDI Data Cable	Type	Length	
		Feet (Ft)	Meters (m)
External to SA705 Cabinet	BC26V-6D (17-00464-01)	6	1.8
	BC26V-12 (17-00464-12)	12	3.7
	BC26V-25 (17-00464-13)	25	7.6
	BC26V-50 (17-00464-14)	50	15.2
	BC26V-80 (17-00464-15)	80	24.4

Figure B–3: SA705 environmental specifications

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL
Temperature (Operating)	10		40	degrees Celsius	oC
	50		104	degrees F	oF
Temperature de-rating above 8000 ft altitude		1.8		deg. C/1000 ft	degrees per 1000 feet
		1.0		deg. F/1000 ft	
Temperature (Non-operating)	-40		66	degrees Celsius	oC
	-40		150	degrees F	oF
Temperature (Storage)	-40		66	degrees Celsius	oC
	-40		151	degrees F	oF
Temperature Rate of Change (Operating)			11 +/- 2	degrees C/hour	oC/h
			20 +/- 4	degrees F/hour	oC/h
Relative Humidity (Operating)	10		80	percent relative humidity (non-condensing)	%RH
Relative Humidity (Non-operating)	8		80	percent relative humidity (non-condensing)	%RH
Relative Humidity (Storage) See note below *			95	percent relative humidity (non-condensing	%RH
Relative Humidity Rate of Change (Operating)			50	percent relative humidity per hour	%RH/h
Maximum Wet Bulb Temperature * (Operating)			28	degrees Celsius	oC
			82	degrees F	oF
Maximum Wet Bulb Temperature (Storage)			32	degrees Celsius	oC
			90	degrees F	oF
Minimum Dew Point Temperature (Operating)	2			degrees Celsius	oC
	36			degrees F	oF
Heat Dissipation (max. avg. values)			1108	watts	W
			3780	Btu/h	Btu/h

NOTE: 95% R.H. applies up to 90oF. Above this temperature, the non-operating humidity is limited to wet bulb temperature of 90oF. The SA705 can only be exposed to the non-operating humidity when packaged per 3700959-04.

Figure B–4: SA705 environmental specifications (cont.)

PARAMETER		MIN	TYP	MAX	UNITS	SYMBOL
Air Flow at <28 oC for full JA/JD configuration			0.14		cubic meters/sec	M3/S
			288		cubic feet/min	ft3/min
Air Flow at >30 oC for full JA/JD configuration			0.21		cubic meters/sec	M3/S
			448		cubic feet/min	ft3/min
Air Flow Location		Intake Location		FRONT	Exhaust Location	REAR
Air Quality see note below	particle size	0.3			micrometers	um
		11.8			microinches	uin
	Concentration			1.76x 10^8	particles per cubic meter	no./m3
				5x10^6	particles per cubic foot	no./ft3
Altitude (Operating)		0		2438	meters	m
		0		8000	feet	ft
Altitude (Non-operating)		0		4877	meters	m
		0		16000	feet	ft
Mechanical Shock (Operating)		Duration		10 +/- 3	milliseconds	ms
		Level		10	gravities	g
Mechanical Shock (Non-operating)		Product in shipping package withstands impact against a wall at velocity 1.75 m/s				
Vibration (Operating)		Frequency Range 5- 30 Hertz 30-500 Hertz 500- 30 Hertz 30- 5 Hertz			Vibration Level .010" p-p disp.amplitude .50g base-peak accel.ampl. .50g base-peak accel.ampl. .010" p-p disp.amplitude	
Vibration (Non-operating)		Vertical Axis Excitation: 1.19 G RMS overall from 5-300 HZ. Power spectral density 0.003 g2/Hz at 5 Hz, increasing at 8 db/octave to 0.02 g2/Hz at 10 Hz. Flat 0.02 g2/Hz from 10-50 Hz with an 8 db/octave rolloff from 50-300 Hz. Longitudinal and Lateral Axis Excitation: 0.698 G RMS overall from 5-200 Hz. Power spectral density 0.0011 g2/Hz at 5 Hz, increasing at 8 db/octave to 0.007 g2/Hz at 10 Hz. Flat 0.007 g2/Hz from 10-50 Hz with 8 db/octave rolloff from 50-200 Hz.				

AIR QUALITY REQUIREMENT

The chemical contamination level the drives operate in will be no more severe than that which will produce a copper coupon reactivity of 400 angstroms after a one month exposure (approximately 1,000 angstroms after a one year exposure).

Figure B–5: Recommended SA705 environmental specifications

The "RECOMMENDED" values for environmental operating limits are selected to provide the maximum product performance and reliability. These are consistent with most Digital service contract requirements.

PARAMETER		MIN	TYP	MAX	UNITS	SYMBOL
RECOMMENDED Temperature (Operating)		18		24	degrees Celsius	oC
		64.4		75.2	degrees Fahrenheit	oF
RECOMMENDED Temperature Rate of Change (Operating)				3	degrees C/hour	oC/hr
				5.4	degrees F/hour	oF/hr
RECOMMENDED Temperature Step Change (Operating)				3	degrees Celsius	oC
				5.4	degrees Fahrenheit	oF
RECOMMENDED Relative Humidity (Operating)		40		60	percent relative humidity (non-condensing)	%RH
RECOMMENDED Relative Humidity Rate of Change (Operating)				10	percent relative humidity (non-condensing) per hour	%RH/hr
Air Quality see note below	particle size	0.5			micrometers	um
		19.7			microinches	uin
	Concentration			1.76x 10^7	particles per cubic meter	no./m3
				5x10^5	particles per cubic foot	no./ft3

AIR QUALITY REQUIREMENT

The chemical contamination level the drives operate in will be no more severe than that which will produce a copper coupon reactivity of 400 angstroms after a one month exposure (approximately 1,000 angstroms after a one year exposure).

Figure B–6: SA705 AC input power specifications, 3 phase, 101 volts

PARAMETER		MIN	TYP	MAX	UNITS	SYMBOL
Voltage Nominal			101		volts	V
Voltage Design Range		88		110	volts	V
Frequency Nominal			60		hertz	Hz
Frequency Range		57		63	hertz	Hz
Number of Phases			3		none	NA
RMS Current Steady State	Phase A		8.0	8.1	amperes	A
	Phase B		4.0	4.1	amperes	A
	Phase C		4.0	4.1	amperes	A
	Neutral N		9.8	9.9	amperes	A
Ground leakage G			0.48		milliamperes	mA
Peak Current Steady State	Phase A		20.7	21.9	amperes	A
	Phase B		10.4	10.9	amperes	A
	Phase C		10.4	10.9	amperes	A
	Neutral N		20.7	21.9	amperes	A
DC Current Levels on AC lines	Phase A			N/A	milliamperes	mA
	Phase B			N/A	milliamperes	mA
	Phase C			N/A	milliamperes	mA
	Neutral N			N/A	milliamperes	mA
Power Cord Type		E31739 ST 105oC VW1 8AWG/5 Cond. LL28267 CSA ST 105oC				
Power Cord Length		4.27	4.42	4.57	meters	m
		168	174	180	inches	in
AC Plug Type		5 wire, NEMA L21-30P				
Ride-through Time		64	71	/	millisecond	ms
Init Inrush Current				80	amperes peak	A
2nd Inrush Current				N/A	amperes peak	A
Start-up Current Amplitude				11.7	rms amperes	A
Start-up Current Duration				10	seconds	s
Power Consumption			1049	1076	watts	W
Apparent Power			1612	1632	volt amperes	VA
Fuse or C.B. Rating			30		amperes	A
Power Factor			0.66		none	PF
Crest Factor			2.7		none	CF
Current Distortion Factor			/		none	NA

Figure B–7: SA705 AC input power specifications, 3 phase, 120 volts

PARAMETER		MIN	TYP	MAX	UNITS	SYMBOL
Voltage Nominal			120		volts	V
Voltage Design Range		88		132	volts	V
Frequency Nominal			60		hertz	Hz
Frequency Range		57		63	hertz	Hz
Number of Phases			3		none	NA
RMS Current Steady State	Phase A		7.3	7.4	amperes	A
	Phase B		3.65	3.7	amperes	A
	Phase C		3.65	3.7	amperes	A
	Neutral N		8.9	9.0	amperes	A
Ground leakage G			0.48		milliamperes	mA
Peak Current Steady State	Phase A		21.3	21.9	amperes	A
	Phase B		10.6	10.9	amperes	A
	Phase C		10.6	10.9	amperes	A
	Neutral N		21.3	21.9	amperes	A
DC Current Levels on AC lines	Phase A			N/A	milliamperes	mA
	Phase B			N/A	milliamperes	mA
	Phase C			N/A	milliamperes	mA
	Neutral N			N/A	milliamperes	mA
Power Cord Type		E31739 ST 105oC VW1 8AWG/5 Cond. LL28267 CSA ST 105oC				
Power Cord Length		4.27	4.42	4.57	meters	m
		168	174	180	inches	in
AC Plug Type		5 wire, NEMA L21-30P				
Ride-through Time		121	134		millisecond	ms
Init Inrush Current				98	amperes peak	A
2nd Inrush Current				N/A	amperes peak	A
Start-up Current Amplitude				10.9	rms amperes	A
Start-up Current Duration				10	seconds	s
Power Consumption			1076	1095	watts	W
Apparent Power			1752	1771	volt amperes	VA
Fuse or C.B. Rating			30		amperes	A
Power Factor			0.62		none	PF
Crest Factor			2.96		none	CF
Current Distortion Factor			/		none	NA

Figure B–8: SA705 AC input power specifications, 3 phase, 220 volts

PARAMETER		MIN	TYP	MAX	UNITS	SYMBOL
Voltage Nominal			220		volts	V
Voltage Design Range		176		242	volts	V
Frequency Nominal			50		hertz	Hz
Frequency Range		47		53	hertz	Hz
Number of Phases			3		none	NA
RMS Current Steady State	Phase A		3.29	3.34	amperes	A
	Phase B		1.65	1.67	amperes	A
	Phase C		1.65	1.67	amperes	A
	Neutral N		4.03	4.08	amperes	A
Ground leakage G			1.0		milliamperes	mA
Peak Current Steady State	Phase A		8.1	8.5	amperes	A
	Phase B		4.0	4.3	amperes	A
	Phase C		4.0	4.3	amperes	A
	Neutral N		8.1	8.5	amperes	A
DC Current Levels on AC lines	Phase A			N/A	milliamperes	mA
	Phase B			N/A	milliamperes	mA
	Phase C			N/A	milliamperes	mA
	Neutral N			N/A	milliamperes	mA
Power Cord Type		5 wire, 4 pole IEC 309 516P6W				
Power Cord Length		4.27	4.42	4.57	meters	m
		168	174	180	inches	in
AC Plug Type		5 wire, 4 pole IEC 309 516P6W				
Ride-through Time		106	118	/	millisecond	ms
Init Inrush Current				91	amperes peak	A
2nd Inrush Current				N/A	amperes peak	A
Start-up Current Amplitude				5.1	rms amperes	A
Start-up Current Duration				10	seconds	s
Power Consumption			1049	1072	watts	W
Apparent Power			1452	1470	volt amperes	VA
Fuse or C.B. Rating			20		amperes	A
Power Factor			0.73		none	PF
Crest Factor			2.55		none	CF
Current Distortion Factor			/		none	NA

Figure B–9: SA705 AC input power specifications, 3 phase, 240 volts

PARAMETER		MIN	TYP	MAX	UNITS	SYMBOL
Voltage Nominal			240		volts	V
Voltage Design Range		186		64	volts	V
Frequency Nominal			50		hertz	Hz
Frequency Range		47		53	hertz	Hz
Number of Phases			3		none	NA
RMS Current Steady State	Phase A		3.1	3.2	amperes	A
	Phase B		1.5	1.6	amperes	A
	Phase C		1.5	1.6	amperes	A
	Neutral N		3.8	3.9	amperes	A
Ground leakage G			1.0		milliamperes	mA
Peak Current Steady State	Phase A		7.6	7.8	amperes	A
	Phase B		3.8	3.9	amperes	A
	Phase C		3.9	3.9	amperes	A
	Neutral N		7.6	7.8	amperes	A
DC Current Levels on AC lines	Phase A			N/A	milliamperes	mA
	Phase B			N/A	milliamperes	mA
	Phase C			N/A	milliamperes	mA
	Neutral N			N/A	milliamperes	mA
Power Cord Type		5 wire, 4 pole IEC 309 516P6W				
Power Cord Length		4.27	4.42	4.57	meters	m
		168	174	180	inches	in
AC Plug Type		5 wire, 4 pole IEC 309 516P6W				
Ride-through Time		140	156	/	millisecond	ms
Init Inrush Current				98	amperes peak	A
2nd Inrush Current				N/A	amperes peak	A
Start-up Current Amplitude				4.7	rms amperes	A
Start-up Current Duration				10	seconds	s
Power Consumption			1067	1081	watts	W
Apparent Power			1478	1517	volt amperes	VA
Fuse or C.B. Rating			20		amperes	A
Power Factor			0.71		none	PF
Crest Factor			2.48		none	CF
Current Distortion Factor			/		none	NA

Figure B–10: SA705 AC output power specifications

PARAMETER		MIN	TYP	MAX	UNITS	SYMBOL
AC Output Power	voltage				amperes	A
						Receptacle Type
	101			16	amperes	A
			IEC 320 C16			Receptacle Type
	120			16	amperes	A
			IEC 320 C16			Receptacle Type
Power Controller Type			881A			

PARAMETER		MIN	TYP	MAX	UNITS	SYMBOL
AC Output Power	voltage				amperes	A
						Receptacle Type
	220			16	amperes	A
			IEC 320 C16			Receptacle Type
	240			16	amperes	A
			IEC 320 C16			Receptacle Type
Power Controller Type			881B			

Figure B–11: SA705 EMS specifications

Broadband Conducted EMI	1000	Volts	2.5	WS
Narrowband Conducted Transients	Frequency Range	10KHZ to 30MHZ		
	V rms into 50 ohms	3		
Narrowband Radiated Susceptibility	Frequency Range	0.1 MHZ to 1000 MHZ		
	Level (V/m)	3		
ESD Control *	MIN	MAX	UNITS	SYMBOL
	2	15	kilovolt	kV
	Meets FCC Class A			


APPENDIX C

Appendix C

SA70R enclosure site preparation specifications

The following information provides site planning specifications for the SA70R enclosure. This information may be used for planning SA705 storage array configurations that contain less than four (4) fully loaded SA70R enclosures. Unless otherwise noted, all specifications here assume the enclosure contains four (4) RA70–RK removable disk drives.

Figure C–1: SA70R enclosure physical specifications

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL
Mounting Code		ENC		SA70R	
Height		26.4		centimeters	cm
		10.4		inches	in
Width		44.5		centimeters	cm
		17.5		inches	in
Depth		72.4		centimeters	cm
		28.5		inches	in
Weight with 0 RA70-RK's		29.5		kilograms	kg
		65		pounds	lb
Weight with 4 RA70-RK's		56.7		kilograms	kg
		125		pounds	lb

Figure C–2: SA70R enclosure physical specifications (cont.)

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL
Shipping Code					
Shipping Height		53.3		centimeters	cm
		21		inches	in
Shipping Width		61		centimeters	cm
		24		inches	in
Shipping Depth		101.6		centimeters	cm
		40		inches	in
Shipping Weight		38.5		kilograms	kg
		85		pounds	lb
Minimum front Service /Operation Clearance Required	91			centimeters	cm
	36			inches	in
rear	91			centimeters	cm
	36			inches	in
left side	N/A			meters	m
	N/A			inches	in
right side	N/A			meters	m
	N/A			inches	in

SDI Data Cable external to SA70R and internal to SA705 cabinet	Type	Length	
		Feet (Ft)	Meters (m)
	17-01699-01	5.4	1.65

Figure C–3: SA70R enclosure environmental specifications

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL
Temperature (Operating)	10		40	degrees Celsius	oC
	50		104	degrees F	oF
Temperature de-rating above 8000 ft altitude		1.8		deg. C/1000 ft	degrees per 1000 feet
		1.0		deg. F/1000 ft	
Temperature (Non-operating)	-40		66	degrees Celsius	oC
	-40		150	degrees F	oF
Temperature (Storage)	-40		66	degrees Celsius	oC
	-40		151	degrees F	oF
Temperature Rate of Change (Operating)			11 +/-2	degrees C/Hour	oC/h
			20 +/-4	degrees F/Hour	oF/h
Relative Humidity (Operating)	10		80	percent relative humidity (non-condensing)	%RH
Relative Humidity (Non-operating)	8		80	percent relative humidity (non-condensing)	%RH
Relative Humidity (Storage) * note	8		95	percent relative humidity (non-condensing	%RH
Relative Humidity Rate of Change (Operating)			50	percent relative humidity per hour	%RH/h
Maximum Wet Bulb Temperature (Operating)			28	degrees Celsius	oC
			82	degrees F	oF
Maximum Wet Bulb Temperature (Storage) *			32	degrees Celsius	oC
			90	degrees F	oF
Minimum Dew Point Temperature (Operating)	2			degrees Celsius	oC
	36			degrees F	oF
Heat Dissipation (max. avg. values)		277		watts	W
		946		Btu/h	Btu/h

* NOTE: 95% R.H. applies up to 90oF. Above this temperature, the non-operating humidity is limited to wet bulb temperature of 90oF. The SA70R can only be exposed to the non-operating humidity when packaged per 3700959-04.

Figure C–4: SA70R environmental specifications (cont.)

PARAMETER		MIN	TYP	MAX	UNITS	SYMBOL
Air Flow at < 28 oC			0.03		cubic meters/sec	M3/S
			72		cubic feet/min	ft3/min
Air Flow at > 30 oC			0.05		cubic meters/sec	M3/S
			112		cubic feet/min	ft3/min
Air Flow Location		Intake Location		FRONT	Exhaust Location	REAR
Air Quality see note below	particle size	0.3			micrometers	um
		11.8			microinches	uin
	Concen-tration			1.76x 10^8	quantity per cubic meter	no./m3
				5x10^6	quantity per cubic foot	nc./ft3
Altitude (Operating)		0		2438	meters	m
		0		8000	feet	ft
Altitude (Non-operating)		0		4877	meters	m
		0		16000	feet	ft
Mechanical Shock (Operating)		Duration		10 +/-3	milliseconds	ms
		Level		10	gravities	g
Mechanical Shock (non-operating)		Duration		30 +/-10	milliseconds	ms
		Level		20	gravities	g
Vibration (Operating)		Frequency Range			Vibration Level	
		5- 30 Hertz			.010" p-p disp.amplitude	
		30-500 Hertz			.50g base-peak accel.ampl.	
		500- 30 Hertz			.50g base-peak accel.ampl.	
		30- 5 Hertz			.010" p-p disp.amplitude	
Vibration (Non-operating)		Vertical Axis Excitation: 1.4 G RMS overall from 10-300 Hz. Power spectral density 0.029 g2/Hz from 10-50 Hz, with an 8 db/octave rolloff from 50-300 Hz. Longitudinal and Lateral Axis Excitation: 0.68 G RMS overall from 10-200 Hz. Power spectral density 0.007 g2/Hz from 10-50 Hz with an 8 db/octave rolloff from 50-200 Hz.				

AIR QUALITY REQUIREMENT

The chemical contamination level the drives operate in will be no more severe than that which will produce a copper coupon reactivity of 400 angstroms after a one month exposure (approximately 1,000 angstroms after a one year exposure).

Figure C–5: Recommended SA70R environmental specifications

The "RECOMMENDED" values for environmental operating limits are selected to provide the maximum product performance and reliability. These are consistent with most Digital service contract requirements.

PARAMETER		MIN	TYP	MAX	UNITS	SYMBOL
RECOMMENDED Temperature (Operating)		18		24	degrees Celsius	oC
		64.4		75.2	degrees Fahrenheit	oF
RECOMMENDED Temperature Rate of Change (Operating)				3	degrees C/hour	oC/hr
				5.4	degrees F/hour	oF/hr
RECOMMENDED Temperature Step Change (Operating)				3	degrees Celsius	oC
				5.4	degrees Fahrenheit	oF
RECOMMENDED Relative Humidity (Operating)		40		60	percent relative humidity (non-condensing)	%RH
RECOMMENDED Relative Humidity Rate of Change (Operating)				10	percent relative humidity (non-condensing) per hour	%RH/hr
Air Quality see note below	particle size	0.5			micrometers	um
		19.7			microinches	uin
	Concen-tration			1.76x 10^7	quantity per cubic meter	no./m3
				5x10^5	quantity per cubic foot	no./ft3

AIR QUALITY REQUIREMENT

The chemical contamination level the drives operate in will be no more severe than that which will produce a copper coupon reactivity of 400 angstroms after a one month exposure (approximately 1,000 angstroms after a one year exposure).

Figure C–6: SA70R AC input power specifications, 1 phase, 101 volts

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL
Voltage Nominal		101		volts	V
Voltage Design Range	86		132	volts	V
Frequency Nominal		50/60		hertz	Hz
Frequency Range	47		63	hertz	Hz
Number of Phases		1		none	NA
RMS Current (Steady State)		3.99	4.04	amperes	A
Ground G		0.48		(leakage) milliamperes	mA
Peak Current (Steady State)		10.4	10.9	amperes	A
DC Current Levels Phase on AC				milliamperes	mA
Lines Neutral				milliamperes	mA
Power Cord Type	1 phase, 3 wire				
Power Cord Length		2.74		meters	m
		108		inches	in
AC Plug Type Cab Mounted 120v/240v 60/50 hz	IEC TYPE 43R03 Female				
	Cord Part Number : 17-00442-19				
Ride-through Time	.64			millisecond	ms
Initial Inrush Current			40	amperes peak	A
Second Inrush Current			N/A	amperes peak	A
Start-up Current Amplitude			5.9	rms amperes	A
Start-up Current Duration			10	seconds	s
Power Consumption		262	269	watts	W
Apparent Power		403	408	volt amperes	VA
Fuse or Circuit Breaker Rating			250 10	volts AC amperes	VAC A
Power Factor		0.66		none	PF
Crest Factor		2.71		none	CF
Current Distortion Factor		N/T		none	NA

Figure C–7: SA70R AC input power specifications, 1 phase, 120 volts

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL
Voltage Nominal		120		volts	V
Voltage Design Range	86		132	volts	V
Frequency Nominal		50/60		hertz	Hz
Frequency Range	47		63	hertz	Hz
Number of Phases		1		none	NA
RMS Current (Steady State)		3.65	3.69	amperes	A
Ground G		0.48		milliamperes	mA
Peak Current (Steady State)		10.6	10.9	amperes	A
DC Current Levels Phase on AC Lines Neutral				milliamperes milliamperes	mA mA
Power Cord Type	1 phase, 3 wire				
Power Cord Length		2.74		meters	m
		108		inches	in
AC Plug Type Cab Mounted 120v/240v 60/50 hz	IEC TYPE 43R03 Female Cord Part Number : 17-00442-19				
Ride-through Time	121			millisecond	ms
Initial Inrush Current			49	amperes peak	A
Second Inrush Current			N/A	amperes peak	A
Start-up Current Amplitude			5.43	rms amperes	A
Start-up Current Duration			10	seconds	s
Power Consumption		269	274	watts	W
Apparent Power		438	443	volt amperes	VA
Fuse or Circuit Breaker Rating			250 10	volts AC amperes	VAC A
Power Factor		0.62		none	PF
Crest Factor		2.96		none	CF
Current Distortion Factor		N/T		none	NA

Figure C–8: SA70R AC input power specifications, 1 phase, 220 volts

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL
Voltage Nominal		220		volts	V
Voltage Design Range	174		264	volts	V
Frequency Nominal		50/60		hertz	Hz
Frequency Range	47		63	hertz	Hz
Number of Phases		1		none	NA
RMS Current (Steady State)		1.65	1.67	amperes	A
Ground G		1.0		milliamperes	mA
Peak Current (Steady State)		4.03	4.26	amperes	A
DC Current Levels Phase on AC Lines Neutral				milliamperes milliamperes	mA mA
Power Cord Type	1 phase, 3 wire				
Power Cord Length		2.74		meters	m
		108		inches	in
AC Plug Type Cab Mounted 120v/240v 60/50 hz	IEC TYPE 43R03 Female				
	Cord Part Number : 17-00442-19				
Ride-through Time	106			millisecond	ms
Initial Inrush Current			46	amperes peak	A
Second Inrush Current			N/A	amperes peak	A
Start-up Current Amplitude			2.53	rms amperes	A
Start-up Current Duration			10	seconds	s
Power Consumption		262	268	watts	W
Apparent Power		363	368	volt amperes	VA
Fuse or Circuit Breaker Rating			250 10	volts AC amperes	VAC A
Power Factor		0.73		none	PF
Crest Factor		2.55		none	CF
Current Distortion Factor		N/T		none	NA

Figure C–9: SA70R AC input power specifications, 1 phase, 240 volts

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL
Voltage Nominal		240		volts	V
Voltage Design Range	174		264	volts	V
Frequency Nominal		50/60		hertz	Hz
Frequency Range	47		63	hertz	Hz
Number of Phases		1		none	NA
RMS Current (Steady State)		1.54	1.58	amperes	A
Ground G		1.0		milliamperes	mA
Peak Current (Steady State)		3.79	3.91	amperes	A
DC Current Levels Phase on AC Lines Neutral				milliamperes milliamperes	mA mA
Power Cord Type	1 phase, 3 wire				
Power Cord Length		2.74		meters	m
		108		inches	in
AC Plug Type Cab Mounted 120v/240v 60/50 hz	IEC TYPE 43R03 Female Cord Part Number : 17-00442-19				
Ride-through Time	140			millisecond	ms
Initial Inrush Current			49	amperes peak	A
Second Inrush Current			N/A	amperes peak	A
Start-up Current Amplitude			2.37	rms amperes	A
Start-up Current Duration			10	seconds	s
Power Consumption		267	270	watts	W
Apparent Power		370	379	volt amperes	VA
Fuse or Circuit Breaker Rating			250 10	volts AC amperes	VAC A
Power Factor		0.71		none	PF
Crest Factor		2.48		none	CF
Current Distortion Factor		N/T		none	NA

Figure C–10: SA70R DC output power specifications

PARAMETER		MIN	TYP	MAX	UNITS	SYMBOL
DC Voltage Range	Voltage					
	5.1 v			40	millivolts ripple	mV
	4 outputs	4.90		5.30	volts dc	V
	12.1 v			40	millivolts ripple	mV
	4 outputs	11.50		12.70	volts dc	V
	12.6 v			40	millivolts ripple	mV
	1 outputs	12.00		13.20	volts dc	V
DC Output Watts Available				384	watts	W
DC Output Amps Available at each DC Voltage	voltage					
	5.1 v		3.9	3.9	amperes	A
	12.1 v		3.6	5.4	amperes	A
	12.6 v	2.0	3.0	5.0	amperes (peak)	A

Figure C–11: SA70R EMC specifications

Field Strength Susceptibility (operating)	Frequency Range	10khz - 1ghz		
	Level (V/m)	3		

	MIN	MID	MAX	UNITS	SYMBOL
ESD Level			15	kilovolt	kV

Meets FCC Class A Specifications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