
RA90/60000

RA90/6000 Cabinet Series Upgrade Installation Guide

Order Number EK–RA9CK–IN–001

Digital Equipment Corporation
Maynard, Massachusetts

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Contents

4 RA90 Disk Drive Switches and Indicators

5 Powering Up the RA90 Disk Drive

Index

Figures

Tables

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About This Manual

Intended Audience

All Digital Customer Services engineers installing an RA90–PA option into a VAX 6000-series processor cabinet should read this manual. Without the information in this manual, proper installation cannot be accomplished.

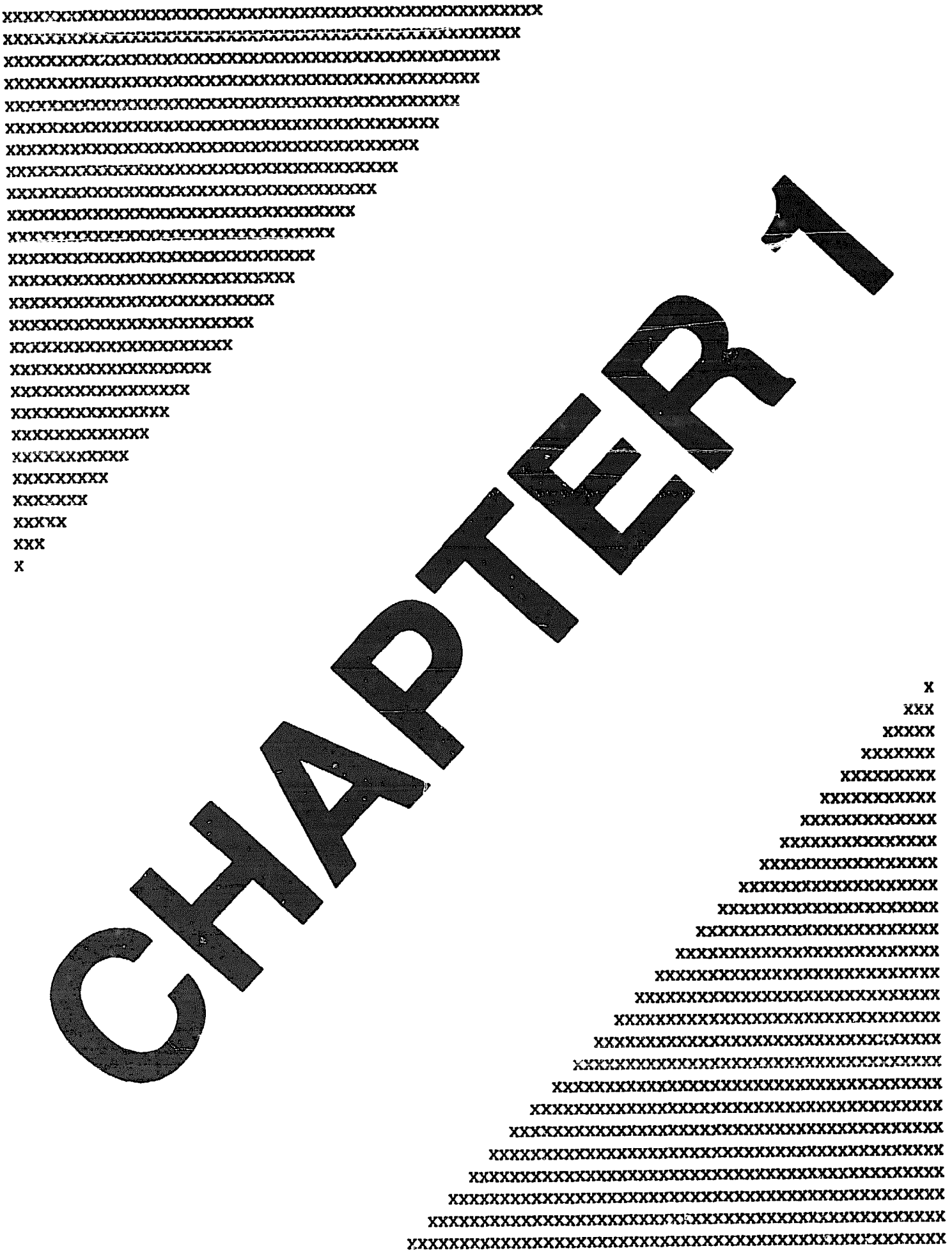
Document Structure

This document is divided into the following chapters:

- Chapter 1 lists the RA90–CK kit, the upgrade option, and the RA90–PA option.
- Chapter 2 contains safety and ESD precautions for Digital Customer Services engineers.
- Chapter 3 explains how to install the RA90–CK kit, the upgrade kit, and the RA90 disk drive.
- Chapter 4 describes the RA90 disk drive switches and indicators.
- Chapter 5 explains how to operate the RA90 disk drive.

Scope

The purpose of this manual is to describe the installation of one or two RA90 disk drives into the drive cavities of a VAX 6000-series processor cabinet. Specific information about the VAX 6000-series processor cabinet and customer acceptance procedures are not contained in this manual. Refer to VAX 6000 model-specific documentation for detailed processor information.


CHAPTER 1

1
RA90–CK and Upgrade Kits

1.1 Introduction

The contents of the RA90–PA option and unpacking instructions for the RA90–NA disk drive are described in this chapter. A brief description of the processor upgrade kit is also included.

WARNING
Digital customers may only access the RA90 disk drive operator control panels (OCPs) through the access slot in the system cabinet front door. Access to the RA90 disk drives through system cabinet front or rear doors is prohibited. All maintenance procedures must be performed by qualified Digital Customer Services engineers.

The RA90–PA option includes:

- RA90–NA (one RA90 disk drive)
- 70–27274–01 (RA90–CK kit)

NOTE
Part number 70–27274–01 is referred to as the RA90–CK kit in this document.

1.1.1 RA90–CK Kit Contents

The RA90–CK kit contents are listed in Table 1–1. Ensure that all contents of the kit are present before starting the installation procedure.

Table 1–1 RA90–CK Kit Parts List

Part Number	Description	Quantity
70–25686–01	Rail chassis assembly	1
70–25687–01	Bracket rail assembly	1
74–36464–01	Bar, insert nut	1
90–06637–00	Washer, lock	6
17–02510–01	I/O cable	1
17–00442–27	Power cord, 3-foot	1
12–24007–02	Screw, shoulder, socket-hex	6
90–00039–26	Screw, Mach flat phil, 10–32	4
EK–RA9CK–IN–001	*RA90/6000 Installation Guide*	1
99–08213–01	Laminate	1

Table 1–1 (Cont.) RA90–CK Kit Parts List

Part Number	Description	Quantity
74–39075–01	Rear lock-down bracket	2
90–10201–01	U-clip	2
90–00049–71	10–32 5/8-inch pan-head sems screws	4
99–07030–02	PE antistatic sheet	A/R
90–07880–00	Cable tie	6
90–08264–00	Cable mount	1
90–07081–00	1/4-inch cable clamp	2
90–00063–41	10–32 5/8-inch sem screw	2
90–06662–00	Flat washers	2

1.1.2 Upgrade Kit Contents

Upgrade kits for system processors that do not already have front door access to the RA90 disk drive operator control panels will need to be installed. The upgrade kit contents are listed in the following table:

62x32–UA	62x32–UB
70–26931–01 — System processor cabinet front door with RA90 disk drive operator control panel access slot	70–26931–01 — System processor cabinet front door with RA90 disk drive operator control panel access slot
H405–E unswitched power controller for 120V/60HZ systems	H405–F unswitched power controller for 220V/50HZ systems
Appropriate logo slug installed on front door	Appropriate logo slug installed on front door

These kit variations allow Digital Customer Services engineers to install RA90 disk drives into existing, installed VAX 6000-series processor cabinets.

1.2 RA90–PA Option

The RA90–PA option is packaged in one box containing the RA90–NA disk drive and its hardware. A second, internally packaged box contains the RA90–CK kit consisting of:

- Chassis rails
- Hardware
- I/O cable
- Power cord
- *RA90/6000 Cabinet Series Upgrade Installation Guide*

1.2.1 Thermal Stabilization of RA90 Disk Drive

Before removing the RA90 disk drive from its moisture barrier bag and follow the required thermal stabilization procedure. Thermal stabilization prevents temperature between the disk drive and its environment from damaging the disk drive's components.

CAUTION
The thermal stabilization procedure is mandatory. Do not open the drive's moisture barrier bag (silver bag) until after the thermal stabilization period has elapsed.

Prior to installation, the RA90 disk drive must be stored at a temperature of 16 degrees C (60 degrees F) or higher for a minimum of 24 hours. This equipment may be stored either in the computer room or in another storage room under controlled temperature conditions. If stored in another storage room, the equipment must sit for an additional hour in the computer room in which it will be installed.

After the thermal stabilization criteria have been met, remove the RA90 disk drive from its moisture barrier bag and proceed with installation.

1.2.2 Unpacking the RA90 Disk Drive

Unpack the RA90 disk drive using Figure 1–1 as a guide. Use the following procedure to remove the drive from its packing material:

1. Cut the shipping straps.
2. Open the shipping container.
3. Remove and save the packing material surrounding the disk drive.
4. Lift the disk drive from the shipping container.

   WARNING
   Do not use the cardboard handles to lift the disk drive from the shipping container. Injury to personnel or damage to equipment could occur if the cardboard handles are used for this purpose.

5. Remove the small plastic bag containing the drive-to-cabinet hardware located under the disk drive.
6. Remove the silver moisture barrier bag from the disk drive.
7. Set the disk drive on an antistatic work surface.

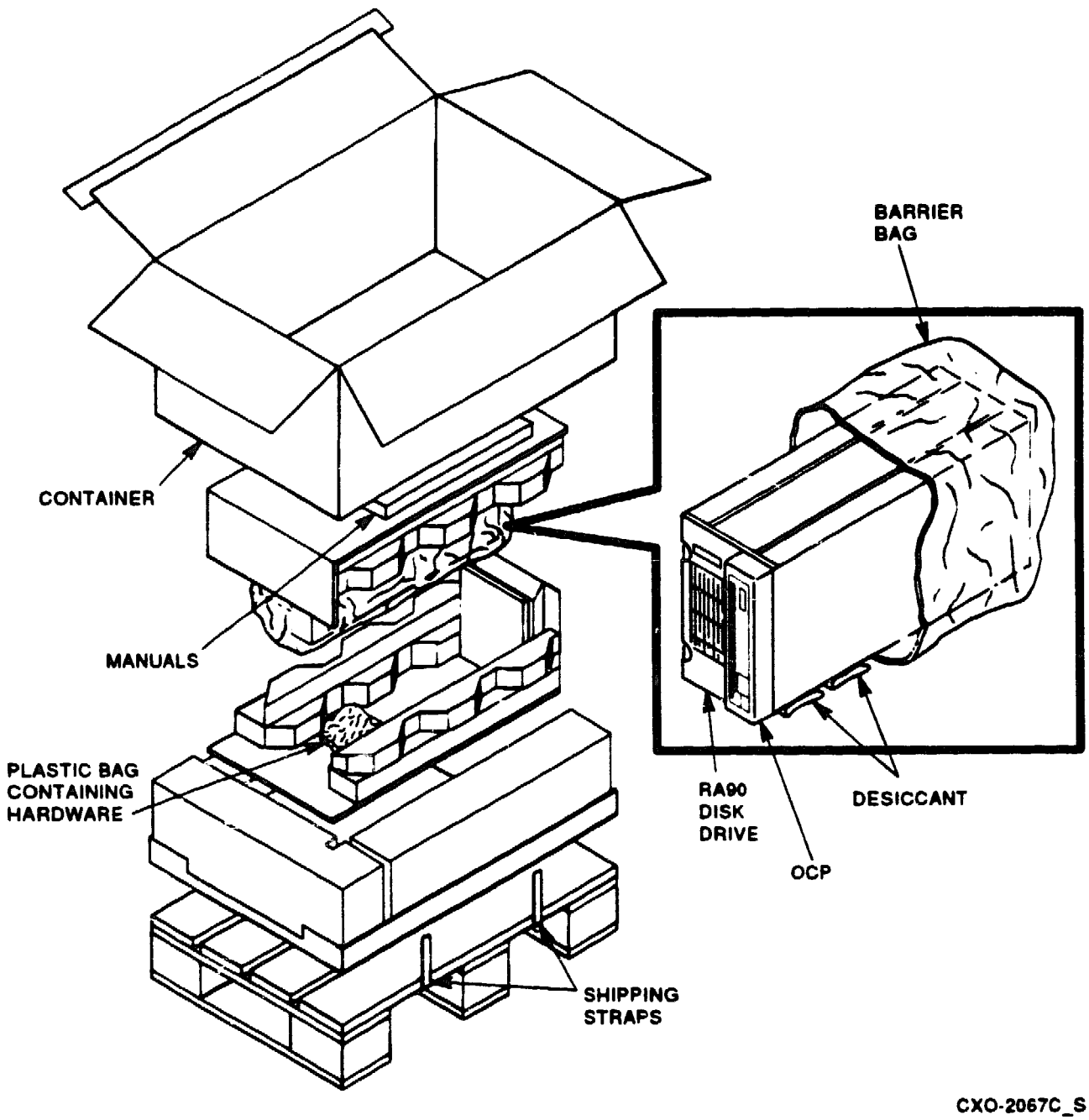
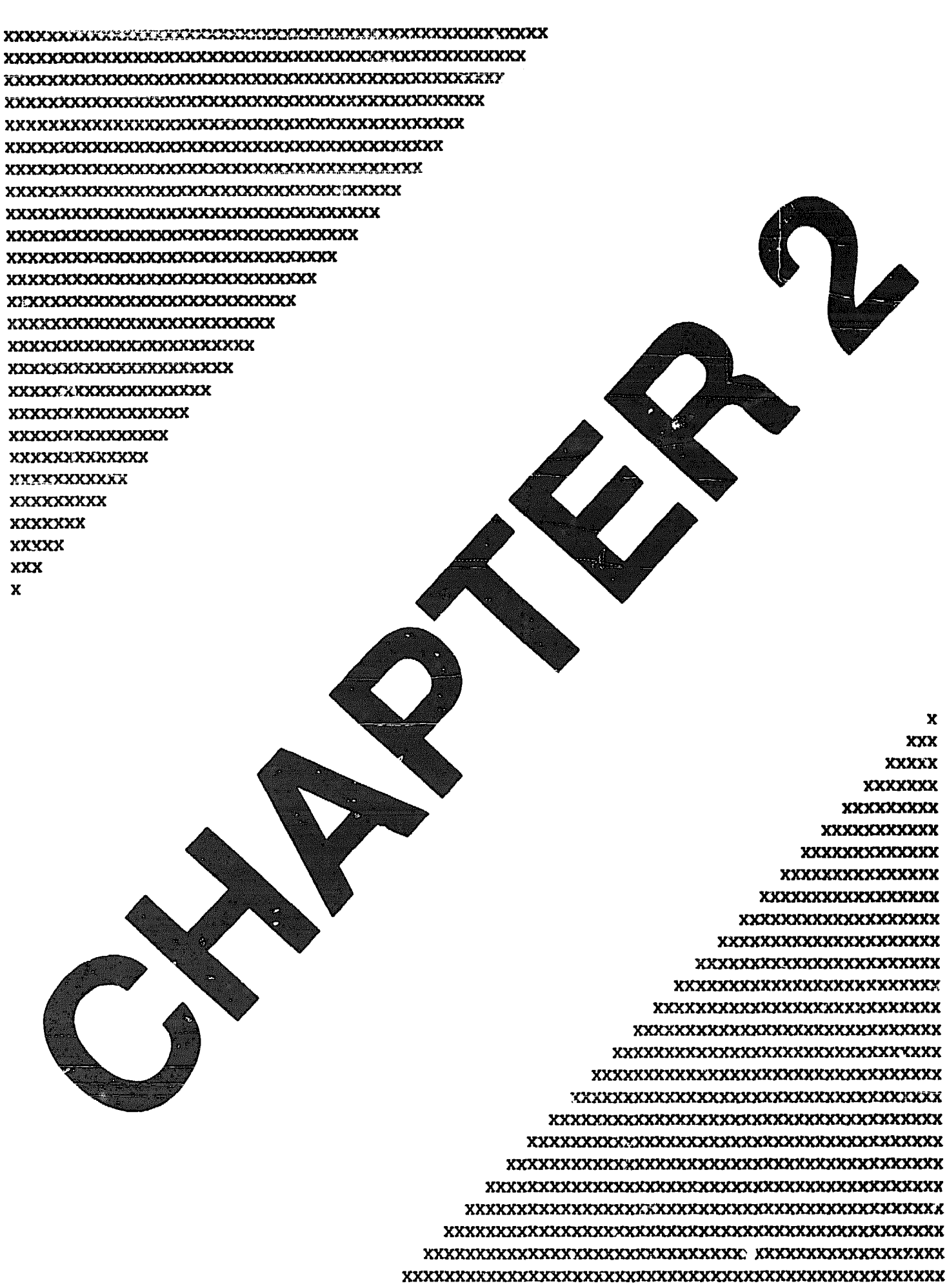


Figure 1–1 Unpacking the RA90 Disk Drive


CHAPTER 2

2
Safety Precautions

2.1 Introduction

This chapter discusses hazards and safety precautions that the Digital Customer Services engineer should be aware of before installing an RA90-CK kit, RA90 disk drive, or cabinet upgrade kit into a VAX 6000-series processor cabinet.

WARNING
Digital customers may access the RA90 disk drive operator control panels (OCPs) only through the access slot in the system processor cabinet front door. Access to the RA90 disk drives through the system cabinet front or rear doors is prohibited. Only qualified Digital Customer Services engineers should perform repair and maintenance procedures behind front and rear system cabinet doors.

2.2 Hazards and Safety Precautions

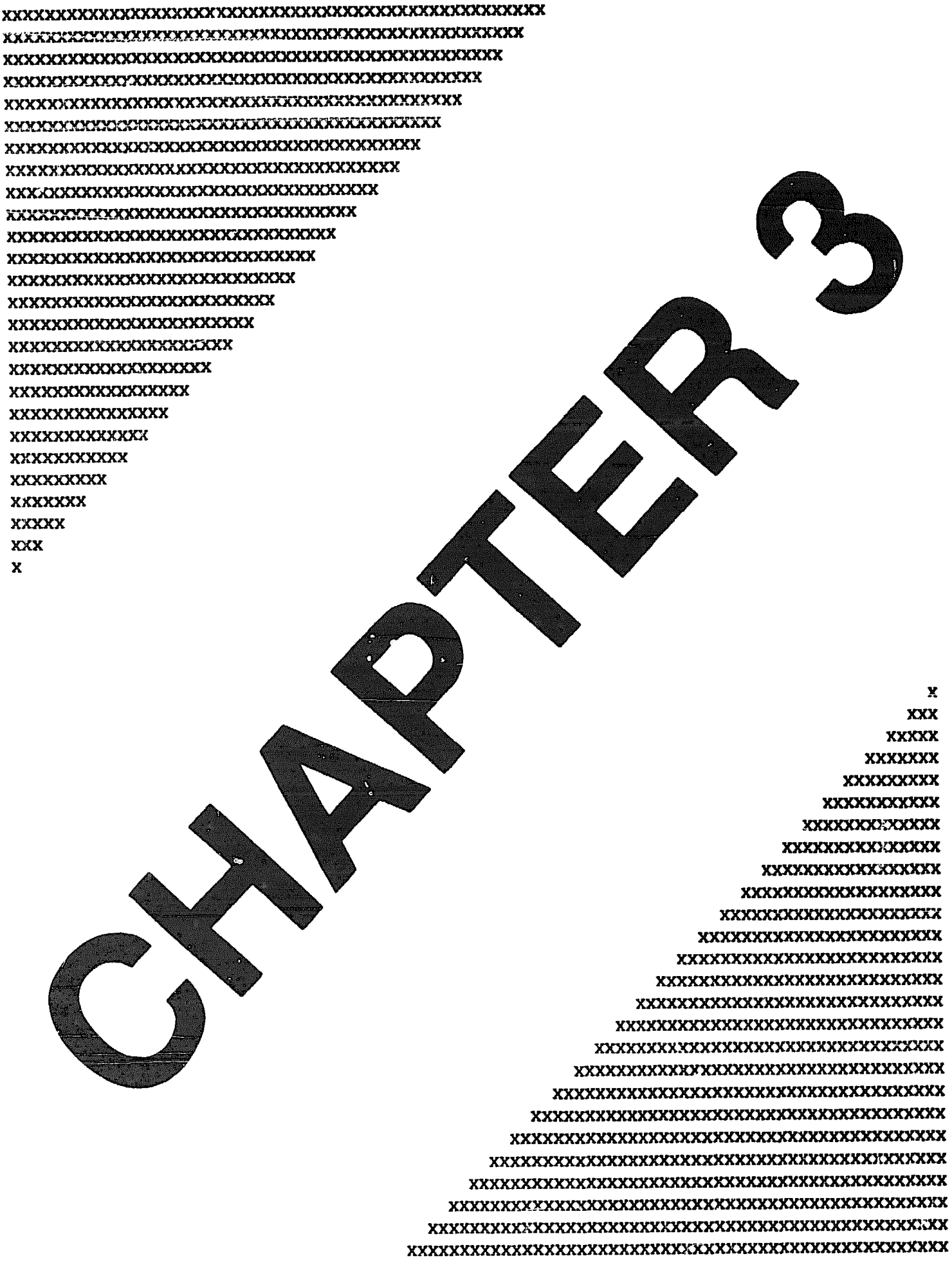
The front door of a VAX 6000-series processor cabinet is considered a safety barrier. High voltages, as well as the blower assembly, are accessible once the front door is opened. The cabinet door is locked and cannot be opened without a 5/32 hex key. Only Digital Customer Services engineers can open the front door without violating Digital safety measures.

RA90 disk drive line voltage selector switches are set to 100/120V 60HZ. Ensure the line voltage selector switch is set to the proper line voltage required for your site. Section 4.3.1 describes how to set the line voltage selector switch. Figure 4–2 shows the location of the line voltage selector switch.

2.3 ESD Precautions

Only Digital Customer Services engineers with training in electrostatic discharge (ESD) procedures should install an RA90 disk drive or work with the system processor cabinets.

Digital Customer Services engineers must wear proper ESD protective ground straps connected to a good ground when accessing, installing, or repairing RA90 disk drives or components in the VAX 6000-series processor cabinets. ESD kits containing protective ground straps are inside the front and rear doors of the system processor cabinets. Use these ESD ground straps when working with components in the processor cabinets. Use a separate ground strap connected to the RA90 disk drive when working with the drive.


CHAPTER 3

3
Installing the RA90–CK and Upgrade Kits and RA90 Disk Drive

3.1 Introduction

This chapter describes how to perform the following:

- Power down the VAX 6000-series processor cabinet
- Install the upgrade kit
- Install the RA90–CK kit components
- Install an RA90 disk drive into the drive cavity of the system processor cabinet
- Route the I/O cable and the power cord from the RA90 disk drive to the controller I/O bulkhead panel
- Power up the VAX 6000-series processor cabinet

WARNING
These procedures must be performed by qualified Digital Customer Services engineers only. Digital customers must not open the VAX 6000-series processor cabinet front or rear doors to access the RA90 disk drives, system processor, power supplies, controllers, or fans. All maintenance and repair actions must be performed by qualified Digital Customer Services engineers.

Front and rear views of the VAX 6000-series system processor cabinet are shown in Figure 3–1 and Figure 3–2.

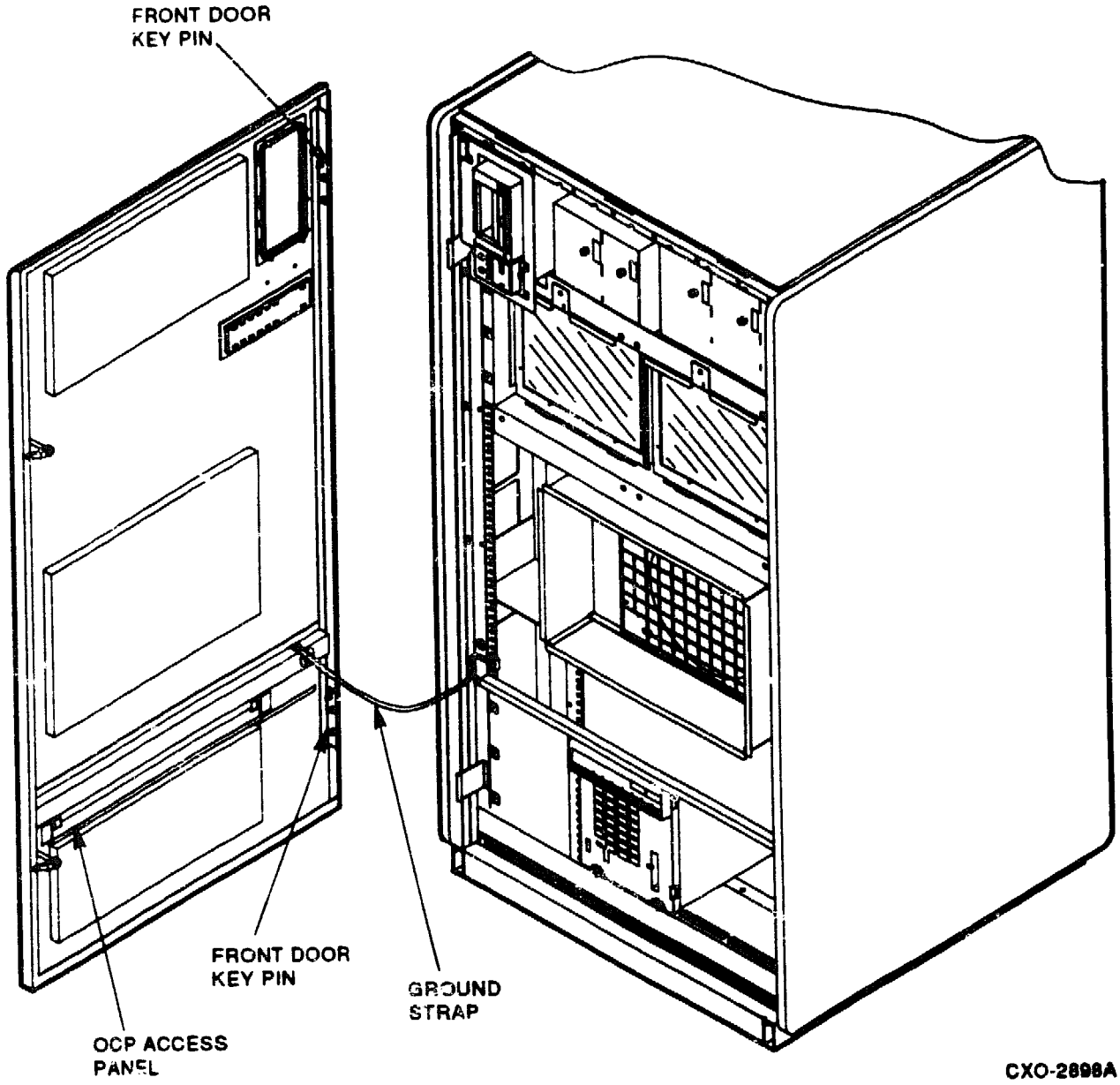


Figure 3–1 Front View of the VAX 6000-Series Processor Cabinet

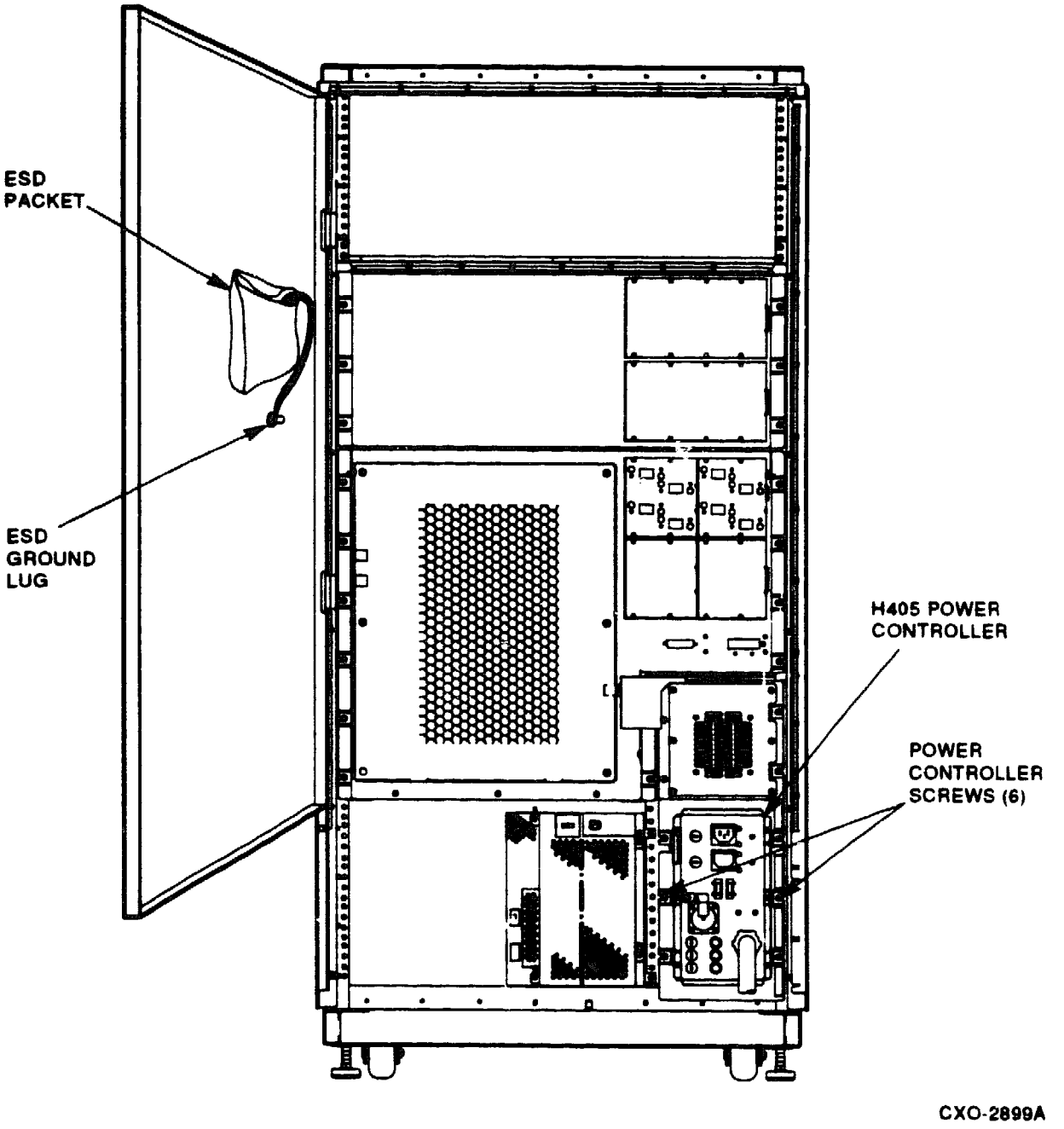


Figure 3–2 Rear View of the VAX 6000-Series Processor Cabinet

3.2 Powering Down the VAX 6000-Series System Cabinet

The VAX 6000-series cabinets include H405 switched power controllers. However, RA90 disk drives require unswitched power controllers for proper functionality. Therefore, switched power controllers in VAX 6000-series cabinets must be replaced when RA90 disk drives are installed. Before replacing the power controller, remove power from the system cabinet, using the following procedure:

1. Locate the system processor cabinet control panel in the upper-left corner of the cabinet front door. The cabinet control panel is shown in Figure 3–3.
2. With the console key, turn the Standby/Enable/Secure control switch to 0.
3. Turn the Update/Halt/Auto Start control switch to Halt.
4. Go to the rear of the cabinet.
5. Locate the H405 power controller.
6. Pull the H405 power controller main circuit breaker T-handle to the OFF (out) position. Refer to Figure 3–3.
7. Unplug the system cabinet power cord from the ac wall receptacle.

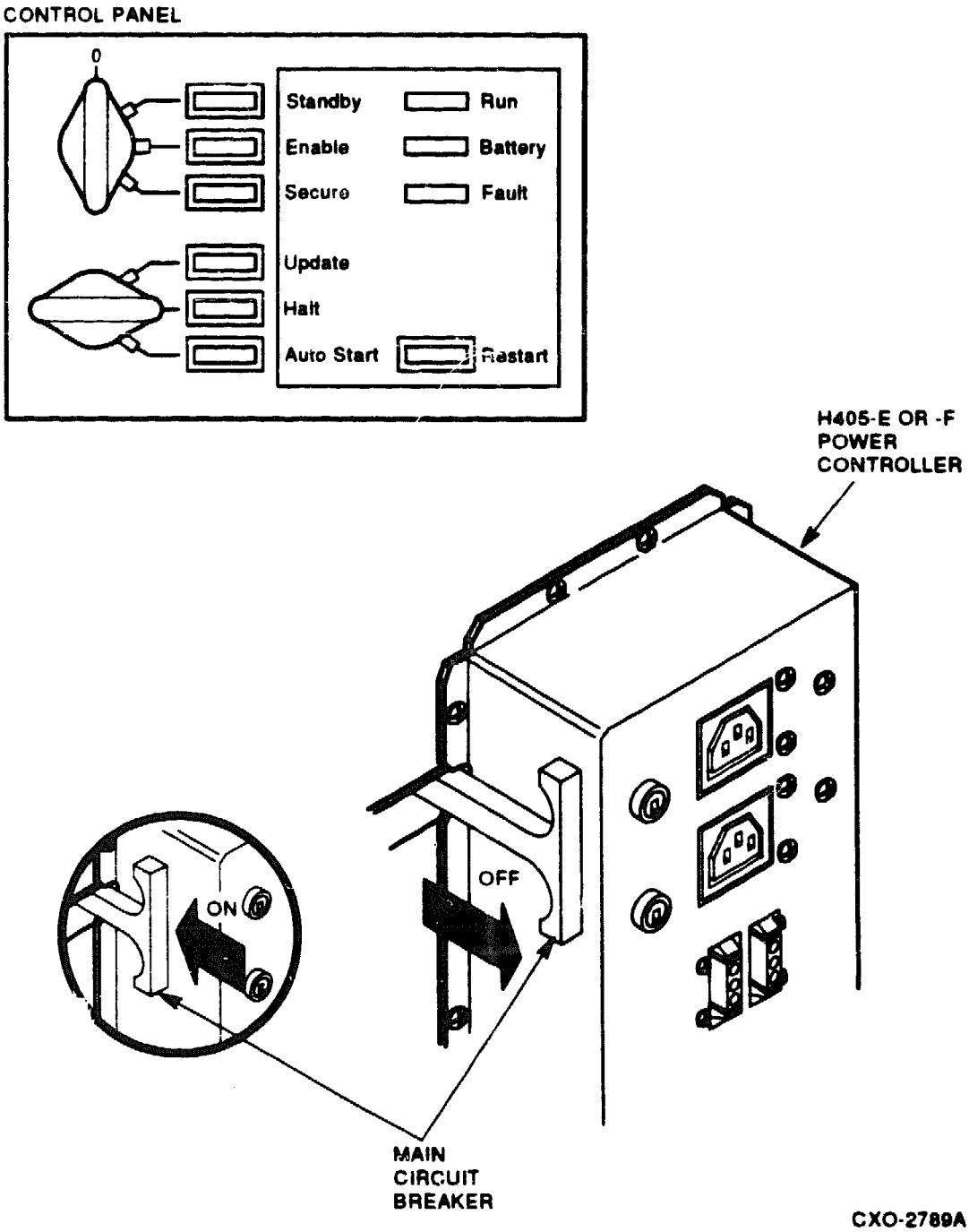


Figure 3–3 System Cabinet Control Panel and H405 Power Controller

3.3 Removing and Installing H405 Power Controllers

Systems that have front doors with RA90 disk drive operator control panel (OCP) access panels have unswitched H405 power controllers. Do not replace these unswitched H405 power controllers. If the system *does not* have front doors with RA90 OCP access, install an unswitched H405. The unswitched H405 is included with the front door in the upgrade kit shipped with the RA90–PA option.

3.3.1 Removing Switched H405 Power Controllers

To remove H405 switched power controllers:

1. Make sure the system cabinet is powered down, as described in Section 3.2.
2. Remove the six screws securing the H405 power controller to the system cabinet.
3. Pull the power controller out far enough to expose and access the system power cords plugged into the rear of the H405 power controller.
4. Unplug all power cords from the power controller.
5. Remove the power controller from the system cabinet.

3.3.2 Installing Unswitched H405 Power Controllers

To install H405 unswitched power controllers:

1. Slide the unswitched H405–E or –F power controller partially into the power controller cavity.
2. Plug all system power cords into the rear of the power controller.
3. Slide the power controller all the way into the cavity.
4. Replace the six screws, securing the power controller to system cabinet.

3.4 Relocating the Rear ESD Packet

The rear ESD packet, located in the drive cavity of the VAX 6000-series processor cabinets, must be removed to install RA90 disk drives. To remove and relocate the ESD packet, use the following procedure:

1. Open the system cabinet rear door, using a 5/32 hex key.
2. Find the rear ESD packet attached to the inside of the system cabinet drive cavity. (Some cabinet models do not have this packet, others already have the packet placed on the cabinet rear door.)
3. Remove the small Phillips screw that attaches the rear ESD ground strap to the cabinet and remove the tinneman nut.
4. Grasp and pull the ESD packet away from the drive cavity sheet metal.
5. Stick the rear ESD packet to the inside of the cabinet rear door as shown in Figure 3–2.
6. Secure the rear ESD ground strap to the rear door ground lug.

3.5 Preparing the System Cabinet for RA90 Disk Drive Installation

To ensure customer safety, install the RA90 upgrade kit. Original VAX 6000-series cabinet front doors must be removed and new front doors with RA90 disk drive OCP access installed.

After the upgrade kit is installed, the RA90–CK kit components must be installed to prepare for installation of the RA90 disk drives.

3.5.1 Upgrading the System Cabinet Front Door

New front doors (70–26931–01) allow customers to access the RA90 disk drive OCPs without opening the cabinet front doors. Figure 3–1 shows the OCP access panel in a new front door.

3.5.1.1 Removing the Original Front Door

To remove the original system cabinet front door:

1. Open the system cabinet front door with a 5/32 hex key.
2. Remove the screw securing the front door ground strap to the cabinet frame.
3. Lift up on the front door key pin, locking the key pin in the upper position.
4. Swing the top of the door away from the cabinet and lift the bottom of the door up and out of the bottom hinge.
5. Remove the door and set it aside.

3.5.1.2 Installing the New System Cabinet Front Door

To install new system cabinet front door:

1. Unpack the new front door.
2. Set the packaging aside.
3. Ensure the top front door key pin is in its upper position.
4. Align the new front door with the bottom cabinet hinge.
5. Swing the new door into position and release the top front door key pin, locking the door into position.
6. Attach the ground strap to the new front door, using the previously removed screw.
7. Close the door and lock it with a 5/32 hex key.

To prepare the system cabinet for RA90 disk drive installation, open the system cabinet front door, using a 5/32 hex key. Follow the procedures in the following sections to complete the RA90 disk drive installation.

3.5.2 Installing the Guide Rail Plate Assembly

Before installing the RA90 disk drive, ensure the system cabinet has been powered down. Refer to Figure 3–4 while performing this procedure.

NOTE

You can install the RA90 disk drive into either the left- or right-hand drive cavities of the cabinet. However, when both drive cavities are empty, install the RA90 disk drive in the left drive cavity first.

1. Locate the pre-assembled guide rail plate assembly in the RA90–CK kit. This assembly consists of:
   - Rail chassis assembly (70–25686–01)
   - Bracket rail assembly (70–25687–01)
   - Insert nut bar (74–36464–01)
   - Four screws (90–00039–26)

2. Slide the pre-assembled guide rail plate assembly into the cabinet. The guide rail plate assembly mounts from the inside of the cabinet uprights.

   NOTE
   The guide rail plate assembly is marked with an arrow for proper installation. Ensure the arrow on the rail sheet metal is pointing up.

   Install the bracket rail assembly into the front of the cabinet to install the RA90 into the right side of the cabinet. Install the bracket rail assembly into the rear of the cabinet to install the RA90 into the left side of the cabinet.

3. Go to the back of the cabinet. Count four holes up from the bottom of the cabinet upright.

   NOTE
   All references to holes refer to the cabinet upright mounting holes. Always start counting from the bottom hole of the cabinet upright.

4. Insert the bottom rear standoff of the rail plate assembly through hole 4.

5. Insert the top rear standoff of the rail plate assembly through hole 15. The standoffs hold the guide rail plate assembly in place.

6. Go to the front of the cabinet. Repeat steps 4 and 5. Install a washer (90–06637–00) and shoulder screw (12–24007–02) into the front center hole of the guide rail plate assembly and through hole 9 of the cabinet upright. Refer to Figure 3–4.

7. Install a second washer (90–06637–00) and shoulder screw (12–24007–02) into the hole above the top standoff of the guide rail plate assembly. Install a third washer and shoulder screw into the hole below the bottom standoff of the guide rail plate assembly.

8. Go to the back of the cabinet. Install three washers (90–06637–00) and three shoulder screws (12–24007–02) into the following rear holes of the guide rail plate assembly:

   - Hole 3 (hole below bottom standoff)
   - Hole 9
   - Hole 16 (hole above top standoff)

9. Torque the three front and three rear shoulder screws on the rail-mounting assembly to 30-inch pounds.

10. Torque the four flat-head screws (90–00039–26) shown in Figure 3–4 holding the bracket rail assembly to the guide rail assembly to 30-inch pounds.

This secures the guide rail plate assembly to the cabinet so that additional hardware (rear lockdown brackets and chassis retaining brackets) can be installed. Figure 3–4 shows the guide rail plate assembly components.

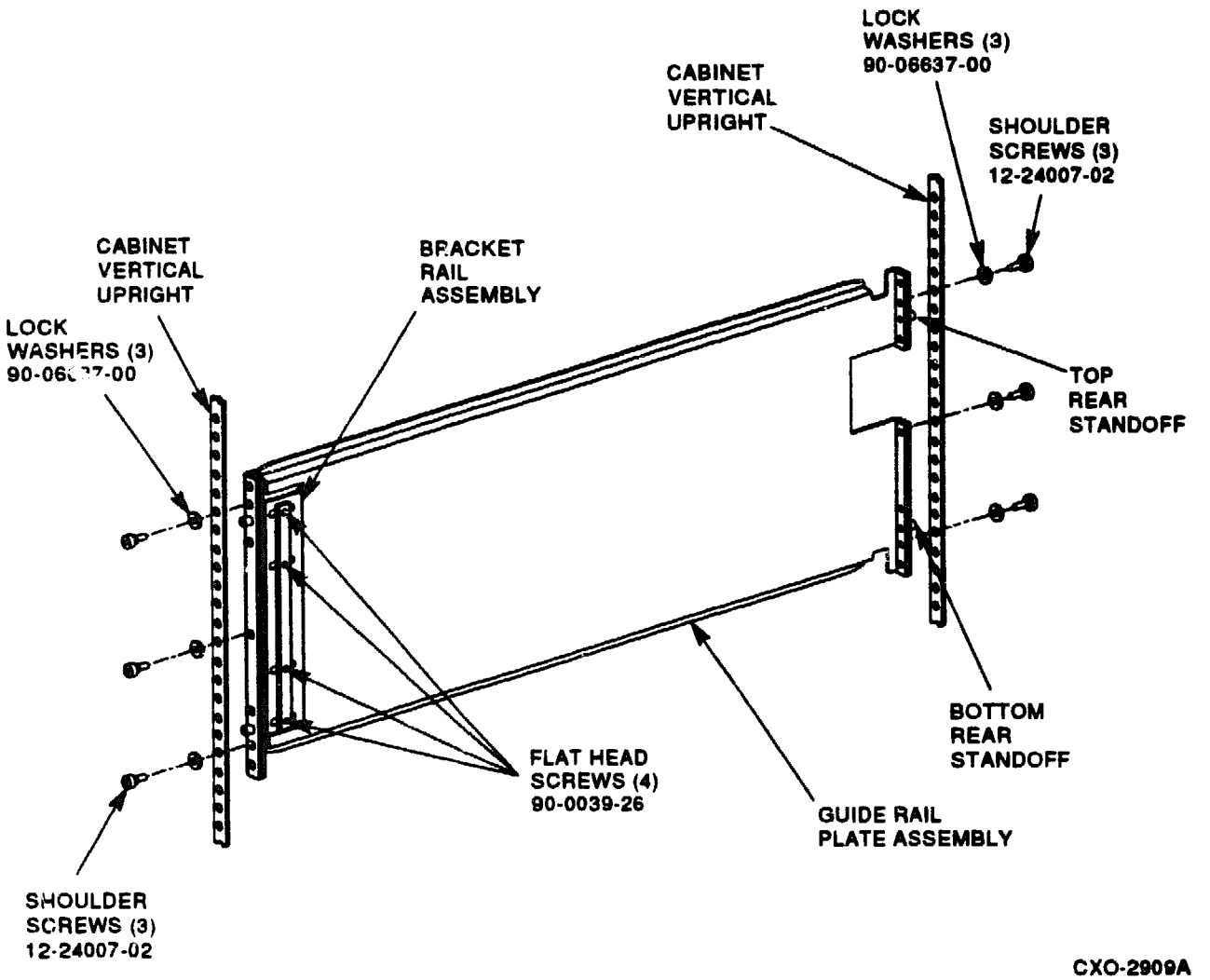


Figure 3–4 Installing the Guide Rail Plate Assembly

3.5.3 Attaching Rear Lockdown Brackets and U-clips

The RA90 disk drive is secured to the system cabinet by two chassis retaining brackets in the front and two rear lockdown brackets in the rear. Before the drive is installed, the two rear lockdown brackets with U-clips must be attached to the top and bottom of the guide rail plate assembly. Refer to Figure 3–5 while performing the following tasks:

1. Go to the rear of the cabinet.
2. Place the L-shaped end of the top rear lockdown bracket into the cutout in the top of the guide rail plate assembly as shown in Figure 3–5. The lockdown bracket will be parallel with the top edge of the guide rail plate assembly.
3. Secure the lockdown bracket to the cabinet upright with the pan-head 10–32 5/8-inch screw (90–00049–71) provided in the RA90–CK kit. Use hole number 17 of the guide rail plate assembly (two holes above the top standoff).
4. Place the U-clip (90–10201–01) over both the lockdown bracket and guide rail plate, 4 inches from the bend in the lockdown bracket as shown in Figure 3–5.

   CAUTION
   It is extremely important that the U-clips are placed 4 inches from the bend in the lockdown bracket. This allows future removal and replacement of the RA90 disk drive to occur without hitting the lockdown bracket.

5. Tighten the pan-head screw.
6. Repeat this procedure for the bottom rear lockdown bracket and U-clip, except use hole number 2 of the guide rail plate assembly (second hole below the bottom standoff).

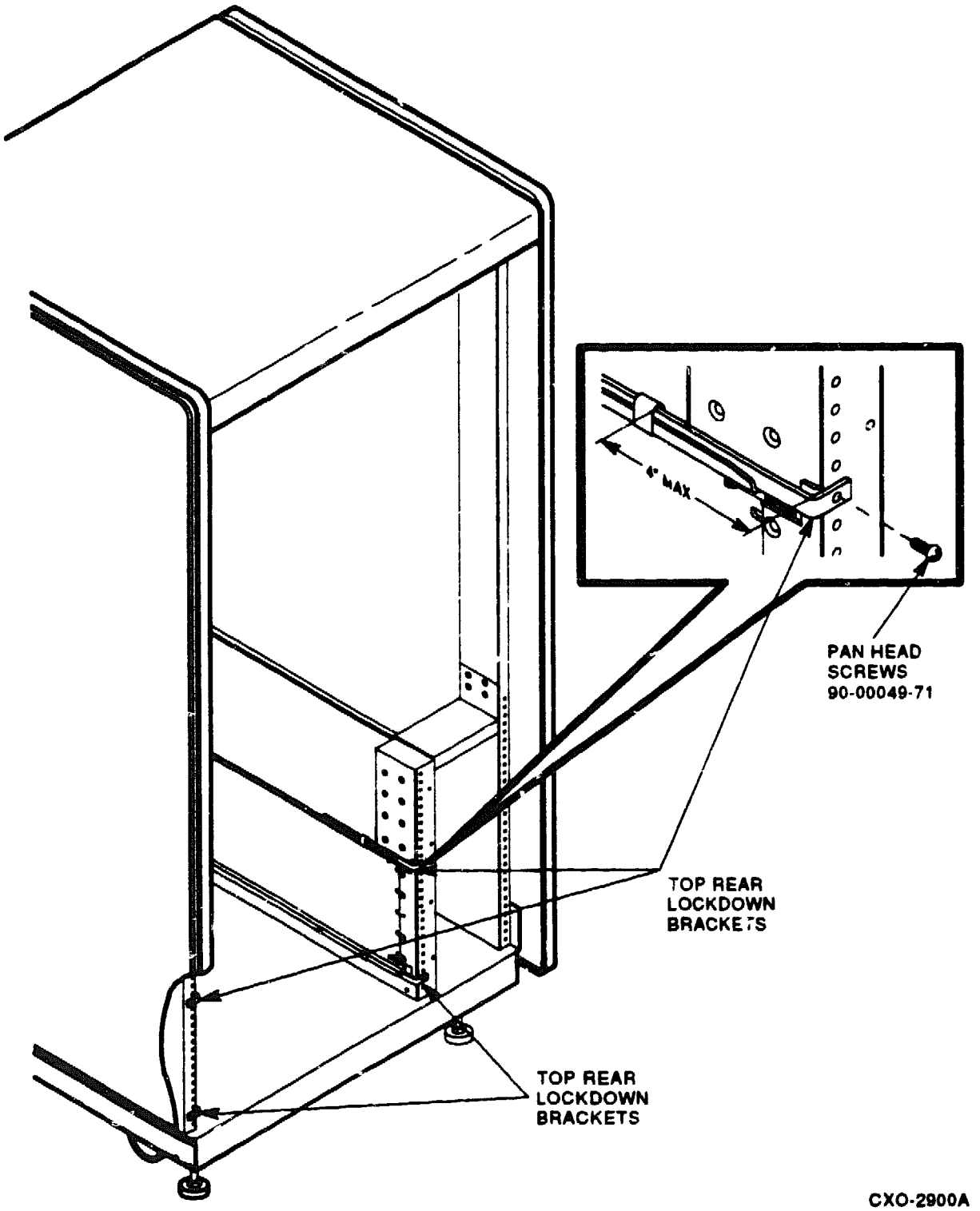


Figure 3–5 Rear Lockdown Brackets and U-clips

3.6 Installing the RA90 Disk Drive into the Cabinet

The RA90 disk drive can be installed in either the left or right disk drive position (facing the front of the cabinet). The first RA90 disk drive should be installed in the left position of the drive cavity.

The following sections describe the tasks necessary to install and secure a RA90 disk drive into the drive cavity of the VAX 6000-series system processor cabinet.

3.6.1 Removing the RA90 Operator Control Panel

Before placing the RA90 disk drive into the cabinet, remove the RA90 OCP to avoid damage during installation. To remove the OCP:

1. Note the orientation. The OCP will need to be placed on the opposite end of the drive for drives installed in the right drive cavity. RA90 OCP reorientation will not be necessary when installing the drive into the left-hand side of the drive cavity.
2. Grasp the middle of the RA90 disk drive OCP and pull it straight out.
3. Set the OCP aside until the RA90 disk drive is installed into the system cabinet.

3.6.2 Attaching the Chassis Retaining Brackets

To install the RA90 disk drive into the system cabinet, attach two chassis retaining brackets to the side of the drive. Refer to Figure 3–6. To attach the retaining brackets:

1. Obtain the two chassis retaining brackets (L-shaped) and four 10–32 x 5/8-inch pan-head Phillips sems screws from the plastic bag that came with the RA90–NA disk drive.
2. Secure each (one top and one bottom) chassis retaining bracket to the side of the RA90 disk drive with two 10–32 x 5/8-inch screws.

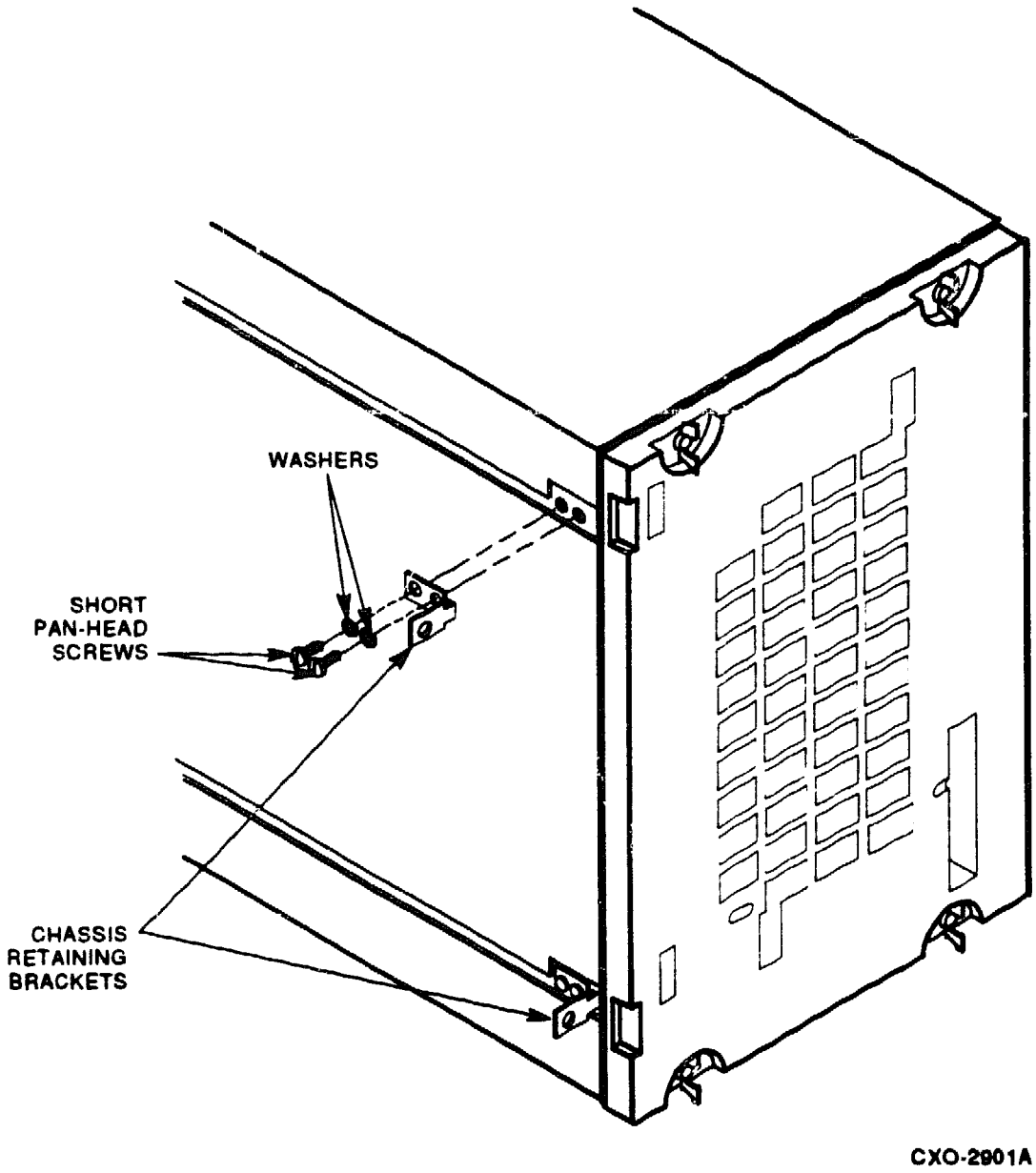


Figure 3–6 Installing the RA90 Disk Drive Top and Bottom Chassis Retaining Bracket

3.6.3 Sliding the RA90 Disk Drive into the System Cabinet

After securing the guide rail plate assembly and rear lockdown brackets and attaching the chassis retaining brackets, install the drive into the drive cavity, using the following procedure:

1. Ensure that the RA90 disk drive voltage selector switch has been set to the proper line voltage.
2. Turn the RA90 disk drive so that the grooves in the side of the drive are facing the guide rail plate assembly grooves.
3. Lift and move the drive into place using a Digital lifting device (FC–10117–AC).

   WARNING
   If a lifting device is not available, two people are needed to install the RA90 disk drive into the drive cavity. The RA90 disk drive weighs 31.8 kilograms (70 pounds) and must be handled with care.

4. Slide the drive into the drive cavity until the chassis retaining bracket holes align with the holes in the cabinet frame. Make sure the drive slides between the top and bottom rear lockdown brackets and the grooves in the guide rail assembly.
5. Insert the 10–32 x 5/8-inch (90–00049–71) pan-head Phillips sems screw (from the RA90–CK kit) through the hole in the upper chassis retaining bracket and into the frame. Refer to Figure 3–6. Do not tighten the screws.
6. Insert the other 10–32 x 5/8-inch (90–00049–71) pan-head Phillips sems screw through the hole in the lower chassis retaining bracket and into the frame.
7. Tighten both top and bottom chassis retaining bracket screws.

3.6.4 Replacing the RA90 Disk Drive Operator Control Panel

To replace the RA90 disk drive OCP:

1. Grasp both sides of the OCP.

   NOTE
   The OCP can be installed into either the top or bottom of the RA90 disk drive casting depending on the final orientation of the drive. (OCP orientation may change depending on whether the drive is installed on the left or right side of the drive cavity.)

2. Align the connector on the back of the OCP with the socket on the bezel connector cap of the RA90 disk drive casting. If the RA90 has been reoriented (right-hand drive installations) since OCP removal, there may be a bezel connector cap over the top OCP slot; remove the cap before trying to plug in the OCP. Move the cap to the bottom OCP connector slot, as shown in Figure 3–7.
3. Push the OCP gently into place (take care not to bend the connector pins), ensuring that the plastic tabs and flexible metal retention clips on the OCP are seated in the bezel casting slots on the RA90 disk drive.

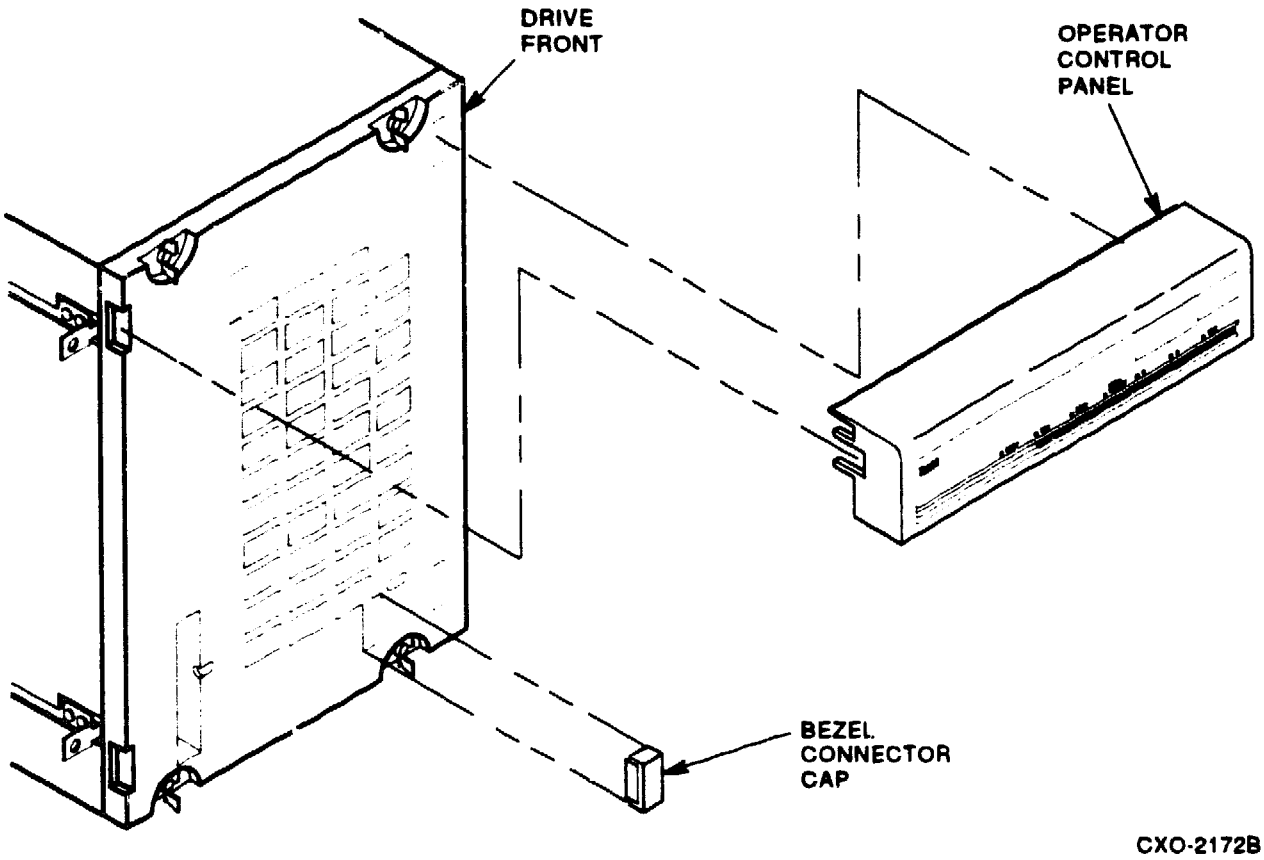


Figure 3–7 RA90 Disk Drive OCP Replacement

3.7 Routing the RA90 Disk Drive Cables

To complete the RA90 disk drive installation, connect the power cord and I/O cable. The following sections describe cable installation and routing. Refer to Figure 3–8 (if installing one RA90 disk drive) or Figure 3–9 (if installing two RA90s) while performing these tasks.

3.7.1 Installing the RA90 Disk Drive Power Cords

Route the RA90 disk drive power cord as follows:

1. Plug the female end of the RA90 disk drive power cord (17–00442–27) into the rear of the RA90 disk drive. (For a one-drive installation, this is the drive closest to the H405 power controller).
2. Route the power cord up through the plastic cable clamp on the cable management bracket as shown in Figure 3–8.
3. Plug the male end of the power cord into the H405–E (or H405–F) power controller power receptacle. For a one-drive installaton, plug the drive closest to the power controller into the bottom power controller receptacle as shown in Figure 3–8.
4. For a two-drive installation, plug the female end of the RA90 power cord (RA90 farthest from the H405 power controller) into the rear of the drive. Route the power cord under the I/O cables, up through the plastic cable clamp on the cable management bracket, and into the top power controller receptacle. Refer to Figure 3–9.

3.7.2 Installing the I/O Cables

To install the I/O cable:

1. Install the I/O cable tie mount (90–08264–00) as shown in Figure 3–8.
2. Plug one end of the I/O cable into Port A of the RA90 disk drive. (For a one-drive installation, plug the end into the drive closest to the H405 power controller.)

   NOTE
   Both ends of the I/O cable (17–02510–01) are identical.

3. Route the Port A I/O cable (17–02510–01) along the lower edge of the RA90 (over the cable tie mount), under the H405 power cord, and up the side of the cabinet upright to the KDB50 disk controller I/O bulkhead as shown in Figure 3–8.
4. Plug the other end of the Port A I/O cable into the KDB50 I/O bulkhead, as shown in Figure 3–8.
5. Secure the I/O cable to the cable tie mount (90–08264–00) with the cable tie wrap (90–07880–00).
6. Remove the existing 1/2-inch sems screws from the cabinet upright. Install the following:
   - Two 10–32 x 5/8-inch screws (90–00063–41)
   - Two flat washers (90–06662–00)
   - Two 1/4-inch cable clamps (90–07081–00)

   These new parts come with the RA90–CK kit. See Figure 3–8 for the mounting location of the cable clamps.

NOTE
Figure 3–9 shows the routing of the second I/O cable. Tie wrap the second cable to the first I/O cable in five places.

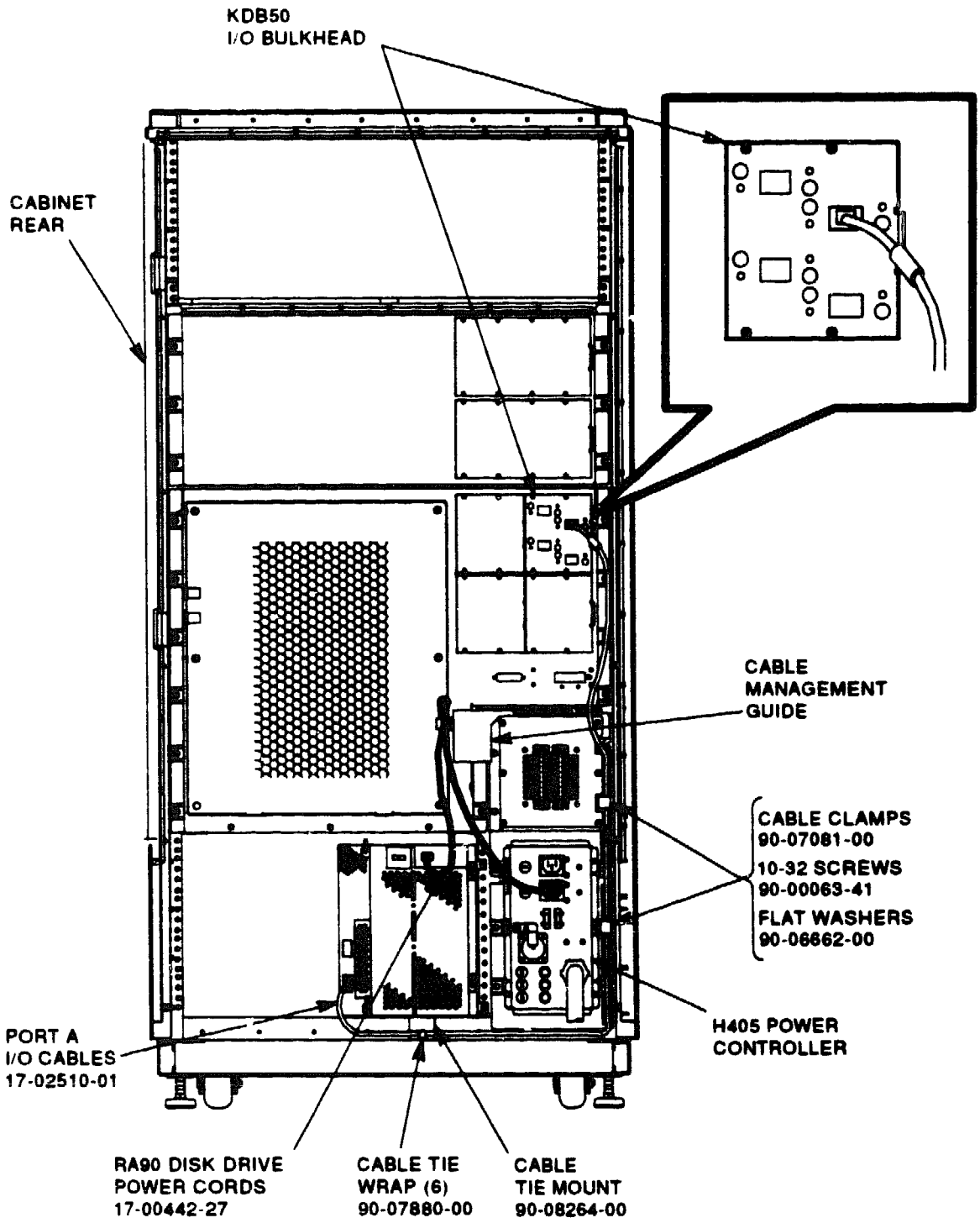


Figure 3–8 Installing the Power Cord and I/O Cable for a One-Drive RA90 Configuration

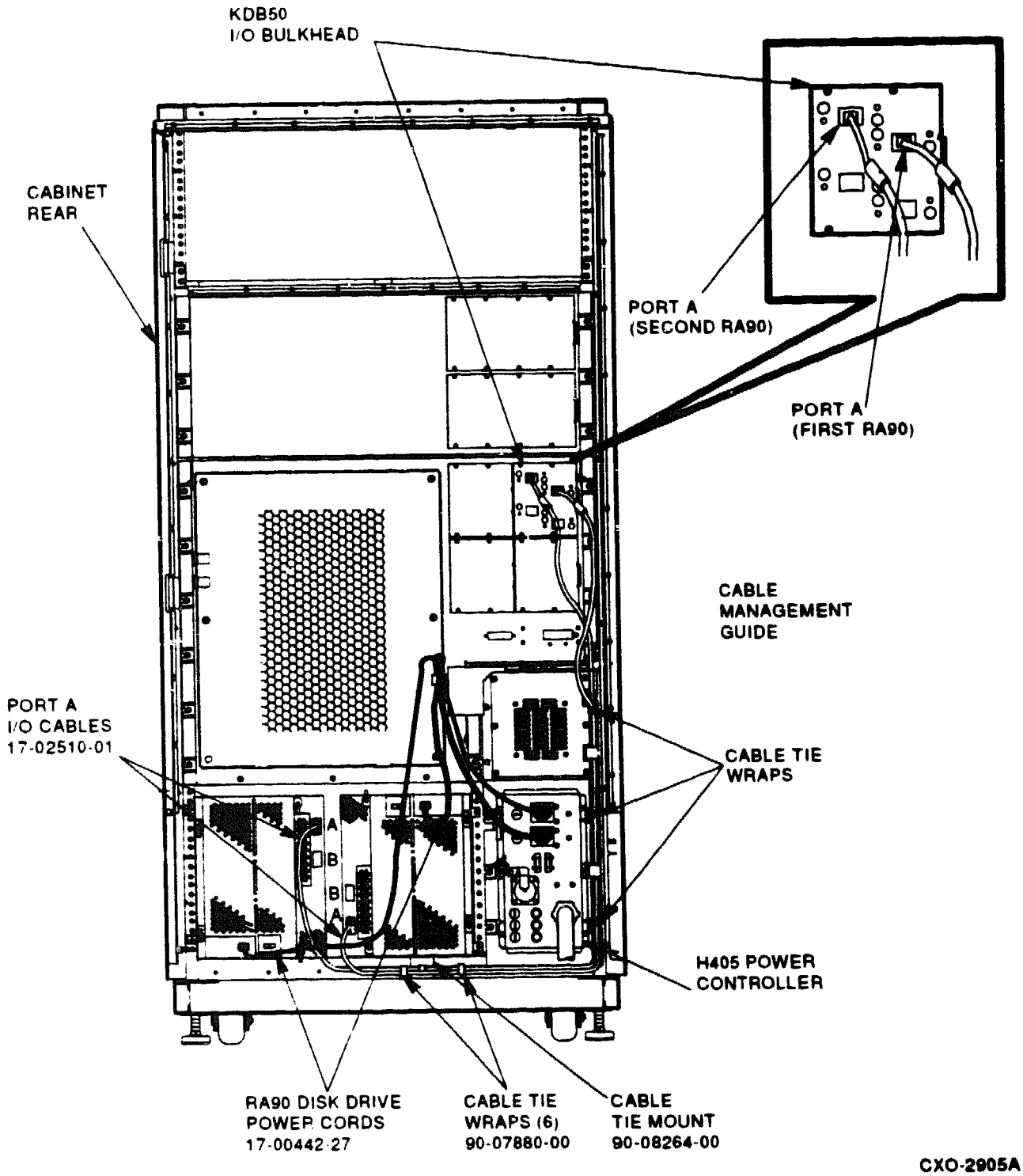


Figure 3–9 Installing the Power Cord and I/O Cable for a Two-Drive RA90 Configuration

3.8 Powering Up the System Cabinet

To apply power to the system cabinet after installation, use the following procedure:

1. Plug the system cabinet power controller cord into an ac wall receptacle.
2. Push in the main circuit breaker T-handle (ON position) located on the H405–E or H405–F power controller. Refer to Figure 3–10.
3. Locate the system cabinet control panel in the upper-left corner of the system cabinet front door, as shown in Figure 3–10.
4. Turn the Standby/Enable/Secure control switch to Enable.
5. Turn the Update/Halt/Auto Start control switch to Auto Start.

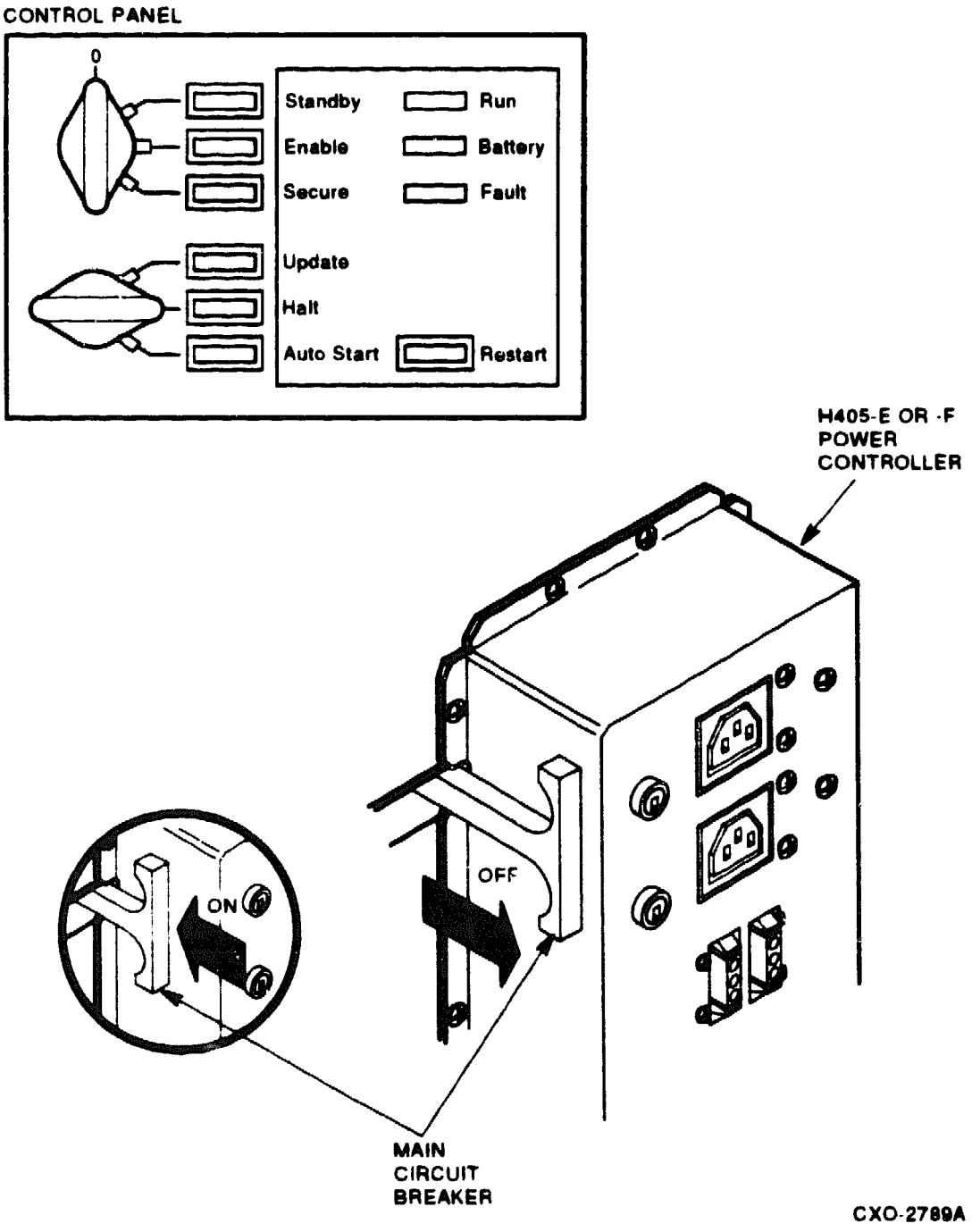
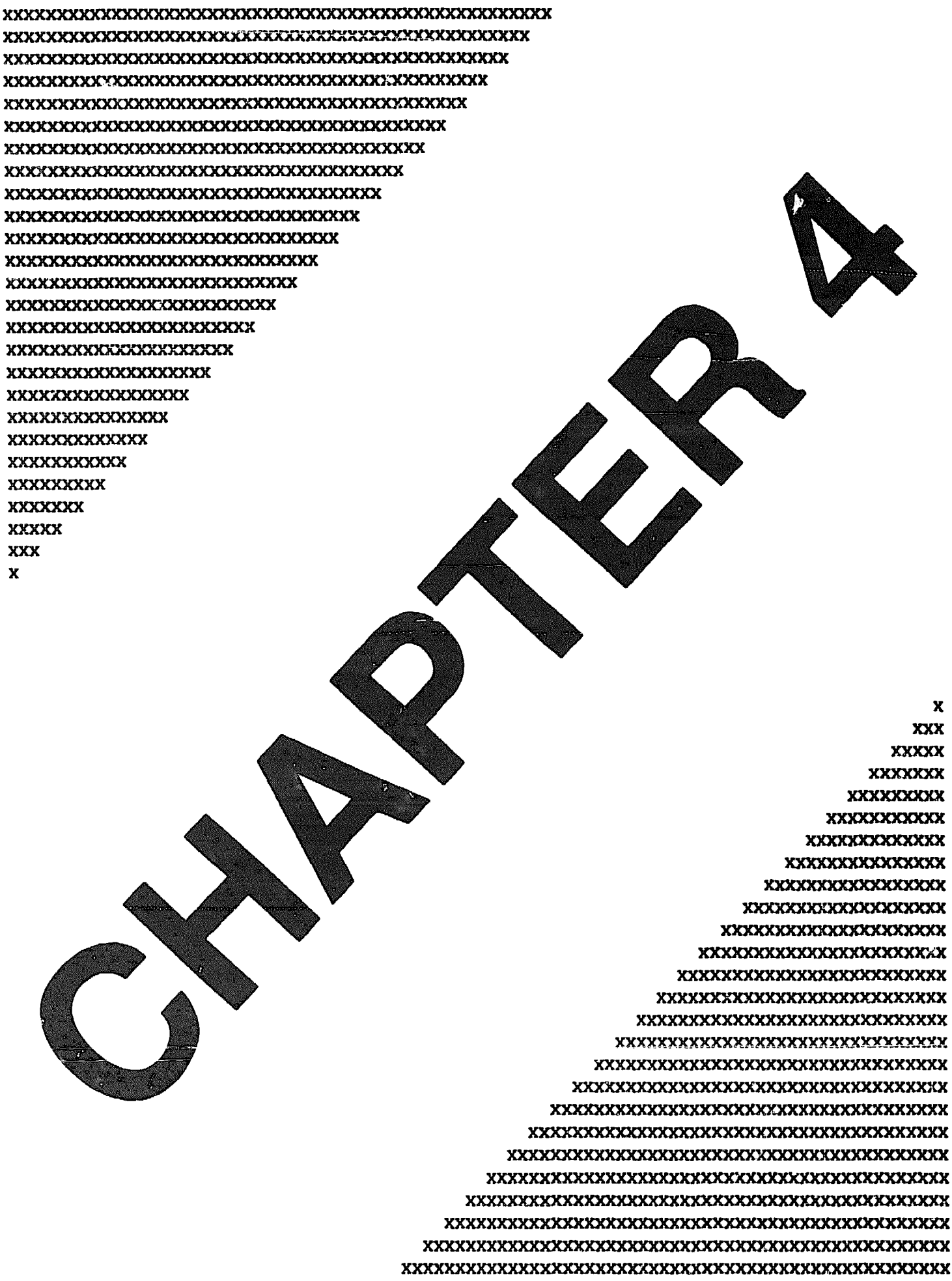


Figure 3–10 System Control Panel and Power Controller


CHAPTER 4

4
RA90 Disk Drive Switches and Indicators

This chapter describes the switches and indicators on the front and rear panels of the RA90 disk drive.

4.1 RA90 Disk Drive Operator Control Panel Switches and Indicators

Figure 4–1 shows the operator control panel (OCP) of the RA90 disk drive. The OCP is located along the top edge of the disk drive. The OCP interfaces to the RA90 disk drive and performs the following functions:

- Selects and displays the unit address
- Selects Run, Write Protect, and Port A, and Port B
- Displays faults and error codes
- Selects tests in the test mode
- Controls the drive software update process
- Communicates with the RA90 master processor
- Monitors momentary contact switches for closure

NOTE
The software update process is a Digital Customer Services function and is not covered in this manual.

To execute or select functions, you must be familiar with the features of the OCP shown in Figure 4–1.

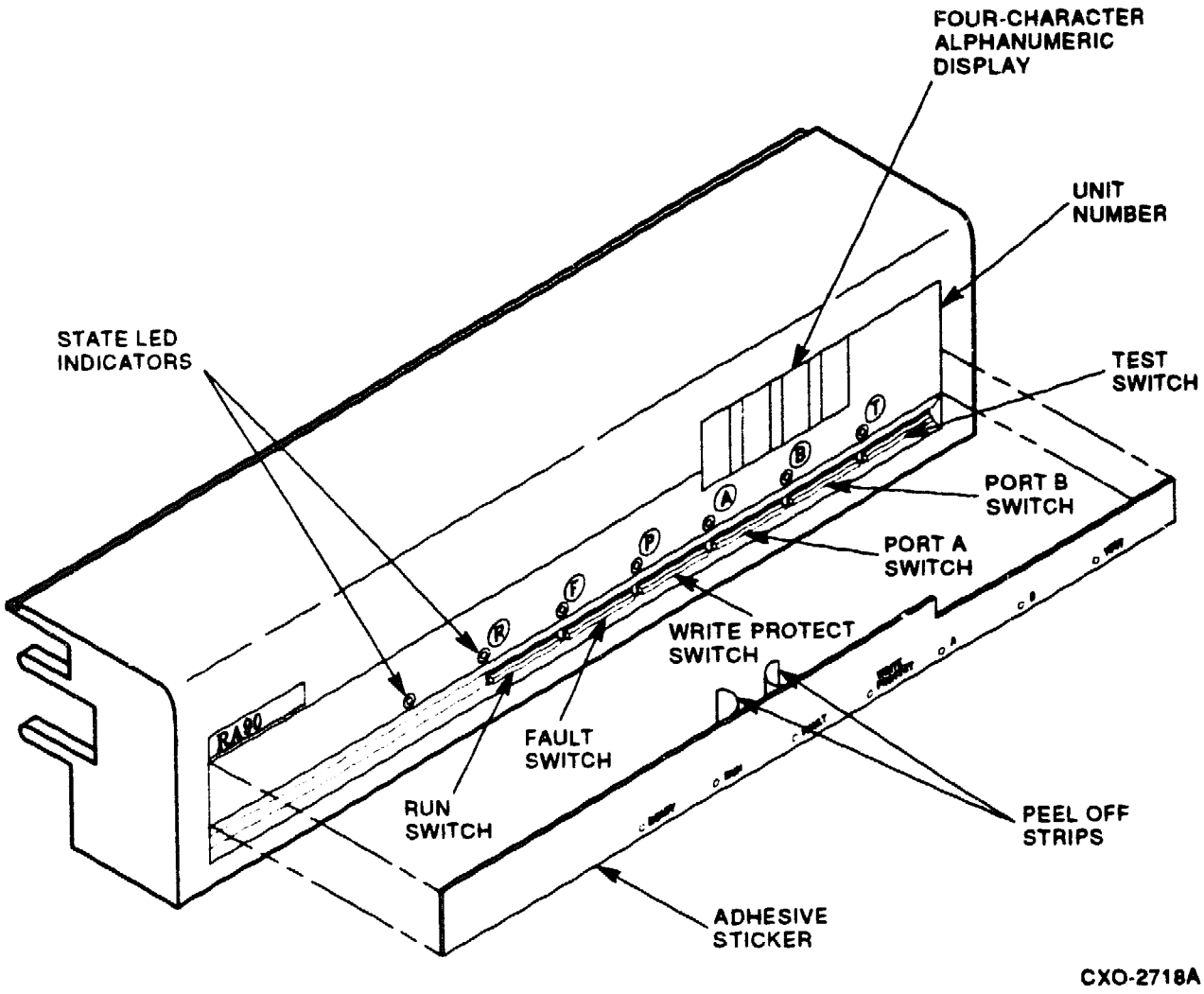


Figure 4–1 Front View of the RA90 Disk Drive

There are no physical in or out states for the RA90 front panel switches. Instead, the state of the switch changes when you select an OCP switch.

Under normal operating conditions, the switch state is displayed by an alphabetic character. For example, selecting the Run switch causes the letter *R* to appear in the OCP display.

4.2 Switch and Indicator States for RA90 Disk Drive Operating Modes

The RA90 operates in three set-up modes: normal, fault display, and test. The following sections describe the functions of each of these modes.

4.2.1 Normal Mode Setup

The normal mode setup is the usual operating mode of the RA90. No Fault or Test LEDs are lit. The switch states are shown in the OCP display, and the LED indicators show the state of the drive.

During normal operations, you can select the following switches:

Switch	Function	Display
Run	Spins up the drive	The letter *R* appears and the Run indicator lights. When the drive is up to speed, the Ready indicator lights.
Port A or B	Makes the drive available to the controller	The letter *A* or *B* appears.
Write Protect	Write protects the drive	The Write Protect indicator lights.
Fault (without a fault)	Performs a 3-second lamp test	
Fault (with a fault)	Clears the fault	
Test	Causes the drive to enter test mode	
Test and Port A or B	Displays the unit address for 2 seconds	

4.2.2 Fault Display Mode Setup

You can enter fault mode only if the Fault indicator is lit. Otherwise, selecting the Fault switch causes an OCP lamp test. To enter the fault display mode, select the Fault switch. An error code is displayed. To exit the fault display mode and clear the fault, select the Fault switch a second time.

NOTE
Hard faults do not clear.

4.2.3 Test Mode Setup

Enter the test mode to set the RA90 unit address or to run resident diagnostics. In test mode, the switches have the following functions:

Switch	Function
Port A or B	To select unit address numbers and test numbers and abort running diagnostics.
Write Protect	To start the tests.

For a more detailed explanation of RA90 OCP switches and indicators, refer to the *RA90 Disk Drive User Guide* (EK–0RA90–UG).

4.3 RA90 Disk Drive Rear Panel Switches and Indicators

Rear panel switches and indicators are located on the power supply chassis, as shown in Figure 4–2.

WARNING
Hazardous voltages exist in the system cabinet and the RA90 disk drive. Installation and service must be performed by qualified Digital Customer Services engineers only. When performing any operation involving the source power, turn off the RA90 circuit breaker and disconnect the line cord from the RA90 disk drive rear panel and from the system cabinet power controller. Perform the operation, then reconnect the power cord.

4.3.1 RA90 Voltage Selector Switch

Before applying power to the RA90 disk drive, ensure the proper operating voltage (100/120V or 220/240V) has been selected for your area. The voltage selector switch is set at the factory for 100/120 volts and 60HZ. Refer to Figure 4 -2. Use the following procedure to select the RA90 disk drive voltage:

1. Locate the line voltage selector switch shown in Figure 4–2. This switch can be seen through the holes in the RA90 rear power supply panel.
2. Using a nonconductive pointed object, slide the switch into the correct position.

4.3.2 RA90 Circuit Breaker

The circuit breaker rocker switch is shown in Figure 4–2. Setting the switch to 1 applies power. Setting the switch to 0 turns the power off.

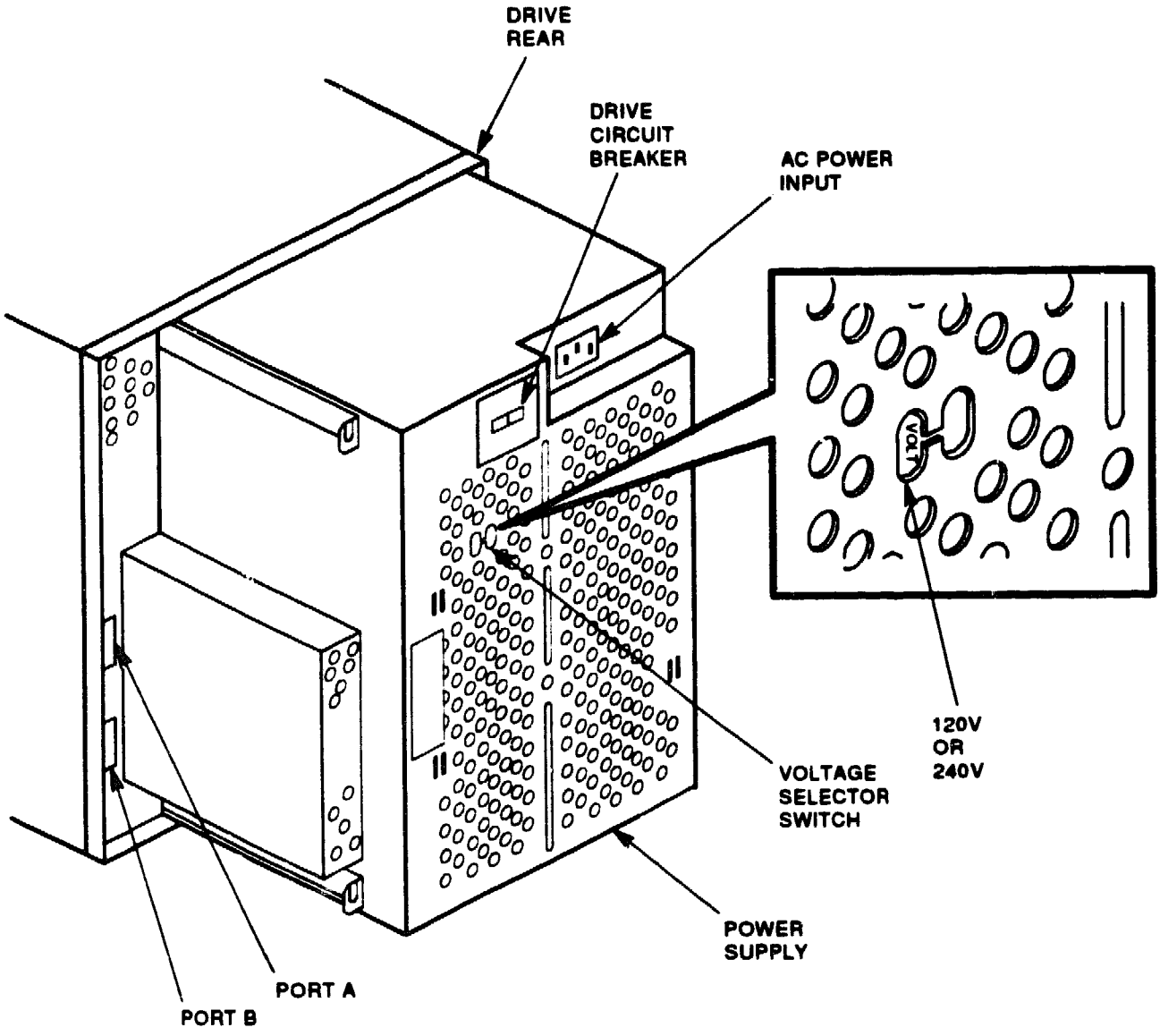
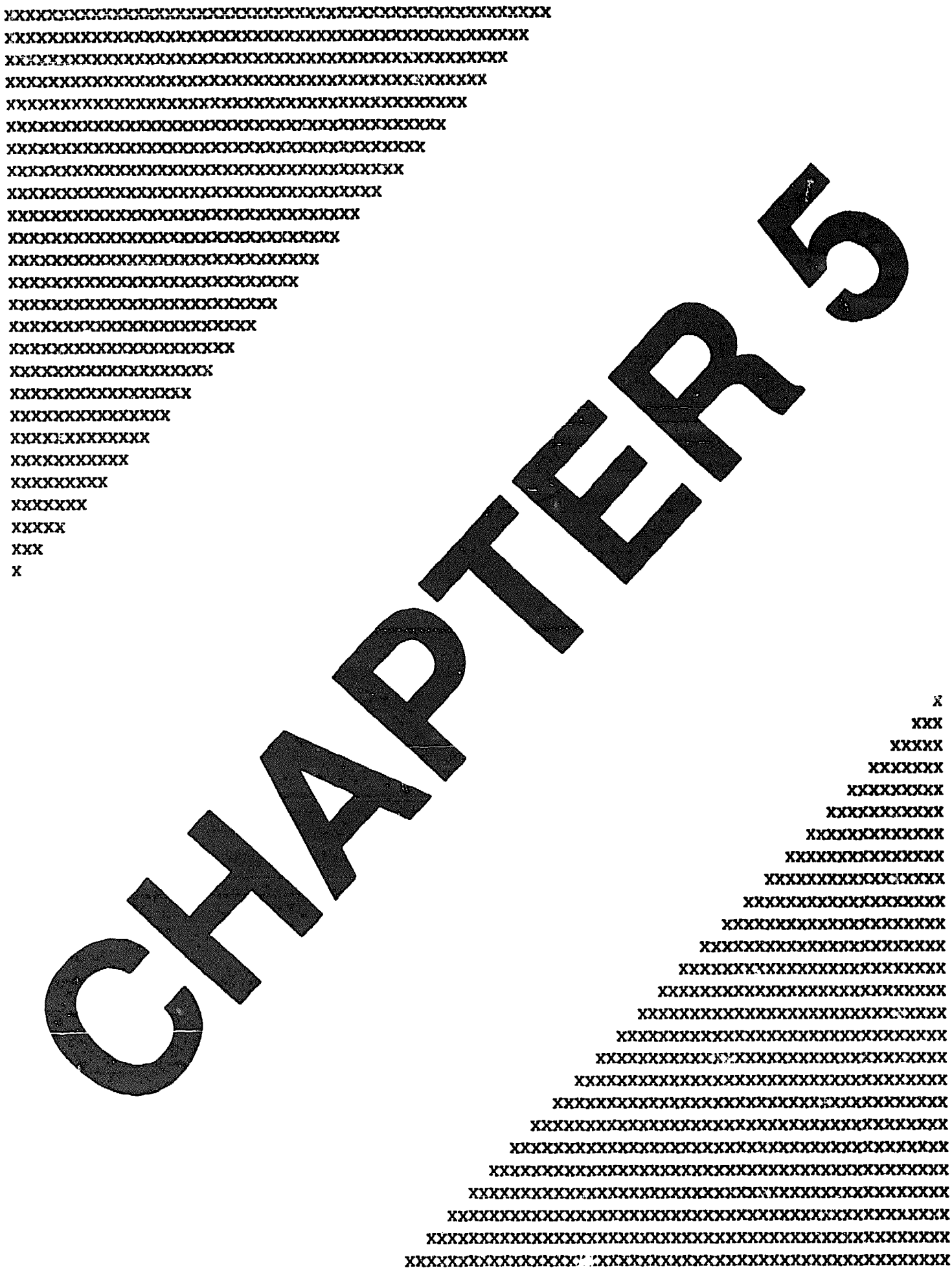


Figure 4–2 RA90 Disk Drive Rear View


CHAPTER 5

5
Powering Up the RA90 Disk Drive

This chapter explains how to use the RA90 disk drive and how to set the unit address numbers.

5.1 Applying Power to the RA90 Disk Drive

After installing the the RA90 disk drive, apply power as follows:

1. Verify the following:
   - The voltage selector switch is set to the proper voltage for your site. (Refer to Section 4.3.1.)
   - The RA90 power cord is plugged into the H405 power controller.
   - The ac power cord from the H405 power controller is plugged into an external power receptacle.
2. Push the circuit breaker T-handle on the H405 power controller to the ON position.
3. Set the RA90 circuit breaker switch to 1.
4. Verify the power is on by checking that the fan starts and normal airflow exists.

5.2 RA90 Disk Drive Power-Up Resident Diagnostics

A sequence of drive-resident diagnostics run at powerup. The sequence consists of hardcore tests with basic processor tests. Successful completion of the hardcore test is indicated by the following OCP displays:

1. Blank (1 second)
2. **WAIT** (16 seconds)
3. [0000] (The unit address may not be zero.)

After the hardcore diagnostics have successfully run, the drive automatically enters an idle loop diagnostic test sequence. This test sequence is indicated by the OCP Test LED illuminating.

Do not select any front panel switches. Allow the drive to remain in the idle loop test for 5 minutes. If you select the Run switch before the test finishes, the drive does not respond until it finishes its current idle-loop routine.

If an error occurs during the powerup or during the idle-loop testing, the drive attempts to display an error code. If a failure occurs, call your Digital Customer Services representative.

5.2.1 OCP Lamp Testing

Perform an OCP lamp test to ensure the LED state indicators and alphanumeric display are working properly. Use the following procedure before selecting an OCP switch:

1. Press the Test switch. The Test LED illuminates.
2. Select the Fault switch. All lamps illuminate. If not, ensure the OCP is seated properly and power is applied to the drive. If lamp test still fails, call your Digital Customer Services representative.
3. Deselect the Test switch.

5.2.2 Spinning Up the RA90 Disk Drive

To spin up the RA90 disk drive:

1. Select the Run switch. The Run indicator illuminates. The OCP displays the following:

```
[R...]
```

2. Allow the drive to come to the READY state as indicated by the operator control panel Ready indicator.
3. Select the Test switch. The Test LED illuminates.
4. Select the Write Protect switch. The OCP displays the following:

```
[T 00]
```

5. Select the Write Protect switch a second time to invoke 18 resident diagnostic tests. These tests take about 4 minutes.
6. Select the Test switch to exit test mode. The Test LED extinguishes and the Ready and Run indicators illuminate. The OCP displays the following:

```
[R...]
```

7. If the Port A or B switch is selected, the port switch is displayed after the unit address. For example:

```
[R AB]
```

5.3 Setting the Unit Address Numbers

Set the RA90 disk drive unit address before placing the drive online. The unit address can be set once power has been applied to the drive. The RA90 unit address is programmable from 0 to 4094.

You must enter test mode to set the unit address. In test mode, use the Port A and B switches to select the unit address numbers and test numbers. Use the following procedure to set the drive unit address. After applying power, use the switches in the order specified in the procedure.

Step	Action	Result
1	Select the Test switch.	The Test LED is lit and zeros are displayed. (Numbers may be displayed if the unit address has been previously programmed.)
2	Select the Port A switch for the ones position.	Position zero (hex) blinks.
3	Select the Port B switch.	Position zero increments one digit every time the Port B switch is selected.
4	Select the Port A switch for the tens position.	Position one blinks.
5	Select the Port B switch.	Position one increments one digit every time Port B is selected.
6	Select the Port A switch for the hundreds position.	Position two blinks.
7	Select the Port B switch.	Position two increments one digit every time Port B is selected.
8	Select the Port A switch for the thousands position.	Position three blinks.
9	Select the Port B switch.	Position three increments one through four for every time Port B is selected.
10	Select the Test switch.	The selection procedure ends.

Before exiting, you are prompted to verify that you want the unit number changed. The OCP displays the following prompt:

```
CHG UNT #? [N]
```

If you do not want to change the unit address, select the Test switch a second time.

To change the unit number:

1. Toggle the Port B switch. The following is displayed:

   ```
   CHG UNT #? [Y]
   ```

2. Select the Test switch to overwrite the old unit number with the new. The new number is displayed on the OCP. The number is stored in EEPROM in case of power loss.

Run the RA90/KDB50 diagnostics to ensure the configuration is operational.

The drive is ready to be attached to the host from the system terminal. For more information about RA90 features and functions, refer to the *RA90 Disk Drive User Guide* (EK–0RA90–IG).


INDEX

Index

S

T

U

V