

VAXstation 4000

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## Options Installation Guide

Order Number: EK-VAXOP-IN. B01

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**First Printing, August 1992**  
**Second Printing, March 1994**

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S2532

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## Preface

### Purpose

This guide explains how to install, test, and use options for the VAXstation 4000 Model 60 and Model 90 systems. Some of the options are installed inside the system unit; others are attached to the system by a cable. To install options in the expansion box, refer to the *BA46 Storage Expansion Box Owner's Guide*.

For information explaining how to install options in the VAXstation 4000 VLC system unit, see the *VAXstation 4000 VLC Owner's Guide*.

### Intended Audience

This guide is for anyone who installs options in the VAXstation 4000 Model 60 or VAXstation 4000 Model 90 workstations.

### Structure

This guide contains an introductory chapter followed by chapters that describe each installable option for the VAXstation 4000 system. It also contains five appendixes, a glossary, and an index.

- Chapter 1 provides an overview of the internal options for the VAXstation 4000, and tells how to prepare the system for installation. It also gives the sequence for adding devices.
- Chapter 2 explains how to install and use the RRD42 compact disc drive. It also includes cabling information, SCSI ID settings, and hardware specifications.
- Chapter 3 explains how to install and use the RX26 diskette drive. It also includes cabling information, SCSI ID settings, and hardware specifications.
- Chapter 4 explains how to install the TZK10 tape drive. It also includes cabling information, SCSI ID settings, and hardware specifications.

- Chapter 5 explains how to install the TLZ06 tape drive. It also includes cabling information, SCSI ID settings, and hardware specifications.
- Chapter 6 explains how to install the RZ2x fixed disk drives. It also includes cabling information, SCSI ID settings, and hardware specifications.
- Chapter 7 explains how to install and remove memory boards in the system unit.
- Chapter 8 explains how to install and remove graphics boards in the system unit.
- Chapter 9 explains how to install the synchronous communications option in the system unit.
- Chapter 10 explains how to install and use the TURBOchannel adapter and option. It also includes hardware specifications.
- Chapter 11 explains how to restore, start, and test the system unit.
- Chapter 12 explains how to connect printers and modems to your system.
- Chapter 13 tells how to install the remote cable option.
- Chapter 14 describes other external options for the VAXstation 4000 system.
- Appendix A provides commands for testing TURBOchannel options.
- Appendix B provides recommended SCSI address settings.
- Appendix C contains port pin-out information for adding peripheral devices to your system unit.
- Appendix D provides a list of associated documentation.
- Appendix E contains the VAXstation 4000 Errata sheet, which provides important information for VAXstation customers.
- The glossary defines technical or unfamiliar terms.
- The index provides references to information within this guide.

## Conventions

The following conventions are used in this guide:

RZ2 <i>x</i>	RZ2 <i>x</i> refers to any of the RZ2-series fixed disk drives
<span style="border: 1px solid black; padding: 2px;">Return</span>	A key name is shown enclosed to indicate that you press a named key on the keyboard.
<b>bold</b>	Bold type in examples indicates commands that you must enter from the keyboard.
<i>italic</i>	Italics indicate important information, a document title, or a variable.
WARNING:	Warnings contain information to prevent personal injury. Read these carefully.
CAUTION:	Cautions provide information to prevent damage to equipment or software. Read these carefully.



# 1

---

## Options for Your VAXstation 4000 System

### **Introduction**

This chapter describes which options you can add in your system unit, and explains the sequence in which to install them.

### **Chapter Topics**

This chapter covers the following topics:

- Options You Can Add
- Adding Options in Sequence
- Preparing Your System

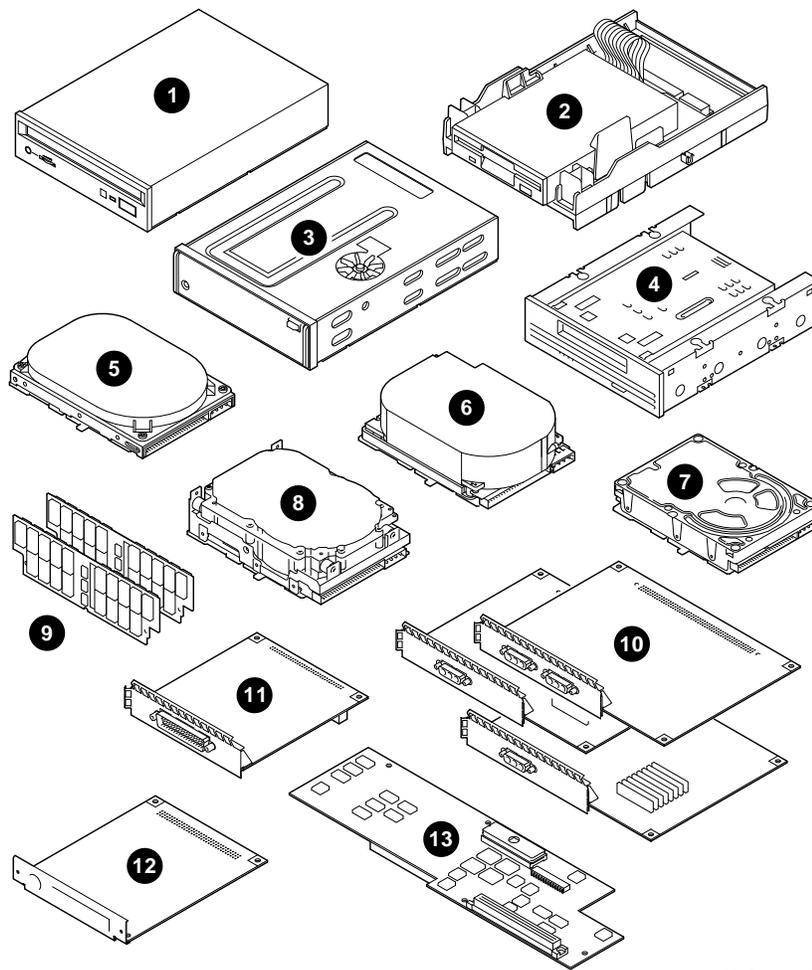
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## Options You Can Add

### Available Options

Figure 1–1 shows which options you can add in your system unit.

**Figure 1–1 VAXstation 4000 System Unit Options**



MLO-008099

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## Adding Options in Sequence

### Names of Options

The names of the options shown in Figure 1–1 are as follows:

- ❶ RRD42 compact disc drive
- ❷ RX26 diskette drive
- ❸ TZK10 tape drive
- ❹ TLZ06 tape drive
- ❺ RZ23L fixed disk drive
- ❻ RZ24 fixed disk drive
- ❼ RZ24L fixed disk drive
- ❽ RZ25 fixed disk drive
- ❾ Memory boards
- ❿ Graphics boards
- ⓫ Synchronous communications board
- ⓬ TURBOchannel option
- ⓭ TURBOchannel adapter

### Sequence for Adding Options

Add options to your VAXstation 4000 system in this sequence:

1. Removable media drives (RRD42, RX26, or TZK10, TLZ06)
2. Fixed disk drives (RZ23L, RZ24, RZ24L, RZ25, RZ25L, RZ26B)
3. Memory boards
4. Communications devices (synchronous communications, or TURBOchannel)
5. Graphics boards

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## Preparing Your System

### Read These Cautions

Read each caution in Table 1–1 before you remove the system cover.

**Table 1–1 Cautions About Opening Your System Unit**

Topic	Caution
Network group	Notify your system manager and work group members if your system is part of a networked group or cluster, before you turn off your system.
Time	Allow at least five minutes from the time the system unit power is turned off until you remove the system unit cover. This gives the power supply capacitors time to discharge safely.
Static discharge	To avoid damage from static discharge, as soon as you remove the cover, touch the metal space marked TOUCH HERE on the top of the power supply.
Antistatic wrist strap	Digital recommends that you wear an antistatic wrist strap when adding devices inside the system unit.

**Overview  
of System  
Preparation**

Table 1–2 lists the steps to prepare your system for an option installation. The sections following the table explain each step in more detail.

**Table 1–2 Steps to Prepare Your System for an Option Installation**

---

1.	Back up your files.
2.	Shut down all software.
3.	Halt your system.
4.	Check the system configuration.
5.	Turn off (O) your system.
6.	Remove the system cover.

---

**Backup and  
Shutdown**

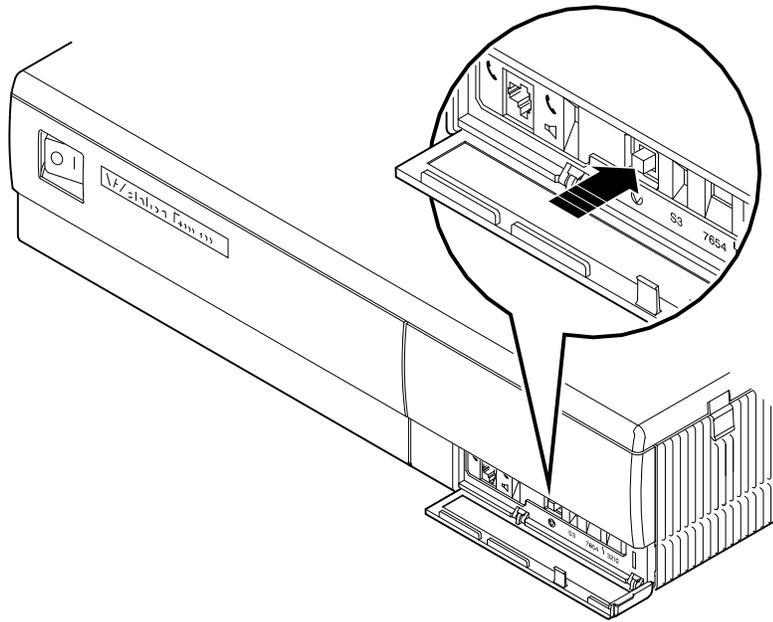
Follow the instructions in your software documentation to back up your files, and shut down the system software.

## Preparing Your System

### Halt Your System

Press the Halt button, shown in Figure 1-2.

**Figure 1-2 Halt Button**



MLO-008495

**Check Your Configuration**

After you press the halt button, you should see the console prompt (>>>) on your screen. Enter the SHOW CONFIG command at the console prompt to show the devices on your system and their status. Figure 1-3 shows an example of a configuration display. The next section explains the numbered elements in the display.

**Figure 1-3 SHOW CONFIG Display**

```

1 >>> SHOW CONFIG
2 KA4n-A Vn.n
3 08-00-2B-0A-7D-CB
4 32MB
5
6
7
8
  DEVNBR  DEVNAM  INFO
  -----  -----  -----
   1      NVR      OK
   2      LCSPX     OK
   3      DZ        OK
   4      CACHE     OK
   5      MEM        OK
   6      FPU        OK
   7      IT         OK
   8      SYS        OK
   9      NI         OK
  10     SCSI       OK
  11     AUD        OK
  12     COMM       OK
  13     TCA        OK
      OPT PRS V1.0
  >>>
  Highres 8 Plane 4Mpixel FB-Vn.n
  32MB 0A,0B,0C,0D=16MB, 1E,1F,1G,1H=16MB
  0-RZ24 5-RZ25 6-INITR
  
```

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## Preparing Your System

### Read the SHOW CONFIG Display

Numbered elements in Figure 1-3:

- ❶ CPU type (Model 60=KA46, Model 90=KA49) and firmware version number
- ❷ Ethernet hardware address
- ❸ Memory size
- ❹ Column headings (Device number, Device name, Information)
- ❺ Graphics line
- ❻ Memory modules
- ❼ Informational message
- ❽ SCSI line

You should see the message OK next to each device name.

**Error Indicators**

Two question marks next to a device name in the configuration display indicate an error. If you see an error indicator next to any device name, as shown in Figure 1-4 ❶, note the ID number ❷ and error number ❸. Your Digital service representative will replace any device.

**Figure 1-4 Configuration Display with Error**

```

>>> SHOW CONFIG
KA4n-A Vn.n
08-00-2B-0A-7D-CB
32MB
-----
DEVNBR  DEVNAM  INFO
-----
  1      NVR     OK
  2      LCSPX   OK
                Highres 8 Plane 4Mpixel FB-Vn.n
  3      DZ      OK
  4      CACHE   OK
  5      MEM     OK
                32MB 0A,0B,0C,0D=16MB, 1E,1F,1G,1H=16MB
  6      FPU     OK
  7      IT      OK
❶  8      SYS     OK
  9      NI      ?? 001 0172
❷ 10      SCSI    OK
                0-RZ24 5-RZ25 6-INITR
❸ 11      AUD     OK
 12      COMM   OK
 13      TCA    OK
                OPT PRS V1.0
>>>
    
```

MLO-009401

## Preparing Your System

### **Turn Off Your System**

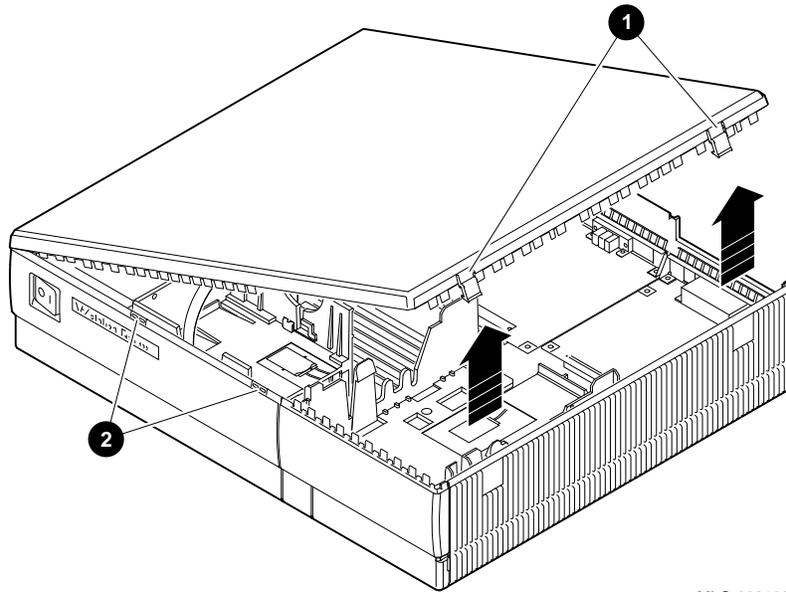
Turn off (O) your system in the following order:

1. System unit
2. Expansion boxes
3. All peripheral devices (such as printers and modems)
4. Monitor (Use the monitor On/Off switch. The monitor power does not turn off when the system unit is turned off.)

### **Remove the System Cover**

Remove the system cover, as shown in Figure 1-5, by carefully releasing the latches (❶) on the right side of the cover. Then pull the cover up and away. You will need to pull forcefully to release the retention devices (❷) on the middle of the front and rear edges of the cover. Pulling forcefully will not break the cover.

Figure 1-5 Removing the System Cover



MLO-008100

**CAUTION:**  
**Static**  
**Discharge**

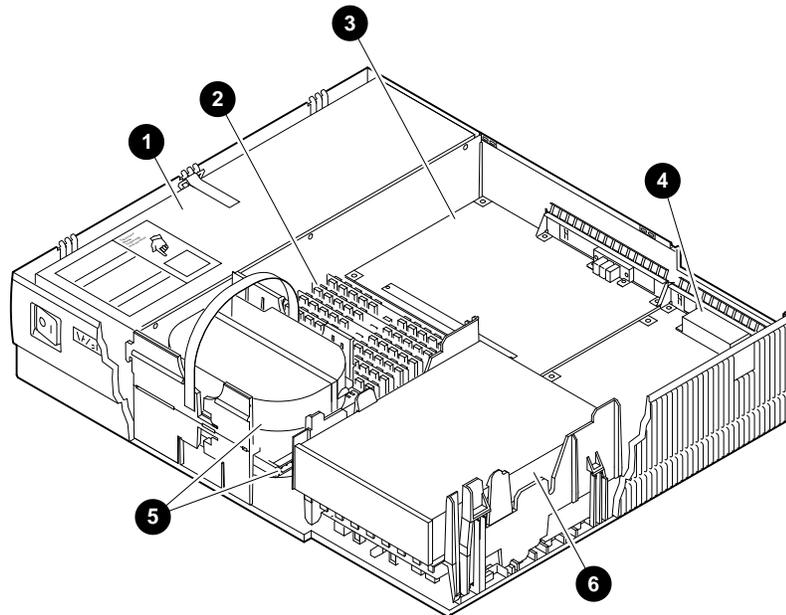
To avoid damage from static discharge, as soon as you remove the cover and before touching anything inside the system unit, touch the TOUCH ME FIRST label on the top of the power supply. Digital also recommends that you wear an antistatic wrist strap and use an antistatic mat when adding options inside the system unit.

## Preparing Your System

### Option Locations

Figure 1-6 shows the location of each option in the system unit. The figure also shows the location of the power supply.

**Figure 1-6 Option Locations**



MLO-008101

- ❶ Power supply
- ❷ Memory modules
- ❸ Graphics board
- ❹ Communications devices (synchronous communications option, quad-screen option (Model 60 only) or TURBOchannel option)
- ❺ Fixed disk drives
- ❻ Removable media devices (RRD42, RX26, TZK10 or TLZ06 drives)

# 2

---

## RRD42 Compact Disc Drive

### Introduction

This chapter describes the features of the RRD42 compact disc drive and explains how to install it in your VAXstation 4000 system unit, as well as how to use it.

### Chapter Topics

This chapter covers the following topics:

- RRD42 Compact Disc Drive Features
- Setting the RRD42 SCSI ID
- Installing the RRD42 Drive
- Connecting the SCSI and Power Cables
- Handling and Storing Compact Discs
- RRD42 Compact Disc Drive Specifications

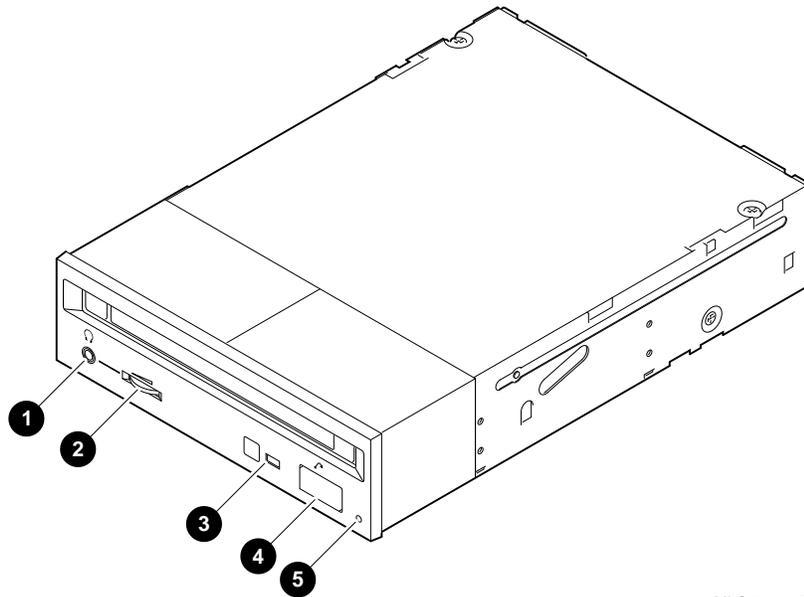
---

## RRD42 Compact Disc Drive Features

### What It Looks Like

Figure 2-1 shows the RRD42 compact disc drive and its controls and indicators.

**Figure 2-1 RRD42 Compact Disc Drive**



MLO-008115

## Controls and Indicators

Table 2–1 explains each RRD42 control or indicator shown in Figure 2–1.

**Table 2–1 RRD42 Controls and Indicators**

	Use this:	To do this:
❶	Headset jack	Insert a headphone
❷	Headset level control	Control the volume
❸	Busy indicator light	Determine if data is being read from the disc ( <i>steady light</i> ) or if a seek operation is being performed ( <i>blinking light</i> )
❹	Eject button	Remove a disc
❺	Manual eject hole	Manually remove a disc

## Overview of Features

The RRD42 compact disc drive, shown in Figure 2–1, has the following features:

- 600-megabyte capacity
- SCSI bus interface
- Audio disc playback with audio line output and headset jack
- Compact disc caddy for disc protection
- Fast access time for high-speed reading operations
- Manual loading and power eject capabilities
- A manual eject function

---

## Setting the RRD42 SCSI ID

### Verify the Jumpers

Before installing the RRD42 drive, verify the positions of the removable electrical connectors, called jumpers, on the rear of the drive, as follows:

Turn the RRD42 drive so that the rear of the drive is facing you. Locate the Mode jumper position and the SCSI ID jumper positions 0, 1, and 2, shown in Figure 2–2.

### The Mode Jumper

Be sure the Mode jumper is in place. This jumper must be in place to use the drive with the VMS operating system.

### The SCSI Jumpers

Verify that SCSI ID jumper 2 is in place and SCSI ID jumpers 0 and 1 are removed, as shown in Figure 2–2. This is the default setting for SCSI ID 4, the SCSI ID setting that your RRD42 drive normally uses.

### Changing the SCSI Default

Default settings should be changed *only* when a system is configured with more than one of a particular device. You are responsible for the SCSI ID settings on your equipment.

If you want to change the setting, choose a new ID from Table B–1. Carefully remove or replace jumpers, referring to the SCSI settings in Figure 2–2. Use tweezers or another small tool to change the jumpers.

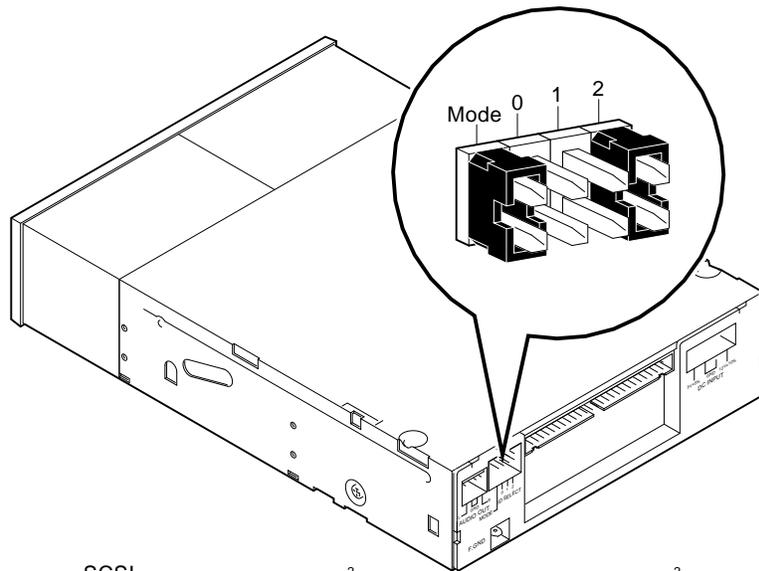
Save any SCSI jumpers you remove. You may need them later.

### Unique SCSI ID

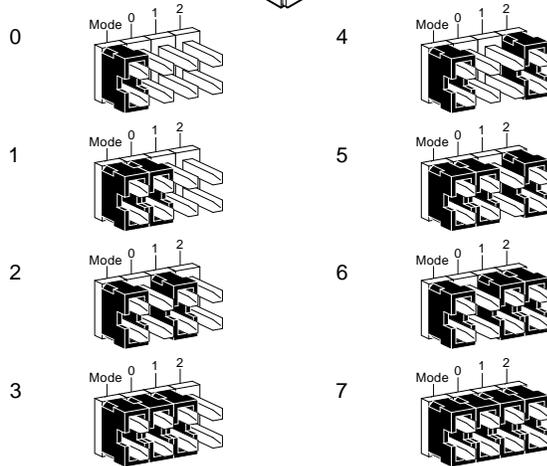
Each SCSI device must have a unique SCSI ID. Never set two or more SCSI devices to the same SCSI ID; the system will not be able to communicate with the devices.

Setting the RRD42 SCSI ID

Figure 2-2 Verifying the RRD42 Drive SCSI ID



SCSI Settings: 0



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---

## Installing the RRD42 Drive

### Important

Prepare your system, as instructed in Chapter 1, before you install this option.

### Installation Overview

Table 2–2 provides an overview of the installation steps. The sections following the table explain each step in more detail.

**Table 2–2 Installation Steps for the RRD42 Compact Disc Drive**

- 
1. Locate and remove the removable media bracket.
  2. Remove the diagnostics board.
  3. Replace the blank bezel in the system unit with the RRD42 bezel shipped with the drive.
  4. Replace the diagnostics board.
  5. Replace the media bracket.
  6. Install the drive in the bracket.
  7. Connect the SCSI and power cables.
- 

### Before You Begin

Remove the fixed disk drive H-bracket, so you can access the removable media bracket catches. See Chapter 6 for instructions, if necessary.

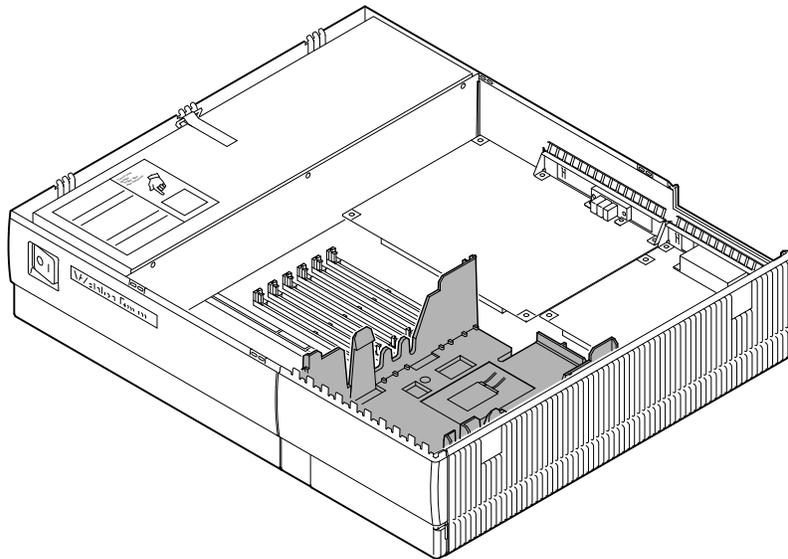
Remove the SPXgt graphics frame buffer, if you have one. See Chapter 8, if necessary.

## Installing the RRD42 Drive

### Locate the Removable Media Bracket

Figure 2-3 shows the location of the removable media bracket.

**Figure 2-3 Location of the Removable Media Bracket**



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### **WARNING:** Sharp Edges

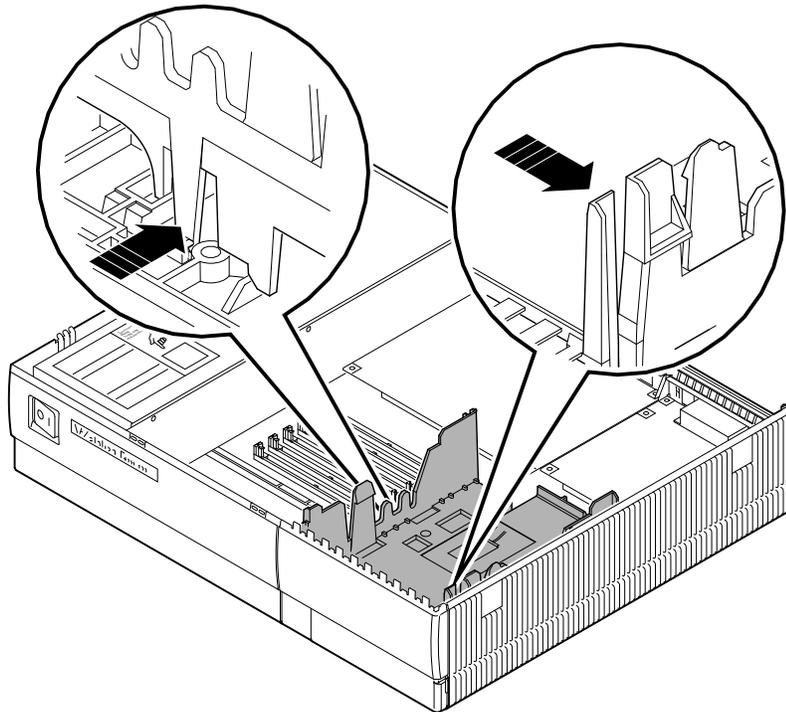
When removing or replacing the removable media bracket, do not touch the sharp plastic edges on the top edge of the bezel.

## Installing the RRD42 Drive

### Remove the Media Bracket

Remove the bracket from the system unit by releasing the two cantilever catches (as shown in Figure 2-4) and lifting the bracket straight up. Pulling up hard will not break the bracket.

**Figure 2-4 Removing the Removable Media Bracket**



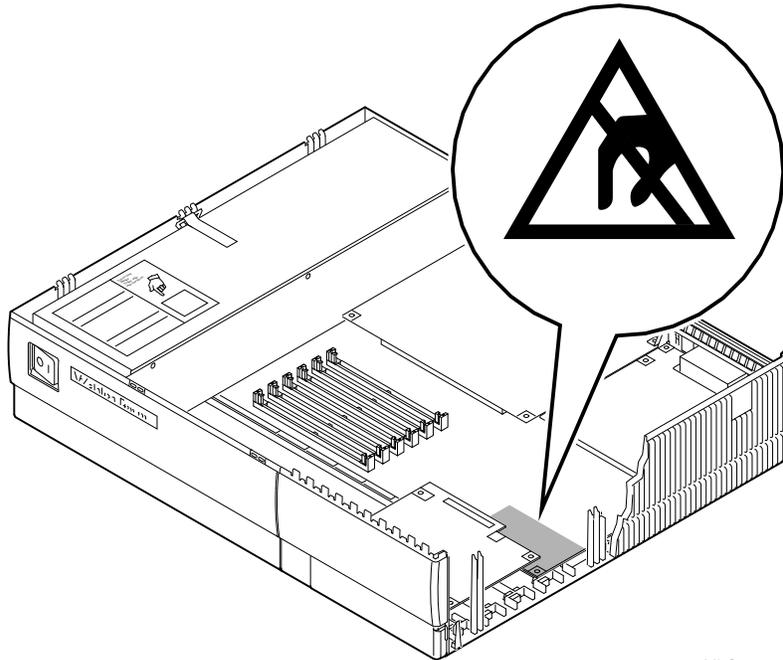
MLO-008103

## Installing the RRD42 Drive

**CAUTION:**  
**Avoid Damage**  
**to Components**

When removing the diagnostic board (in the next step) be very careful to avoid touching the CPU board in the area shown in Figure 2-5. Touching the board in the area indicated could damage some of the components on the board.

**Figure 2-5 Avoid Touching This Area!**



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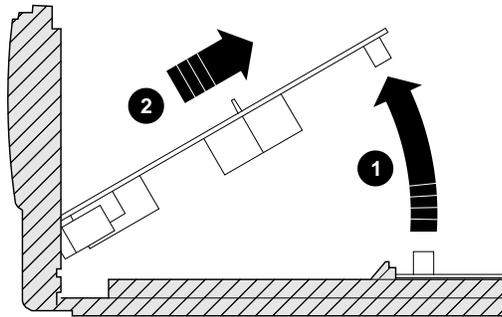
## Installing the RRD42 Drive

### Remove the Diagnostics Board

To remove the diagnostics board from the system unit, follow these steps and refer to Figure 2-6.

1. Pull up on the rear edge of the board, releasing the connectors **1**.
2. Slide the board **2** out of the system unit.

**Figure 2-6 Removing the Diagnostics Board**



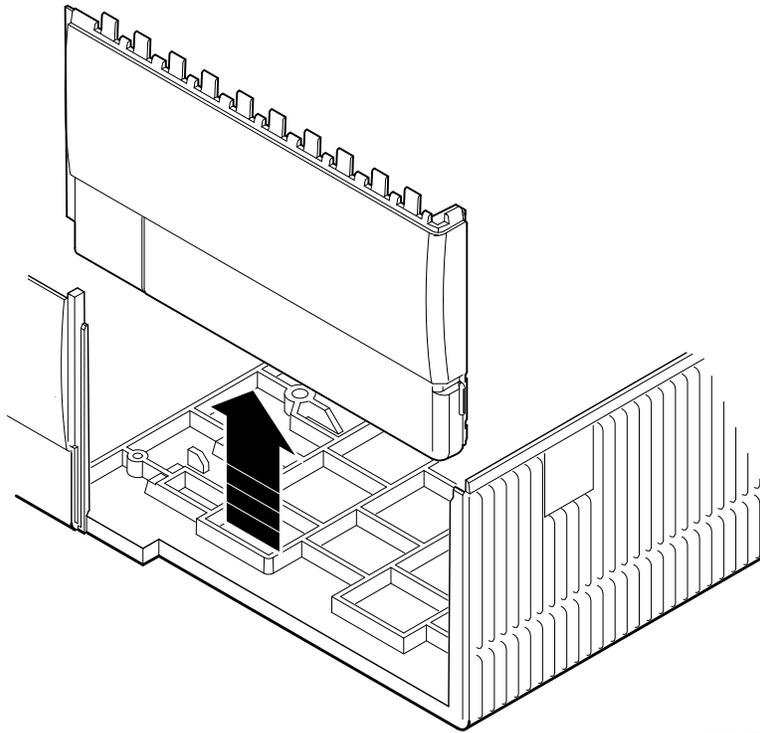
MLO-008104

## Installing the RRD42 Drive

### Remove the Bezel

Remove the blank bezel from the front of the system unit by pulling the bezel up, as shown in Figure 2-7.

**Figure 2-7 Removing the Blank Bezel from the System Unit**



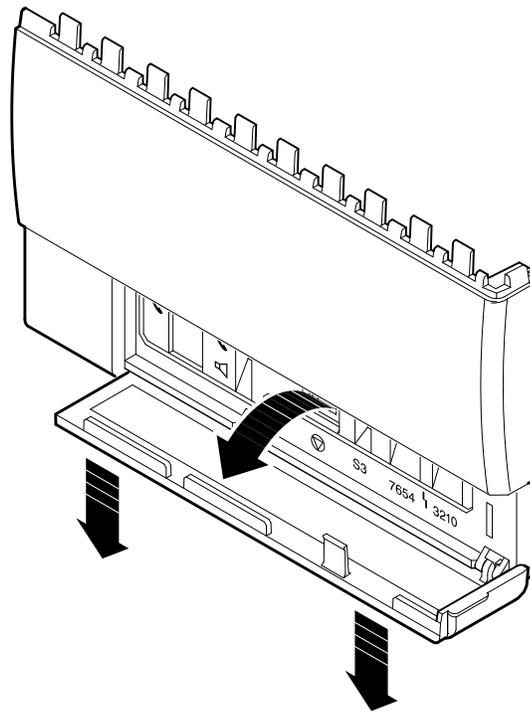
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## Installing the RRD42 Drive

### Remove and Re-install the Door

Carefully remove the door from the blank bezel by pressing down on its front edge, as shown in Figure 2-8.

**Figure 2-8 Removing the Door from the Bezel**



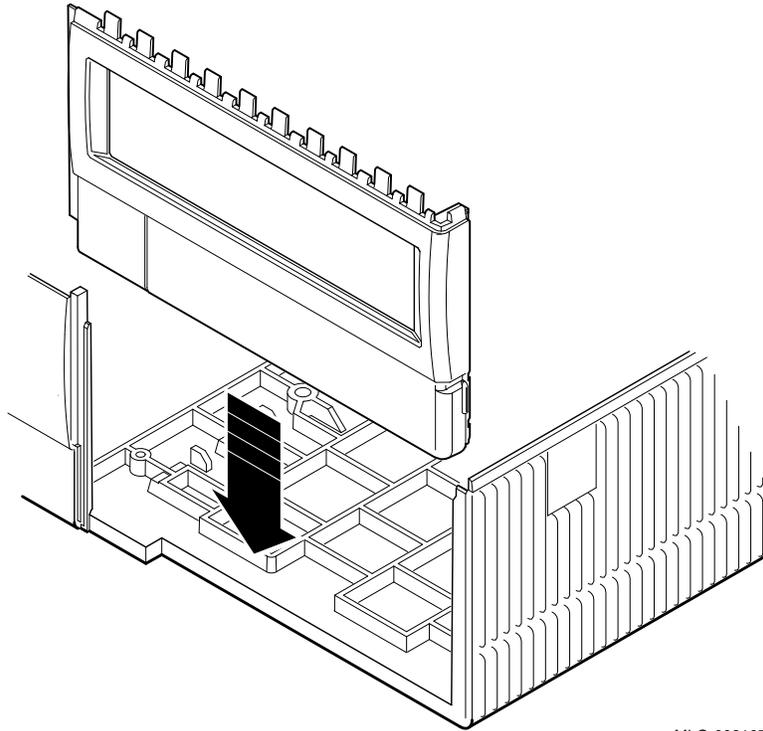
MLO-008106

Snap the door onto the RRD42 bezel at the two hinges. Close the door.

### Install the RRD42 Bezel

Slide the RRD42 bezel into the front panel on the system unit, as shown in Figure 2-9. The ridges on the bezel slide into the grooves on the system unit.

**Figure 2-9 Installing the RRD42 Bezel in the System Unit**



MLO-008107

### Steps to Replace the Diagnostics Board

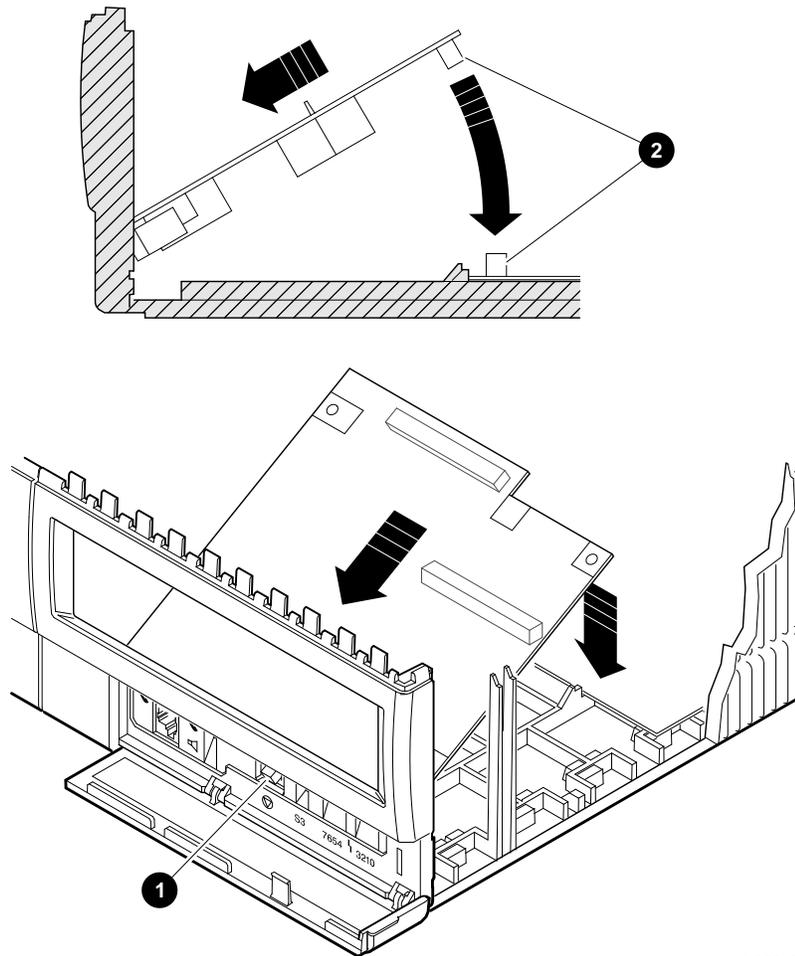
To replace the diagnostics board, follow these steps and refer to Figure 2-10:

1. Fit the front edge of the board into the notches on the inside of the bezel.
2. Align the square halt button **1** on the board with the square hole in the bezel.

## Installing the RRD42 Drive

3. Press down on the rear edge of the board, to ensure the connectors **2** are firmly seated.

**Figure 2-10** Replacing the Diagnostics Board

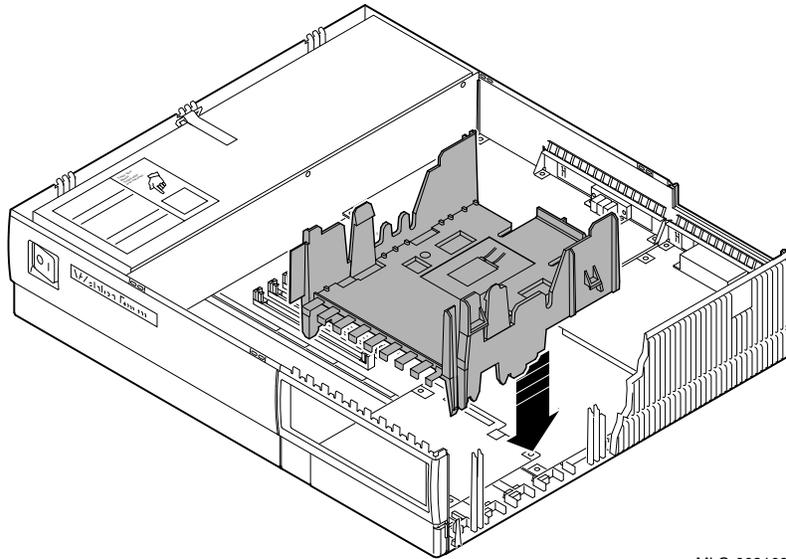


MLO-008108

**Replace the Media Bracket**

Place the removable media bracket in the system unit, as shown in Figure 2–11. The bracket slides down along two keys molded in the inside wall of the system unit, and latches on the front corner when it is fully seated.

**Figure 2–11 Replacing the Removable Media Bracket in the System Unit**



MLO-008109

**CAUTION:  
Position Cables**

Be careful not to catch the power and SCSI cables for the drives under the removable media bracket. See the cable routing information in Chapter 11.

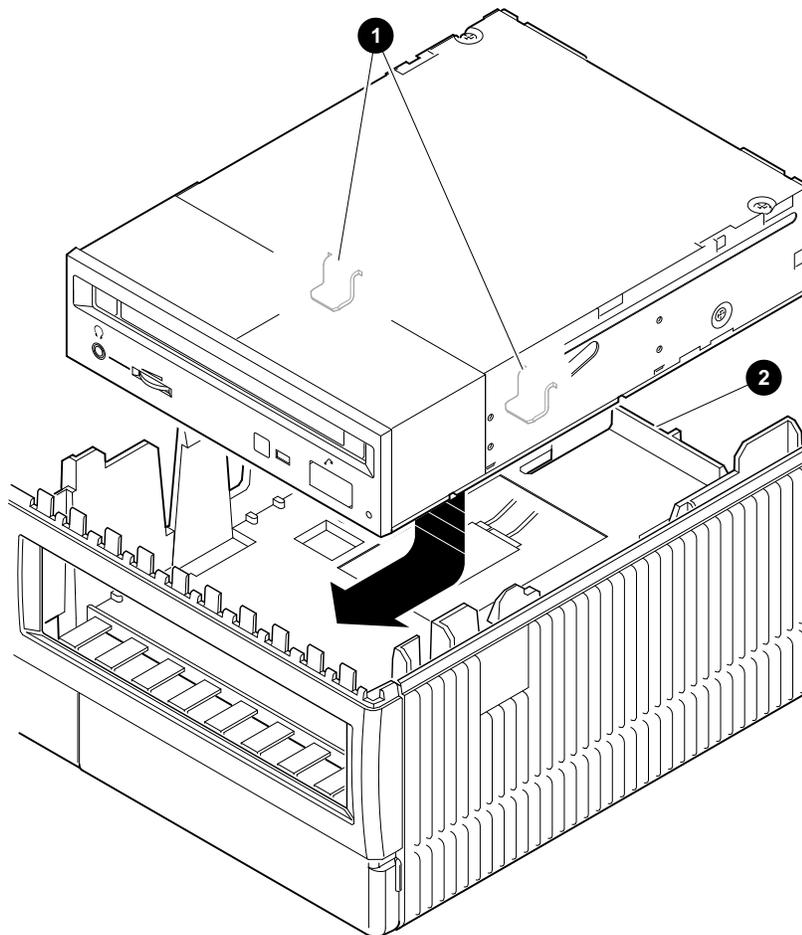
## Installing the RRD42 Drive

### Install the Drive in the Bracket

Place the RRD42 drive in the removable media bracket, as shown in Figure 2–12.

When the drive is seated, slide it forward to lock it in place. Clips **1** on the underside of the drive will lock into the bracket, and a latch **2** on the bracket will engage the rear of the drive.

**Figure 2–12** Placing the RRD42 Drive in the Bracket



MLO-008110

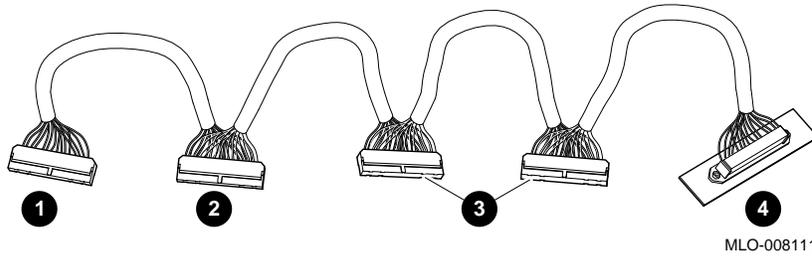
---

## Connecting the SCSI and Power Cables

### Locate the SCSI Cable

Locate the SCSI cable, shown in Figure 2–13, and identify the SCSI connector ❷ for the RRD42 drive.

**Figure 2–13 SCSI Cable and Connectors**



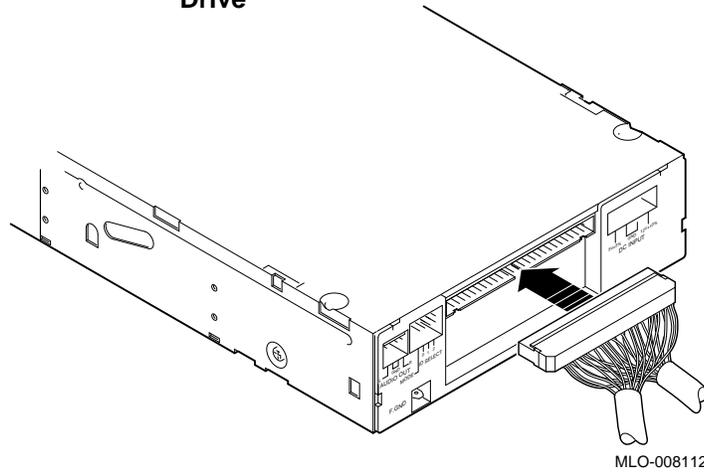
- ❶ CPU connector
- ❷ RRD42 connector
- ❸ RZ2x connectors
- ❹ Rear panel SCSI port

## Connecting the SCSI and Power Cables

### Connect the SCSI Cable

Connect the RRD42 SCSI connector to the SCSI port on the RRD42 drive, as shown in Figure 2-14.

**Figure 2-14** Connecting the SCSI Connector to the RRD42 Drive



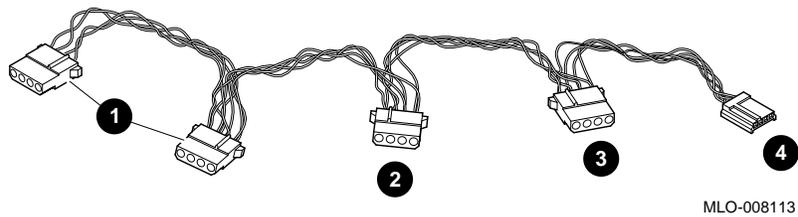
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## Connecting the SCSI and Power Cables

### Locate the Power Cable

Locate the power cable, shown in Figure 2–15, and identify the connector ❸ for the RRD42 drive.

**Figure 2–15 Power Cable and Connectors**



MLO-008113

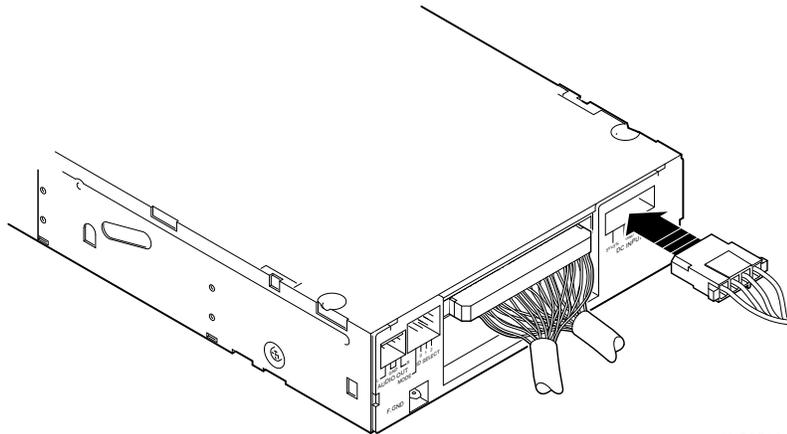
- ❶ RZ2x connectors
- ❷ CPU connector
- ❸ RRD42 connector
- ❹ RX26 connector

## Connecting the SCSI and Power Cables

### Connect the Power Cable

Connect the RRD42 power connector to the power port of the RRD42 drive, as shown in Figure 2–16.

**Figure 2–16 Connecting the Power Connector to the RRD42 Drive**



MLO-008114

### Replace H-Bracket

Place the H-bracket back in the system unit now. See Chapter 6, if necessary.

### Replace SPXgt Frame Buffer

If you removed the SPXgt frame buffer, replace it now. See Chapter 8, if necessary.

### Testing the Installation

This completes the installation of the RRD42 compact disc drive. To test your installation of the RRD42 compact disc drive, see Chapter 11.

---

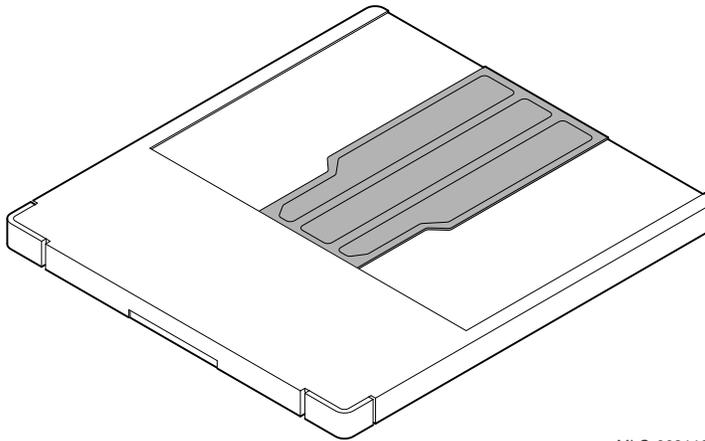
## Handling and Storing Compact Discs

### Guidelines

Take the following precautions when handling and storing compact discs and the disc caddies into which discs are loaded:

- Do not drop the disc or the caddy.
- Do not disassemble the caddy; it has been precisely adjusted at the factory.
- Do not touch the surface of a disc; always handle a disc by its edges.
- Never manually open the caddy shutter, shown in Figure 2–17. The caddy shutter opens automatically when you insert the caddy into the drive.

**Figure 2–17 Compact Disc Caddy Shutter**



MLO-008116

- Store discs and caddies away from dust.
- Keep discs and caddies out of direct sunlight, and away from heaters and other heat sources.
- Wipe a disc with a lint-free cloth when dust or fingerprints contaminate its surface.

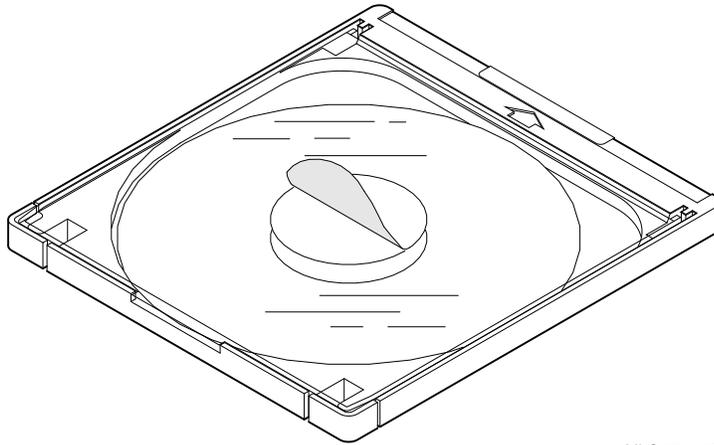
## Handling and Storing Compact Discs

- Wipe clean in a straight line, from the center to the edge, not in circles.

### Removing the Protective Film

If there is a protective film on the center of the caddy lid, remove the film, as shown in Figure 2-18, before using the caddy.

**Figure 2-18 Removing the Protective Film on a Compact Disc Caddy**

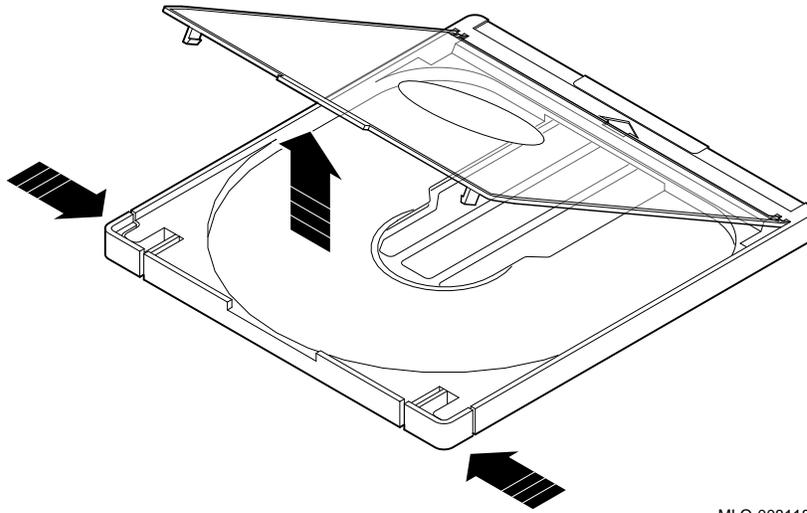


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**Opening the Caddy**

Open the caddy by pressing the tabs on both sides of the caddy at the end opposite the shutter, as shown in Figure 2–19.

**Figure 2–19 Opening the Compact Disc Caddy**



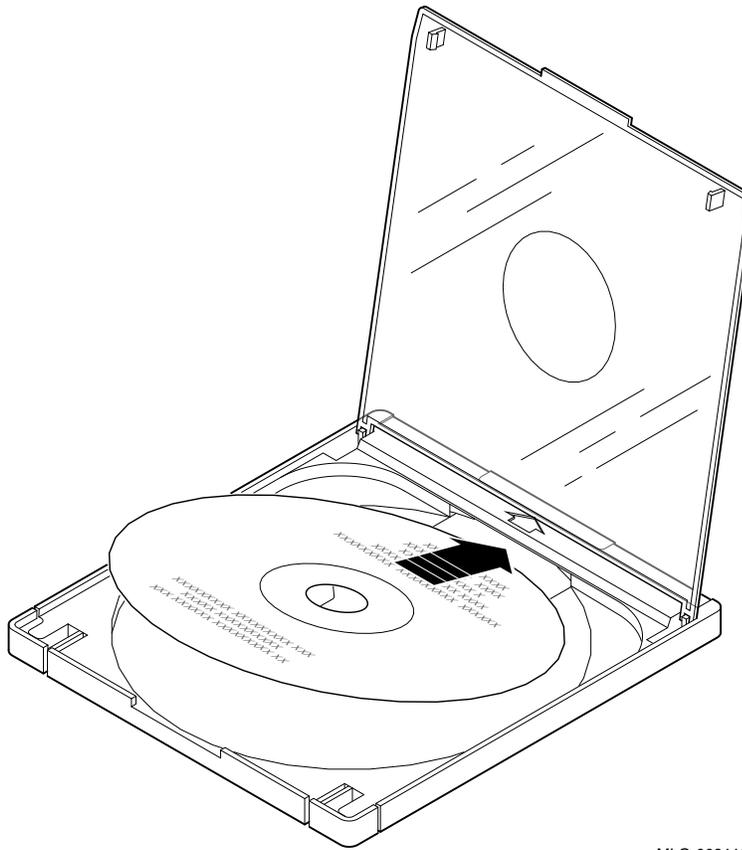
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## Handling and Storing Compact Discs

### Putting the Disc in the Caddy

Set a disc, with its printed side up, into the caddy, as shown in Figure 2–20.

**Figure 2–20 Loading a Compact Disc into a Caddy**



MLO-008119

Close the caddy lid by pressing both corners firmly until they snap into place.

### **CAUTION: Disc Malfunctions**

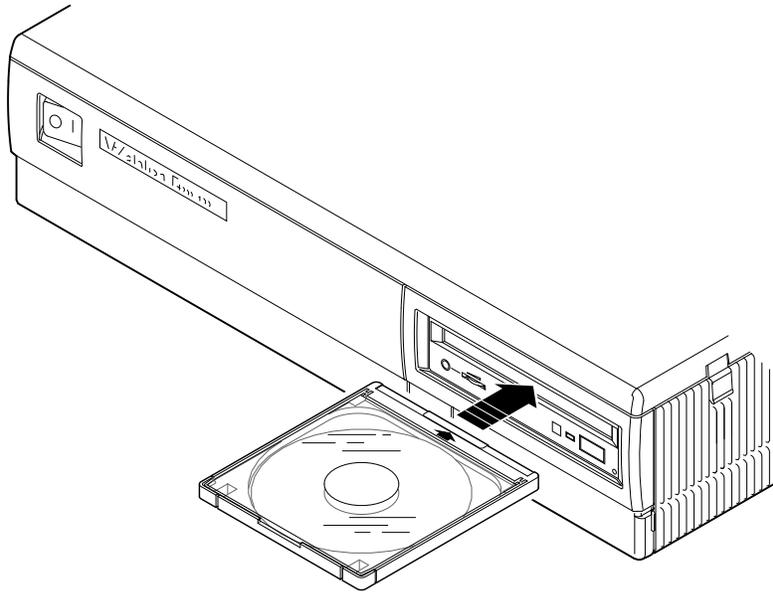
Always handle a disc by its edges; do not touch the surface. If you do get fingerprints and dust on the disc, which can cause it to malfunction, wipe the disc with a lint-free cloth.

## Inserting a Loaded Caddy

To insert a loaded compact disc caddy into the drive:

1. Make sure the system unit is turned on ( | ).
2. Insert the disc caddy into the drive with the arrow label on the caddy facing up, as shown in Figure 2–21. Push the caddy into the drive as far as it will go. The caddy should be completely within the drive when properly inserted.

**Figure 2–21** Inserting a Compact Disc Caddy into the Drive



MLO-008120

3. Check the indicator light, which comes on when the caddy has been inserted correctly.  
The caddy ejects if the enclosed disc is upside down, if the disc is improperly positioned in the caddy, or if any other conditions prevent the drive from reading the disc.
4. When the indicator light goes off, the compact disc drive is ready to use. To use the software on the compact disc, follow the instructions provided with your system software.

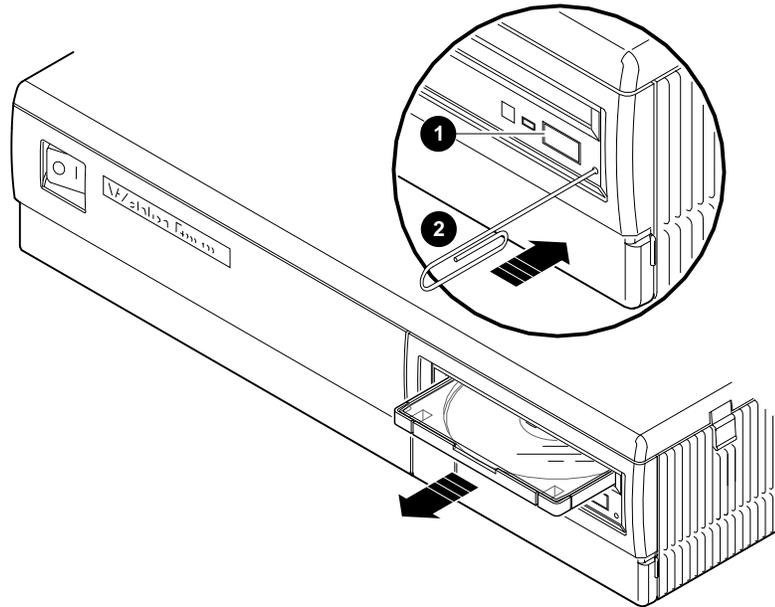
## Handling and Storing Compact Discs

### Removing a Caddy

To remove a compact disc caddy, press the eject button ❶. If the eject button is disabled under the control of the software, you can remove the disc manually, as follows:

1. Turn off (O) the system unit, as described in Chapter 1.
2. Insert a steel rod the size of a large paper clip into the manual eject hole ❷, as shown in Figure 2-22, and push until the disc emerges from the drive.

**Figure 2-22 Manually Removing a Compact Disc Caddy**



MLO-008121

---

## RRD42 Compact Disc Drive Specifications

### Hardware Specifications

Table 2–3 provides hardware specifications for the RRD42 compact disc drive.

**Table 2–3 RRD42 Compact Disc Drive Specifications**

Drive Feature	Specification
Capacity per disc	600 MB
Access time	Full stroke 650 msec (typical) Average (1/4 stroke) 380 msec (typical)
Data transfer rate	Sustained rate 150 KB/sec Burst rate 1½ MB/sec

### Operating Conditions

Table 2–4 provides the operating conditions for the RRD42 compact disc drive.

**Table 2–4 RRD42 Compact Disc Drive Operating Conditions**

Environmental Variable	Operating Conditions
Temperature range	5°C to 50°C (41°F to 122°F)
Relative humidity	10% to 90%, noncondensing
Altitude	2500 m (8000 ft) at 36°C (96°F)
Maximum wet bulb temperature	29°C (84°F)
Minimum dew point temperature	2°C (36°F)

## RRD42 Compact Disc Drive Specifications

### Nonoperating Conditions

Table 2–5 provides the nonoperating conditions for the RRD42 compact disc drive.

**Table 2–5 RRD42 Compact Disc Drive Nonoperating Conditions**

<b>Environmental Variable</b>	<b>Nonoperating Conditions</b>
Temperature range	–30°C to 55°C (–22°F to 131°F)
Relative humidity	10% to 90%, noncondensing
Altitude	13,600 m (44,600 ft) at 36°C (96°F)
Maximum wet bulb temperature	46°C (115°F)
Minimum dew point temperature	2°C (36°F)

# 3

---

## RX26 Diskette Drive

### Introduction

This chapter explains how to install the RX26 diskette drive in your VAXstation 4000 Model 90 system unit, as well as how to use it.

### Chapter Topics

This chapter covers the following topics:

- RX26 Diskette Drive Features
- Setting the SCSI ID
- Installing the RX26 Drive
- Connecting the SCSI and Power Cables
- Using the RX26 Diskettes
- RX26 Diskette Specifications

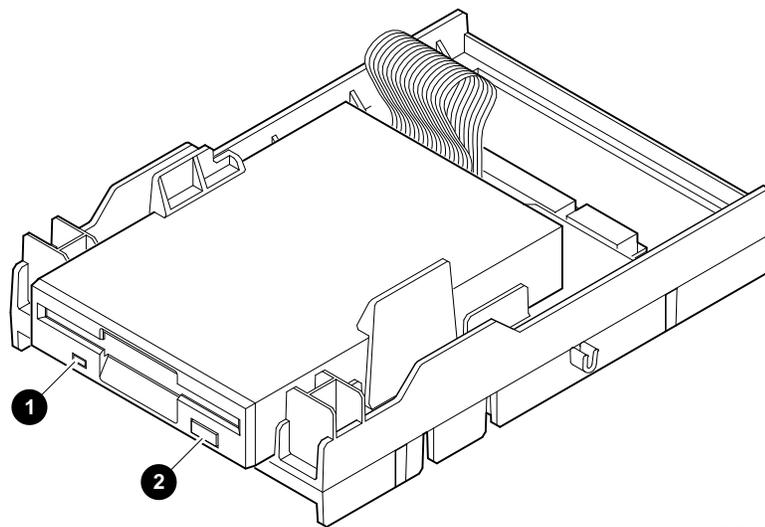
---

## RX26 Diskette Drive Features

### RX26 Features

The RX26 half-height diskette drive (see Figure 3–1) allows you to back up selected files, load applications, and transport files between standalone systems.

**Figure 3–1** RX26 Diskette Drive



MLO-008128

Figure 3–1 shows the busy indicator light ❶ and the eject button ❷.

---

## Setting the SCSI ID

### Verifying the SCSI ID

Before installing the drive in the system, you need to verify the SCSI ID on the drive.

1. Turn the RX26 drive so that the left side of the drive is facing you. Locate the SCSI ID switches 1, 2, and 3, as shown in Figure 3–2.
2. Verify that the switches are set to the correct positions (left to right) as shown, for SCSI ID 5:

Switch 1 = Down

Switch 2 = Up

Switch 3 = Down

This is the default setting for SCSI ID 5, the SCSI setting that your RX26 drive normally uses.

### CAUTION

Do not use a pencil to set the SCSI ID switches. Graphite particles can damage the switches.

### Changing the Default Setting

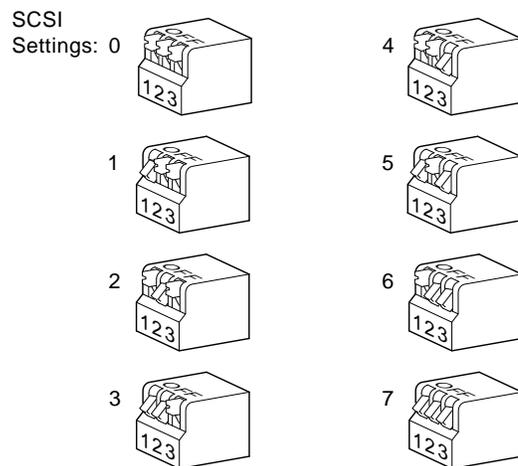
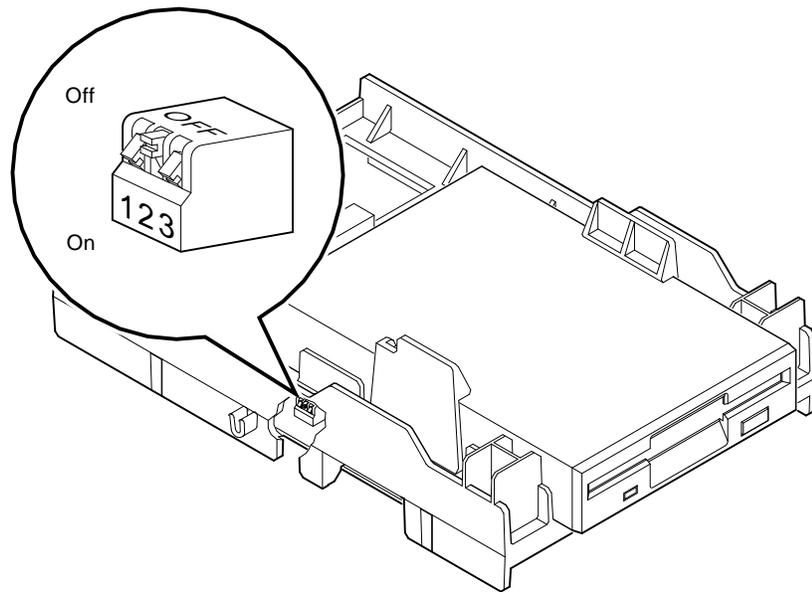
Default settings should be changed *only* when a system is configured with more than one of a particular device. You are responsible for the SCSI ID settings on your equipment. If you want to change the setting, choose a new ID from Table B–1, and refer to the SCSI ID settings shown in Figure 3–2.

### Unique SCSI ID

Each SCSI device must have a unique SCSI ID. Never set two or more SCSI devices to the same SCSI ID; the system will not be able to communicate with the devices.

## Setting the SCSI ID

**Figure 3-2 Setting the RX26 Diskette Drive SCSI ID**



MLO-009403

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## Installing the RX26 Drive

<b>Important</b>	Prepare your system, as instructed in Chapter 1, before you install this option.
<b>Installation Overview</b>	Table 3–1 provides an overview of the steps to install the RX26 drive. The sections following the table explain each step in more detail.

**Table 3–1 Installing the RX26 Diskette Drive**

---

1. Remove the removable media bracket.
  2. Remove the diagnostics board.
  3. Replace the blank bezel in the system unit with the RX26 bezel shipped with the drive.
  4. Replace the diagnostics board.
  5. Install the drive in the media bracket.
  6. Replace the bracket in the system.
  7. Connect the SCSI and power cables.
- 

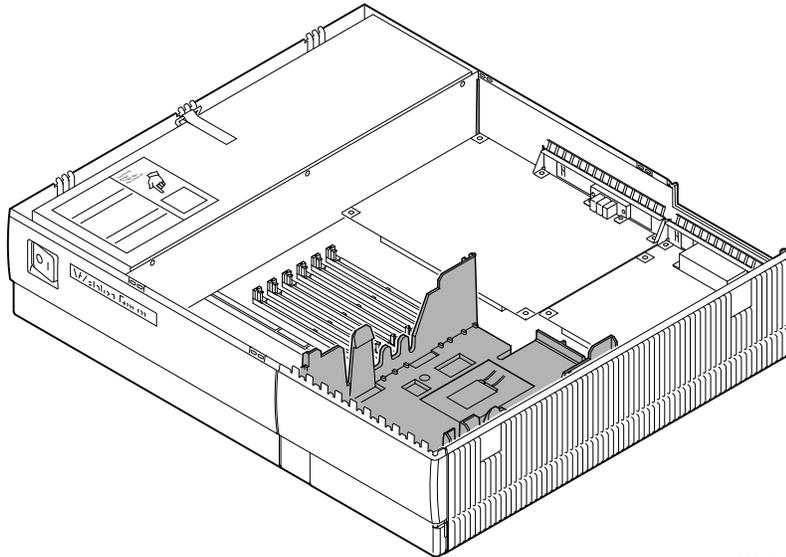
<b>Before You Begin</b>	<p>Remove the fixed disk drive H-bracket, so you can access the removable media bracket catches. See Chapter 6 for instructions, if necessary.</p> <p>Remove the SPXgt graphics frame buffer, if you have one. See Chapter 8, if necessary.</p>
-------------------------	---

## Installing the RX26 Drive

### Locate the Removable Media Bracket

Figure 3-3 shows the location of the removable media bracket.

**Figure 3-3 Location of the Removable Media Bracket**



MLO-008102

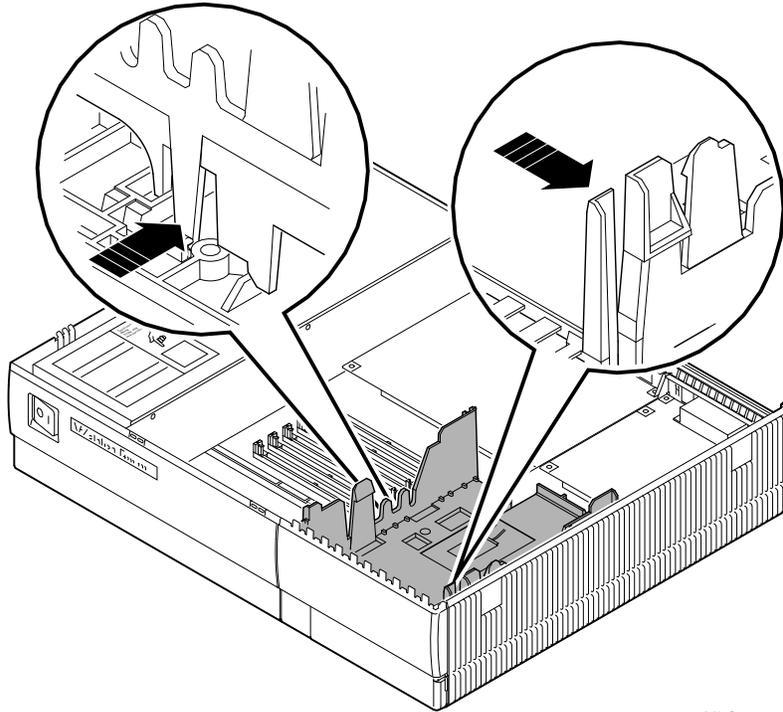
### **WARNING:** Sharp Edges

When removing or replacing the removable media bracket, do not touch the sharp plastic edges on the top of the removable media bezel or blank bezel.

**Remove the Bracket**

Remove the bracket from the system unit by releasing the two cantilever catches, as shown in Figure 3-4, and lifting the bracket straight up.

**Figure 3-4 Removing the Removable Media Bracket**



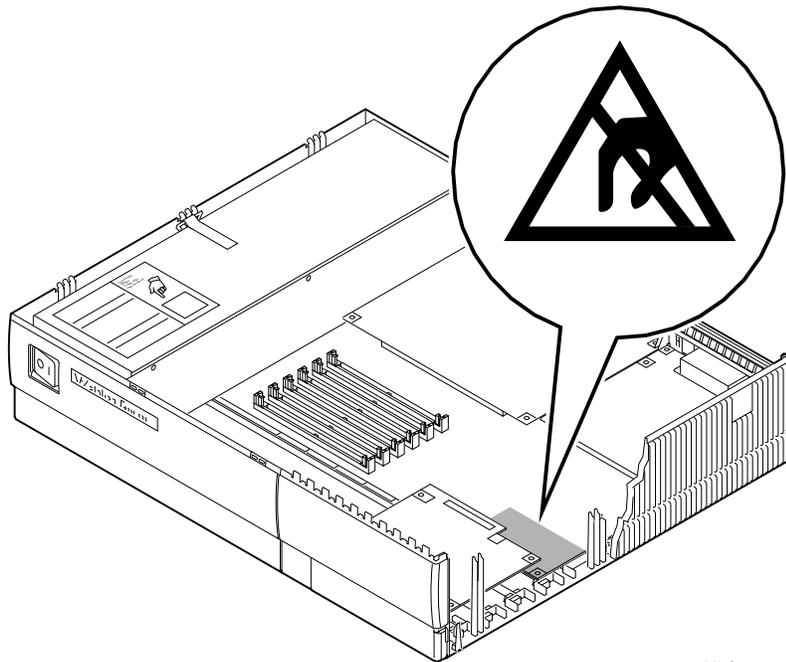
MLO-008103

## Installing the RX26 Drive

**CAUTION:**  
**Damage to**  
**Components**

When removing the diagnostics board (in the next step), be very careful to avoid touching the CPU board in the area shown in Figure 3-5. Touching the board in the area indicated could damage some of the components on the board.

**Figure 3-5 Avoid Touching This Area!**



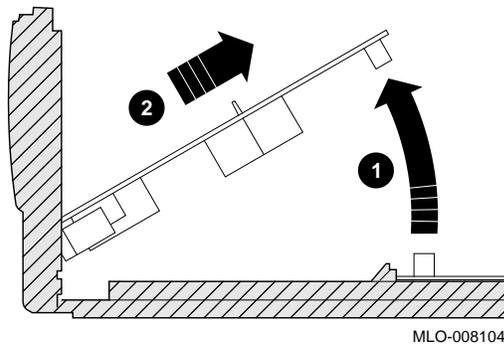
MLO-008159

### Remove the Diagnostics Board

To remove the diagnostics board, follow these steps and refer to Figure 3-6:

1. Pull up on the rear edge of the board, releasing the connectors **1**.
2. Slide the board **2** out of the system unit.

**Figure 3-6 Removing the Diagnostics Board**

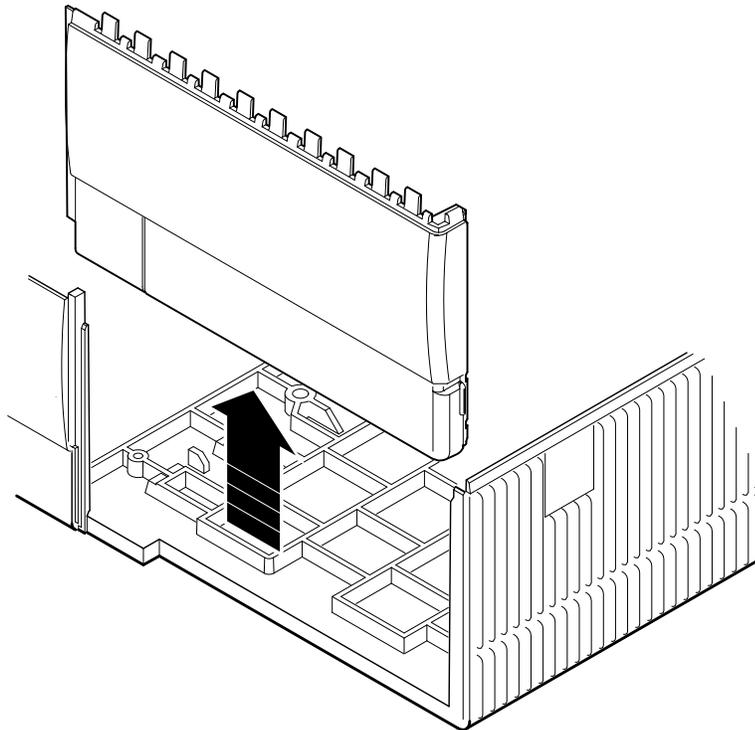


## Installing the RX26 Drive

### Remove the Bezel

Remove the blank bezel from the front of the system unit, as shown in Figure 3-7.

**Figure 3-7 Removing the Blank Bezel from the System Unit**

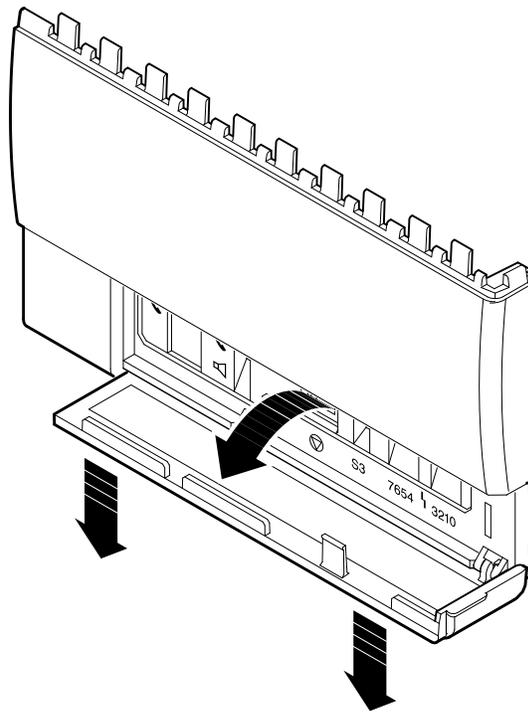


MLO-008105

**Remove the Door**

Carefully remove the door from the blank bezel by pressing down on its front edge, as shown in Figure 3-8.

**Figure 3-8 Removing the Door from the Bezel**



MLO-008106

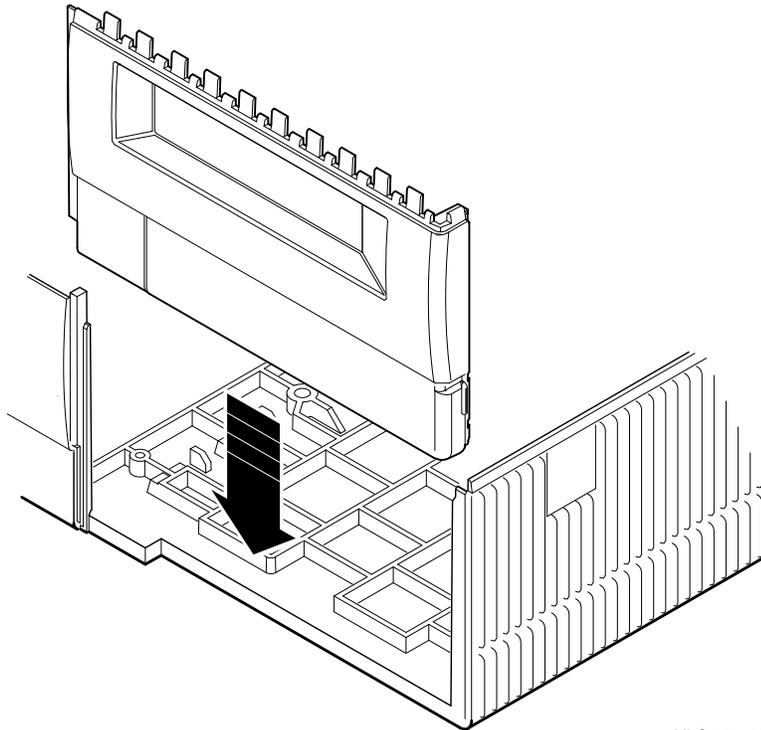
Install the door on the RX26 bezel that ships with the drive. Snap the door onto the bezel at the two hinges. Close the door.

## Installing the RX26 Drive

### **Install the RX26 Bezel**

Slide the new bezel into the front panel on the system unit, as shown in Figure 3-9. The ridges on the bezel slide into the grooves on the front panel.

**Figure 3-9 Installing the RX26 Bezel in the System Unit**



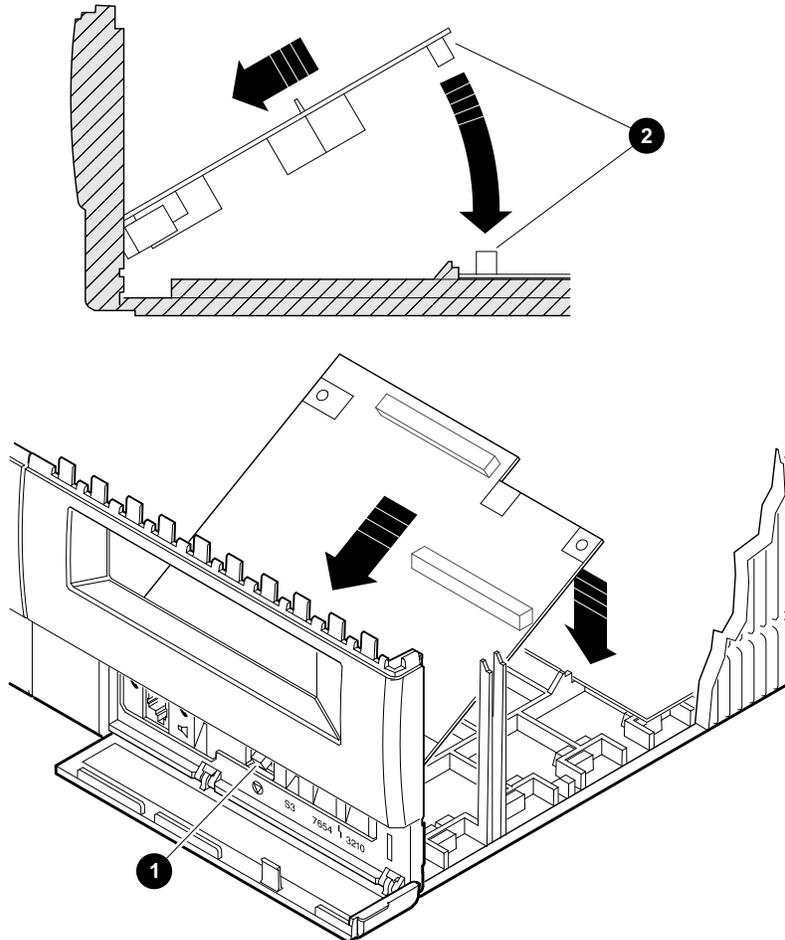
MLO-008122

## Replace the Diagnostics Board

See Figure 3-10 to replace the diagnostics board as follows:

1. Fit the front edge of the board into the notches on the inside of the bezel, aligning the square halt button **1** on the board with the square hole in the bezel.
2. Press down on the rear connectors **2**.

Figure 3-10 Replacing the Diagnostics Board



MLO-008123

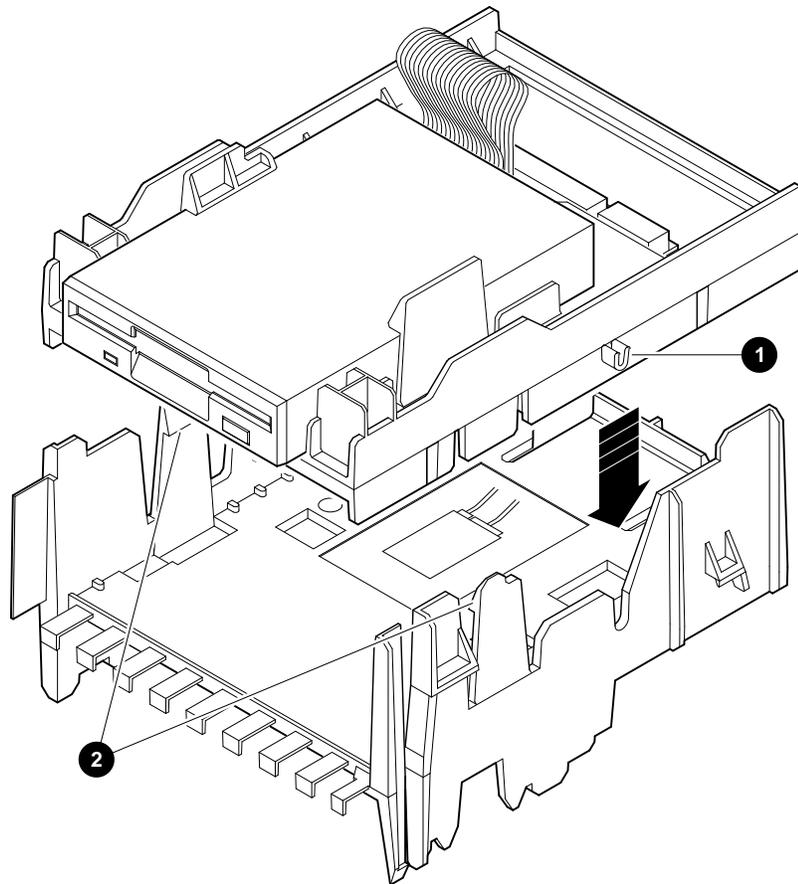
## Installing the RX26 Drive

### Install the Drive in the Bracket

Place the RX26 drive in the removable bracket, as shown in Figure 3-11.

When the drive is seated, slide it forward to lock it in place. Clips **1** on the underside of the drive will lock into the bracket, and a latch **2** on the bracket will engage the rear of the drive.

**Figure 3-11** Placing the RX26 Drive in the Bracket



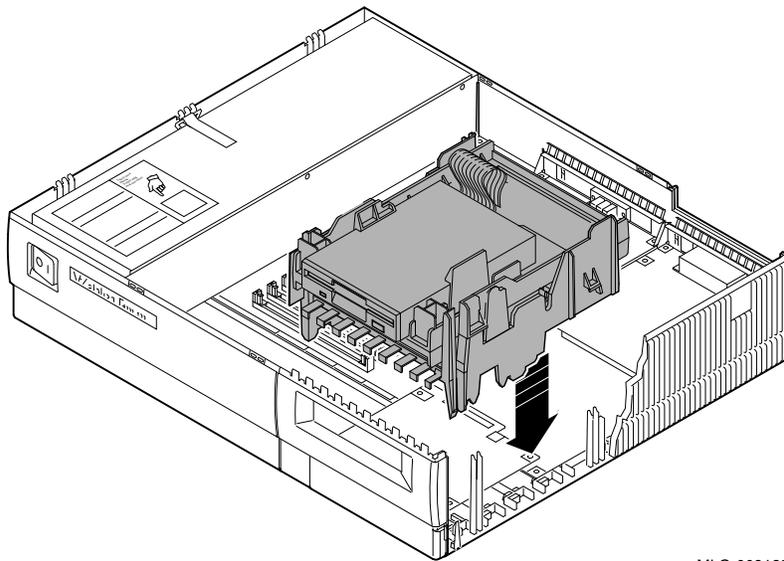
MLO-008124

## Installing the RX26 Drive

### Place Bracket in System

Place the removable media bracket in the system unit, as shown in Figure 3-12. The bracket will slide down along two keys molded in the inside wall of the system unit, and will latch on the front corner when it is fully seated.

**Figure 3-12 Replacing the Bracket in the System Unit**



MLO-008125

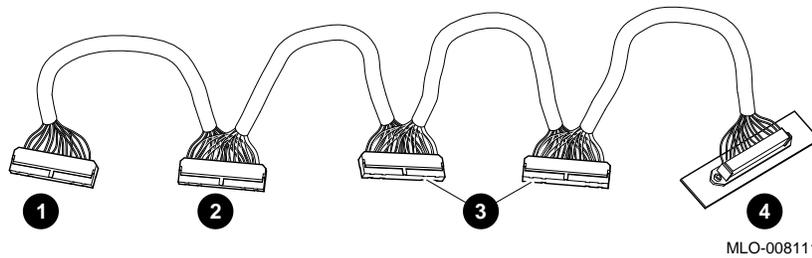
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## Connecting the SCSI and Power Cables

### Locate the SCSI Cables

Locate the SCSI cable and identify the RX26 SCSI connector **2**, shown in Figure 3-13.

**Figure 3-13 SCSI Cable and Connectors**



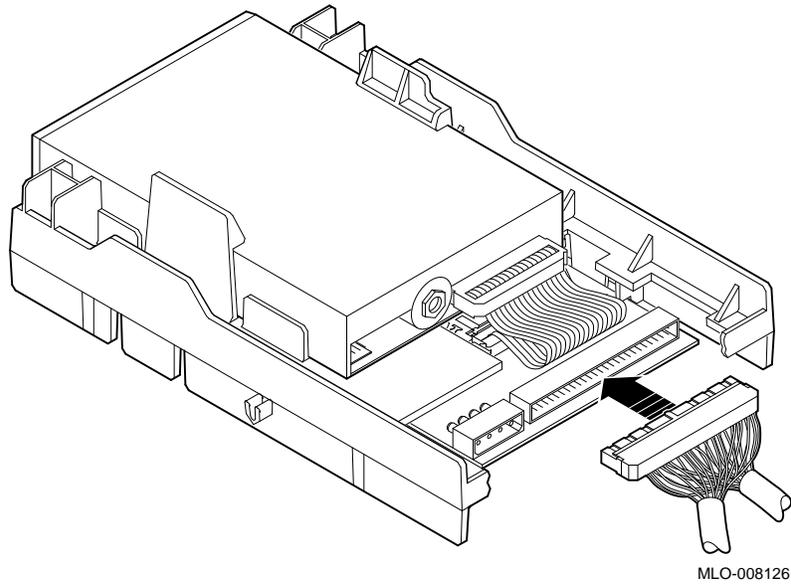
- 1** CPU connector
- 2** RX26 connector
- 3** RZ2x connectors
- 4** Rear panel SCSI port

## Connecting the SCSI and Power Cables

### Connect the SCSI Cable

Connect the RX26 SCSI connector to the SCSI port on the RX26 drive tray, as shown in Figure 3–14. The connector is keyed; be sure you have it oriented correctly before attempting to insert it into the drive.

**Figure 3–14 Connecting the SCSI Connector to the RX26 Drive**

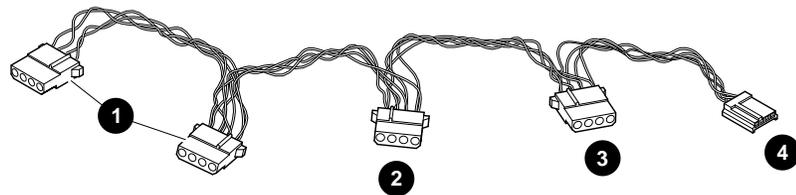


## Connecting the SCSI and Power Cables

### Locate the Power Cable

Locate the power cable and identify the two RX26 connectors, ❸ and ❹, shown in Figure 3–15.

**Figure 3–15 Power Cable and Connectors**



MLO-008113

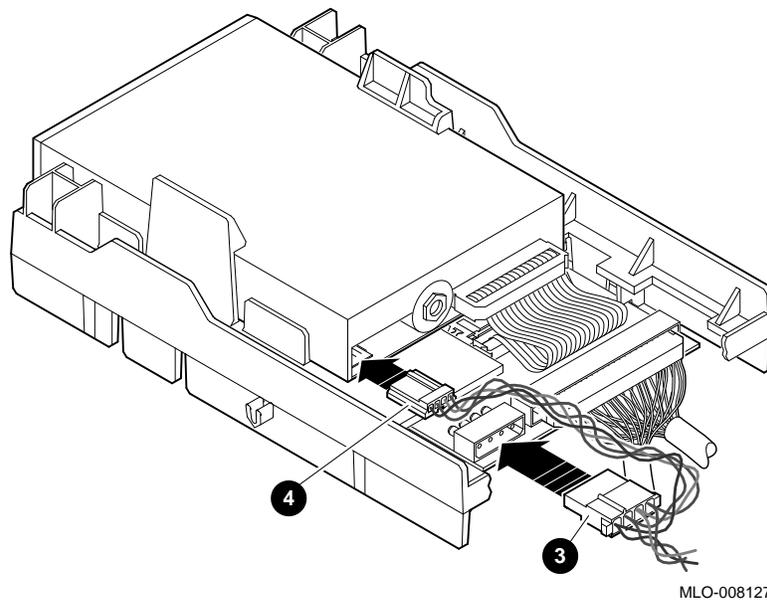
- ❶ RZ2x connectors
- ❷ CPU connector
- ❸ RX26 connector
- ❹ RX26 connector

### Connect the Power Cable

Connect the *two* RX26 power connectors ❸ and ❹ to the RX26 drive, as shown in Figure 3–16. The connectors are keyed; be sure you orient them correctly before attempting to insert them into their ports.

## Connecting the SCSI and Power Cables

**Figure 3–16 Connecting the Power Connector to the RX26 Drive**



### **Replace H-Bracket**

Place the H-bracket back in the system unit now. See Chapter 6, if necessary.

### **Replace SPXgt Frame Buffer**

If you removed the SPXgt frame buffer, replace it now. See Chapter 8, if necessary.

### **Testing the Installation**

This completes the installation of the RX26 diskette drive. To test your installation of the RX26 diskette drive, see Chapter 11.

---

## Using the RX26 Diskettes

### Diskette Storage Capacity

You can use the RX26 diskette drive to increase mass storage and to perform system backup and data interchange. The drive uses industry-standard 3½-inch diskettes. Table 3–2 lists storage capacities for compatible diskettes of various densities.

**Table 3–2 Storage Capacity of RX26 Diskettes**

Diskette	Unformatted	R/W <sup>1</sup>
Double density (DD)	1.0 MB	R
High density (HD)	2.0 MB	R/W
Extra density (ED)	4.0 MB	R/W

<sup>1</sup>R/W = read/write capability

The following sections explain how to use and care for diskettes.

### Handling and Storing RX26 Diskettes

Take the following precautions when handling and storing diskettes:

- Keep your diskettes dry, and out of extreme temperatures and direct sunlight.
- Keep the diskettes away from any equipment that contains a magnet, such as the monitor or a telephone.

The heat and electromagnetic field of your monitor can damage diskettes by distorting or erasing the magnetic data.

For further information, refer to the *RX26 Owner's Reference Card*.

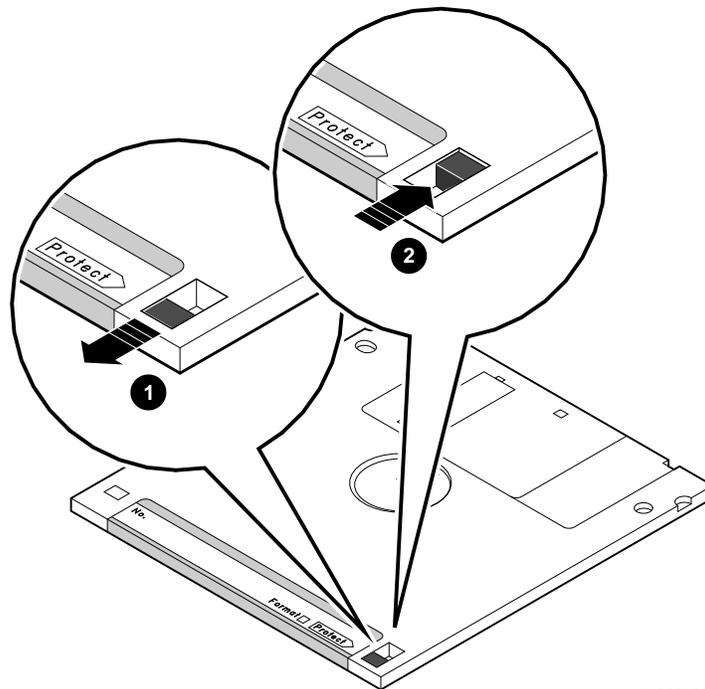
### Write-Protecting a Diskette

Write-protecting a diskette prevents accidental overwriting or erasure of data on the diskette. For example, if you are using a diskette to install software applications on your system, you may want to protect the information on the diskette.

### Write-Protect Switch Functions

Before you use a diskette, check its write-protect position (see Figure 3-17). When the write-protect switch is in the down position ❶, you can read information on the diskette, but you cannot add information. When the switch is in the up position ❷, you can write data onto the diskette.

Figure 3-17 Write-Protecting a Diskette



MLO-008129

### Hint

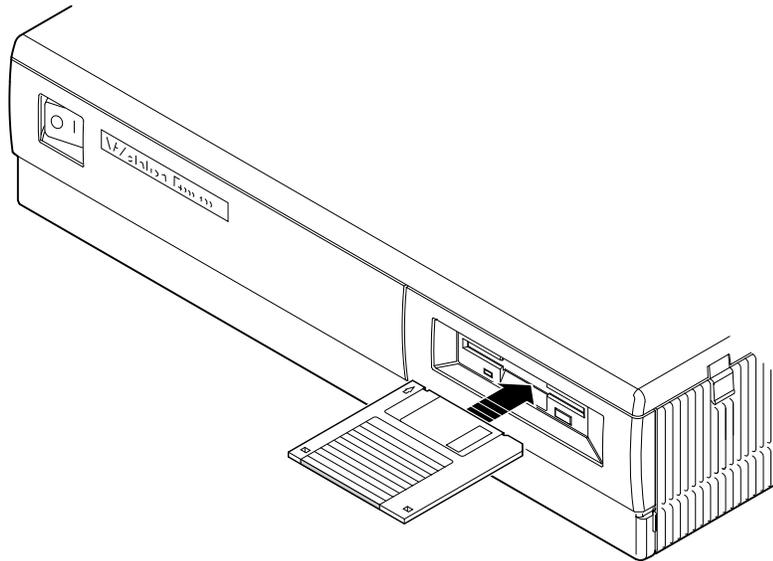
If you can see through the little square hole in the diskette, your diskette is write-protected.

## Using the RX26 Diskettes

### Inserting a Diskette

To insert a diskette into the diskette drive, slide the diskette, arrow side up, into the drive, as shown in Figure 3–18. The diskette slides straight in and drops down to its load position.

**Figure 3–18** Inserting a Diskette



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### **CAUTION:** Damage to Diskette

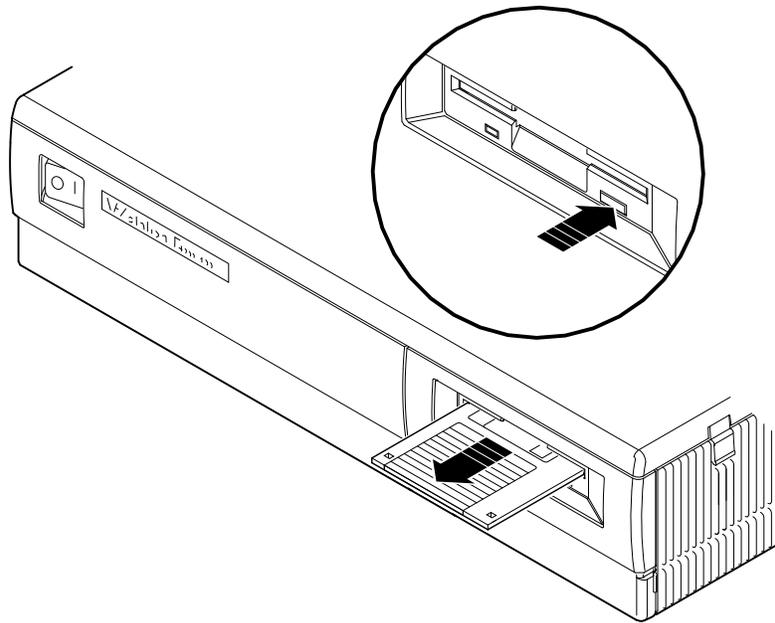
Never insert or remove a diskette when the diskette drive is in use (the busy indicator light on the front of the drive is on); doing so can damage the diskette.

## Removing a Diskette

To remove a diskette:

1. Make sure the indicator light is off.
2. Press the eject button, as shown in the insert of Figure 3–19. When the diskette pops halfway out, grasp the diskette, and slide it out of the drive.

**Figure 3–19** Removing a Diskette



MLO-008131

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## RX26 Diskette Specifications

**Specifications** Table 3–3 provides hardware specifications for RX26 diskettes.

**Table 3–3 RX26 Diskette Drive Specifications**

<b>Topic</b>	<b>Description</b>
Diskette size	3½ inches
Diskettes per diskette drive	1
Storage capacity	4 MB unformatted, 2.9 MB formatted (ED)
	2 MB unformatted, 1.4 MB formatted (HD)
	1 MB unformatted, 720 KB formatted (DD)

# 4

---

## TZK10 Tape Drive

### **Introduction**

This chapter explains how to install and use the TZK10 tape drive in your VAXstation 4000 Model 90 system.

### **Chapter Topics**

This chapter covers the following topics:

- TZK10 Tape Drive Features
- Setting the SCSI ID
- Installing the TZK10 Drive
- Connecting the SCSI and Power Cables
- Using the TZK10 Tape Drive
- TZK10 Tape Drive Specifications

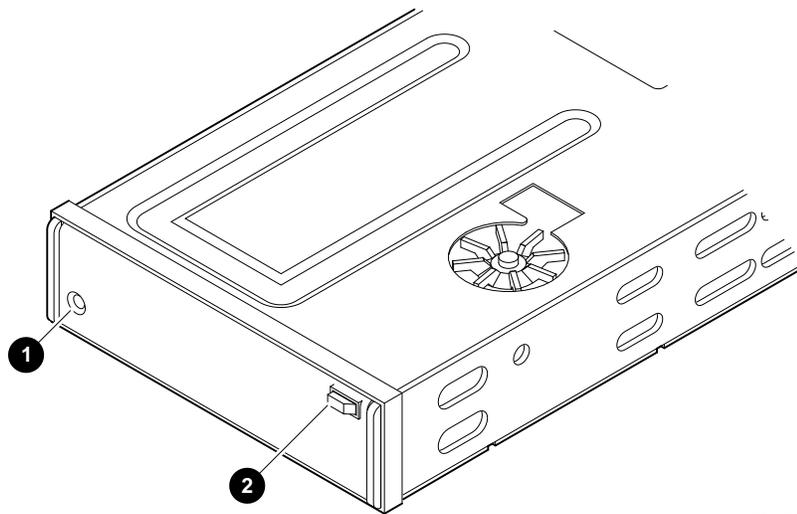
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## TZK10 Tape Drive Features

### Features

The TZK10 tape drive (see Figure 4–1) uses standard quarter-inch cartridge (QIC) tapes for loading applications and doing file backups.

**Figure 4–1 TZK10 Tape Drive**



MLO-008135

The TZK10 tape drive has a dual-color (green and amber) busy indicator light **1** and an eject button **2**.

**Busy Indicator  
Light**

Table 4–1 summarizes the meaning of each state of the busy indicator light.

**Table 4–1 TZK10 Indicator Light States**

<b>State</b>	<b>Meaning</b>
Off	Tape is not present or tape is present but is not loaded (is dismounted).
Solid green	Tape is loaded (mounted). <sup>1</sup>
Blinking green	Tape is in motion.
Solid amber	Drive is faulty.

<sup>1</sup>Tape cartridge is auto-loaded upon insertion.

---

## Setting the SCSI ID

### Verify the Jumpers

Before installing the TZK10 drive, verify the positions of the removable electrical connectors, called jumpers, on the rear of the drive, as follows:

1. Turn the TZK10 drive so that the rear of the drive is facing you.
2. Locate the Parity jumper and the SCSI ID jumpers 2, 1, and 0, shown in Figure 4–2.

### Parity Jumper

Be sure the Parity jumper is in. This jumper must be in place to use the drive with the VMS operating system.

### The SCSI Jumpers

Verify that the SCSI ID jumpers 2 and 0 are attached and SCSI ID jumper 1 is removed, as shown in Figure 4–2.

This is the default setting for SCSI ID 5, the SCSI ID setting that your TZK10 drive normally uses.

### Changing the SCSI Default

Default settings should be changed *only* when a system is configured with more than one of a particular device. You are responsible for the SCSI ID settings on your equipment.

If you want to change the setting, choose a new ID from Table B–1. Carefully remove or replace jumpers, referring to the SCSI settings shown in Figure 4–2. Use tweezers or another small tool to change the jumpers.

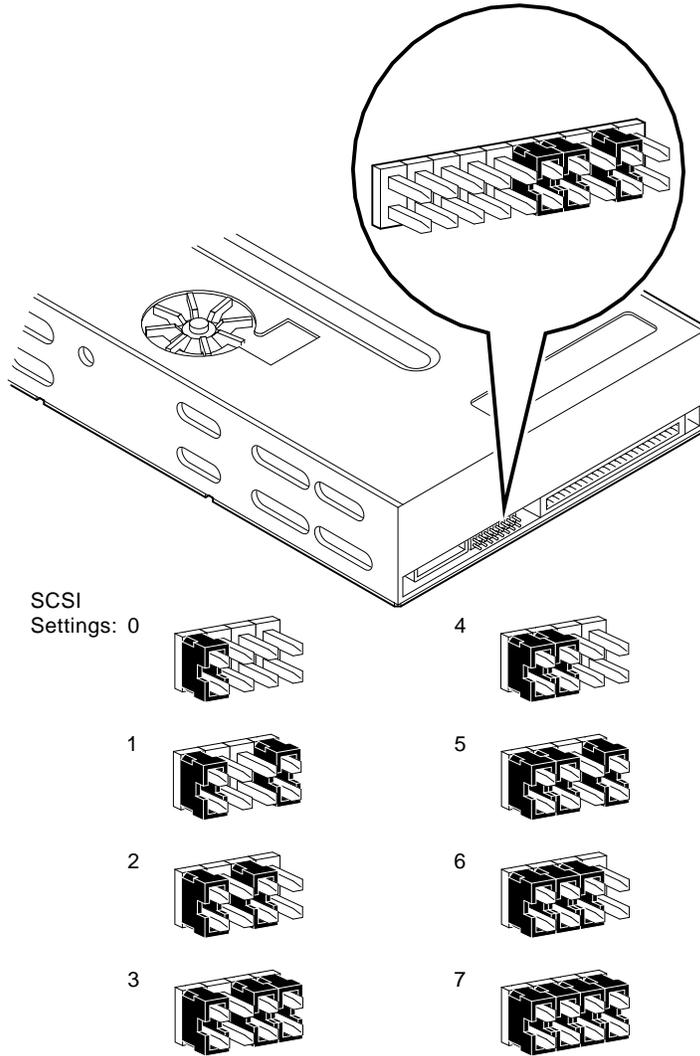
Save any SCSI jumpers you remove. You may need them later.

### Unique SCSI ID

Each SCSI device must have a unique SCSI ID. Never set two or more SCSI devices to the same SCSI ID; the system will not be able to communicate with the devices.

Setting the SCSI ID

Figure 4-2 Verifying the TZK10 Tape Drive SCSI ID



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## Installing the TZK10 Drive

### Important

Prepare your system, as instructed in Chapter 1, before you install this option.

### Installation Overview

Table 4–2 provides an overview of the steps you perform to install the TZK10 tape drive. The following sections explain each step in more detail.

**Table 4–2 Installing the TZK10 Tape Drive**

---

1. Locate and remove the removable media bracket.
  2. Remove the diagnostics board.
  3. Replace the blank bezel in the system unit with the TZK10 bezel shipped with the drive.
  4. Replace the diagnostics board.
  5. Replace the media bracket.
  6. Install the drive in the bracket.
  7. Connect the SCSI and power cables.
- 

### Before You Begin

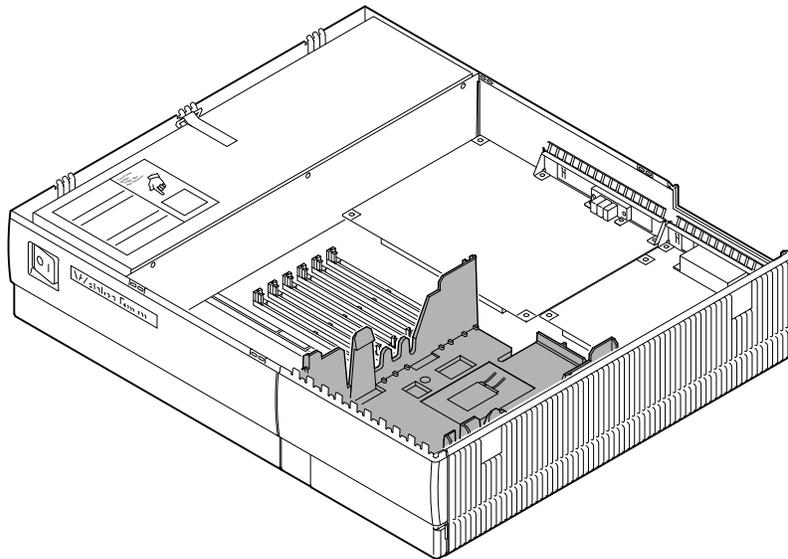
Remove the fixed disk drive H-bracket, so you can access the removable media bracket catches. See Chapter 6 for instructions, if necessary.

Remove the SPXgt graphics frame buffer, if you have one. See Chapter 8, if necessary.

**Locate the Removable Media Bracket**

Figure 4-3 shows the location of the removable media bracket.

**Figure 4-3 Location of the Removable Media Bracket**



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**WARNING:  
Sharp Edges**

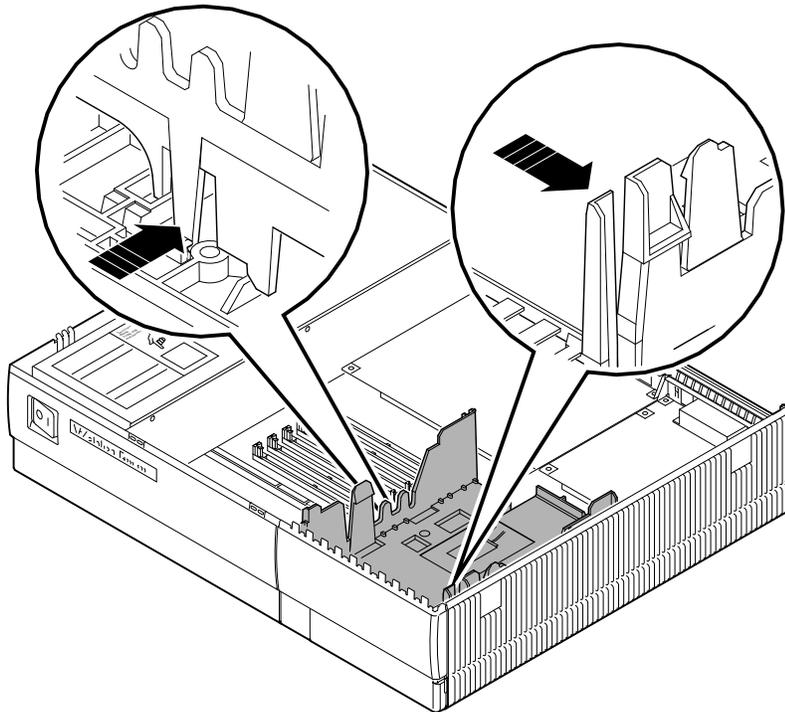
When removing or replacing the removable media bracket, do not touch the sharp plastic edges on the top of the removable media bezel or blank bezel.

## Installing the TZK10 Drive

### Remove the Bracket

Remove the bracket from the system unit by releasing the two cantilever catches (as shown in Figure 4-4) and lifting the bracket straight up.

**Figure 4-4 Removing the Removable Media Bracket**



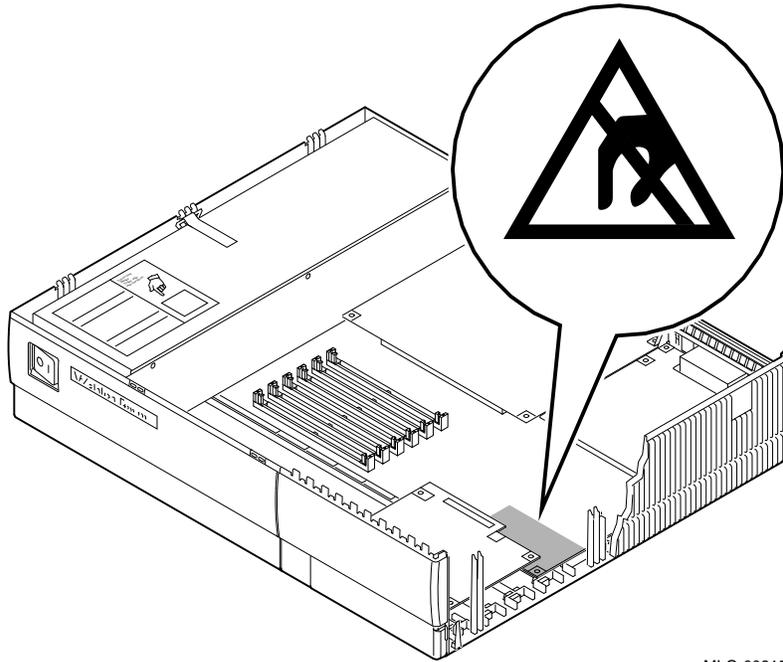
MLO-008103

## Installing the TZK10 Drive

**CAUTION:**  
**Damage to**  
**Components**

When removing the diagnostics board (in the next step), be very careful to avoid touching the CPU board in the area shown in Figure 4-5. Touching the board in the area indicated could damage some of the components on the board.

**Figure 4-5 Avoid Touching This Area!**



MLO-008159

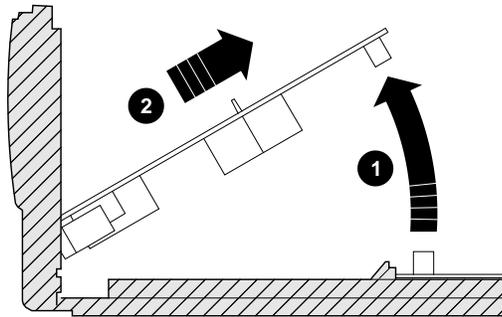
## Installing the TZK10 Drive

### Remove the Diagnostics Board

To remove the diagnostics board, follow these steps and refer to Figure 4-6:

1. Pull up on the rear edge of the board, releasing the connectors **1**.
2. Slide the board **2** out of the system unit.

**Figure 4-6 Removing the Diagnostics Board**



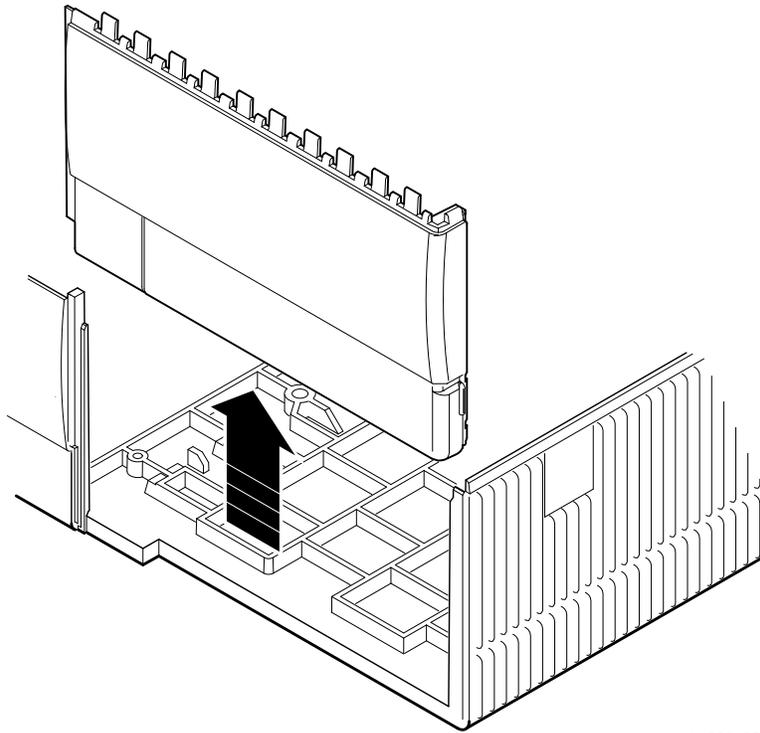
MLO-008104

## Installing the TZK10 Drive

### Remove the Bezel

Remove the blank bezel from the front of the system unit, as shown in Figure 4-7.

**Figure 4-7 Removing the Blank Bezel from the System Unit**



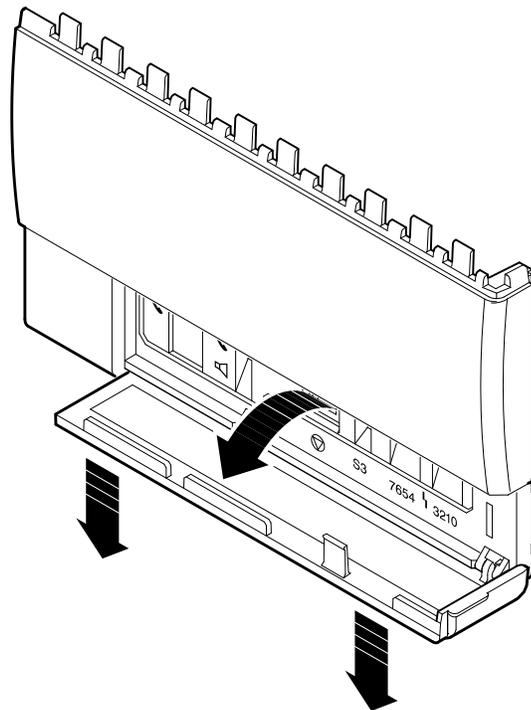
MLO-008105

## Installing the TZK10 Drive

### Remove the Bezel Door

Carefully remove the door from the blank bezel by pressing down on its front edge, as shown in Figure 4-8.

**Figure 4-8 Removing the Door from the Bezel**



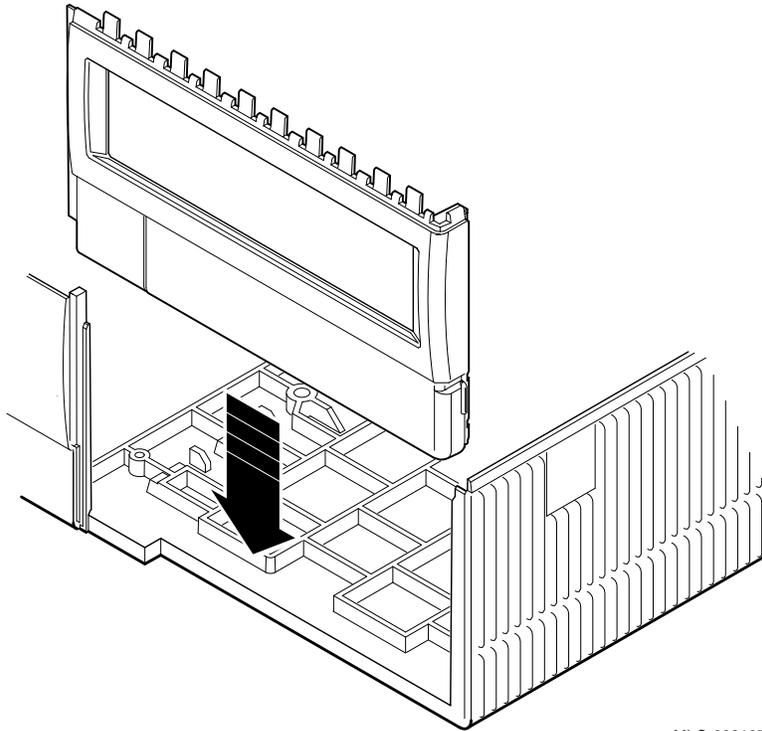
MLO-008106

Install the door on the TZK10 bezel that ships with the drive. Snap the door onto the bezel at the two hinges. Close the door.

### Install the TZK10 Bezel

Slide the new bezel into the front panel on the system unit, as shown in Figure 4–9. The ridges slide in the grooves.

**Figure 4–9** Installing the TZK10 Bezel in the System Unit



MLO-008107

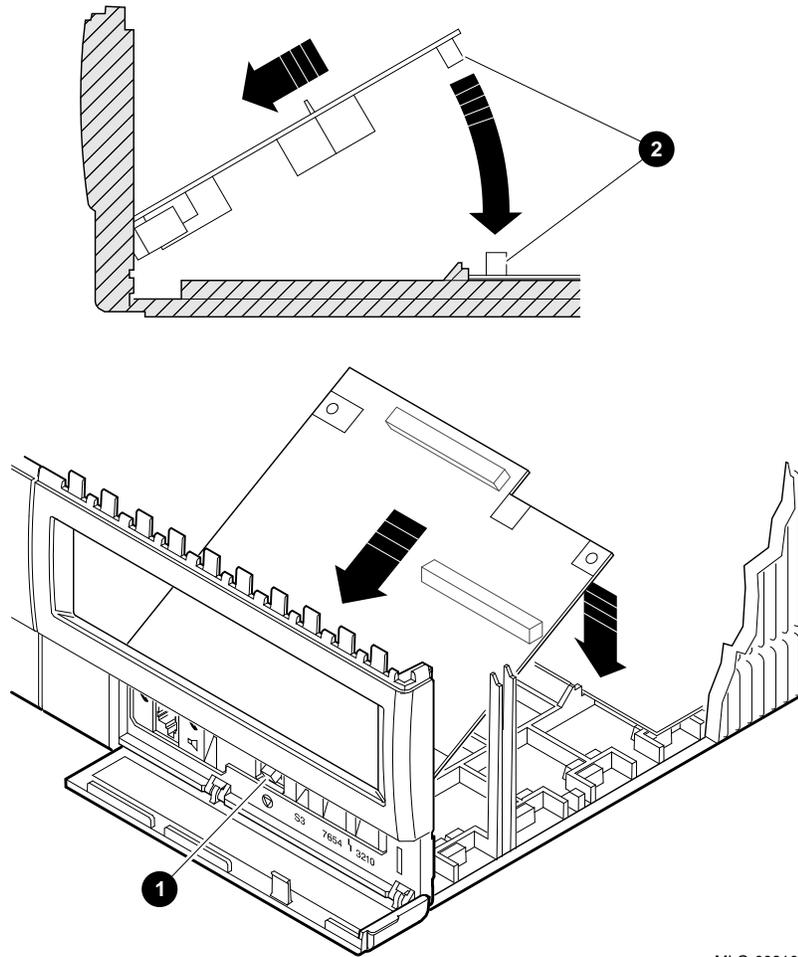
### Replace the Diagnostics Board

See Figure 4–10 to replace the diagnostics board as follows:

1. Fit the front edge of the board into the notches on the inside of the bezel.
2. Align the square halt button **1** on the board with the square hole in the bezel.
3. Press down on the rear edge of the board, to ensure the connectors **2** are firmly seated.

Installing the TZK10 Drive

Figure 4-10 Replacing the Diagnostics Board



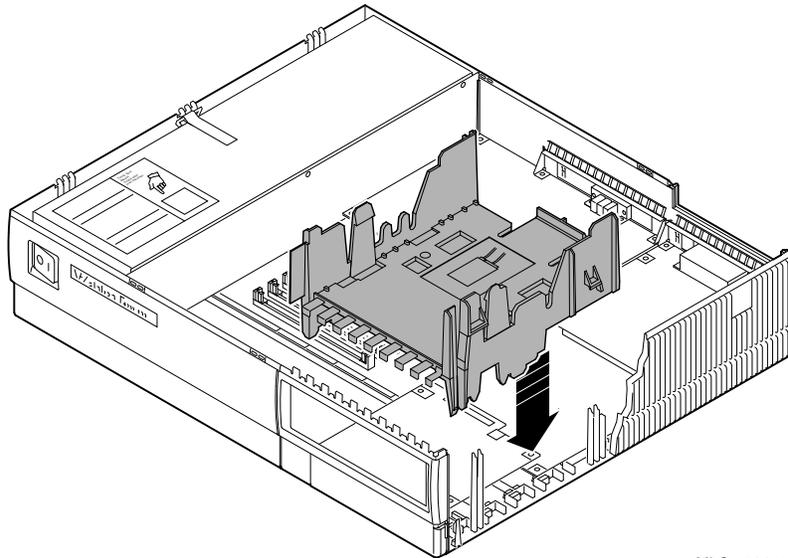
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## Installing the TZK10 Drive

### Place Bracket in System

Place the removable media bracket in the system unit, as shown in Figure 4–11. The bracket will slide down along two keys molded in the inside wall of the system unit, and will latch on the front corner when it is fully seated.

**Figure 4–11 Replacing the Bracket in the System Unit**



MLO-008109

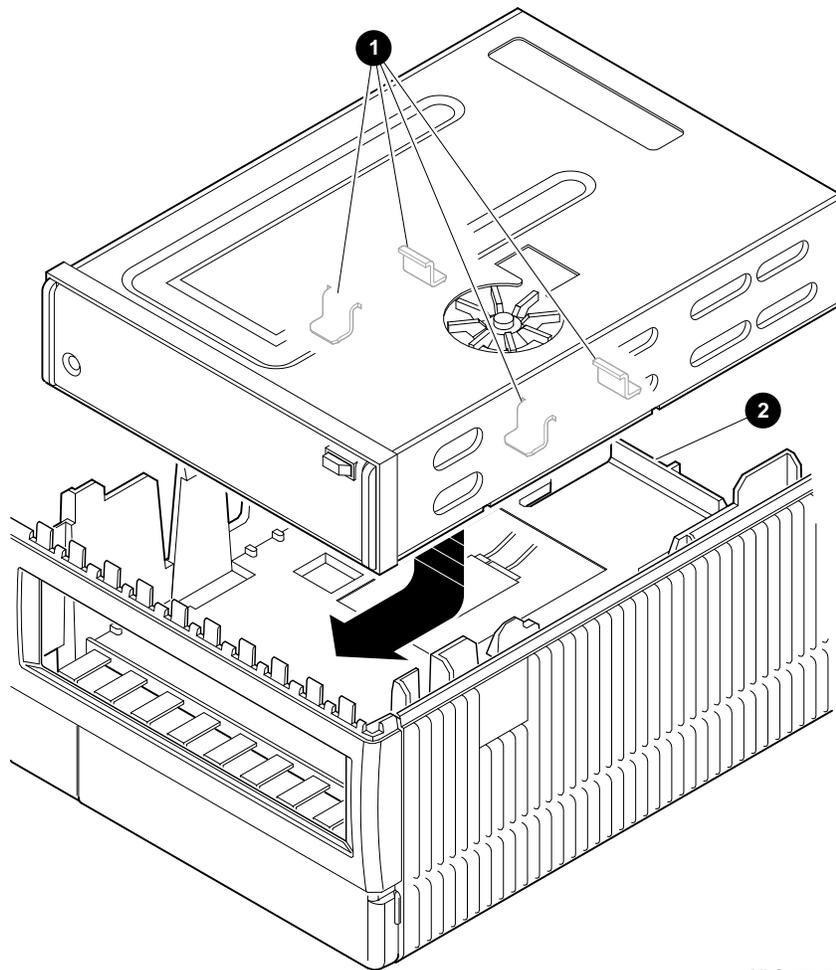
## Installing the TZK10 Drive

### Install the Drive in the Bracket

Place the TZK10 drive in the removable bracket, as shown in Figure 4–12.

When the drive is seated, slide it forward to lock it in place. Clips **1** on the underside of the drive will lock into the bracket, and a latch **2** on the bracket will engage the rear of the drive.

**Figure 4–12** Placing the TZK10 Drive in the Bracket



MLO-008132

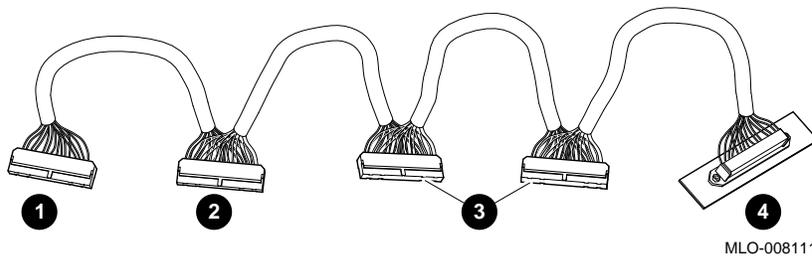
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## Connecting the SCSI and Power Cables

### Locate the SCSI Cable

Locate the SCSI cable, shown in Figure 4–13, and identify the SCSI connector ❷ for the TZK10 drive.

**Figure 4–13 SCSI Cable and Connectors**



- ❶ CPU connector
- ❷ TZK10 connector
- ❸ RZ2x connectors
- ❹ Rear panel SCSI port

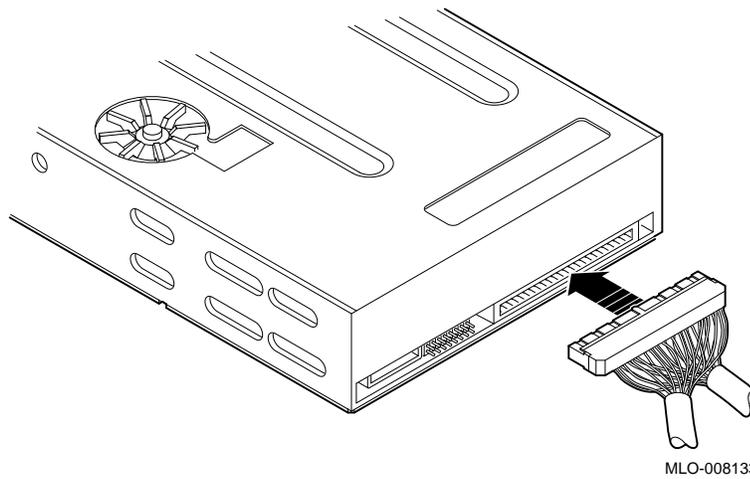
MLO-008111

## Connecting the SCSI and Power Cables

### Connect the SCSI Cable

Connect the SCSI cable, as shown in Figure 4–14. The connector is keyed; be sure you have it oriented correctly before attempting to insert it into the drive.

**Figure 4–14 Connecting the SCSI Cable to the TZK10 Drive**

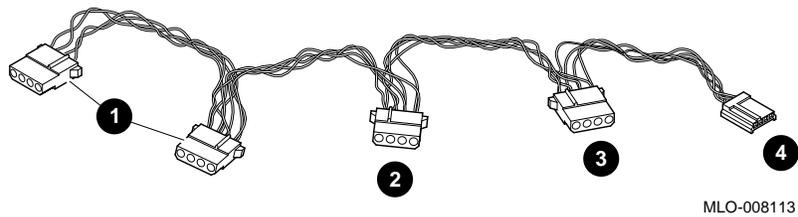


## Connecting the SCSI and Power Cables

### Locate the Power Cable

Locate the power cable, shown in Figure 4–15, and identify the power cable connector ❸ for the TZK10 drive.

**Figure 4–15 Power Cable and Connectors**



MLO-008113

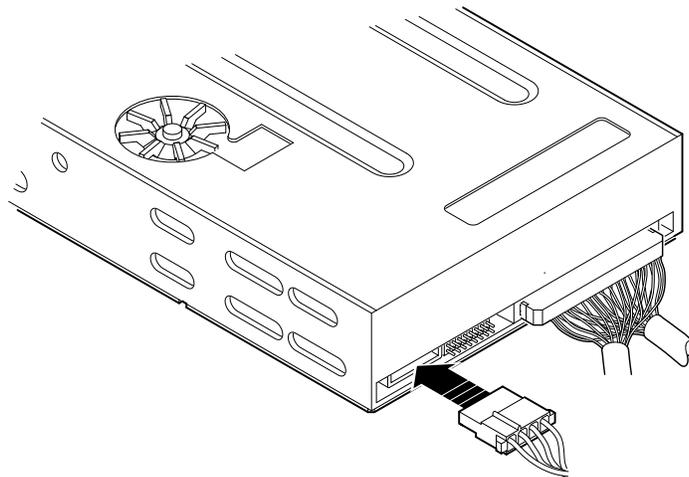
- ❶ RZ2x connectors
- ❷ CPU connector
- ❸ TZK10 connector
- ❹ RX26 connector

## Connecting the SCSI and Power Cables

### Connect the Power Cable

Connect the TZK10 power connector to the TZK10 drive, as shown in Figure 4–16. The connector is keyed; be sure you orient it correctly before attempting to insert it into the port.

**Figure 4–16 Connecting the Power Connector to the TZK10 Drive**



MLO-008134

### Replace H-Bracket

Place the H-bracket back in the system unit now. See Chapter 6, if necessary.

### Replace SPXgt Frame Buffer

If you removed the SPXgt frame buffer, replace it now. See Chapter 8, if necessary.

### Testing the Installation

This completes the installation of the TZK10 cartridge tape drive. To test your installation of the TZK10 cartridge tape drive, see Chapter 11.

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## Using the TZK10 Tape Drive

### Tape Drive Capacity

The TZK10 cartridge tape drive is a half-height, 5¼-inch, 525-megabyte, streaming tape drive that uses a standard quarter-inch cartridge (QIC). The TZK10 tape drive provides archival storage and retrieval and data collection capabilities.

The TZK10 tape drive can use any of the Digital tape cartridges listed in Table 4–3. The drive is shipped with a DC6320 tape cartridge.

**Table 4–3 TZK10 Tape Cartridges**

Cartridge	Capacity	Format	R/W <sup>1</sup>	Length
DC6525	up to 525 MB	QIC-320	R/W	300 m (1000 ft)
DC6320	up to 320 MB	QIC-320	R/W	186 m (620 ft)
DC6150 DC600XTD	up to 150 MB	QIC-150	R/W	189 m (620 ft)
DC6150 DC600XTD	up to 120 MB	QIC-120	R/W	189 m (620 ft)
DC600A	up to 60 MB	QIC-24	R	183 m (600 ft)

<sup>1</sup>R/W = read/write capabilities

The following sections explain how to use and care for tape cartridges.

### Handling and Storing TZK10 Tape Cartridges

Take the following precautions when handling and storing tape cartridges:

- Avoid dropping or striking cartridges.
- Keep cartridges out of direct sunlight, away from heaters and other sources of heat.
- Store cartridges where the temperature is between 10°C and 40°C (50°F and 104°F).
- If a cartridge has been exposed to extreme heat or cold, allow it to stabilize at room temperature for the same amount of time as it was exposed, up to 24 hours.

## Using the TZK10 Tape Drive

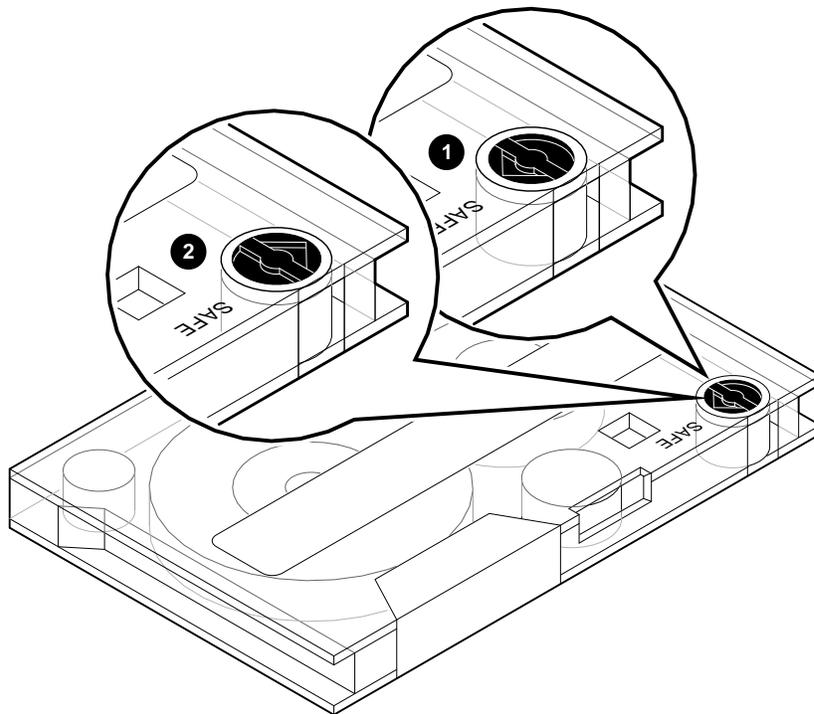
- Avoid placing cartridges near sources of electromagnetic interference, such as terminals, motors, and video or X-ray equipment. Any tape exposed to a magnetic field can lose information.
- Store a cartridge in a dust-free environment where the relative humidity is between 20% and 80%.
- Store a cartridge in its protective container, on edge or stacked. However, when stacking cartridges, do not stack more than five high.
- Place an identification label only in the space provided for the label on top of the cartridge.

For further information refer to the *TZK10 Cartridge Tape Drive Owner's Guide*.

### Write-Protecting TZK10 Tape Cartridges

The TZK10 tape cartridge has a write-protect switch to prevent accidental overwriting of data. Rotate the switch to the write-protected position ❶, indicated by the word SAFE imprinted on the case. (See Figure 4–17.) If you are writing data to the tape, turn the write-protect switch away from the SAFE label ❷.

Figure 4–17 Write-Protecting TZK10 Tape Cartridges



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### Inserting a TZK10 Tape Cartridge

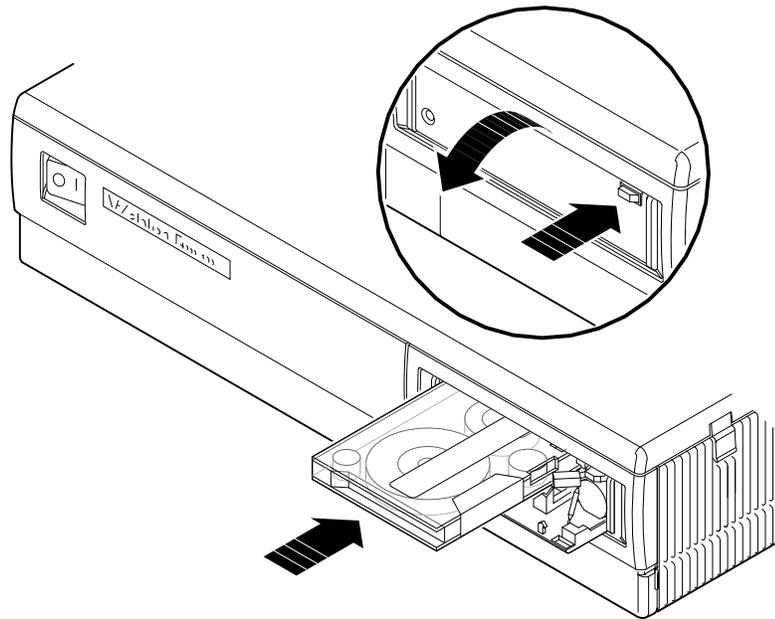
To insert the TZK10 tape drive:

1. Make sure the system unit is on ( | ).
2. Press the eject button, as shown in the insert of Figure 4–18, to open the drive door on the front of the system unit.
3. Insert the TZK10 tape cartridge into the drive with the cartridge's write-protect switch in the upper right corner.

## Using the TZK10 Tape Drive

4. Slide the cartridge straight into the drive until you feel resistance, then close the door.

**Figure 4-18** Inserting the TZK10 Tape Cartridge



MLO-008137

## Removing a TZK10 Tape Cartridge

To remove the tape cartridge, press the eject button. The door opens and the cartridge ejects part way. Grasp the cartridge, and slide it out of the drive.

---

## TZK10 Tape Drive Specifications

### Hardware Specifications

Table 4–4 provides hardware specifications for the TZK10 cartridge tape drive.

**Table 4–4 TZK10 Cartridge Tape Drive Specifications**

Operating Variable	Specification
Mode of operation	Streaming
Drive interface	SCSI-2
Height	44 mm (1.732 in)
Width	146.05 mm (5.75 in)
Depth	208.28 mm (8.20 in)
Weight (without cartridge)	1.1 kg (2.4 lb)
Media	DC6320/DC6525 tape cartridge or Digital approved equivalent (see Table 4–3)
Track width, write	0.1778 mm +0.0000/–0.0127 mm (0.0070 in +.0000 in/–0.0005 in)
Track width, read	0.1270 mm +0.0127/–0.0000 mm (0.0050 in +.0005 in/–0.0000 in)
Data density	16,000 bpi
Number of tracks	26
Data transfer rate	200 KB at average streaming mode 1½ MB at SCSI maximum
Tape speed	3.05 cm/s (120 ips)
Track format	Multiple track serpentine recording

(continued on next page)

**Table 4–4 (Cont.) TZK10 Cartridge Tape Drive Specifications**

<b>Operating Variable</b>	<b>Specification</b>
Storage capacity	320 MB, formatted (approx. DC6320 cartridge) 525 MB, formatted (approx. DC6525 cartridge)
Power requirements	+12 V $\pm$ 5% @ 1.0 A (2.0 A surge), 150 mV ripple peak-to-peak +5 V $\pm$ 5% @ 1.2 A (1.8 A surge), 150 mV ripple peak-to-peak
Nominal power consumption	20 watts
Peak power consumption	33 watts

**Operating Conditions**

Table 4–5 provides operating conditions for the TZK10 cartridge tape drive.

**Table 4–5 TZK10 Operating Conditions**

<b>Environmental Variable</b>	<b>Operating Conditions</b>
Temperature range	5°C to 40°C (41°F to 104°F)
Relative humidity	20% to 80% maximum
Altitude	4 km (13,000 ft)

## TZK10 Tape Drive Specifications

### Nonoperating Conditions

Table 4–6 provides the nonoperating conditions for the TZK10 cartridge tape drive.

**Table 4–6 TZK10 Nonoperating Conditions**

<b>Environmental Variable</b>	<b>Nonoperating Conditions</b>
Temperature range	–30°C to +60°C (–22°F to 140°F)
Relative humidity	10% to 90% maximum
Altitude	13 km (40,000 ft)



# 5

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## TLZ06 Tape Drive

### Introduction

This chapter describes the features of the TLZ06 tape drive, explains how to install it in your VAXstation 4000 system unit, and explains how to use it.

### Chapter Topics

This chapter covers the following topics:

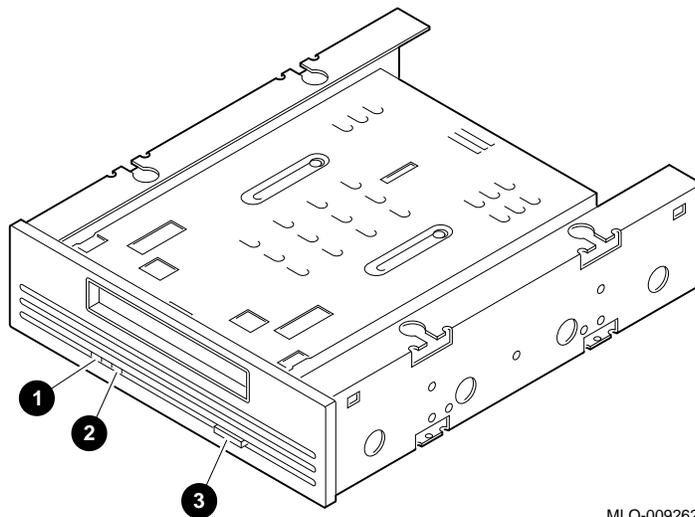
- TLZ06 Tape Drive Features
- Setting the SCSI ID
- Installing the TLZ06 Drive
- Connecting the SCSI and Power Cables
- Handling and Storing Tapes
- TLZ06 Tape Drive Specifications

---

## TLZ06 Tape Drive Features

- Capacity**            The capacity of the TLZ06 tape drive is 4.0 gigabytes.  
See Table 5–6 for more capacity information.
- Purpose**             The TLZ06 tape drive can be used for file backup and loading applications.
- Illustration**        The TLZ06 tape drive is shown in Figure 5–1.

**Figure 5–1 TLZ06 Tape Drive**



MLO-009262

### Controls and Indicators

The controls and indicators on the TLZ06 are as follows:

- ❶ Tape eject button
- ❷ Write-protect indicator
- ❸ Tape activity indicator

---

## Setting the SCSI ID

### Address Switches

Before you can use the TLZ06 drive, check the mode and SCSI address switches to make sure that they are set for the desired operating system and SCSI address. See Figure 5–2 for the location of these switches.

### Selecting the SCSI Address

Switches 3, 2, and 1 allow you to select a unique SCSI address for each drive. When switches 3, 2, and 1 are set as "down/up/down". The drive is set for SCSI address 5, the default address for a tape drive.

If you are using only one tape drive, you may leave the SCSI switches at the default address. If you are using more than one tape drive, you will need to select a unique SCSI address for each tape drive.

### Changing the Default

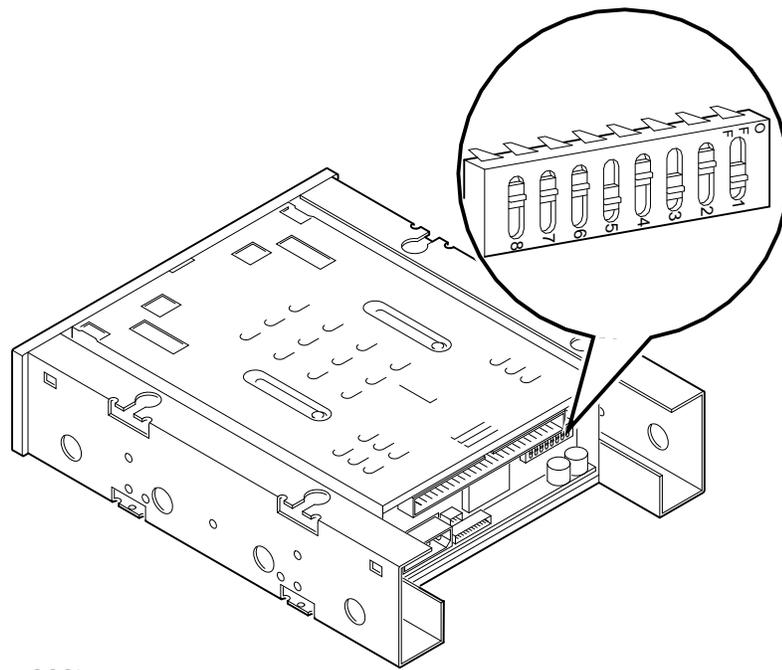
Default settings should be changed *only* when a system is configured with more than one of a particular drive. If you want to change the default address, choose a new ID from Table B–1, and refer to Figure 5–2 for the SCSI setting.

### Unique SCSI ID

Each drive must have a unique SCSI address. Never set two or more drives to the same SCSI address; the system will not be able to communicate with the drives.

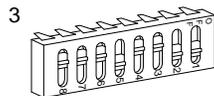
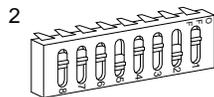
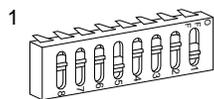
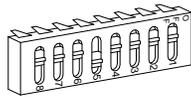
## Setting the SCSI ID

**Figure 5-2 TLZ06 Mode and SCSI Address Switches**

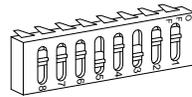


SCSI

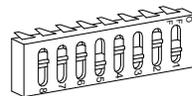
Settings: 0



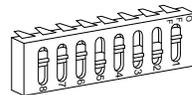
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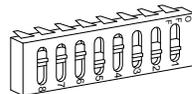
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## Installing the TLZ06 Drive

**Important** Prepare your system, as instructed in Chapter 1, before you install this option.

**Installation Overview** Table 5–1 provides an overview of the installation steps. The sections following the table explain each step in more detail.

**Table 5–1 Installation Steps for the TLZ06 Tape Drive**

- 
- |    |   |
|----|---|
| 1. | Locate and remove the removable media bracket.  |
| 2. | Remove the diagnostics board.   |
| 3. | Replace the blank bezel in the system unit with the TLZ06 bezel shipped with the drive. |
| 4. | Replace the diagnostics board.  |
| 5. | Replace the media bracket.  |
| 6. | Install the drive in the bracket.   |
| 7. | Connect the SCSI and power cables.  |
- 

**Before You Begin** Remove the fixed disk drive H-bracket, so you can access the removable media bracket catches. See Chapter 6 for instructions, if necessary.

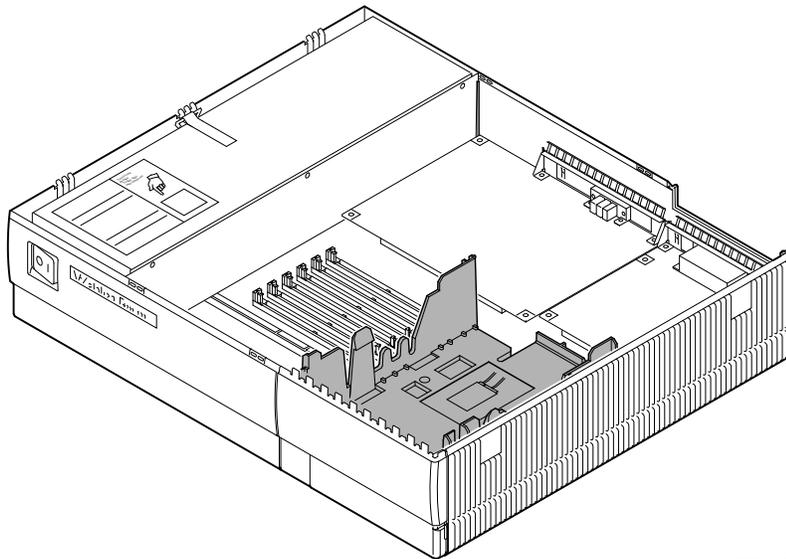
Remove the SPXgt graphics frame buffer, if you have one. See Chapter 8, if necessary.

## Installing the TLZ06 Drive

### Locate the Removable Media Bracket

Figure 5-3 shows the location of the removable media bracket.

**Figure 5-3 Location of the Removable Media Bracket**



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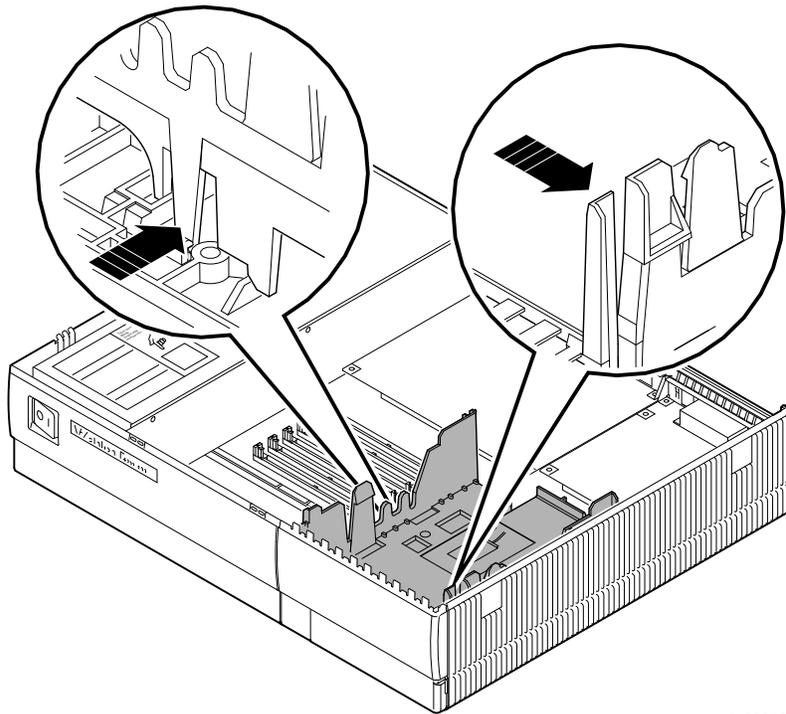
### **WARNING:** Sharp Edges

When removing or replacing the removable media bracket, do not touch the sharp plastic edges on the top edge of the bezel.

**Remove the Media Bracket**

Remove the bracket from the system unit by releasing the two cantilever catches (as shown in Figure 5-4) and lifting the bracket straight up. Pulling up hard will not break the bracket.

**Figure 5-4 Removing the Removable Media Bracket**



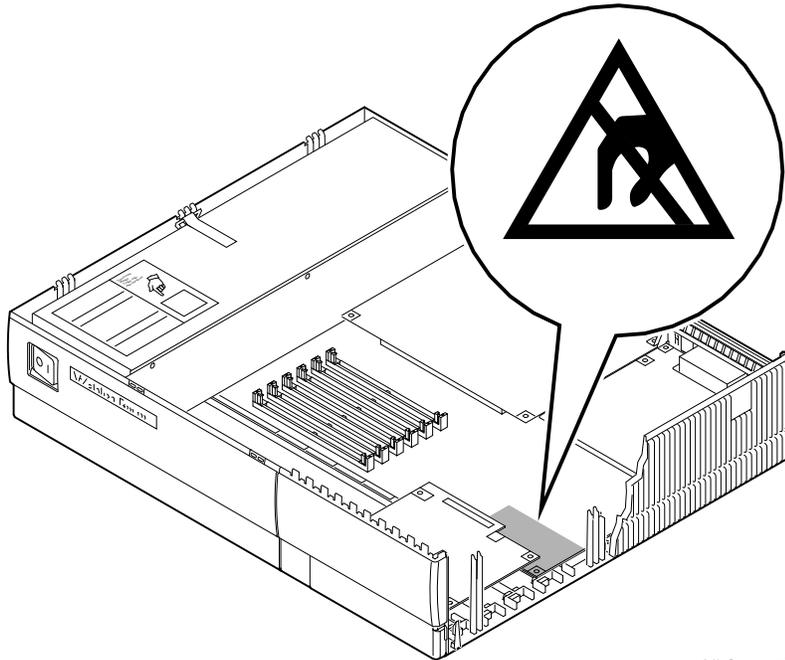
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## Installing the TLZ06 Drive

**CAUTION:**  
**Avoid Damage**  
**to Components**

When removing the diagnostic board (in the next step) be very careful to avoid touching the CPU board in the area shown in Figure 5-5. Touching the board in the area indicated could damage some of the components on the board.

**Figure 5-5 Avoid Touching This Area**



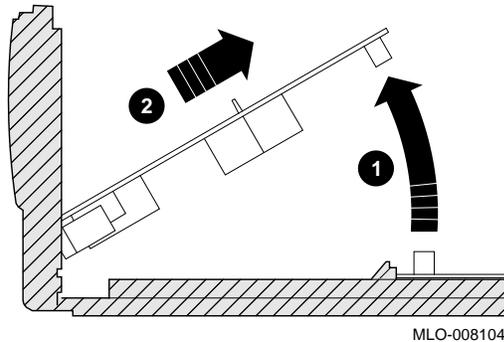
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### Remove the Diagnostics Board

To remove the diagnostics board, follow these steps and refer to Figure 5-6:

1. Pull up on the rear edge of the board, releasing the connectors **1**.
2. Slide the board **2** out of the system unit.

**Figure 5-6 Removing the Diagnostics Board**



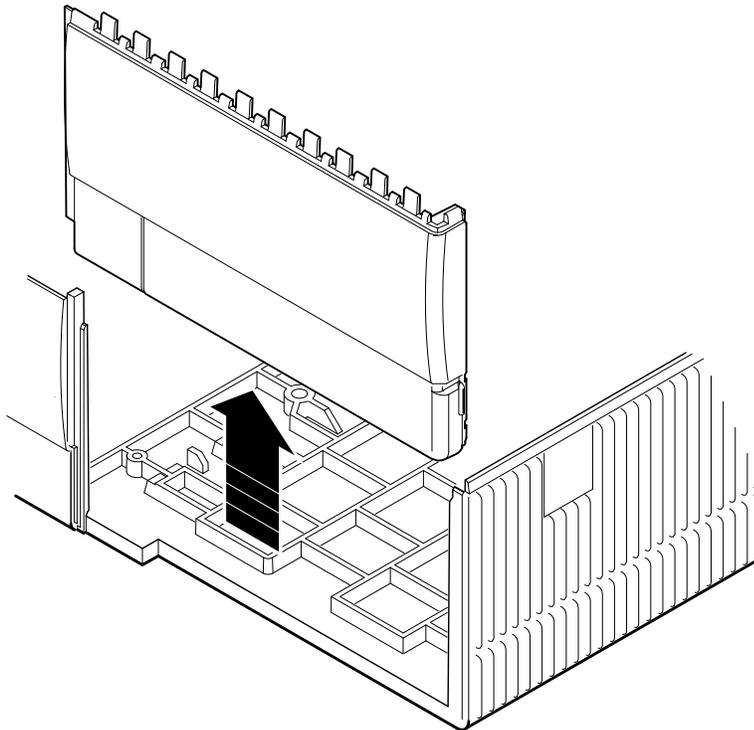
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## Installing the TLZ06 Drive

### Remove the Bezel

Remove the blank bezel from the front of the system unit by pulling the bezel up, as shown in Figure 5-7.

**Figure 5-7 Removing the Blank Bezel from the System Unit**

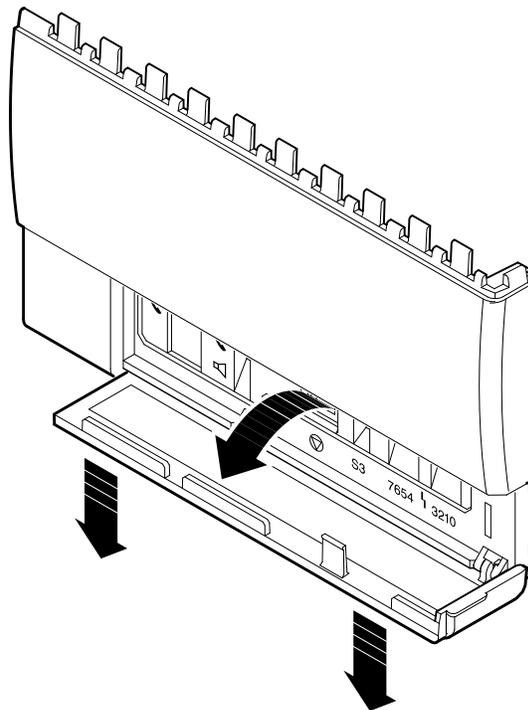


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**Remove and Install the Door**

Carefully remove the door from the blank bezel by pressing down on its front edge, as shown in Figure 5–8.

**Figure 5–8 Removing the Door from the Bezel**



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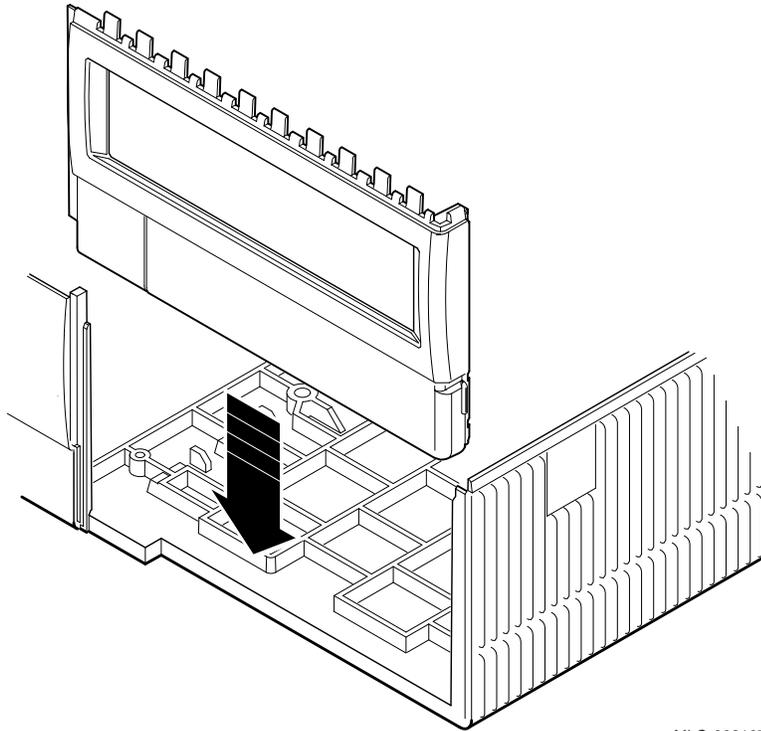
Snap the door onto the TLZ06 bezel at the two hinges. Close the door.

## Installing the TLZ06 Drive

### Install the TLZ06 Bezel

Slide the TLZ06 bezel into the front panel on the system unit, as shown in Figure 5–9. The ridges slide into the grooves.

**Figure 5–9** Installing the TLZ06 Bezel in the System Unit



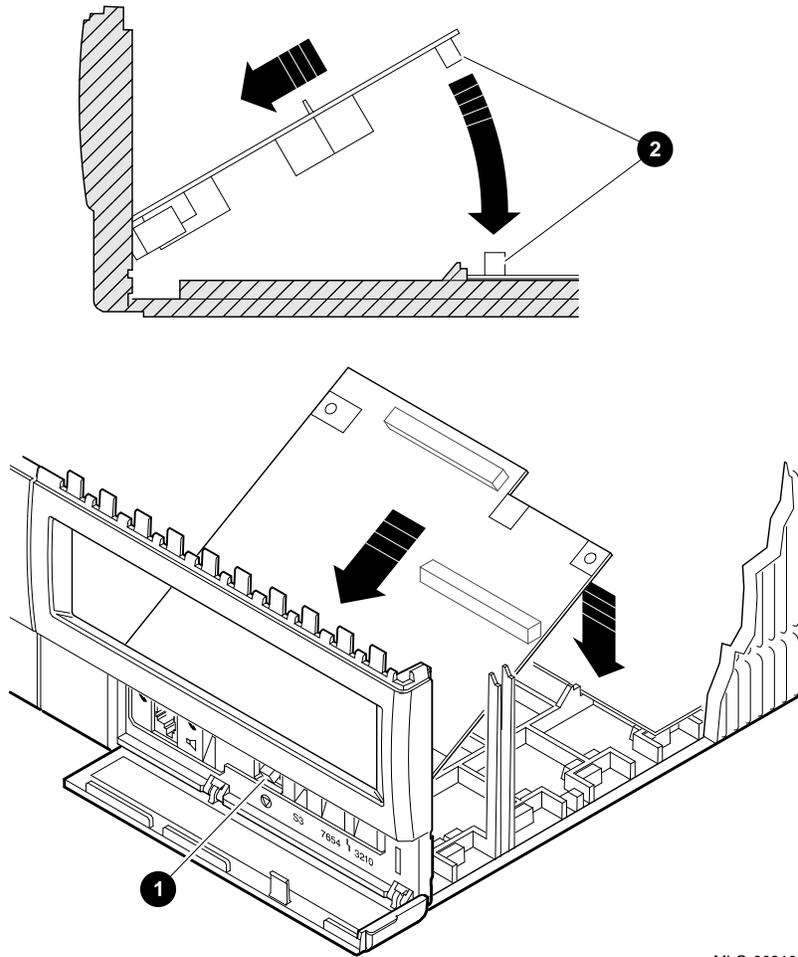
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### Replace the Diagnostics Board

To replace the diagnostics board, follow these steps and refer to Figure 5–10:

1. Fit the front edge of the board into the notches on the inside of the bezel.
2. Align the square halt button **1** on the board with the square hole in the bezel.

Figure 5-10 Replacing the Diagnostics Board



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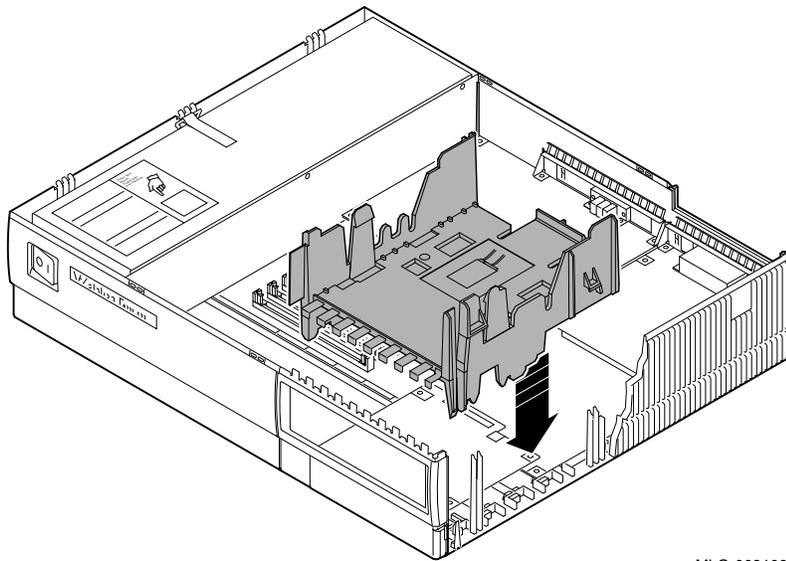
3. Press down on the rear edge of the board, to ensure the connectors **2** are firmly seated.

## Installing the TLZ06 Drive

### Replace the Bracket in the System Unit

Place the removable media bracket in the system unit, as shown in Figure 5-11. The bracket slides down along two keys molded in the inside wall of the system unit, and latches on the front corner when it is fully seated.

**Figure 5-11 Replacing the Removable Media Bracket in the System Unit**



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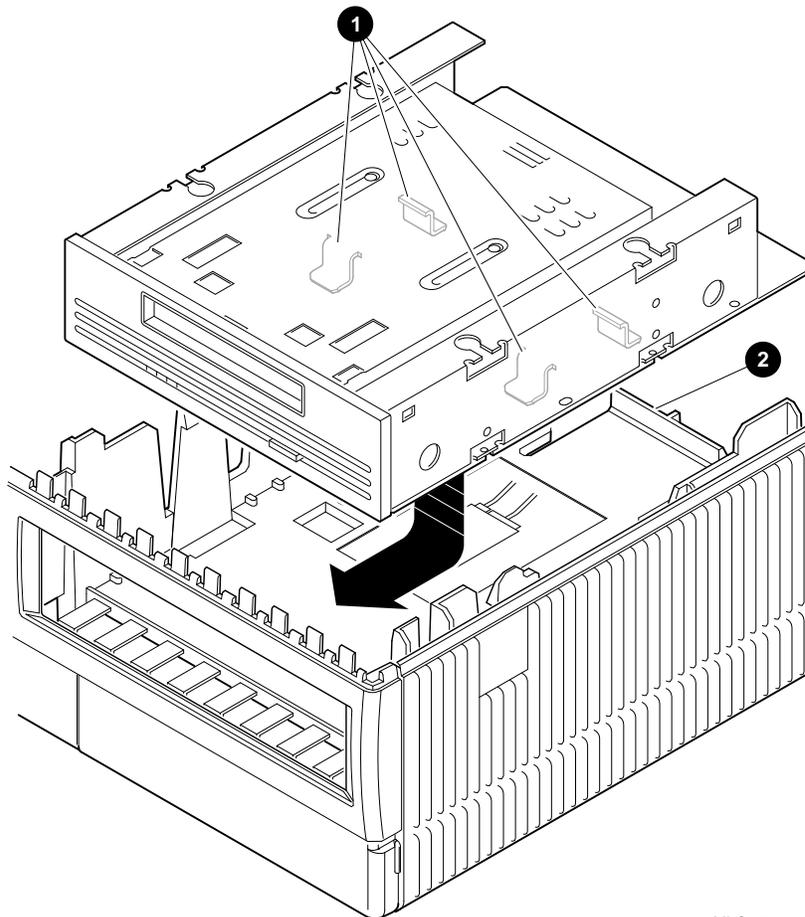
## Installing the TLZ06 Drive

### Install the Drive in the Bracket

Place the TLZ06 drive in the removable bracket, as shown in Figure 5–12.

When the drive is seated, slide it forward to lock it in place. Clips **1** on the underside of the drive will lock into the bracket, and a latch **2** on the bracket will engage the rear of the drive.

**Figure 5–12** Placing the TLZ06 Drive in the Bracket



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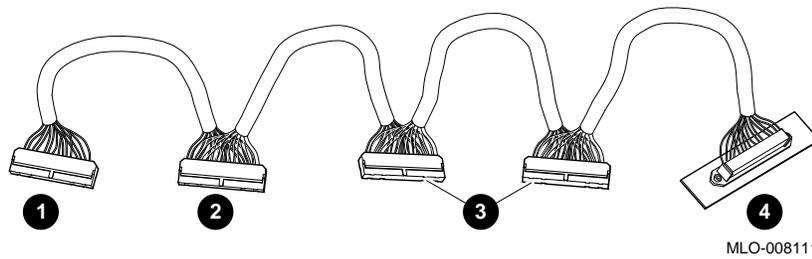
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## Connecting the SCSI and Power Cables

### Locate the SCSI Cables

Locate the SCSI cable, shown in Figure 5–13, and identify the SCSI connector ❷ for the TLZ06 drive.

**Figure 5–13 SCSI Cables and Connectors**



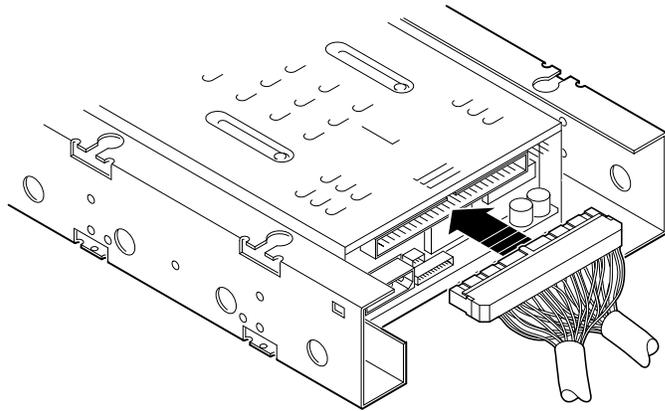
- ❶ CPU connector
- ❷ TLZ06 connector
- ❸ RZ2x connectors
- ❹ Rear panel SCSI port

## Connecting the SCSI and Power Cables

### Connect the SCSI Cable

Connect the TLZ06 SCSI connector to the SCSI port on the TLZ06 drive, as shown in Figure 5-14.

**Figure 5-14 Connecting the SCSI Connector to the TLZ06 Drive**



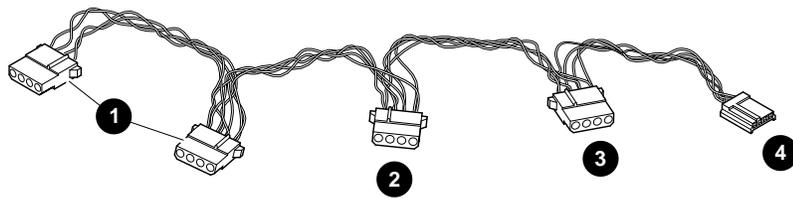
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## Connecting the SCSI and Power Cables

### Locate the Power Cable

Locate the power cable, shown in Figure 5–15, and identify the power connector ❸ for the TLZ06 drive.

**Figure 5–15 Power Cable and Connectors**



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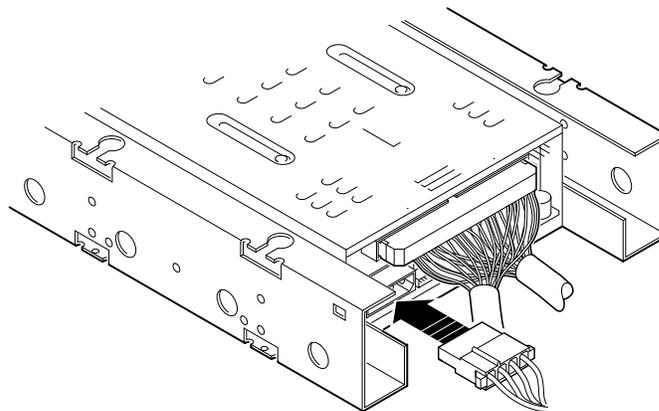
- ❶ RZ2x connectors
- ❷ CPU connector
- ❸ TLZ06 connector
- ❹ RX26 connector

## Connecting the SCSI and Power Cables

### Connect the Power Cable

Connect the TLZ06 power cable to the power port of the TLZ06 drive, as shown in Figure 5–16.

**Figure 5–16 Connecting the Power Connector to the TLZ06 Drive**



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### Replace H-Bracket

Place the H-bracket back in the system unit now. See Chapter 6, if necessary.

### Replace SPXgt Frame Buffer

If you removed the SPXgt frame buffer, replace it now. See Chapter 8, if necessary.

### Testing the Installation

This completes the installation of the TLZ06 tape drive. To test your installation of the TLZ06 tape drive, see Chapter 11.

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## Handling and Storing Tapes

### Guidelines

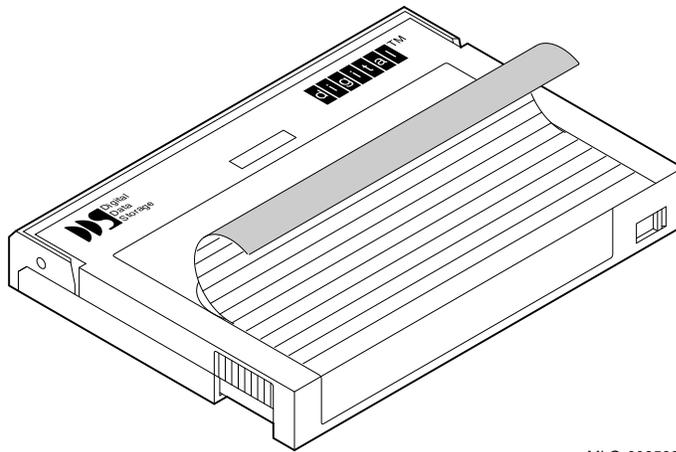
When handling and storing TLZ06 tape cassettes:

- Do not drop or strike cassettes.
- Keep cassettes out of direct sunlight, away from heaters and other sources of heat.
- Store cassettes where the temperature is between 10°C and 40°C (50°F and 104°F).
- If a cassette has been exposed to extreme heat or cold, allow it to stabilize at room temperature for the same amount of time as it was exposed, up to 24 hours.
- Avoid placing cassettes near sources of electromagnetic interference, such as terminals, motors, and video or X-ray equipment. Any tape exposed to a magnetic field can lose information.
- Store cassettes in a dust-free environment where the relative humidity is between 20% and 80%.
- Store cassettes in their protective containers, on edge or stacked. However, when stacking cassettes, do not stack more than five high.
- Place an identification label only in the space provided for the label on top of the cassette, as shown in Figure 5–17.

**Labeling TLZ06  
Tape Cassettes**

Figure 5–17 shows the proper placement of a cassette label.

**Figure 5–17 Labeling the TLZ06 Tape Cassette**



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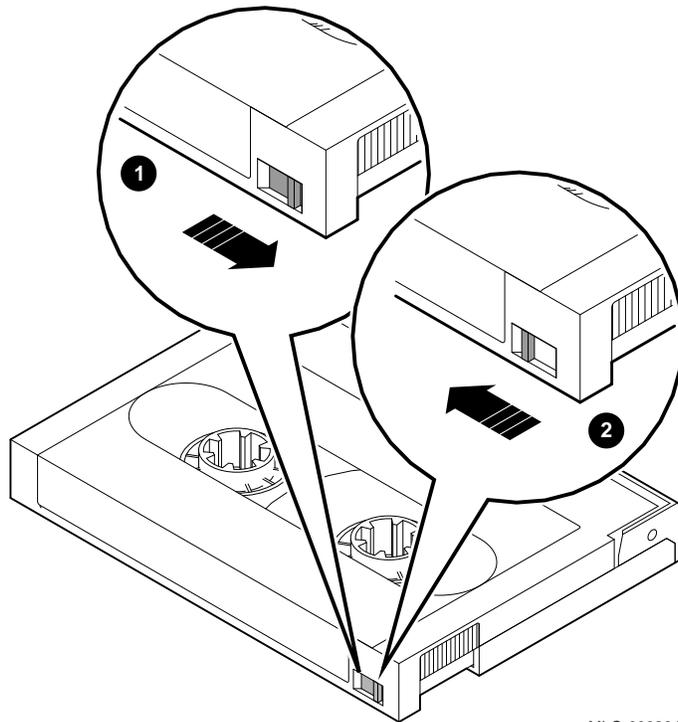
## Handling and Storing Tapes

### Write-Protecting TLZ06 Tape Cassettes

Write-protecting a cassette prevents accidental overwriting or erasure of data on the cassette.

Before you use a cassette, check its write-protect switch. If you want to write data onto the cassette, set it in position ❶ in Figure 5–18. If you want to read information from the cassette, but don't want to write information onto it, set the write-protect switch to position ❷ in Figure 5–18.

**Figure 5–18 Write-Protecting the TLZ06 Tape Cassette**



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### **CAUTION:** Possible Tape Damage

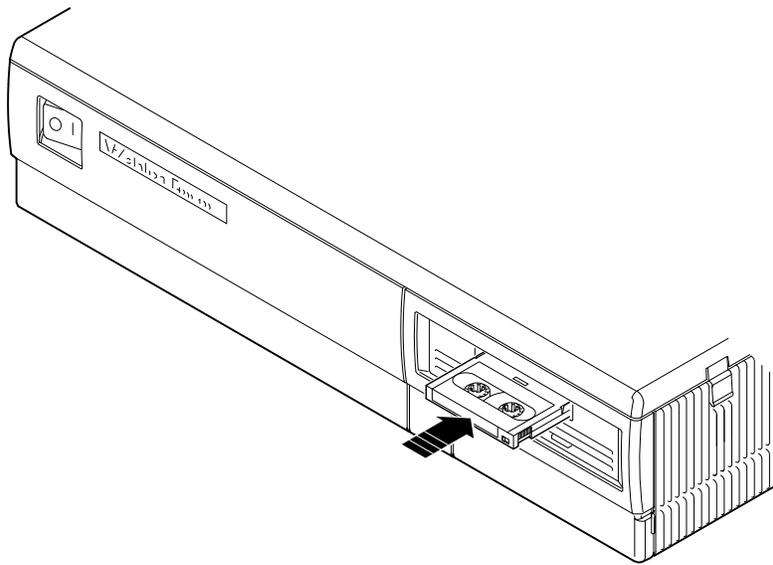
Use a pen to slide the write-protect switch. Do *not* use a pencil; the graphite can damage the tape.

### Inserting a TLZ06 Tape Cassette

To insert the tape into the drive, do the following:

1. Make sure that the system unit is on ( | ).
2. Insert the TLZ06 tape cassette into the drive, as shown in Figure 5–19.

**Figure 5–19** Inserting the TLZ06 Tape Cassette



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### Removing a TLZ06 Tape Cassette

To remove the tape from the drive, press the tape eject button.

---

## TLZ06 Tape Drive Specifications

Tables 5–2 through 5–6 provide specification information for the TLZ06 tape drive.

**Table 5–2 TLZ06 Drive Dimensions**

Weight	Height	Width	Depth
2.2 kg (4.7 lb)	4.1 cm (1.6 in)	14.6 cm (5.75 in)	17.8 cm (7.0 in)

**Table 5–3 TLZ06 Power Consumption**

Power	9 watts
-------	---------

**Table 5–4 TLZ06 Drive Operating Conditions**

Operating temperature	10°C to 40°C (50°F to 104°F)
Operating humidity	20% to 80%, noncondensing
Altitude	0 m to 4.6 km (0 ft to 15,000 ft)

**Table 5–5 TLZ06 Drive Nonoperating Conditions**

Nonoperating temperature	–40°C to 70°C (–40°F to 158°F)
Operating humidity	5% to 95%, noncondensing
Altitude	0 km to 15.2 km (0 ft to 50,000 ft)

**Table 5–6 TLZ06 Cassettes**

Cassette	Size	Capacity
TLZ04-CA <sup>1</sup>	4mm x 60m	1.3 or 2.6 gigabytes
TLZ06-CA	4mm x 90m	2 or 4 gigabytes

<sup>1</sup>Can read only if compression is not enabled

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# 6

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## Fixed Disk Drives

### Introduction

This chapter describes the RZ2*x* fixed disk drive options for your system unit.

### Chapter Topics

This chapter covers the following topics:

- Setting the SCSI ID
- Installing a Fixed Disk Drive
- Connecting the SCSI and Power Cables
- RZ23L Drive Hardware Specifications
- RZ24 Drive Hardware Specifications
- RZ24L Drive Hardware Specifications
- RZ25 Drive Hardware Specifications
- RZ25L Drive Hardware Specifications
- RZ26B Drive Hardware Specifications

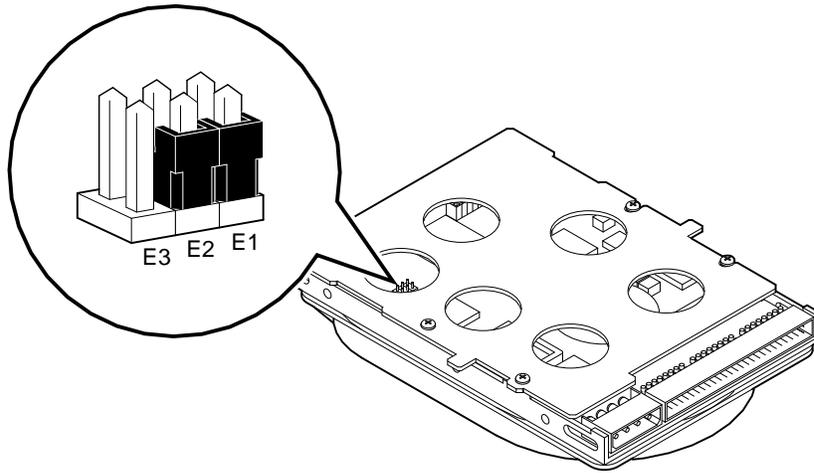
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## Setting the SCSI ID

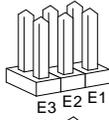
<b>Verify the SCSI ID</b>	Before installing the drive in the system unit, you need to verify the position of the removable electrical connectors, called jumpers, on the drive.
<b>Default Settings</b>	<p>If your fixed disk drive was not factory-installed, it may have been shipped with all of the jumpers attached (to prevent loss of jumpers when shipping and unpacking). In this case, the SCSI ID is set to 7, and you might need to change it. Digital recommends SCSI settings 0, 1, 2, and 3 for fixed disk drives.</p> <p>Save any jumpers you remove. You may need them later.</p>
<b>Changing the Default Setting</b>	Refer to the figures that follow if you need to change your SCSI setting. You are responsible for the SCSI ID settings on your equipment.
<b>Unique SCSI ID</b>	Each device must have a unique SCSI ID. Never set two or more devices to the same SCSI ID; the system will not be able to communicate with the devices.
<b>SCSI ID Settings</b>	Figures 6–1 through 6–6 show the SCSI ID jumper settings for the RZ2 $x$ fixed disk drives.
<b>RZ24L Note</b>	Remove the metal bracket on the RZ24L drive to access the SCSI jumpers.

Setting the SCSI ID

Figure 6-1 Setting the RZ23L Drive SCSI ID



SCSI  
Settings: 0



1



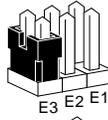
2



3



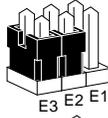
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5



6



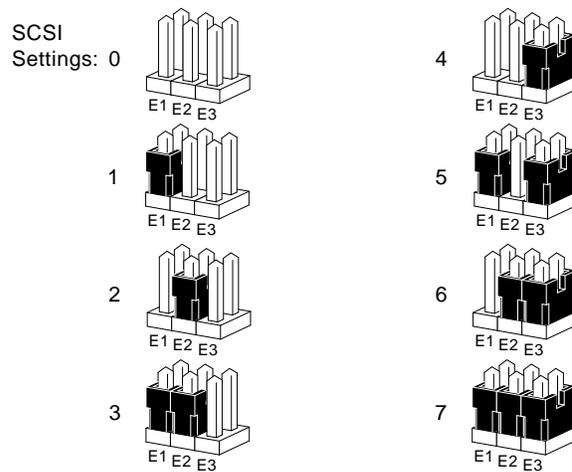
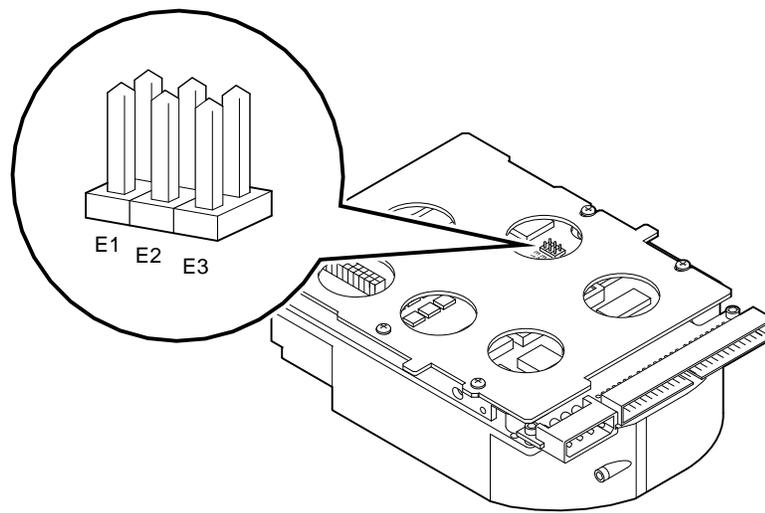
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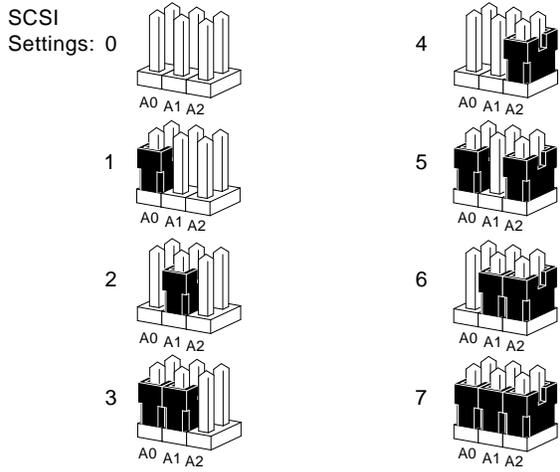
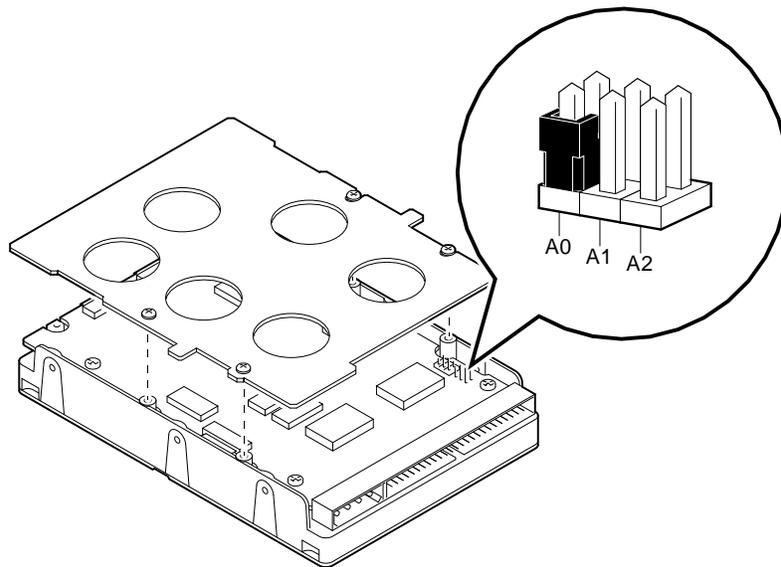
## Setting the SCSI ID

Figure 6-2 Setting the RZ24 Drive SCSI ID



MLO-009406

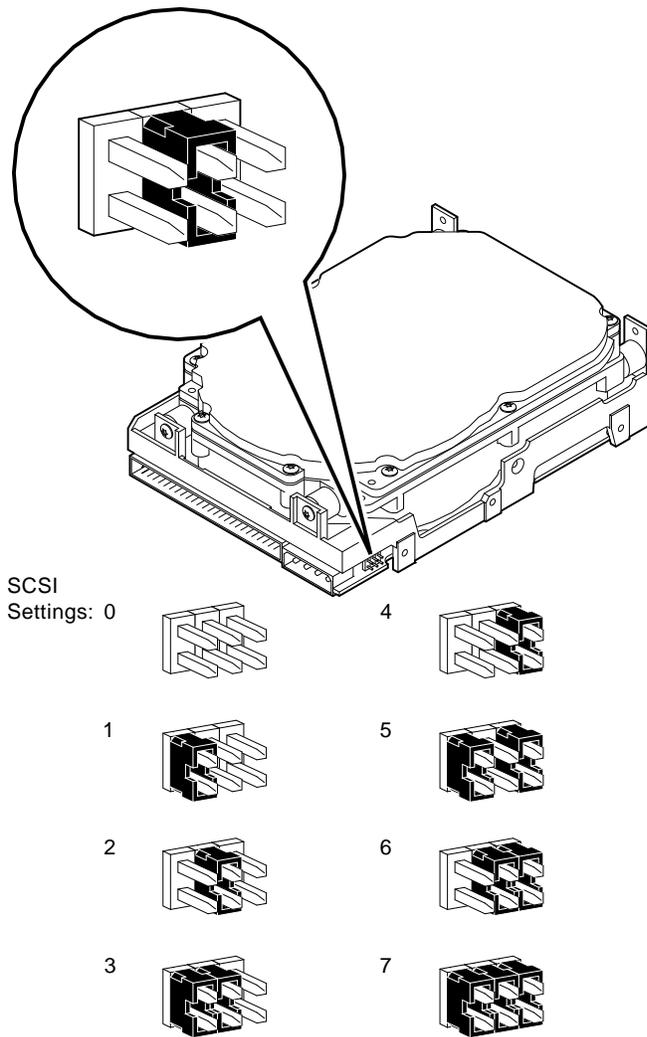
Figure 6-3 Setting the RZ24L Drive SCSI ID



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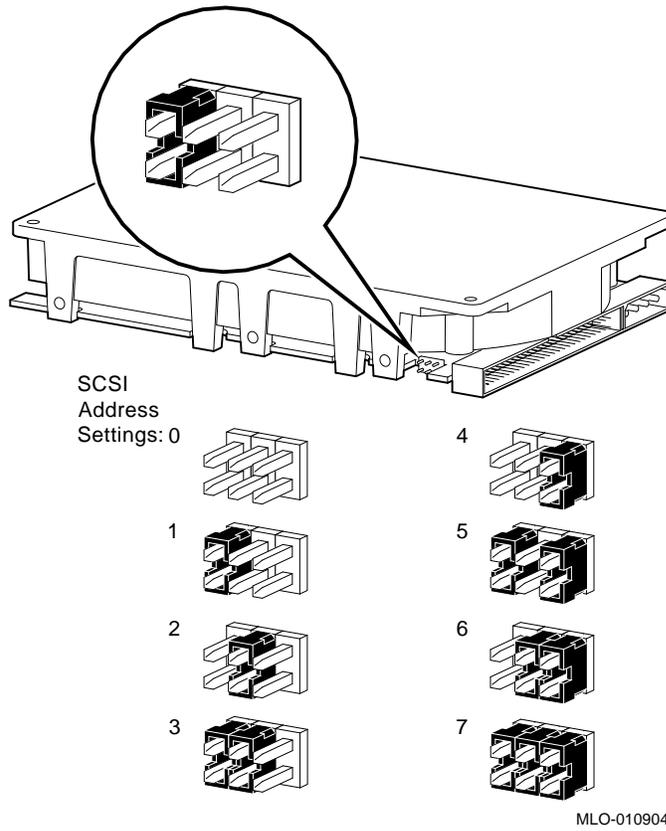
## Setting the SCSI ID

Figure 6-4 Setting the RZ25 Drive SCSI ID



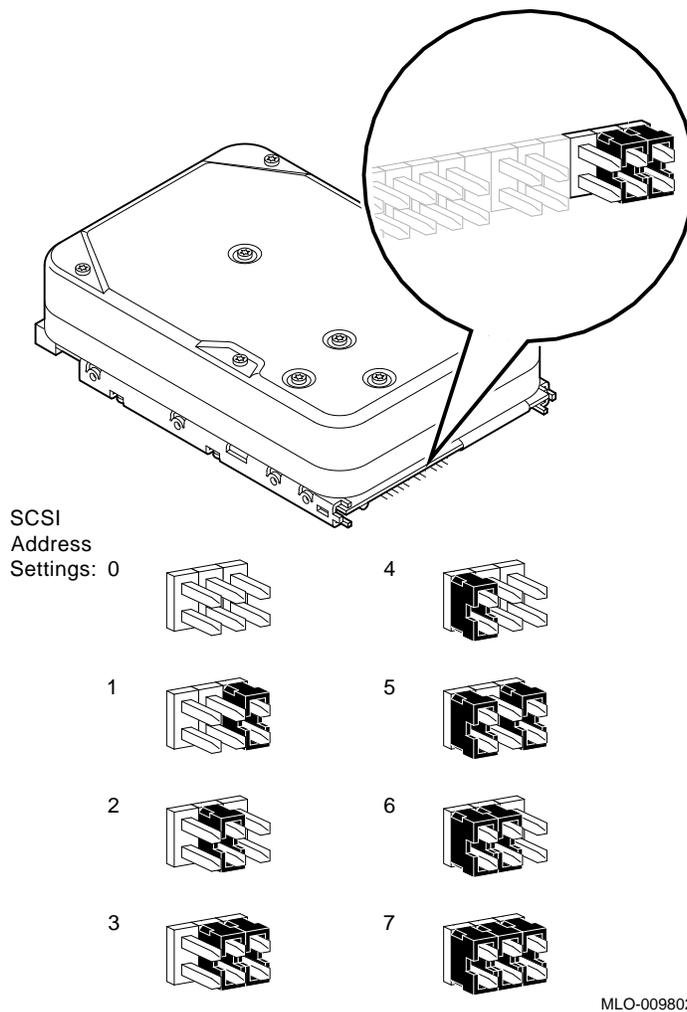
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Figure 6-5 Setting the RZ25L Drive SCSI ID



## Setting the SCSI ID

**Figure 6-6** Setting the RZ26B Drive SCSI ID



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### Compatibility

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The RZ26B fixed disk drive can be installed *only* in the Model 60 and Model 90 systems.

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## Installing a Fixed Disk Drive

### Important

Prepare your system, as instructed in Chapter 1, before you install this option.

If your system has an SPXgt graphics module, you must remove the frame buffer before installing a fixed disk drive. See Chapter 8, if necessary.

### Installation Overview

Table 6–1 provides an overview of the steps you perform to install a fixed disk drive. The following sections explain each step in more detail.

**Table 6–1 Installing a Fixed Disk Drive**

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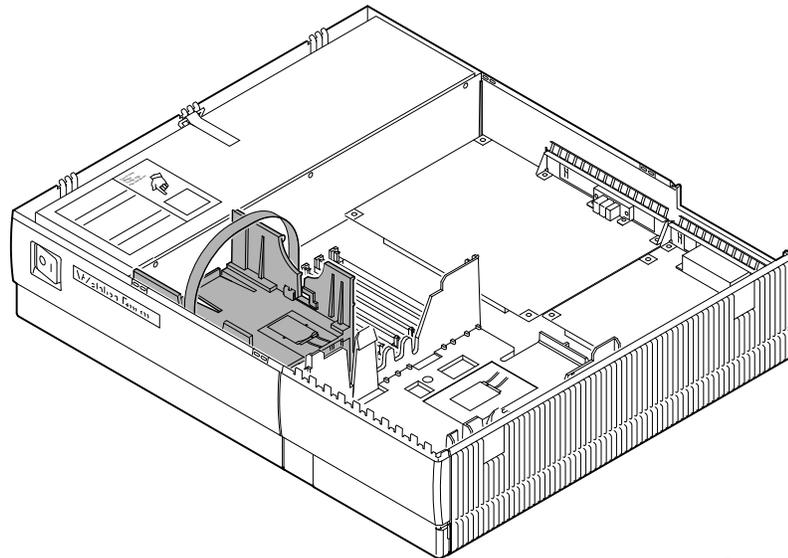
1. Remove the H-bracket.
  2. Insert the first drive in the bottom of the bracket.
  3. Insert the second drive in the top of the bracket.
  4. Remove the system cables.
  5. Connect the SCSI and power cables.
  6. Replace the H-bracket.
  7. Route the cables.
-

## Installing a Fixed Disk Drive

### Locate the H-bracket

The RZ2x fixed disk drives are mounted in the H-bracket. See Figure 6-7 for the location of the H-bracket in your system unit.

**Figure 6-7 H-Bracket Location**

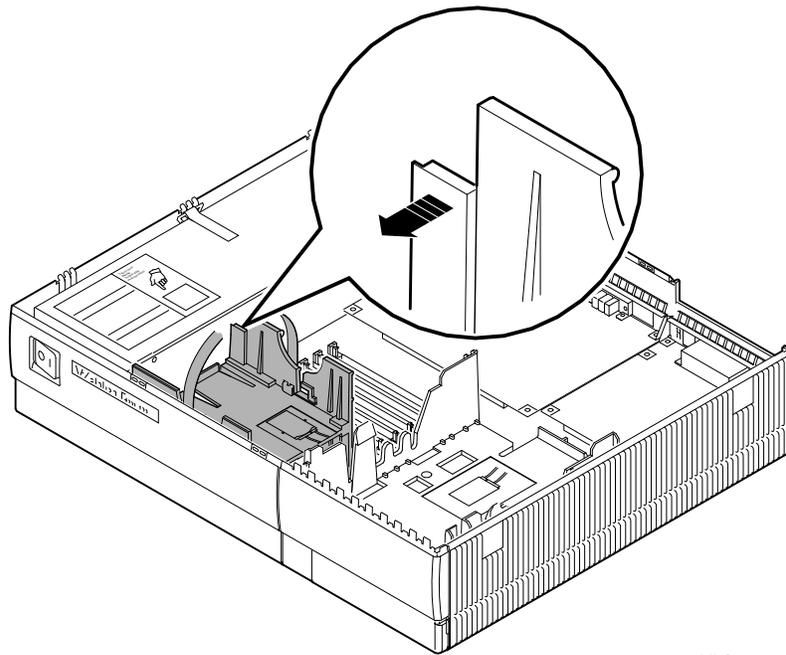


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**Remove the H-Bracket**

Remove the H-bracket from the system unit by pushing in on the cantilever catch on the bracket (as shown in Figure 6–8) and lifting the bracket straight up with the strap handle.

**Figure 6–8 Removing the H-Bracket from the System Unit**



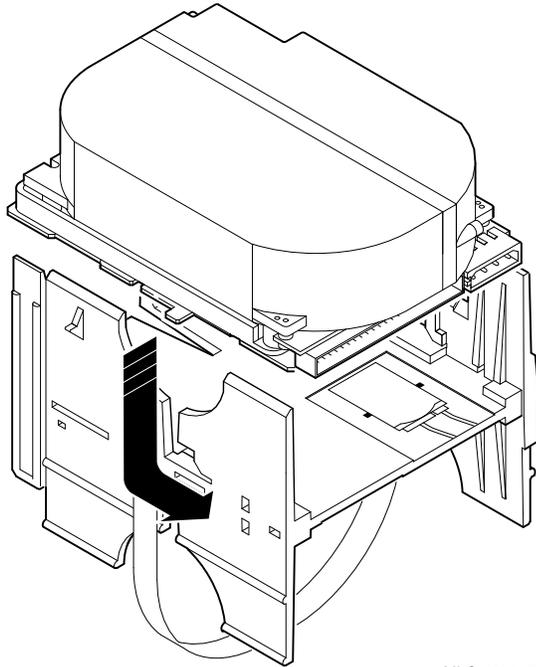
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## Installing a Fixed Disk Drive

### Insert First Drive in the H-Bracket

When installing two drives, mount the largest one in the bottom of the bracket. The RZ25 and RZ26B drives are large, the RZ24 is smaller, and the RZ23L, RZ24L, and RZ25L are the smallest. Mount the drive, as shown in Figure 6–9.

**Figure 6–9** Placing the First Drive in the H-Bracket



MLO-008142

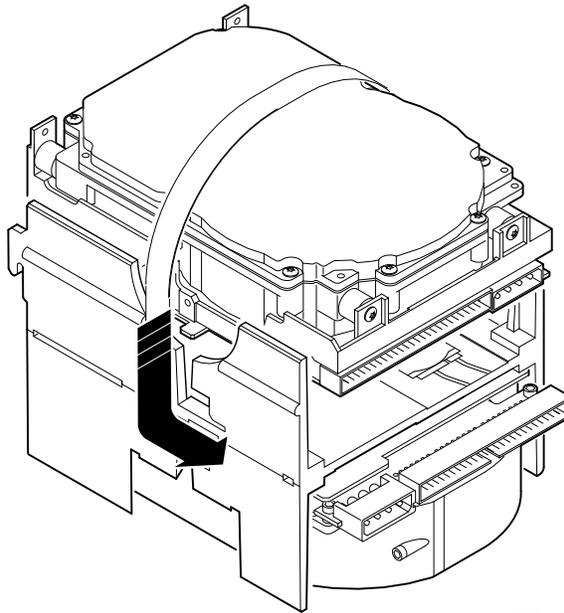
1. Orient the drive and the bracket.
2. Lower the drive into the bracket and press firmly.
3. Slide the drive until it locks into place.

## Installing a Fixed Disk Drive

### Insert Second Drive in the Bracket

Turn the bracket over and insert the second drive, as shown in Figure 6–10.

**Figure 6–10** Placing a Second Drive in the H-Bracket



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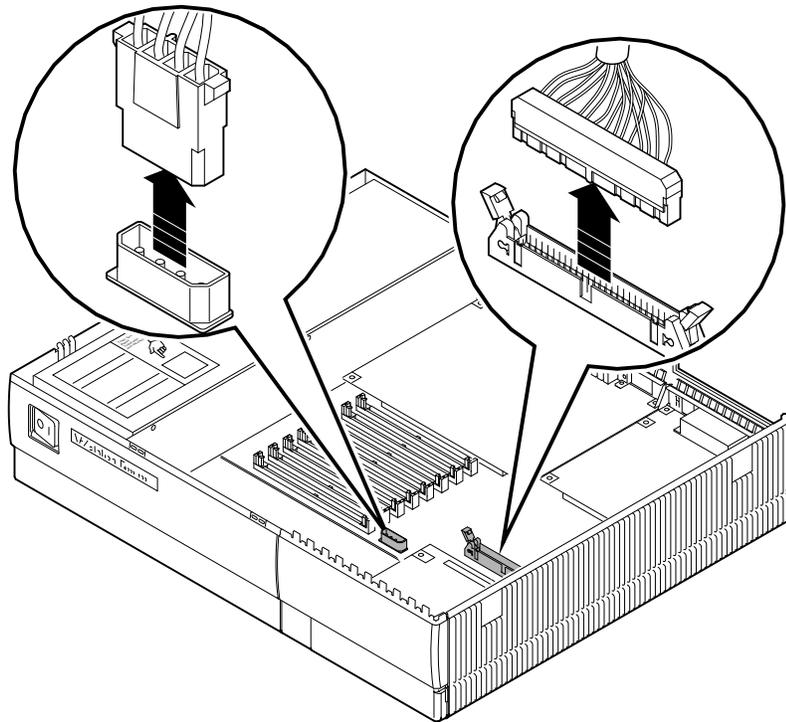
1. Orient the drive and the bracket.
2. Lower the drive into the bracket and press firmly.
3. Slide the drive until it locks into place.

## Installing a Fixed Disk Drive

### Remove System Cables

Disconnect the SCSI and power cables from the CPU board and any removable media device (RRD42, RX26, TZK10 or TLZ06). (This will allow you to rest the H-bracket, with drives, on a convenient support while you attach the drive cables.) Refer to Figure 6-11, if necessary.

**Figure 6-11 Removing Cable and Connectors**



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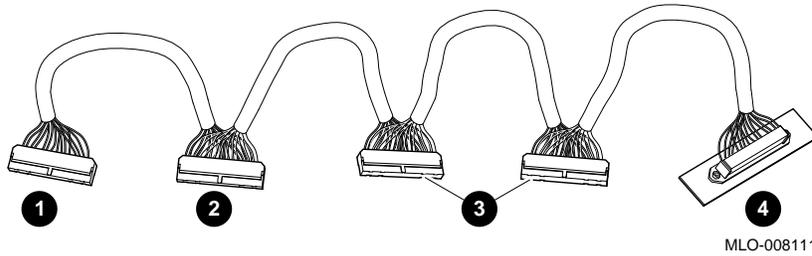
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## Connecting the SCSI and Power Cables

### Locate the SCSI Cable

Locate the SCSI cable, shown in Figure 6–12, and identify the two connectors ❸ for the RZ2x fixed disk drives.

**Figure 6–12 SCSI Cable and Connectors**



- ❶ CPU connector
- ❷ RRD42, RX26, TZK10 connector
- ❸ RZ2x connectors
- ❹ Rear panel SCSI port

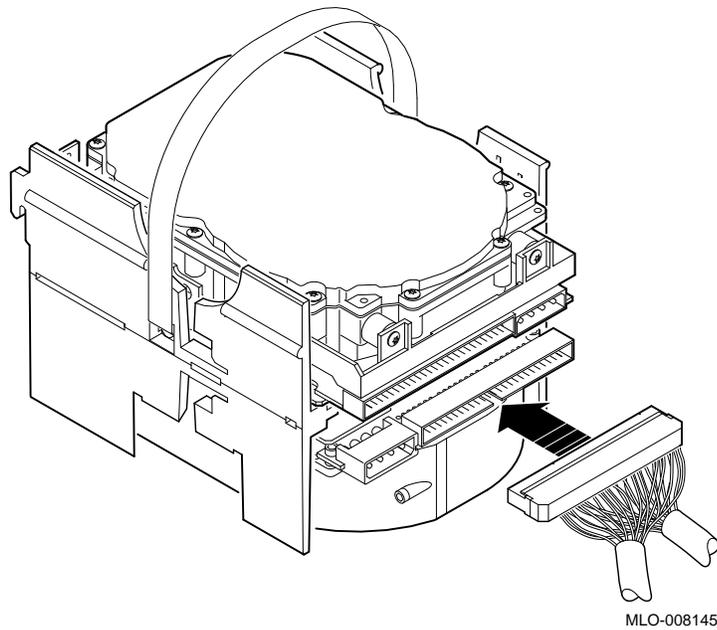
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## Connecting the SCSI and Power Cables

### Connect the SCSI Cable

Connect the SCSI connectors to the fixed disk drives, as shown in Figure 6–13. The connectors are keyed; be sure you have them oriented correctly before attempting to insert them into the drive. Either connector will work for the drives. (If you use only one disk drive, leave the other connector unattached.)

**Figure 6–13** Connecting the SCSI Connector to the Disk Drive

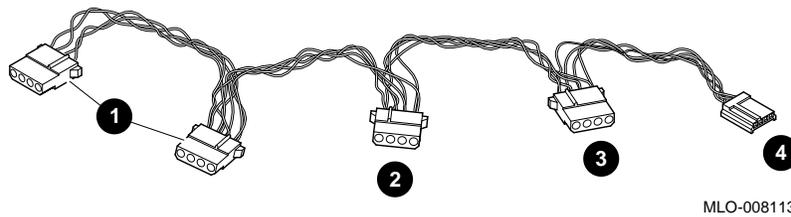


## Connecting the SCSI and Power Cables

### Locate the Power Cable

Locate the power cable, as shown in Figure 6–14, and identify the two connectors ❶ for the fixed disk drives.

**Figure 6–14 Power Cable and Connectors**



MLO-008113

- ❶ RZ2x connectors
- ❷ CPU connector
- ❸ RRD42, RX26, TZK10 connector
- ❹ RX26 connector

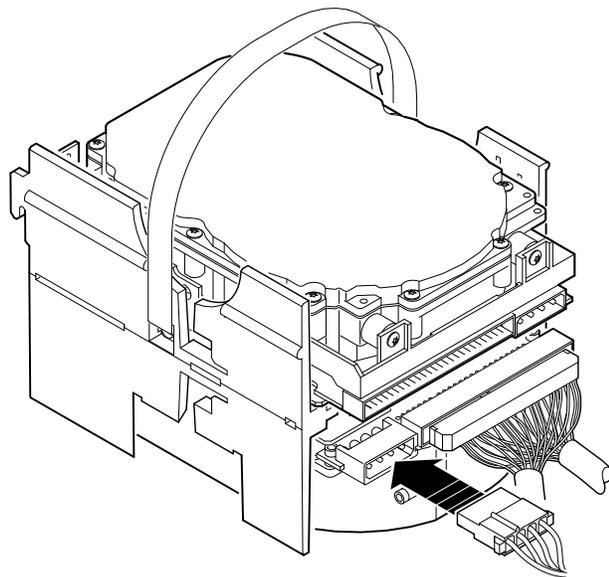
## Connecting the SCSI and Power Cables

### Connect the Power Cables

Connect the power connectors to the disk drives, as shown in Figure 6–15. The connectors are keyed; be sure you have them oriented correctly before inserting them.

If you use only one disk drive in the bottom of the H-bracket, use the connector at the end of the power cable. Leave the other connector unattached.

**Figure 6–15** Connecting the Power Cable to the Disk Drive



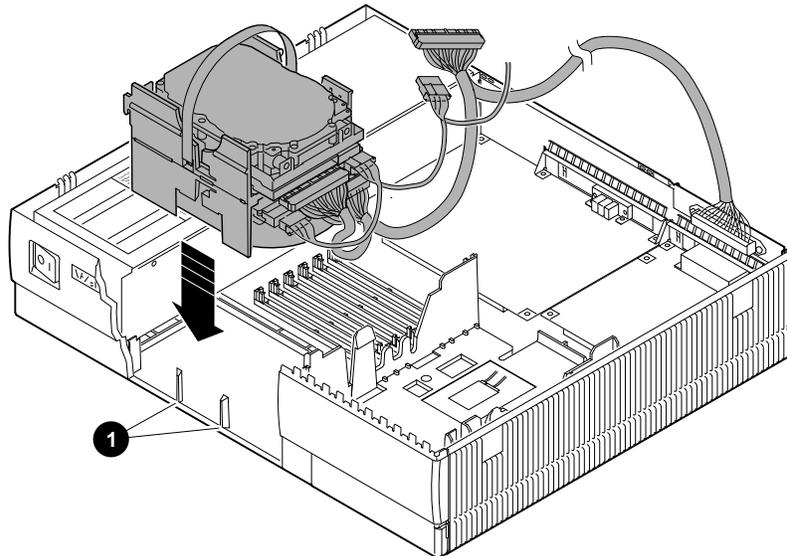
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## Connecting the SCSI and Power Cables

### Replace the H-Bracket

Lift the loaded H-bracket by the strap handle, and place it in the system unit, as shown in Figure 6-16.

**Figure 6-16** Replacing the H-Bracket



MLO-008147

Slide the bracket down the inside of the front panel so that it engages with the two keys ❶ molded in the panel. Make sure that the cables do not get caught on the removable media bracket.

### **WARNING:** Replace H-Bracket Carefully

When replacing the H-bracket in the system unit, do not touch the sharp plastic teeth on the top edge of the bezel. Also, be careful not to pinch your fingers under the bottom edge of the bracket. See the cable routing information in Chapter 11.

Reconnect the power and SCSI cables to any removable media device already present, and to the CPU module, to complete the installation.

### Testing the Installation

To test your installation of the RZ-series fixed disk drive, see Chapter 11.

---

## RZ23L Drive Hardware Specifications

**Capacity**

Table 6–2 provides the capacity specifications for the RZ23L fixed disk drive.

**Table 6–2 RZ23L Fixed Disk Drive Storage Specifications**

<b>Formatted Storage Capacity</b>	
Per drive	121 MB
Per surface	30 MB
Bytes per track	19,968
Bytes per block	512
Blocks per track	39
Blocks per drive	237,588
Spare blocks per track	1
Spare blocks per drive	6,092
Spare cylinders	0
Buffer size	64 KB

**Performance**

Table 6–3 provides performance specifications for the RZ23L fixed disk drive.

**Table 6–3 RZ23L Performance Specifications**

<b>Performance Variable</b>	<b>Operating Conditions</b>
Data transfer rate to/from media	1½ MB/sec
Data transfer rate to/from buffer	1.13 MB/sec
Bus asynchronous	3.0 MB
Bus synchronous	4.0 MB
Seek time track to track	≤8 msec

(continued on next page)

## RZ23L Drive Hardware Specifications

**Table 6–3 (Cont.) RZ23L Performance Specifications**

<b>Performance Variable</b>	<b>Operating Conditions</b>
Seek time average	≤ 19 msec
Seek time maximum (full stroke)	≤35 msec
Average latency	8.8 msec
Rotational speed	3409 rpm ±0.5%
Start time	20 sec maximum
Stop time	20 sec maximum
Interleave	1:1

### Operating Conditions

Table 6–4 provides the operating conditions for the RZ23L fixed disk drive.

**Table 6–4 RZ23L Drive Operating Conditions**

<b>Environmental Variable</b>	<b>Operating Conditions</b>
Ambient temperature	10°C to 55°C (50°F to 131°F)
Relative humidity	8%–80%
Altitude	–304 km to 3048 m (–1000 ft to 15,000 ft)
Maximum wet bulb	25.6°C (78°F) (noncondensing)
Heat dissipation	3.6 W (seeking) (12.31 Btu/hr) 3.8 W (typical) (13.0 Btu/hr)
Temperature gradient	11°C/hr (52°F/hr)

## RZ23L Drive Hardware Specifications

### Nonoperating Conditions

Table 6–5 provides the nonoperating conditions for the RZ23L fixed disk drive.

**Table 6–5 RZ23L Drive Nonoperating Conditions**

<b>Environmental Variable</b>	<b>Nonoperating Conditions</b>
Ambient temperature	–40°C to 66°C (–40°F to 151°F)
Relative humidity	8%–95% (packaged)
Altitude	–304 km to 12,192 m (–1000 ft to 40,000 ft)
Maximum wet bulb	46°C (115°F) (noncondensing)
Temperature gradient	20°C/hr (68°F/hr)

---

## RZ24 Drive Hardware Specifications

**Capacity**

Table 6–6 provides the capacity specifications for the RZ24 fixed disk drive.

**Table 6–6 RZ24 Fixed Disk Drive Storage Specifications**

<b>Formatted Storage Capacity</b>	
Per drive	209.7 MB
Per surface	26.2 MB
Bytes per track	19,456
Bytes per block	512
Blocks per track	38
Blocks per drive	409,792
Spare blocks per track	1
Spare blocks per drive	10,944
Spare cylinders	0
Buffer size	64 KB

**Performance**

Table 6–7 provides performance specifications for the RZ24 fixed disk drive.

**Table 6–7 RZ24 Drive Performance Specifications**

<b>Performance Variable</b>	<b>Operating Conditions</b>
Data transfer rate to/from media	1½ MB/sec
Data transfer rate to/from buffer	1.13 MB/sec
Bus asynchronous	3.0 MB
Bus synchronous	4.0 MB
Seek time track to track	5 msec

(continued on next page)

## RZ24 Drive Hardware Specifications

**Table 6–7 (Cont.) RZ24 Drive Performance Specifications**

<b>Performance Variable</b>	<b>Operating Conditions</b>
Seek time average	16 msec
Seek time maximum (full stroke)	≤35 msec
Average latency	8.6 msec
Rotational speed	3497 rpm ±0.5%
Start time	20 sec maximum
Stop time	20 sec maximum
Interleave	1:1

## Operating Conditions

Table 6–8 provides the operating conditions for the RZ24 fixed disk drive.

**Table 6–8 RZ24 Drive Operating Conditions**

<b>Environmental Variable</b>	<b>Operating Conditions</b>
Ambient temperature	10°C to 55°C (50°F to 131°F)
Relative humidity	8%–80%
Altitude	–304 km to 4573 km (–1000 ft to 15,000 ft)
Maximum wet bulb	25.6°C (78°F) (noncondensing)
Heat dissipation	6.8 W (seeking) (23.26 Btu/hr) 6.6 W (typical) (22.57 Btu/hr)
Temperature gradient	11°C/hr (20°F/hr)

## RZ24 Drive Hardware Specifications

### Nonoperating Conditions

Table 6–9 provides the nonoperating conditions for the RZ24 fixed disk drive.

**Table 6–9 RZ24 Drive Nonoperating Conditions**

<b>Environmental Variable</b>	<b>Nonoperating Conditions</b>
Ambient temperature	–40°C to 66°C (–40°F to 151°F)
Relative humidity	8%–95% (packaged)
Altitude	–304 km to 12,192 km (–1000 ft to 40,000 ft)
Maximum wet bulb	46°C (115°F) (noncondensing)
Temperature gradient	20°C/hr (68°F/hr)

---

## RZ24L Drive Hardware Specifications

### Capacity

Table 6–10 provides the capacity specifications for the RZ24L fixed disk drive.

**Table 6–10 RZ24L Fixed Disk Drive Storage Specifications**

<b>Formatted Storage Capacity</b>	
Per drive	245.4 MB
Per surface	61.35 MB
Bytes per block	512
Blocks per track	44 to 87
Blocks per drive	479,350
Spare blocks per drive	1818
Spare tracks	0
Buffer size	256 Kbytes

### Operating Conditions

Table 6–11 provides the operating conditions for the RZ24L fixed disk drive.

**Table 6–11 RZ24L Drive Operating Conditions**

<b>Environmental Variable</b>	<b>Operating Conditions</b>
Ambient temperature	10°C to 55°C
Relative humidity	8% to 80%
Altitude	–1,000 ft. to 10,000 ft.
Maximum wet bulb	25.6°C 78°F
Heat dissipation	5.7 watts (seeking) 3.7 watts (idle mode)
Temperature gradient	20°C/hr 20°F/hr

## RZ24L Drive Hardware Specifications

### Performance

Table 6–12 provides performance specifications for the RZ24L fixed disk drive.

**Table 6–12 RZ24L Drive Performance Specifications**

Performance Variable	Operating Conditions
Data transfer rate to/from media	1.87 MB/sec (min) 3.75 MB/sec (max)
Bus asynchronous	4.0 MB/sec
Bus synchronous	5.0 MB/sec
Seek time track to track	2.5 msec
Seek time average	16 msec
Seek time maximum (full stroke)	<=30 msec
Rotational speed	4306 rpm
Start time	16 nominal 20 maximum
Stop time	16 nom 20 max
Interleave	1:1

### Nonoperating Conditions

Table 6–13 provides the nonoperating conditions for the RZ24L fixed disk drive.

**Table 6–13 RZ24L Drive Nonoperating Conditions**

Environmental Variable	Nonoperating Conditions
Ambient temperature	–40°C to 66°C
Relative humidity	8% to 95% (noncondensing)
Altitude	–1,000 ft. to 40,000 ft.
Maximum wet bulb	46°C 115°F
Temperature gradient	30°C/hr. 36°F/hr.

---

## RZ25 Drive Hardware Specifications

**Capacity**

Table 6–14 provides the capacity specifications for the RZ25 fixed disk drive.

**Table 6–14 RZ25 Fixed Disk Drive Storage Specifications**

<b>Formatted Storage Capacity</b>	
Per drive	426 MB
Per surface	47.3 MB
Bytes per track	24,576–37,376 (variable)
Bytes per block	512
Blocks per track	48
Blocks per drive	832,031
Spare blocks per track	1
Spare blocks per drive	14,148
Spare cylinders	2
Buffer size	60 Kbytes

**Operating Conditions**

Table 6–15 provides the operating conditions for the RZ25 fixed disk drive.

**Table 6–15 RZ25 Drive Operating Conditions**

<b>Environmental Variable</b>	<b>Operating Conditions</b>
Ambient temperature	10°C to 55°C (50°F to 122°F)
Relative humidity	8%–80%
Altitude	30.48 km to 304.78 km (–1000 ft to 10,000 ft)
Maximum wet bulb	25.6°C (78°F) (noncondensing)
Heat dissipation	12W (seeking) 10W (typical)
Temperature gradient	11°C/hr (20°F/hr)

## RZ25 Drive Hardware Specifications

### Performance

Table 6–16 provides the performance specifications for the RZ25 fixed disk drive.

**Table 6–16 RZ25 Drive Performance Specifications**

Performance Variable	Operating Conditions
Data transfer rate to/from media	2.1–3.2 MB/sec (variable)
Data transfer rate to/from buffer	2.33 MB/sec
Bus asynchronous	3.0 MB
Bus synchronous	4.0 MB
Seek time track to track	2½ msec
Seek time average	14 msec
Seek time maximum (full stroke)	28 msec
Average latency	6.8 msec
Rotational speed	4412 rpm ± 0.5%
Start time	20 sec maximum
Stop time	30 sec maximum
Interleave	1:1

### Nonoperating Conditions

Table 6–17 provides the nonoperating conditions for the RZ25 fixed disk drive.

**Table 6–17 RZ25 Drive Nonoperating Conditions**

Environmental Variable	Nonoperating Conditions
Ambient temperature	–40°C to 66°C (–40°F to 151°F)
Relative humidity	8%–95% (packaged)
Altitude	–1000 ft to 10,000 ft
Maximum wet bulb	46°C (115°F)
Temperature gradient	20°C (68°F/hr)

---

## RZ25L Drive Hardware Specifications

**Capacity**

Table 6–18 provides the capacity specifications for the RZ25L fixed disk drive.

**Table 6–18 RZ25L Hardware Specifications**

<b>Formatted Storage Capacity</b>	
Per drive	535 MB
Per surface	90.7 MB
Bytes per track	48,460 (average)
Bytes per block	512
Spare blocks per track	1
Spare cylinders	2
Buffer size	240 KB

**Performance**

Table 6–19 provides the performance specifications for the RZ25L fixed disk drive.

**Table 6–19 RZ25L Drive Performance Specifications**

<b>Performance Variable</b>	<b>Operating Conditions</b>
Data transfer rate to/from media	5.25 MB/sec (maximum)
Seek time track to track	1.5 msec
Seek time average	10.5 msec
Seek time maximum (full stroke)	23 msec
Average latency	5.4 msec
Rotational speed	5411 rpm $\pm$ 0.5%
Interleave ratio	1:1

## RZ25L Drive Hardware Specifications

### Operating Conditions

Table 6–20 provides the operating conditions for the RZ25L fixed disk drive.

**Table 6–20 RZ25L Drive Operating Conditions**

Operating Conditions	
Ambient temperature	5°C to 50°C (41°F to 122°F)
Relative humidity	8%–80%
Altitude	305 m to 3048 m (–1000 ft to 10,000 ft)
Maximum wet bulb temperature	28°C (82°F) (noncondensing)
Heat dissipation	8.4W (seeking) 7W (typical)
Temperature gradient	20°C/hr (36°F/hr)

### Nonoperating Conditions

Table 6–21 provides the Nonoperating conditions for the RZ25L fixed disk drive.

**Table 6–21 RZ25L Drive Nonoperating Conditions**

Nonoperating Conditions	
Ambient temperature	–40°C to 70°C (–40°F to 158°F)
Relative humidity	5%–95%
Altitude	–305 m to 12,210 m (1000 ft to 40,000 ft)
Maximum wet bulb temperature	46°C (115°F)
Temperature gradient	25°C (45°F/hr)

---

## RZ26B Drive Hardware Specifications

**Capacity**

Table 6–22 provides the capacity specifications for the RZ26B fixed disk drive.

**Table 6–22 RZ26B Drive Storage Specifications**

<b>Formatted Storage Capacity</b>	
Per drive	1.05 GB
Per surface	80.9 MB
Bytes per block	512
Blocks per track	56 to 96
Blocks per drive	50,860
Spare cylinders	69
Buffer size	256K

**Operating Conditions**

Table 6–23 provides the operating conditions for the RZ26B fixed disk drive.

**Table 6–23 RZ26B Drive Operating Conditions**

<b>Environmental Variable</b>	<b>Operating Conditions</b>
Ambient temperature	5°C to 50°C (41°F to 122°F)
Relative humidity	8% to 80%
Altitude	-1000 ft to 10,000 ft above sea level
Maximum wet bulb	28°C
Heat dissipation	12.1 W (on idle)
Temperature gradient	12° C per hour

## RZ26B Drive Hardware Specifications

### Performance

Table 6–24 provides performance specifications for the RZ26B fixed disk drive.

**Table 6–24 RZ26B Drive Performance Specifications**

Performance Variable	Operating Conditions
Data transfer rate to/from media	2.6 MB/sec to 4 MB/sec
Data transfer rate to/from buffer	2.5 MB (asynchronous) to 5 MB (synchronous)
Seek time track to track	2.5 msec
Seek time average	10.5 msec
Seek time maximum (full stroke)	22 msec
Average latency	5.56 msec
Rotational speed	5400 rpm
Start time	14 ms (nominal) 20 MS (maximum)
Stop time	20 ms (maximum)
Interleave	1:1

### Nonoperating Conditions

Table 6–25 provides the nonoperating conditions for the RZ26B fixed disk drive.

**Table 6–25 RZ26B Drive Nonoperating Conditions**

Environmental Variable	Nonoperating Conditions
Ambient temperature	-40°C to 65°C (-40°F to 149°F)
Relative humidity	5% to 90%
Altitude	-305 M (-1000 ft) to 15,240 M (50,000 ft) above sea level
Maximum wet bulb	28°C
Temperature gradient	30° C per hour



# 7

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## Memory Boards

**Introduction** This chapter tells you how to add and remove memory boards in your VAXstation 4000 Model 60 and Model 90 system units.

**Chapter Topics** This chapter contains the following topics:

- Overview of Memory Boards
- Adding Memory Boards in the Model 60
- Removing Memory Boards from the Model 60
- Adding Memory Boards in the Model 90
- Removing Memory Boards from the Model 90

**Important:  
Prepare Your  
System** Prepare your system, as instructed in Chapter 1, before you install this option. If you have a model 90 you must remove the fixed disk drive H-bracket (see Chapter 6), before adding or removing memory boards.

If you have an SPXgt graphics module (Model 60 and Model 90) you must remove the frame buffer (see Chapter 8), before adding or removing memory boards. and the SPXg or SPXgt graphics option (Chapter 8) before installing new memory boards.

**CAUTION:  
Static  
Discharge** To avoid damage from static discharge, as soon as you remove the cover and before touching anything inside the system unit, touch the TOUCH ME FIRST label on the top of the power supply. Digital also recommends that you wear an antistatic wrist strap and use an antistatic mat when adding memory boards inside the system unit.

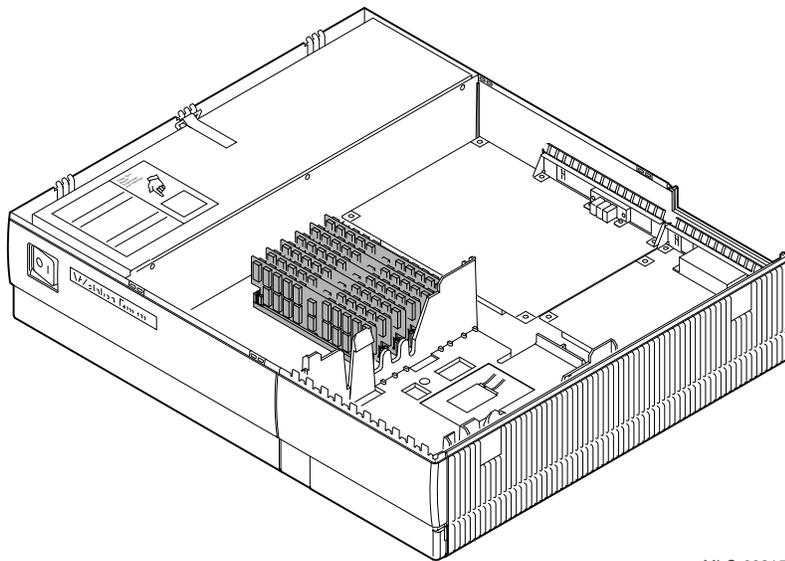
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## Overview of Memory Boards

### Memory Location

Figure 7–1 shows the location of memory boards in the system unit.

**Figure 7–1** Location of Memory Boards



MLO-008150

### Power Supply Graphic

A label on the power supply contains diagrams that show how to insert a memory board.

### CAUTION: Use Compatible Boards

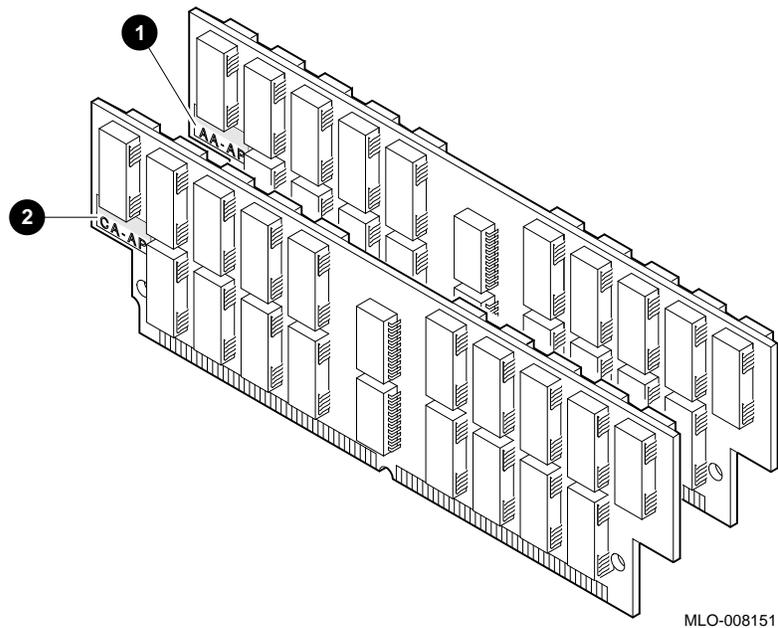
Do not attempt to use memory boards from any other system without checking for compatibility. Other boards are *not* necessarily compatible with your system.

## Overview of Memory Boards

### Memory Boards Description

Memory boards are available in 4- and 16-megabyte sizes. Four-megabyte boards ❶ are identified with the letters **AA**, and 16-megabyte boards ❷ are identified with the letters **CA**. See Figure 7-2.

Figure 7-2 4-MB and 16-MB Memory Boards



MLO-008151

### CAUTION

Handle memory boards by their edges to avoid damaging and contaminating the board pins and connectors.

---

## Adding Memory Boards in the Model 60

### Memory Configurations (Model 60)

The basic VAXstation 4000 Model 60 system has 8 megabytes of memory on the CPU board. To increase the memory capacity to 16, 24, 32, 40, 48, 56, 72, 80, or 104 megabytes, use the appropriate configuration, as shown in Table 7-1. There are six slots for memory boards. When adding both 4- and 16-megabyte memory boards, add the 4-megabyte boards first.

**Table 7-1 Memory Configurations (Model 60)**

Desired Memory	Boards to Add
8 MB	None
16 MB	Two 4-MB
24 MB	Four 4-MB
32 MB	Six 4-MB
40 MB	Two 16-MB
48 MB	Two 4-MB and two 16-MB
56 MB	Four 4-MB and two 16-MB
72 MB	Four 16-MB
80 MB	Two 4-MB and four 16-MB
104 MB	Six 16-MB

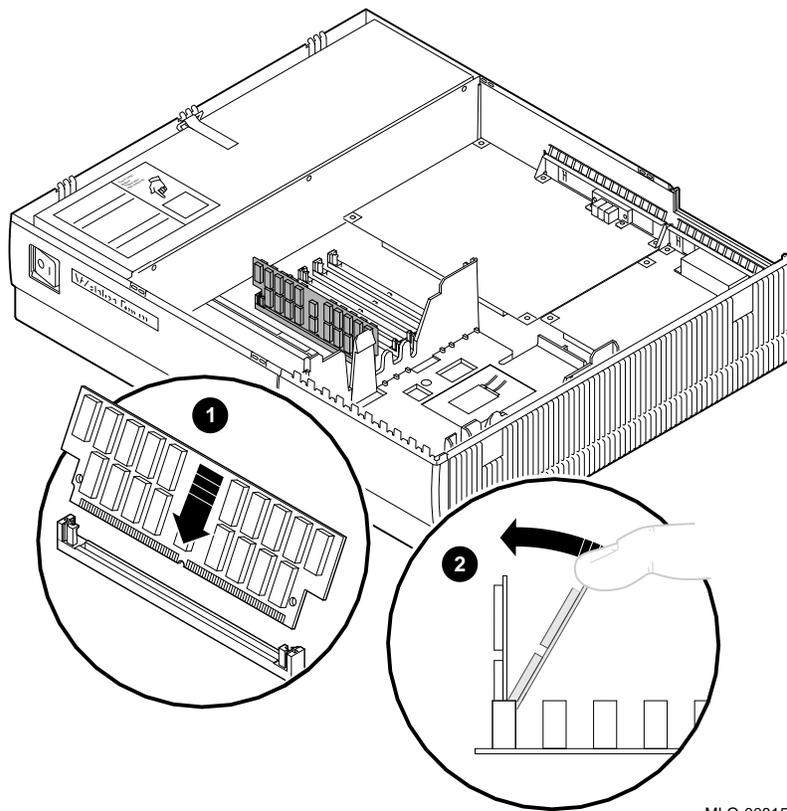
**Rule: Use Pairs** Always add or remove memory boards for the Model 60 in *pairs*.

## Adding Memory Boards in the Model 60

### Add the First Memory Board (Model 60)

Follow the steps in Figure 7-3 to insert the first memory board in your Model 60 system unit.

Figure 7-3 Adding the First Memory Board (Model 60)



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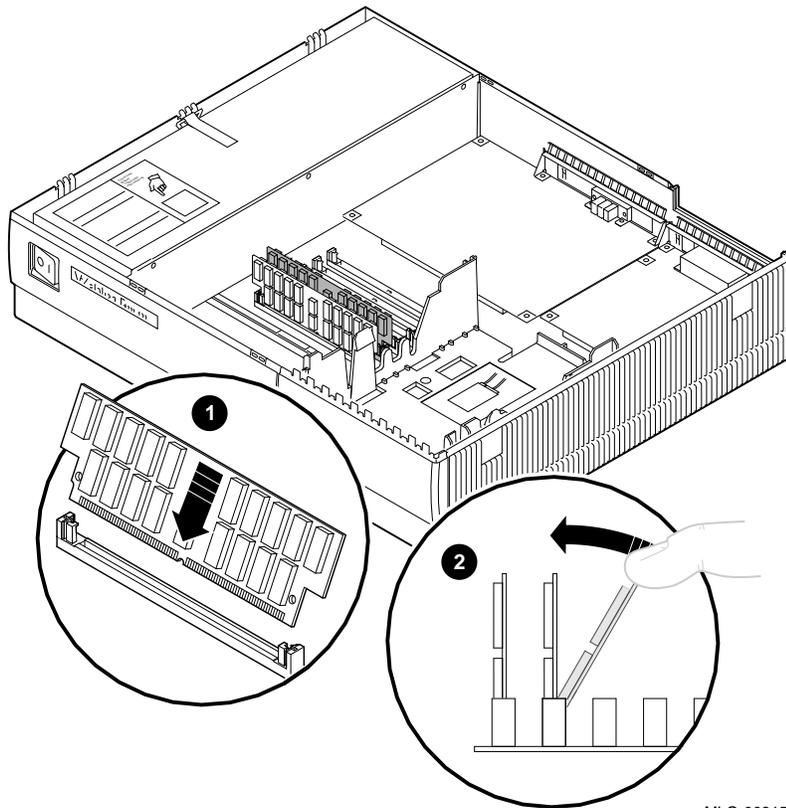
- 1 Insert the first memory board at an angle with the notch end toward the power supply. Place it in the open slot closest to the front of the system unit.
- 2 Push the board upright so that it stands vertically. You should hear a distinctive *click* on each side when the board is pushed upright.

## Adding Memory Boards in the Model 60

### Adding More Memory (Model 60)

Using the same technique, add the next memory board in the next open slot. Figure 7-4 shows where to add the second memory board.

**Figure 7-4 Adding the Second Memory Board (Model 60)**



MLO-008153

Working from front to rear, continue adding boards in open slots, until your system contains the desired amount of memory.

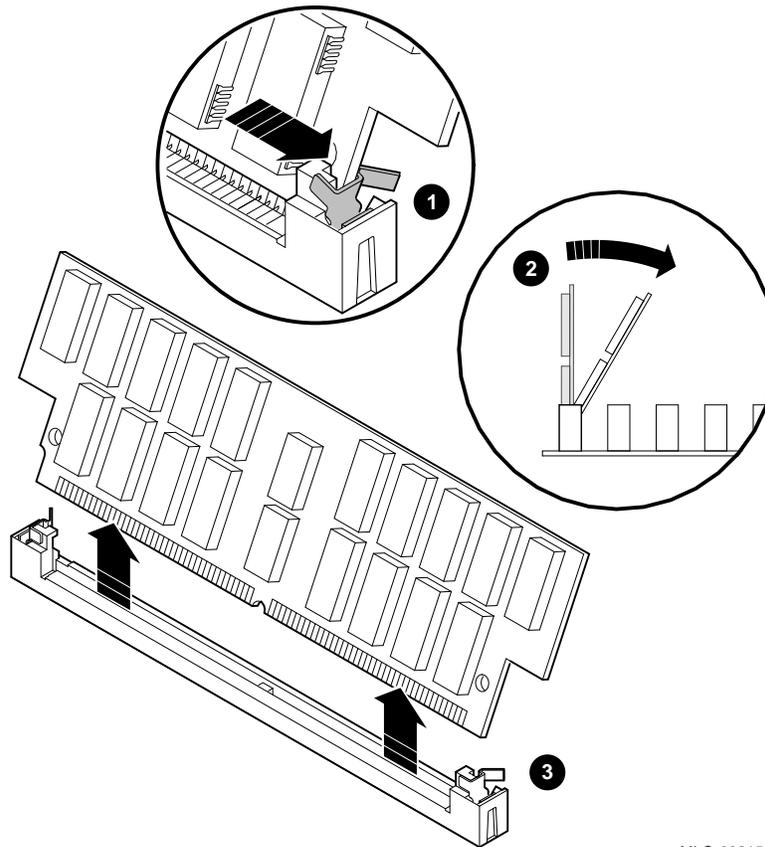
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## Removing Memory Boards from the Model 60

### Removing Memory (Model 60)

To remove memory boards, release the metal board clips **1** at each end of the board, as shown in Figure 7-5. Tilt the board **2**, and lift the board out **3**. Start at the rearmost board and work toward the front.

Figure 7-5 Removing a Memory Board (Model 60)



MLO-008154

## Adding Memory Boards in the Model 90

**SPXg, SPXgt  
Graphics  
Option**

The SPXg and SPXgt graphics options must be removed so you can access the memory boards. See Chapter 8 for removal instructions.

**Remove  
H-Bracket**

Remove the H-bracket from the system unit for easier removal of the memory boards.

**Memory Slots  
(Model 90)**

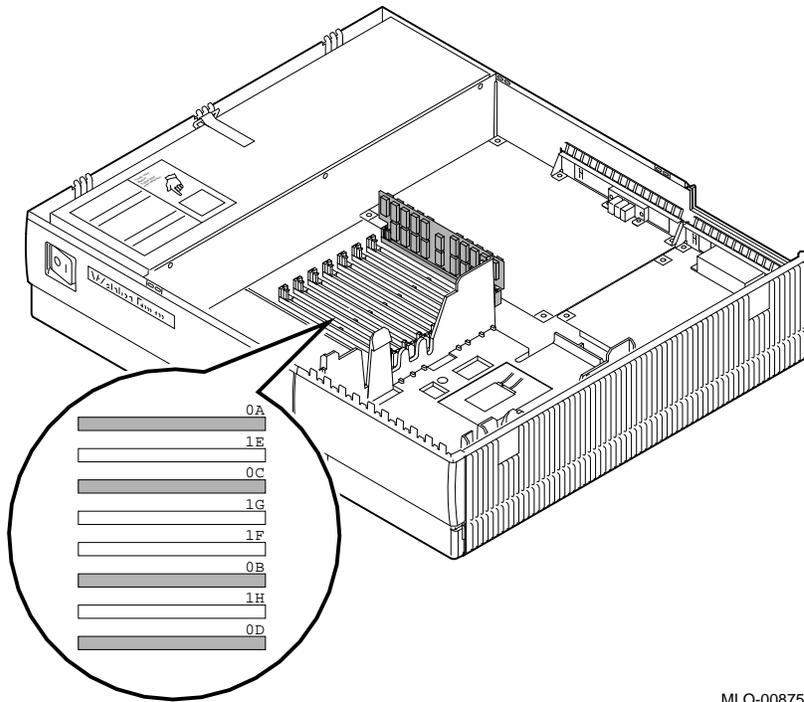
There are eight slots for memory boards, as shown in Figure 7–6. When you install memory boards, each set of four boards must go in either the 0 slots or the 1 slots. In Figure 7–6 the 0 slots are shaded and the 1 slots are white.

**CAUTION**

Handle memory boards by their edges to avoid damaging and contaminating the board pins and connectors.

Adding Memory Boards in the Model 90

Figure 7-6 Memory Slots in the Model 90



MLO-008750

## Adding Memory Boards in the Model 90

### Memory Configurations (Model 90)

To increase the memory capacity of your Model 90 from the basic 16 MB to 32, 64, 80, or 128 MB, use the appropriate configuration, as shown in Table 7–2.

**Table 7–2 Memory Configurations (Model 90)**

Desired Memory	Boards to Add	Slot Number
16 MB	Four 4-MB	All 0's or all 1's
32 MB	Eight 4-MB	All
64 MB	Four 16-MB	All 0's or all 1's
80 MB	Four 16-MB Four 4-MB	0's 1's
128 MB	Eight 16-MB	All

### Rule: Sets of Four

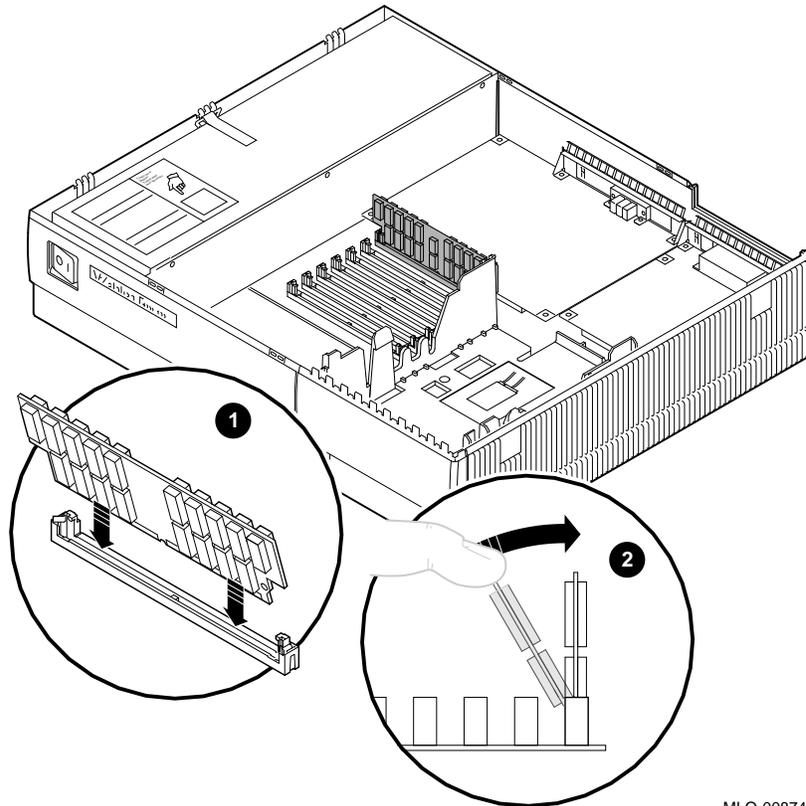
Add or remove memory boards for the Model 90 in *sets of four*. See Table 7–2.

## Adding Memory Boards in the Model 90

### Adding Memory (Model 90)

Follow the steps in Figure 7-7 to insert the first memory board.

**Figure 7-7 Adding the First Memory Board**



MLO-008749

- ➊ Insert the first memory board at an angle with the notched end toward the power supply. Place it in the open slot closest to the rear of the system unit.
- ➋ Push the board upright so that it stands vertically. You should hear a distinctive *click* on each side when the board is pushed upright.

## Removing Memory Boards from the Model 90

### **SPXg, SPXgt Graphics Option**

The SPXg and SPXgt graphics options must be removed so you can access the memory boards. See Chapter 8 for removal instructions.

### **Remove H-Bracket**

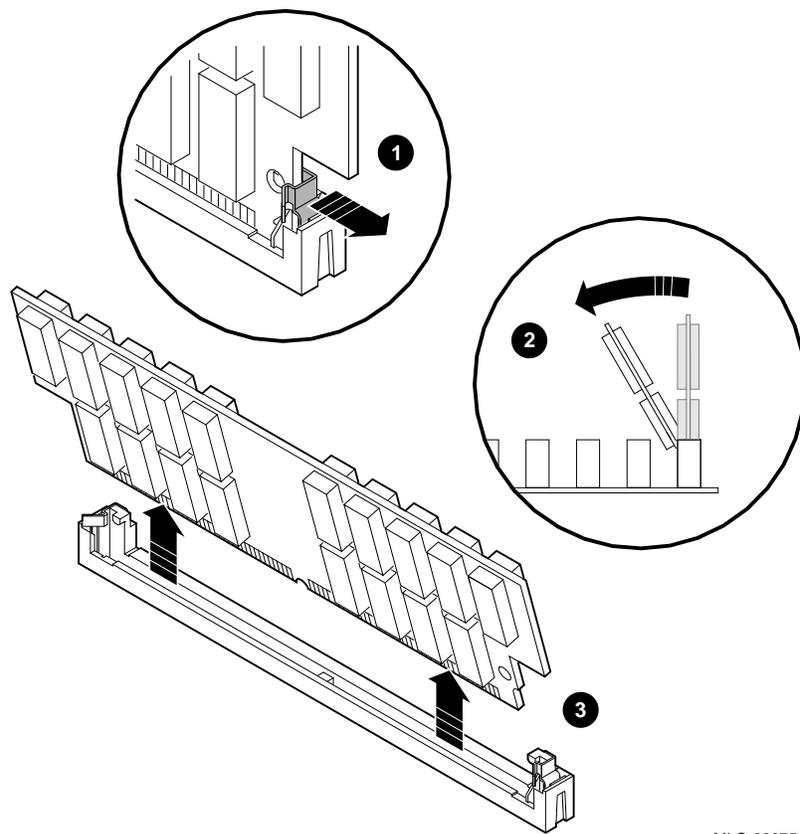
Remove the H-Bracket from the system unit for easier removal of the memory boards.

### **Removing Memory (Model 90)**

To remove one or more memory boards, release the metal board clips ❶ at each end of the board, as shown in Figure 7–8. Tilt the board ❷, then lift the board out ❸.

Removing Memory Boards from the Model 90

Figure 7-8 Removing a Memory Board from the Model 90



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## Graphics Option Modules

**Introduction**

This chapter explains which graphics options are available for the VAXstation 4000 Model 60 and the VAXstation 4000 Model 90. It also explains how to remove and install a graphics option.

**Chapter Topics**

This chapter covers the following topics:

- VAXstation 4000 Graphics Options
- Installation Overview
- Removing an Existing Graphics Board
- Installing a Graphics Option

**Important:  
Prepare Your  
System**

Prepare your system, as instructed in Chapter 1, before you remove or install a graphics option.

## Graphics Option Modules

### Monitor Compatibility

Table 8–1 describes the graphics options, monitors, and the frequency supported by each VAXstation model.

**Table 8–1 Monitor and Graphics Board Compatibility**

	Model 60	Model 90
<b>Graphics Options:</b>		
8-place LCG	Standard	
8-plane color LCG	Option	
8-plane dual-screen	Option	
LCSPX 8-plane		Standard
SPXg 8-plane	Option	Option
SPXgt 24-plane	Option	Option
<b>Monitors:</b>		
VRM17	X	X
VRM319	X	X
VR320		X
VRT16	X	X
VRT19	X	X
<b>Frequency Supported:</b>		
66 Hz	X	X
72 Hz	Monochrome only	X

Consult your Digital sales representative and your monitor documentation for more information about monitors.

### Dual Monitors

The VAXstation 4000 Model 60 supports dual-monitor capability; the Model 90 does not.

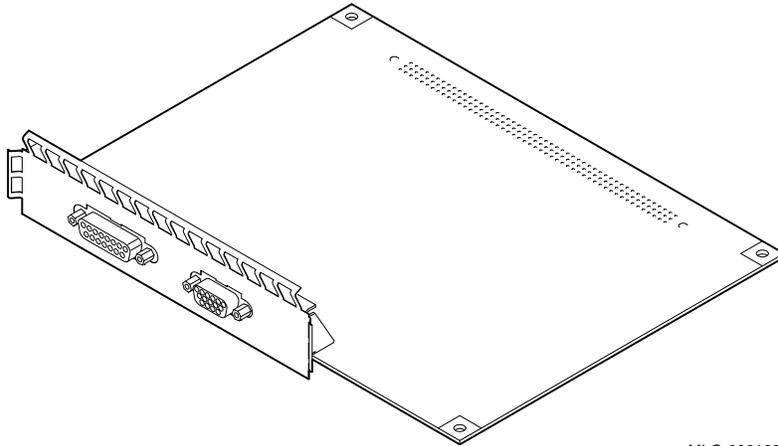
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## VAXstation 4000 Graphics Options

### 8-Plane LCG Graphics Board

The 8-plane LCG module is a low-resolution, low-cost graphics board that is standard in the VAXstation 4000 Model 60 system unit. Figure 8-1 shows the 8-plane LCG graphics board.

**Figure 8-1 8-Plane Low-Resolution LCG Board**



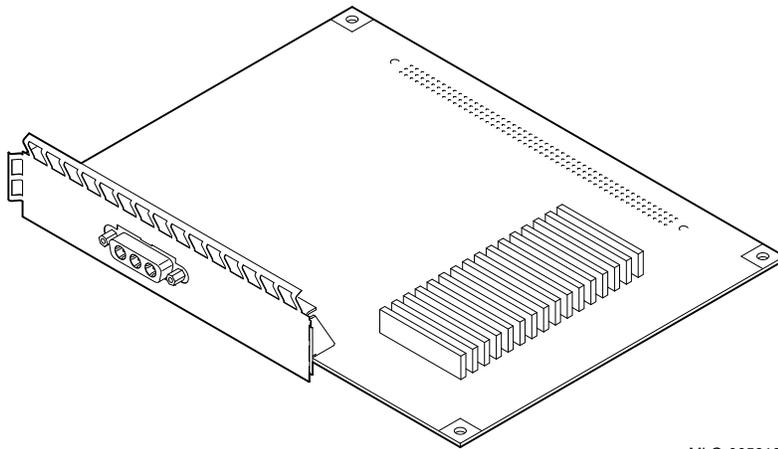
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VAXstation 4000 Graphics Options

**8-Plane Color  
Graphics Board**

Figure 8-2 shows the 8-plane color LCG graphics board for the VAXstation 4000 Model 60 system.

**Figure 8-2 8-Plane Low-Resolution Color LCG Board**

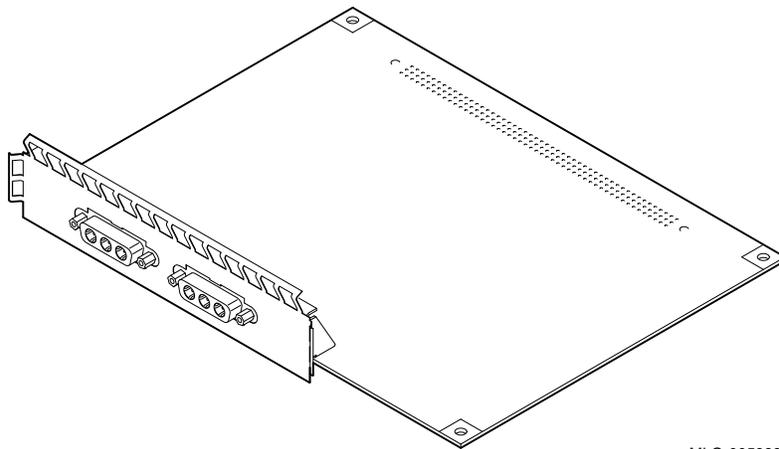


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**Dual-Screen  
Graphics Board**

Figure 8-3 shows the 8-plane dual-screen graphics board for the VAXstation 4000 Model 60 system unit.

**Figure 8-3 8-Plane Dual-Screen Board**

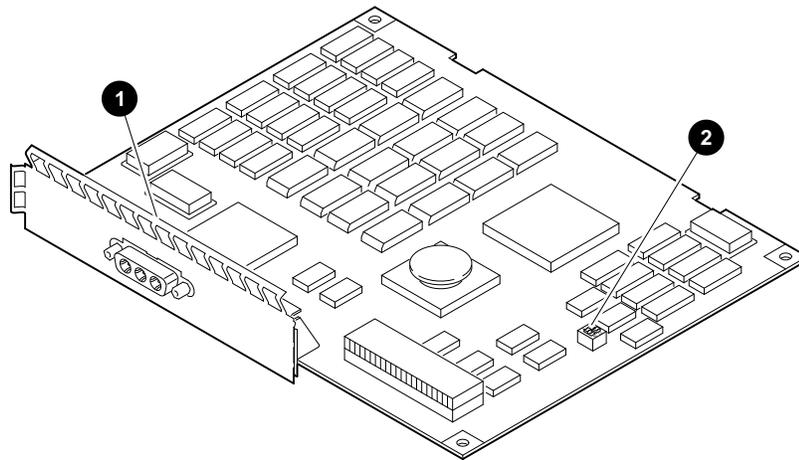


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### LCSPX 8-Plane Graphics Board

Figure 8-4 shows the LCSPX 8-plane graphics board that is standard in the VAXstation 4000 Model 90 system unit.

**Figure 8-4 LCSPX Graphics Board**



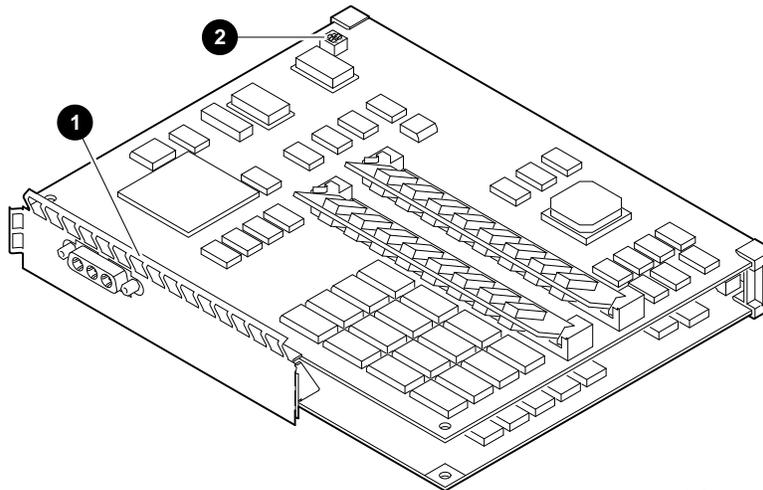
MLO-008740

- ❶ Radio frequency interference (RFI) gasket
- ❷ Switch package for Model 60 frequency setting (see Figure 8-8)

### SPXg 8-Plane Graphics Module

Figure 8-5 shows the SPXg 8-plane graphics module for the VAXstation 4000 Model 60 and Model 90 systems. The module consists of a graphics board and a frame buffer.

Figure 8-5 SPXg 8-Plane Graphics Module



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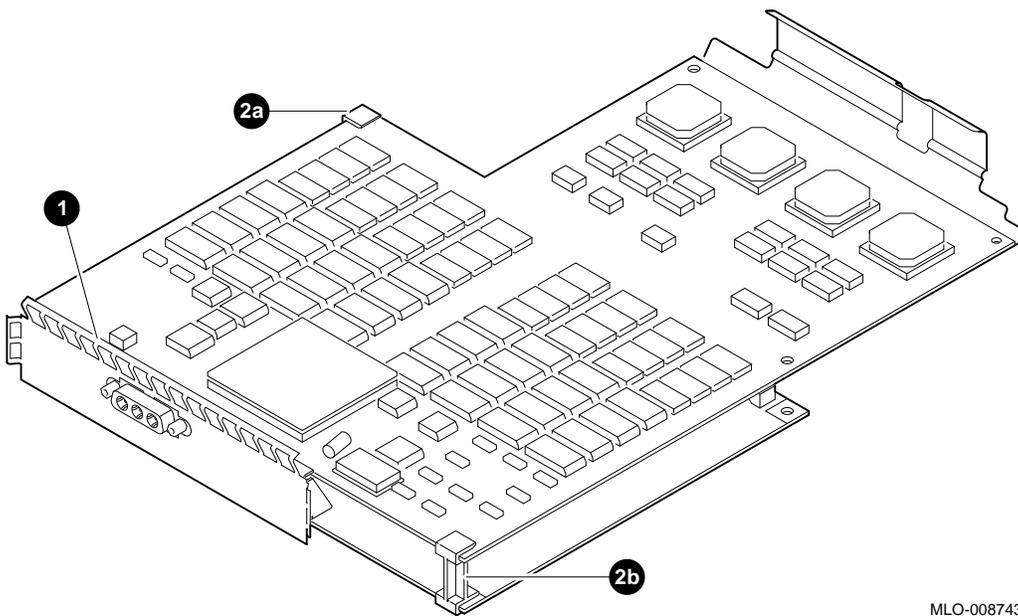
- ❶ Radio frequency interference (RFI) gasket
- ❷ Switch package for Model 60 frequency setting (see Figure 8-8)

VAXstation 4000 Graphics Options

**SPXgt 24-Plane  
Graphics  
Module**

Figure 8-6 shows the 24-plane graphics module for the VAXstation 4000 Model 60 and Model 90 systems. The module consists of a graphics board and a frame buffer.

**Figure 8-6 SPXgt 24-Plane Graphics Module**



MLO-008743

- ❶ Radio frequency interference (RFI) gasket
- ❷ E-clips (a,b) that hold the boards together

---

## Installation Overview

**Important** Prepare your system by following the instructions in Chapter 1.

**Installation Steps** Table 8–2 lists the steps you follow to install a graphics option. The following sections explain each step in detail.

**Table 8–2 Steps to Install a Graphics Option**

---

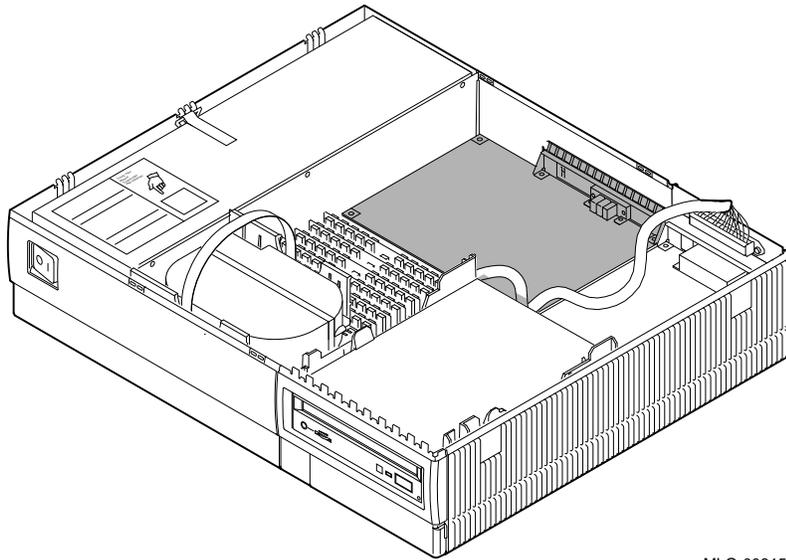
1. Locate and remove the existing graphics board.
  2. Check the B-switch setting on the SPXg 8-plane board (Model 60).
  3. Insert the new graphics board.
  4. Reconnect the cables.
  5. Test your installation by following the instructions in Chapter 11.
-

## Installation Overview

### Graphics Board Location

Locate the existing graphics board at the rear of the system unit, next to the power supply. See Figure 8-7.

**Figure 8-7 Location of the Existing Graphics Board**

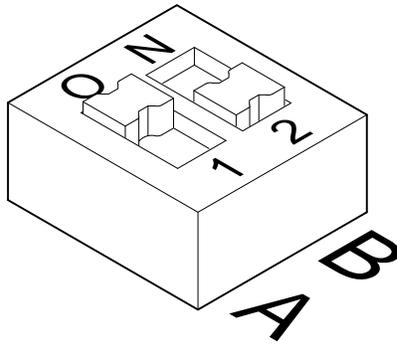


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**Check  
Switch B  
Setting**

Before installing the LCSPX or the SPXg graphics board in your VAXstation 4000 Model 60, make sure that switch B of the two-switch package on the board is set for the correct frequency for your monitor. The settings are 2=66 Hz, and N=72 Hz.

**Figure 8-8 Setting the B Switch**



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See Figure 8-4 for the switch location on the LCSPX module, and Figure 8-5 for the switch location on the SPXg module.

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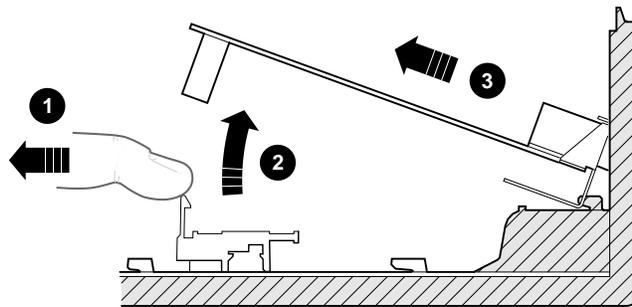
## Removing an Existing Graphics Board

### Remove an LCG Board (Model 60)

To remove an 8-plane LCG board from the VAXstation 4000 Model 60 system unit, follow these steps:

1. Remove any external cable that is attached to the graphics port on the rear of the system unit.
2. Remove the existing board by releasing the two board latches **1**, as shown in Figure 8-9, and lifting the board up **2** and out **3**.

Figure 8-9 Removing an Existing LCG Board



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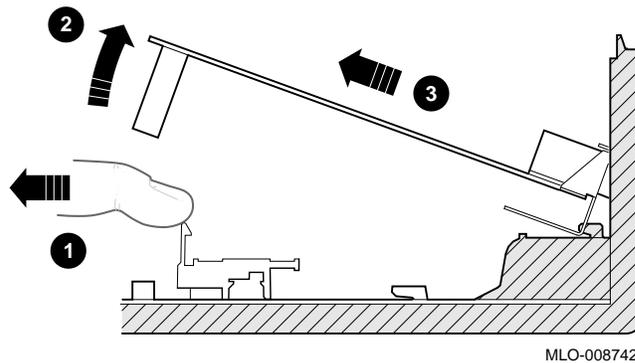
## Removing an Existing Graphics Board

### Remove an LCSPX Board (Model 90)

To remove an existing graphics board from the VAXstation 4000 Model 90 system unit, follow these steps:

1. Remove any external cable that is attached to the graphics port on the rear of the system unit.
2. Remove the existing board by releasing the two board latches **1**, as shown in Figure 8–10, and lifting the board up **2** and out **3**.

Figure 8–10 Remove an LCSPX Graphics Board



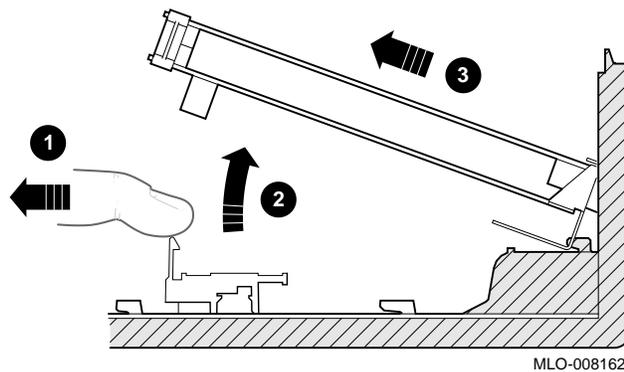
## Removing an Existing Graphics Board

### Remove an SPXg Module (Model 60, 90)

To remove an SPXg graphics module from the VAXstation 4000 Model 60, or Model 90, follow these steps:

1. Remove any external cable that is attached to the graphics port on the rear of the system unit.
2. Remove the existing module by releasing the two board latches **1**, as shown in Figure 8–11, and lifting the module up **2** and out **3**.

Figure 8–11 Remove an SPXg Graphics Module



## Removing an Existing Graphics Board

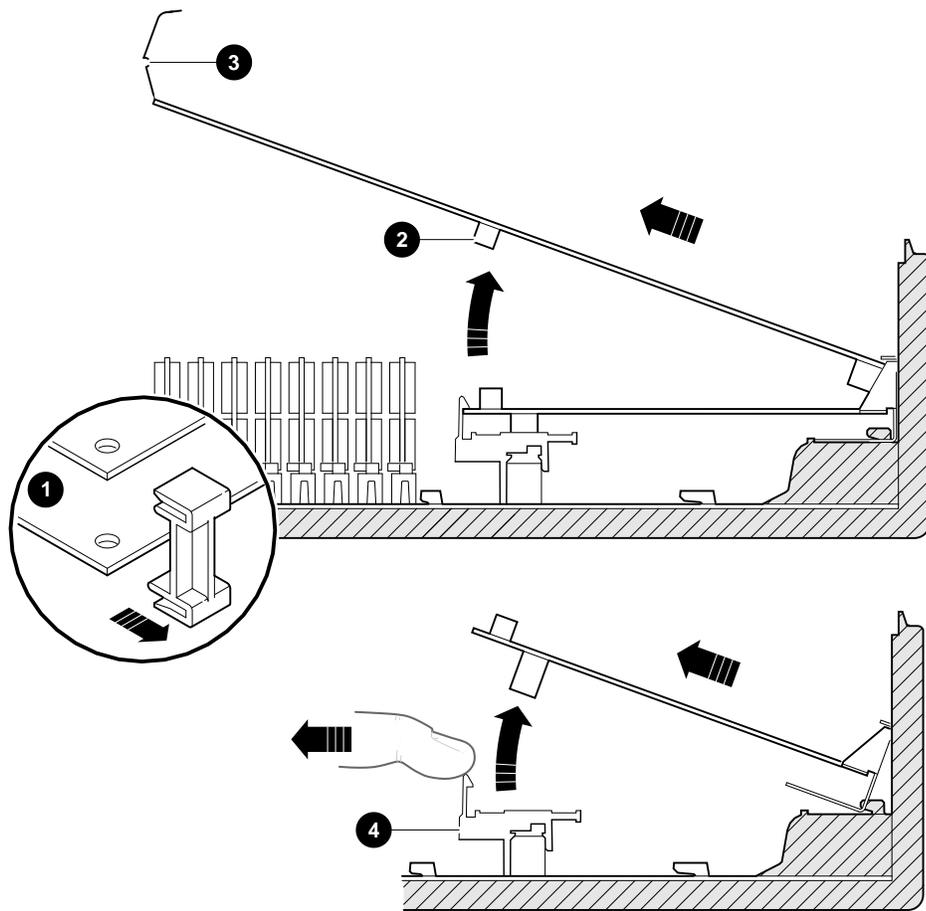
### Remove an SPXgt Module

The shape and size of the 24-plane frame buffer board prohibit removing the graphics module as one assembly. Follow these steps, referring to Figure 8–12, to remove the SPXgt graphics module from the VAXstation 4000 Model 60 or Model 90 system unit.

1. Remove the plastic E-clip ❶ that holds the graphics board to the frame buffer.
2. Lift the frame buffer from the center connector ❷, then free it from the ridge ❸ on the disk drive H-bracket. Gently work the frame buffer free by pulling up from the center of the board.
3. Pull the frame buffer out of the RFI gasket (shown in Figure 8–6. The gasket will remain in place, held by the video connector bracket on the graphics board.
4. Release the board latches ❹.
5. Lift the graphics board from the system unit.

Removing an Existing Graphics Board

Figure 8-12 Removing the SPXgt 24-Plane Graphics Module



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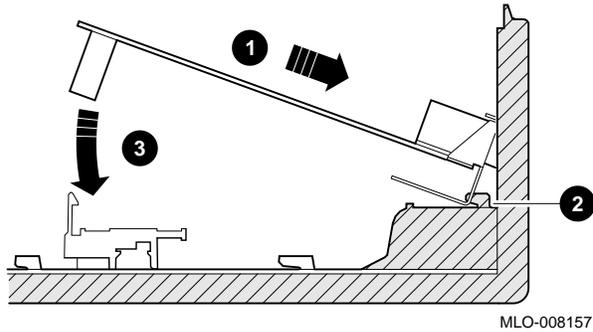
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## Installing a Graphics Option

### Install an LCG Board (Model 60)

Place the new board in your Model 60 system unit, as shown in Figure 8-13 ❶. Make sure the bottom bracket fits into the grooves ❷. Press down firmly on the edge of the board until it latches ❸.

Figure 8-13 Installing an LCG Board



Reconnect the cable that you removed from the graphics port.

This completes installation of the LCG board. To test your installation, see Chapter 11.

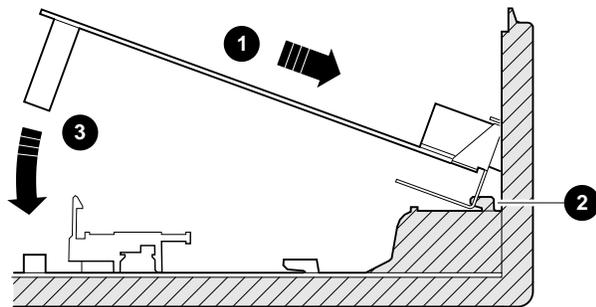
## Installing a Graphics Option

### Install an LCSPX Board (Model 90)

Slide the RFI gasket on the board, as shown in Figure 8-4.

Place the new board in your Model 90 system unit, as shown in Figure 8-14 ❶. Make sure the bottom bracket fits into the grooves ❷. Press down firmly on the edge of the board until the rear connector ❸ is secure.

**Figure 8-14 Installing an LCSPX Graphics Board**



Reconnect the cable that you removed from the graphics port.

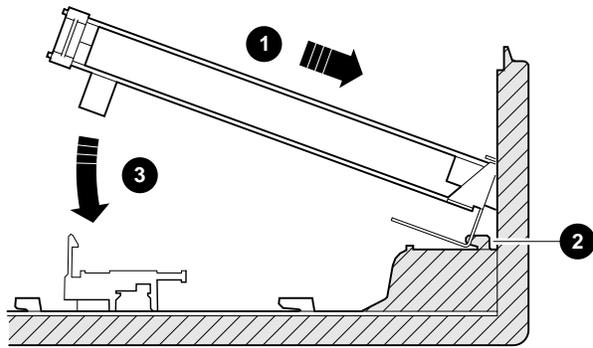
This completes installation of the LCSPX board. To test your installation, see Chapter 11.

**Install an  
SPXg Module  
(Model 60, 90)**

Slide the RFI gasket on the module, as shown in Figure 8–5.

Place the new module in your Model 60 or Model 90 system unit, as shown in Figure 8–15 **1**. Make sure the bottom bracket fits into the grooves **2**. Press down firmly on the edge of the module until it latches **3**.

**Figure 8–15 Installing an SPXg Graphics Module**



MLO-008161

Reconnect the cable that you removed from the graphics port.

This completes installation of the SPXg graphics module. To test your installation, see Chapter 11.

## Installing a Graphics Option

### Install an SPXgt Module (Model 60, 90)

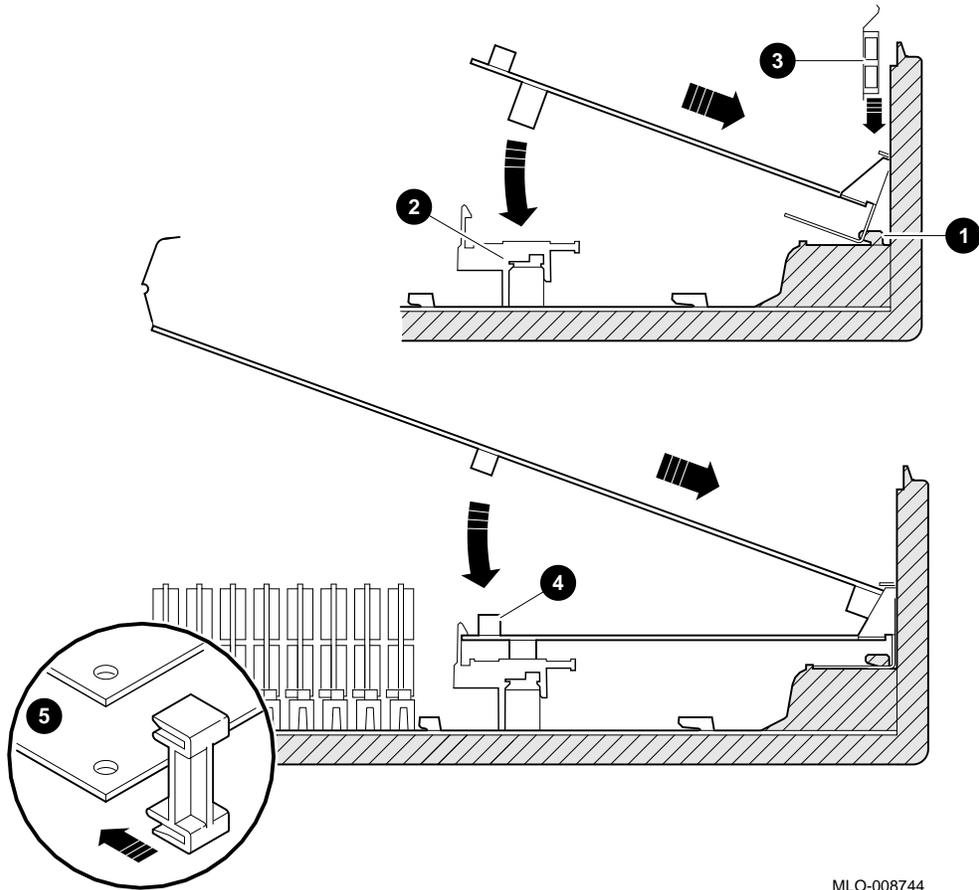
Slide the RFI gasket on the board, as shown in Figure 8–6.

Follow these steps and refer to Figure 8–16 to install the SPXgt graphics module:

1. Remove the plastic E-clip (callout **2a** in Figure 8–6) from the tail end of the SPXgt graphics module and pull the graphics board and frame buffer apart.
2. Insert the graphics board into the system unit. Make sure it fits into the grooves and the ridge **1**.
3. Press down firmly on the edge of the board until it latches. **2**.
4. Orient the RFI gasket **3** so that the wide holes are at the top. Slide the gasket between the graphics board and the system unit.
5. Insert the frame buffer into the system unit and connect it to the 150-pin connector **4** on the bottom board.
6. Replace the E-clip **5** on the module.

## Installing a Graphics Option

**Figure 8–16 Installing the SPXgt Graphics Module**



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Reconnect the cable that you removed from the graphics port. If the module appears to move when you reconnect it, it may not be installed accurately.

This completes installation of the SPXgt module. To test your installation, see Chapter 11.



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# DSW21 Synchronous Communications Option

**Introduction**

This chapter describes how to install the synchronous communications option in your system unit.

**Chapter Topics**

This chapter covers the following topics:

- Overview of the DSW21 Synchronous Communications Option
- Location of the Synchronous Communications Option
- Installing the Synchronous Communications Option

---

## Overview of the DSW21 Synchronous Communications Option

### Features

The synchronous communications option is a synchronous serial communications interface that allows you to connect your system in one of two ways:

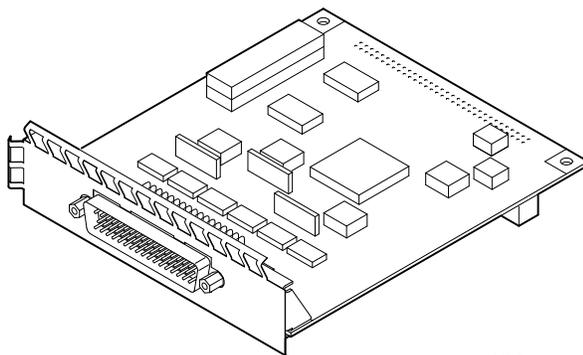
- Through a modem to a wide area network (WAN)
- Directly to another system through a null modem

### WANDD Adapter Needed

You must have a Wide Area Network Device Driver (WANDD) to use the synchronous communications option. The WANDD is a separate product; it is not automatically included with the option. Contact your Digital sales representative to order the WANDD.

Figure 9-1 shows the synchronous communications option.

**Figure 9-1 Synchronous Communications Option**



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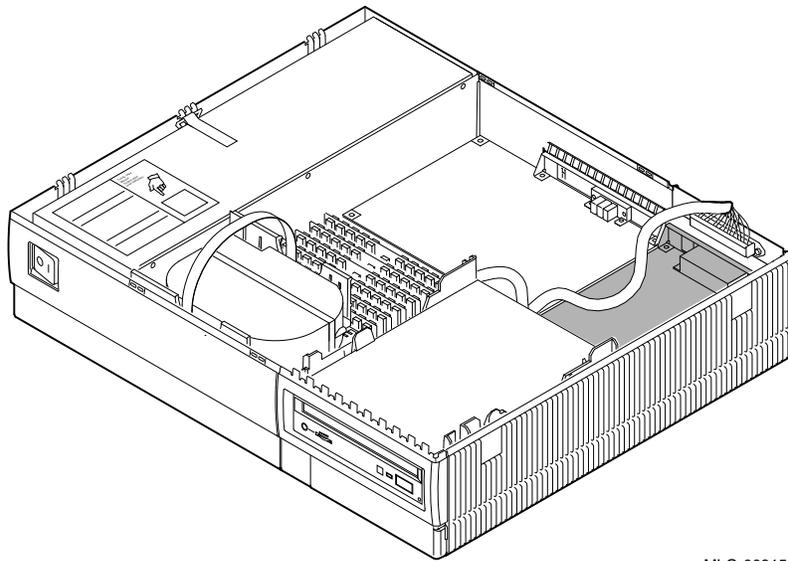
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## Location of the Synchronous Communications Option

### Option Location

Figure 9-2 shows the location for the synchronous communications option.

**Figure 9-2 Synchronous Communications Option Location**



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## Installing the Synchronous Communications Option

### Configuration Restriction

You can not have both the synchronous communications option and the TURBOchannel option (or quad-screen option, Model 60 only) in your system unit. If you have another communications option in your system unit, you must remove it before installing a synchronous communications option.

### Important

Prepare your system, as instructed in Chapter 1, before you install this option.

### Installation Overview

Table 9–1 provides an overview of the synchronous communications option installation procedure. The remainder of this section explains each step in more detail.

**Table 9–1 Synchronous Communications Option Installation Procedure**

- 
- |    |  |
|----|--|
| 1. | Touch the TOUCH HERE space on the power supply.  |
| 2. | Disconnect the SCSI cable from the system board and from the opening over the synchronous communications port. |
| 3. | Insert the synchronous communications option.  |
| 4. | Reconnect the SCSI cable.  |
-

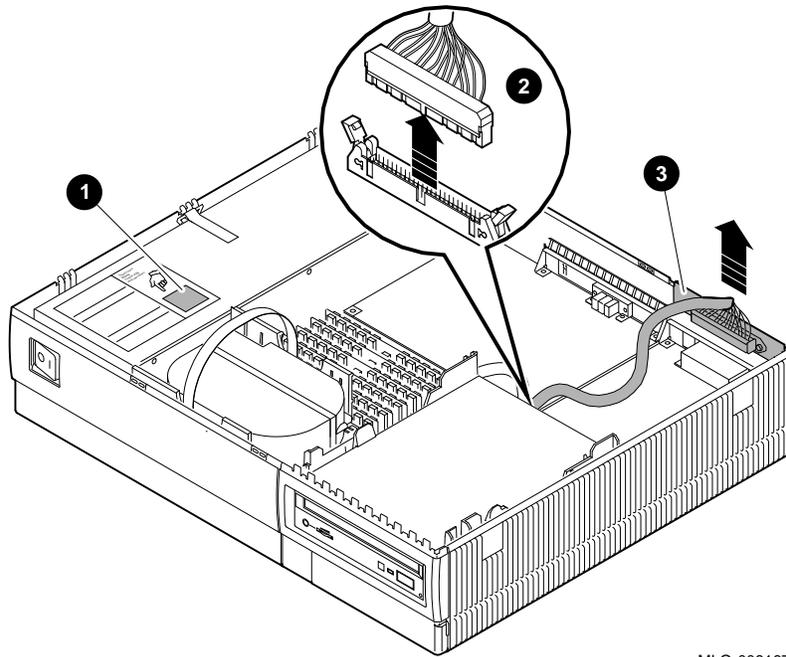
## Installing the Synchronous Communications Option

### Inside the System Box

To install the synchronous communications option, follow these steps:

1. As soon as you remove the cover, and before you remove anything else, touch the space labeled **TOUCH HERE 1**, as shown in Figure 9-3, to avoid damage from static discharge.

**Figure 9-3 Inside the System Box**



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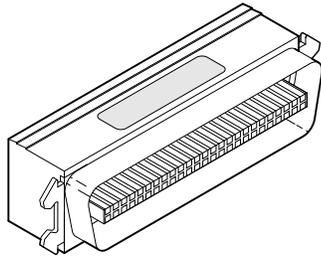
2. Disconnect the SCSI cable 2 from the system unit by pushing the two side clips out and lifting up.
3. Lift up and set aside the SCSI cable 3 that rests in the opening over the synchronous communications connector.

## Installing the Synchronous Communications Option

### SCSI Terminator

If a SCSI terminator, (shown in Figure 9–4), or a SCSI cable is attached to the SCSI port on the rear of the system unit, the terminator or cable can be left in place.

**Figure 9–4 SCSI Terminator**



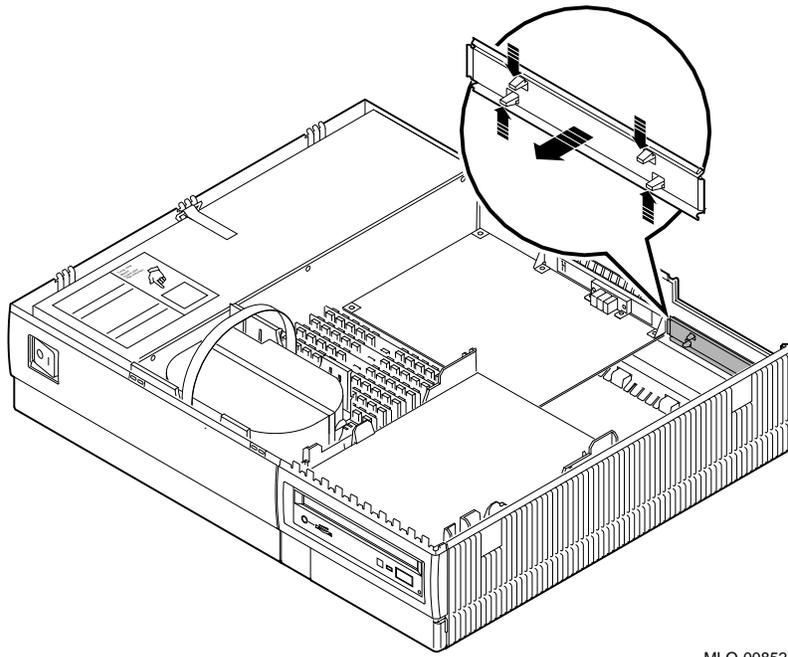
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### Remove the Filler Plate

Remove the filler plate that covers the synchronous communications option port opening by squeezing the tabs together, then pulling it out, as shown by the arrows in Figure 9–5.

Installing the Synchronous Communications Option

Figure 9-5 Removing the Filler Plate



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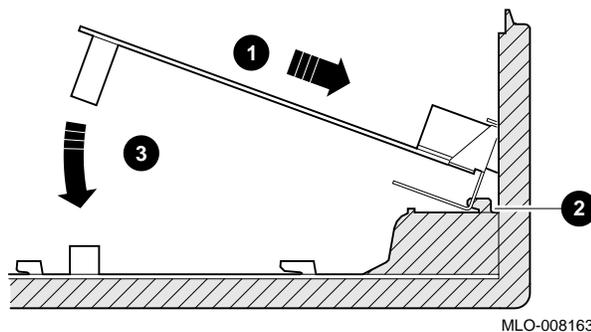
## Installing the Synchronous Communications Option

### Insert the Option

Follow these steps, and see Figure 9–6 to insert the synchronous communications option:

1. Slide the synchronous communications option ❶ firmly towards the back of the system unit.
2. Make sure that the two small openings in the metal bracket under the 50-pin connector slide onto the two molded ridges ❷ on the system board.
3. After making sure that the connectors are carefully aligned, press the board firmly down directly into the 64-pin connector ❸.

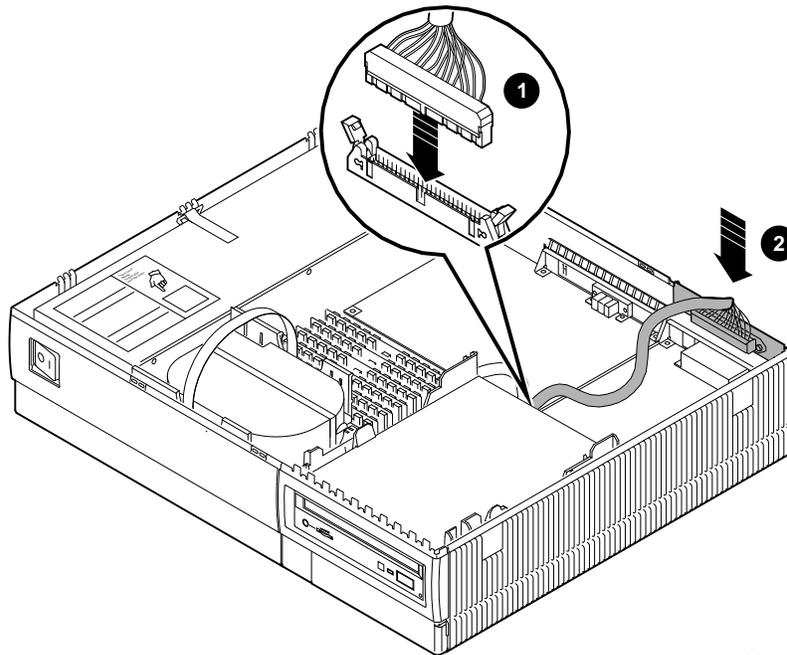
**Figure 9–6** Installing the Synchronous Communications Option



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## Installing the Synchronous Communications Option

**Figure 9–7 Installing the Rear Panel SCSI Port**



MLO-008165

### Complete the Installation

To complete the installation of the synchronous communications option, follow these steps:

1. Reconnect the SCSI cable ❶ to the CPU connector.
2. Slide the metal plate with the SCSI port ❷ into the slot in the rear panel of the system unit, as shown in Figure 9–7. Note that the metal plate must be oriented so that the wires come out of the *top* of the connector. Reconnect the SCSI cable that you removed from the SCSI port.
3. Connect your modem cable to the 50-pin connector on the rear of the synchronous communications option.

This completes the installation of the synchronous communications option. To test your installation, see Chapter 11.



# 10

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## TURBOchannel Option

### Introduction

The TURBOchannel option is a high-performance input/output interconnection that provides a data communications path. It allows additional options to be installed in your system, for instance:

- A second Ethernet connection
- A second SCSI bus
- A VME (Versa Module Eurocard) adapter
- A third-party TURBOchannel device

The TURBOchannel option comes in two packages, the adapter package and the option package. You must install both the adapter and the option to use the TURBOchannel.

### Chapter Topics

This chapter covers the following topics:

- Shipping Contents
- Installing the TURBOchannel Adapter and Option
- TURBOchannel Option Specifications

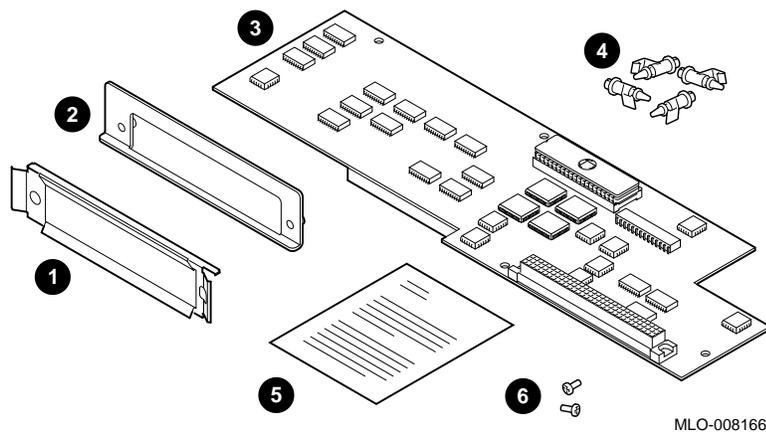
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## Shipping Contents

### TURBOchannel Adapter Components

Figure 10-1 shows the components shipped with the TURBOchannel adapter.

**Figure 10-1 TURBOchannel Adapter Components**



**Description of Components**

Table 10–1 describes the TURBOchannel adapter components shown in Figure 10–1.

**Table 10–1 TURBOchannel Adapter Component Descriptions**

<b>Number</b>	<b>Component Name</b>	<b>Function</b>
①	FCC shield	Seals the opening
②	Metal filler plate	Aids mounting of the option
③	TURBOchannel adapter board	Converts bus
④	4 plastic standoffs	Hold the adapter board in place
⑤	Documentation	Explains how to install the TURBOchannel adapter and the option
⑥	2 Phillips screws	Secure the metal bracket on the TURBOchannel option to the system unit

**Documentation**

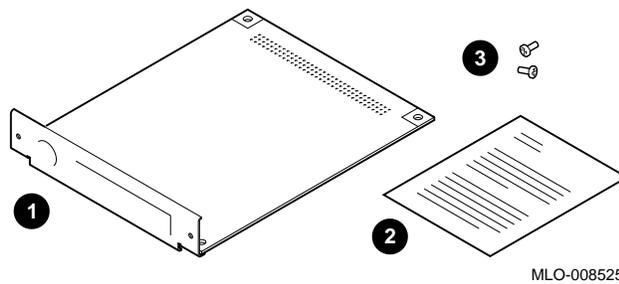
You do not need the documentation that comes with the TURBOchannel adapter. It is a duplication of this chapter.

Shipping Contents

### **TURBOchannel Option Components**

Figure 10-2 shows the components that come with the TURBOchannel option.

**Figure 10-2 TURBOchannel Option Components**



### **Important**

Throw away the document ❷ and the two screws ❸ that come in this TURBOchannel package. Use this Options Installation Guide and the screws that come with the adapter.

## Installing the TURBOchannel Adapter and Option

### Preparing Your System

Before you begin your TURBOchannel option installation, see the following information in this guide:

- Preparing your system (See Chapter 1)
- Removing a graphics option (See Chapter 8)

### Minimum ROM Revision

Check your system's start-up display for the following ROM requirement:

- Model 60 requires V1.2
- Model 90 requires V1.0

### Configuration Restriction

You can not have both the TURBOchannel option and the synchronous communications option (or quad-screen option, Model 60 only) in your system unit. If you have another communications option in your system unit, you must remove it before installing a TURBOchannel option.

## Installing the TURBOchannel Adapter and Option

### Installation Overview

Table 10–2 provides an overview of the TURBOchannel option installation procedure. The remainder of this section explains each step in more detail.

**Table 10–2 TURBOchannel Option Installation Procedure**

---

1. Touch the TOUCH HERE space on the power supply.
  2. Disconnect the SCSI cable from the system board and from the opening over the TURBOchannel port.
  3. Remove the filler plate.
  4. Remove the existing graphics board (if applicable).
  5. Install the four plastic standoffs.
  6. Insert the TURBOchannel adapter board.
  7. Replace the graphics board (if applicable).
  8. Attach the FCC shield to the front of the TURBOchannel option.
  9. Install the TURBOchannel option.
  10. Reconnect the SCSI cables.
  11. Screw the metal bracket onto the TURBOchannel option.
-

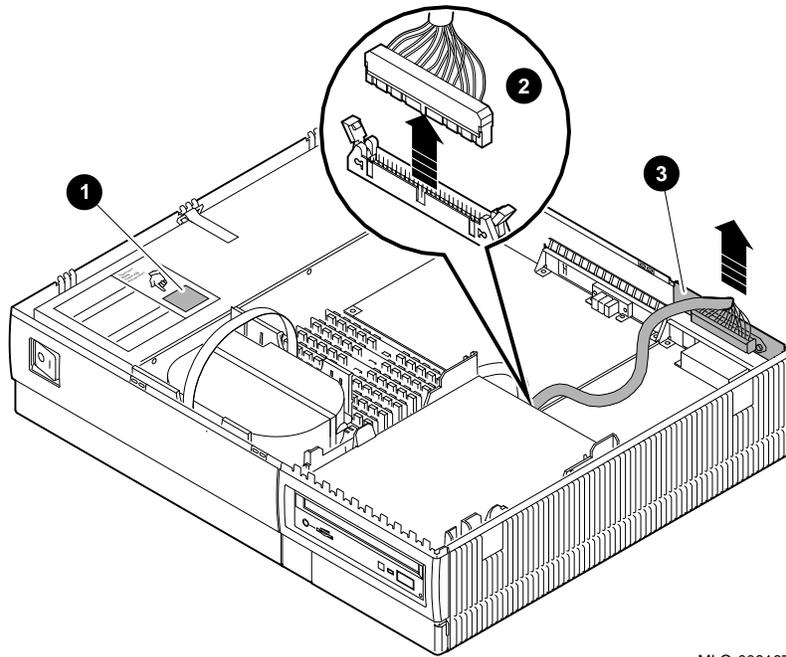
## Installing the TURBOchannel Adapter and Option

### Locate the Touch Here Label

To install the TURBOchannel option, follow these steps:

1. As soon as you remove the cover, and before you remove anything else, touch the space labeled TOUCH HERE ❶, as shown in Figure 10-3, to avoid damage from static discharge.

Figure 10-3 Inside the System Box



MLO-008167

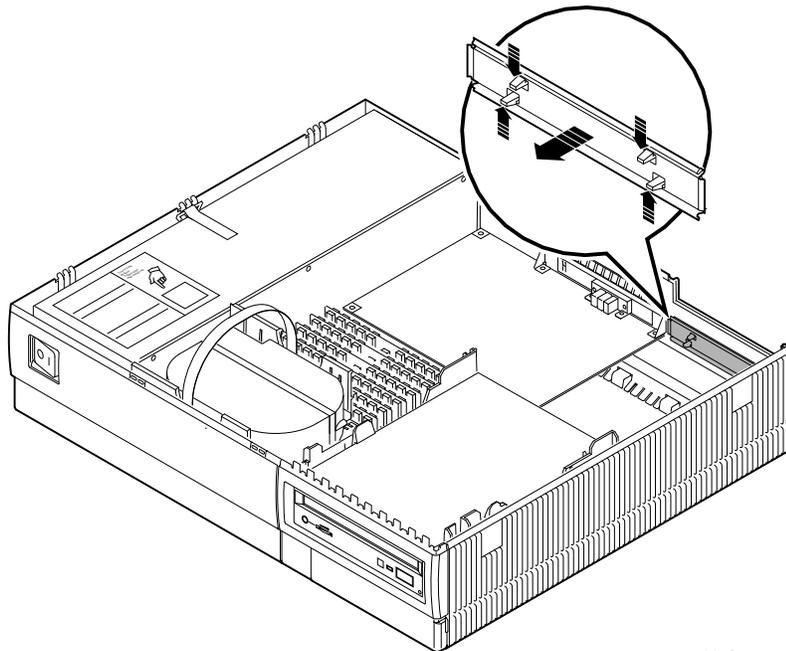
2. Disconnect the SCSI cable from the system unit by pushing the two side clips out and lifting up ❷.
3. Pull up and set aside the SCSI cable that rests in the opening over the TURBOchannel connector ❸.

## Installing the TURBOchannel Adapter and Option

### Remove the Filler Plate

Remove the filler plate that covers the TURBOchannel option port opening by squeezing the tabs together, then pulling it out, as shown by the arrows in Figure 10-4.

**Figure 10-4 Removing the Filler Plate**



MLO-008524

### Remove Existing Board

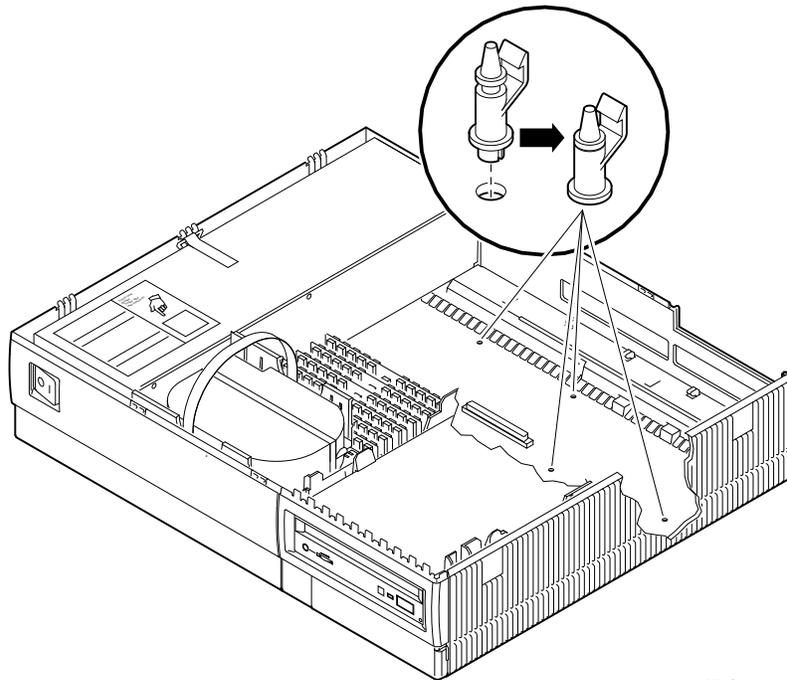
To remove an existing graphics board from your system unit, follow the steps in Chapter 8.

## Installing the TURBOchannel Adapter and Option

### Insert Plastic Standoffs

Insert the four plastic standoffs in the locations shown in Figure 10-5.

**Figure 10-5** Inserting the Plastic Standoffs



MLO-008518

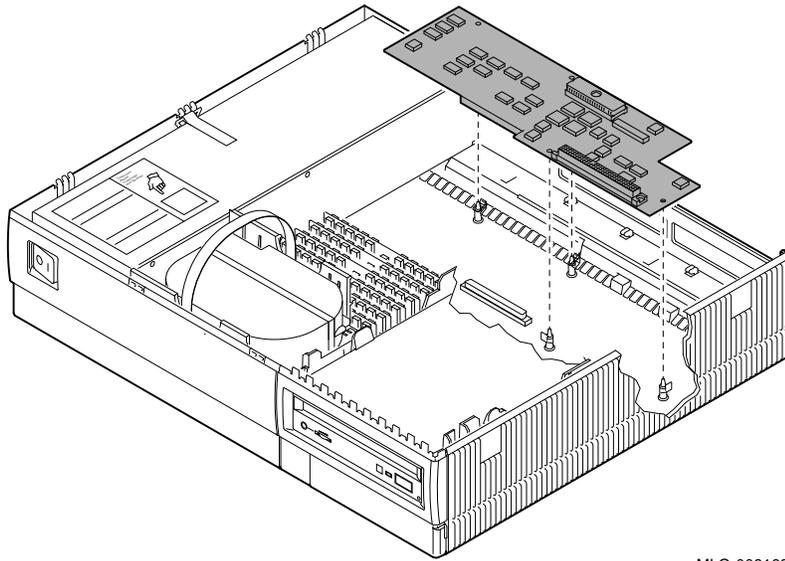
Position the standoffs as shown in Figure 10-6.

## Installing the TURBOchannel Adapter and Option

### Insert the Adapter Board

Line up the TURBOchannel adapter board holes over the four plastic standoffs, as shown in Figure 10–6. Press the board down, snapping the board down over each standoff to secure it.

**Figure 10–6** Inserting the TURBOchannel Adapter Board



MLO-008168

### Replace the Graphics Board

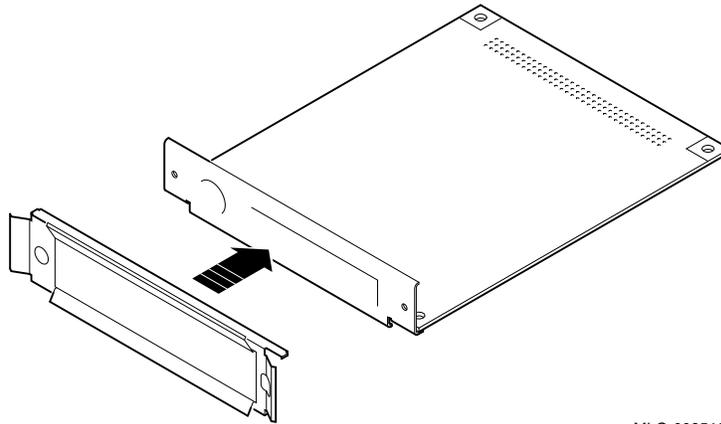
To replace the graphics board in your system unit, follow the steps in Chapter 8.

## Installing the TURBOchannel Adapter and Option

### **Attach the FCC Shield**

Attach the FCC shield to the front of the TURBOchannel option module, over the metal bracket, as shown in Figure 10–7.

**Figure 10–7 Attaching the FCC Shield**



MLO-008519

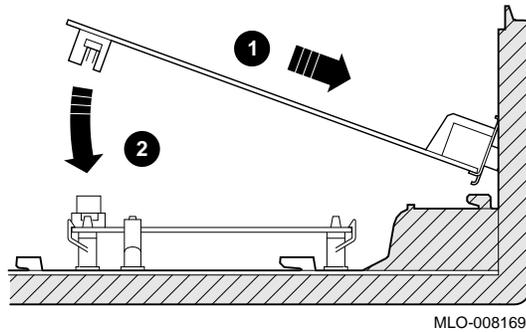
## Installing the TURBOchannel Adapter and Option

### Insert the TURBOchannel Option

Insert the TURBOchannel option, as shown in Figure 10–8.

1. Slide the TURBOchannel option module **1** firmly towards the back of the system unit.
2. Press the rear of the module so that the module connector **2** goes into the connector on the TURBOchannel adapter board.

**Figure 10–8** Inserting the TURBOchannel Option



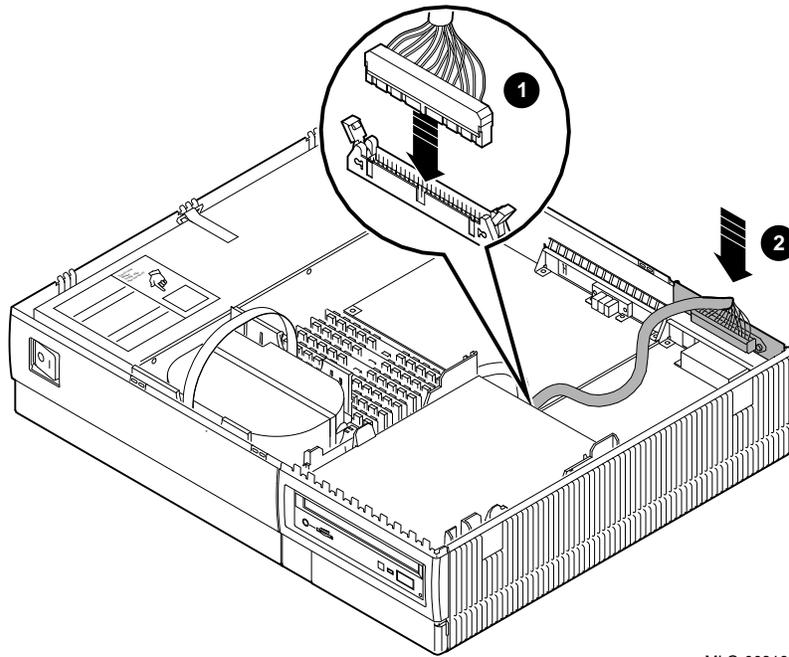
## Installing the TURBOchannel Adapter and Option

### Replace the SCSI Cables

Reconnect the two SCSI cables, as shown in Figure 10–9.

1. Align and connect the SCSI cable **1** to the system unit. Make sure the two side latches snap in, securing the connection.
2. Return the SCSI connector **2** to the port slot above the TURBOchannel option port.

Figure 10–9 Replacing the SCSI Cables



MLO-008165

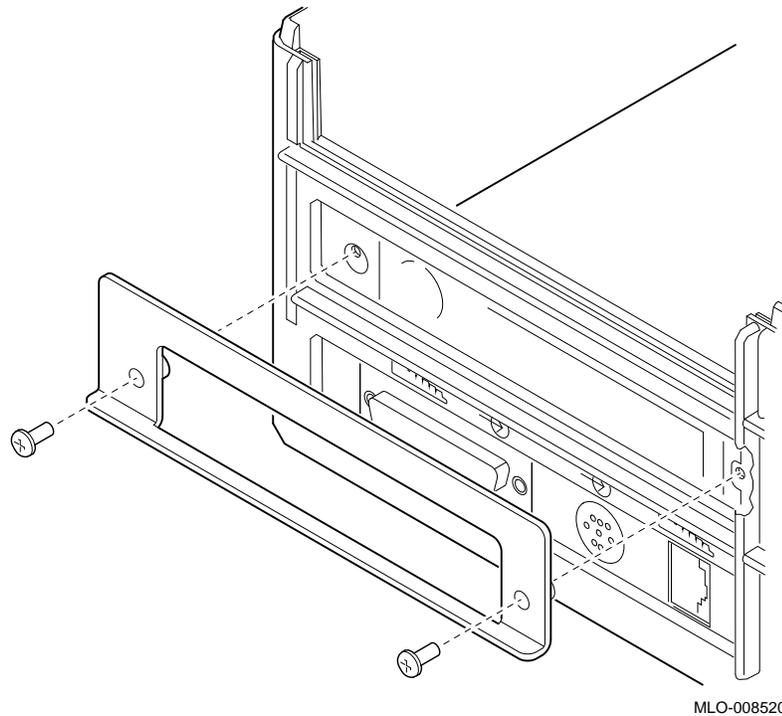
## Installing the TURBOchannel Adapter and Option

### Attach the Option Plate

Place the metal option plate over the outside of the TURBOchannel option on the rear of the system unit, as shown in Figure 10–10.

Screw the option plate into the TURBOchannel option module using the two Phillips screws, as shown in Figure 10–10.

**Figure 10–10** Screwing on the Option Plate



This completes the TURBOchannel option installation.

### Testing the Installation

To test your TURBOchannel option installation, follow the instructions in Chapter 11 and in Appendix A.

---

## TURBOchannel Option Specifications

**Specifications** Table 10–3 provides the specifications for the TURBOchannel option.

**Table 10–3 TURBOchannel Specifications**

Category	Specification
Air flow	150 LFM
Connector	96-pin DIN
Data path	32-bit multiplexed address/data
Nonoperating storage temperature	0°C to 50°C 32°F to 89.6°F
Operating temperature	10°C to 40°C 50°F to 104°F
Operating temperature (with tape or floppy)	15°C to 32°C 59°F to 90°F
Protocol	Synchronous, 12.5 MHz
Relative humidity	10% to 90%, noncondensing



# 11

---

## Restoring the System

### Introduction

This chapter describes how to restore your VAXstation 4000 system after you have finished installing your internal options.

### Chapter Topics

This chapter covers the following topics:

- Routing the Cables
- Closing the System Unit
- Restarting the System
- Testing the System After Adding a Device

---

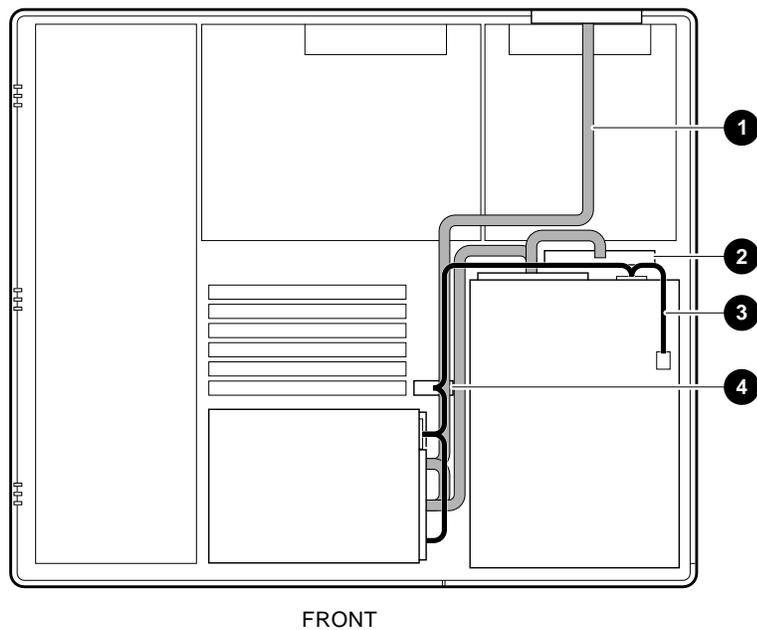
## Routing the Cables

### Route the Cables

Route the power and SCSI cables around the side and rear of the removable media bracket, as shown in Figure 11-1.

Connect the cables to the CPU board using the CPU connectors shown in Figure 6-14 and Figure 6-12.

**Figure 11-1 Routing Cables**



MLO-008148

- ❶ SCSI cable
- ❷ CPU SCSI connector
- ❸ Power cable
- ❹ CPU power connector

---

## Closing the System Unit

### Replace the Cover

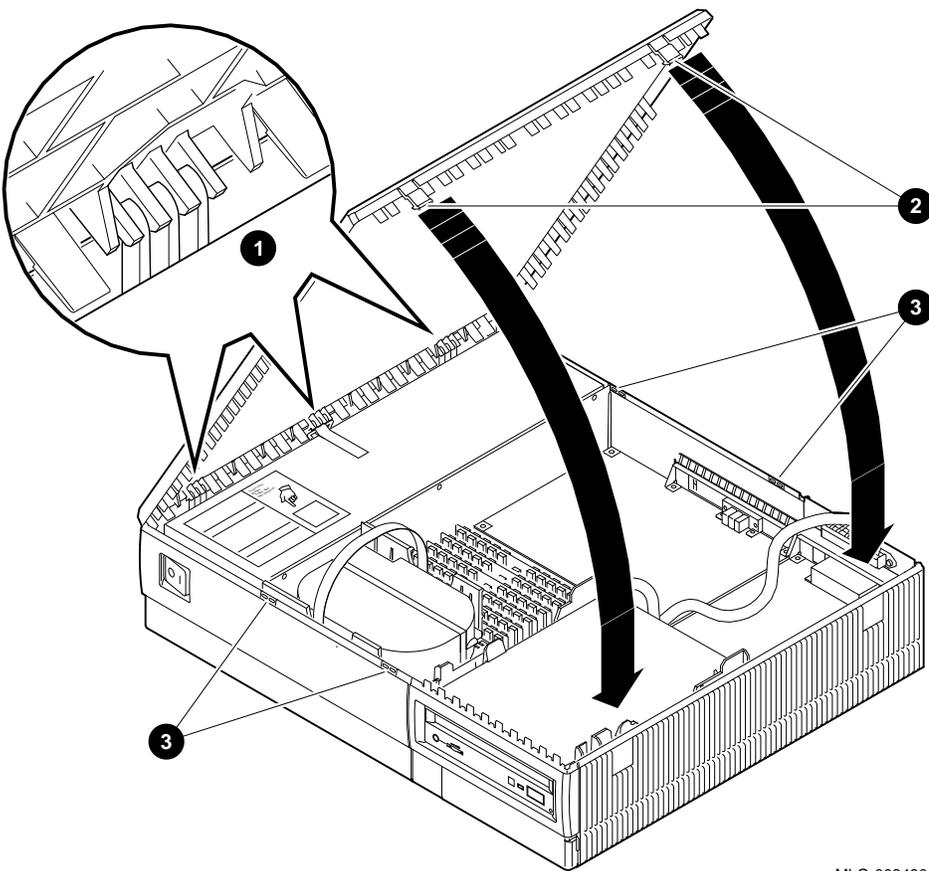
Mesh the hinge teeth ❶ of the cover with the hinge teeth on the left side of the system unit, then lower the cover. The cover latches ❷ should click into place. See Figure 11–2. Press firmly on the middle of the front and rear edges of the cover until you hear the retention devices ❸ click.

### **WARNING:** Sharp edges

When closing the system unit cover, do not touch the sharp plastic teeth on the top edge of the bezel.

## Closing the System Unit

**Figure 11–2 Replacing the System Unit Cover**



MLO-008490

---

## Restarting the System

### **Turn On Equipment**

To start your system, turn on ( | ) your equipment in the following order:

1. Expansion boxes
2. Printer and modem
3. Monitor (Use the monitor On/Off switch. The monitor power does not turn on when they system unit is turned on.)
4. System unit

### **Press Halt Button**

Press the halt button to get the console prompt.

---

## Testing the System After Adding a Device

### SHOW CONFIG Command

To confirm that the devices are connected correctly, do the following:

1. Display the system device configuration by using the SHOW CONFIG command as explained in Chapter 1. Compare the latest configuration display with the configuration display you viewed when you prepared the system before adding a device.

In the latest display, you should see the new device as well as the devices present in the system before you made the addition. If the new device is not in the list, it has not been installed properly.

2. Check the SHOW CONFIG command display to see that devices are set to the correct SCSI IDs by using the SHOW CONFIG command.
3. Verify that no error messages appear. Two question marks next to a device mnemonic identify an error in that device. If any error messages appear, write them down.
4. Verify that devices are interacting correctly by using the TEST 100<sup>1</sup> command to run the system exerciser. Refer to the *VAXstation 4000 Model 60 Owner's and System Installation Guide* or the *VAXstation 4000 Model 90 Owner's and System Installation Guide* for more information on the system exerciser.

### Problem?

If you have a problem, check the cables, connectors, and SCSI ID settings.

If you continue to have a problem, refer to the *VAXstation 4000 Model 60 Owner's and System Installation Guide*, the *VAXstation 4000 Model 90 Owner's and System Installation Guide*, or contact your Digital customer service representative.

---

<sup>1</sup> See Appendix A for testing the TURBOchannel option.

# 12

---

## Printers and Modems

**Introduction** This chapter describes printers and modem options.

**Chapter Topics** This chapter covers the following topics:

- Printers
- Connecting a Printer
- Modems
- Connecting a Modem

---

## Printers

### Available Printers

Table 12–1 describes the printers available for the VAXstation 4000 system.

**Table 12–1 Available Printers**

LN03	Desktop nonimpact laser printer that produces letter-quality text at a rate of 8 pages per minute.
LN03 PLUS	Enhanced LN03. This printer prints documents with both text and graphics.
LN03R ScriptPrinter	Nonimpact page printer that uses laser recording technology to produce high-quality PostScript output, text, graphics, and images.
LA75 Companion Printer	Desktop dot-matrix printer that produces sixel graphics.
LA210 Printer	Desktop dot-matrix printer that produces high-speed drafts, near letter-quality drafts, and bitmap graphics.
LJ250/252 Companion/Color Printer	Desktop ink-jet color printer, serial (LJ250) or parallel (LJ252).

In addition, the VAXstation 4000 supports serial third-party plotters and printers.

### Ordering a Printer

When you order a printer, you also need to order the following:

- A DEC 423 serial line cable.
- The appropriate adapter (H8575-A) to connect the printer to the cable.

---

## Connecting a Printer

### **Important: Before Shutdown**

See your software documentation for shutdown procedures before turning your system off. If you are a member of a cluster, see your system manager for shutdown procedures.

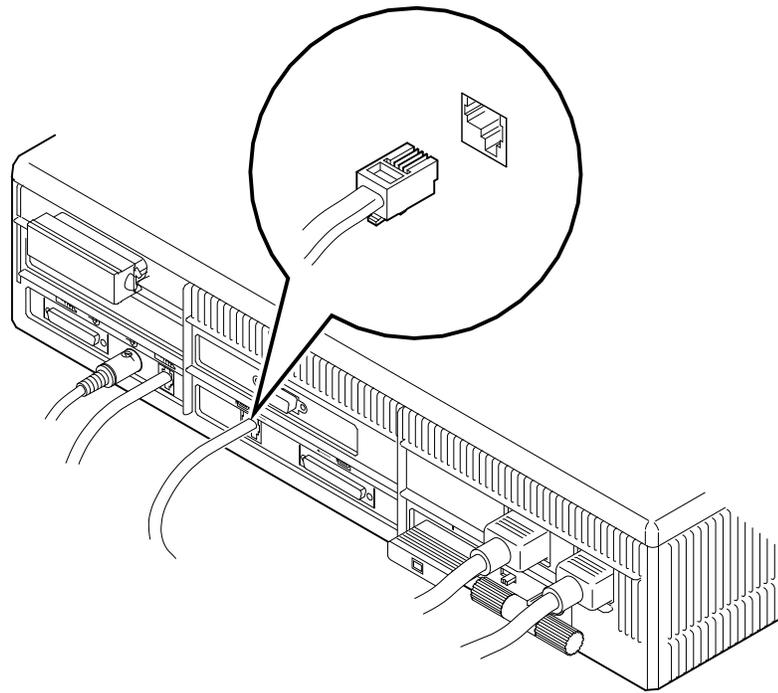
### **Connecting a Printer**

To attach your printer, follow these steps:

1. Consult the documentation that came with the printer, and do the following:
  - Unpack and set up the printer.
  - Set the baud rate on the printer.
2. Make sure that the printer is off (O).
3. Turn off (O) the system unit.
4. Turn off (O) the expansion boxes.
5. Turn off (O) other peripheral devices, such as modems.
6. Turn off (O) the monitor. (Use the monitor On/Off switch. The monitor power does not turn off when the system unit is turned off.)
7. Attach one end of the printer cable to the rear of the printer. (Consult the documentation that came with the printer.)
8. Attach the other end of the printer cable to one end of the serial line cable.
9. Attach the free end of the serial line cable to the printer port on the rear of the system unit, as shown in Figure 12–1.

## Connecting a Printer

**Figure 12–1 Connecting a Printer Cable to the System Unit**



MLO-008491

## Restore the System

Turn your system back on, following the steps described in Chapter 11.

---

## Modems

**Modem Defined**

A modem is a device that converts computer signals to signals that can be sent over a telephone line. Modems are typically used for communications in large networks, such as wide area networks (WANs).

The asynchronous communications port on the rear of the system unit has full modem control and supports several transfer rates, the maximum being 19.2 kilobytes per second. Refer to your modem documentation for instructions on setting your modem baud rate.

**Available Modems**

Table 12–2 lists the modems available for the VAXstation 4000 system.

**Table 12–2 Modems**

Modem	Description
DF242 Scholar Plus	300, 1200, and 2400 bits/s full-duplex asynchronous
DF224	300, 1200, and 2400 bits/s full-duplex asynchronous
DF112	300 and 1200 bits/s full-duplex asynchronous
DF03	300 and 1200 bits/s full-duplex asynchronous

**Ordering a Modem**

When you order a modem, you also need to order the following:

- A DEC 423 serial line cable
- A 25-pin D-sub adapter/DECconnect passive adapter

Autoanswer is not available; only data leads are connected.

---

## Connecting a Modem

### **Important: Before Shutdown**

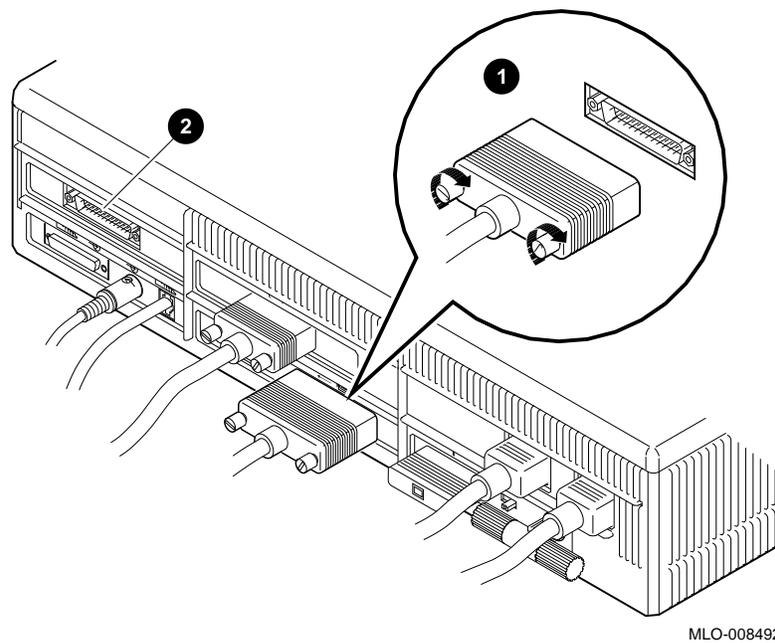
See your software documentation for shutdown procedures before turning your system off. If you are a member of a cluster, see your system manager for shutdown procedures.

### **Connecting a Modem**

To connect your modem, do the following:

1. Make sure that the modem is off (O).
2. Turn off (O) the system unit.
3. Turn off (O) expansion boxes.
4. Turn off (O) peripheral devices, such as printers.
5. Turn off (O) the monitor.
6. Follow the setup directions that came with your modem.
7. Consult your modem documentation to clear the Force DSR attribute on your modem. (With this attribute cleared, your system will recognize the loss of the modem connection, should it occur.)
8. Attach the 25-pin D-sub adapter/DECconnect passive adapter to the rear of the modem.
9. Attach one end of the DEC 423 serial line cable to the 25-pin D-sub/DECconnect adapter.
10. Attach the free end of the serial line cable to the 25-pin communications port **1** on the rear of the system unit, as shown in Figure 12-2.
11. Refer to your modem documentation for proper settings and operation of the modem.

Figure 12-2 Connecting a Modem Cable to the System Unit



MLO-008492

**Connect  
Modem Cable**

If you have a synchronous communications adapter installed and wish to use it for your modem connection, connect the modem cable to the synchronous communications port **2**.

**Restore the  
System**

Turn your system back on, following the steps described in Chapter 11.



# 13

---

## Remote Cable Option

**Introduction** This chapter describes how to install the remote cable option.

**Chapter Topic** This chapter explains the following:

- Installing the Remote Cable Kit

The floor stand, described in Chapter 14, allows you to remove the VAXstation 4000 system and expansion box from the desktop. A remote cable kit for mouse and keyboard connection is available should you wish to place the system unit farther than 1 meter (3 feet) from the monitor, mouse, and keyboard.

## Installing the Remote Cable Kit

**Important:  
Before  
Shutdown**

See your software documentation for shutdown procedures before turning your system off. If you are a member of a cluster, see your system manager for shutdown procedures.

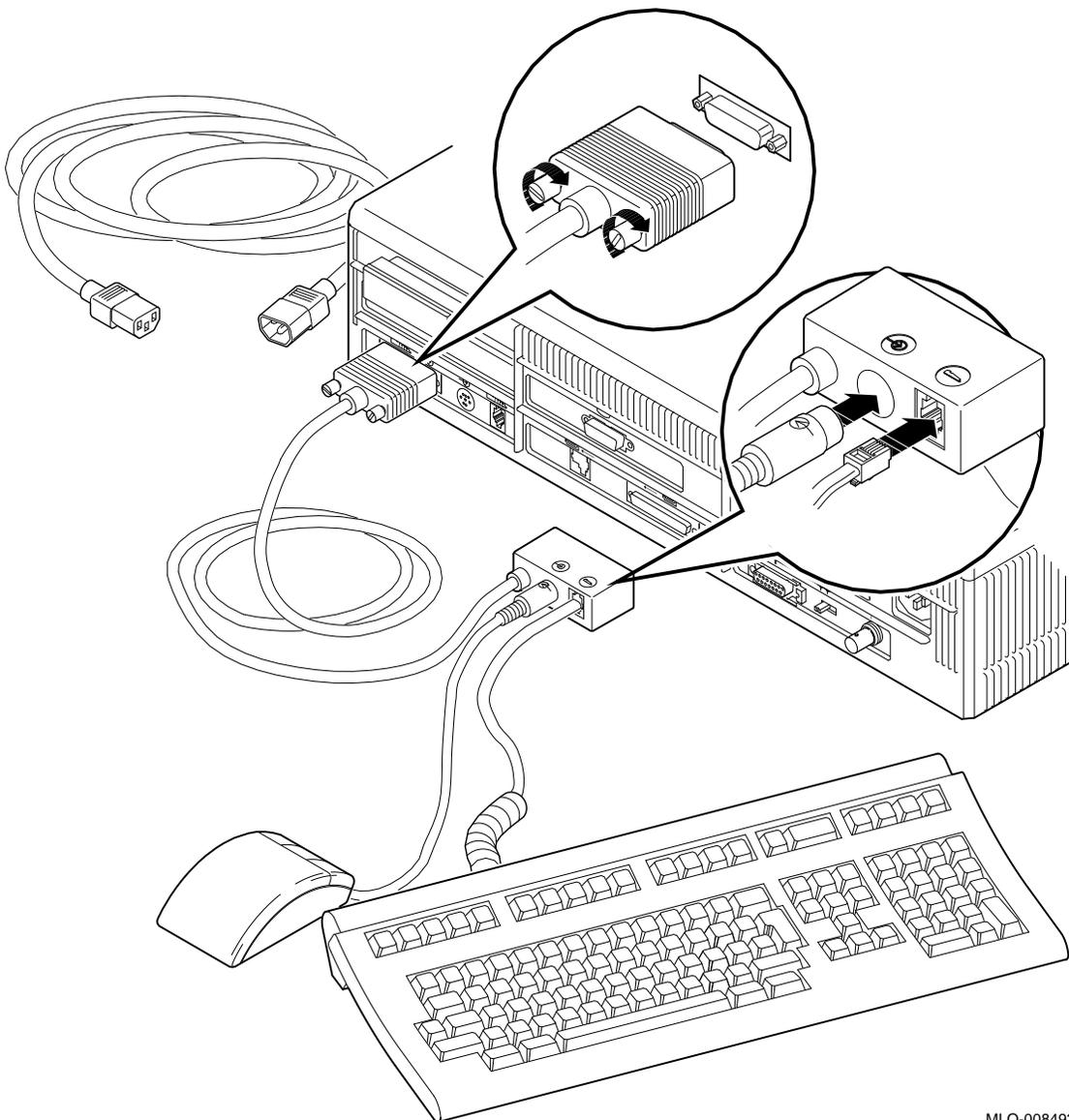
**Installation  
Steps**

To install the remote cable kit, follow these steps:

1. Turn off (O) the system unit.
2. Turn off (O) expansion boxes.
3. Turn off (O) peripheral devices, such as printers and modems.
4. Turn off (O) the monitor.
5. Remove the mouse and keyboard connectors from their ports on the rear panel of the system unit.
6. Connect the remote cable to the 15-pin port on the rear panel, as shown in Figure 13-1.
7. Connect the mouse and keyboard to the other end of the cable, as shown in Figure 13-1.
8. Remove the short monitor power cable and replace it with the longer cable.

Installing the Remote Cable Kit

Figure 13-1 Installing the Remote Cable Kit



MLO-008493



# 14

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## Other External Options

### Introduction

A number of external options are available for the VAXstation 4000 system. Adding these options does not involve opening the system unit.

This chapter does not contain any installation instructions, but does contain general descriptions of these external options. For specific information, contact your Digital sales representative.

### Chapter Topics

This chapter contains descriptions of the following options:

- Button Box (Programmable Function Keyboard)
- Dial Box
- Floor Stand
- Headset
- Multiple-Box Rack (WorkStand)
- Other Options

Button Box (Programmable Function Keyboard)

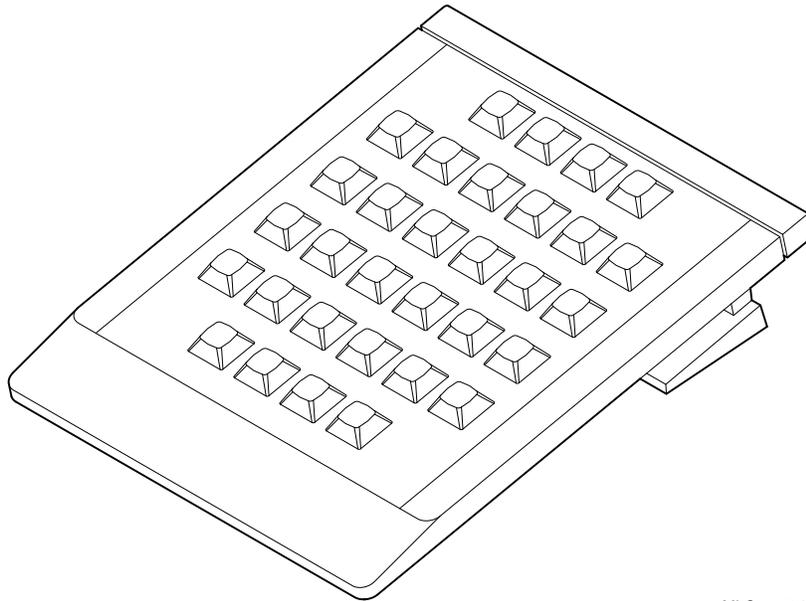
---

## Button Box (Programmable Function Keyboard)

### Features

The programmable function keyboard (button box), shown in Figure 14-1, is for special graphics applications on the VAXstation 4000. This device contains an array of 32 lighted momentary-contact pushbutton switches.

**Figure 14-1 Programmable Function Keyboard (Button Box)**



MLO-005941

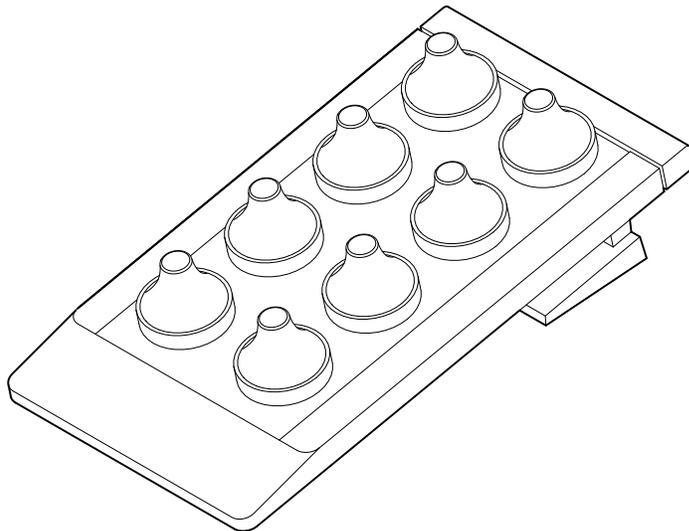
---

## Dial Box

### Features

The dial box, shown in Figure 14–2, is for special graphics applications on the VAXstation 4000. It contains eight dials, each of which turns a continuously variable potentiometer. Each potentiometer is connected to an analog-to-digital converter.

**Figure 14–2 Dial Box**



MLO-005936

Floor Stand

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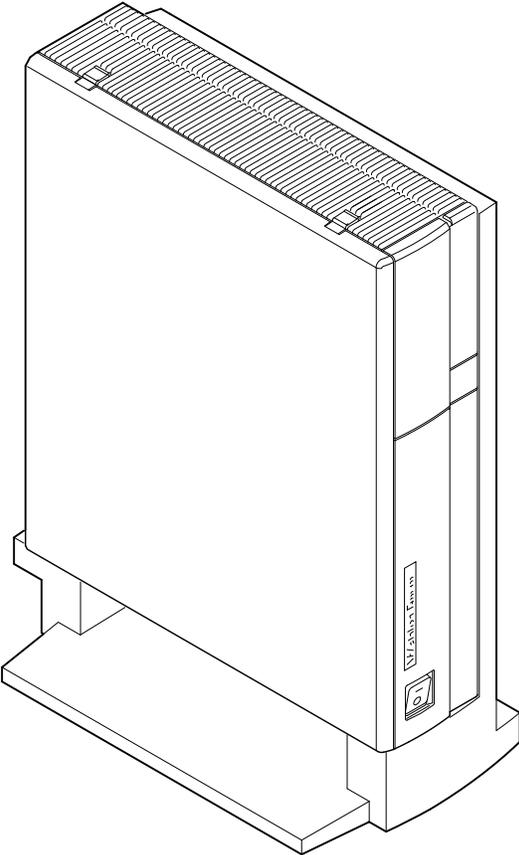
## Floor Stand

### Features

The floor stand, shown with a system unit in Figure 14–3, allows the system unit and expansion box to be mounted vertically on the floor, either individually or together as a single unit (using two floor stands). A special remote cable kit for mouse and keyboard connection is available should you wish to place the system unit farther than 1 meter (3 feet) from the monitor, mouse, and keyboard.

Floor Stand

Figure 14-3 Floor Stand



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## Headset

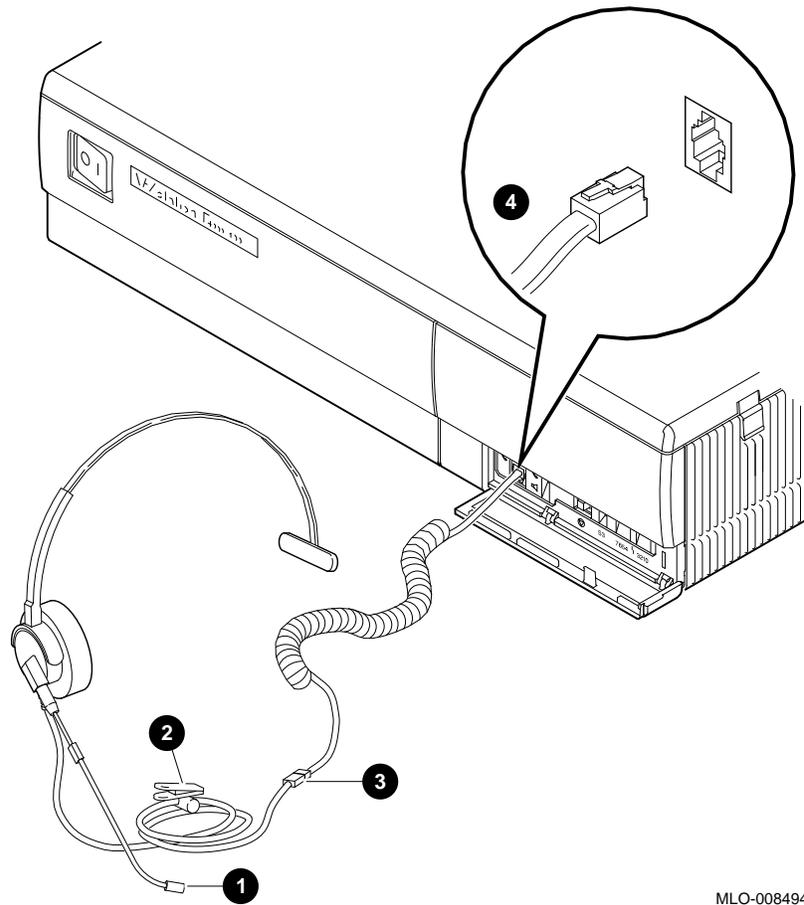
### Features

The headset option, shown in Figure 14–4, provides an alternative to a telephone handset for you to use to input and output audio data.

The headset has an adjustable microphone ❶ for voice input, a two-foot cord that has a clothing clip ❷, and a quick-disconnect connector ❸ which attaches to a coiled cord that plugs into the audio port ❹ on the front of the system unit.

Headset

Figure 14-4 Headset Option



MLO-008494

Multiple-Box Rack (WorkStand)

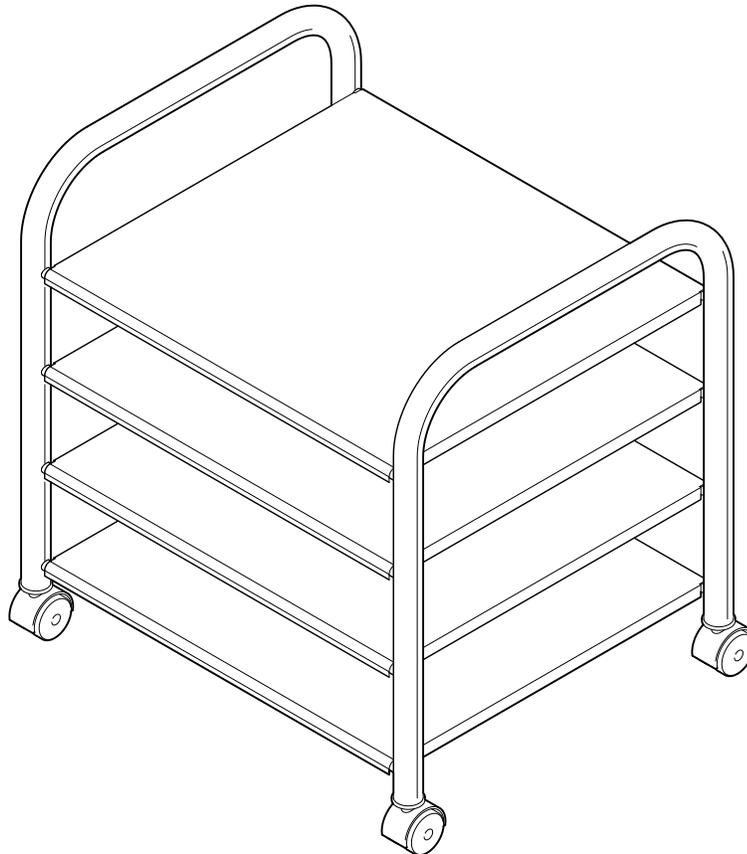
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## Multiple-Box Rack (WorkStand)

### Features

The multiple-box rack (WorkStand), shown in Figure 14–5, can house the system unit and several expansion boxes.

**Figure 14–5 Multiple-Box Rack (WorkStand)**



MLO-005940

---

## Other Options

### **Storage Expansion Boxes**

Two storage expansion boxes are available for the VAXstation 4000. For more information on these boxes and available options for them, refer to the *BA46 Storage Expansion Box Owner's Guide* or the *SZ03 SCSI Expansion Box Owner's Card*, both listed in Appendix D.

### **Tablet**

With the VAXstation 4000 you can use either the standard mouse or an 11-by-11-inch tablet with a puck and pen pointers.

The tablet is connected to the DIN serial port (mouse port) on the rear of the system unit.



# A

---

## TURBOchannel Testing

### **Introduction**

This appendix is for users who want to test their TURBOchannel firmware.

### **Appendix Topics**

This appendix describes the functions of the TURBOchannel self-test, and the tests run with the MIPS/REX emulator. It covers the following topics:

- Running TURBOchannel Adapter (TCA) Self-Tests
- Running Tests with the MIPS/REX Emulator

---

## Running TURBOchannel Adapter (TCA) Self-Tests

### Types of Tests

The TURBOchannel Adapter TCA start-up tests execute when you turn on the system to verify correct operation of the TCA hardware. You can also invoke these tests from the VAXstation 4000 console prompt (>>>) by entering one of the following commands:

```
>>> T TCA 
```

or

```
>>> T 13 
```

Table A-1 lists the TCA start-up tests and their functions.

**Table A-1 TCA Start-Up Tests**

TCA Test	Function
Register test	Verifies the functions of the control and status register (CSR).
Interrupt test	Generates an interrupt to test the interrupt service routine.
First in/first out (FIFO) test	Tests the load and empty functions of the TCA FIFO.
Trigger test	Tests the TURBOchannel direct memory access (DMA) functionality.
TCA size bus	Indicates if a device is connected to slot 0.

### TCA Self-Test Error Codes

The TCA self-test invoked by the T TCA command, or when you turn on the system, uses diagnostic light codes (Table A-2) and error codes (Table A-3). Use a combination of each to determine which test failed (light code) and which function failed (error code).

Running TURBOchannel Adapter (TCA) Self-Tests

**Table A-2 TCA Diagnostic Light Codes**

Light Code		Meaning
XXOX	0000	Entry into test
XXOX	000X	TCA register test
XXOX	00X0	TCA interrupt test
XXOX	00XX	TCA FIFO test
XXOX	0X00	TCA DMA trigger test
XXOX	0XX0	TCA size bus test

**Table A-3 TCA Self-Test Error Codes**

Error (decimal)	Error (hex)	Meaning
0002	0002	Turbochannel Reset bit is stuck at 1.
0004	0004	Forced Turbochannel Timeout is not seen.
0006	0006	Timeout bit is stuck at 1.
0008	0008	FIFO is empty after loading data.
0010	000A	FIFO is not empty after retrieving data.
0012	000C	Data read from FIFO does not match loaded data.
0014	000E	Forced invalid reference error is not seen.
0016	0010	Forced ERROR condition is not seen.
0018	0012	TCA interrupt at VAX INT_REG is not set.
0020	0014	Interrupt bit on TCA is not set.
0022	0016	ISR was not entered on interrupt.

(continued on next page)

Running TURBOchannel Adapter (TCA) Self-Tests

**Table A-3 (Cont.) TCA Self-Test Error Codes**

<b>Error (decimal)</b>	<b>Error (hex)</b>	<b>Meaning</b>
0024	0018	FIFO data was bad after DMA Trigger read operation.
0026	001A	FIFO data does not match loaded data after DMA T rigger write.

---

## Running Tests with the MIPS/REX Emulator

### Invoking the MIPS/REX Emulator

The MIPS/REX emulator is a utility for VAXstation 4000 users to execute TURBOchannel diagnostics and firmware. Those diagnostics are described in the individual TURBOchannel options user guides. Refer to those documents for information about the various options.

Invoke the MIPS/REX emulator by entering the following command:

```
>>> T/UT TCA 
```

The VAXstation 4000 will respond with the following display:

```
      **KA46/49 TURBOCHANNEL REX EMULATOR**  
      >>
```

### Help Command

When you type the help command at the emulator prompt (>>), as shown below, a list of commands that can be entered from the console to test TURBOchannel options displays.

```
>> t tc0 ? 
```

### Command Descriptions

Table A-4 explains each MIPS/REX emulator command and function.

**Table A-4 MIPS/REX Emulator Commands**

Command	Function
t tc0 <i>testname</i>   ?	Runs a TURBOchannel option test, or asks the option to display all the tests it contains.
t tc0 script <i>scriptname</i>	Executes a script.
t tc0 init	Runs the initialization function provided by the option ROM. This initializes the option. No error occurs if an option has no init object.
t tc0 cnfg	Runs the cnfg function provided by the option ROM. No error occurs if an option has no cnfg object.
t tc0 ls	Lists all ROM objects for the specified TURBOchannel device. ROM objects reside on the TURBOchannel card.
t tc0 cat <i>scriptname</i>	Displays the contents of a script. Use this command to see which tests a given script will run.

**Directory of ROM Objects**

To see a list of all ROM objects (like the UNIX LS command, or the VMS DIR command) enter the following:

```
>> t tc0 ls Return
```

The following text displays:

```
>>t tc0 ls
    *emul: t tc0 ls
      28 | boot --> code
      28 | cnfg --> code
      28 | init --> code
      28 | t --> code
     256 | pst-q
     272 | pst-t
     288 | pst-m
    29264 | code*
>>
```

The symbols in the preceding example are explained as follows:

- > means symbolic link
- \* means executable image
- | separator for neatness

The lines without symbols are ROM-resident scripts. A script is a list of tests that execute one after another.

## Running Tests with the MIPS/REX Emulator

### MIPS/REX Self-Tests

To display the self-tests that are available, enter the following command:

```
>> t tc0/? 
```

The following text displays:

```
>>t tc0/?  
*emul: t tc0/?  
flash  
eprom  
68K  
sram  
rmap  
phycsr  
mac  
elm  
cam  
nirom  
intlpbk  
iplsaf  
pmccsr  
rnc  
pktmem  
rtostim  
botim  
extlpbk  
extmemtst  
dmatst  
enablerem  
disablerem  
  
>>
```

To run an emulator test, follow this example, where *flash* is the test name:

```
>> t tc0/flash 
```

### Executing a Script

The following example shows how to execute the `pst-q` script:

```
>> t tc0 pst-q 
```

## Running Tests with the MIPS/REX Emulator

The following text displays:

```
>>t tc0 pst-q
*emul: t tc0 pst-q
t 0/flash
t 0/eprom
t 0/68K
t 0/sram
t 0/rmap
t 0/phycsr
t 0/mac
t 0/elm
t 0/cam
t 0/nirom
t 0/intlpbk
t 0/iplsaf
t 0/pmccsr
t 0/rmc
t 0/pktmem
t 0/rtostim
t 0/botim
t 0/dmatst

>>
```

The emulator shows each test within the script as it executes. The emulator checks the error status after each test completes and saves it for the end of the script.

### The CNFG Command

To display the devices on the TURBOchannel, enter the CNFG command, as follows:

```
>> t tc0 cnfg 
```

For example:

```
>> t tc0 cnfg
*emul: t tc0 cnfg
DEC PMAF-AA T5.2P- (fddi: 08-00-2b-27-4c-91)
```

If, for example, you had a PMAZ SCSI controller, you may see a list of the devices attached to the SCSI bus. The information displayed is option dependent.

### Exit the Emulator

To exit the emulator, type  at the emulator prompt (>>). You will return to the VAXstation 4000 console prompt (>>>).

## **TURBOchannel Error Messages**

The emulator's purpose is to execute the tests that reside on the TURBOchannel option's ROM. While an error status code is maintained during testing, the emulator can not diagnose TURBOchannel hardware failures, therefore any such messages are reported by the option. An example of an option-reported error message follows:

```
?TFL: #/test message
```

See your TURBOchannel option user's guide for more information on these error messages.

## **Emulator Error Messages**

If the emulator reports a failure during execution of the MIPS code, one of the following emulator messages will display:

1. **ERR-MIPS - DID NOT FIND ROM IN SLOT nn**  
This message indicates that the emulator can not read the ROM header in slot nn. Check option seating, check option connector for bent pins, check option ROM for bent pins.
2. **ERR-MIPS - ROM OBJECT REPORTED A SEVERE ERROR**  
This message is a flag to the operator that the emulator received a "severe error status" code back from a TURBOchannel object. The operator should check for a "?TFL" error message, then consult the TURBOchannel option user's guide.
3. **ERR-MIPS - BAD ADDRESS DETECTED (ADDR address),  
CODE = mm**  
This message comes from the instruction emulator indicating that the TURBOchannel ROM code has gone outside the expected range of addresses permitted by the TURBOchannel Firmware Specification. Check to see if the module and test are supported by the emulator.



# B

---

## Recommended SCSI Settings

### **Introduction**

The information in this appendix is for technically trained users who want to do custom configurations. It explains how to set the SCSI ID on the options you install.

### **What Is SCSI?**

The Small Computer Systems Interface, or SCSI, is an interface designed for connecting disk drives and other peripheral devices to computer systems. SCSI is defined by an American National Standards Institute (ANSI) standard and is used by computer and peripheral vendors throughout the industry.

---

## Setting the SCSI ID

### Who Sets the SCSI ID?

Digital sets each SCSI device to a SCSI ID before the equipment leaves the factory. These settings should be changed *only* when you configure a system with more than one of the same device. You are responsible for the SCSI ID settings on your equipment.

You can add up to seven SCSI devices to the system on a SCSI bus. All data is sent between the system and the devices connected to the bus. Each of the seven SCSI devices is identified by a number from 0 to 7, called a SCSI ID. Each device looks at all the data on the bus, but receives only the data that has its SCSI ID.

### Recommended SCSI Settings

Table B–1 lists the recommended SCSI settings for the system unit. If you have an expansion box, be sure no device is set to the same SCSI ID as a device in the system unit.

**Table B–1 Recommended SCSI Switch Settings**

Device	Recommended SCSI ID
RZ2x	0
RZ2x	1
RZ2x	2
Single factory-installed RZ2x	3
RRD42	4
RX26/TZK10/TLZ06	5
KA46/KA49 SCSI controller	6
(Any device)	7

For most applications, SCSI IDs can be set arbitrarily as long as no two devices share the same ID.

# C

---

## Port Pin-outs

### Introduction

This appendix is for users who want to connect communications devices to their system.

### Appendix Topics

The following tables explain the port pins on the back of the system unit:

- Printer/Communications Port Pin-outs
- Asynchronous Communications Port Pin-outs
- DSW21 Synchronous Communications Port Pin-outs
- H3199 Multistandard Loopback Connector Pinning

---

## Port Pin-outs

### Printer Communications

Table C-1 lists the port pin-outs for the printer/communications port.

**Table C-1 Printer/Communications Port Pin-outs**

Pin Number	Meaning
1	Data Terminal Ready (DTR)
2	Transmit
3	Ground
4	Ground
5	Receive
6	Data Set Ready (DSR)

## Asynchronous Communications Port

Table C-2 lists the port pin-outs for the asynchronous communications port.

**Table C-2 Asynchronous Communications Port Pin-outs**

Pin Number	Meaning
1	Protective ground optional
2	Transmit data
3	Receive data
4	Request to send
5	Clear to send
6	Data set ready
7	Ground
8	Carrier detect
9	Not used
10	Not used
11	Not used
12	Speed detect
13	Not used
14	Not used
15	Not used
16	Not used
17	Not used
18	Receiver signal element timing
19	Not used
20	Data terminal ready
21	Not used
22	Calling indicator
23	Data signal rate selector
24	Not used
25	Test

Port Pin-outs

**DSW21 Port Pin-outs**

Table C–3 lists the port pin-outs for the synchronous communications port.

**Table C–3 DSW21 Synchronous Communications Port Pin-outs**

Pin Number	Signal Name	34-Pin BC19X Adapter V.35 Interface <sup>1</sup>	15-Pin BC20Q Adapter X.21 Interface	25-Pin BC19V Adapter V.24 Interface	25-Pin BC19Q Adapter EIA530 Interface	37-Pin BC19U Adapter RS422 Interface	37-Pin BC19W Adapter RS423 Interface
1	Code ground <sup>2</sup>						
2	Code 0	Code ground	Code ground				
3	Code 1		Code ground	Code ground			Code ground
4	Code 2				Code ground	Code ground	
5	Code 3						
6	Transmit data A		2		2	4	
7	Transmit data B		9		14	22	
8	Transmit data			2			4
9	Request to send (RTS) RTS/C A		3		4	7	
10	RTS/C B		10		19	25	
11	Receive data A		4	3	3	6	6

<sup>1</sup>These six columns list the pin name or number of each adapter cable to which the corresponding 50-pin connector pin attaches.

<sup>2</sup>Code ground is the common point for code inputs

(continued on next page)

**Table C-3 (Cont.) DSW21 Synchronous Communications Port Pin-outs**

Pin Number	Signal Name	34-Pin BC19X Adapter V.35 Interface <sup>1</sup>	15-Pin BC20Q Adapter X.21 Interface	25-Pin BC19V Adapter V.24 Interface	25-Pin BC19Q Adapter EIA530 Interface	37-Pin BC19U Adapter RS422 Interface	37-Pin BC19W Adapter RS423 Interface
12	Receive data B		11	DTE ground	16	24	24
13	Local loop			18	18	20	20
14	Speed indicator						
15	Test indicator			25	25	18	18
16	Remote loop			21	21	14	14
17	Ring indicator	J		22	22	15	15
18	Receive clock A		6	17	17	8	8
19	Receive clock B		13	DTE ground	9	26	26
20	Transmit clock A		7	15	15	5	5
21	Transmit clock B		14	DTE ground	12	23	23
22	Clock			24			
23	V35 Transmit clock A	Y					
24	V35 Transmit clock B	A					
25	V35 Clock A	U					

<sup>1</sup>These six columns list the pin name or number of each adapter cable to which the corresponding 50-pin connector pin attaches.

(continued on next page)

Port Pin-outs

**Table C-3 (Cont.) DSW21 Synchronous Communications Port Pin-outs**

Pin Number	Signal Name	34-Pin BC19X Adapter V.35 Interface <sup>1</sup>	15-Pin BC20Q Adapter X.21 Interface	25-Pin BC19V Adapter V.24 Interface	25-Pin BC19Q Adapter EIA530 Interface	37-Pin BC19U Adapter RS422 Interface	37-Pin BC19W Adapter RS423 Interface
26	V35 Clock B	W					
27	V35 Receive data A	R					
28	V35 Receive data B	T					
29	V35 Transmit data A	P					
30	V35 Transmit data B	S					
31	V35 Receive clock A	V					
32	V35 Receive clock B	X					
33	Data terminal ready (DTR)	H		20			12
34	Data set ready (DSR) A	E		6	6	11	11
35	DSR B	DTE ground		DTE ground	DTE ground	29	29
36	RTS C	C		4			7

<sup>1</sup>These six columns list the pin name or number of each adapter cable to which the corresponding 50-pin connector pin attaches.

(continued on next page)

**Table C–3 (Cont.) DSW21 Synchronous Communications Port Pin-outs**

Pin Number	Signal Name	34-Pin BC19X Adapter V.35 Interface <sup>1</sup>	15-Pin BC20Q Adapter X.21 Interface	25-Pin BC19V Adapter V.24 Interface	25-Pin BC19Q Adapter EIA530 Interface	37-Pin BC19U Adapter RS422 Interface	37-Pin BC19W Adapter RS423 Interface
37	DCD/I A	F	5	8	8	13	13
38	DCD/I B	DTE ground	12	DTE ground	10	31	31
39	Clear to send (CTS) A	D		5	5	9	9
40	CTS B	DTE ground		DTE ground	13	27	27
41	DCE ground	DTE ground		DTE ground	23	20	20
42	Test 1 (checksum)						
43	Test 2 (static RAM)						
44	DTE ground	B	8	7	7	19,37	19,22,25,30,35,37
45	DTR A				20	12	
46	DTR B					30	
47	Clock A				24	17	
48	Clock B				11	35	
49	Test 3 (controller chip self-test)						
50	Speed selector			23		16	16

<sup>1</sup>These six columns list the pin name or number of each adapter cable to which the corresponding 50-pin connector pin attaches.

Figure C–1 shows the location of the synchronous communications port pins.



**H3199  
Multistandard  
Loopback  
Connector Pins**

The H3199 multistandard loopback connector is included with the DSW21 Synchronous Communications Adapter. Table C-4 shows how the H3199 is wired.

**Table C-4 H3199 Multistandard Loopback Connector Pinning**

<b>Pin Number</b>	<b>Signal Description</b>
1 - 5	Cable code (all grounded)
35, 41, 4	Grounds and receiver inputs
6 and 11	Data — channel A
7 and 12	Data — channel B
9 and 37	RTS/C and DCD/I — channel A
10 and 38	RTS/C and DCD/I — channel B
13 and 15	Local loop and test indicator
16 and 34	Remote loop and DSR — channel A
17 and 50	Speed select and ring indicator
47, 18, 20	Clock, Rx clock, Tx clock — channel A
48, 19, 21	Clock, Rx clock, Tx clock — channel B
45 and 39	DTR and CTS — channel A
46 and 40	DTR and CTS — channel B
33 and 14	DTR and Test 4
8 and 42	Data and Test 1
36 and 43	RTS and Test 2
29 and 27	V.35 data — channel A
30 and 28	V.35 data — channel B
25, 23, 31	V.35 clock — channel A
26, 24, 32	V.35 clock — channel B
22 and 49	Clock and Test 3



# D

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## Associated Documents

**Introduction**

This appendix lists the associated documentation for the VAXstation 4000 Model 60 and the VAXstation 4000 Model 90.

**Hardware Part Numbers**

For option and system hardware part numbers, consult your Digital sales representative.

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## Associated Documents

### Online Documents

Table D-1 lists the VAXstation 4000 online documents available on compact disc (Bookreader).

**Table D-1 VAXstation 4000 Bookreader Documents**

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**Titles**

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*VAXstation 4000 Model 90 Owner's and System Installation Guide*

*VAXstation 4000 Options Installation Guide*

*BA46 Storage Expansion Box Owner's Guide*

*VAXstation 4000 Model 60 Service Information*

*VAXstation 4000 Model 90 Service Information*

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### Printed Documents

Table D-2 lists the associated documents available in printed form.

**Table D-2 Associated Printed Documents**

---

<b>VAXstation 4000 Family</b>	<b>Order Numbers</b>
<i>VAXstation 4000 Model 60 Owner's and System Installation Guide</i>	EK-PMARI-OM
<i>VAXstation 4000 Model 60 to VAXstation 4000 Model 90 Upgrade Guide</i>	EK-VX690-UP
<i>BA46 Storage Expansion Box Owner's Guide</i>	EK-STEXP-IG
<i>Vertical Floor Stand Installation Guide</i>	EK-FLRST-IN
<i>VMS Factory Installed Software for VAXstation 4000 Workstations Questions and Answers for Users</i>	EK-VMSFI-RC

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**Service  
Documentation**

Table D–3 lists the service documentation available for the VAXstation 4000 family.

**Table D–3 Service Documentation**


---

VAXstation 4000 Documentation Kit	EK–V4666–DK
<i>VAXstation 4000 Model 90 Service Information</i>	EK–KA490–SV
<i>VAXstation 4000 Model 60 Service Information</i>	EK–V466H–SV
<i>VAXstation 4000 Model 60 Optional Devices Service Information</i>	EK–V4066–SV
<i>BA46 Expansion Service Information</i>	EK–VBA46–SV
<i>VAXstation 4000 Model 60 and VLC Condensed Service Information</i>	EK–V466H–PS

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**Device  
Documentation**

Table D–4 lists documentation for devices used in the VAXstation 4000 systems.

**Table D–4 Device Documentation**


---

<i>RRD42 Compact Disc Drive Owner's Manual</i>	EK–RRD42–OM
<i>RX26 Owner's Reference Card</i>	EK–RX26D–RC
<i>TZK10 Cartridge Tape Drive Owner's Guide</i>	EK–TZK10–OG
<i>TLZ06 Cartridge Tape Drive Owner's Guide</i>	EK–TLZ06–OM
<i>RZ Series Disk Drive Subsystem</i>	EK–RZXXD–PS

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## Associated Documents

### DECconnect Documentation

Table D-5 lists documentation available for DECconnect systems.

**Table D-5 DECconnect Documentation**

---

<i>DECconnect System General Description</i>	EK-DECSY-GD
<i>DECconnect System Requirements Evaluation Workbook</i>	EK-DECSY-EG
<i>DECconnect System Installation and Verification Guide</i>	EK-DECSY-VG
<i>DECconnect System Stand-alone ThinWire Networks: Planning and Installation Guide</i>	EK-DECSY-TG
<i>DECconnect System Planning and Configuration Guide</i>	EK-DECSY-CG
<i>OPEN DECconnect Building Wiring Components and Applications Catalog</i>	EC-I1834-29

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### SCSI Documentation

Table D-6 lists documentation available about the Small Computer System Interface (SCSI).

**Table D-6 SCSI Documentation**

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<i>Small Computer System Interface: An Overview</i>	EK-SCSIS-OV
<i>Small Computer System Interface: A Developer's Guide</i>	EK-SCSIS-SP

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### VMS Software Documentation

Table D-7 lists documentation available for VMS users.

**Table D-7 VMS Software Documentation**

---

Base Set	QA-09SAA-GZ
<i>VMS User's Manual</i>	
<i>VMS System Manager's Manual</i>	
<i>VMS License Management Utility Manual</i>	
VMS DECwindows User Kit (2 manuals)	

(continued on next page)

**Table D-7 (Cont.) VMS Software Documentation**


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General User Subkit	QA-001A1-GZ
General Information (3 manuals)	
Using VMS (6 manuals)	
Using DCL (2 manuals)	
DCL Dictionary (2 manuals)	
Processing Text (4 manuals)	
System Messages (2 manuals)	
System Management Subkit	QA-001A2-GZ
Setup (10 manuals)	
Maintenance (6 manuals)	
Security (4 manuals)	
Performance (4 manuals)	
Networking (4 manuals)	
Programming Subkit	QA-001A3-GZ
Introduction (3 manuals)	
Programming Utilities (7 manuals)	
System Routines (2 manuals)	
System Services (2 manuals)	
Run-Time Library (8 manuals)	
File System (6 manuals)	
System Programming (4 manuals)	
Device Support (2 manuals)	
VAX MACRO	
VAX TPU (2 manuals)	
<i>VMS Upgrade and Installation Supplement: VAXstation 3100, 4000, and MicroVAX 3100 Series</i>	AA-NY74C-TE

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# E

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## VAXstation 4000 Options Installation Guide Errata Sheet

### Important Facts

This errata sheet contains important information on the following topics:

- SCSI IDs for devices on the TURBOchannel PMAZ option
- Booting from a TURBOchannel device
- The SHOW CONFIG command and TURBOchannel devices
- Switch setting for LCSPX and SPXg refresh rates
- TURBOchannel support on the Model 60 and Model 90
- Video connector RFI gasket installation
- SPXgt graphics module removal

### TURBOchannel PMAZ

Use SCSI ID 0, 1, 2, 3, 4 or 5 for your devices on the TURBOchannel PMAZ option; do not use SCSI ID 6 or 7. On the VMS operating system, SCSI ID 6 is reserved for the controller, and on the UNIX operating system, where the PMAZ option originates, SCSI ID 7 is reserved for the controller.

### Booting from a TURBOchannel Device

The VAXstation 4000 Models 60 and 90 do not support booting from a TURBOchannel device.

### SHOW CONFIG Command

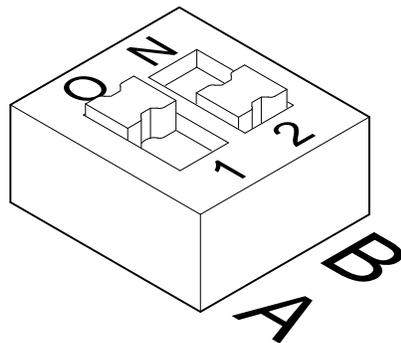
When you enter the SHOW CONFIG command in console mode, it displays the TURBOchannel adapter in your system, but does not display devices on the TURBOchannel. To display the TURBOchannel devices, you must run the MIPS emulator, as described in Appendix A of the *VAXstation 4000 Options Installation Guide* (EK-VAXOP-IN. A01).

### LCSPX and SPXg Refresh Rates

If you need to change the refresh rate for the LCSPX or the SPXg graphics board, see Figure E-1 and follow these steps:

- LCSPX
1. Set switch 1 toward the ON marker on the switch pack for a 72-Hz refresh rate.
  2. Set switch 1 away from the ON marker on the switch pack for a 66-Hz refresh rate.
- Switch 2 can be in either position (inactive).
- SPXg
1. Set switch 2 toward the ON marker on the switch pack for a 72-Hz refresh rate.
  2. Set switch 2 away from the ON marker on the switch pack for a 66-Hz refresh rate.
- Switch 1 can be in either position (inactive).

Figure E-1 Setting the Refresh Rate



MLO-008738

### TURBOchannel Support

The VAXstation 4000 Model 90 fully supports both programmable I/O (such as Ethernet and SCSI) and DMA (such as FDDI) devices on the TURBOchannel Adapter.

The VAXstation 4000 Model 60 supports only programmable I/O devices (not DMA devices).

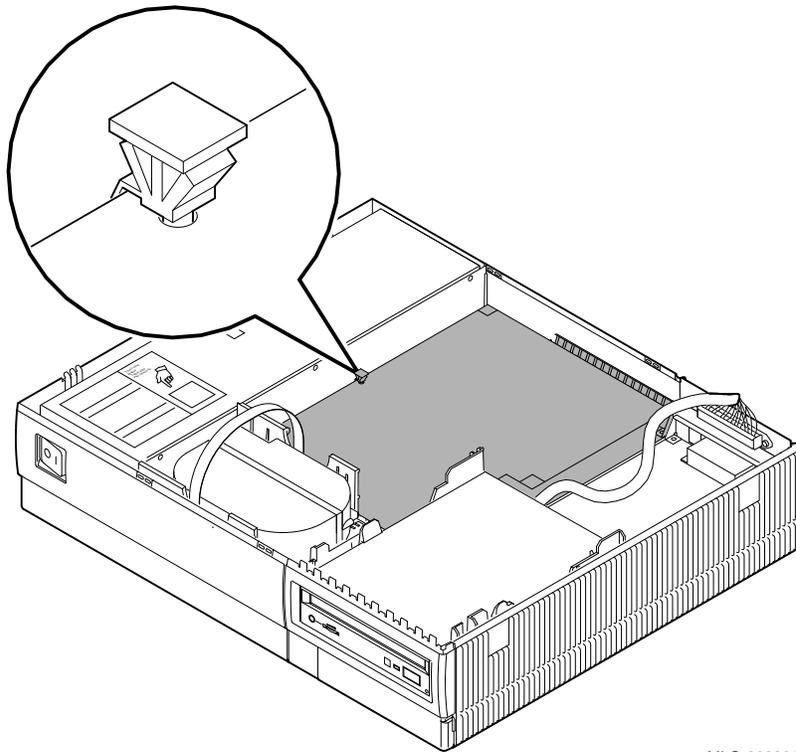
### Video Connector RFI Gasket

When you install a graphics module, be sure that the RFI gasket is flush against the video connector. Your graphics module may *appear* to be installed correctly, but if the RFI gasket is not flush with the video connector, it will not meet FCC regulations.

**SPXgt Graphics  
Module**

If your system has the plastic standoff shown in Figure E-2, use it as a pulling device when you lift the SPXgt frame buffer from the center connector to avoid damage caused by pulling up on the tail bracket.

**Figure E-2 Location of Plastic Standoff on the SPXgt Graphics Module**



MLO-009801



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# Glossary

**alternate console feature**

A feature that allows you to receive system messages on and direct system activities from an alternate terminal, if necessary, to diagnose problems with the monitor.

**ANSI**

American National Standards Institute.

**applications**

Programs, such as a financial spreadsheet program, that perform end-user tasks.

**architecture**

The internal configuration of a computer including its registers, instruction set, and input/output structure.

**backup**

A copy of files or software made for safekeeping. Also, the process of making copies of the data stored on your disk so that you can recover that data after an accidental loss. You make backup copies on tape cartridges, or over a network using the Remote System Manager.

**baud rate**

The speed at which signals are serially transmitted along a communications line. One baud equals 1 bit per second.

**bezel**

The removable molded panel on the front and back of the system unit. Certain bezels shipped with particular devices, such as the TZK10 or RRD42 drives, are designed to provide access to the front of the device after it is installed.

**bit**

A binary digit; the smallest unit of information in a binary system of notation, designated as a 0 or a 1.

**boot**

To bring a device or system to a defined state where it can operate on its own.

**boot device**

The device on which the operating system software is loaded.

**boot flag**

A setting that determines from where the system will boot. Default boot flags should already be set when you receive your system.

**bus**

A cable along which communication signals in a computer system travel.

**byte**

A group of 8 binary digits (bits). A byte is one-quarter of a VAX system word. See also **kilobyte** and **megabyte**.

**cable**

A sheathed group of electrical conductors.

**caddy**

The holder for an RRD42 compact disc.

**CD**

See **compact disc**.

**client**

A piece of hardware or software that obtains a specific set of services from a server.

**cluster**

A group of networked computers that share disk storage, application programs, and other computer resources. Also called a VAXcluster.

**command**

A request you make to the operating system to perform a specific function, for example, a request to run a program or show the configuration of a system.

**communication**

The flow of information from one point (the source) to another (the receiver).

**compact disc**

A flat circular plate on which read-only optical data is stored. A laser optical reader retrieves this information.

**component**

A basic part, or element, of your system that can be either internal or external. Compare to **device**.

**configuration**

See **system configuration**.

**connector**

Hardware that connects directly to a port on the system.

**console**

A device through which an operator communicates with the computer.

**console commands**

Commands input when the system is in console mode.

**console mode**

The state in which the computer is controlled directly by user commands from the console terminal rather than indirectly through the operating system. Put your system in console mode by pressing the halt button on the front of the system unit. Console mode is indicated by the console prompt (>>>) on the monitor screen. Compare to **program mode**.

**console prompt**

The prompt (>>>) that appears on the screen when the system is in console mode.

**controller**

A system component, usually a printed circuit board, that regulates the operation of one or more devices.

**cursor**

A blinking symbol on the screen that indicates where the next character you type will appear.

**data**

A formal representation of information suitable for communication, interpretation, and processing by computers.

**database**

A collection of interrelated data on one or more mass storage devices. The collection is organized to facilitate efficient and accurate inquiry and update.

**DECconnect**

Digital's simple, cost-effective cabling system for extending Ethernet and terminal interconnections into offices and work areas.

**DECnet network**

Digital networking software that runs on nodes in both **local** and **wide area networks**.

**DECwindows**

An interface to the VMS operating system that allows a workstation screen to be divided into windows where several application programs can appear simultaneously and commands can be executed using menus and a mouse. See also **window**.

**default**

A value or setting that is in effect unless another value or setting is specified.

**default recovery action**

The action that the system takes after a power or system failure.

**device**

The general name for any hardware unit connected to the system and capable of receiving, storing, or transmitting data. Examples of devices are drives and units that you can install into the system unit or an expansion box.

**device name**

The name by which a device or controller is identified in the system.

**diagnostics**

Programs, located in read-only memory, that detect and identify abnormal system hardware operation.

**disc**

See **compact disc**.

**disk**

A flat circular plate with a coating on which data is magnetically stored in concentric circles (tracks). A fixed disk resides permanently inside a disk drive, whereas a diskette is removable.

**disk drive**

A device that holds one or more disks. The drive contains mechanical components that spin the disks and move the read and write heads that store and read the information on the surface of the disks.

**diskette**

A flexible disk contained in a square jacket. Diskettes can be inserted and removed from diskette drives.

**diskette drive**

A disk drive that reads from or writes to a removable diskette. The VAXstation 4000 uses the RX26 diskette drive.

**diskless system**

A system that has no storage capacity of its own.

**DISMOUNT**

A command that closes a mounted disk or magnetic tape volume for further processing and deassigns the logical name associated with the device.

**distributed application**

An application in which part of the application functions are distributed to other systems over the network for processing. This distribution provides more efficient use of system resources.

**drive leader**

A plastic leader inside a tape drive. The cartridge leader on the magnetic tape and the drive leader on the tape drive come together. The drive leader draws the magnetic tape out of the tape cartridge and onto a take-up reel inside the drive. As the tape is wound onto the take-up reel, it passes the magnetic read and write heads.

**error line**

A line of information that appears if a self-test or a power-up test fails. The following information appears on the error line:

- Field replaceable unit (FRU) number
- Component number
- Component mnemonic
- Error message number

For example:

```
001 9 NI 172
```

**error message number**

A number that appears on the error line representing a particular system or component problem.

**Ethernet**

A type of local area network based on Carrier Sense Multiple Access with Collision Detection (CSMA/CD); a communications concept for local communication networks that use coaxial cable.

**Ethernet hardware address**

The unique Ethernet physical address associated with a particular Ethernet communications controller.

**Ethernet subsystem**

Refers to the Ethernet controller chip built into the system board.

**expansion box**

A box that holds additional system devices.

**faceplate**

A wall receptacle that provides a single network connection for your workstation.

**fatal error**

An error from which a process cannot recover. Fatal errors are either those that cause the CPU to stop, or disk write errors other than those caused by the disk drive being powered down or write-locked.

**field replaceable unit (FRU)**

A part of the system that can be replaced by your Digital service representative.

**file**

A collection of related information treated by the system as a unit.

**firmware**

Software that is stored in a fixed way (wired in), usually in read-only memory.

**fixed disk**

A disk that resides permanently inside a disk drive. Compare to **diskette**.

**fixed disk drive**

The disk drive that holds and reads from or writes to a fixed disk.

**gigabyte (GB)**

The measure used to refer to memory or secondary storage capacity, equal to 1,000 megabytes or 1,048,576,000 bytes.

**ground**

A large conducting body used as a common return for an electric circuit and as an arbitrary zero voltage of potential.

**hardware**

The physical equipment—mechanical and electrical—that makes up a system. Compare to **software**.

**housing**

The plastic case in which a compact disc sits. See also **caddy**.

**icon**

A symbol on the back or front of the system unit that identifies a port to which a cable or power cord can be connected.

**input/output (I/O) device**

A piece of equipment that transmits data to (input) and from (output) the system. For example, a terminal or a mouse. See **mouse**.

**interface**

An electronic circuit board that links an external device to a computer. Also, a device or piece of software that allows a user to communicate with the system or allows the components of the system to communicate with each other.

**kilobyte (KB)**

The measure use to refer to memory or secondary storage capacity, equal to 1,024 bytes.

**local**

In close proximity to the computer. Compare to **remote**.

**local area network (LAN)**

A high-speed communications network that covers a limited geographical area, such as a section of a building, an entire building, or a cluster of buildings. It is a privately owned communication network whose speed is upward of one megabit per second.

**local console mode**

A device that allows you to interact directly with the system without requiring the password security feature. Compare to **privileged console mode**.

**local device**

A disk drive, tape drive, or other device that is only available to the computer to which it is connected.

**log in**

The means of identifying yourself to the operating system. When you log in, you type an account name and password. If the name and password match an account on the system, you are allowed access to that account.

**loopback connector**

An Ethernet or communications connector used on the back of the system unit when testing the Ethernet subsystem or the synchronous COMM adapter.

**magnetic tape**

A tape, made of plastic and coated with magnetic oxide, that is used to store data. Also called magtape.

**media**

The physical material on which data is recorded, for example, magnetic disks, diskettes, and compact discs.

**megabyte (MB)**

A unit of measure equal to 1,000 kilobytes or 1,048,576 bytes.

**memory**

The area of the system that electrically stores instructions and data, often temporarily.

**mnemonic**

The abbreviation used by the system to identify a device or controller in the system.

**modem**

A device that converts computer signals to signals that can be sent over a telephone line.

**module**

A printed circuit board that contains electrical components and electrically conductive pathways between components. A module stores data or memory or controls the functions of a device.

**monitor**

A video device that displays data.

**mouse**

A hand-held input device that is moved across the desktop to move the pointer or cursor on the monitor screen and to select menu options and draw graphics. The mouse is palm-sized and contains three buttons (function keys).

**network**

Two or more computers linked by communication lines to share information and resources.

**network coordinator**

The person who manages the network, assigns unique node names and addresses for each system on the network, and provides administrative assistance to network users.

**node**

A computer, workstation, or peripheral device that is connected to a network and that can communicate with other members of the network.

**node name**

A name that identifies a unique node.

**nonvolatile memory**

Memory in which values are stored even when the system is turned off.

**online documentation**

Documents that can be read directly on your monitor screen. Online documentation is stored on a compact disc and includes all text and illustrations found in the printed manuals. Fast access time and cross-referencing are two advantages of online documentation.

**operating system**

An integrated collection of programs that controls the operation of the system and allows users access to data files, input/output devices, and application programs.

**parity**

A method of checking whether binary numbers or characters have been transmitted correctly by counting the 1 bits.

**password**

A unique string of characters or numbers, or both that identifies you to the computer.

**password security feature**

The feature that restricts access to certain console commands. To use all console commands, users must enter a password.

**peripheral device**

A device that provides the central processing unit (CPU) with additional memory storage or communication capability. Examples are disk and diskette drives, video terminals, and printers.

**pointing device**

A terminal input device that allows you to make a selection from a menu or to draw graphics. See **mouse** and **tablet**.

**port**

A socket on the front or back of the computer to which a terminal, printer, modem or other device is connected.

**power-up**

A series of ordered events that occur when you supply power by turning on the system.

**privileged console commands**

The commands allowed by the password security feature. See **password security feature**.

**privileged console mode**

The state the system is in when the password security feature is enabled. See **password security feature**.

**process**

A program currently using memory and running on the system.

**program**

The sequence of instructions the system uses to perform a task. See **software**.

**program mode**

The state in which the computer is controlled by the operating system. After the operating system is installed, the system always operates in program mode, unless you put it into console mode. Compare to **console mode**.

**prompt**

A symbol displayed by a program or an operating system, indicating that you are to provide input.

**puck**

A palm-sized device that slides on a tablet's surface. The puck and tablet together function as a pointing device. See **pointing device** and **tablet**.

**random access memory (RAM)**

Memory that can be both read from and written to and that can randomly access any one location during normal operations. The type of memory the system uses to store the instructions of programs currently being run.

**read-only memory (ROM)**

Memory that cannot be modified. The system can use (read) the data contained in ROM but cannot change it.

**register**

A storage location in hardware logic other than main memory.

**remote**

Physically distant from a computer, but linked to a computer by communication lines. Compare to **local**.

**removable media device**

A device such as the RRD42, TZK10, or RX26 drives from which the storage medium is removable.

**ROM**

See **read-only memory (ROM)**.

**satellite**

A node that is booted remotely from the system disk on the boot node. Also, a computer system that obtains a specific set of services from a server system.

**SCSI**

See **Small Computer System Interface**.

**SCSI bus**

A communications pathway between the Small Computer System Interface (SCSI) and up to seven disks and other peripheral devices.

**section**

A single length of ThinWire Ethernet cable terminated at each end with a connector.

**segment**

A length of ThinWire Ethernet cable made up of one or more cable sections connected with barrel connectors or T-connectors.

**serial port**

A port dedicated to hookups with serial line devices such as a terminal or printer. Serial devices transmit data one word after another (serially) along a single pair of lines from a sending device to a receiving device.

**server**

Hardware or software that provides a specific set of services to a satellite or client.

**Small Computer System Interface (SCSI)**

An interface designed for connecting disks and other peripheral devices to computer systems. SCSI, pronounced “skuh-zee,” is defined by an ANSI standard and is used by many computer and peripheral vendors throughout the industry.

**software**

Instructions executed by the system to perform a chosen or required function. Compare to **hardware**.

**standalone network**

A network that starts and operates alone, without being connected to another network.

**standalone workstation**

A workstation that starts and operates alone without being connected to another computer.

**standard Ethernet network**

An Ethernet network connected with standard Ethernet cable. (Also known as ThickWire Ethernet). Compare to **ThinWire Ethernet network**.

**storage device**

A device, such as a diskette or tape, capable of recording information.

**strain relief strap**

See **universal strain relief strap**.

**stylus**

A penlike device that draws on the surface of a tablet and functions as a pointing device.

**synchronous communication**

Communication through a synchronous serial interface, also referred to as the COMM board. This option allows you to connect your system in one of two ways:

- Through a modem to a Wide Area Network (WAN)
- Directly to another system through a null modem; that is, a connection box that replaces two modems and their connecting wires. This allows two devices that are designed to interact through modems to be locally connected.

**system**

A combination of hardware, software, and peripheral devices that together perform specific processing operations.

**system configuration**

The combination of hardware and software that makes up a usable computer system.

**system disk**

The disk that stores the operating system and that starts the system and allows it to run properly.

**system unit**

The part of the system that contains the drives, memory, power supply and the computer itself.

**tablet**

An absolute-positioning input device composed of a flat-surfaced digitizing tablet and a puck or stylus. The tablet is a drawing surface. The puck and stylus are pointing devices that move the cursor on the monitor screen, draw graphics, and make selections from the menu.

**tape cartridge**

Housing for magnetic tape. The cartridge contains a reel of tape and a take-up reel. A cartridge is similar to a cassette, but of slightly different design.

**tape drive**

A device that contains mechanical components and holds, turns, reads, and writes on magnetic tape.

**T-connector**

A connector used to join ThinWire Ethernet cable sections.

**terminal**

A device for entering information into a computer system and displaying it on a screen. A typewriter-like keyboard, mouse, tablet or other pointing devices are used to enter information.

**terminator**

A connector used on one or both ends of an Ethernet segment that provides the 50-ohm termination resistance needed for the cable. A terminator is also used on both sides of a T-connector and on the SCSI port.

**ThinWire Ethernet network**

A Digital trademark used to describe its 10base2 (IEEE standard 802.3 compliant) Ethernet products used for local distribution of data.

**timesharing**

A system in which two or more programs are allotted, in turn, equal time or use of a computer or computer device.

**universal strain relief strap**

A plastic strap used when connecting the monitor video cable to the back of the monitor. The strap prevents the weight of the cable junction box from pulling the cables out of the BNC connectors.

**user interface**

The style of interaction between the computer and the user of that computer.

**VAXcluster configuration**

A group of two or more computers connected by an Ethernet cable. In a VAXcluster, one computer (the server) serves the other computers. The server is required to start the other computers, and it manages the resources that they share.

**VMS device name**

The name that the VMS operating system uses for a storage device to access that particular device.

**VMS operating system**

Digital Equipment Corporation's proprietary operating system.

**volatile memory**

Memory from which values are lost when the system is turned off.

**wide-area network**

A public or private data communications system in which transmissions are carried primarily over telephone lines.

**window**

An area on your monitor screen in which you can start, run, and view a separate process. Windowing capability is supported by both VMS and ULTRIX workstation software.

**work group**

Several workstations, connected together on a network, that perform similar tasks and share information or databases.

**workstation**

A single-user system that offers high-performance, high-resolution graphics, and can function in a network environment.

**write-protect switch**

The switch that you set on a tape cartridge or an RX26 diskette to prevent loss of data by accidental overwriting.



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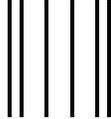
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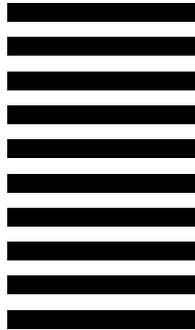
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