

VAXstation 3100 Model 76

Owner's Guide

digital equipment corporation
maynard, massachusetts

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About This Guide

Purpose of This Manual

This manual describes how to install, test, and maintain the hardware components of a VAXstation 3100 Model 76 system. This manual also includes information on how to configure and connect a Model 76 system to an Ethernet network.

Who Should Use This Manual

This manual is for anyone setting up and using the VAXstation 3100 Model 76 workstation for the first time. This manual is also for anyone installing new devices inside the workstation system unit.

Structure of This Manual

This manual contains nine chapters, six appendixes, a glossary of technical terms, and an index.

- Chapter 1 introduces you to the VAXstation 3100 Model 76 system.
- Chapter 2 shows how to install your VAXstation 3100 Model 76.
- Chapter 3 discusses how to use your VAXstation 3100 Model 76 and the RX23 diskette drive.
- Chapter 4 describes how to add and use expansion boxes for your system.

- Chapter 5 tells you how to connect your system to a simple ThinWire daisy-chain network, as well as to a standard Ethernet Network.
- Chapter 6 provides basic troubleshooting information.
- Chapter 7 provides instructions for running diagnostic tests.
- Chapter 8 lists the options available for your system. It also shows how to connect a printer or modem to your system.
- Chapter 9 tells you how to add optional devices inside your system unit.
- Appendix A tells you how to set your startup procedures, including how to reboot your system and change the default recovery action.
- Appendix B gives information about setting SCSI IDs for devices inside the workstation system unit and for devices in expansion boxes.
- Appendix C gives information about status and error codes resulting from diagnostic testing.
- Appendix D provides hardware specifications for system components.
- Appendix E lists additional documents to help you get acquainted with your new system.
- The Glossary explains technical terms used in the manual.
- The Index refers you to specific topics covered in the manual.

Guide to VAXstation 3100 Model 76 Documentation



The following table lists some of the manuals you may use in addition to this one to install and operate your VAXstation 3100 Model 76 system. The manuals you receive with your equipment may differ, depending on your hardware and software. See also Appendix E, Related Documents.

Manual	Topics
Monitor Installation/Owner's Guide	Connecting a monitor to your system unit Adjusting monitor screen brightness and contrast
VMS Installation Guide	Installing VMS operating system software Backing up files

Manual	Topics
VMS Installation Guide	Installing VMS system software Using VMS software Backing up files
DECwindows User's Guide	Using DECwindows, an optional software interface layered on VMS Using the mouse Manipulating windows Creating and using files
Application Installation Guides	Installing software applications
RA42 Storage Expansion Box Guides	Installing and using expansion boxes

Ordering Additional Copies

You can order additional copies of this documentation set from DECdirect as described in the ordering information section at the end of this document. The order numbers for the various available combinations of VAXstation 3100 Model 76 documents are as follows:

Table 1 VAXstation 3100 Model 76 Documentation Kits

Kit Number	Contents
EK-VXS1A-KT	Owner's Guide/Upgrade Guide
EK-VXS1B-KT	Owner's Guide
EK-VXS1C-KT	Upgrade Guide

Conventions

The following conventions are used in this manual:

Ctrl/x

A sequence such as **Ctrl/x** indicates that you must hold down the key labeled Ctrl while you press another key or a pointing device button.

Return

A name enclosed in a box in interactive examples indicates a key you press on the keyboard.

red ink

Red in interactive examples indicates information you must enter from the keyboard. In the online version of the book, this user input is bold type.

bold	Bold type is used to introduce new terms. New terms are defined in the Glossary.
RZxx	RZxx refers to any of the RZ-series hard disk drives.
UPPERCASE	Uppercase letters indicate that you must enter a command exactly as shown. For example, enter SHOW.
lowercase	Lowercase letters in commands indicate that you must provide a value. For example, enter SET PASSWORD new_password.
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.
Note	Notes provide general information about the current topic.

Icon Descriptions

Throughout this manual, icons (symbols) identify important switches, buttons, and procedures. These icons are briefly described here. Figure 2-3 shows the locations on the system unit for many of the ports, switches, and buttons.

Icons That Signal Procedures

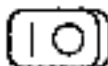
Certain icons act as reminders about important procedures that are being described in the text.



This icon signals that you must open another guide (for instance, the monitor guide) for more complete instructions on a certain procedure. Then you return to the procedures in this manual.



This representation of an on/off switch shows the off (O) position. This icon signals that you should turn off one or more devices, as described in the text.



The on/off switch is shown in the on (I) position. This icon signals that you should turn on one or more devices, as described in the text.

Icons for Ports and Buttons

Some icons appear on the back of the system unit itself to identify ports and buttons. In text, the icon for a port indicates that you connect a cable to that port. The icon for a button indicates that you press that button. See Figures 2-3 for icon locations on the system unit.



The SCSI icon signals that you attach a cable or terminator to the SCSI port. See Chapter 4 for instructions.



The Ethernet icon signals a procedure involving one of the Ethernet connectors or the network button. See Chapters 2 and 6 for instructions.



The halt icon signals that you press the halt button to put the system into console mode. See Chapter 7 for instructions.



The keyboard icon identifies the port into which you insert the keyboard cable. See Chapter 2 for instructions.



The mouse icon identifies the port into which you insert the mouse cable (or the tablet cable). See Chapter 2 for instructions.



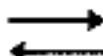
This icon appears on the cable for the mouse (or tablet). You insert this cable into the port labeled with the mouse icon. See Chapter 2 for instructions.



The monitor icon identifies the port into which you insert the monitor cable. See Chapter 2 for instructions.



The printer icon identifies the port for the printer cable. See Chapter 8. This port also supports a hardcopy terminal or an additional video terminal as an alternate console. See Appendix A.



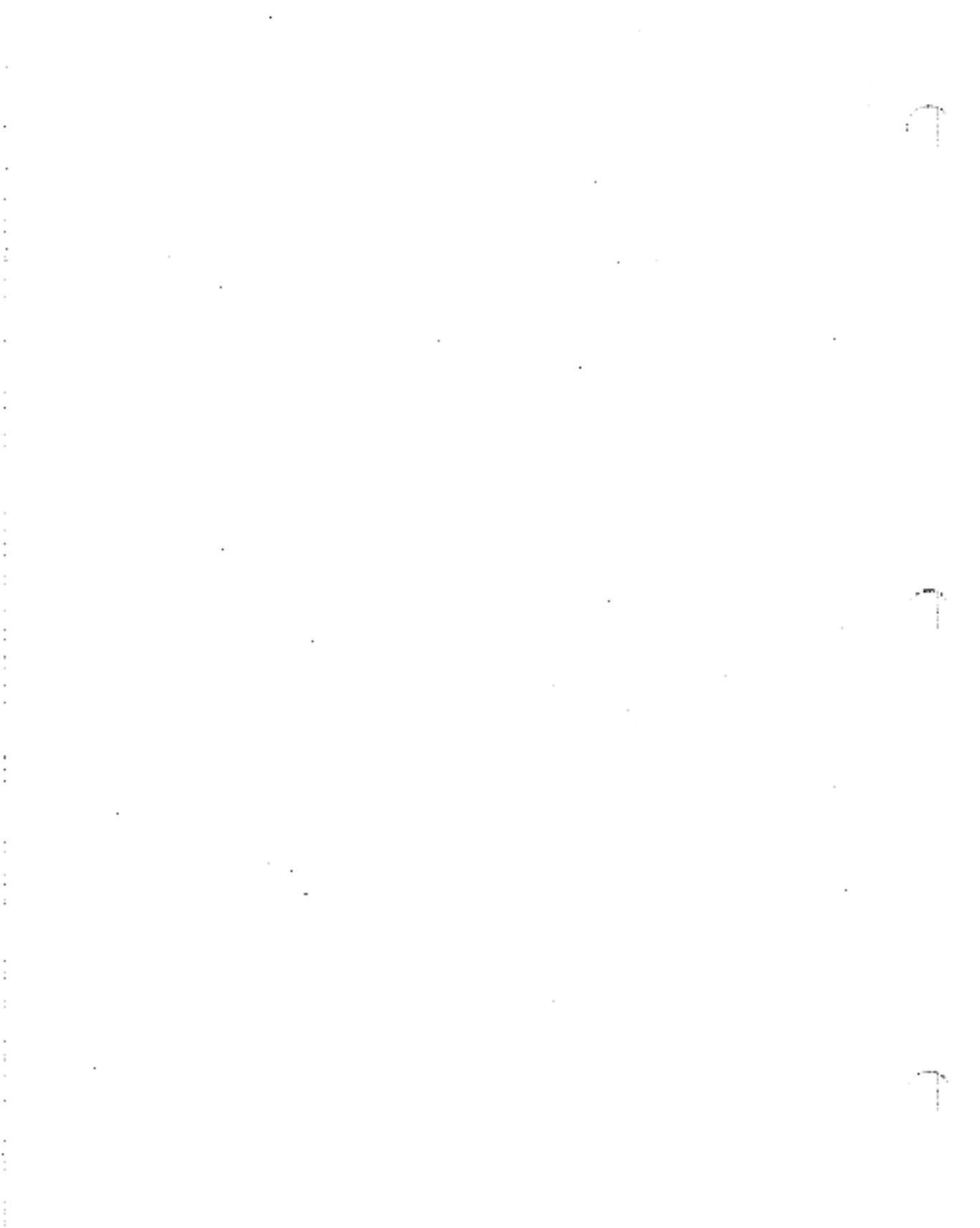
This icon identifies the communications port. If you purchase a modem, you insert the modem cable into this port. See Chapter 8.



This icon identifies the alternate console switch. See Appendix A gives instructions installing and using an alternate console.



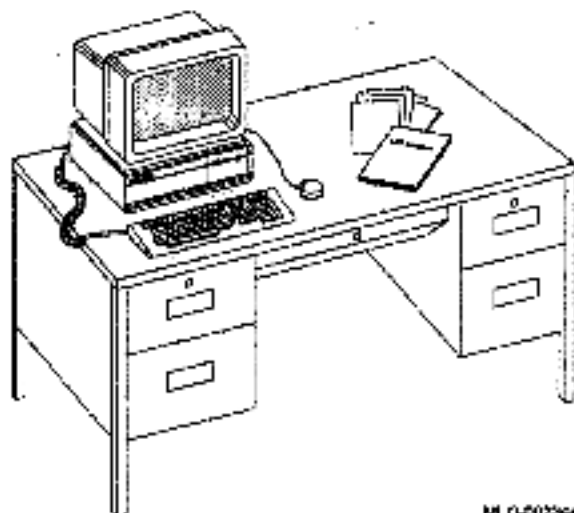
This icon identifies the row of diagnostic lights on the back of the system unit.



Your VAXstation 3100 Model 76

This chapter describes some of the features of the VAXstation 3100 Model 76 system (Figure 1-1).

Figure 1-1 VAXstation 3100 Model 76 System



MLD-002904

The VAXstation 3100 Model 76 system is a low-cost desktop **system** that offers all the advantages of Digital Equipment Corporation's VAX architecture. The VAXstation 3100 Model 76 system provides an integrated computing environment that offers desktop VAX computing, industry-standard personal productivity tools, and **transparent access to distributed applications and resources.**

The VAXstation 3100 Model 76 system does the following:

- Provides 8 VUPS of processing power on a Rigel-based **central processing unit (CPU)**.
- Provides an integrated computing environment that offers the best of **timesharing** and local or distributed applications.
- Is contained in a compact, four-piece desktop package that takes up a minimal amount of space.
- Supports up to 32 **megabytes of memory**.
- Supports the VWS/UIS or the **DECwindows user interface**.

The DECwindows interface is based on the **X Window System** industry standard. This means that all applications written for the VAXstation 3100 environment provide a consistent style of interaction, thus reducing both learning time and errors.

- Is equipped with both standard Ethernet and ThinWire Ethernet **ports** for connection to a **DECnet network**.
- Provides a **password security** feature for securing your system in **console mode**. See Section 7.11 for more information on this feature.

The Model 76 **diskless satellite workstation** is the basic system. With it you can work in a small group or be connected to a network. You can configure it with a **paging and swap disk** or with an **RX23 diskette drive**, which uses 1.4-megabyte **diskettes**.

Installing System Hardware

This chapter describes the following steps involved in installing the Model 76 system hardware:

- Choosing the right location (Section 2.1)
- Unpacking your system (Section 2.2)
- Setting up your system (Section 2.3)
- Starting your system (Section 2.4)
- Setting the keyboard language (Section 2.5)
- What to do next (Section 2.6)
- Installing your operating system (Section 2.7)
- Turning your system off (Section 2.8)

If you have ordered optional **devices** to install inside the system unit, it is important for you to set up your new system and become familiar with its operation before adding any internal device. Chapter 8 describes available options and Chapter 9 tells how to add optional devices inside the system unit.

2.1 Choosing the Right Location

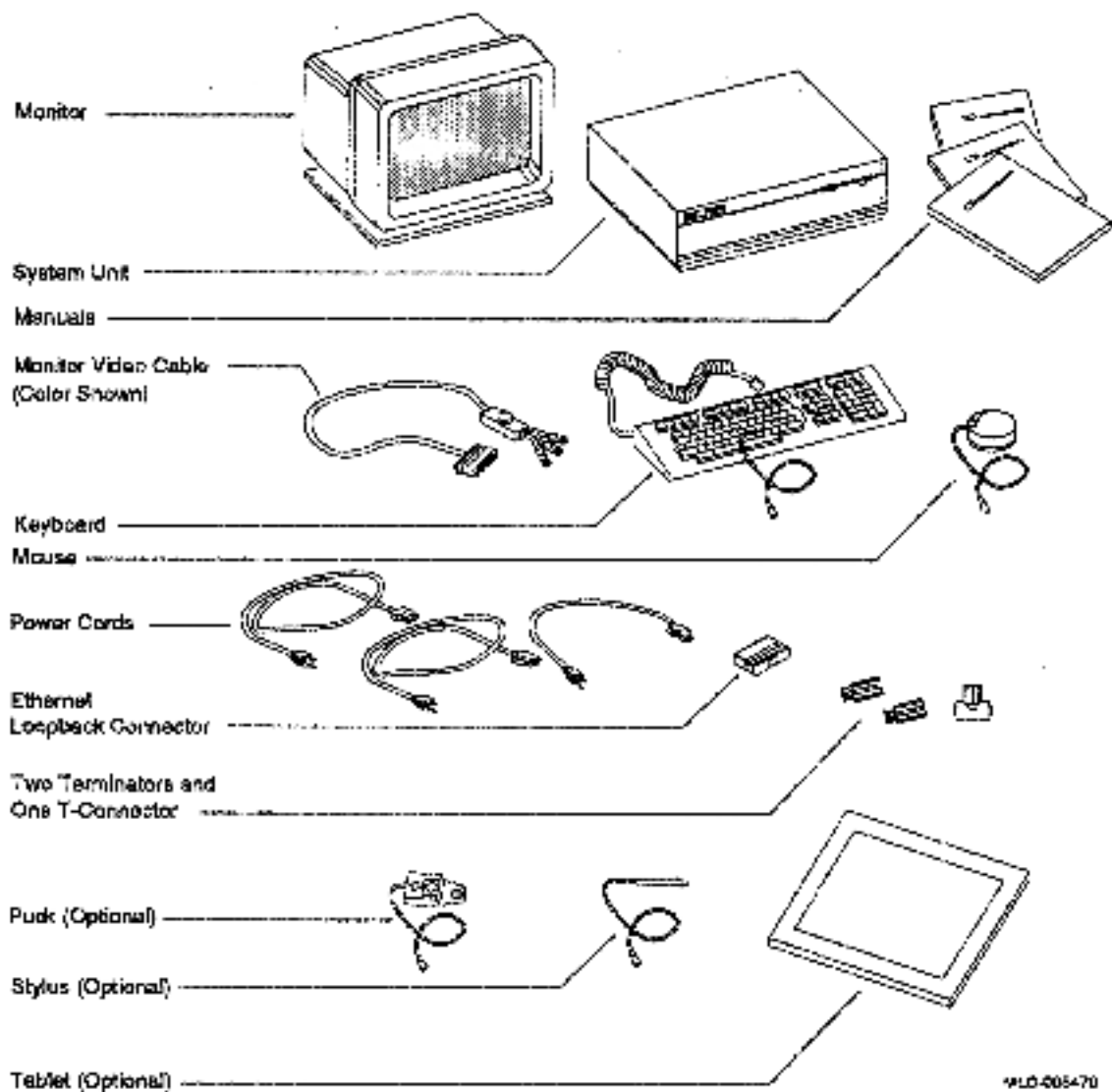
Use the following checklist to ensure that your VAXstation 3100 Model 76 operates at its best:

- Keep the temperature between 10°C and 40°C (50°F and 104°F) and the relative humidity between 10% and 90%.
- Keep the air well circulated to prevent the accumulation of excess heat and dust.
- Keep your equipment away from heaters, photocopiers, direct sunlight, and abrasive particles.
- Select a surface that is large enough to hold a system unit with a monitor, a keyboard, and a mouse or tablet. Your desk or work table is a good choice. It is important that your system unit be positioned at least 3 feet away from other operating equipment.
- Place the monitor so that the top line of the monitor display is at eye level.
- To eliminate screen glare, choose a place where bright light will not reflect off the monitor.
- Keep the area clean. Do not place food or liquid on or near your equipment, and do not place your system unit directly on the floor. Dust and dirt damage system components.
- Keep air vents clear on each side of the system unit for proper ventilation.
- Do not place the system unit on its side. Blocking the air vents can cause the system unit to overheat.
- Connect your computer system to an isolated grounded circuit.
- Let the equipment stabilize to room temperature before you turn it on.
- Carefully read all installation instructions before you turn on the power.

2.2 Unpacking Your System

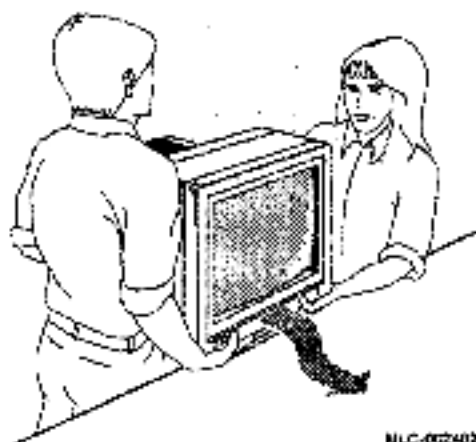
Unpack your system unit and monitor box. Figure 2-1 shows the basic components of your system. The contents of your shipment may differ from those shown in Figure 2-1, depending on what you have ordered.

Figure 2-1 Unpacking



Warning *The system unit and the monitor are heavy. Two people should lift the equipment out of the boxes and place it on a work surface (Figure 2-2).*

Figure 2-2 Lifting Equipment



NLC-002402

Check whether your system unit is labeled color or monochrome. Use the color or monochrome monitor video cable that comes with your system unit to connect your monitor to the system unit. See Section 2.3.5.

Your system is identified on the back of the system unit with a label. For example, "Model: WS48A-xx" denotes a Model 76 system, the xx identifying the contents of the system unit.

Save cartons and packing material. Always repack your equipment in its original packing material when you move it.

2.3 Setting Up Your System

You are now ready to begin setting up your system.

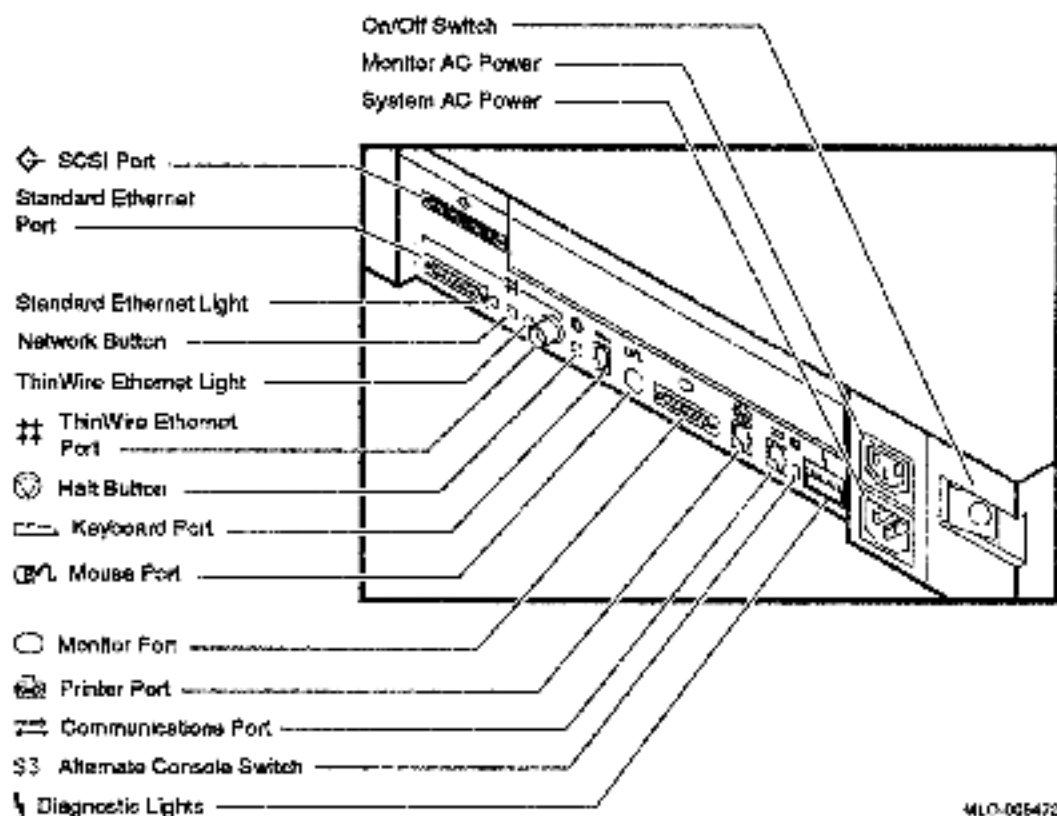
Note *Digital recommends that you not add optional devices until you have successfully installed and started up your VAXstation 3100 system. Refer to Chapter 9 for information on adding optional devices inside your system unit.*

2.3.1 Identifying System Unit Ports

Turn the system unit so that the back faces you. Take a minute to look at all the ports shown in Figure 2-3. Symbols (called **device icons**) molded on the bezel identify each port you will need to install your system. The icons are defined in About This Guide. The appropriate icon appears in the margin of this manual whenever you need to connect or disconnect a cable from one of these ports, or when you need to operate a button.

If you have a storage device in your system, there will be a **SCSI (Small Computer System Interface)** port with a cover on the back of your system unit. Chapter 4 tells you how to remove this cover to connect an expansion box to your system.

Figure 2-3 System Unit Ports and Icons

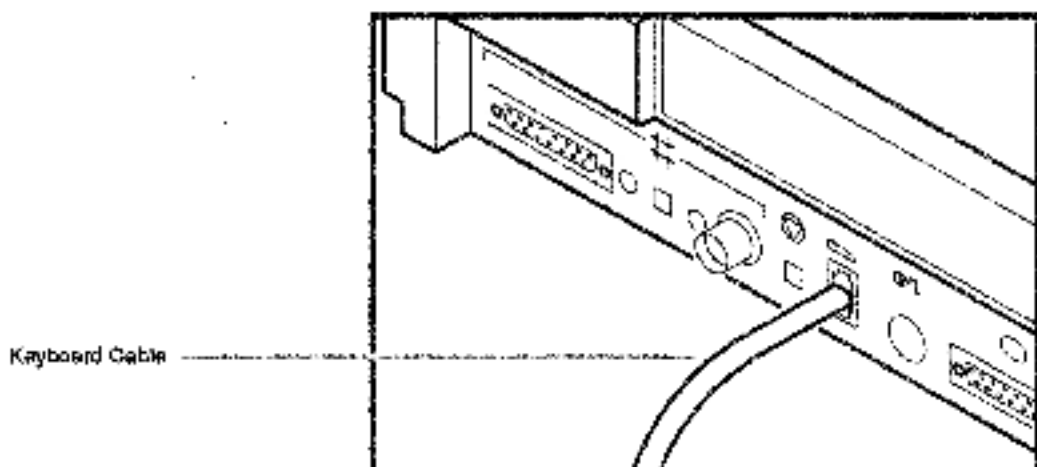


2.3.2 Connecting the Keyboard

Connect the free end of the keyboard cable to the keyboard port on the back of the system unit, as shown in Figure 2-4.

Caution Do not connect or disconnect the keyboard while the system is turned on.

Figure 2-4 Connecting the Keyboard to the System Unit



2.3.3 Connecting the Mouse

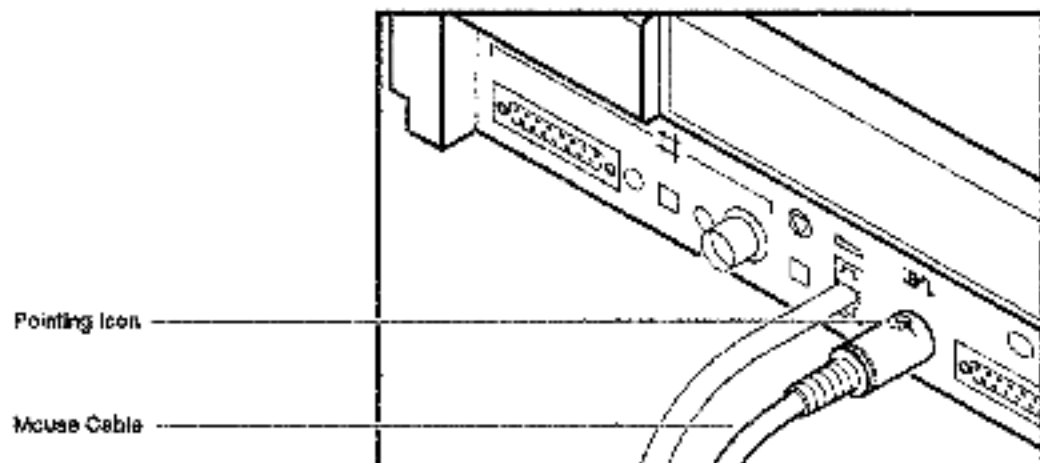


Find the mouse cable's device icon, as shown in Figure 2-5.

Connect the free end of the mouse cable, with the pointing icon on top, to the mouse port on the back of the system unit, as shown in Figure 2-5. If you have a tablet, connect it to the system unit in the same manner described for connecting a mouse.

Caution *Do not connect or disconnect the mouse while the system is turned on.*

Figure 2-5 Connecting the Mouse to the System Unit



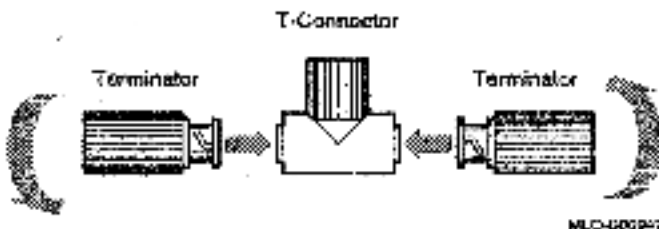
WLD-002548

2.3.4 Attaching Ethernet Terminators

Before you can complete the **power-up** test, discussed later in this chapter, you must first connect the **T-connector**, with two **Ethernet** terminators, and the **loopback** connector to the system unit:

- 1 Push an Ethernet terminator into each side of the T-connector and turn both to the right until they lock into place, as shown in Figure 2-6.

Figure 2-6 Connecting Terminators to the T-Connector

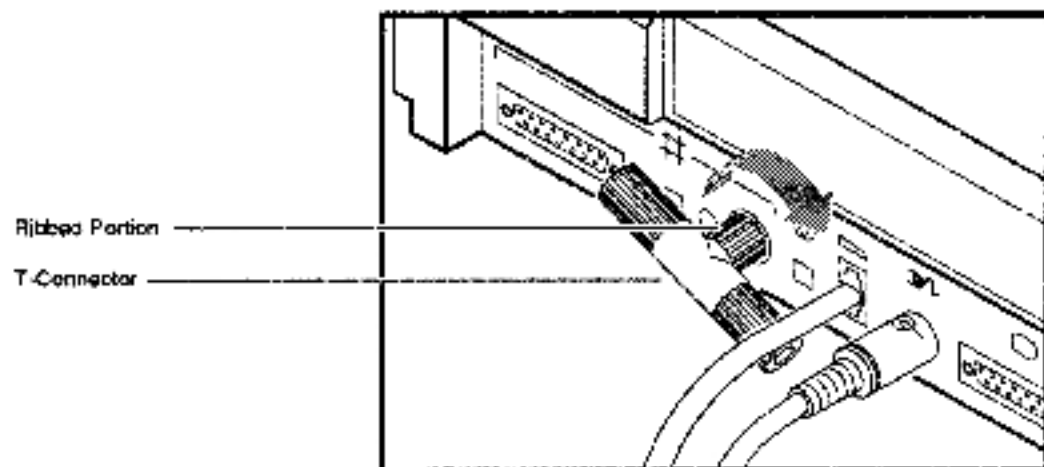


Later, if you connect to a network, you will exchange ThinWire cable sections for one or both Ethernet terminators, depending on your network setup. See Chapter 5 for additional information.



- 2 Next, connect the T-connector to the ThinWire Ethernet port on the back of the system unit. To do this, turn the ribbed portion of the connector to the right until it locks into place, as shown in Figure 2-7.

Figure 2-7 Connecting the T-Connector to the System Unit

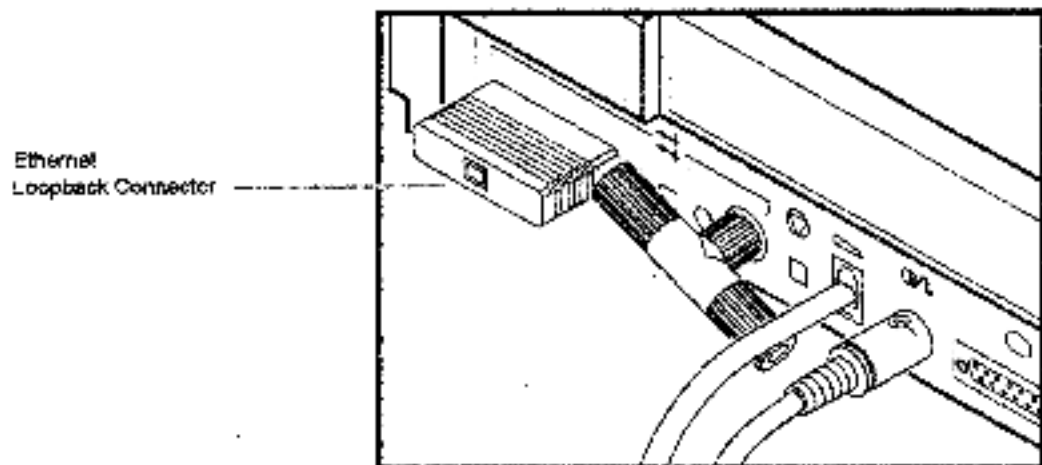


MLC-000200

Make sure the T-connector is set at an angle, as shown in Figures 2-7, to allow room for the loopback connector to be connected in the next step.

- 3 Connect the loopback connector to the standard Ethernet port on the back of the system unit, as shown in Figure 2-8. Later, when the system has been turned on, the green light on the connector will come on.

Figure 2-8 Connecting the Loopback Connector to the System Unit



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2.3.5 Connecting the Monitor

Installation is basically the same for any of the monitors available for your system. You can put the monitor beside the system unit or on top of it. Install your monitor according to the instructions in your monitor guide. See your monitor guide for information on these procedures:

- Connecting the monitor video cable
- Changing the voltage setting
- Replacing a fuse
- Adjusting screen brightness and contrast

To set up your monitor, follow these steps:

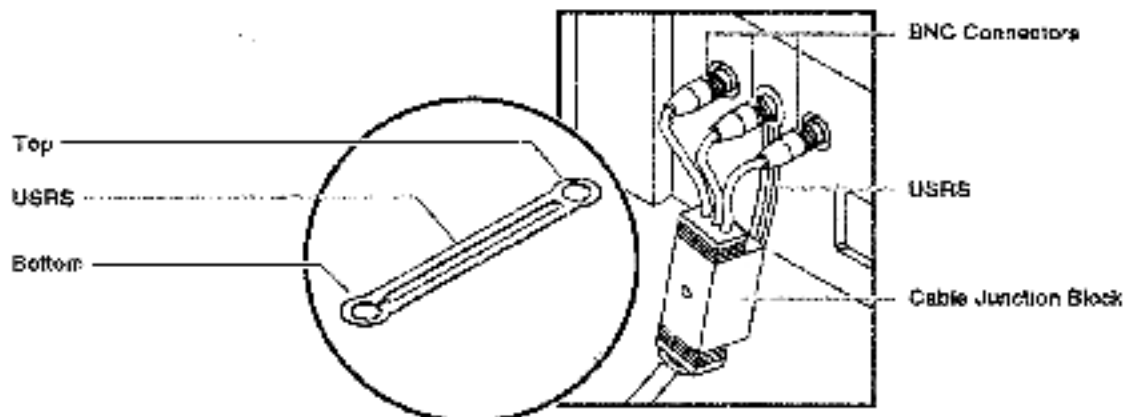
- 1 See your monitor guide for installation instructions.

Caution *Never connect or disconnect the monitor video cable and the system unit while the power is on.*

- 2 The color monitor video cable will attach to the monitor with either a thumbscrew or a universal strain relief strap (USRS). Check for an attachment point (screw hole) on the back of your monitor where a thumbscrew can be attached. If there is one, proceed to step 3. If there is none, proceed to step 5 to attach the monitor video cable using the universal strain relief strap. (See Figure 2-9.)
- 3 Select the appropriate thumbscrew for your monitor. The color monitor video cable comes with two different thumbscrews. Use the long screw for the large color monitor; use the short screw for all other monitors.
- 4 Push the thumbscrew into the junction block of the monitor cable until it snaps in place. Then screw it into the attachment point in the back of the monitor, being careful not to overtighten it. Proceed to step 6.

- 5 Attach the universal strain relief strap to the color monitor video cable by completing the following procedure (Figure 2-9):
 - Insert the three BNC connectors and cable junction block of the monitor video cable through the center slot of the universal strain relief strap, making sure the strap is under the cable junction block.

Figure 2-9 Connecting the Monitor Video Cable to the Monitor Using the Universal Strain Relief Strap



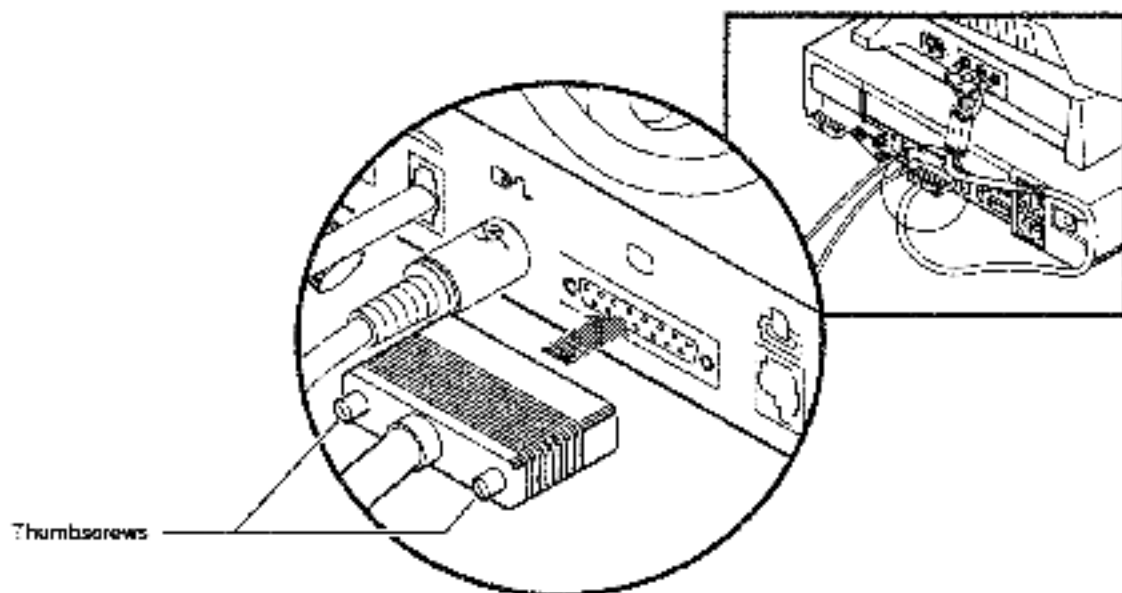
MLO 004590

Note The bottom of the cable junction block has the smaller of the two screw holes, and is dimpled. The universal strain relief strap should lie against this side of the cable junction block.

- Pull the monitor video cable into the slotted hole at the bottom of the universal strain relief strap and pull the strap flush with the cable junction box.
- Align the center (green) BNC connector with the two key slots of the closed hole at the top of the universal strain relief strap, and snap the BNC connector into the hole.
- Follow the instructions in your monitor guide to attach the BNC connectors to the back of the monitor.

- 6 Follow the directions in the monitor guide to connect the monitor video cable to the monitor.
- 7 Connect the free end of the monitor video cable to the back of the system unit, as shown in Figure 2-10.

Figure 2-10 Connecting the Monitor Video Cable to the System Unit



WLO-061558

- 8 Tighten the thumbscrews on the monitor connector by turning them to the right.

2.3.6 Connecting the Power Cords

The power cord is an electrical ground for your system. To connect your system to a power source, perform the following steps:

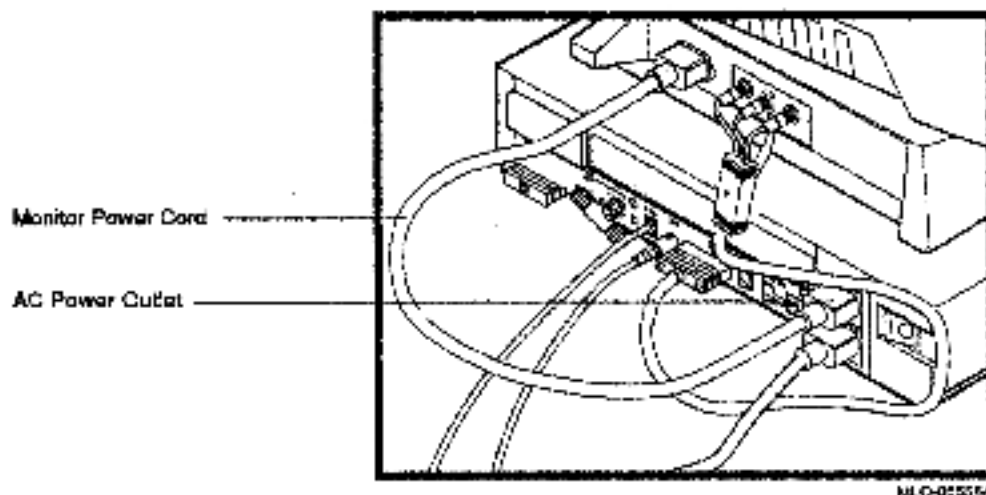


- 1 Make sure that the monitor and the system unit power switches are off (O).

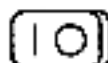
Caution Whereas the system unit automatically adjusts itself to the correct voltage, your monitor may not. Refer to your monitor guide to check the monitor voltage rating.

- 2 Before proceeding, ensure that your monitor's voltage requirements match the voltage of the AC power outlet into which you plan to plug the monitor. Monitors require either 110 VAC or 220 VAC.
- 3 Connect one end of the short power cord to the monitor, as shown in Figure 2-11. Plug the other end of the power cord into the system unit's AC power outlet.

Figure 2-11 Connecting the Monitor Power Cord



2.4 Starting Your System



To start your system, turn your system components on (I) in the order given here.

- 1 Turn expansion boxes on (I) in the following order:
 - BA42 expansion box
 - Other expansion boxes (if present)
 - Compact disc expansion box (if present)

To connect expansion boxes, see Chapter 4.

- 2 Turn the printer and **modem** on (), if you have this equipment.

To connect a printer or modem, see Chapter 8.

- 3 Turn the monitor on ().

Leave the monitor on so that the monitor turns on and off with the system unit.

- 4 Turn the system unit on ().

The green light on the front of the monitor and system unit should come on. It takes approximately 1 to 2 minutes for the first line of the power-up display to appear on the screen.



This is a good time to adjust the brightness and contrast of your monitor. Your screen looks blank if the brightness and contrast are turned down too low. Follow the directions in your monitor guide to set the brightness and contrast.

2.4.1 Checking the Power-Up Display

When you turn on the system unit, a power-up display appears on the monitor screen.

■ Power-Up Display for a Diskless System

If you have a diskless system, you will see a display similar to the following. This display means that your system has passed all power-up tests.

```
XA45-A V1.0
F...3...D...C...B...A...9...8...7...6...5...4...3...2...1..
VMS/VME      ADDR  CRVTP  NMBYTES  RM/EX  WP  DEVNAM
-----
ESAC          08-00-2B-C7-E3-53
[ESR0:] >>>
```

■ Power-Up Display for a System with a Hard Disk and Diskette Drive

If you have a system with a hard disk and diskette drive, you will see a display similar to the following. This display means that your system has passed all power-up tests.

F...E...D...C...B...A...9...8...7...6...5...4...3...2...1...

```
? E 0040 0000.0005
? D 0050 0000.0005
? 6 00A1 0000.4001 (This is not an error if a drive
                    is not attached to SCSI-B port)
```

Enter the following to display a list of devices:

[ESAO] >>> SHOW DEVICE [Enter]

VMS/VME	ADDR	DEVTYPE	NUMBYTES	RM/FX	WE	DEVNAM
-----	----	-----	-----	-----	--	-----
ESAO	DE-00-2B-07-E3-23					
DRA500	A/5/0/00	DISK	104 MB	FX		RZ23
DRA500	A/5/0/00			RM		RX23
...HostID....	A/6	INITR				
...HostID....	B/6	INITR				

Press Ctrl/C to continue; that is, hold down the Ctrl key while you press the C key.

After you have checked the power-up display, remove all **media** from integral devices or expansion boxes. See Chapter 3 and Chapter 4 for instructions on how to remove the media.

2.4.2 If You Have Problems

If you do not see one of the power-up displays, turn off your system unit, review each installation step, and repeat the power-up procedure. If you still have problems, see Chapter 6 for information on power-up error messages.

2.5 Setting the Keyboard Language

If the following display appears on your monitor, you need to set your keyboard language. If this display does not appear, your keyboard language has been set.

- | | |
|----------------------------|------------------------------|
| 0) Dansk | 8) Français (Suisse Romande) |
| 1) Deutsch | 9) Italiano |
| 2) Deutsch (Schweiz) | 10) Nederlands |
| 3) English | 11) Norsk |
| 4) English (British/Irish) | 12) Português |
| 5) Español | 13) Suomi |
| 6) Français | 14) Svenska |
| 7) Français (Canadien) | 15) Vlaams |

3? >>>

Use the following guidelines to select a language from the keyboard language menu. The language you select must match the type of keyboard you have.

- 1 If you want to select the **default** language (option 3, English), press Return.
- 2 If you want to select another language, enter at the **prompt** the number of the language that matches the language of your keyboard, and press Return.

A different keyboard is available for each language. If you do not know the language variation of the keyboard you received, check the packing list.

The language that you choose or that has already been set is saved in memory. If you need to change the keyboard language later, refer to Section 7.9.

- 3 At this point go to Chapter 7 and read it so that you will understand the diagnostics.
- 4 Now run TEST 50 to display the system configuration, Ethernet hardware address, ROM revision levels, and status information.
- 5 Record all the information to check the status information.

2.6 What to Do Next

If you plan to connect your workstation to a network or to add an additional expansion box to your system, you need to do so before installing your operating system software. The following table shows you where to find instructions for completing these tasks.

Task	Location
Adding expansion boxes	Chapter 4
Installing network hardware	Chapter 5
Connecting a printer	Chapter 8
Connecting a modem	Chapter 8
Connecting a tablet	Chapter 2
Adding optional devices inside the system unit	Chapter 9
Selecting system startup procedures	Appendix A

After installing your network and optional hardware, you are ready to install your operating system software.

2.7 Installing Your Operating System

To install your VMS operating system software, you need one of the following:

- Connection to a network to load the software from another system
- Compact disc expansion box

Before you install your operating system software, set the system startup choices to start the operating system from the **disk drive** on which you plan to install your software. See Appendix A.

To install VMS software on the Model 76, follow the operating system installation instructions that came with the software. During software installation, you transfer operating system software from the installation media to a hard disk in your system unit or in an expansion box.

If you are connecting a printer to your system unit, refer to Section 8.6 for device-specific information you need to complete installation of your operating system.

If you are connecting a modem to your system unit, refer to Section 8.7 for device-specific information you need to complete installation of your operating system.

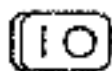
If you are a member of a local area **VAXcluster configuration**, you access operating system software from your server.

If you are part of an Ethernet local area network, you can use the **Remote System Manager (RSM)** on the server to install your operating system as well as application software.



For information about using RSM or accessing the VMS operating system software on your server, refer to your operating system documentation.

2.8 Turning Your System Off



If you need to turn your system off (O), follow the shutdown instructions in your operating system software documentation.

After shutting down the operating system, turn your system components off in the following order:

- 1 Expansion boxes
- 2 Printer, modem, and other equipment
- 3 System unit and monitor

Learning About Your System

Your Model 76 system can use disk drives or diskettes to store and retrieve information and **compact discs** to retrieve information. You may have a diskless system, or you may have one or more **built-in storage devices**. Devices can be added to your system, either inside the system unit, as explained in Chapter 9, or outside the system unit as expansion boxes, as explained in Chapter 4.

This chapter discusses the following:

- Hard disk drives (Section 3.1)
- RX23 diskette drive (Section 3.2)
- Mouse (Section 3.3)

3.1 Hard Disks

A hard disk consists of a drive that stores information on a nonremovable **disk**. Disks come in different sizes. You can have one, two, or three 3.5-inch RZ22, RZ23, or RZ24 hard disks in your system unit.

- The RZ22 hard disk stores 52 megabytes of information.
- The RZ23 hard disk stores 104 megabytes of information.
- The RZ24 hard disk stores 209 megabytes of information.

See Chapter 9 for information about adding hard disks inside your system unit.

3.2 RX23 Diskette Drive

This section tells you how to insert, remove, write-protect, and write to a diskette.

The disk drive provides 1.4 megabytes of storage space on RX23K diskettes.

Diskettes are magnetic disks that store information the same way hard disks do, though their storage capacity is considerably less. Digital requires that you use high-density (HD) diskettes.

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

Caution *Do not place diskettes or magnetic media on or near your monitor. The heat and electromagnetism from your monitor may damage diskettes by distorting or erasing the magnetic data.*

3.2.1 Inserting a Diskette

If a diskette drive is installed in your system, it is located at the front of the system unit. The drive can hold one diskette.

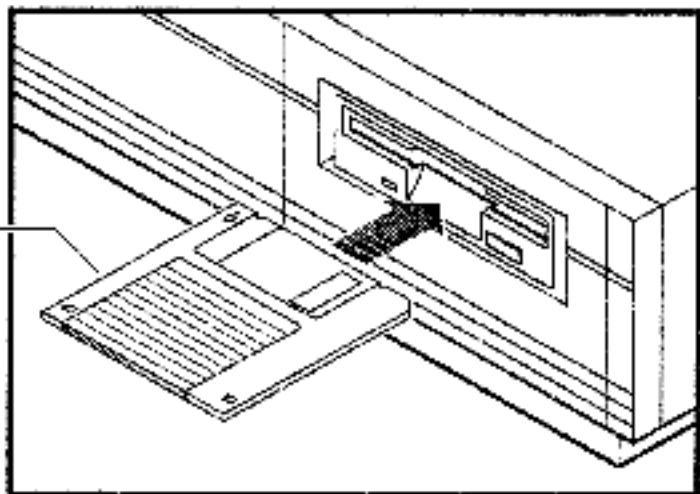
Caution *Never remove or insert a diskette while the diskette drive is performing a function. When the diskette drive is in use, the green light on the front of the diskette drive is on. Inserting or removing a diskette while the green light is on can cause incorrect data to be written to the diskette, and can damage the diskette itself.*

To insert a diskette into the diskette drive slot, slide the diskette into the drive, with the front of the disk up (Figure 3-1).

The diskette slides straight in and drops down to its load position.

Figure 3-1 Inserting a Diskette

Diskette



MLD-003401

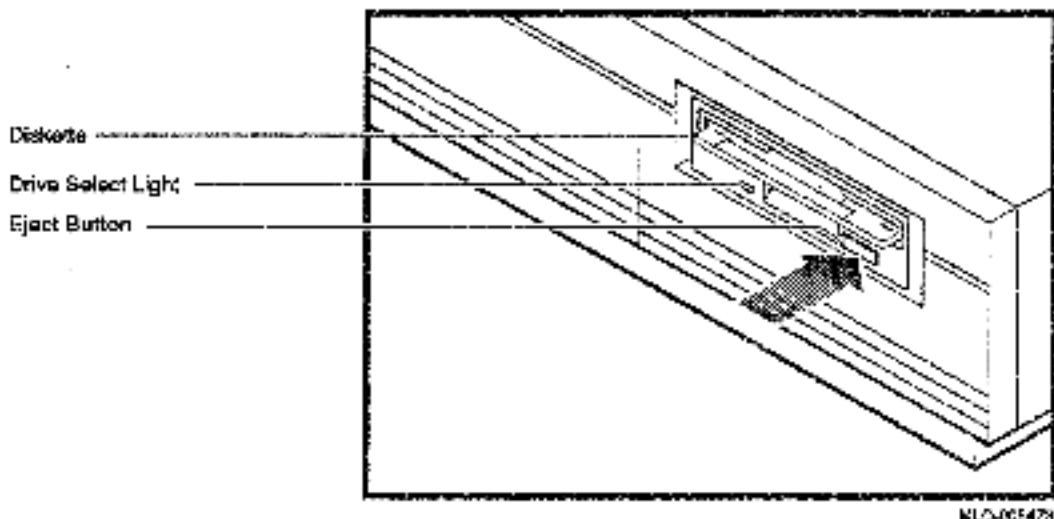


3.2.2 Removing a Diskette

You must do a software **dismount** on the diskette drive before removing a diskette. For information on dismounting, see your software documentation.

To remove a diskette from the diskette slot, push the eject button, as shown in Figure 3-2. Then remove the diskette.

Figure 3-2 Removing a Diskette

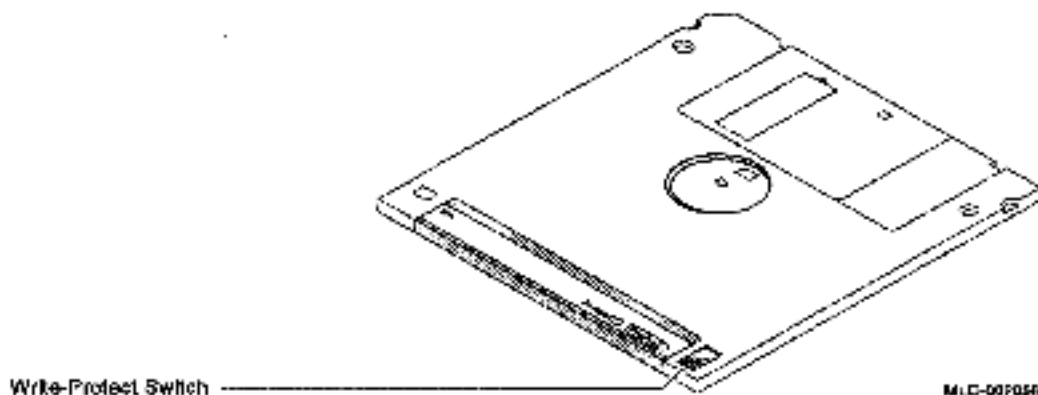


3.2.3 Write-Protecting a Diskette

Write-protecting a diskette prevents accidental erasure of information. The diskette drive can read information on the diskette regardless of the position of the **write-protect switch**. However, the diskette drive cannot write data to a write-protected diskette.

If you are using a diskette to install software applications on your system, or if you want to protect information on the diskette, move the write-protect switch on the back of the diskette toward the protect label until it locks in place, as shown in Figure 3-3.

Figure 3-3 Write-Protecting a Diskette



3.2.4 Writing to a Diskette

If you are using a diskette to make a **backup** copy of a file, or if you want to write out data, set the write-protect switch to enable writing to the tape.

To enable writing, slide the switch away from the protect label until the switch locks in place.

3.3 Mouse



Use the mouse to point to and select menu choices and other screen elements after windowing software has been installed on your system. To learn how to use your mouse, see your windowing software documentation.

7

7

7

Adding and Using Expansion Boxes

This chapter discusses the following:

- Guidelines for connecting expansion boxes (Section 4.1)
- Preparing your system for an expansion box (Section 4.2)
- Connecting one expansion box (Section 4.4)
- Daisy-chaining multiple expansion boxes (Section 4.6)
- Adding and using the compact disc expansion box (Section 4.6)

An expansion box is an external box that connects to your system unit to provide additional compact disc, hard disk, or tape storage. Each expansion box is shipped with the appropriate cables and connectors for connecting more than one box. The following expansion boxes can be used with a Model 76 system:

- 600-megabyte compact disc expansion box
- Various hard disk expansion box storage options in the RZ6x-xx series
Refer to the documentation that accompanies each expansion box for installation and user information.
- BA42 storage expansion box
Refer to the *BA42 Storage Expansion Box Installation Guide* for installation information.

The compact disc is a read-only storage device that reads **data** from removable compact discs. It can be used for many purposes, including software installation, database storage, and online documentation.

4.1 Guidelines for Connecting Expansion Boxes

Note See your operating system documentation for shutdown procedures before turning your system off.

Use the following guidelines when connecting expansion boxes:

- Connect no more than three expansion boxes to the system unit SCSI port. Remember the following rules:
 - Seven SCSI IDs are available for customer configuration.
 - More than one SCSI device is housed in one expansion box with a total of six external devices supported. For more information on SCSI, please refer to Appendix B.
 - Each device must have a unique SCSI ID.
- Use only expansion boxes purchased for the Model 76 system. Expansion boxes purchased for use with other Digital equipment must be upgraded by a Digital customer service representative.
- You must attach the 50-pin terminator that comes with your expansion box to the unused SCSI port on the back of the last expansion box.
- All expansion boxes should be plugged into the same grounded power strip or electrical source.
- To reduce potential problems with signal integrity that may occur when transmission lines are poorly matched, Digital recommends the following:
 - Cables should be no more than 4 meters (13 feet) long.
 - Cables and terminators should be supplied by Digital.
- After you have installed all expansion boxes but before you turn on the system unit, turn on all expansion boxes in the following order:
 - 1 BA42 storage expansion box
 - 2 Other expansion boxes
 - 3 Compact disc expansion box or boxes

This procedure ensures that the device in each expansion box is ready for use and that the system firmware includes each device in its configuration.

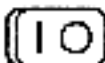
- See Section 7.9 for instructions on how to display your new **system configuration** with the **TEST 50** command. See Section 7.7 for instructions on how to **run** the system exerciser with the **TEST 0** command.

4.2 Preparing Your System for an Expansion Box



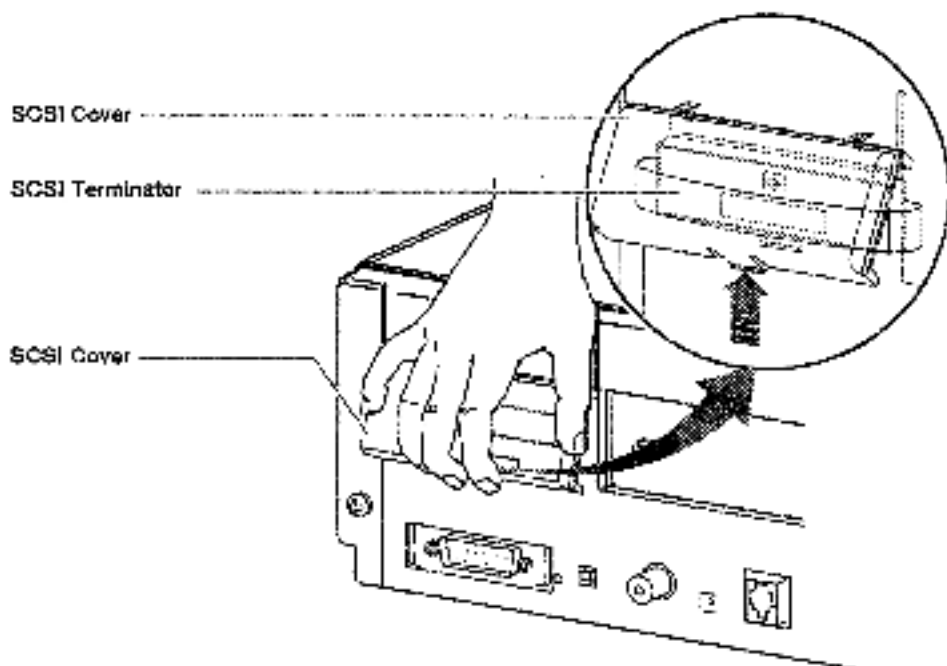
To add an expansion box to your system, you must first remove the SCSI cover and the terminator from the SCSI port on your system unit.

Note See your operating system documentation for shutdown procedures before turning your system off.



- 1 Turn your system off (O).
- 2 To remove the SCSI cover, place your fingers under the locking tab. To release the SCSI cover, lift it as shown in Figure 4-1.

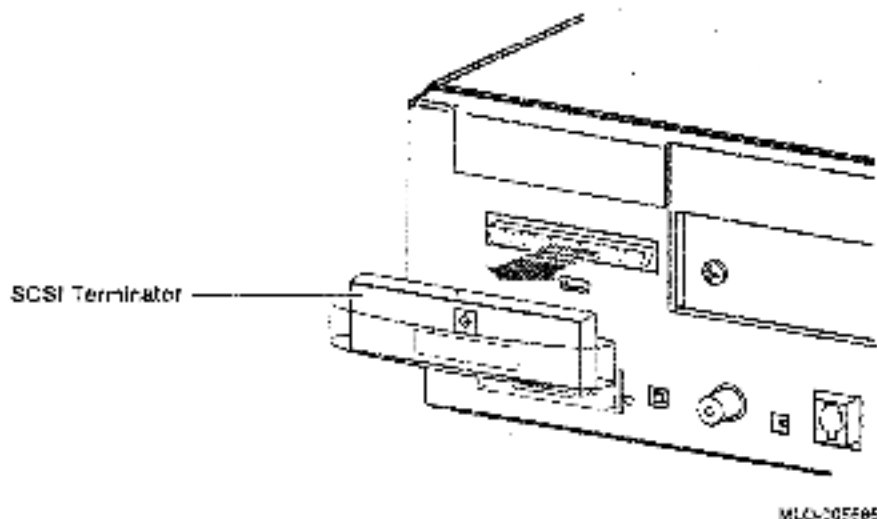
Figure 4-1 Removing the SCSI Terminator Access Door



MLC-305555

- 3 To remove the SCSI terminator, place your fingers under the loop and pull out, as shown in Figure 4-2.

Figure 4-2 Removing the SCSI Terminator



- 4 Set the terminator and the cover aside. You must reattach them later if you disconnect all the expansion boxes from the system unit.

4.3 Connecting One BA42 Expansion Box

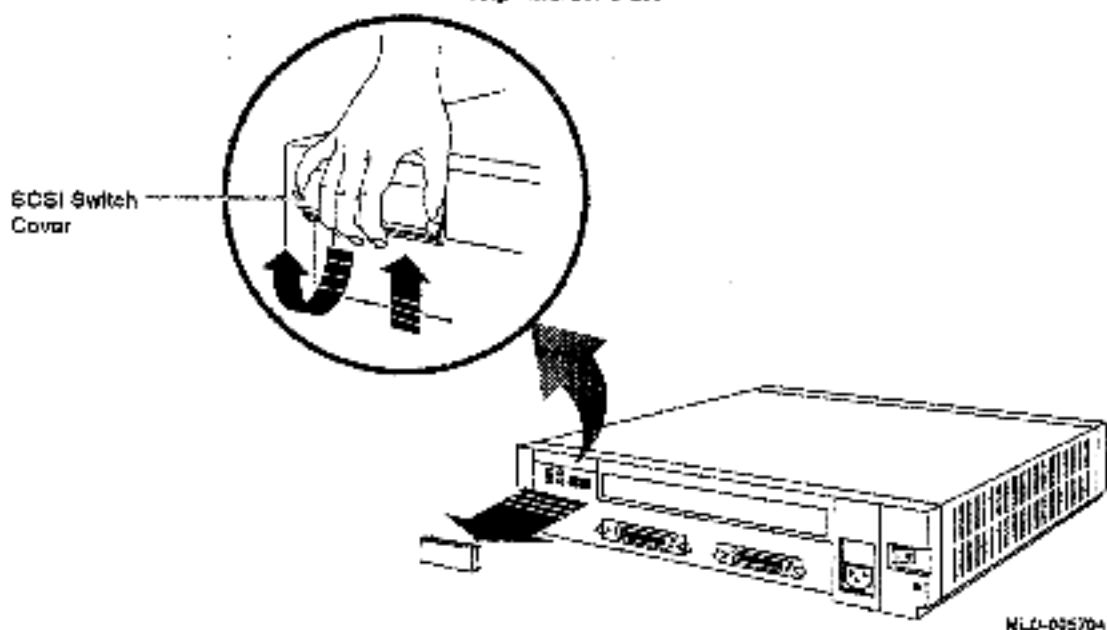
Note See your operating system documentation for shutdown procedures before turning your system off.

To connect a single BA42 expansion box, follow these steps:

- 1 Turn both the system unit and the expansion box off (O).
- 2 Turn the expansion box so that the back is facing you. Remove the SCSI ID switch cover by pressing up on the bottom of the cover and lifting it away, as shown in Figure 4-3.



Figure 4-3 Removing the SCSI ID Switch Cover from the Expansion Box



- 3 Verify that the SCSI ID switches are set to the correct default positions (Figure 4-4).
 - If you have one diskette drive in your expansion box, the rightmost three SCSI ID switches on the back of the expansion box determine the SCSI ID for that drive. The switches should be set as follows:
 - Switch 1 = Down
 - Switch 2 = Down
 - Switch 3 = Up

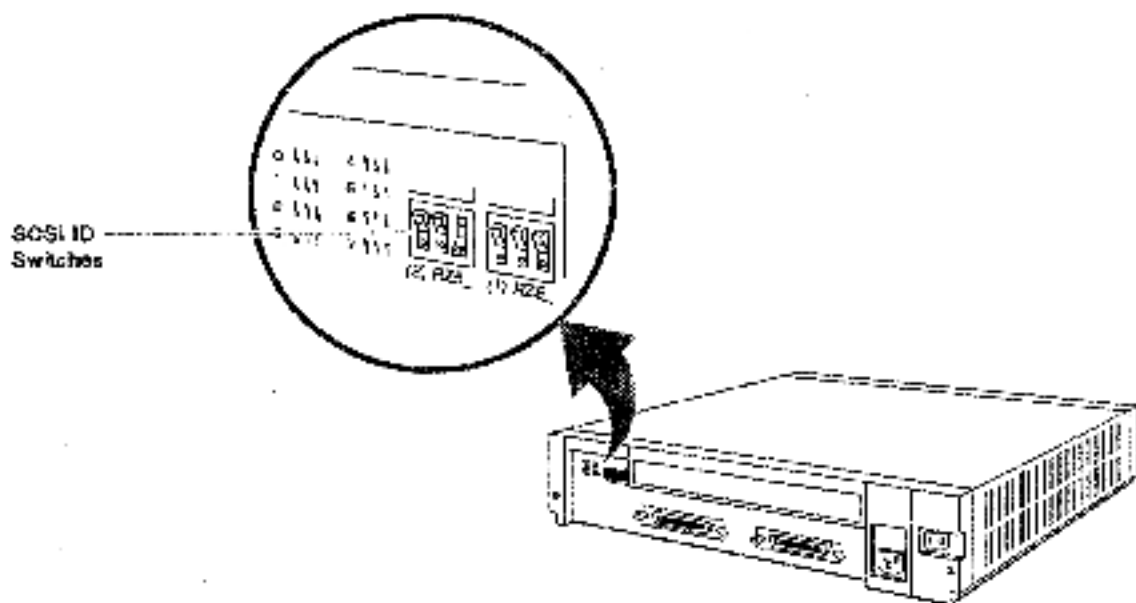
- If you have a second diskette drive in your expansion box, the leftmost three SCSI ID switches on the back of the expansion box determine the SCSI ID for the second drive. These switches should be set as follows:

Switch 1 = Down

Switch 2 = Down

Switch 3 = Down

Figure 4-4 Setting the SCSI ID Switches on the Expansion Box



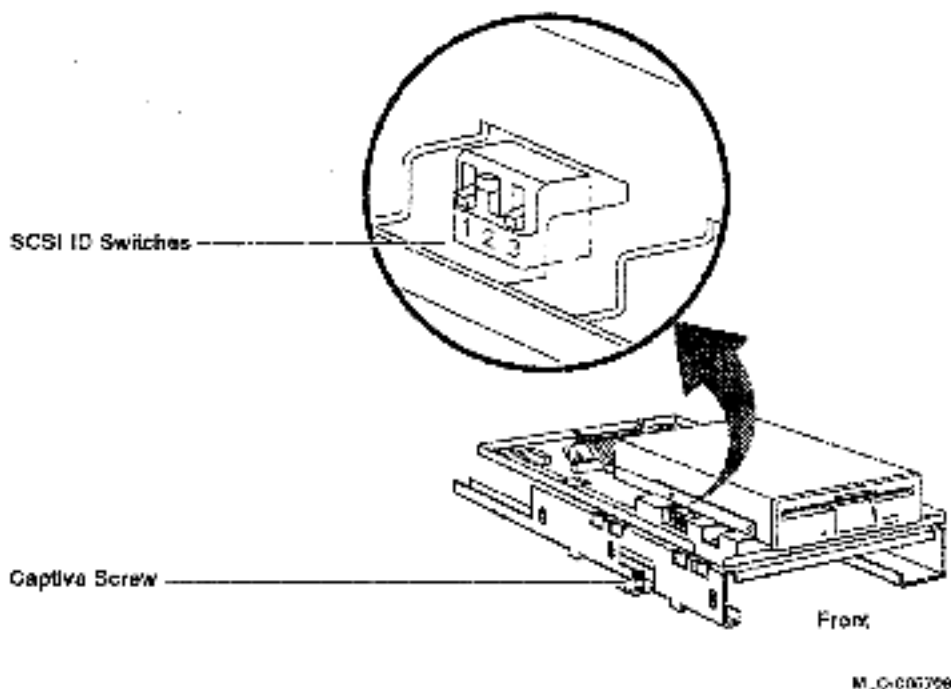
- 4 If you have an RX23 diskette drive, set the SCSI ID on the drive to 5 (Figure 4-5). See the *BA42 Storage Expansion Box Installation Guide* for instructions on removing the box cover. The switches should be set as follows:

Switch 1 = Down

Switch 2 = Up

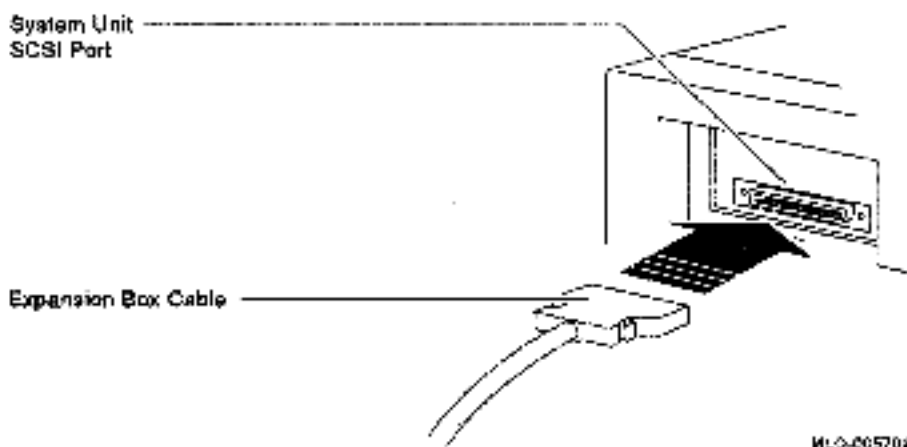
Switch 3 = Down

Figure 4-5 Setting the SCSI ID Switches on the RX23 Diskette Drive



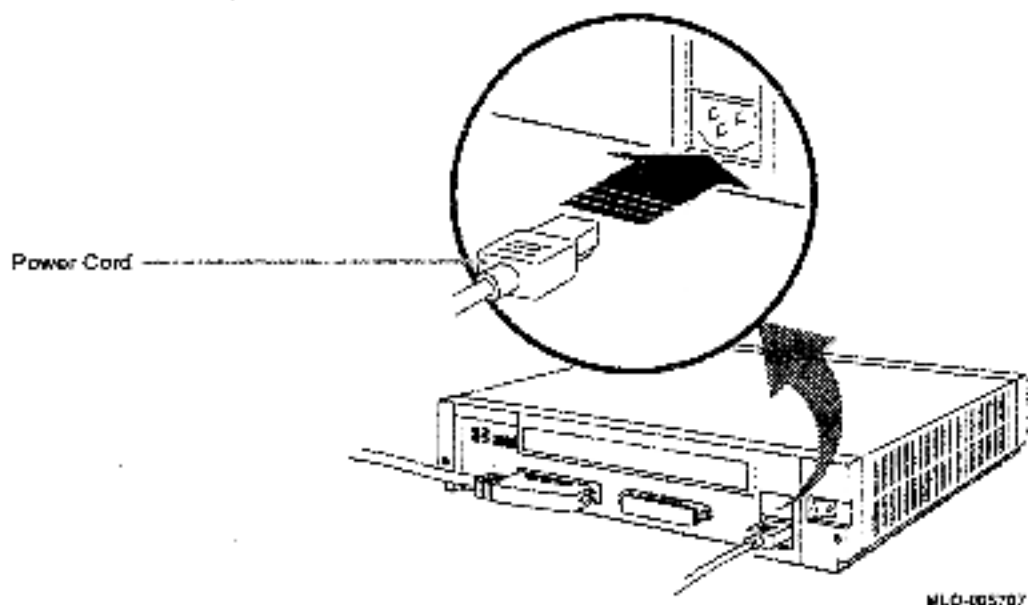
- 5 Connect the expansion box cable to the system unit, as shown in Figure 4-6.
- 6 Install the diskette drives in the expansion box as described in your BA42 expansion box documentation.

Figure 4-6 Connecting the System Unit to the Expansion Box



- 7 Connect the prongless end of the power cord to the expansion box and plug the pronged end of the power cord into the power outlet. (Figure 4-7).

Figure 4-7 Connecting the Power Cord to the Expansion Box

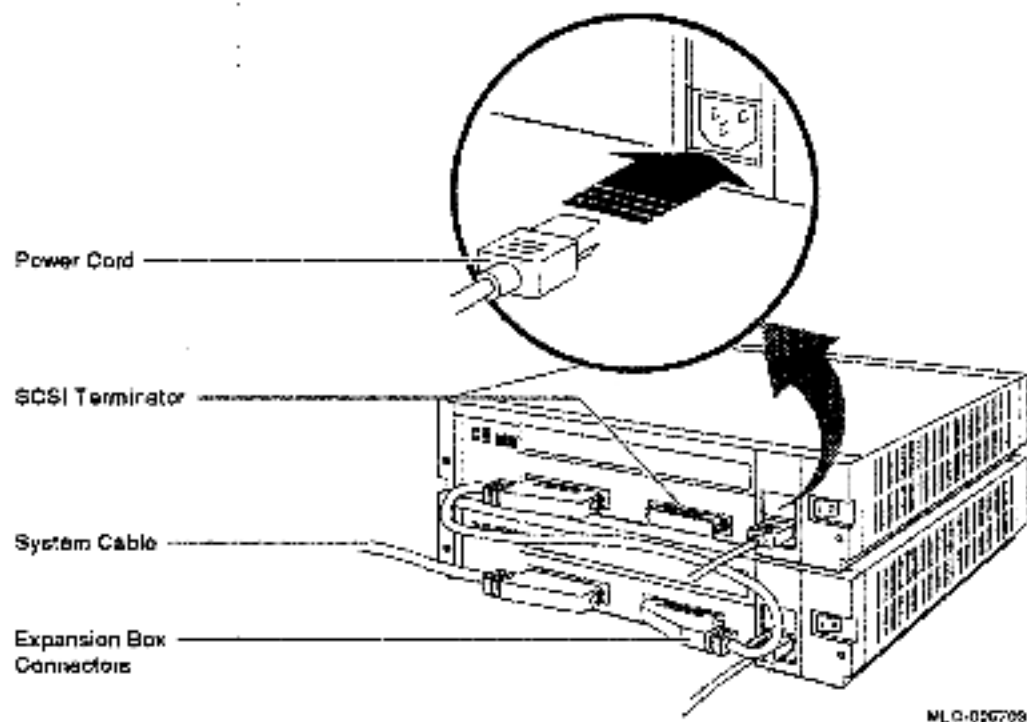


4.3.1 Daisy-Chaining Multiple 8A42 Expansion Boxes

You can connect additional expansion boxes, linking the new boxes to the previously connected ones. You can **daisy-chain** devices to your system in any order by following these steps:

- 1 Halt the system unit and turn the power off (O).
- 2 Remove and set aside the 50-pin terminator on the most recently added expansion box. Store the terminator for possible future use.
- 3 Connect one end of the 50-pin-to-50-pin SCSI cable to the new expansion box.
- 4 Connect the other end of the 50-pin-to-50-pin SCSI cable to the available port on the first expansion box.
- 5 Attach the 50-pin terminator that you just removed from the first expansion box to the unused SCSI port on the new expansion box.
- 6 Connect the power cord for the new expansion box to the expansion box power port. Plug the other end of the power cord into a grounded power source. Each expansion box needs its own power connection.
- 7 Figure 4-8 shows how two expansion boxes are connected.

Figure 4-8 Expansion Box Connections



4.4 Connecting One Compact Disc Expansion Box

Note See your operating system documentation for shutdown procedures before turning your system off.

To connect a single expansion box to your system unit, follow these steps:



- 1 Turn both the system unit and the expansion box off (O).
- 2 Turn the expansion box so that the back is facing you.
- 3 Verify that the SCSI ID switches on the back of the expansion box are set to the correct default switch positions.

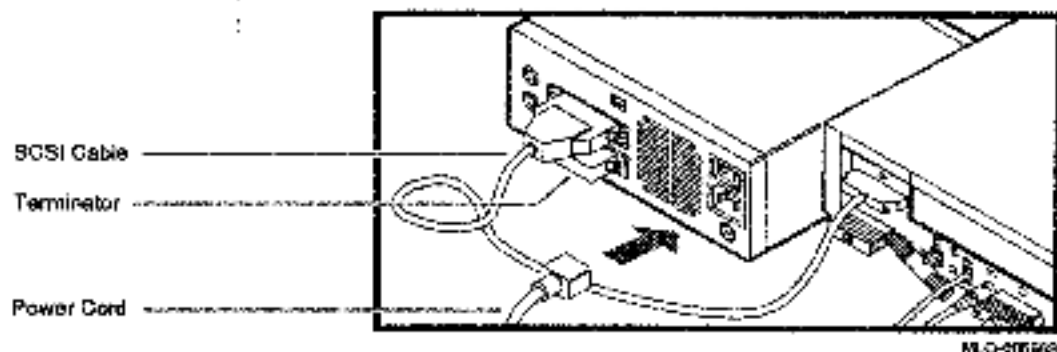
The default switch positions for the compact disc expansion box are as follows:

- Switch 1 = Up
- Switch 2 = Down
- Switch 3 = Down
- Switch 4 = Down

Refer to Table B-5 if you have changed the default switch positions.

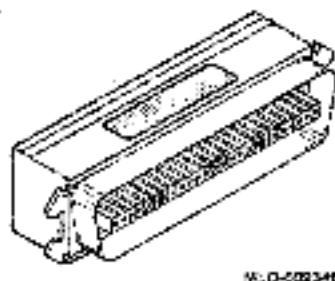
- 4 Connect the 68-pin-to-50-pin SCSI cable, as shown in Figure 4-9 for the compact disc.
 - Note the orientation of the pins in the system unit SCSI connector. There are more pins in the top than in the bottom row. Turn the 68-pin connector (small end of the cable) so its holes match the pins.
 - Press the clips on the sides of the 68-pin connector and push the connector into the system unit SCSI port until the clips lock into place.

Figure 4-9 Connecting One Compact Disc Expansion Box



- Caution** Do not force the 68-pin connector into the SCSI port. You may damage the pins in the SCSI port.
- Connect the 50-pin connector (large end of the cable) to either port on the back of the expansion box and snap the bail lock in place.
- 5 Connect the 50-pin SCSI terminator that comes with the expansion box to the unused port on the expansion box. Figure 4-10 shows the 50-pin terminator.

Figure 4-10 SCSI 50-Pin Terminator



- 6 Connect the power cord to the expansion box power port; plug the other end into a grounded power source.
- Figures 4-9 shows how to connect one compact disc drive expansion box to your system unit.

4.5 Daisy-Chaining Multiple Expansion Boxes

You can connect additional expansion boxes, linking the new boxes to the previously connected ones. You can daisy-chain devices to your system in any order by following these steps:



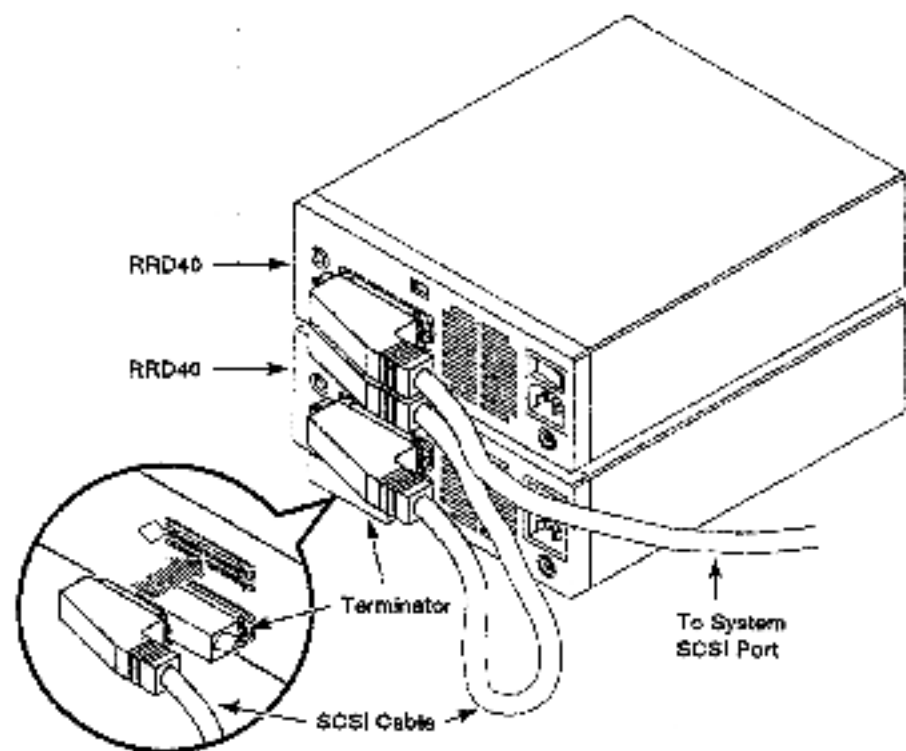
- 1 Turn the system unit and all expansion boxes off (O).
- 2 Remove and set aside the 50-pin terminator on the most recently added expansion box. Store the terminator for possible future use.

Note *If you have more than one of the same type of device attached to your system, you must change the SCSI ID on the second device to an open ID on the SCSI bus. See Section 4.6.3 and Appendix B for additional information.*

- 3 Connect one end of the 50-pin-to-50-pin SCSI cable to the new expansion box.
- 4 Connect the other end of the 50-pin-to-50-pin SCSI cable to the available port on the first expansion box.
- 5 Attach the 50-pin terminator that you just removed from the first expansion box to the unused SCSI port on the new expansion box.
- 6 Connect the power cord for the new expansion box to the expansion box power port. Plug the other end of the power cord into a grounded power source. Each expansion box needs its own power connection.

Figure 4-11 shows two daisy-chained compact disc expansion boxes.

Figure 4-11 Connecting Two Compact Disc Expansion Boxes



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4.6 Adding and Using the Compact Disc Expansion Box

This section describes the following steps:

- Selecting the voltage
- Verifying the SCSI ID
- Inserting a compact disc

For instructions on unpacking and preparing to connect a compact disc expansion box, read Section 4.1, Section 4.2, and Section 4.3.

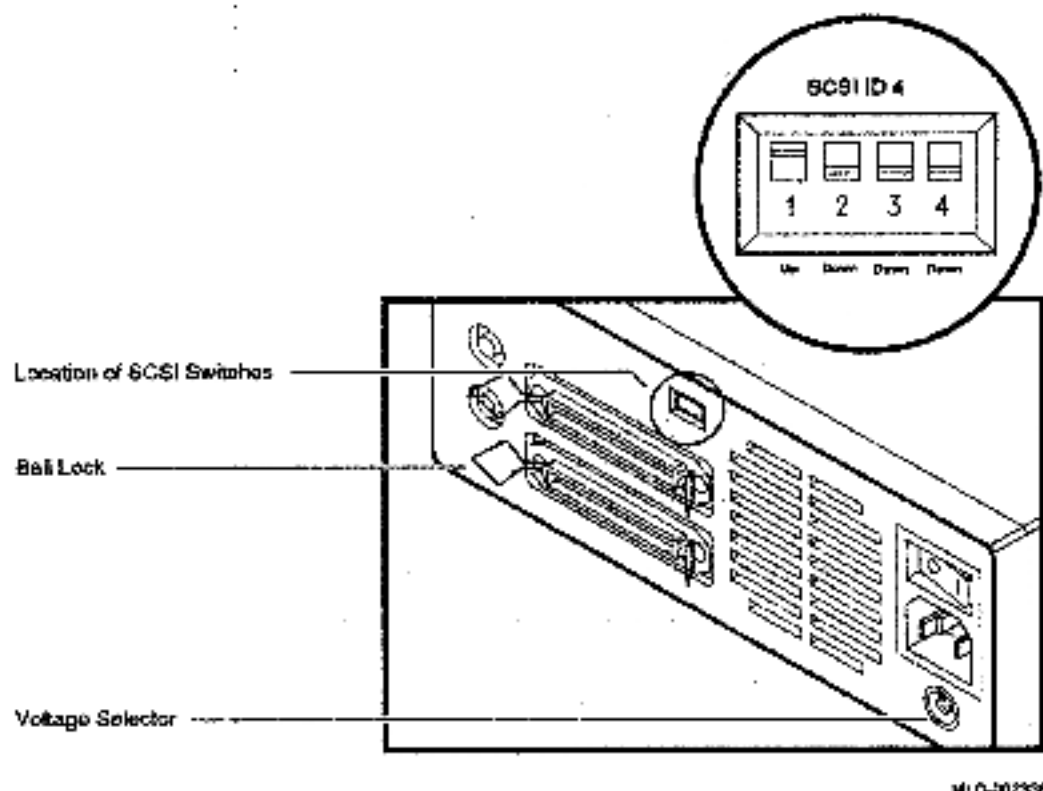
4.6.1 Selecting the Voltage

Turn the compact disc expansion box so that the back is facing you and locate the voltage selector switch below the power port (Figure 4-12). This switch can be set to one of two voltages, 110 VAC or 220 VAC. Check that the switch on your compact disc expansion box is set to the correct voltage for your power requirements.

4.6.2 Verifying the SCSI ID on the First Compact Disc

The compact disc expansion box is shipped from the factory with the SCSI ID set to 4, as shown in Figure 4-12. Leave the SCSI ID on the first compact disc set to 4. If you are adding a second compact disc to your system, go to Section 4.6.3 for information on resetting the SCSI ID.

Figure 4-12 Compact Disc Voltage Selector and Factory SCSI ID Switch Positions



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4.6.3 Resetting the SCSI ID on a Second Compact Disc

If you are adding a second compact disc expansion box to your configuration, you must reset the switches on the second box to an open SCSI ID (one that is not currently being used). See Table B-5 for possible switch settings.

To determine which IDs are available on the SCSI-B bus, enter **TEST 50** at the console prompt (**>>>**), then press Return. Your system configuration appears on the screen, as shown in the following example:

```
SCSI-B      1010.0001   V1.3
FFFFFFFF   00000001   FFFFFFFF   FFFFFFFF   05000001   FFFFFFFF   FFFFFFFF   FFFFFFFF
  ①         ②         ③         ④         ⑤         ⑥         ⑦         ⑧
```

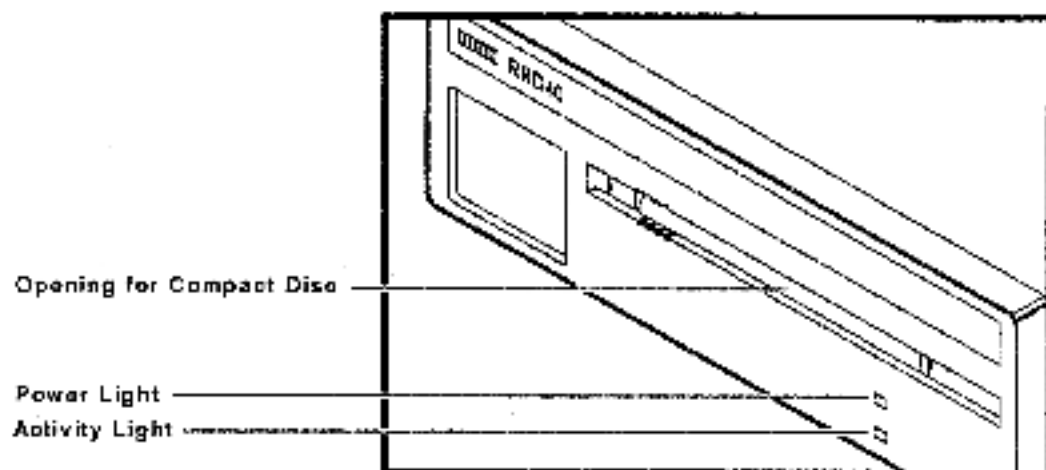
In this example, SCSI IDs 0 to 7 are identified by ❶ to ❸ as described below. The code FFFFFFF05 indicates an open SCSI ID.

- ❶ SCSI ID 0 — Open
- ❷ SCSI ID 1 — RZ55, RZ56, or RZ57 hard disk
- ❸ SCSI ID 2 — Open
- ❹ SCSI ID 3 — Open
- ❺ SCSI ID 4 — Compact disc
- ❻ SCSI ID 5 — Open
- ❼ SCSI ID 6 — SCSI-B bus controller
- ❽ SCSI ID 7 — Open

4.6.4 Inserting a Compact Disc

The compact disc expansion box has an opening for a compact disc and two indicator lights, as shown in Figure 4-13.

Figure 4-13 Compact Disc Expansion Box

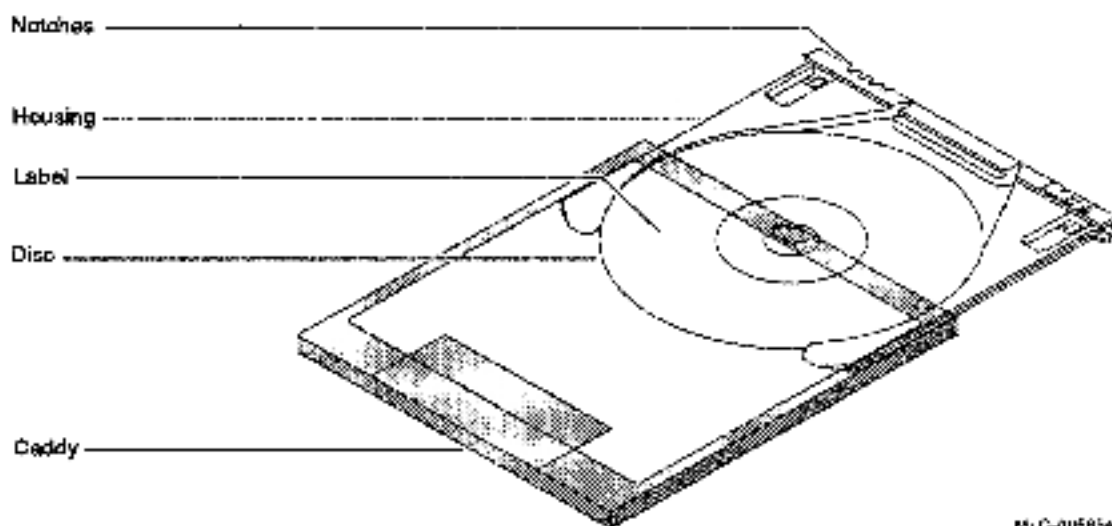


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The power light comes on when you turn on the compact disc expansion box. The activity light comes on when you insert and load a compact disc in the drive; it flashes when the disc is transferring information.

Before inserting a disc, make sure the power light on the front of the disc drive is on. Insert the entire disc caddy into the disc opening on the drive; do not remove the disc from the caddy. Figure 4-15 shows a compact disc and its caddy.

Figure 4-14 A Compact Disc



To insert a disc, follow these steps:

- 1 Examine the disc caddy.

Make sure that it is not cracked or damaged in any way. Never insert a damaged caddy into a compact disc drive.

- 2 Examine the disc inside the caddy.

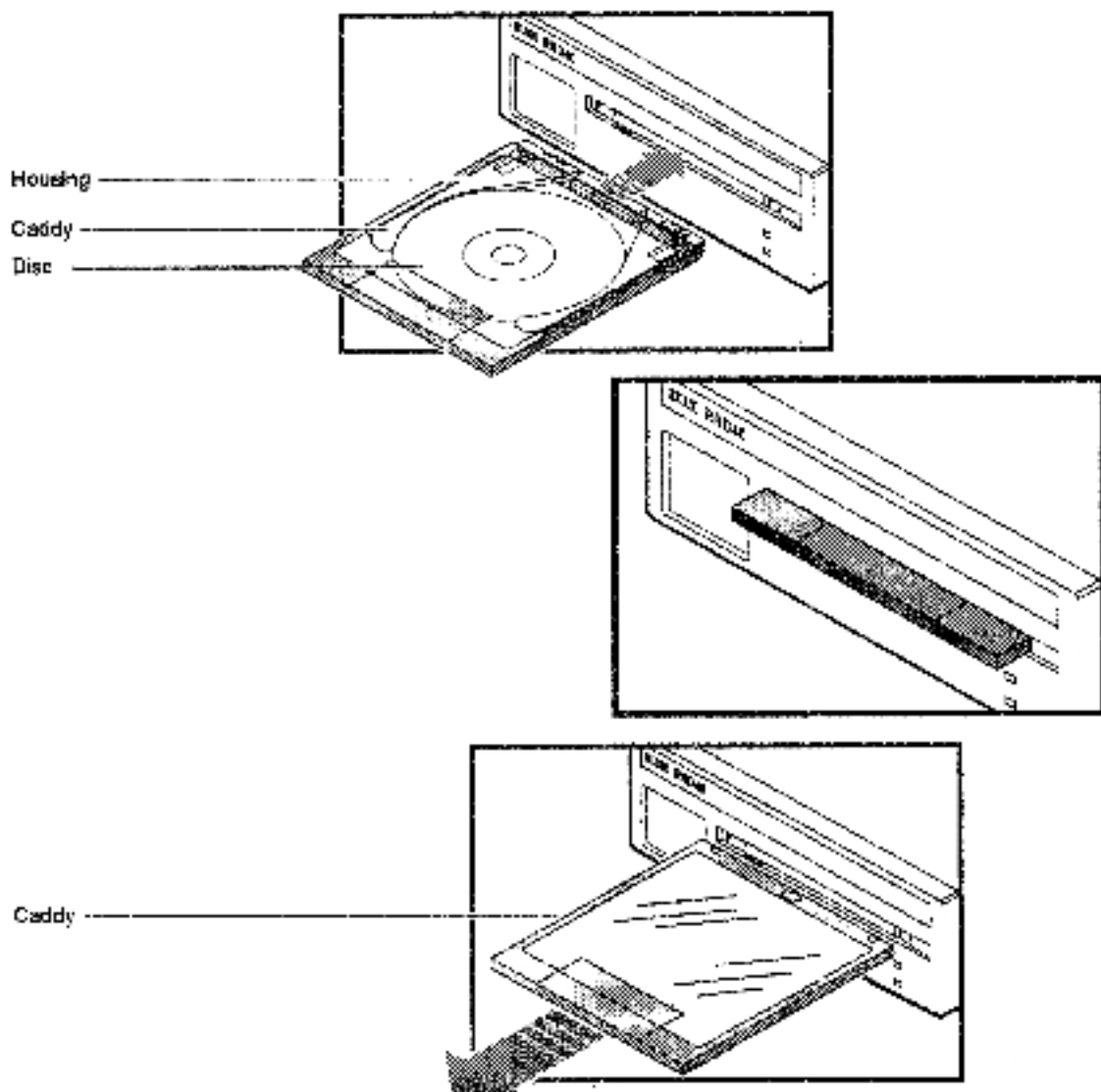
The label on the disc should always be facing up when you insert the disc into the drive. When the label is facing up, the four notches on the disc housing are on the left. These notches line up with four similar notches on the front of the compact disc drive.

Note *If the disc is in the caddy label side up but the notches are on the right, the disc is improperly oriented. Proceed no further with the loading. See the compact disc installation/owner's manual for more information.*

Caution *Do not write on the disc with any implement. The data area on the disc is easily damaged.*

- 3 Slide the caddy in as far as it will go and then remove it. The disc and its housing remain in the drive. Only the empty caddy comes out (Figure 4-15).

Figure 4-15 Inserting a Compact Disc



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- 4 The activity light should come on within 5 seconds.

If the drive accepted the disc but the activity light does not come on, the disc may be sitting incorrectly in the caddy and should be removed and reinserted.

If your software does not load properly, see Chapter 7 for information on using the test disc.

4.6.5 Removing a Compact Disc

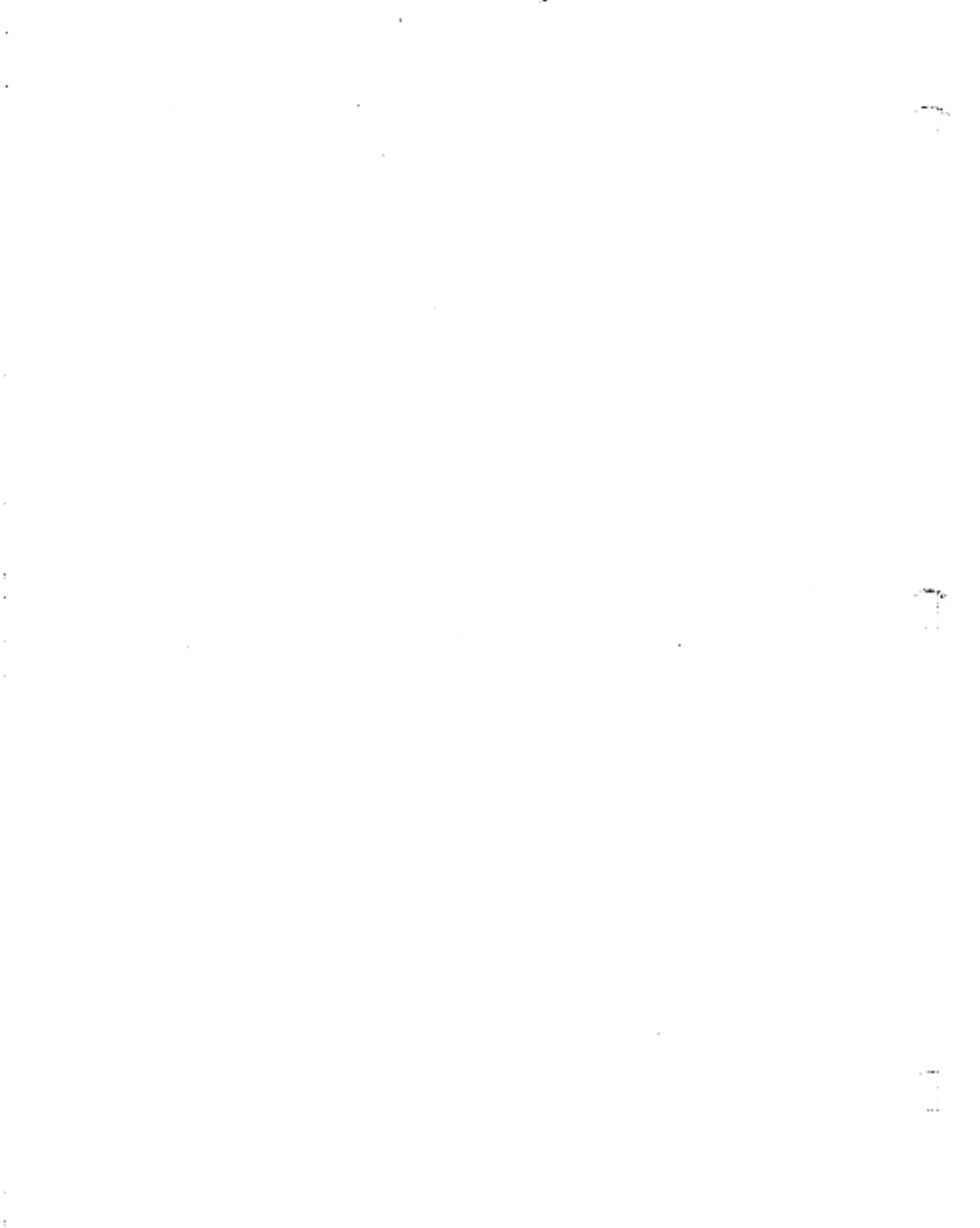
Before removing a disc, make sure that the activity light is not blinking. If it is blinking, the compact disc drive is transferring data. Wait until the activity light stops blinking. To unload a disc, follow these steps:

- 1 Position the caddy as for loading, with the arrow on the sleeve pointing into the drive opening (Figure 4-15).
- 2 Insert the sleeve into the drive opening as far as it will go.
- 3 Remove the caddy.

The disc and housing should be in the sleeve. The activity light will go out.

4.7 Testing Expansion Boxes

After installing each expansion box, see Chapter 7 to run the configuration display and then run the system exerciser.



Connecting to a Network

This chapter discusses connecting your VAXstation 3100 system to a network. It covers the following topics:

- Networking guidelines (Section 5.1)
- Connecting to a ThinWire Ethernet network (Section 5.2)
- Connecting to a standard Ethernet network (Section 5.3)

You can also daisy-chain VAXstation 3100 systems to form a work group. For additional information, see Section 6.2.4.

All networking cables and connectors must be purchased separately.

5.1 Networking Guidelines

Use the following guidelines when connecting your VAXstation 3100 system to a network:

- If your VAXstation is a networked standalone system (a workstation that starts and operates independently of all other computers), you need make only one network connection. The connection is from your workstation to your system with either a ThinWire Ethernet connection or a standard Ethernet connection.
- If your VAXstation is to be part of a **work group** (a VAXcluster, for example), you need to make a ThinWire Ethernet or standard Ethernet network connection between your system and the work group, each workstation of which is connected to another.

5.2 Connecting to a ThinWire Ethernet Network

This section covers all aspects of connecting your VAXstation 3100 to a **ThinWire Ethernet network**, as follows:

- Setting the network button
- Verifying the ThinWire Ethernet network installation
- Connect ThinWire Ethernet cable

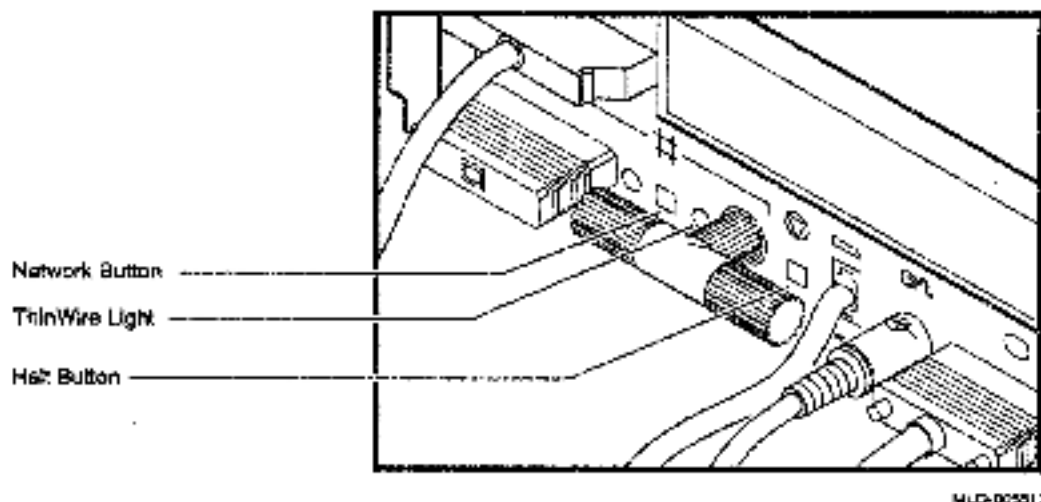
5.2.1 Setting the Network Button

The ThinWire/standard Ethernet network button is usually set in the out position when you receive your VAXstation 3100. There are two positions for the network button:

- Out—Standard Ethernet
- In—ThinWire Ethernet

Figure 5-1 shows the network button in the in position, set for ThinWire Ethernet.

Figure 5-1 Network Button Set for ThinWire Ethernet



MLD-00551 1

If your system is set incorrectly, follow these steps:

- 1 Locate the recessed network button.
- 2 Press the network button so that the light to its right comes on.

5.2.2 Verifying ThinWire Ethernet Network Installation

To verify ThinWire Ethernet installation, follow these steps:

- 1 Turn your VAXstation 3100 system on (|). The green light to the right of the network button should come on, and the following display should appear on your monitor screen:

KA4S-A V1.0

F...E...D...C...B...A...9...8...7...6...5...4...3...2...1
>>>

If the console prompt (>>>) does not appear, press the **halt** button on the back of the system unit. Figure 5-1 shows the location of the halt button.

- 2 At the console prompt, enter the following command:

```
>>> SHOW ETHERNET 
```

The **Ethernet hardware address** appears on the screen in the following format:

ID XX-XX-XX-XX-XX-XX

For example:

ID 08-00-2B-07-A7-80

Note The letters *ID* are not part of the address. Each Ethernet hardware address is unique.

- 3 Write your Ethernet hardware address here:

Ethernet hardware address _____

You use the Ethernet hardware address as system identification during software installation.

- 4 At the console prompt, enter TEST 50 and press Return.

If the last line of information in the display is NI 0000.0001, the ThinWire Ethernet subsystem is working.

If a number between 0000.0002 and 0000.7XXX appears, there may be a failure in the Ethernet subsystem. Check that terminators are attached to the T-connector. Enter TEST 1 at the console prompt and press Return. TEST 1 provides data for the TEST 50 display. Now repeat the TEST 50 command. If you continue to receive a failure indicator, call your Digital service representative.

If NI 0000.7XXX, or any number above 0000.7XXX, appears on that line, check all Ethernet connections. See Section 5.2.6.

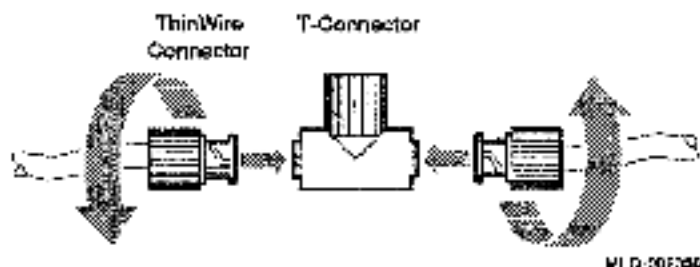
5.2.3 Connecting ThinWire Ethernet Cable

Follow these steps to connect a VAXstation 3100 to a ThinWire Ethernet cable.

- 1 Turn your system off (O).
- 2 Remove a terminator from one side of the T-connector.
- 3 Firmly push a ThinWire connector into this side of the T-connector and turn it to the right until it locks into place.
 - If your system is the first or last system in a single ThinWire **segment**, leave the terminator attached to the other side of the T-connector. A segment is a length of cable made up of one or more cable **sections** connected with **barrel connectors** or T-connectors.
 - If your system is not the first or last system and you want to connect your system between two other systems, replace both terminators with sections of ThinWire cable.

Figure 5-2 shows you how to connect two ThinWire cable segments to a T-connector.

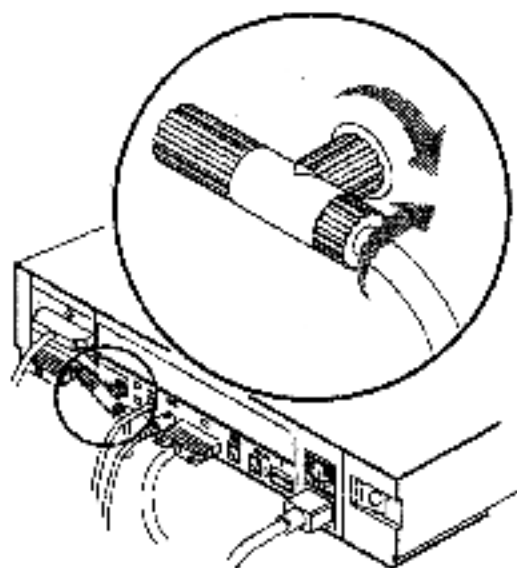
Figure 5-2 Adding ThinWire Cable



- 4 Check that the T-connector is securely attached to the back of your system. Figure 5-3 shows the correct way to connect the first or last workstation in a ThinWire network.

Note Always turn the ribbed portion of a T-connector to the right until it locks in place.

Figure 5-3 Checking Cable Connections



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5.2.4 Creating a Daisy-Chain Work Group

A daisy-chain work group consists of several serially connected workstations on a single ThinWire Ethernet cable segment. This cable segment can function as a standalone network, or it can be connected to a larger network.

The benefit of a daisy-chain configuration is that it lowers the cost of wiring. The risk is that someone might improperly unplug a system and disrupt network connections between systems on the same ThinWire Ethernet segment. You must always terminate both ends of a ThinWire Ethernet segment.

Figure 5-4 shows a Model 76 connected to several other Model 76s to form a daisy-chain work group.

Figure 5-4 Model 76 Systems In a Daisy-Chain Work Group



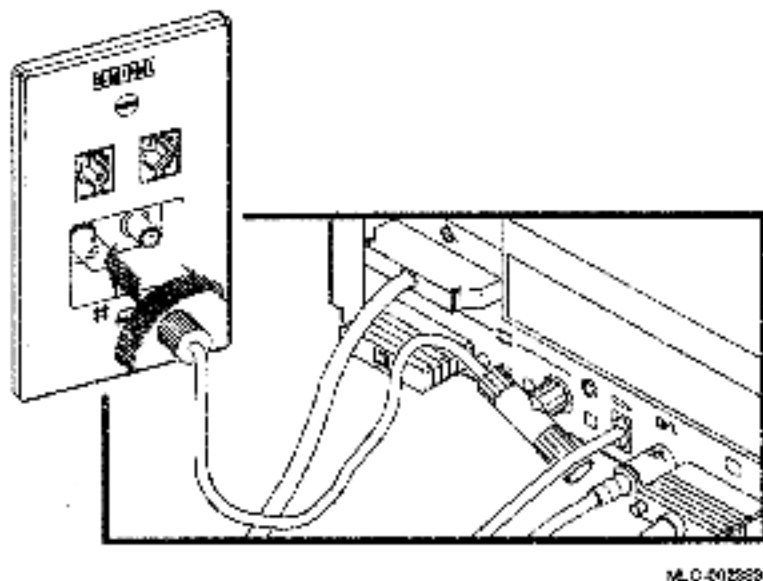
WLO-002134

5.2.5 Connecting to a DECconnect Faceplate

If your office has been wired with Digital DECconnect products, you must connect your Model 76 to the DECconnect faceplate in your office (Figure 5-5). To connect your system to a DECconnect faceplate, follow these steps:

- 1 Attach one end of the ThinWire Ethernet cable to the faceplate.
- 2 Check that the other end of the ThinWire Ethernet cable is firmly attached to the ThinWire Ethernet port on the back of your system unit. Figure 5-5 shows a VAXstation 3100 plugged into a DECconnect faceplate.

Figure 5-5 Connecting to a DECconnect Faceplate



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5.2.6 Troubleshooting the ThinWire Ethernet Segment

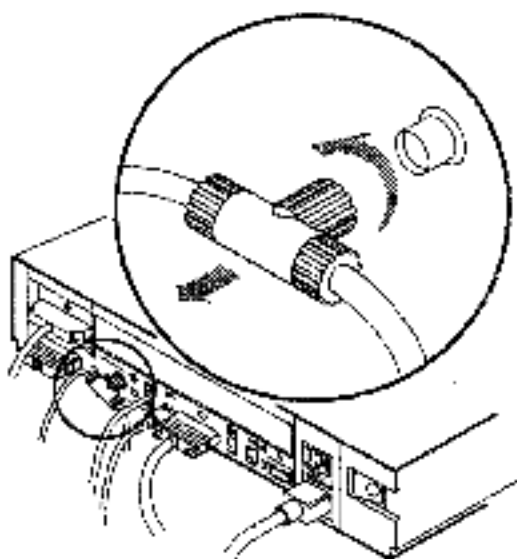
If you have verified your ThinWire Ethernet installation (Section 5.2.2) and have found problems, use the following checklist to make sure all connections are correct:

- 1 Check that the green light to the right of the network button is on.
- 2 Check that the T-connector has not been disconnected from an operating ThinWire Ethernet segment.

Note *If you need to remove a system from an active ThinWire Ethernet segment, disconnect the center of the Tconnector directly from the system.*

Figure 5-6 shows the correct way to remove a T-connector from an active ThinWire Ethernet segment.

Figure 5-6 Removing a T-Connector from an Active ThinWire Segment



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- 3** Make sure that no more than two ThinWire Ethernet segments are connected to the T-connector. If you remove a ThinWire Ethernet cable, replace it with a terminator.
- 4** Check that you have not disconnected a terminator from either end of an active ThinWire Ethernet segment. This procedure disrupts network operation.
- 5** Check that all connections on the ThinWire Ethernet segment are secure.
- 6** After you have checked all ThinWire Ethernet connections, retest the Ethernet by entering the following command at the console prompt:

```
>>> test 1 Return
```

If a connection is established, the following display appears:

```
1...  
>>>
```

If a connection is not established, the following message appears:

```
1?...  
84 FAIL  
>>>
```

Note Make sure the network button is in the correct position: out for standard Ethernet, in for ThinWire Ethernet.

- 7 If a connection is not established, follow these steps to find the source of the failed connection:

- Remove the T-connector from the ThinWire Ethernet port on the back of your system unit.

Note If you need to remove a system from an active ThinWire segment, disconnect the center of the T-connector directly from the system.

- Take the T-connector and two terminators you received with your system and plug the two terminators into the T-connector. Plug this T-connector with the terminators attached into the ThinWire Ethernet port on the back of the system unit.
- Enter the following command at the console prompt:

```
>>> TEST 1 [Enter]
```

If TEST 1 passes, the following display appears:

```
1...  
>>>
```

If TEST 1 fails, you have an internal hardware problem with your VAXstation S100 and need to call your Digital service representative.

5.3 Connecting to a Standard Ethernet Network

This section covers the tasks involved in connecting your system to a **standard Ethernet network**:

- Setting the network button
- Verifying a standard Ethernet network
- Troubleshooting standard Ethernet
- Connecting a transceiver cable to your Model 76 system



5.3.1 Setting the Network Button

To use standard Ethernet on your Model 76 system, follow these steps:

- 1 Press the network button on the back of the system unit (see Figure 5-1) to the standard Ethernet (out) position.
- 2 When you turn on your system, the green light to the left of the network button comes on, indicating you may connect to standard Ethernet.

5.3.2 Verifying Standard Ethernet Network Installation

To verify standard Ethernet installation, follow these steps:

- 1 Check that the Ethernet loopback connector is attached to your system unit. If you have not attached the loopback connector, see Section 2.3.4.
- 2 Turn your system on (). The light at the end of the loopback connector should come on. The following display appears on your monitor screen:

KAC2-A V1.0

```
F...E...D...C...B...A_9...8...7...6...5...4...3...2...1
>>>
```

- 3 At the console prompt, enter the following command:

```
>>> SHOW ETHERNET [turn on]
```

The Ethernet hardware address appears on the screen in the following format:

```
ID XX-XX-XX-XX-XX-XX
```

For example:

```
ID 08-00-2B-02-CE-71
```

Note The letters ID are not part of the address. Each Ethernet hardware address is unique.

- 4 Write your Ethernet hardware address here:

```
Ethernet hardware address _____
```

You need the Ethernet hardware address as system identification during software installation and VAXcluster configuration.

- 5 At the console prompt, enter TEST 60 and press Return.

If the last line of the display is NI 0100.0001, the standard Ethernet subsystem is installed and working.

If a number between 0100.0002 and 0100.7XXX appears on that line, there is a failure in the Ethernet subsystem. See Section 5.3.3 for troubleshooting.

If NI 0100.7XXX or any number above 0100.7XXX appears on that line, check all Ethernet connections.

- 6 After successfully completing the power-up self-test and verifying the network, remove the loopback connector and store it for future diagnostic testing.
- 7 Proceed to Section 5.3.4, Connecting a Transceiver Cable.

5.3.3 Troubleshooting Standard Ethernet

If your standard Ethernet TEST 50 display includes data on the last line of information above the console prompt (>>>), you need to run some **diagnostics**:

- 1 Make sure the loopback connector is securely connected to the system and the green light is on.

Note *If your system is already connected to an active Ethernet segment, your system can be tested in console mode without a loopback connector.*

- 2 Turn your system off (O) and then on (I) again. Ethernet connection is verified during the power-up sequence.
- 3 After you have checked all Ethernet connections, retest the Ethernet subsystem. At the console prompt, enter the following command:

```
>>> TEST 5 [Enter]
```

If a connection is established, the following display appears:

```
1...  
>>>
```

If a connection is not established, the following message appears:

```
1?...  
84 FAIL  
>>>
```

Note *Make sure the network button is in the correct position: out for standard Ethernet, in for ThinWire Ethernet.*

If TEST 1 fails, you have an internal hardware problem and need to call your Digital service representative. Make a note of the code that appears on your screen along with the fail message, and provide this information when you call.

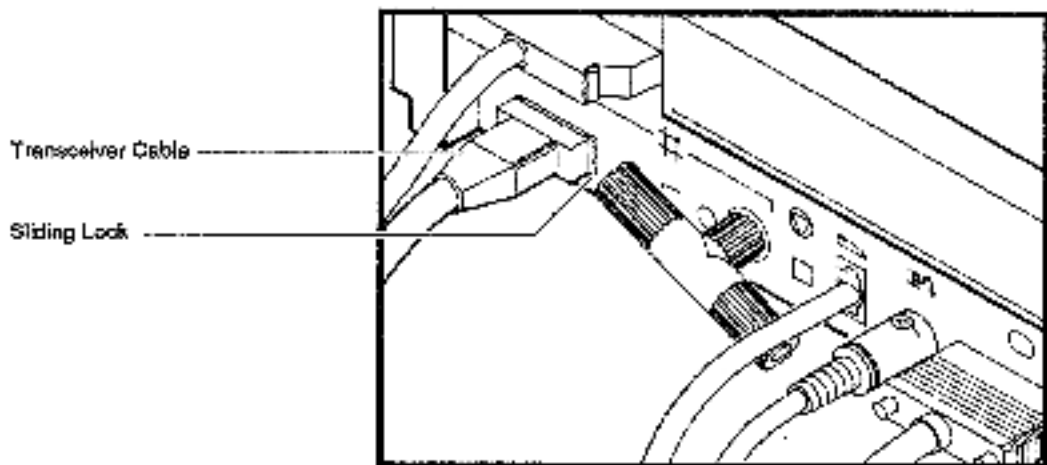
5.3.4 Connecting a Transceiver Cable

A **transceiver cable** is the physical connection among a standard Ethernet network interface, the H4000 or H4005 transceiver, the DELNI transceiver tap, and a VAXstation 3100 system.

If your work environment is set up for standard Ethernet, follow these steps to connect the transceiver cable (Figure 5-7):

- 1 Turn the system unit off (O).
- 2 Remove the loopback connector.
- 3 Attach the 15-pin connector on the standard Ethernet transceiver cable to the back of the system unit (Figure 5-7).
- 4 Using a screwdriver, move the sliding lock shown in Figure 5-7 to the left. Insert the standard Ethernet transceiver cable and slide the sliding lock to the right.

Figure 5-7 Connecting a Transceiver Cable to the System Unit



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Troubleshooting

This chapter tells you how to do the following:

- Identify a problem (Section 6.1)
- Use the troubleshooting table (Section 6.2)

If you know the source of your problem, see Table 6-1 for suggested solutions.

6.1 Identifying a Problem

To determine where your problem is, follow these steps:



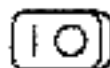
- 1 Refer to your operating system documentation for shutdown procedures before turning off your Model 76 system and SCSI devices. Devices may not be added to the SCSI bus, removed from the SCSI bus, or recabled while the operating system is running.

Caution *Failure to meet this requirement may cause loss of user data or system failure.*

- 2 Turn all expansion boxes off (O).
- 3 Turn the monitor and all **peripheral devices** such as printers and modems off (O).
- 4 Turn the system unit off (O).
- 5 Check that the following cables are correctly connected at both ends:
 - Monitor video cable
 - Monitor power cord
 - System power cord

- Expansion box connector cable
- Expansion box power cord
- Keyboard cable
- Mouse/tablet cable
- Network cables

At this point, all components should be off.



- 6 Now turn your equipment on (1), in the order given in the following list.
 - BA42 storage expansion boxes
 - Compact disc expansion box
 - Printer
 - Monitor
 - System unit

- 7 Adjust the brightness and contrast on your monitor.

If you still have a problem, refer to Table 6-1.

If you have not found a solution to your problem after checking the troubleshooting tables, run system diagnostics as described in Chapter 7.

6.2 Using the Troubleshooting Table

After you have determined the source of your problem, follow these steps:



- For monitor problems, see your monitor guide.
- For network problems, see Chapter 6.
- For problems with the compact disc drive, see the diagnostic information in the compact disc drive owner's manual and in Section 7.8.1.
- For other problems, do the following:
 - 1 Note the symptoms of the problem.
 - 2 Locate a description of the symptom in the Symptom column of Table 6-1.
 - 3 Check the conditions for that symptom in the Possible Cause column. If more than one possible cause is given, check the possible causes and their suggested solutions in the order listed.

- 4 Follow the advice in the Suggested Solution column.
- 5 Run system diagnostics, as described in Chapter 7.
- 6 If the problem persists, call your Digital service representative.

Table 6-1 Troubleshooting

Symptom	Possible Cause	Suggested Solution
System Unit Problems		
System unit fan is off	Power cable is not connected.	Check the power cable connections at both ends.
	Power supply or system unit fan has failed.	Contact your Digital service representative.
Power Light is off	Power cable is not connected.	Check the power cable connections at both ends.
	Wall socket may not be working.	Try a different wall socket, or try an electrical device that you know works in the wall socket. Turn the system off for 10 seconds and then back on. Turn the system off. Unplug the video cable, communications cable, and printer. Then plug all cables back in and turn the system on. Contact your Digital service representative.
Power-up display does not show after 2 minutes.	Monitor power cord or video cable is not connected.	Check that the monitor power cord and video cable are plugged in at both ends.
	Alternate console switch is in the wrong position.	Move the alternate console switch to the correct position. See Section A.4.
	Monitor brightness and contrast controls are too dark to show the screen display.	Adjust the monitor brightness and contrast controls. Verify that the monitor power switch is on (I).
	Keyboard cable is not connected.	Check the keyboard cable connection.
	Monitor fuse is blown.	See your monitor guide for fuse replacement instructions.
	Wall socket may not be working.	Try a different wall socket, or try an electrical device that you know works in the wall socket. If the problem persists, contact your Digital service representative.

(continued on next page)

Table 6-7 (Cont.) Troubleshooting

Symptom	Possible Cause	Suggested Solution
System Unit Problems		
Power-up display contains question marks or asterisks.	If you have a monochrome system with color monitor.	Check system and monitor to make sure that both are color or monochrome.
	Eight-plane graphics coprocessor module is installed, but the new color cable is not installed.	Install the color cable.
Window display does not appear on the screen. (System does not boot.)	Possible system error; can be a soft error or a hard error.	If question marks or asterisks appear with any numbers in the power-up display, see Section 7.1.1, Section 7.2, and Section 7.7 for further test instructions.
	Software is not installed.	See your software documentation for installation instructions. See Section 7.2, Section 7.3, and Section 7.7 for further test instructions.
	Video option has failed.	See Section 7.2 and Section 7.7 for more information.
	Software problem.	Call your Digital service representative.
	Default recovery action is set to halt.	Change the default recovery action to boot the system from the system disk. See Appendix A.
	Incorrect boot device has been specified.	Change the default recovery action to boot the system from the system disk. See Appendix A.
Monitor Problems		
No display on monitor screen.	Monitor is not turned on.	Check monitor on/off switch. Check that monitor power cable is connected at both ends.
	Contrast and brightness controls are too dark to show the screen display.	Adjust the contrast and brightness controls. Refer to your monitor guide for more information.
	Color board installed, no color cable or monochrome monitor.	Check for color cable or monochrome monitor.
	Monochrome system, color monitor.	Make sure your system and monitor match up with color system to color monitor, or monochrome system to monochrome monitor.

(continued on next page)

Table 6-1 (Cont.) Troubleshooting

Symptom	Possible Cause	Suggested Solution
Mouse/Tablet Problems		
Pointing device (mouse or optional tablet) pointer does not appear on the screen, or the monitor does not respond to pointing device commands.	Pointing device cable is installed incorrectly or is loose.	Turn off system. Unplug and then replug the cable to reset the device.
	System is in console mode; no pointer appears on the screen.	Install your windowing software.
	Pointing device is faulty	Replace with another pointing device, or call your Digital service representative.
Keyboard Problems		
Keys do not work.	Hold Screen key is active.	Press the Hold Screen key to release the hold on the screen.
	Keyboard cable is loose or not connected.	Check the keyboard cable at both ends.
	Keyboard has failed.	Replace the keyboard. If the problem persists, contact your Digital service representative.
Compact Disc Drive Problems		
Refer to the compact disc drive owner's manual.		
See Section 7.3.1 in Chapter 7 of this manual for additional information.		
BA42 Storage Expansion Box Problems		
Refer to the <i>BA42 Storage Expansion Box Installation Guide</i> .		

(continued on next page)

Table 6-1 (Cont.) Troubleshooting

Symptom	Possible Cause	Suggested Solution
Disk and Diskette Problems		
Software does not boot from the hard disk.	A problem exists with the hard disk.	See Section 7.3, Section 7.4, and Section 7.7.
	Default boot device is set incorrectly.	See Appendix A to set or change the default boot device.
	Recovery action may be set to halt.	See Appendix A to change the default recovery action.
	A problem exists with the software (if installed) on the hard disk.	Refer to your software documentation for help.
Software does not boot from the diskette drive, or a diskette read or write error message is displayed.	No diskette in the diskette drive.	Insert a diskette with bootable software. Use instructions in software documentation.
	Diskette was inserted incorrectly.	Check that the write-protect notch on the diskette is to your left when you insert the diskette and that the label is up.
	Diskette is damaged or does not contain bootable software.	Try another diskette that contains bootable software.

Running Diagnostics

This chapter describes some of the diagnostics you can run on your Model 76 system to check that the system is running correctly. It also describes messages commonly displayed during system power-up.

This chapter tells you how to do the following:

- Read power-up messages (Section 7.1)
- Run self-tests (Section 7.2)
- Read the configuration display (Section 7.3)
- Test internal storage devices (Section 7.4)
- Test memory modules (Section 7.5)
- Read the device display (Section 7.6)
- Use the system exerciser (Section 7.7)
- Run the test utilities (Section 7.8)
- Change the keyboard language (Section 7.9)
- Interpret console commands (Section 7.10)
- Use the password security feature (Section 7.11)
- Reboot the system after running tests (Section 7.12)
- Call your Digital service representative (Section 7.13)

For information on status and test codes, see Appendix C.

7.1 Reading Power-Up Messages

Every time you turn your system on, the system runs power-up tests to check all the devices installed in your system. As each device is tested, a test number is displayed on the terminal screen. Diagnostic lights on the rear of the system unit indicate the status of the system as it is powering up.

Note The system may take from 60 to 90 seconds to display the power-up test sequence.

Upon successful completion of the tests, the operating system starts to boot.

Note If your monitor does not display any information on the screen after the power-up test sequence (approximately 1 second), you may have a monitor, video, or system board failure. Check your monitor guide or chapter 6 of this manual.

An example of a power-up screen display follows:

KA43-A V1.0 ①

F...E...D...C...B...A...9...8...7...6...5...4...3...2...1... ②

- ① The CPU designate (KA43-AA) and the read-only memory (ROM) version (V1.0)
- ② Test numbers for each device in system. See Table 7-1 to identify the devices. Three dots (...) after a test number indicate that the device tested successfully. An underscore and two dots (..) indicate that the optional device is not installed or that the device has not been tested. Question marks or an asterisk indicate an error; see Section 7.1.1.

To look at the status of a device, display the configuration table by running TEST 50 as described in Section 7.3.

Table 7-1 Device Identifiers in Power-Up and Self-Tests

Identifier	Mnemonic	Device
F	MONO	Base video
E	CLK	System clock
D	NVR	Nonvolatile RAM
C	DZ	Serial line controller
B	MEM	Memory
A	MM	Memory-management unit
9	FP	Floating point unit
8	IT	Interval timer
7	SCSI-A	SCSI-A bus controller
6	SCSI-B	SCSI-B bus controller
5	SYS	Interrupt controller and Ethernet ID ROM
4	SPLN	Optional 8-plane graphics coprocessor
3		Reserved
2		Reserved
1	NI	Ethernet network interconnect

7.1.1 Power-Up Error Messages

If an error is detected during power-up, the power-up sequence contains question marks or asterisks next to the identifier for which the error was detected. For example:

F...E...D...C...B...A...9...8...7...6?...5...4*...3...2...1...

A single question mark (?) next to a device identifier indicates a minor problem that probably will not interfere with the system power-up. See Section 7.1.2 for examples of problems flagged with a single question mark.

A double question mark (??) indicates a serious problem that will affect normal operation and use of the system. The device may need to be replaced. Contact your Digital service representative.

An asterisk (*) means that the device is installed but its ROM code is not executed. Only device identifiers 7, 6, or 4 can have an asterisk (*).

Use Table 7-1 to identify the faulty or corrupted device. Then run a self-test on that device.

To look at the status of a device, display the configuration table by running TEST 50 (see Section 7.8).

7.1.2 Power-Up Status Messages

Common power-up status messages are explained here:

1 System clock not set

? E 0040 0000.0005

The system clock has not been set. Setting the clock is a normal part of software installation. The clock cannot be set while the system is in console mode. Once you have set the clock, this code will clear the next time the system is powered up.

2 Low battery

? D 0050 0000.0005

The system battery's charge is low or completely discharged. Run the system for about 17 hours to fully recharge the battery.

3 No devices connected to internal SCSI-A bus

? T 00A0 0000.4001

4 No devices connected to external SCSI-B bus

? S 00A0 0000.4001

5 No Ethernet cable (ThinWire)

?? 1 00C0 0000.7004

This message indicates one or more of the following:

- No cable is installed on the ThinWire Ethernet connectors.
- No terminator is on the ThinWire Ethernet (port), or no terminator is present at one or both ends of the segment.
- The network button is set to the wrong position (it should be in for ThinWire Ethernet, out for standard Ethernet).
- There is a faulty cable or loose connection.

6 No Ethernet cable (standard)

?? 1 00C0 0011.700E

This message indicates one or more of the following:

- No cable is installed on the standard Ethernet connectors.
- No loopback connector is installed on the standard Ethernet port.
- The network button is set to the wrong position (it should be in for ThinWire Ethernet, out for standard Ethernet).
- There is a faulty cable or loose connection.

See Section 6.1 for the correct order in which to turn your system components off (O) and on (I).

To correct the problem, turn the system off (O) and check each of the above possible problems. Now turn the system back on (I). If you get the same message again, you may have a hardware problem with your Ethernet **module**.

Note See your operating system documentation for shutdown procedures before halting your system.

7.2 Running Self-Tests

Self-tests are used to display the status of the devices installed on your system. Self-test diagnostic programs reside permanently in the Model 76 ROM.

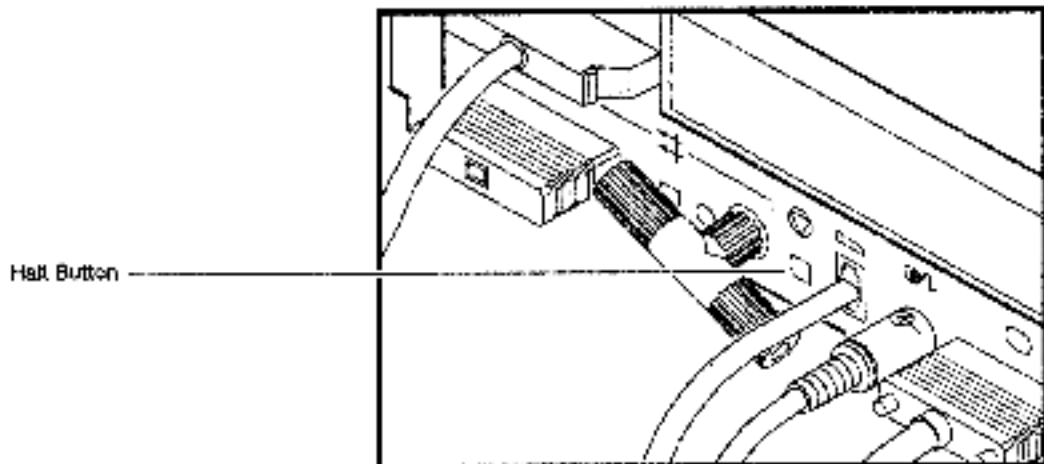
To test a device in your Model 76 system, follow these steps:

- 1 Use Table 7-1 to find the number or letter identifier for the device you want to test.
- 2 Put your Model 76 system in console mode by pressing the halt button on the back of the system unit. Figure 7-1 shows the location of the halt button.

Note See your operating system documentation for shutdown procedures before halting your system.



Figure 7-1 Halt Button



M/C-007330

- 3 Enter **TEST** and a space followed by the device identifier, and press Return.

```
>>> TEST 7 Return
```

In this example, the SCSI-A bus **controller** is being tested. If you want to test a consecutive series of devices, enter **TEST** followed by the first and last numbers of the series:

```
>>> TEST F 7 Return
```

In the above example, the system tests device F, then E, D, C, B, A, 9, 8, and 7.

The system displays the number of each device as it is tested, followed by three periods (...). If the self-test is successful, no question mark or error message is displayed, and the console prompt appears after the last device has been tested:

```
?...  
>>>
```

If the device is not installed, or is not tested, an underscore and two dots (..) are displayed before the console prompt appears:

```
?_..  
>>>
```

If a device fails the self-test, a question mark (?) follows the device identifier and a failure message is displayed before the console prompt appears:

```
???.  
 84 FAIL  
>>>
```

If a self-test results in a failure, enter the TEST 50 command to display your system configuration. You do not need to press the halt button.

Call your Digital service representative.

7.3 Reading the Configuration Display

The configuration display is a table that lists the status of each device installed in your system. The configuration table holds the results of the self-tests and power-up tests and is updated each time the self-test is run.

To display your system configuration, perform the following steps:

- 1 Put the Model 76 in console mode by pressing the halt button on the rear of the system.

Note See your operating system documentation for shutdown procedures before halting your system.

- 2 Enter the following:

```
>>> TEST 50 RETURN
```

This procedure displays the system configuration, Ethernet hardware ID, ROM revision levels, and status information. Error information in the configuration display is valuable to your Digital service representative. See Appendix C for additional information about status and error codes in the configuration display.

A sample configuration display follows:

```

KA43-A V1.0      ①
ID 08-00-2B-07-E3 ②

MONO      0000.0001 ③
CLK        0000.0001
NVR        0000.0001
DZ         0000.0001
           00000001 00000001 00000001 00000001 00000001 000012AC ④
MEM        0010.0001
           C1000000 ⑤
MM         0000.0001
FP         0000.0001
IT         0000.0001

SCSI-A     262B.0001 V1.59 ⑥
           FFFFFFF05 FFFFFFF05 FFFFFFF05 00000001 FFFFFFF05 01000001 FFFFFFF03 FFFFFFF05
SCSI-B     1C1C.0001 V1.59
           FFFFFFF05 FFFFFFF05 00000001 00000001 05000001 FFFFFFF05 FFFFFFF03 FFFFFFF05
SYS        0000.0001
OPIN       0000.0001 V1.3
NI         0000.0001
>>>

```

- ① CPU designate (KA43-AA) and ROM version (V1.0)
- ② Ethernet hardware address
- ③ Status codes for devices (see Appendix C)
- ④ DZ status codes (see Section 7.3.1)
- ⑤ 16 megabytes of memory (see Section 7.5 for more information)
- ⑥ SCSI status codes (see Section 7.4)

Table 7-1 gives the mnemonics for devices that may be part of your configuration.

Any code in the configuration table other than 0000.0001 on the lines for MONO, DZ, MM, FP, IT and SYS devices indicates a hard error. If you observe such a code, contact your Digital service representative.

The other devices (CLK, NVR, MEM, SCSI-A, SCSI-B, SPLN, and NI) may have a code other than 0000.0001 and still operate normally.

Note To update the information in the configuration display after making a change to the system configuration, you can either power up the system or enter the following command:

```
>>> TEST F 1 [Enter]
```

Reenter the TEST 50 command to view the current configuration status.

7.3.1 DZ Status Codes

The DZ status codes cover the status of the four serial lines, the keyboard, and the mouse or tablet. The DZ lines from the previous example are explained in detail here:

```
DZ      0000.0001
      00000001  00000001  00000001  00000001  00000001  000012A0
           ①      ②      ③      ④      ⑤      ⑥
```

- ① Keyboard port status
- ② Video port status
- ③ Communications port status
- ④ Printer port status
- ⑤ Keyboard self-test
- ⑥ Mouse or tablet self-test

Any status code other than 00000001 for the four ports and keyboard indicates a failure on that line. A status code of 00000000 for the keyboard indicates that the keyboard is disconnected. A status code for the mouse or tablet other than 000012A0 (good) or 00000000 (nothing connected) indicates a device failure.

7.3.2 Configuration Display on a Diskless System

If you have a diskless system, the TEST 50 command will produce a configuration display similar to the following:

```
KR43-A V1.0
ID 00-00-2B-07-05-02

MONO      0000.0001
CLK       0000.0001
NVR       0000.0001
DZ       0000.0001
          00000001 00000001 00000001 00000001 00000001 000012A0
MEM       0000.0001
          00000000
MM        0000.0001
FP        0000.0001
IT        0000.0001
SYS       0000.0000
BPLM     0000.0001 V1.3
NT        0000.0001
>>>
```

7.4 Testing Internal Storage Devices

You can use the TEST 50 command to check the status of hard disk drives and any diskette drive installed in your system unit.

To determine the status of a device from the TEST 50 configuration display, you must first do the following:

- Ascertain the device's SCSI ID setting from the address column in the device display, explained in Section 7.6.
- Find the SCSI-A line in the TEST 50 display.

The eight alphanumeric SCSI-A codes (SCSI IDs 0 through 7, numbered ❶ through ❸ in the following example) tell the functional status of each device:

```
SCSI-A      2020.0001 V1.3
FFFEFF01 FFEFF05 FFEFF05 00000001 FFEFF05 FFEFF05 FFEFF03 FFEFF05
 ❶       ❷       ❸       ❹       ❺       ❻       ❼       ❽
```

- ❶ SCSI ID 0 — Open
- ❷ SCSI ID 1 — Open
- ❸ SCSI ID 2 — Open
- ❹ SCSI ID 3 — RZ22, RZ23, or RZ24 hard disk
- ❺ SCSI ID 4 — Open
- ❻ SCSI ID 5 — Open

⑦ SCSI ID 6 — SCSI-A bus controller

⑧ SCSI ID 7 — Open

In this example, the absence of two question marks in the left column indicates that no failure has been detected. Two question marks in the left column indicate that one or more of the drives are faulty. To determine which device is faulty, examine the status codes. A status code different from those listed in Table 7-2 may indicate a faulty device.

Table 7-2 SCSI Status Codes Indicating Good Devices

Status Code	Device
FFFFFFFF08	SCSI-A bus controller
00000001	RZ22, RZ23, RZ24, or RX23 drive

The status codes in Table 7-3 may indicate faulty devices or open SCSI IDs.

Table 7-3 SCSI Status Codes Indicating Possible Problems

Status Code	Device
FFFFFFFF05	Device is offline or not installed at this address
FFFFFFFFFF	Device was not tested—possible SCSI bus controller error

A device code of FFFFFFFF05 in the SCSI-A line indicates that the device's SCSI ID may be set incorrectly, that the device cabling may be disconnected, or that the device is not installed. Halt your system then turn it off and check the device's cabling and SCSI ID setting. Then turn your system on and retest it. If the code is still FFFFFFFF05 after retesting, call your Digital service representative.

If you see any code different from those listed in Table 7-2 and Table 7-3, make sure that no two devices are set to the same SCSI ID. If you still have problems, call your Digital service representative.

For more information on SCSI status codes, see Appendix C.

7.5 Testing Memory Modules

To check the functional condition of **memory modules**, find the memory (MEM) line in the configuration display. If a system's memory is good, a line similar to the one below appears:

```
MEM          0008.0001 ❶  
              00800000 ❷
```

The 8-digit decimal code following MEM (❶) indicates the amount of error-free memory available, as follows:

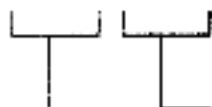
Table 7-4 8-Digit Memory Decimal Code

Code	Available Memory
0004.0001	4MB
0008.0001	8MB
000C.0001	12MB
0010.0001	16MB
0014.0001	20MB
0018.0001	24MB
0020.0001	32MB

In the bit map representation in Example 7-1, each digit represents a SIMM memory module and four banks of memory (1 bank = 1 megabyte). A digit other than 0 indicates an error on a SIMM memory module.

Example 7-1 SIMM Memory Error Display

```
?? MEM      0010.0020
            01000000 00000000
```



Bit map representation of the failed memory bank on a memory module. If not all zeroes (00000000).

This field is displayed only when a failure is detected on one of the SIMM modules.

Hexadecimal representation of the total amount of memory in the system as listed below.

00400000	4MB
00800000	8MB
00C00000	12MB
01000000	16MB
01400000	20MB
01800000	24MB
01C00000	28MB
02000000	32MB

To determine which are the failing modules, do the following:

- 1 Refer to Table 7-5 and find the line that shows your system's total memory module configuration.
- 2 Check the position of the nonzero digit in the 8-digit number. Then refer to Table 7-5 to determine which module or modules are failing.

Table 7-5 Locating a Failed SIMM Memory

Memory Module Configuration SIMM Cailout on System Module	8-Digit Error Code for MEM							
	8	7	6	5	4	3	2	1
SIMM 1 ¹	0	0	0	0	0	0	0	X ²
SIMM 2 ¹	0	0	0	0	0	0	X ²	0
SIMM 3 ¹	0	0	0	0	0	X ²	0	0
SIMM 4 ¹	0	0	0	0	X ²	0	0	0
SIMM 5 ¹	0	0	0	X ²	0	0	0	0
SIMM 6 ¹	0	0	X ²	0	0	0	0	0
SIMM 7 ¹	0	X ²	0	0	0	0	0	0
SIMM 8 ¹	X ²	0	0	0	0	0	0	0

¹Memory modules are numbered from 0 through 7 in SIMM memory error displays, but on the CPU module they are numbered 1 through 8.

²A 0 in this SIMM location means this SIMM is good. Any other code indicates this SIMM is failing. For example, a code of 00004000 indicates that the SIMM numbered 4 on the eth of the system module is bad.

7.6 Reading the Device Display

Use the **SHOW DEVICE** command to display a list of the devices installed in your system and their locations on the SCSI bus:

```
>>> SHOW DEVICE disk
```

① VMS/VMS	② ADDR	③ DEVTYPE	④ NOBYTES	⑤ RM/FX	⑥ WF	⑦ DEVNAM
ESAO	06-00-2D-07-E3-63					
DKA300	A/3/0/00	DISK	104 MB	FX		R223
...HostID...	A/6	INITR				
DKB200	B/2/0/00	DISK	104 MB	FX		R223
DKB300	B/3/0/00	DISK	104 MB	FX		R223
DKB400	B/4/0/00	RODISK	205 MB	RM	WF	RSD40
...HostID...	B/6	INITR				

>>>

- ❶ Device numbers for the VMS operating system
- ❷ Address—Tells which SCSI bus (A or B) a device is on and what the device's SCSI ID setting is
- ❸ Device type (disk or RODISK (read-only disk)); INTR (initiator) is the host Model 76
- ❹ Number of megabytes available

Note *The compact disc (RRD40 in this example) is a read-only device. The display in this column varies for this device, depending on the number of files loaded on the compact disc by the manufacturer.*

- ❺ Removable (RM) or fixed (FX) disk
- ❻ Write-protected
- ❼ Device name
- ❽ Ethernet device and Ethernet hardware address

Consider, for example, the following line from the previous display:

```
DKB400 R212 B/4/0/00 RODISK 205 MB RM WP RRD40
```

This line indicates a compact disc drive (the RRD40 in this example), located at address ID 4 on the SCSI-B bus. The compact disc is a read-only, removable disc and is write-protected.

7.7 Using the System Exerciser

If you suspect system problems, use the system exerciser to check the quality of your software media.

Emulating an operating system, the system exerciser interacts among and tests all internal and external devices on the system. Use the system exerciser if your system has intermittent problems. It first exercises each device individually, then exercises them all simultaneously. The system exerciser takes as long as 11 minutes to complete. It does not write on any medium.

Note *See your operating system documentation for shutdown procedures before halting your system.*

To run the system exerciser, follow these steps:

- 1 Insert media in all devices. Put the test disc in the compact disc drive and a blank diskette in the RX23 diskette drive.



- 2 Put the system in console mode by pressing the halt button on the back of the system unit.
- 3 Enter the following command:

```
>>> TEST C [Newman]
```

The following example shows the type of display that appears after the system exerciser has run all tests.

```

RA43-A V1.0          01      00

F  C0B0  MCNO  0000.0001  11 1005      0 00:00:35
C  C0B0  DZ   0000.0001  14             0 00:01:12
B  C010  MEM   0010.0001   5 00A7      0 00:02:02
7  C090  SCSI-A 6000.0001  22 0C02      0 00:02:23
                                3200.0001 ①
6  C0A0  SCSI-B 6000.0001  15 0C02      0 00:02:56
                                3200.0001 ②
                                3200.0001 ③
                                4100.0001 ④
1  C0C0  KZ   0000.0001   9             0 00:04:01
⑤ ⑥      ⑦      ⑧

DC  C.00:00:14
706 KLT INST
PC - 00005207
>>>

```

- ① RZ23 disk drive (user disk)
- ② RZ35 disk drive (system disk)
- ③ RZ35 disk drive (user disk)
- ④ Compact disc drive
- ⑤ Test identifier (see Table 7-1)
- ⑥ Device identifiers
- ⑦ Device mnemonic (see Table 7-1)
- ⑧ Status and error information

Various **graphics** tests are displayed on the screen during the system exerciser. Single question marks provide status information and do not interfere with the operation of the system. Double question marks in the final display indicate errors.

If you see double question marks, call your Digital service representative for assistance.

7.8 Running the Test Utilities

This section discusses the compact test utility and the erase disk utility for SCSI hard disks.

Note *If an expansion box fails, first check all cable connections.*

7.8.1 Compact Disc Test Utility

The compact disc drive is shipped with a test disc for use when you suspect compact disc drive problems. Follow these steps to test your compact disc drive.

Note *See your operating system documentation for shutdown procedures before halting your system.*

- 1 Press the halt button on the back of your system unit. The console prompt (>>>) is displayed on your screen.
- 2 Insert the test disc in the compact disc drive, following the instructions in Section 4.6.4.
- 3 Enter TEST 0 and press Return. The system exerciser display appears on your screen.
- 4 The numbers 4100.0001 as part of the system exerciser display indicate a normal response code.
- 5 A 4101.0471 error code on the screen display indicates a problem with the compact disc drive. A 4104.0A71 error code on the screen display indicates that the compact disc drive has failed the test. Do not use the drive. Call your Digital service representative for assistance.

7.8.2 Erase Disk Utility for SCSI Hard Disks

The erase disk utility erases all data on a specified hard disk.

Caution *This utility destroys all data on the hard disk.*

Note *See your operating system documentation for shutdown procedures before halting your system.*



- 1 Press the halt button on the back of your system unit. The console prompt (>>>) is displayed on your screen.
- 2 Enter SHOW DEVICE and press Return.
- 3 Enter TEST 50 and press Return. See Section 7.3 for an example of the TEST 50 screen display.
- 4 Identify the SCSI ID of the hard disk you wish to erase. See Appendix B for SCSI ID information.
- 5 Enter TEST 75 and press Return.

The following example shows the erase disk utility erasing the hard disk in the BA42 storage expansion box. The hard disk in this example is located on SCSI-B bus address ID 1. The erasing procedure completes successfully.

Note The output below is common to both formatting and erasing programs. When you run the TEST 75 erasing program, the formatting portion is not activated. Successful erasure does not produce the readout on line 6.

Caution This utility destroys all data on the hard disk.

```
>>> TEST 75 [Enter]

EraseHDerase
PV_SCS_FMT_CHN (0=SCSI-A, 1=SCSI-B)? : [Enter] ①
PV_SCS_FMT_ID (0,1,2,3,4,5,6,7)? : 1 [Enter] ②
PV_SCS_FMT_VERIFY (1/0)? : 1 [Enter] ③

PV_SCS_FMTING..... ④
PV_SCS_FMT_BBrep1=0 ⑤
PV_SCS_FMT_SUCC ⑥

>>>
```

- ① Select the SCSI-A bus or SCSI-B bus. SCSI-B bus was selected in this example.
- ② Specify the SCSI ID. SCSI ID 1 was selected in this example.
- ③ Provide verification of your action: 1 = yes; 0 = no.
- ④ Your hard disk is being erased.
- ⑤ The number of bad blocks is listed.
- ⑥ Your hard disk has been successfully erased.

Running the erase disk utility on the hard disk located at SCSI address ID 3, the SCSI-B bus, produces a screen display like the one below, which includes an error:

```
>>> TEST 75 Return

ScsiHderase
PV_SCS_FMT_CHN (0=SCSIA, 1=SCSIB)? 1 Return
PV_SCS_FMT_ID (0,1,2,3,4,5,6,7)? 3 Return
PV_SCS_FMT_RSure (1/0)? 1 Return

PV_SCS_FMTing.....7
PV_SCS_FMT_ERR#3
>>>
```

Table 7-6 lists and explains all possible erase disk utility error messages.

Table 7-6 Error Messages for the Erase Disk Utility

Code	Meaning
1	Illegal unit number entered
2	Error occurred during a SCSI bus command
3	Reassign blocks failed (no more replacement blocks available)
4	Unit not ready
5	Illegal device type for operation
6	SCSI bus hung after reset attempts
7	Data comparison error

7.9 Changing the Keyboard Language

To change the language of your keyboard, follow these steps:

- 1 Press the halt button on the back of your system unit to put your system in console mode.
- 2 At the console prompt (>>>), enter SET KBD and press Return. The Keyboard Language menu appears.
- 3 Select a language from the Keyboard Language menu.

Note See your operating system documentation for shutdown procedures before halting your system.

7.10 Interpreting Console Commands

Console commands and the tests or utility programs they execute are listed in Table 7-7, Table 7-8, and Table 7-9.

To see a list of these commands, enter **HELP** at the console prompt and press **Return**.

Table 7-7 SHOW Commands

Command	Information Displayed
HELP	All commands
SHOW BFLG	Default boot flag
SHOW BOOT	Default boot device (see Section A.3)
SHOW DEVICE	Boot devices available
SHOW ETHER	Ethernet Hardware address
SHOW HALT	Default action after your system halts (see Section A.2)
SHOW KBD	Keyboard type selected (see Section 7.9)
SHOW MEMORY	Memory for your system unit
SHOW PSE	Password enable bit
SHOW SCSI-A	SCSI-A bus host ID number
SHOW SCSI-B	SCSI-B bus host ID number
SHOW VER	Version of ROM

Table 7-8 SET Commands

Command	Default Set
SET BFLG	Default boot flag
SET BOOT	Default boot device
SET HALT	Default recovery action
SET KBD	Keyboard language
SET PSE	Password enable bit
SET PSWD	Password security feature
SET SCSI-A	SCSI-A bus host ID number
SET SCSI-B	SCSI-B bus host ID number

Table 7-9 TEST Commands

Command	Test or Utility Program
TEST F	Self-test on base video (MONO)
TEST E	Self-test on system clock (CLK)
TEST D	Self-test on nonvolatile RAM (NVR)
TEST C	Self-test on serial line controller (DZ)
TEST B	Self-test on system memory (MEM)
TEST A	Self-test on memory-management unit (MMU)
TEST 9	Self-test on floating point unit (FP)
TEST 8	Self-test on interval timer (IT)
TEST 7	Device controller—SCSI-A
TEST 6	Device controller—SCSI-B
TEST 5	Self-test on interrupt controller and Ethernet ID ROM (SYS)
TEST 4	Self-test on 8-plane graphics coprocessor option (8PLN)
TEST 3	Reserved
TEST 2	Reserved
TEST 1	Self-test on Ethernet circuits (NI)
TEST 0	System exerciser
TEST 50	Configuration display
TEST 54	Language inquiry menu
TEST 75	SCSI disk data eraser (erase disk utility)

7.11 Using the Password Security Feature

In normal operation, your VAXstation 3100 gives all users console operator privileges. For customers who require that direct access to memory and kernel system operation be restricted to authorized personnel only, a password security feature is available in console access and operation.

Initiate the password security feature by using the console command **LOGIN**, which is not the same as the VMS **LOGIN** command. The system will ask for a password, after which access to privileged console commands will be allowed only to users possessing the password code.

Note This password must be a character string of exactly 16 hexadecimal characters (0 through 9 and A through F). It is important that you make a note of your password and store it in a secure place. If you forget your password, you must call your Digital service representative to regain access to the privileged console mode of your system.

The privileged console commands are the following:

BOOT (with parameters)
DEPOSIT
EXAMINE
FIND
HALT
INITIALIZE
LOAD
MICROSTEP
NEXT
REPEAT
SET
SHOW
START
UNJAM
X
@

Any commands that modify memory and registers, or commands that transfer control of the CPU from the console monitor to another program such as BOOT or START

This privileged state continues until the privileged user leaves the console state by using the BOOT, CONTINUE, HALT, or START command. Subsequent entries into the privileged state can be gained only by use of the 16-character password.

Console commands accepted in nonprivileged mode (secure) include the following:

LOGIN (to allow password entry to the privileged state)
BOOT (with no parameters)
CONTINUE (if the user inadvertently pushes the halt button, this command allows continued operations in a nonprivileged mode)
! (to enter optional text not to be acted upon by the system)

7.11.1 Setting or Resetting Your Password Security Feature

Your VAXstation 3100 arrives from the factory with the password security feature disabled and the password set to 0. Follow these steps to implement the password security feature on your system.

- 1 At the console prompt (>>>) enter SET PSWD and press Return.
- 2 The console responds with the prompt 1 >>>. Enter your password and press Return. The password you type will not be displayed on the screen.

Note This password must be a character string of exactly 16 hexadecimal characters (0 through 9 and A through F). It is important that you make a note of your password and store it in a secure place. If you forget your password, you must call your Digital service representative to regain access to the privileged console mode of your system.

- 3 The console responds with the prompt 2 >>>. Enter your password a second time for verification. Again, the password will not be displayed on the screen.
- 4 If the two passwords you have entered do not match, the console aborts the command and displays the following error message:

```
251 ILL PSWD
```
- 5 If the two passwords you have entered match, your password is preserved in nonvolatile memory, where it is stored even if power is removed from the system unit.

7.11.2 Enabling the Password Security Feature

Once your password is correctly entered, follow these steps to enable the password feature:

- 1 At the console prompt (>>>) enter SHOW PSE and press Return.
- 2 The console responds with a 0 on the next line.
- 3 At the console prompt (>>>) enter SET PSE 1 and press Return.
- 4 The password security feature is now enabled. You can no longer use the privileged commands without logging in.

- 5 To test this, enter **SHOW PSE** at the console prompt (**>>>**) and press Return.
- 6 The console responds as follows:

```
??3 ILL CMD
```
- 7 You must now **log in** at the console prompt to use **SHOW** or other privileged commands. At the console prompt (**>>>**) enter **LOGIN** and press Return.
- 8 The console responds with the prompt **? >>>**. Enter your password and press Return.
- 9 If the password you enter is not correct, the console responds with the following code:

```
??3 ILL CMD
```
- 10 If the password you enter is accepted, you may now proceed to use privileged commands. You may also disable the password feature by entering the command **SET PSE 0** at the console prompt (**>>>**). When you finish performing privileged commands and leave console mode, the console is left in a secure state. You will need to enter your password again next time you want to perform privileged commands in console mode.

7.12 Rebooting the System After Running Tests

While you are running any of the tests or procedures in this chapter, you are in console mode. To resume normal operation of the Model 76 system, you must reenter **program mode**. There are two ways to enter program mode:

- 1 Enter **BOOT** at the console prompt and press Return. The system then searches each device in turn for the operating system software.
- 2 Enter **BOOT** followed by a space and the name of the device that contains your operating system software, as shown in the following example:

```
>>> BOOT DRAGON [2500m]
```

This procedure lets the system boot the software immediately, without searching.

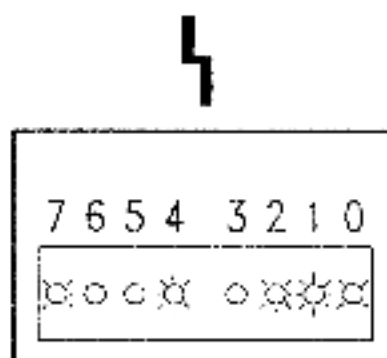
See Appendix A for information on setting your system parameters.

7.13 Calling Your Digital Service Representative

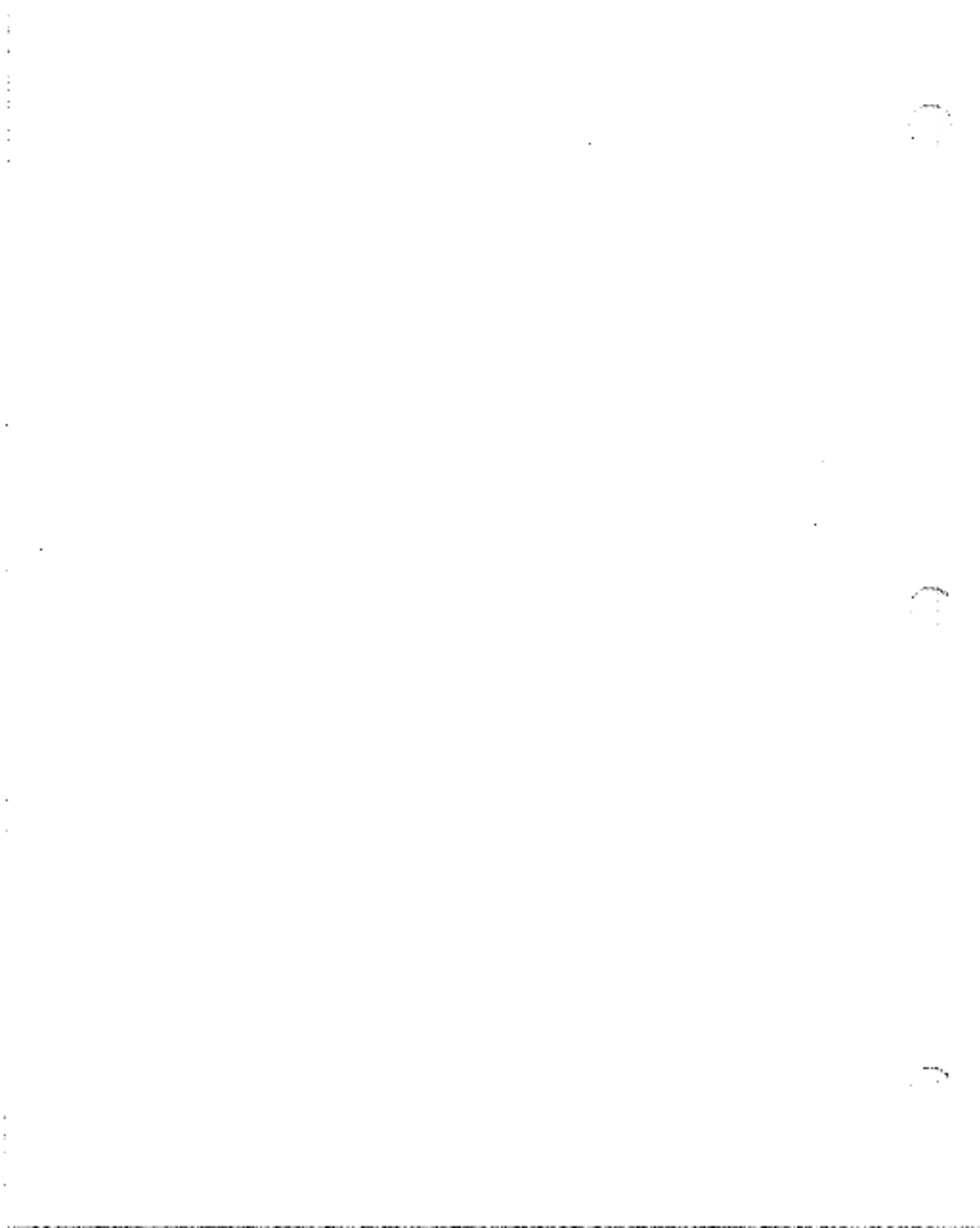
If you followed the corrective actions listed in Chapter 6 and Chapter 7 and you continue to have problems with your Model 76 system, do the following and then call your Digital customer support center (from within the United States or Canada, call 1-800-DEC-8000):

- 1 Write down the serial and model numbers of your system unit. The numbers are located on the system power supply.
- 2 Make notes based on Table 6-1. This information helps your service representative know the state of your system when the problem occurred.
- 3 Be prepared to read information from the screen and to enter commands at the keyboard while you talk to your service representative on the telephone.
- 4 Eight recessed diagnostic lights on the back of the system unit may come on when you turn on the system (Figure 7-2). Write down the status of these lights. Your service representative may ask you to describe which lights are on.

Figure 7-2 Diagnostic Lights



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Available Options

This chapter describes the hardware options available for your VAXstation 3100 system. You can add many of these hardware options inside your system unit yourself using instructions provided in Chapter 9. For information on purchasing these options, consult your Digital service representative or, if you are in the United States or Canada, call DECdirect by dialing 1-800-DIGITAL.

This chapter discusses the following options:

- Hard disks (Section 8.1)
- Memory (Section 8.2)
- Graphics coprocessor module/color option (Section 8.3)
- Scanline coprocessor module (SPX color graphics accelerator) (Section 8.4)
- Internal devices (Section 8.5)
- Printers (Section 8.6)
- Modems (Section 8.7)
- Tablet (Section 8.8)
- Monitors (Section 8.9)

8.1 Hard Disks

A hard disk consists of a drive that stores information on a nonremovable disk. Internal hard disks available for the Model 76 system are the 62-megabyte R222 hard disk, the 104-megabyte R223 hard disk, and the 209-megabyte R224 hard disk. You can add one, two, or three hard disks inside the system unit as described in Chapter 9.

8.2 Memory

The Model 76 system can have up to 32 megabytes of memory. You can add memory modules inside the system unit to form various configurations as described in Section 9.3.

8.3 Graphics Coprocessor Module/Color Option

The graphics coprocessor module/color option allows you to run color graphics software applications. You can add a graphics coprocessor module/color option inside your system unit as described in Chapter 9.

The graphics coprocessor module/color option supports monitors with a resolution of 1024 by 864 pixels and displays up to 256 colors from a palette of 16.7 million.

8.4 Scanline Coprocessor Module/Color Option

The scanline coprocessor module (SPX color graphics accelerator option) allows you to run more advanced color graphics software applications than does the graphics coprocessor module/color option.

The SPX color graphics accelerator is a high-performance graphics option that supports monitors with a high resolution (1280 by 1024 pixels) and monitors with a low resolution (1024 by 864 pixels). It displays up to 256 colors from a palette of 16.7 million.

8.5 Guidelines for Internal Devices

Your Model 76 system unit has the following maximum configuration for devices:

- 32 megabytes of memory, including the 8 megabytes that come with the system
- One graphics coprocessor module/color option

- Three storage devices; for instance:
 - Three RZxx hard disks
 - Two hard disks and one RX28 diskette drive

8.6 Printers

Table 8-1 lists some of the printers available for the VAXstation 3100 system.

Table 8-1 Printers

Printer	Description
LN03	Desktop laser printer
LN03 PLUS	Enhanced LN03; prints text and graphics
LN03R ScriptPrinter	Nonimpact page printer; prints PostScript text and graphics
LA100	Desktop dot-matrix printing terminal
LA75 Companion Printer	Desktop dot-matrix printer; prints sixel graphics
LPS20 PrintServer	Networked PostScript printer
LPS10 PrintServer	Networked PostScript printer

When you order a printer, you also need to order a DEC 423 serial line cable and the appropriate D-sub adapter to connect the printer to your Model 76 system. Consult your Digital sales representative to determine the correct adapter for your printer.

8.6.1 Connecting a Printer

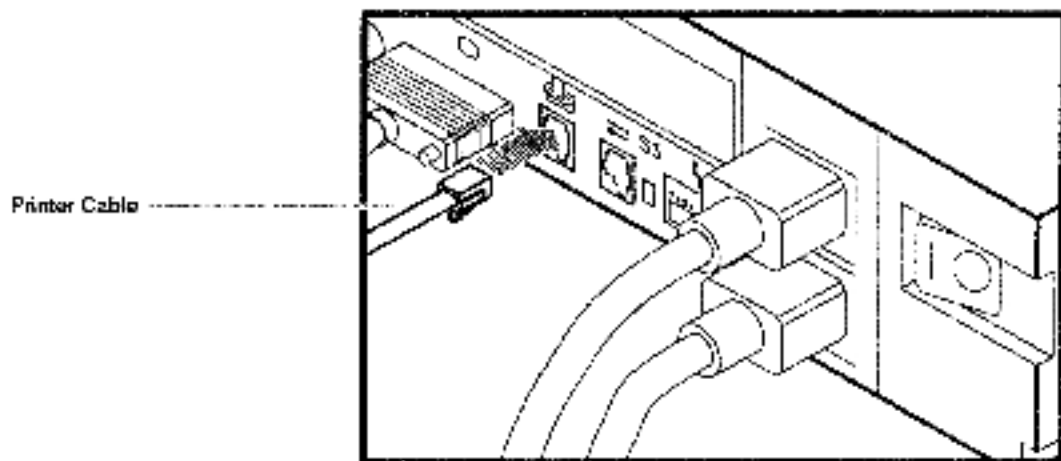
To connect your printer, follow these steps:

- 1 Make sure that the printer and all equipment, including expansion boxes and the system unit, are off.
- 2 Using the documentation that comes with the printer, do the following:
 - Unpack and set up the printer.
 - Set the baud rate on your printer to 4800 baud.
- 3 Attach one end of the D-sub adapter to the back of the printer. (Check the printer documentation.)
- 4 Connect the printer cable to the D-sub adapter. If you do not have a D-sub adapter, connect the printer cable directly to the printer.



- 5 Attach the other end of the printer cable to the printer port on the back of the system unit, as shown in Figure 8-1.

Figure 8-1 Connecting Your Printer



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When building your software, you will need the device names for your operating system to set up a printer port for your Model 76. For the VMS operating system, enter the device name **TTA3:**.

You will find other important information on connecting a printer to your operating system in the following documentation:

- *System Management Volume 1A, Guide to Setting Up a VMS System*
- *General User Volume 4, DCL Dictionary*



8.7 Modems

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, for instance **wide area networks (WANs)**.

The communications port on the back of the system unit comes set at 1200 baud. Refer to your modem documentation for the correct baud for your modem. Autoanswer is not available; data leads only are connected.

Table 8-2 lists the modems available for the VAXstation 3100.

Table 8-2 Modems

Modem	Description
DF242 Scholar Plus	300, 1200, and 2400 bps (bits per second) full duplex asynchronous
DF224	300, 1200, and 2400 bps full-duplex asynchronous
DF212	300, 600, and 1200 bps full-duplex asynchronous
DF112	300 and 1200 bps full-duplex asynchronous
DF03	300 and 1200 bps full-duplex asynchronous

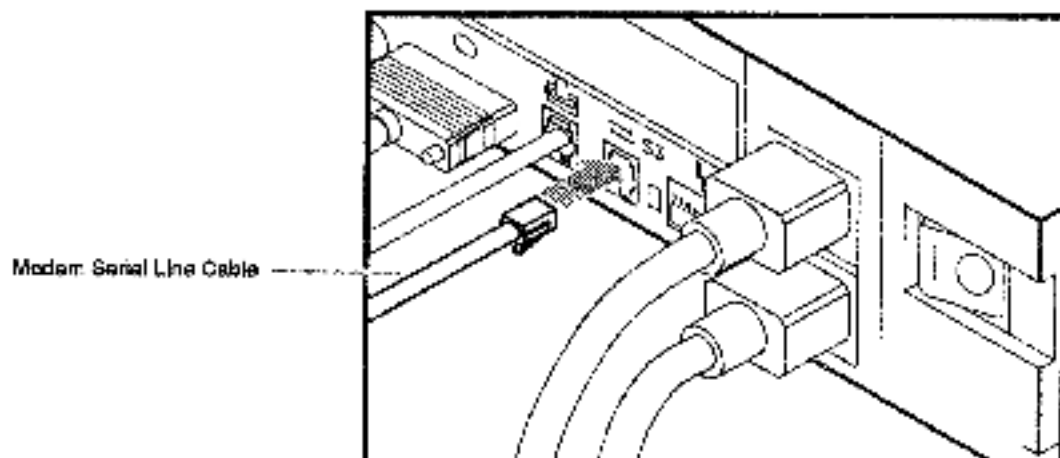
When you order a modem, you also need to order a DEC 423 serial line cable and a 25-pin D-sub/DECconnect passive adapter to connect a modem to your system.

8.7.1 Connecting a Modem

To connect your modem, follow these steps:

- 1 Make sure that the modem and other equipment, including the system unit, are off.
- 2 Follow the directions that come with your modem to set it up.
- 3 Follow the directions that come with your modem to clear the Force DSR attribute on the modem. (With the Force DSR attribute cleared, your system will recognize the loss of modem connection, should it occur.)
- 4 Attach the 25-pin D-sub/DECconnect passive adapter to the back of the modem.
- 5 Attach one end of the modem serial line cable to the 25-pin D-sub/DECconnect passive adapter.
- 6 Attach the free end of the modem serial line cable to the communications port on the back of the system unit, as shown in Figure 8-2.

Figure 8-2 Connecting a Modem



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Note Full modem support is not available on the communications port of the Model 76. The 6-pin MMJ connector is for data leads only and is recommended for *local* interconnects only.

When building your software, you will need the device names for your operating system to set up a modem port for your Model 76. For the VMS operating system, enter the device name TTA2:.

Consult the following documentation for other important information on connecting a modem to your operating system:

- *System Management Volume 1A, Guide to Setting Up a VMS System*
- *System Management Volume 5A: Networking, Guide to DECnet VAX Networking*

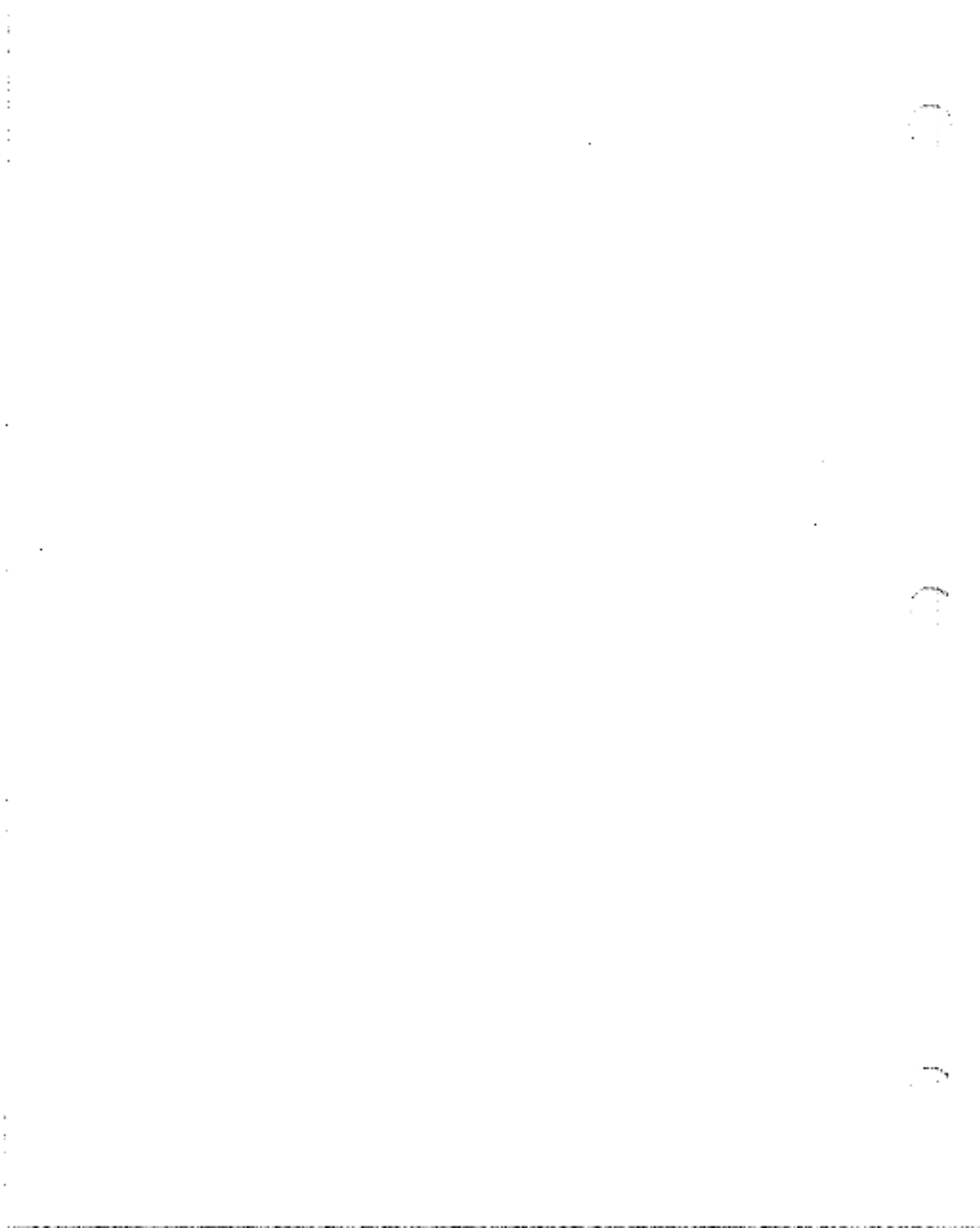
8.8 Tablet

Instead of the mouse, the tablet with the puck or stylus may be used as a pointing device for menu selection, graphics entry, and pointer control. The VSXXX-AB tablet system consists of a digitizing tablet, a four-button **puck**, a two-button **stylus**, and a 1.5-meter (5-foot) power/signal cable.

To connect your tablet, follow the directions for connecting a mouse in Chapter 2.

8.9 Monitors

Several monitors are available for the Model 76. Contact your Digital sales representative for more information.



Adding Optional Devices Inside Your System Unit

This chapter tells you how to add optional internal devices to your system unit. Specifically, it tells you how to do the following:

- Prepare your system (Section 9.1)
- Add devices (Section 9.2)
- Add SIMM memory modules (Section 9.3)
- Add a graphics coprocessor module/color option (Section 9.5)
- Add hard disks (Section 9.6)
- Restore the system unit (Section 9.7)
- Start your system (Section 9.8)
- Test the system after adding a device (Section 9.9)

You can choose one of two ways to add optional devices inside your system unit. You can either add the devices yourself, or you can have a Digital service representative add the devices for you. If you choose to add devices yourself, note the following:

- Additions may take more than 1 hour.
- The instructions in this chapter assume you are familiar with the Model 76 system and the following diagnostic test displays:
 - System power-up messages
 - Configuration display resulting from the TEST 50 console command

- System exerciser display resulting from the TEST 0 console command
- SHOW DEVICE console command display
- Improper addition of a device or module could lead to a device or module failure. The Model 76 warranty may not cover such a failure.

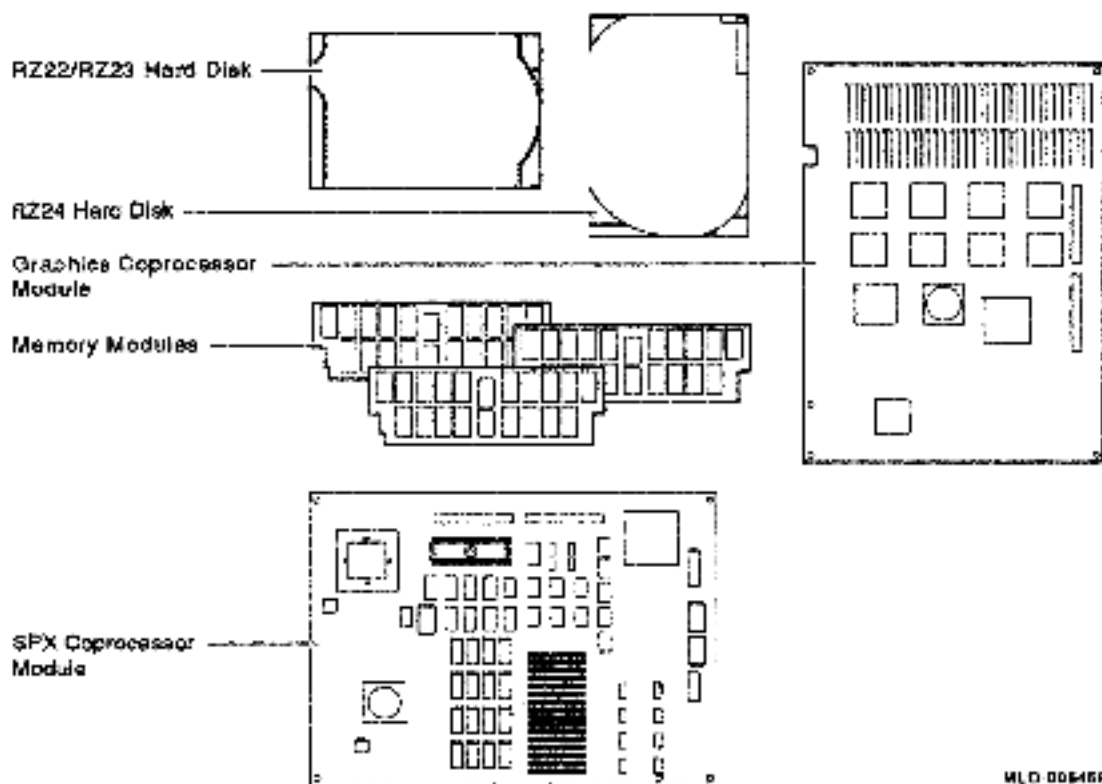
Devices you can add include the following:

- Memory modules (Section 9.3)
- Graphics coprocessor module/color option (Section 9.5)
- SPX (scanline coprocessor) color graphics accelerator (see the associated documentation)
- Hard disks (Section 9.6)

Figure 9-1 shows the types of devices and modules you can add to upgrade your system unit.

Note *After you perform the upgrade, you may have extra parts.*

Figure 9-1 Modules and Devices You Can Add



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9.1 Preparing Your System

To prepare the system unit for added devices, follow these steps:

- 1 If you have files stored on a system disk, back them up following the instructions in your software documentation.

Note See your operating system documentation for shutdown procedures before turning your system off.

- 2 Put your system into console mode by pressing the halt button on the rear of the system. Enter the following command:

>>> SET HALT 2 [Return]

After you have added the new device or module, your system will halt at the console prompt when you first turn it on. You can then use diagnostic tests as described in Section 9.9 to determine whether the new device or module is connected correctly.

- 3 Before you add a new device or module, you should review your current system configuration. After adding a device or module, you can compare the new system configuration with the current one to help verify that all devices are present and functioning correctly. You should record the current system configuration information for reference.

- To determine the presence of internal storage devices such as RZ22, RZ23, or RZ24 hard disks or an RX23 diskette drive, enter the following command:

```
>>> SHOW DEVICE [unit]
```

A display similar to the following should appear:

VMS/VMB	ADDR	DEVTYP	NUMBYTES	RM/PX	WP	DEVNAM
-----	-----	-----	-----	-----	---	-----
ESAC	05-00-2B-07-E3-83					
DKA300	A/3/0/00	DISK	104 MB	FX		RZ23
...HostID....	A/6	INITE				
...HostID....	B/6	INITE				

>>>

This display shows the mnemonic RZ23 in the DEVNAM column, indicating that one hard disk is present in the system. The RZ22, RZ23, or RZ24 mnemonic appears for each hard disk present.

If your system has an RX23 diskette drive, its device line will resemble the following:

DKA500	RZ5	A/5/0/00		RM		RX23
--------	-----	----------	-------	----	--	------

- To determine the presence of other devices and the quantity of memory inside your system unit, enter the following command:

```
>>> TEST 50 [unit]
```

A configuration display similar to the following appears:

```

MONO      0000.0001
CLK        0000.0001
NVR        0000.0001
DZ         0000.0001
00000001 00000001 00000001 00000001 00000001 000012AD
MEM        0008.0001 ①
00000000
MM         0000.0001
FP         0000.0001
IT         0000.0001
SCSI-A     0808.0001 V1.3 ②
FFFFFFFF FFFFFFFF EFFFFFFF 00000001 FFFFFFFF FFFFFFFF FFFFFFFF EFFFFFFF
SCSI-B     1818.0001 V1.3 ③
FFFFFFFF FFFFFFFF EFFFFFFF 00000001 00000001 FFFFFFFF FFFFFFFF EFFFFFFF
SYS        0000.0000
SPLN       0000.0001 V1.3 ④
NT         0000.0001
>>>

```

- To determine the quantity of memory in your system, look at the MEM (memory) line (①). The 8-digit decimal number following MEM represents the quantity of memory in the system, detailed in Table 9-1.

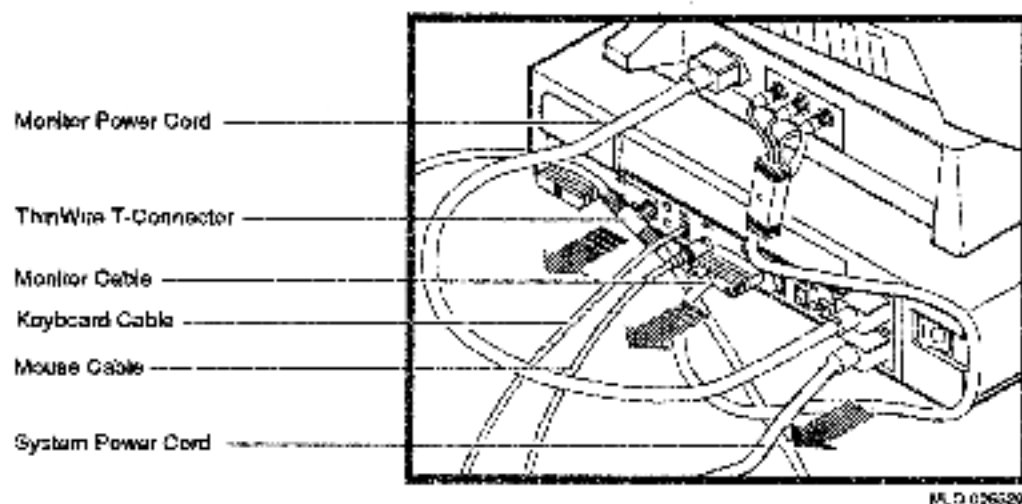
Table 9-1 Memory Quantity

Code	Memory Available
0008.0001	8MB
000C.0001	12MB
0010.0001	16MB
0014.0001	20MB
0018.0001	24MB
0020.0001	32MB

- ② and ③ indicate the SCSI-A and SCSI-B lines.
- SPLN (S-plane graphics coprocessor) or SPGFX in the configuration display (④) indicates that the system includes a graphics coprocessor module/color option.

- 4 Turn the system unit off (O).
- 5 Disconnect the system power cord first from the wall and then from the system unit.
- 6 Before removing the system cover, disconnect the following cords and cables from the system unit in the order listed (Figure 9-2):
 - Monitor power cord
 - Keyboard cable
 - Mouse cable

Figure 9-2 Disconnecting the System Unit and Monitor Cables

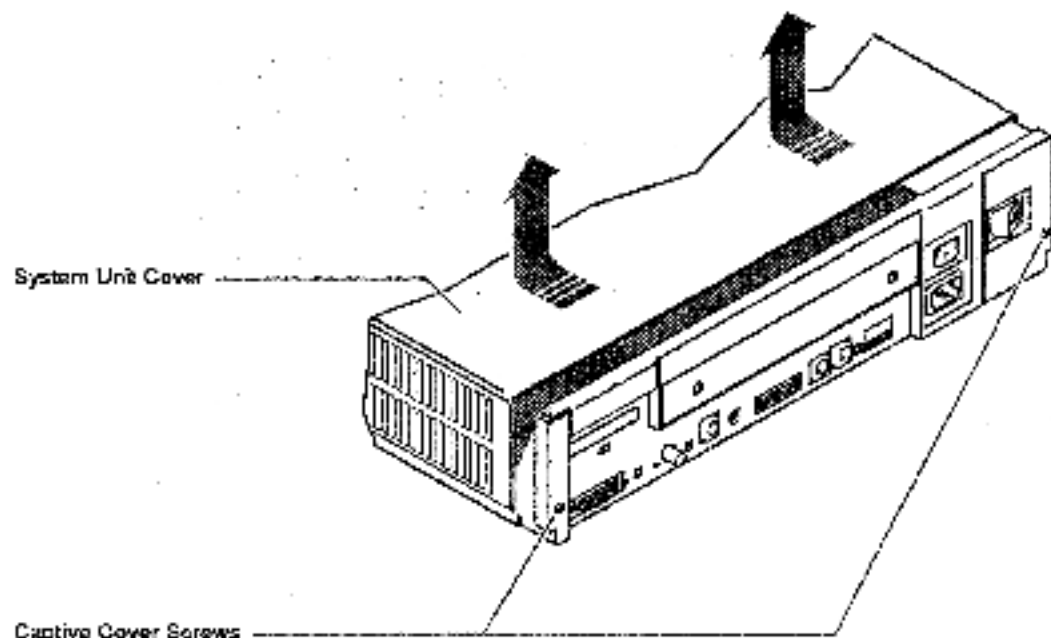


- 7 Disconnect the monitor video cable by turning the connector thumbscrews to the left and then removing the cable from the system unit. Figure 2-10 shows a close-up view of the monitor video connector.
- 8 Remove the monitor from the top of the system unit and set it aside. The monitor is heavy; you may require the assistance of a second person to lift it.
- 9 Disconnect the ThinWire Ethernet T-connector from the system unit by turning the ribbed portion of the T-connector to the left and then removing it. Figure 5-8 shows how to remove the Ethernet T-connector.

10 Remove the system cover as follows:

- Unscrew the two captive cover screws located on the outside edges of the back of the system unit until the screws are very loose. Do not remove the screws. Figure 9-3 shows the captive screw positions.
- Slide the system unit cover forward toward the front of the system unit and then lift it up and away from the system unit.

Figure 9-3 Removing the System Unit Cover



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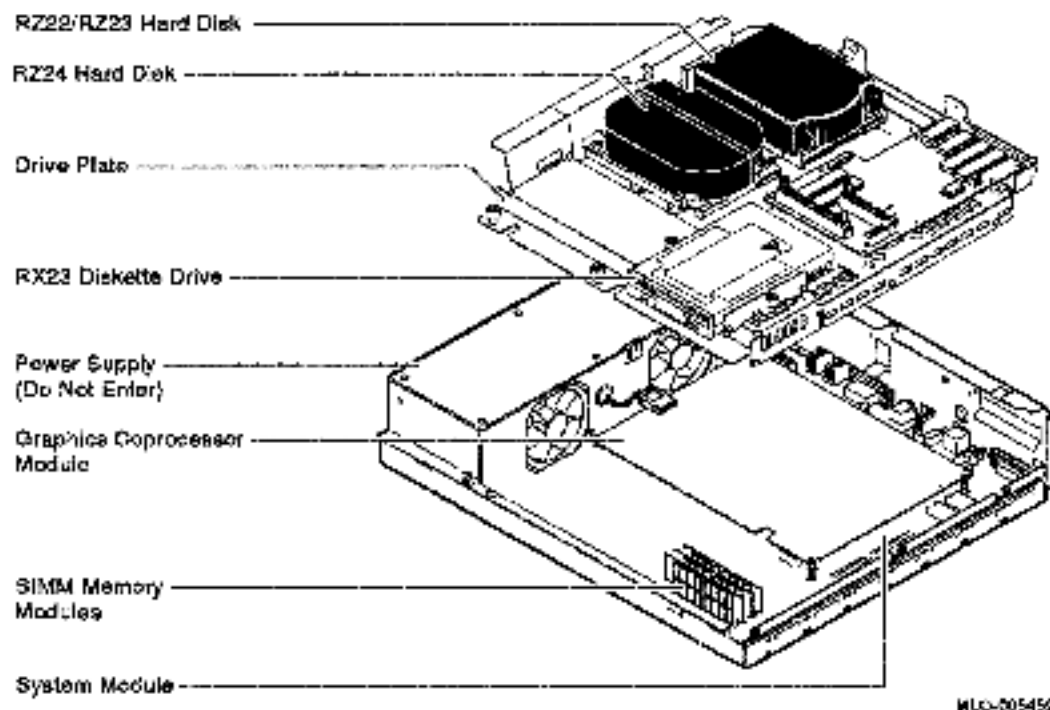
Warning Do not attempt to open the power supply located inside the system unit (see Figure 9-1). There are dangerous voltages inside the power supply, and there are no user-serviceable parts.

9.2 Sequence for Adding Devices

If you are adding more than one device, add them in the following order, based on their locations inside the system unit (Figure 9-4):

- 1 SIMM memory modules (Section 9.3)
- 2 Graphics coprocessor module/color option (Section 9.5)
- 3 RZ22, RZ23, and RZ24 hard disks (Section 9.6)

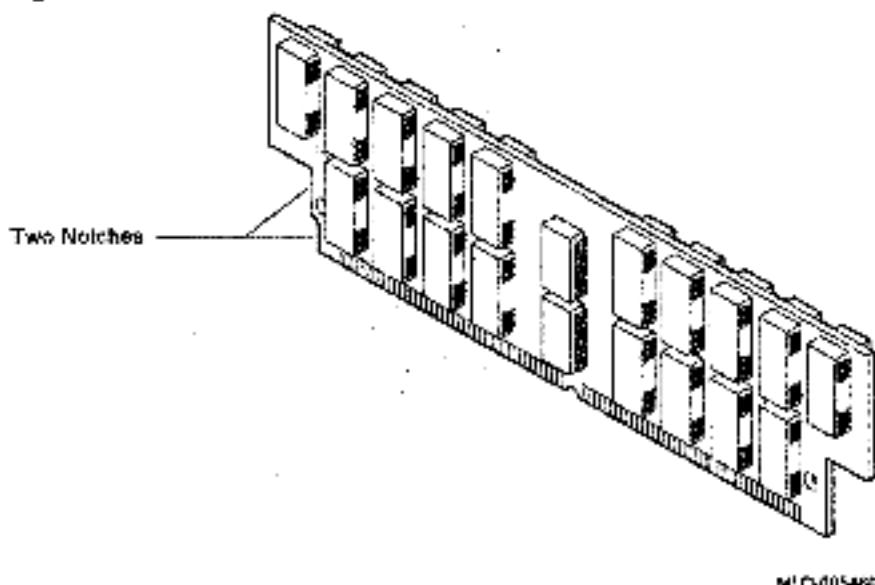
Figure 9-4 Device and Module Locations



9.3 Adding SIMM Memory Modules

Your system has two memory modules, each of which has 4 megabytes of memory; thus, your system has a total of 8 megabytes of SIMM memory. You can add memory to a maximum configuration of 32 megabytes. Memory modules are available in 4-megabyte sizes. Figure 9-5 illustrates a 4-megabyte memory module.

Figure 9-5 4MB SIMM Memory Module



There are eight SIMM connectors on the system module. You can add memory in 4-megabyte increments. To increase your system's memory capacity to 12, 16, 20, 24, 28, or 32 megabytes, use the appropriate configuration as shown in Table 9-2.

Table 9-2 Adding SIMM Memory

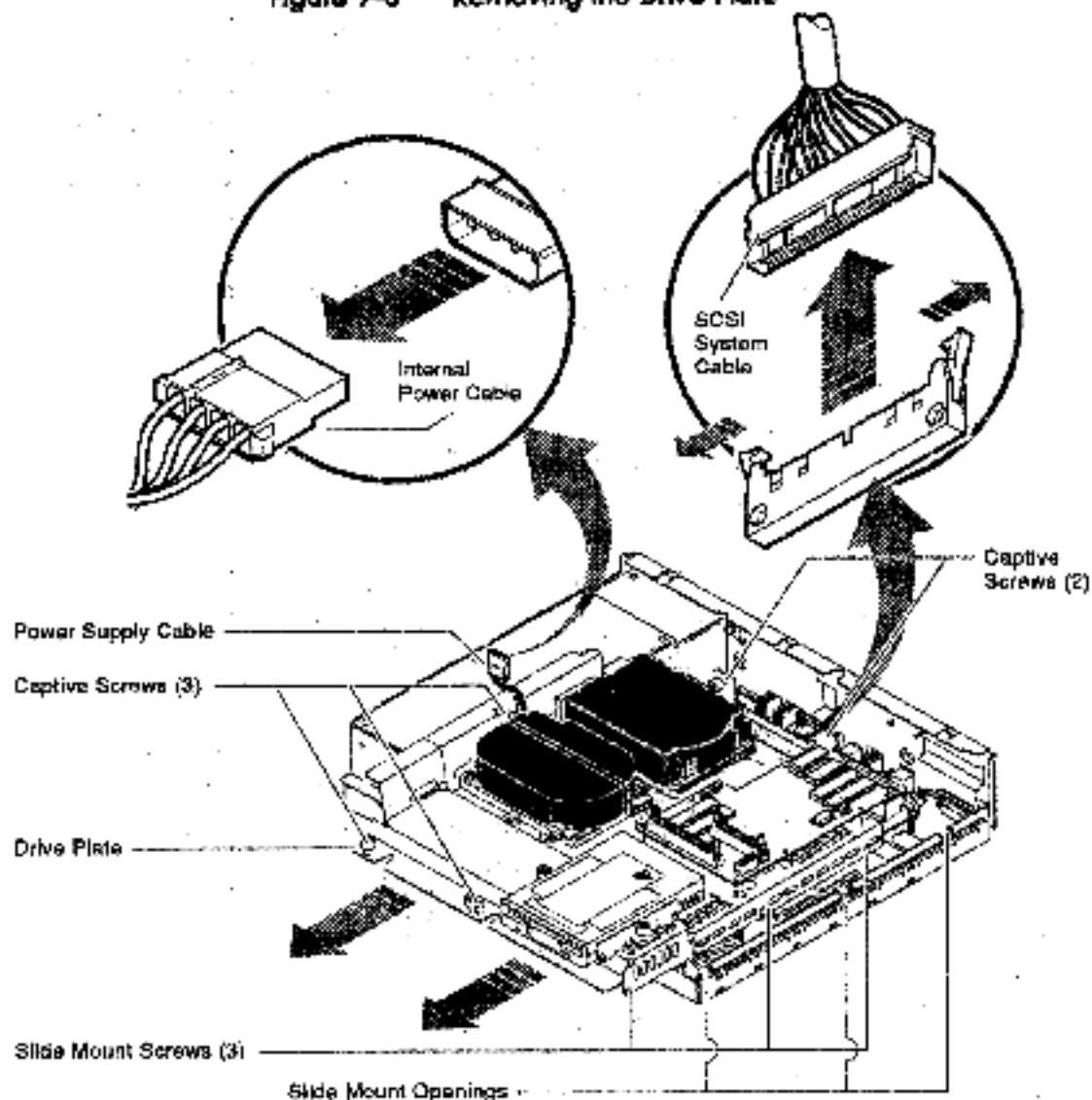
Desired Memory	Number of 4MB SIMMs to Add	Total 4MB SIMMs
12MB	1	3
16MB	2	4
20MB	3	5
24MB	4	6
28MB	5	7
32MB	6	8

Caution To protect the memory modules from damage due to static charge, wear an antistatic wrist strap (part number 12-24023-07) provided with your workstation when you are adding devices to the system unit. Connect the clip end of the antistatic strap to the system unit frame.

To add a memory module, complete the following steps:

- 1 If you have not already done so, prepare the system unit by following the steps in Section 9.1.
- 2 If your system has a drive plate with storage devices mounted on it, do not remove the devices mounted on the drive plate. Instead, complete the following steps:
 - Disconnect the internal power cable from the internal power supply (Figure 9-8).
 - Disconnect either the SCSI terminator or the external SCSI cable from the SCSI port. Figure 4-2 shows the SCSI terminator, and Figure 4-9 shows a SCSI cabling scheme.
 - Loosen the eight drive plate screws. Figure 9-6 shows the placement of the screws. Do not remove the five captive screws or the three slide mount screws from their mountings.

Figure 9-6 Removing the Drive Plate

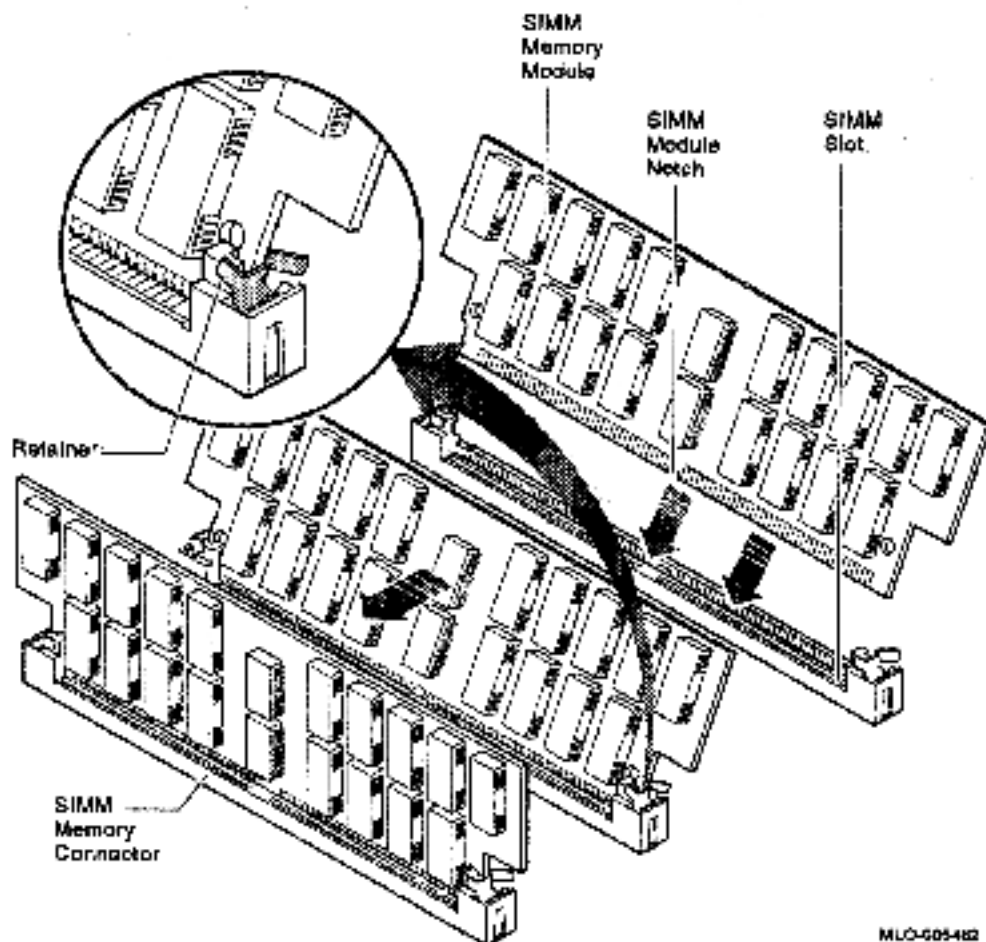


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- Carefully slide the drive plate (with the disk drives mounted on it) back and up out of the system unit. Set the plate aside.

- 3 To add a SIMM memory module, orient the module as shown in Figure 9-7. The side of the module that has two notches on the bottom corner (see Figure 9-5) goes toward the power supply. Hold the SIMM at an angle (roughly 55°) and place it in the slot closest to the front of the system unit. Make sure that the memory module is firmly seated in the connector. It should easily slip into place. Push the module up so that it stands vertically.

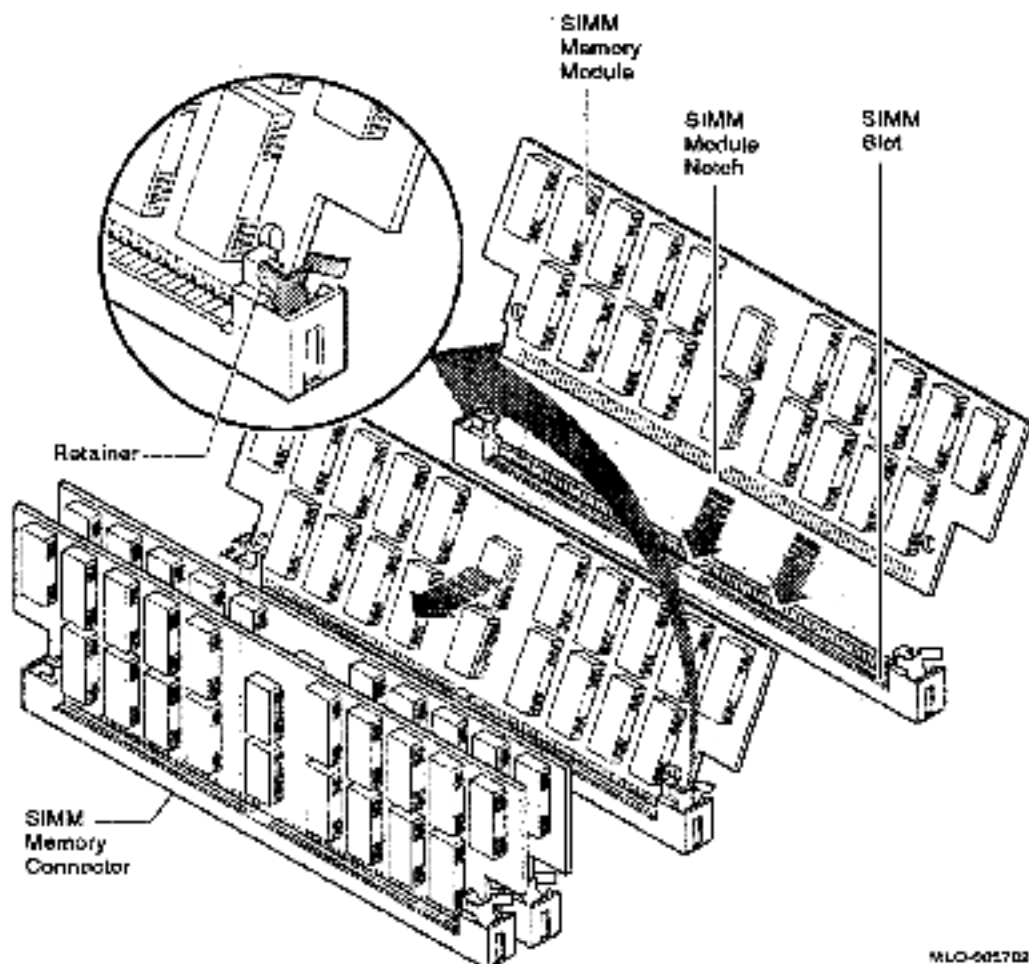
Figure 9-7 Adding One SIMM Memory Module



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- 4 Press the memory module until it locks in place.
- 5 Working from front to back (memory slots 1-8), continue placing memory module in the open slots until your system contains the desired amount of memory (Figure 9-8). There must be no vacant slots between memory modules.

Figure 9-8 Adding Two SIMMs



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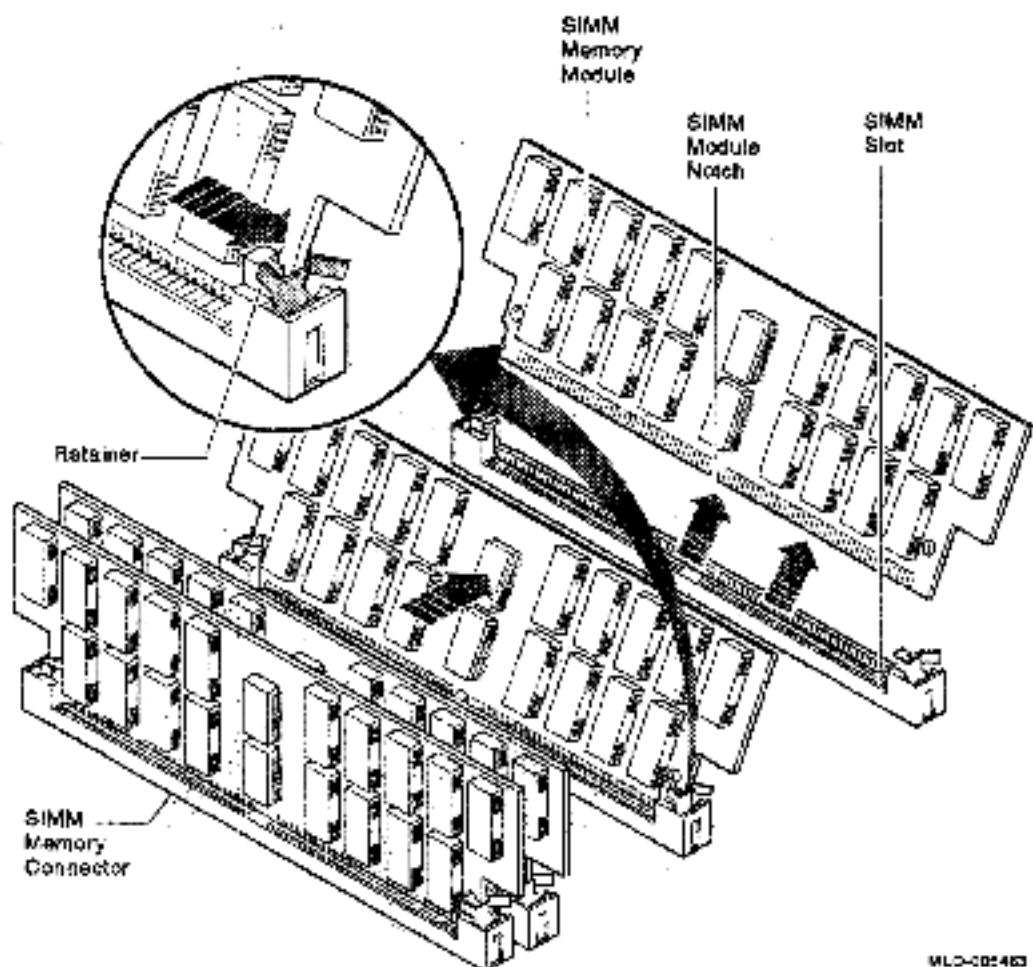
- 6 When you are done adding memory modules, you will either go to Section 9.5 to add your graphics coprocessor or complete the following steps:
 - Slide the drive plate toward the back of the system. Make sure the three screws on the right side of the drive plate go inside the slide mount openings on the side of the system unit. Make sure the power supply cable slips through the opening on the drive plate nearest the power supply, just below the thumbscrew.
 - Tighten the five captive screws on the drive plate.
 - Tighten the three slide mount screws.
 - Reconnect the internal power cable to the power supply cable.
 - Reconnect the external SCSI cable to the SCSI port on the system module.
- 7 If you have further additions to make inside the system unit, turn to the appropriate sections in this chapter. Otherwise, proceed to Section 9.7.

9.4 Removing a SIMM Memory Module

Caution To protect the memory modules from damage due to static charge, wear an antistatic wrist strap (part number 12-24029-07) provided with your workstation when you are adding devices to the system unit. Connect the end of the antistatic strap to the system unit frame.

- 1 Working from back to front, remove each SIMM memory module as shown in Figure 9-9 until you have reached the module you want to remove.

Figure 9-9 Removing SIMM Memory Modules



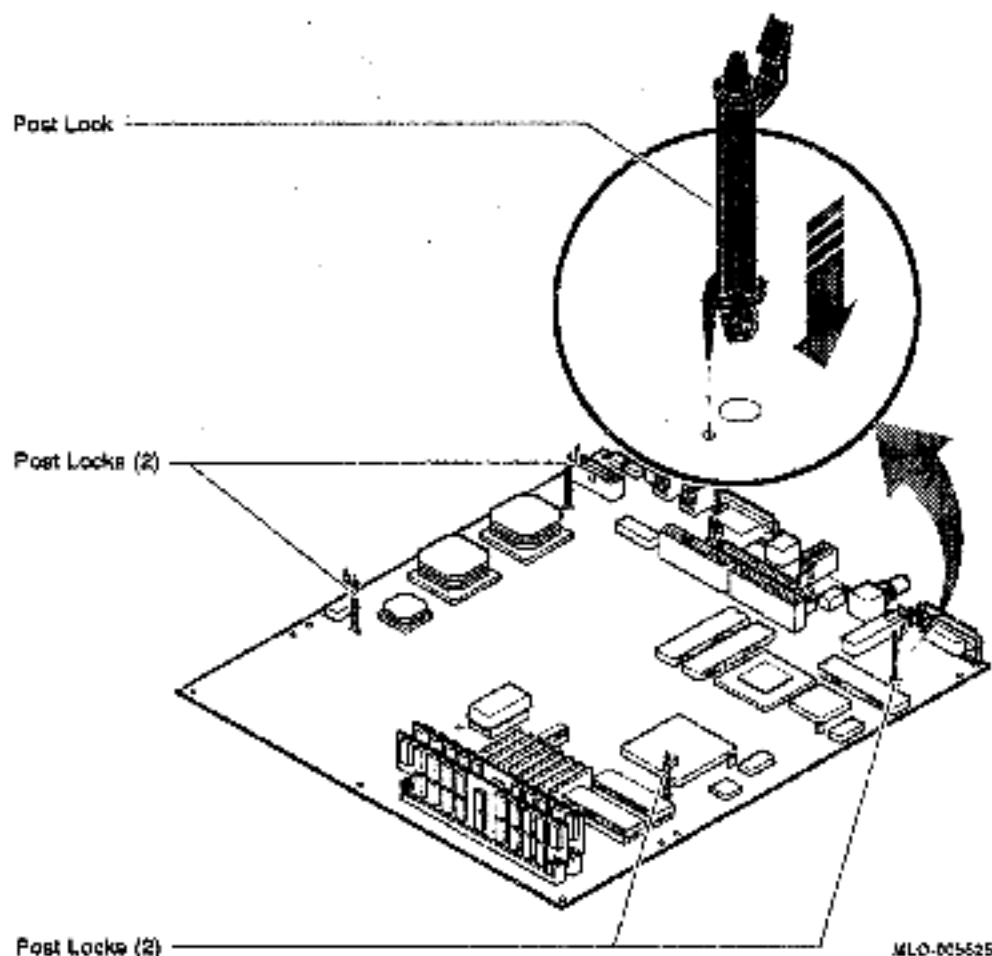
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9.5 Adding a Graphics Module/Color Option

To add a graphics coprocessor module/color option, complete the following steps:

- 1 Insert the four post locks for the graphics coprocessor module/color option on the system module, as shown in Figure 9-10.

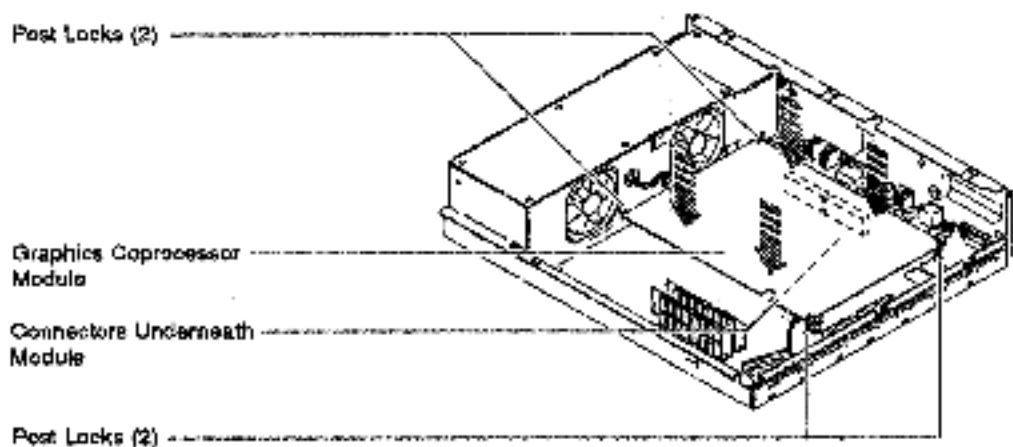
Figure 9-10 Inserting Post Locks on the System Module



- 2 If you have not already done so, prepare the system unit by following the steps in Section 9.1.
- 3 If you are adding multiple devices, review Section 9.2.

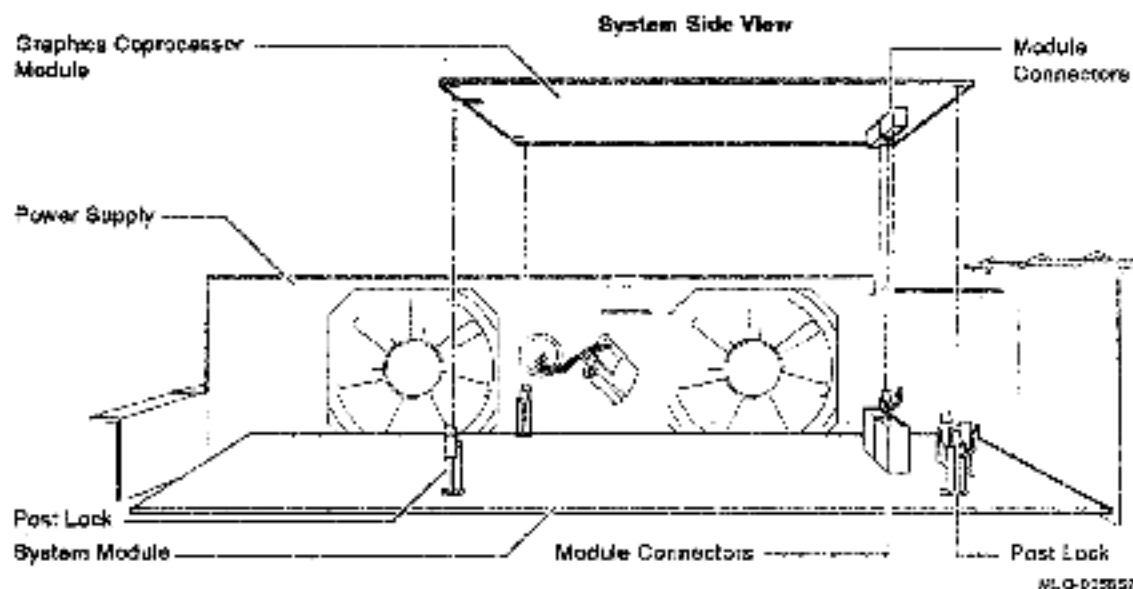
- 4 If your system has a drive plate with mass storage devices mounted on it, follow the instructions for removing the drive plate in Section 9.3.
- 5 Connect the set of connectors on the graphics coprocessor module/color option with the set of connectors on the system module. Figure 9-11 shows the top view of the graphics coprocessor module/color option installed inside the system unit. Figure 9-12 shows the side view of the graphics coprocessor module/color option installed inside the system unit. Figure 9-12 also shows the graphics coprocessor module/color option in relation to the post locks and connectors.

Figure 9-11 Adding a Graphics Module/Color Option—Top View



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Figure 9-12 Adding a Graphics Module/Color Option—Side View



- 6 Press the graphics coprocessor module/color option downward until it locks onto the four system module post locks.
- 7 Position the graphics module directly above its connectors and press down firmly. Figure 9-12 shows where to press on the graphics coprocessor module/color option to ensure a good connection.
- 8 If you have no further additions, refer to Section 9.7.

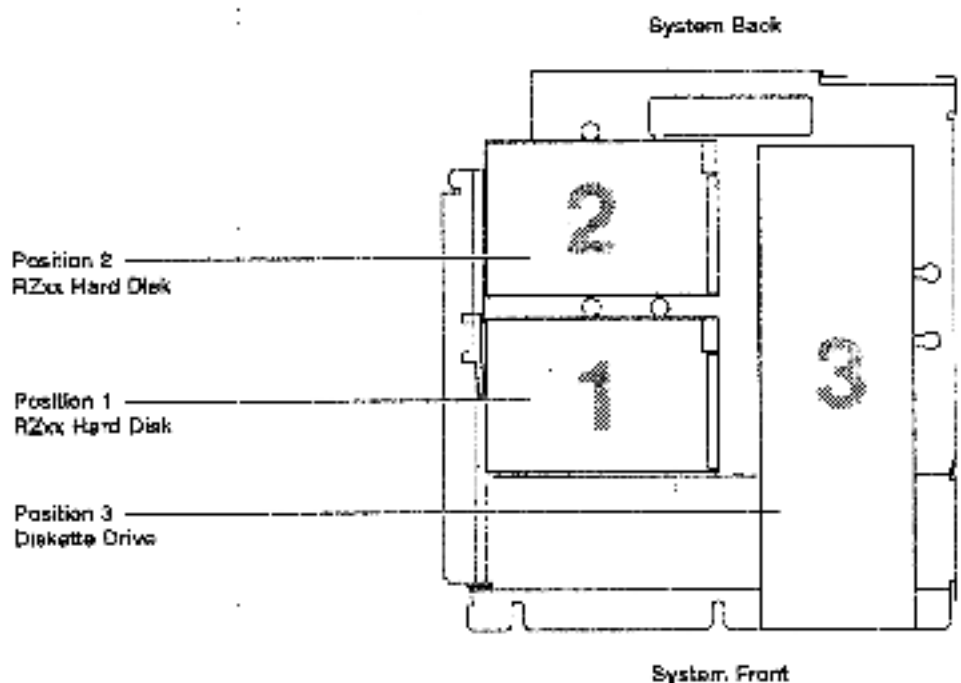
9.6 Adding Hard Disks

To add a hard disk, complete the following steps:

- 1 If you have not already done so, prepare the system unit by following the steps in Section 9.1.
- 2 If you are adding multiple device types, review Section 9.2.

- 3 Locate the positions on the drive plate where hard disks can be added:
 - If you have a diskette drive already in place on the drive plate, the first and second hard disks go on the drive plate in positions 1 and 2, respectively, as shown in Figure 9-18.

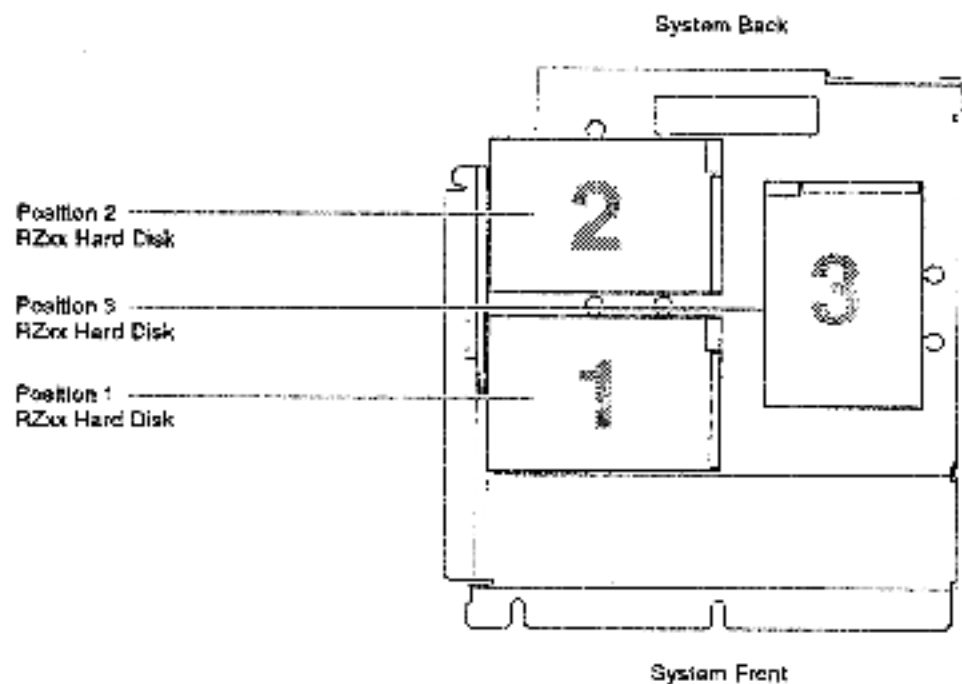
Figure 9-13 Two RZxx Hard Disks with a Diskette Drive on the Drive Plate



WLO-005888

- If you do not have a diskette drive already in place, the first, second, and third hard disks go on the drive plate in positions 1, 2, and 3, respectively, as shown in Figure 9-14.

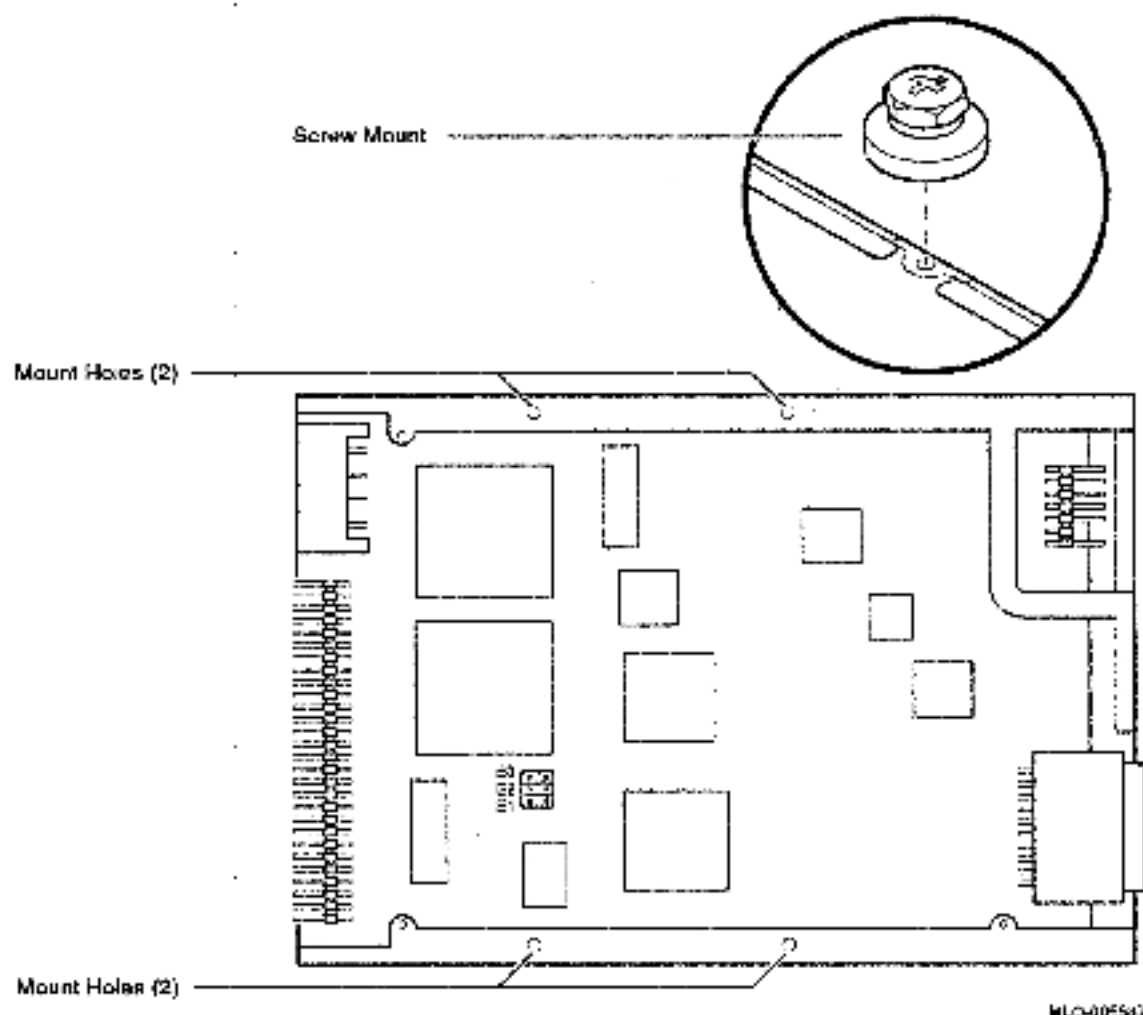
Figure 9-14 Three RZxx Hard Disks on the Drive Plate



MLO-P05485

- 4 Screw the four screw mounts into the bottom of the hard disk, as shown in Figure 9-15.

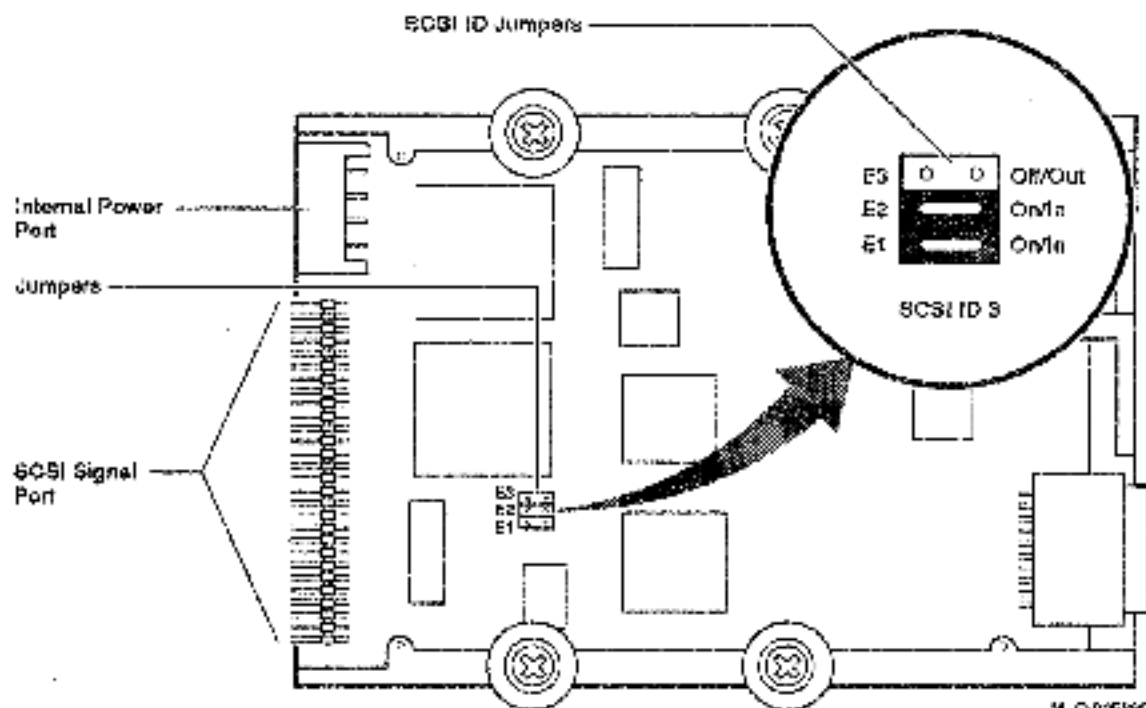
Figure 9-15 Adding Mounts to a Hard Disk



- 5 You are ready to set the SCSI ID on the hard disk. Appendix B contains all the information you need on SCSI ID settings.
- 6 Locate SCSI ID jumpers E1, E2, and E3 on the underside of the hard disk, as shown in Figure 9-16 and Figure 9-17.

Jumpers are removable electrical connectors on the ID seatings. To set a SCSI ID jumper in the off position, remove the jumper from its seating by pulling the jumper out. To set a jumper in the on position, leave it in place.

Figure 9-16 Setting the SCSI ID on the R223 Hard Disk

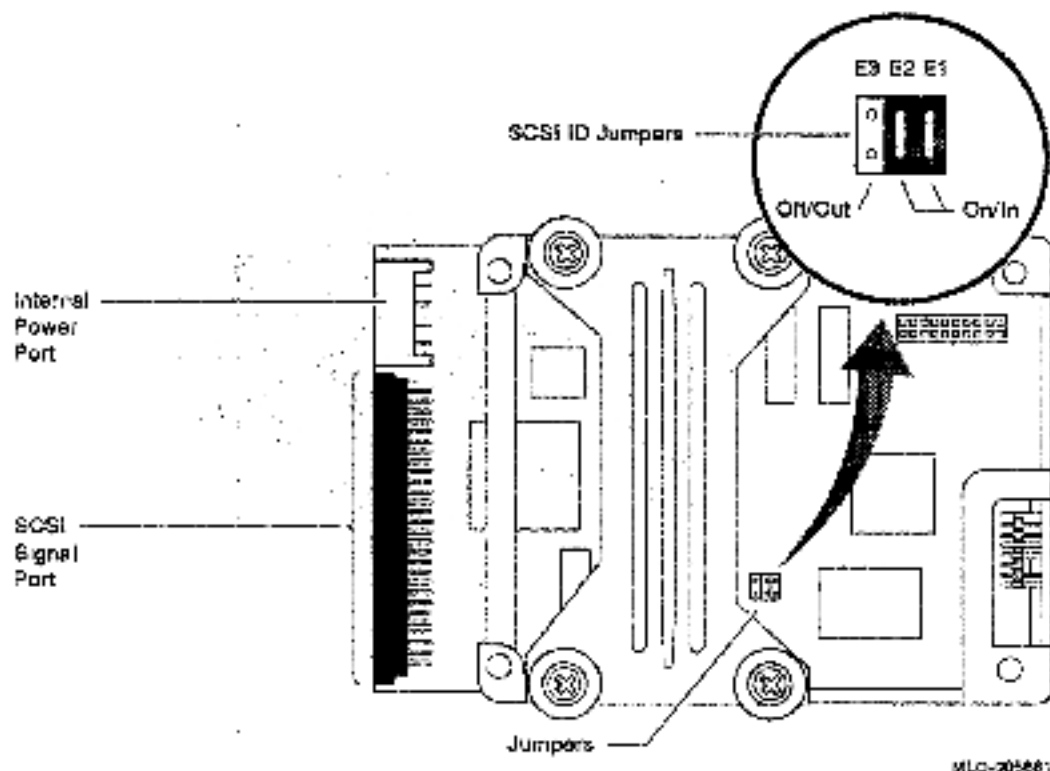


Note You must select a SCSI ID address code number from 0 through 7. The code for each device must be unique. (Do not use SCSI ID code 6, which is reserved for the SCSI controller.) It is important that you save any SCSI ID jumpers that you remove. You may need to reconfigure your system unit later and change the ID setting on the hard disk.

- 7 Set the SCSI ID on the basis of the total number of hard disks you will have inside the system unit. Digital recommends the following guidelines:

- For a system with one hard disk, set the SCSI ID code number to 3:
 E1 = In (on)
 E2 = In (on)
 E3 = Out (off)
- For a system with two hard disks, designate one to be a system disk for the operating system software and the other to be a user disk for applications software. Set the system disk SCSI ID code to 3 and the user disk SCSI ID code to 2:
 E1 = Out (off)
 E2 = In (on)
 E3 = Out (off)

Figure 9-17 Setting the SCSI ID Codes on the RZ24 Hard Disk



- For a system with three hard disks, set the third disk's SCSI ID code number to 1:

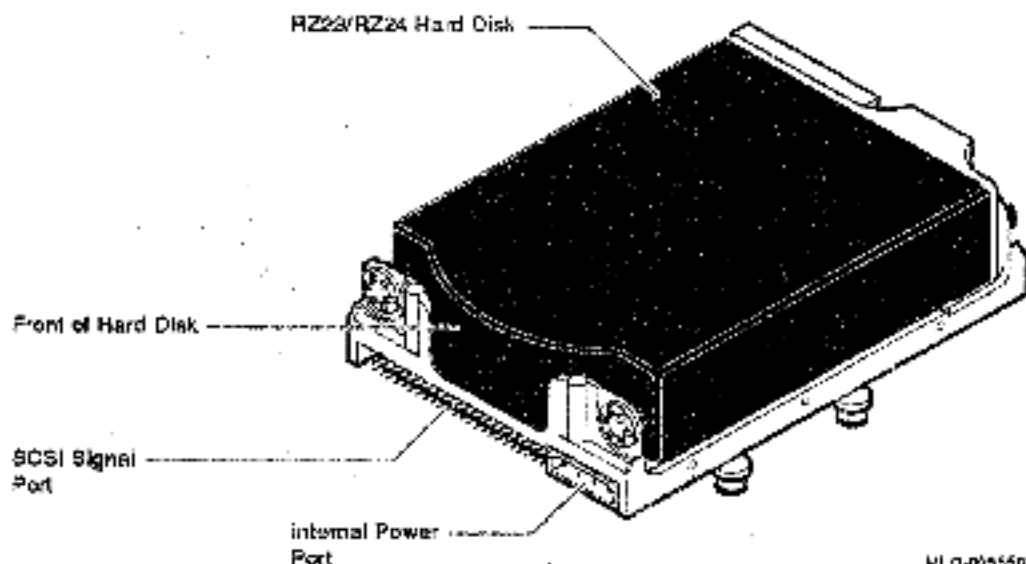
E1 = In (on)
E2 = Out (off)
E3 = Out (off)

All possible SCSI ID jumper settings for the hard disks are shown in Table B-4.

Caution *Never set two or more devices to the same SCSI ID; the system will not be able to service the devices.*

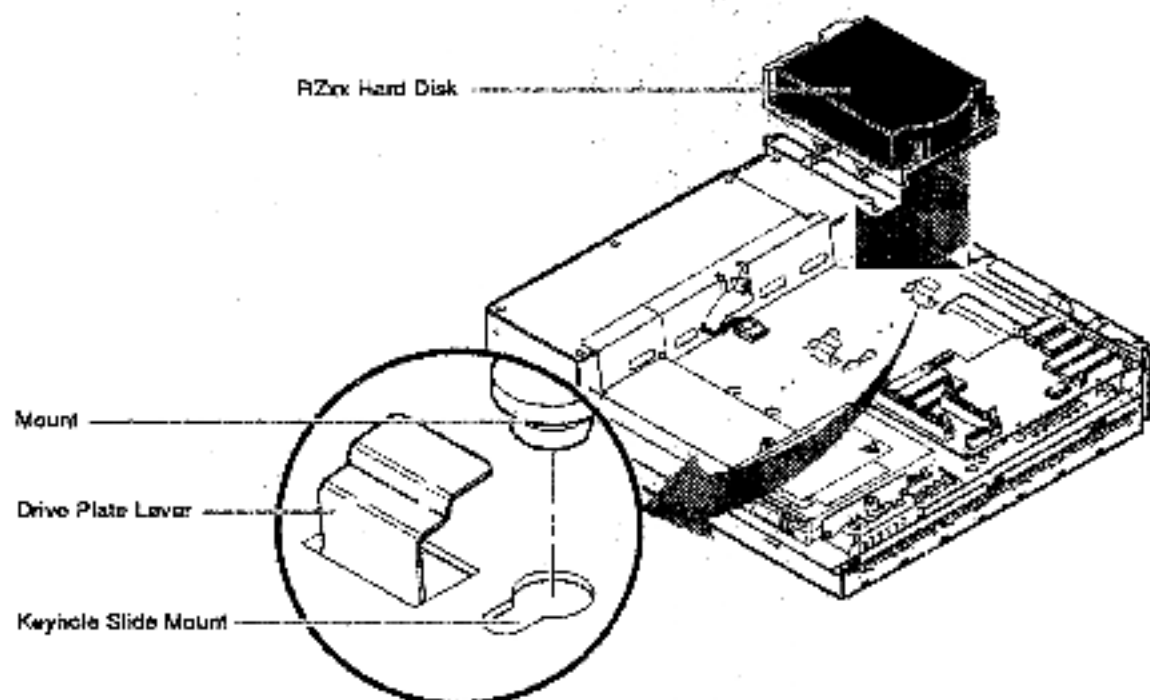
- Mount the hard disks on the drive plate, being sure to orient them as shown Figure 9-14.
- If you are adding a hard disk to position 3, the front of the hard disk faces the rear of the system box. Figure 9-18 shows an enlarged view of the front of the hard disk and the cable connectors.

Figure 9-18 RZxx Hard Disk



- Insert the four screw mounts on the bottom of the hard disk inside the four keyhole slide mount openings in the drive plate, as shown in Figure 9-19.

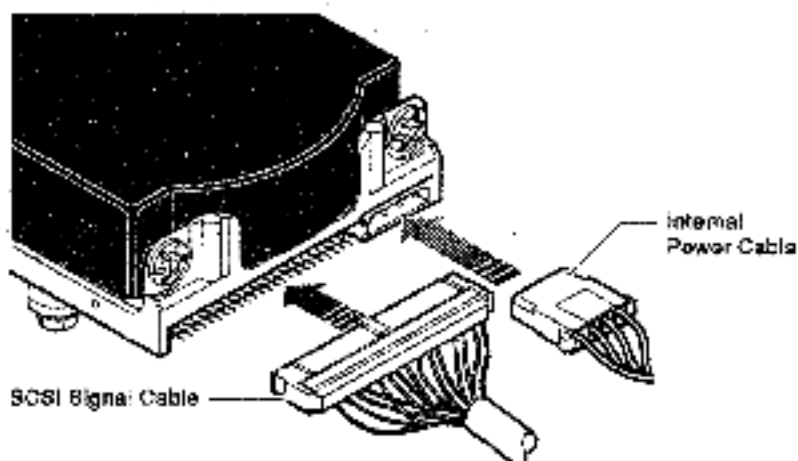
Figure 9-19 Mounting a Hard Disk on the Drive Plate



MLQ-025401

- Press the hard disk down and slide it forward in the grooves of the drive plate until the drive plate lever pops up, locking the hard disk in place. When the hard disk is correctly mounted, the drive plate lever will make firm contact with the side of the hard disk, and the hard disk will not move on the drive plate.
- 5** Locate the two power cables:
- The power cable fixed to the power supply
 - The 4-conductor internal power cable, labeled 17-02220-04 (Figure 9-20)

Figure 9-20 RZxx Hard Disk Cable Connections



M.C-026467

Note that each of the power connectors on the 4-connector internal power cable has a raised key on one side. The one small connector is not used with hard disks.

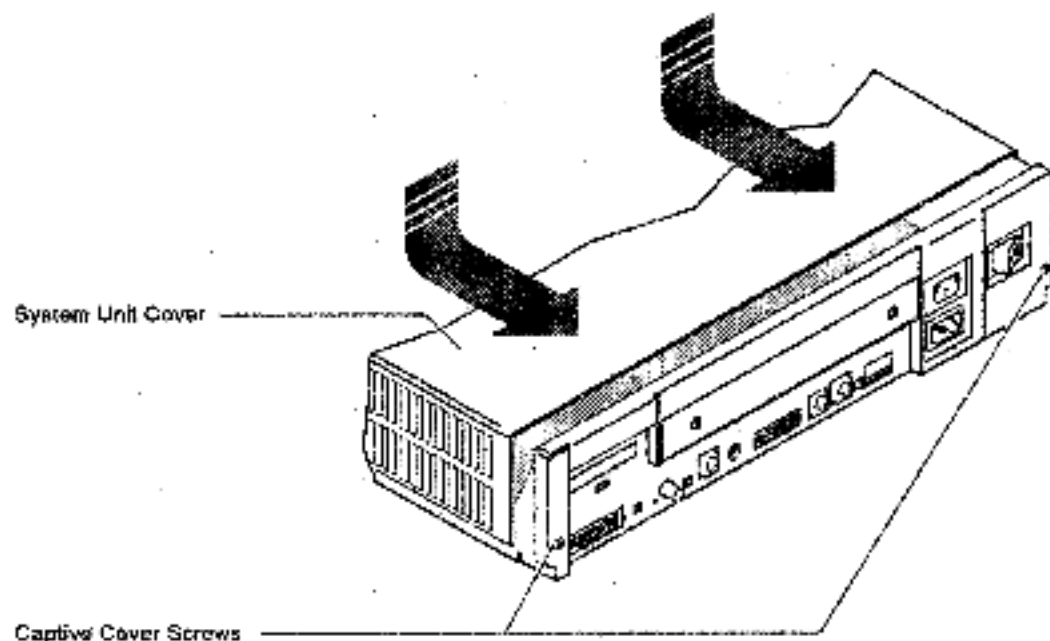
- 9 Connect one of the 4-connector internal power connectors to the power supply port so that the raised keys are aligned.
- 10 The remaining three power connectors are identical. Connect one of the power connectors into the power port on the front of each hard disk so that its off-center key faces downward. Some connectors may remain unconnected, depending on your system configuration.
- 11 Locate the SCSI signal cable, shown in Figure 9-20. The SCSI signal cable has three additional connectors for connecting to mass storage devices. Note that one side of each SCSI signal connector has a raised center key.
- 12 Connect a free SCSI signal connector into the front of the hard disk so that the keyed side of the SCSI signal connector faces upward, away from the drive plate.
- 13 If you have further additions to make inside the system unit, turn to the appropriate sections. Otherwise, proceed to Section 9.7.

9.7 Restoring Your System Unit

To restore the system, follow these steps:

- 1 Replace the system cover and tighten the two cover screws, as shown in Figure 9-21.

Figure 9-21 Replacing the System Unit Cover

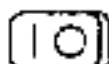


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- 2 Reconnect the cables to the system unit in the following order:

- Keyboard cable (Figure 2-4)
- Mouse cable (Figure 2-5)
- Monitor video cable (Figure 2-10)
- Ethernet T-connector (Figure 2-7)
- ThinWire or standard Ethernet terminator
- Monitor power cord (Figure 2-11)
- System power cord

9.8 Starting Your System



To start your system, turn your equipment on (|) in the order given.

- 1 Turn expansion boxes on (|) in the following order:
 - BA42 expansion box
 - Hard disk expansion boxes
 - Compact disc expansion box
- 2 Turn the printer and modem on (|), if you have this equipment. (To connect a printer, or modem, see Chapter 8.)
- 3 Turn the monitor on (|).
- 4 Turn the system unit on (|).
- 5 Proceed to Section 9.9 to verify that you added and replaced devices correctly.

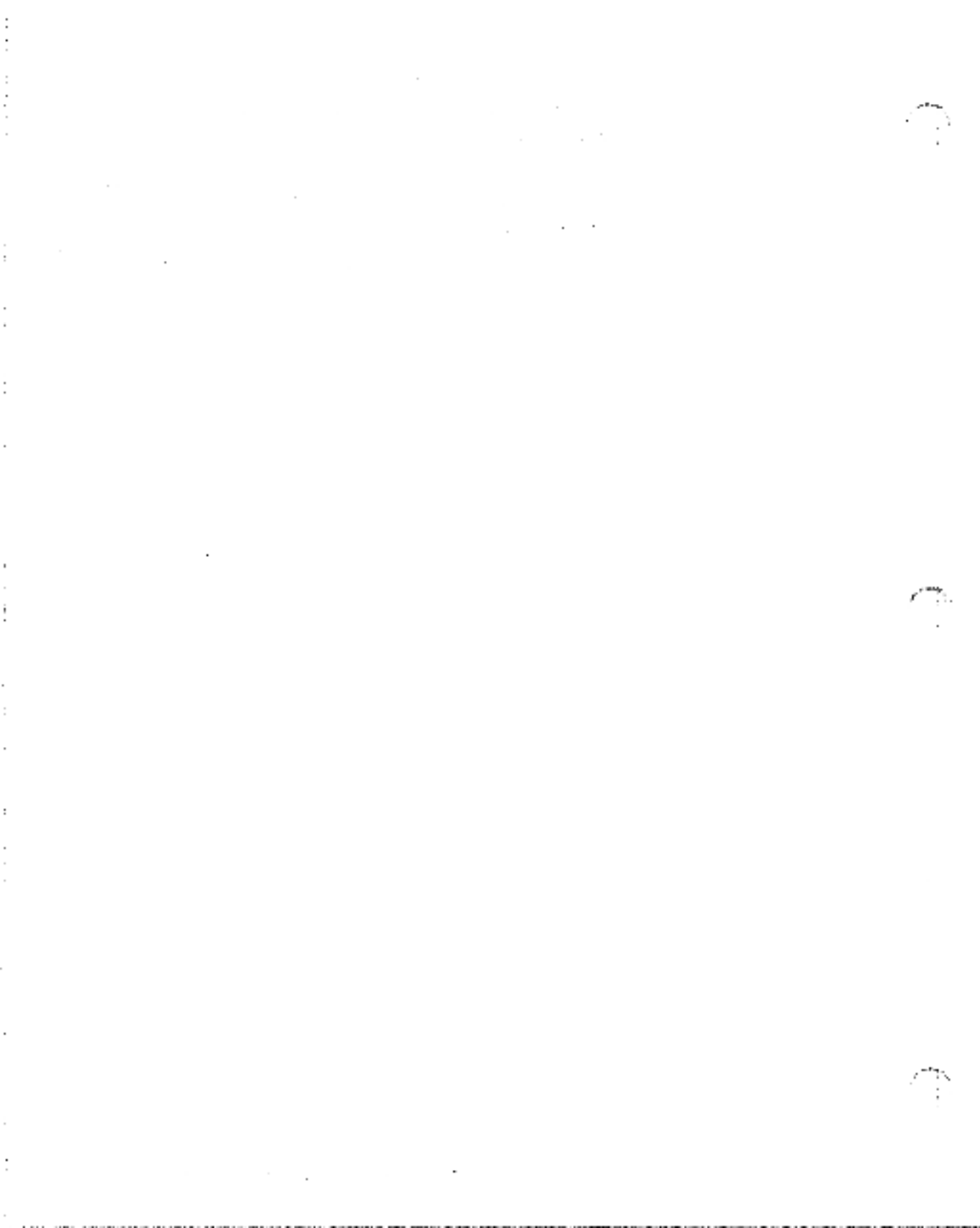
9.9 Testing Your System After Adding a Device

To verify that devices or modules are connected correctly, follow these steps:

- 1 Note any power-up error or status messages. Refer to Section 7.1 for an explanation of these messages.
For example, if you added a storage device such as an R223 or R224 hard disk, you should not see the following status message, which indicates that no devices have been connected to the internal SCSI-A bus:

```
7 7 0000 0000.4001
```
- 2 Display the system device configuration by using the **TEST 50** command as explained in Section 7.3. Compare the latest configuration display with the configuration display you viewed when you prepared the system. You should see the newly added device as well as all the devices present before the addition. Make sure no error messages appear.
- 3 Verify that devices are interacting correctly by using the **TEST 6** command to run the system exerciser, as explained in Section 7.7.
- 4 Verify that devices are set to the correct SCSI IDs by using the **SHOW DEVICE** command, as explained in Section 7.6.

- 5 If you have problems, check the following:
 - Are all cables inside and outside the system unit reconnected?
 - Are all modules fully seated in their connectors?
 - Are SCSI IDs set correctly? There should be no devices with duplicate SCSI IDs.
- 6 If you continue to have problems, contact your Digital service representative.



A

Startup Procedures

This appendix describes how to do the following:

- Set the hardware to boot the operating system software automatically from a particular device (Section A.1)
- Set your system to have a particular mode of action should the system power down (Section A.2)
- Set the default boot flags for your software (Section A.3)
- Set your system up with an alternate console (Section A.4)

For more information on setting your startup procedures, see your operating system installation guide.

A.1 Automatic Booting

Set the default boot device to the disk drive on which you installed your operating system software. The VAXstation S100 will boot from that device at startup. The operating system software should reside in one of the following places:

- On a hard disk in the system unit
- On a hard disk in an expansion box
- On a compact disc drive in an expansion box
- On a remote system that you access through the Ethernet

Table A-1 shows the names assigned to each of the possible devices. The default boot device should be set to one of these.

Table A-1 SCSI Boot Device Names

Device and Location	VMS Device Name	ULTRIX Device Name
Hard disk in system unit (SCSI-A bus at ID 0-7)	DKAx00	RZx
Hard disk in expansion box (SCSI-B bus at ID 0-7)	DKBx00	RZx
Mass storage on remote system	ESA0	SE0

To change the default boot device, follow these steps:

Note Check your software documentation for shutdown procedures before halting your system.

- 1 Check that the system is in console mode. To get the console prompt (`>>>`), press the halt button on the rear of the system unit.
- 2 At the console prompt, enter SET BOOT and the name of the default boot device where the software will reside, as shown in the following example:

```
>>> SET BOOT DKAB00 [Enter]
```

- 3 Up to two devices may be selected at one input, as shown in the following example:

```
>>> SET BOOT DKAB00,DKA200
```

A.2 Changing the Default Recovery Action

When you receive your system, it automatically starts up the operating system software every time you power up or there is an operating system software failure. The options you have for setting the default recovery action are listed and explained in Table A-2.

Table A-2 Values for Recovery Action

Value	Recovery Action	Result	User Action
1	Automatic restart	Console mode	None
2	Automatic reboot	Operating system software reboots automatically	None
3	Automatic halt	Console prompt appears	Enter BOOT ¹

¹Enter BOOT or RBOOT and the device name (for example, BOOT DKAx00), where the operating system software resides.

If you want to change the default recovery action, follow these steps:

Note Check your software documentation for shutdown procedures before halting your system.

- 1 Put your Model 76 in console mode by pressing the halt button on the back of the system unit.
- 2 At the console prompt, enter the following:

```
>>> SHOW HALT Return
```

The value for the default recovery action displays:

```
2
>>>
```
- 3 To change to automatic reboot, enter the following at the console prompt:

```
>>> SET HALT 2 Return
```
- 4 If you want your system to halt after every power-up, enter the following at the console prompt:

```
>>> SET HALT 3 Return
```

A.3 Setting the Default Boot Flags

The default boot flags should be set for the operating system installed on your Model 76. Consult your operating system documentation for more information.

To set the default boot flags, follow these steps:

Note Check your software documentation for shutdown procedures before halting your system.



- 1 Check that the system is in console mode. If the console prompt does not appear on the screen, press the halt button on the back of the system unit.
- 2 Get the default boot flag number (a hexadecimal number of up to 8 characters) from your operating system software documentation.
- 3 At the console prompt, enter the following:

```
>>> SET BOOT default-bootflag-number [boot]
```

default-bootflag-number is a number you enter for your system. See your software documentation for more information.

- 4 Set the default boot flags for your operating system.

A.4 Using an Alternate Console with Your System



The VAXstation 3100 Model 76 has a serial port to which you usually attach a printer. (The printer icon appears above this port.) You can also attach a video terminal to this port to use as an alternate (operator) console, or you can add a supported hardcopy terminal or video terminal to this port if you want a printout of a software installation. You can even connect a printer to the video terminal.

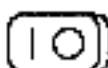
If you are attaching a video terminal to the serial port to use as an alternate console terminal, you must first set the alternate console switch on the back of the system unit. Then perform the following steps:



- 1 Shut down your system. See your software documentation for proper shutdown procedures before turning your system off. Also, you should not turn off, halt, or restart the system without notifying work group members.
- 2 Turn the expansion boxes, monitor, and system unit to the off (O) position.



S3



- 3 On the back of the system unit, find the S3 icon over the alternate console slide-switch. Down is the normal position.
- 4 Set the alternate console switch to the up (on) position. Use a small pointed object (do not use a pencil; the graphite will damage the switch) to set the switch. When the switch is in the up position, you enable a video terminal as an alternate console. The serial port is now a terminal port.
- 5 Attach one end of a DEC 423 serial line cable to the serial port (printer port) on the Model 76 system unit and the other end of the serial line cable to the serial port on the alternate console terminal.
- 6 Turn the alternate console terminal on (1).
- 7 Check the monitor baud rate, which should be set to 9600 baud. See your monitor documentation for additional information.
- 8 Turn all expansion boxes and the system unit on (1).
- 9 If the console prompt (>>>) does not appear on the alternate console screen, press the break key on the alternate console terminal keyboard.
- 10 At the alternate console keyboard, enter DTE at the console prompt (>>>) and press Return:

>>> DTE Return

This command converts the system from console mode to terminal emulation mode. An asterisk is added to the console prompt after you enter the DTE command. The new prompt (*>>>) indicates that you are working in alternate console mode. All information displayed on the screen comes from the Model 76 system.

To exit terminal emulation mode, press Ctrl/P. The Model 76 system returns to local console mode (>>>).

The Model 76 system with the S3 switch in the up position will always attempt to use the serial line. The alternate console uses the information only after you enter the DTE command. The state of the S3 switch is read only at power-up.

2

3

4

SCSI IDs

This appendix provides information about the following:

- SCSI ID default settings (Section B.1)
- Setting SCSI IDs (Section B.2)
- Setting SCSI ID switches for devices inside the system unit (Section B.3)
- Setting SCSI ID switches for the RRD40 compact disc expansion box (Section B.4)

This information is for technical users who wish to do custom configurations. SCSI (Small Computer Systems Interface) is an interface designed for connecting disks and other peripheral devices to computer systems. SCSI is defined by an American National Standards Institute (ANSI) standard and is used by many computer and peripheral vendors throughout the industry.

Up to eight SCSI devices can share a SCSI bus (a cable). All data is sent between the system and the devices on the cable. Each SCSI device attached to the cable looks at all the data but takes only the data that has the proper device identification. Each of the eight devices is identified by a number between 0 and 7, called a SCSI ID.

B.1 SCSI ID Default Settings

Digital sets each SCSI device to a default SCSI ID before the equipment leaves the factory. 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.

The number 7 is used by devices requiring the highest priority on the SCSI bus. The number 6 is reserved for the controller. The remaining ID numbers (0 through 5) are available for custom configuration.

SCSI default settings for each Model 76 system are listed in Table B-1. The settings listed give optimal performance on most systems. However, if you have special performance needs, you can set the identification number on each SCSI device manually. For most applications, SCSI IDs can be set arbitrarily as long as no two devices have the same ID. Each SCSI device has a set of switches or jumpers that can be set to a specific ID.

B.2 Setting SCSI IDs

To see status information about each SCSI ID on your system, enter TEST 50 at the console prompt (>>>) and press Return. Your system configuration appears on the screen in a display similar to the one below:

```
SCSI-A      1C1C.0001  V1.3
  ①  ②  ③  ④  ⑤  ⑥  ⑦  ⑧
FFFFF05 FFFFF05 FFFFF05 0000001 0100001 0100001 FFFFF03 FFFFF05
SCSI-B      1C1C.0001  V1.3
  ①  ②  ③  ④  ⑤  ⑥  ⑦  ⑧
FFFFF05 FFFFF05 FFFFF05 0000001 0500001 FFFFF05 FFFFF03 FFFFF05
```

The system configuration display includes a SCSI-A bus line and a SCSI-B bus line. The 16 alphanumeric SCSI-A and SCSI-B codes, numbered ① through ⑧ in the example for your reference, correspond to SCSI ID numbers 0 through 7 in each line. For example, ① refers to SCSI ID 0 in the SCSI-A line and SCSI ID 0 in the SCSI-B line. Each SCSI code in the display shows the presence or absence of a device at that ID and tells the functional status of a connected device. Table B-1 shows each SCSI-A and SCSI-B ID number and its recommended use. Table B-2 explains the SCSI codes in the configuration display.

Table B-1 SCSI IDs for a VAXstation 3100 Model 76 with an Expansion Box

ID	SCSI-A Device	SCSI-B Device
① 0	Open	Reserved for expansion
② 1	RZ23 or RZ24 ¹	Reserved for expansion
③ 2	RZ23 or RZ24 ¹	Reserved for expansion
④ 3	RZ23 or RZ24 ²	RZ56
⑤ 4	Open	RRD40 expansion box
⑥ 5	RX23	Reserved for expansion
⑦ 6	SCSI-A adapter	SCSI-B adapter
⑧ 7	Open	Reserved for expansion

¹Normally used for the applications disk.

²Normally used for the system disk.

Table B-2 SCSI Codes

Code	Meaning
FFFFFFFF05	Device is off line or is not installed at this ID.
FFFFFFFF03	SCSI bus controller is functional at this ID.
FFFFFFFF	Possible SCSI bus controller error.
00000001	RZ5x hard disk is functional at this ID.
05000001	RRD40 compact disc drive is functional at this ID.

A code other than one listed in Table B-2 indicates a malfunction in the device connected at that ID.

Remember the following when you set SCSI IDs:

- You can connect up to seven devices on one bus.
- Each device must have a unique SCSI ID.
- SCSI-A is an internal bus for internal devices.
- SCSI-B is an external bus for external devices.

Note Proper operation of the SCSI bus requires that you use high-quality, properly configured cables and connectors to connect all devices. Digital recommends that you use Digital-supplied cable assemblies intended for interconnecting SCSI devices. This ensures

that the impedance characteristics, signal propagation velocity, inductance, capacitance, cross-talk, grounding, conductor pairing, and shielding meet the requirements for proper operation of the bus. Digital also recommends that you power all units on the SCSI bus from a common AC power source. The proper operation of any SCSI bus that uses cable assemblies that are not supplied by Digital, or that are not configured in accordance with Digital's recommendations, is not guaranteed.

B.3 Setting SCSI Switches for Devices Inside the System Unit

As mentioned, you set all devices inside the system unit to open IDs on the SCSI-A bus. Tables B-3 and B-4 give all the possible switch positions for each storage device inside the system unit.

Table B-3 RX23 Diskette Drive SCSI ID Settings

SCSI ID	Switch Positions		
	1	2	3
0	Off	Off	Off
1	On	Off	Off
2	Off	On	Off
3	On	On	Off
4	Off	Off	On
5†	On	Off	On
6‡	Off	On	On
7	On	On	On

†Recommended ID for the RX23 diskette drive.

‡Reserved ID for the SCSI controller.

Table B-4 Hard Disk SCSI ID Settings

SCSI ID	Jumper Positions		
	1	2	3
0	Out	Out	Out
1†	In	Out	Out

†Recommended IDs for RZ23 and RZ24 hard disks.

(continued on next page)

Table B-4 (Cont.) Hard Disk SCSI ID Settings

SCSI ID	Jumper Positions		
	1	2	3
2†	Out	In	Out
3†	In	In	Out
4	Out	Out	In
5	In	Out	In
6†	Out	In	In
7	In	In	In

†Recommended IDs for R223 and R224 hard disks.

‡Reserved ID for the SCSI controller.

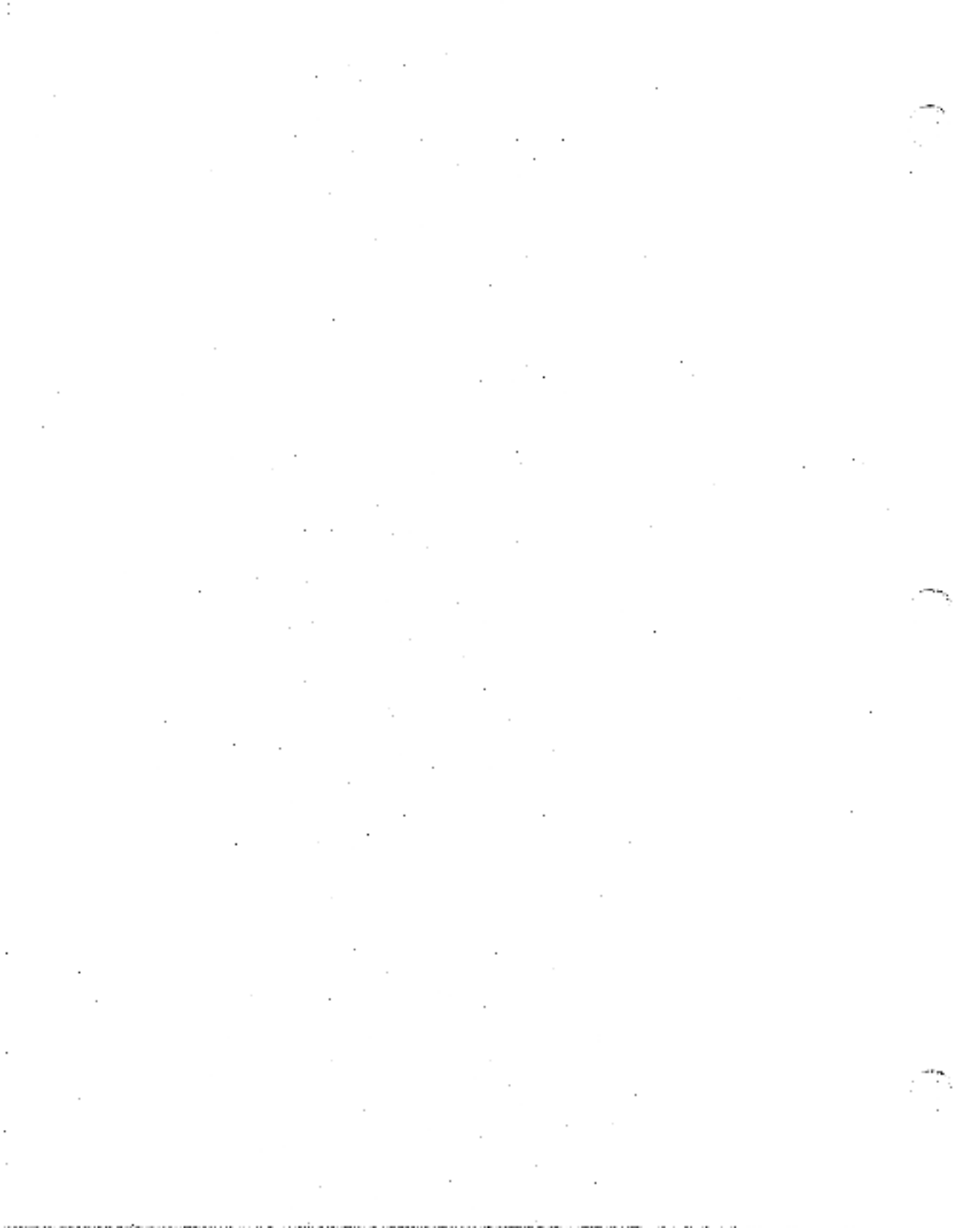
B.4 Setting SCSI Switches for the RRD40 Compact Disc Expansion Box

Set external devices to open IDs on the SCSI-B bus. Table B-5 gives all the possible switch positions for the RRD40 compact disc expansion box.

Table B-5 RRD40 Compact Disc Expansion Box SCSI ID Settings

SCSI ID	Switch Positions			
	1	2	3	4 [†]
0	Down	Down	Down	Down
1	Down	Down	Up	Down
2	Down	Up	Down	Down
3	Down	Up	Up	Down
4	Up	Down	Down	Down
5	Up	Down	Up	Down
6	Up	Up	Down	Down
7	Up	Up	Up	Down

[†]Switch 4 is unused; leave it in the down position.



Power-Up, Self-Test, and Test 50 Status and Error Codes

This appendix lists some of the error codes and status codes for the power-up test, self-test, and TEST 50. The error and status codes are the same for each of these tests. For quick reference, use this table to find the codes for each device.

Failing Test/Device	Section
Test F - Monochrome video circuits (MONO)	C.1
Test E - Time-of-year clock (CLK)	C.2
Test D - Nonvolatile RAM (NVR)	C.3
Test C - Serial line controller (DZ)	C.4
Test B - System memory (MEM)	C.5
Test A - Memory management (MM)	C.6
Test 9 - Floating point (FP)	C.7
Test 8 - Interval timer (IT)	C.8
Tests 6 and 7 - SCSI bus controller (SCSI-A and SCSI-B)	C.9
Test 5 - Interrupt controller and Ethernet ID ROM (SYS)	C.10
Test 4 - Graphics coprocessor module/color option (SPLN)	C.11
Test 3 - Not supported	
Test 2 - Not supported	
Test 1 - Ethernet circuits (NI)	C.12

C.1 Monochrome Video Circuits (MONO)

The error code format is 0000.XXXX, where XXXX is one of the codes listed in Table C-1.

Table C-1 Monochrome Video Circuit Error Codes (0000.XXXX)

Error Code	Definition
0001	No error.
0010	End of frame bit did not set in interrupt, pending register.
0020	End of frame failed to set for the second time.
0040	End of frame failed to set for the third time.
0080	No end of frame interrupt was seen.
0100	Wrong IPL (interrupt priority level) for an EOF (end of file) interrupt.
0200	Interrupt request failed to clear interrupt, pending register bit.
0400	End of frame interrupt did not occur.
0800	Error during cursor test.

C.2 Time-of-Year Clock (CLK)

The error code format is 0000.XXXX, where XXXX is one of the error codes listed in Table C-2.

Table C-2 Time-of-Year Clock Error Codes (0000.XXXX)

Error Code	Definition
0001	No error.
0008	Dispatcher should check the time at the end of testing.
0004	Invalid time set.
0005	Clock has not been reset since the last time the battery voltage level was low.
0010	Time-of-year test failed.
0020	Vrt bit failed to set after it was read the first time.
0040	Battery voltage level was down during the clock test.

C.3 Nonvolatile RAM (NVR)

The error code format is 0000.XXXX, where XXXX is one of the codes listed in Table C-3. An error code of 5 indicates that the battery voltage is too low for data in the NVR to be valid.

Table C-3 Nonvolatile RAM Error Codes (0000.XXXX)

Error Code	Definition
0001	No error.
0004	Battery was down at the last entry.
0005	NVR failed.
0080	The battery check code in the NVR did not agree with the expected check code.

C.4 Serial Line Controller (DZ)

The first line of the error code is of the format 0000.XXXX, where XXXX is one of the error conditions listed in Table C-4.

Table C-4 Serial Line Controller Error Codes (0000.XXXX)

Error Code	Definition
0001	No error.
0002	Master reset failed.
0004	Basic CSR (control and status register) test failed.
000E	CSR read-write test failed.
0010	Basic TCR (transmitter control register) test failed.
0020	Read-write TCR test failed.
0040	Transmitter ready test failed.
0080	Receiver ready test failed.
0100	Transmitter interrupt timeout.
0200	Receiver interrupt timeout.
0400	Either the transmitter or the receiver interrupted at the wrong priority.
0800	Receiver interrupt occurred when the receiver was not enabled.

(continued on next page)

Table C-4 (Cont.) Serial Line Controller Error Codes (0000.X000)

Error Code	Definition
1000	Data comparison error.
2000	Overflow error did not happen.
4000	This line is untested.
8000	Error in the modem control logic test.

The second line of six codes under the DZ error code contains the status of each serial line as well as the status of the keyboard and mouse (or tablet). This second line of status codes allows you to identify a failing serial line. The status codes in the second line appear in the following format:

```
0000WWWW 0000WWWW 0000WWWW 0000WWWW YYYYYYYY ZZZZZZZZ
line 0   line 1   line 2   line 3   keyboard  mouse
```

where WWWWW is a status code (see Table C-5), YYYYYYYY is a keyboard internal self-test code (see Table C-6), and ZZZZZZZZ is a mouse or tablet internal self-test code (see Table C-7).

Table C-5 Serial Line Controller Status Codes (0000WWWW)

Status Code	Definition
0001	Serial line tested successfully.
4000	Serial line is untested.

Table C-6 Keyboard Self-Test Codes (YYYYYYY)

Status Code	Definition
00000000	No keyboard is connected.
00000001	Keyboard is connected and tested successfully.
000000FD	Loopback is connected and tested successfully.

Table C-7 Mouse or Tablet Self-Test Codes (ZZZZZZ)

Status Code	Definition
00000000	No mouse or tablet is connected.
000012A0	Mouse or tablet is connected and tested successfully.
00000084	Loopback is connected and tested successfully.

C.5 System Memory (MEM)

The first line of the error code is of the format 0000.XXXX, where XXXX is one of the codes listed in Table C-8. These codes show the error/status information for the memory on the memory module.

Table C-8 4 Digit Memory Error Codes (0000.XXXX)

Error Code	Definition
0001	No error.
0002	Test address routine failed.
0004	Byte mask failed.
0008	Data/address test failed.
0010	No memory found during sizing.
0020	Unexpected parity error.
XX00	this is a CACHE error.

The second line under the MEM code contains additional information on the system memory in the following format:

YYYYYYY ZZZZZZZZ

where YYYYYYY is the total number of bytes of good memory found in the system. If this field is not an even megabyte value (for instance, 00020000), then the second field, ZZZZZZZZ, is displayed to indicate the failing megabyte bank. Each bit in the ZZZZZZZZ status code indicates the status for one bank of memory. In some cases, where a parity error is detected, the error may be on both the system module and the memory module.

C.6 Memory Management (MM)

This function is not provided for this product.

C.7 Floating Point (FP)

The error code format is 0000.000X, where X is one of the error codes listed in Table C-9.

Table C-9 Floating Point Error Code (0000.000X)

Error Code	Definition
0002	Floating point error.
0004	Invalid floating point exception.
XXXX	Indicates failing vector.

C.8 Interval Timer (IT)

The error code format is 0000.000X, where X = 2 for a fatal error or 1 for success.

C.9 SCSI Bus Controllers (SCSI-A and SCSI-B)

This section includes the codes for all SCSI bus controllers on all VAXstation 3100 systems.

Note A soft error occurs if nothing is connected to the SCSI-B bus.

The first line of the error code is of the format WWXX.YYZZ,

where WW is the binary mask field of the devices selected successfully on the SCSI bus (see Table C-10), XX is the binary mask field of the devices tested successfully on the SCSI bus (see Table C-10), YY is a set of binary error flags (see Table C-11), and ZZ is the status/error code of the SCSI controller on the SCSI mass storage controller module (see Table C-12).

The second line of the error code is of the format DDMMSSTT, where DD is the status of the data-in phase of the INQUIRY command, MM is the status of the message-in phase of the INQUIRY command, SS is the status of the status phase of the INQUIRY command, and TT is the status of the devices on the SCSI bus. All these status codes are identical and are listed in Table C-13.

The second line of the error code indicates the status of the eight possible devices on the SCSI bus, including the controller on the SCSI mass storage controller module. The first code in this second line is reserved for the SCSI controller on the SCSI mass storage controller module. Codes 2 through 8 are for the devices connected to the SCSI bus.

Table C-10 Binary Mask of Selected Devices (WW)XX.0000)

Binary Mask	Device ID	Screen Display
0000 0001	0	01
0000 0010	1	02
0000 0100	2	04
0000 1000	3	08
0001 0000	4	10
0010 0000	5	20
0100 0000	6	40
1000 0000	7	80

Table C-11 Binary Mask of Error Flags (0000.YY00)

Binary Mask	Definition	Screen Display
0000 0001	Problem is on the system module.	01
0000 0010	Problem is not on the system module.	02
0001 0000	Reset is required to free the SCSI bus.	10
0010 0000	Not all selected devices are operating properly.	20
0100 0000	DMA (direct memory address) and interrupts are untested.	40

Table C-12 SCSI Controller Status and Error Codes (0000.00ZZ)

Error Code	Definition
01	No error.
02	Data buffer RAM addressing failure.
04	Data buffer RAM byte mask failure.
06	Data buffer data path failure.
10	Error in SCSI controller registers during reset.
12	Error in SCSI controller registers after reset.
20	Unexpected interrupt after reset, (interrupt priority level) IPL = 1F.
22	No interrupt request after reset.
24	No interrupt after reset when (interrupt priority level) IPL has been lowered.
26	Interrupt request was not cleared after ISR (interrupt service routine; reset).
28	Multiple interrupts following reset.
2A	Unknown interrupt following reset.
2C	Wrong interrupt following reset.
30	Phase was not bus free at the start of the test.
40	First attempt to read the SCSI controller's registers failed.
42	SCSI controller register address test failed at <code>ini_cmd</code> .
44	SCSI controller register address test failed at <code>mode</code> .
46	SCSI controller register address test failed at <code>tar_cmd</code> .
48	SCSI controller register address test failed at <code>scd_ctl</code> .
4A	Mode (DMA) found set after being cleared when <code>ini_cmd(hay)</code> was clear.
4C	Mode (DMA) found set after being set when <code>ini_cmd(hay)</code> was clear.
4E	Mode (DMA) found set after being cleared when <code>ini_cmd(hay)</code> was set.
50	Mode (DMA) found clear after being set when <code>ini_cmd(hay)</code> was set.
60	Data output to the bus with <code>ini_cmd(exout)</code> clear.
62	No data to the bus with <code>ini_cmd(exout)</code> set.

(continued on next page)

Table C-12 (Cont.) SCSI Controller Status and Error Codes (0000,0022)

Error Code	Definition
64	Parity bit <code>cur_stat(dbp)</code> did not match data on the bus.
66	With the bus free, data in did not match data out.
68	<code>int_end(sel)</code> to <code>cur_stat(sel)</code> mismatch.
6A	<code>in_end(ack)</code> to <code>status(ack)</code> or <code>in_end(ack)</code> to <code>status(ack)</code> mismatch.
6C	<code>tar_end(req)</code> to <code>cur_stat(req)</code> , <code>tar_end(mag)</code> to <code>cur_stat(mag)</code> , <code>tar_end(ed)</code> to <code>cur_stat(ed)</code> , or <code>tar_end(io)</code> to <code>cur_stat(io)</code> mismatch with <code>mode(targ)</code> set.
6E	Clearing <code>mode(targ)</code> does not prevent <code>tar_end</code> bits from appearing on the bus.
70	ISR hit with <code>IPL = 1F</code> and <code>int_mask(ac)</code> was clear.
72	Interrupt request <code>int_req(ac)</code> was set for no reason.
74	SCSI bus status(<code>intreq</code>) was set for no reason.
80	SCSI bus was busy at the start of the interrupt test—no test was done.
82	ISR hit following the bus free with <code>IPL = 1F</code> and <code>int_mask(ac)</code> was clear.
84	Interrupt request <code>int_req(ac)</code> was not set following the bus free.
86	SCSI bus status(<code>intreq</code>) was not set following the bus free.
88	Status(<code>bayerr</code>) was not set after it caused an interrupt.
90	SCSI bus was busy during the interrupt test—no test was done.
92	ISR hit following the bus free with <code>IPL = 1F</code> and <code>int_mask(ac)</code> was set.
94	Interrupt request <code>int_req(ac)</code> was not set following the bus free.
96	SCSI bus status(<code>intreq</code>) was not set following the bus free.
98	Status(<code>bayerr</code>) was not set following the bus free.
A0	SCSI bus was busy during the interrupt test—no test was done.

(continued on next page)

**Table C-12 (Cont.) SCSI Controller Status and Error Codes
(0000.0022)**

Error Code	Definition
A2	Timeout waiting for the bus free interrupt.
A4	ISR was not hit following the bus free.
A6	Interrupt request int_req(sc) was not cleared following ISR after the bus free.
A8	SCSI bus status(intreq) was not set following the bus free.
AA	Multiple interrupts from the bus free.
AC	Unknown interrupt from the bus free.
AE	Wrong interrupt from the bus free.
B0	SCSI bus was busy during the interrupt test—no test was done.
B2	Timeout waiting for parity interrupt.
B4	ISR was not hit following parity.
B6	Interrupt request int_req(SC) was not cleared following ISR after parity.
B8	SCSI bus status(intreq) was not set following parity.
BA	Multiple interrupts from parity.
BC	Unknown interrupt from parity.
BE	Wrong interrupt from parity.
C0	Phase was not bus free before arbitration.
C2	Ini_cmd(aip) bit failed to set.
C4	Lost arbitration (first check of ini_cmd(la)).
C6	Higher priority device in bus.
C8	Lost arbitration (second check of ini_cmd(la)).
D0	Not all selected targets tested satisfactory.

Table C-13 Device Status Codes (DDMMSSTT)

Status Code	Definition
FF	Device is untested.
01	No error.
03	Device is reserved by the host (SCSI controller).
05	Device did not respond to selection.
10	Device did not set cur_stat(req) soon enough when changing phase.
12	Jitter on the phase lines when changing phase.
20	Device set the command phase twice.
22	Device changed phase before the command was complete.
24	Device failed to set cur_stat(req) when getting the command.
26	Device failed to clear cur_stat(req) when getting the command.
28	Command phase was out of sequence.
2A	Stuck in the command phase.
30	Device set the data-in phase twice.
32	Device failed to set cur_stat(req) when returning data.
34	Device failed to clear cur_stat(req) when returning data.
36	Device changed the data-in phase before transferring any data.
38	Data-in phase was out of sequence.
3A	Stuck in the data-in phase.
40	Target set the status phase twice.
42	Target failed to set cur_stat(req) when returning data.
44	Target failed to clear cur_stat(req) when returning data.
46	Target changed status phase before transferring any data.
48	Status phase was out of sequence.
4A	Stuck in the status phase.
50	Target set the message-in phase twice.
52	Target failed to set cur_stat(req) when returning data.

(continued on next page)

Table C-13 (Cont.) Device Status Codes (DDMMSSSTT)

Status Code	Definition
54	Target failed to clear cur_stat(req) when returning data.
56	Target changed the message-in phase before transferring any data.
58	Message-in phase was out of sequence.
5A	Stuck in the message-in phase.
60	Target set the data-out phase (unexpectedly).
62	Target set the phase to 100b (reserved phase).
64	Target set the phase to 101b (reserved phase).
66	Target set the message-out phase.
68	Selected target did not set any phase before releasing bus.
70	Target not following the expected phase sequence.
72	Parity error was detected during programmed I/O transfer.
80	Unexpected interrupt at the start of the DMA test.
90	Target failed to set the command phase.
92	Unexpected interrupt at the start of the command phase in the DMA test.
94	Timeout waiting for the DMA to complete in the command phase in the DMA test.
96	No DMA and following the command phase in the DMA test.
98	Wrong interrupt following the command in the DMA test.
9A	Sed_err was not zero following the command in the DMA test.
9C	DMA was not complete after the EOP (end-of-procedure) command phase (ACK (acknowledgment) was not clear soon enough).
A0	status(demand) bit was not cleared when mode(dma) was cleared at the start of the data-in phase in the DMA test.
A2	Target failed to set the data-in phase in the DMA test.

(continued on next page)

Table C-13 (Cont.) Device Status Codes (DDMMSSST)

Status Code	Definition
A4	Timeout waiting for the DMA to complete in the data-in phase in the DMA test.
A6	No status(demand) following the data-in phase in the DMA test.
A8	Wrong interrupt following the data-in phase in the DMA test.
AA	Sed_cnt was not zero following the data-in phase in the DMA test.
AC	DMA was not complete after the EOP in data-in phase (ACK was not clear soon enough).
B0	status(demand) was not cleared when mode(dma) was cleared at the start of the status phase in the DMA test.
B2	Target failed to set the status phase in the DMA test.
B4	Timeout waiting for the DMA to complete in the status phase in the DMA test.
B6	No status(demand) following the status phase in the DMA test.
B8	Wrong interrupt following the status in the DMA test.
BA	Sed_cnt was not zero following the status in the DMA test.
BC	DMA was not complete after the EOP in the status phase (ACK was not clear soon enough).
C0	status(demand) was not cleared when mode(dma) was cleared at the start of the message-in phase in the DMA test.
C2	Target failed to set the message-in phase in the DMA test.
C4	Timeout waiting for the DMA to complete in the message-in phase in the DMA test.
C6	No status(demand) following the message-in phase in the DMA test.
C8	Wrong interrupt following the message-in phase in the DMA test.
CA	Sed_cnt was not zero following the message-in phase in the DMA test.

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Table C-13 (Cont.) Device Status Codes (DDMMSSST)

Status Code	Definition
CC	DMA was not complete after the EOF in the message-in phase (ACK was not clear soon enough).
D0	Status(demand) was not cleared when mode(dma) was cleared at the end of the DMA test.
D2	SCSI bus was not free soon enough at the end of the DMA test.

C.10 Interrupt Controller and Ethernet ROM (SYS)

The error code format is 0000.XXXX, where XXXX is one of the codes listed in Table C-14.

Table C-14 Interrupt Controller and Ethernet ROM Error Codes (0000.XXXX)

Error Code	Definition
0001	No error.
0002	System ROM failed checksum.
0004	Ethernet ROM failed checksum.
0008	No interrupts were pending.
0010	Not all of the expected interrupts occurred.
0020	Unexpanded interrupt.
0040	Improper priority.
0080	Default interrupt service routine was called. An interrupt that was not enabled occurred.
0100	No keyboard found in the configuration.

C.11 Graphics Coprocessor Module/Color Option

The error code format is XXXX.YYYZ, where XXXX is the status of the failing test (ignores this field); YYY is one of the codes listed in Table C-15; and Z is 1 to indicate no error, 2 to indicate a fatal error, or 3 to indicate a status message.

Table C-15 Graphics Coprocessor Module/Color Option Error Codes (0000.YYYD)

Error Code	Falling Test	Error Code	Falling Test
0001	No error	012Z	Packing/ unpacking
001Z	Initialization	013Z	Compression/ decompression
002Z	Chip select	014Z	Adder interrupt
003Z	Long memory	015Z	FCC interrupt
004Z	Memory	016Z	VDAC
005Z	ID data bus	017Z	Cursor
006Z	Scrolling	018Z	Sync readback
007Z	FCC initialization	019Z	Left edge detect readback
008Z	FCC RAM counters	020Z	Right edge detect readback
009Z	FCC RAM	021Z	Video readback
010Z	Display list commands	022Z	Cursor readback
011Z	Short display list	03AZ	Memory data path

C.12 Ethernet Circuits (NI)

The error code format is 0WXX.YYYY, where W = 1 if no heartbeat is present (0 = heartbeat present), XX is the number of retries over the Ethernet cable before a success, and YYYY is one of the codes listed in Table C-16. If your transceiver is not designed to provide a heartbeat (an H4001, for example), this condition does not apply. If your transceiver is designed to provide a heartbeat (an H4000, for example) and this bit is set to 1, you have an external hardware problem with your transceiver.

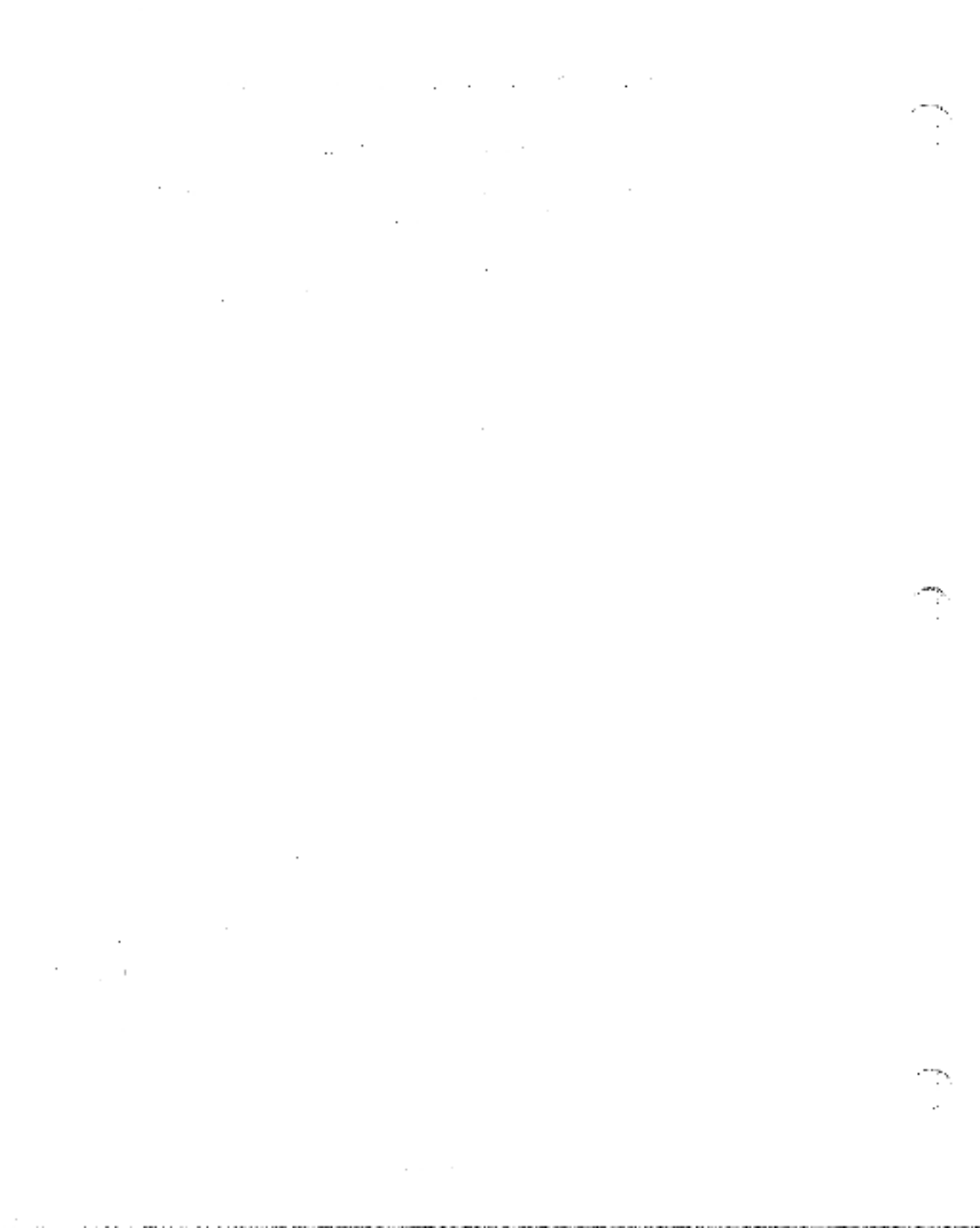
Table C-16 Ethernet Circuit Error Codes (0000.YYYY)

Error Code	Definition	Error Code	Definition
0001	No error.	4008	Bad filter value.
1002	Initialization failed.	400A	Initialization failed.
1004	RX not enabled.	400C	Loopback failed.
1006	TX enabled.	400E	Initialization failed.
1008	Initialization failed.	4010	Loopback failed.
100A	RX enabled.	5002	Initialization failed.
100C	TX not enabled.	5004	OWN not toggled.
2002	Initialization failed.	5006	No RTRY error.
2004	Loop failed.	5008	TX turned off.
3002	Initialization failed.	500A	Initialization failed.
3004	Loop failed.	500C	TX failed.
3006	No CRC match.	500E	No RCV MISS.
3008	Initialization failed.	6002	Initialization failed.
300A	TX failed.	6004	Loopback failed.
300C	RX failed.	6006	Bad CSRO.
300E	Initialization failed.	6008	No NI interrupt.
3010	TX failed.	600A	Initialization failed.
3012	OWN not toggled.	600C	Loopback failed.
3014	No RX error.	600E	Wrong number of interrupts.
3016	No STP.	6010	NI interrupt bits set.
3018	No ENP.	7002	Initialization failed.
301A	No CRC error.	7004	OWN not toggled.
301C	No FRAM error.	7006	No BUFF error.

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Table C-16 (Cont.) Ethernet Circuit Error Codes (0000.YYYY)

Error Code	Definition	Error Code	Definition
801E	No RINT.	7008	TX still on.
4002	Initialization failed.	700A	Initialization failed.
4004	TX failed.	700C	TX failed.
4006	Packet received.	700E	RX failed.



D

Hardware Specifications

This appendix provides tabular information about the following:

- VAXstation 3100 Model 76 system dimensions (Table D-1)
- VAXstation 3100 Model 76 system specifications (Table D-2)
- VAXstation 3100 Model 76 system storage conditions (Table D-3)
- VAXstation 3100 Model 76 operating and nonoperating conditions (Table D-4)
- VAXstation 3100 Model 76 system electrical specifications (Table D-5)
- R223 hard disk drive specifications (Table D-6)
- R224 hard disk drive specifications (Table D-7)
- KX23 diskette drive specifications (Table D-8)

Table D-1 System Unit Dimensions (Diskless System)

Weight	Height	Width	Depth	
11.4 kg	10.3 cm	46.4 cm	39.4 cm	Metric Dimensions
(25 lb)	(4.1 in.)	(18.3 in.)	(15.5 in.)	English Dimensions

Table D-2 System Specifications

Line Voltage	120V/240V
Voltage Tolerance	58–132V/176–264V
Frequency/single phase	60Hz/50Hz
Frequency Tolerance	47–63Hz
Max. running current	2.8A/1.6A
Max. power consumption	190W
Processor	KA43-AA 60 ns CPU and 32KB cache
DRAM memory	Up to 32MB in 4MB increments
ROM memory	256KB
Optional coprocessor	8-plane graphics coprocessor, scanline processor accelerator
Optional hard disks	One to three RZxx integral hard disks
Optional expansion boxes	BA42 storage expansion box and RRJ40 compact disc drive
Monitor options	38-cm (15-in.) monochrome or color, 1024-by-804-pixel; 45-cm (19-in.) monochrome or color, 1024-by-804-pixel For hardware specifications, see your monitor guide.
Interfaces	1 SCSI port, 1 ThinWire Ethernet port, 1 standard Ethernet port, and serial lines

Table D-3 System Storage Conditions

Temperature range	5°C to 50°C (41°F to 122°F)
Relative humidity	10% to 95% (noncondensing)
Altitude	2400 m (8000 ft) @ 36°C (96°F)
Maximum wet bulb temperature	32°C (90°F)
Minimum dew point	2°C (36°F)

Table D-4 System Operating and Nonoperating Conditions

Operating Conditions	
Temperature range	10°C to 40°C (50°F to 104°F)
Temperature change rate	11°C/hr (20°F/hr) maximum
Relative humidity	10% to 90% (noncondensing, no diskette) 20% to 80% (diskette in use)
Altitude	2400 m (8000 ft) @ 36°C (96°F)
Maximum wet bulb temperature	28°C (82°F)
Minimum dew point	2°C (36°F)
Heat dissipation	155 watts maximum
Nonoperating Conditions	
Temperature range	-40°C to 88°C (-40°F to 151°F)
Relative humidity	95% @ 66°C (may condense)
Altitude	4900 m (16,000 ft)
Maximum wet bulb temperature	28°C (82°F)
Minimum dew point	2°C (36°F)

Table D-5 System Electrical Specifications

Input voltage	Automatically adjusting AC input from 120 VAC to 240 VAC
Frequency range	47 Hz to 68 Hz

Table D-6 R223 Hard Disk Drive Specifications

Physical Dimensions	
Weight	.828 kg (1.82 lb)
Height	41.28 mm (1.625 in.)
Width	101.6 mm (4.00 in.)
Depth	146.06 mm (5.75 in.)
Formatted Storage Capacity	
Per drive	104MB
Per surface	18MB
Bytes per track	16,896
Bytes per block	512
Blocks per track	33
Blocks per drive	204,864
Spare blocks per track	1
Spare blocks per drive	8208
Performance	
Transfer rate to/from media	1.25MB/sec
Transfer rate to/from buffer	1.25MB/sec
Seek time track to track	≤ 8 msec
Seek time average	≤ 25 msec
Seek time maximum (full stroke)	≤ 45 msec
Average latency	8.4 msec
Rotational speed	3575 RPM ±0.1%
Start time (maximum)	20 sec
Stop time (maximum)	20 sec
Interleave	1:1

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Table D-6 (Cont.) RZ23 Hard Disk Drive Specifications

Environmental Specifications	Operating	Nonoperating
Ambient temperature	10°C to 60°C (50°F to 110°F)	-40°C to 66°C (-40°F to 150°F)
Relative humidity	8% to 80%	81% to 95% (packaged)
Altitude	-304 m to 3048 m (-1000 ft to 10,000 ft)	-304 m to 12192 m (-1000 ft to 40,000 ft)
Maximum wet bulb (noncondensing)	35.6°C (78°F)	46°C (115°F)
Heat dissipation	8 watts (typical) (27.36 Btu/hr) 9 watts maximum (30.8 Btu/hr)	—
Temperature gradient	11°C/hr (20°F/hr)	20°C/hr (36°F/hr)

Table D-7 RZ24 Hard Disk Drive Specifications**Physical Dimensions**

Weight	780 kg (1.72 lbs)
Height	41.28 mm (1.625 in)
Width	101.6 mm (4.00 in)
Depth	146.05 mm (5.75 in)

Formatted Storage Capacity

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

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Table D-7 (Cont.) R224 Hard Disk Drive Specifications

Performance	
Transfer rate to/from media	1.5 MB/sec
Transfer rate to/from buffer	1.25 MB/sec
Seek time track to track	≤ 5 msec
Seek time average	≤ 16 msec
Seek time maximum (full stroke)	≤ 35 msec
Average latency	8.9 msec
Rotational speed	3497 RPM ±0.5%
Start time (maximum)	20 sec
Stop time (maximum)	20 sec
Interleave	1:1
Environmental Specifications	
Operating	
Ambient temperature	10°C to 55°C (50°F to 99°F)
Relative humidity	8% to 80%
Altitude	-1000 ft to 15,000 ft (-304 m to 4579 m)
Maximum wet bulb (noncondensing)	25.6°C (78°F)
Heat dissipation	6.6 W (seeking) (22.57 Btu/hr) 6.8 W (read/write mode) (23.26 Btu/hr)
Temperature gradient	11°C/hr (20°F/hr)
Environmental Specifications	
Nonoperating	
Ambient temperature	-40°C to 66°C (-40°F to 150°F)
Relative humidity	8% to 95% (packaged)
Altitude	-1000 ft to 40,000 ft (-304 m to 12192 m)
Maximum wet bulb (noncondensing)	46°C (115°F)
Heat dissipation	—
Temperature gradient	20°C/hr (36°F/hr)

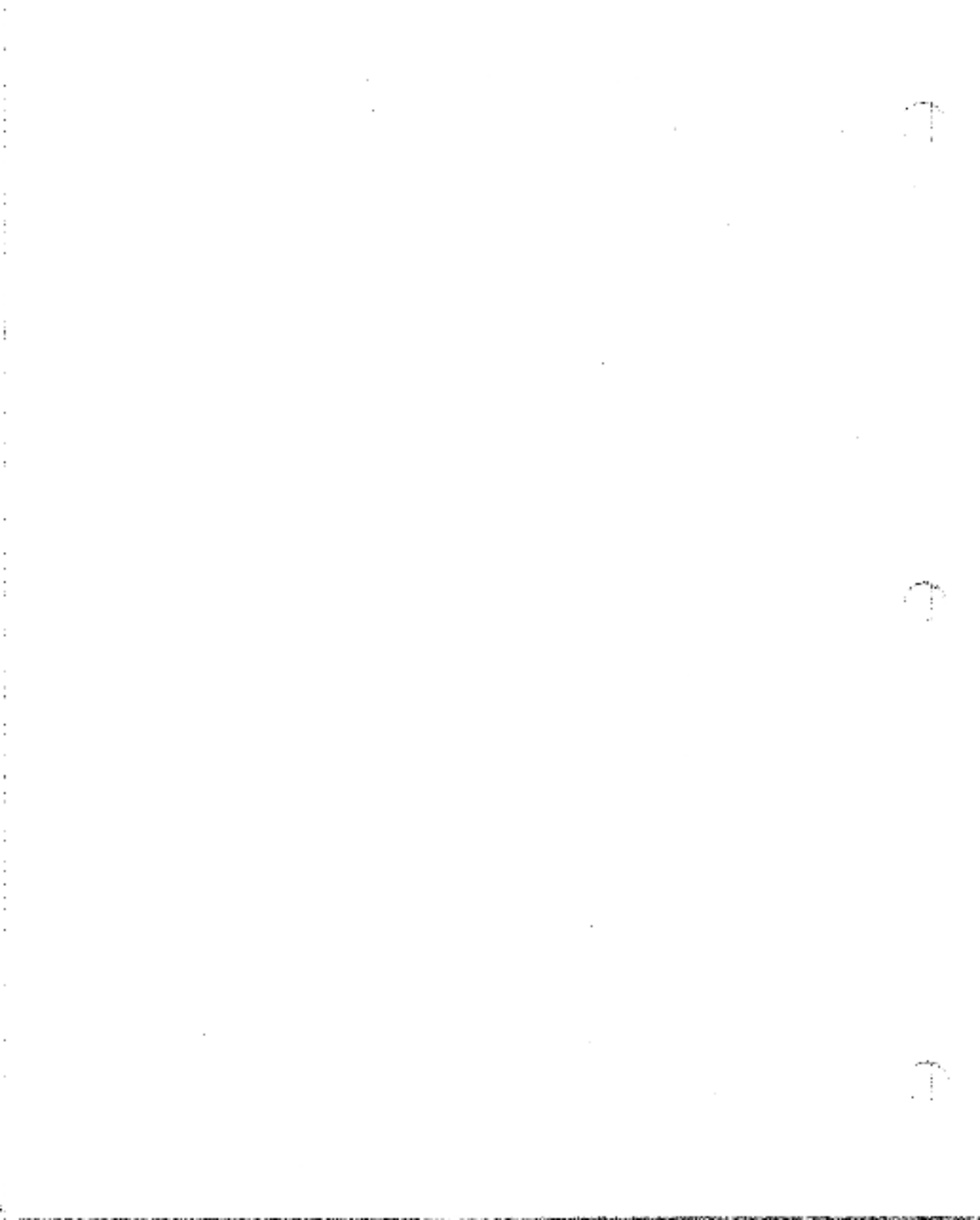
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Table D-7 (Cont.) RZ24 Hard Disk Drive Specifications**Functional Specifications**

Recording density (bpi at ID)	28,441
Flux density (fci at ID)	15,627
Track density (tpi)	1150
Tracks/surface	776
R/W heads	8
Disks	8
Time to process EOC (512 bytes)	<100 msec

Table D-8 RX23 Diskette Drive Specifications

Subject	Description
Diskette size	5 1/4 in. (3.5 in.)
Diskettes/diskette drive	1
Data capacity	1.2MB (RX23K)
Track density	135 tpi
Storage capacity (high density)	800KB



Related Documents

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

Not all of the documents listed in Table E-1 are available in every country. Check with your Digital sales representative for availability.

Table E-1 Associated Documents

Titles	Order Numbers
VAXstation 3100 Family	
<i>VAXstation 3100 Maintenance Guide</i>	EK-285AA-MG
<i>VAXstation 3100 Maintenance Guide Addendum</i>	EK-344AA-AD
<i>VAXstation 3100 Illustrated Parts Breakdown</i>	EK-MS150-IP
<i>VAXstation 3100 Model 38 Owner's Manual</i>	EK-VSM30-OM
<i>VAXstation 3100 Model 48 Owner's Manual</i>	EK-VSM40-OM
<i>VAXstation 3100 Model 76 Upgrade Guide</i>	EK-VXS1M-CG
<i>BA42 Storage Expansion Box Installation Guide</i>	EK-BA42A-IN
<i>Dual Monitor Adapter Installation Guide</i>	EK-DUALM-IN
<i>VAXstation Model 30 Desktop-VMS Basic System Guide</i>	EK-259AA-UG
<i>VAXstation Model 30 Desktop-VMS Advanced System Guide</i>	EK-260AA-OM

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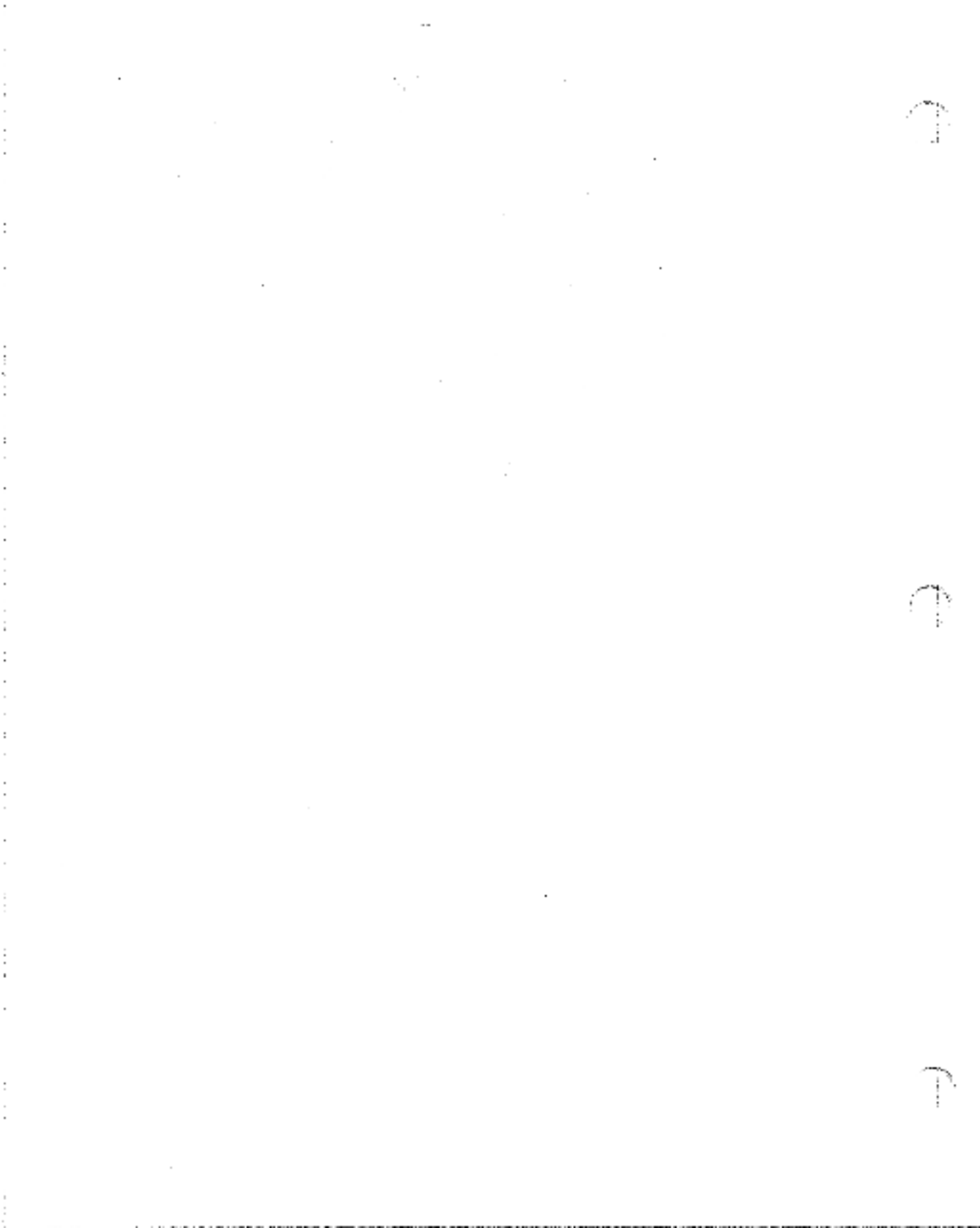
Table E-1 (Cont.) Associated Documents

Titles	Order Numbers
Handbook Series	
<i>Technical Summary of Digital's Workstation Family with Application Listing</i>	KB-32975-61
RRD40 Compact Disc Drive	
<i>RRD40 Disc Drive Owner's Manual</i>	EK-RRD40-OM
DECconnect System	
<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
Printers	
<i>System Management Volume 1A, Guide to Setting Up a VMS System</i>	AA-LA25A-TE
<i>General User Volume 4, DCL Dictionary</i>	AA-LA12A-TE
<i>System Manager Binder 3A, System Environment Setup</i>	AA-KS85A-TE
Modems	
<i>System Management Volume 1A, Guide to Setting Up a VMS System</i>	AA-LA25A-TE
<i>System Management Volume 5A, Networking: Guide to DECnet VAX Networking</i>	AA-LA47A-TE
<i>System Management Binder 3A, System Environment Setup</i>	AA-KS85A-TE

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Table E-1 (Cont.) Associated Documents

Title	Order Numbers
SCSI	
<i>Small Computer System Interface: An Overview and a Developer's Guide</i>	EK-SC518-DK
System Software	
<i>VMS License Management Utility Manual</i>	AA-LA33B-TE
<i>VMS Installation and Operations Manual: VAXstation S100, Microvax Series</i>	AA-NY74B-TE
<i>Installation Guide for VMS Workstations Software and Migration Tools</i>	AA-HX11J-TE
<i>VMS Backup Utility Manual</i>	AA-LA35A-TE
<i>VMS VAXcluster Manual</i>	AA-LA27B-TE



Glossary

architecture

The internal configuration of a computer (processor), including its registers, instruction set, and input/output structure.

backup

A copy of files or software made for safekeeping in a backup operation.

bad blocks

Damaged blocks on a disk that the system cannot access. Blocks become damaged from wear or abuse.

barrel connector

A socket type of connector for connecting two sections of ThinWire cable.

baud rate

The speed at which signals are serially transmitted along a communications line. One baud equals 1 bit per second.

bezel

A molded panel, such as on the front and back of the system unit.

binary

A number system that uses two digits, 0 and 1, represented in system circuitry by two voltage levels. Programs are executed in binary form.

bit

A binary digit; the smallest unit of information in a binary system of notation, designated as a 0 or a 1.

block

A standard unit of storage space on a disk or tape surface; 512 bytes. Although a drive writes data to the disk or tape 1 byte at a time, a block is the smallest amount of space on a disk or tape that the system can access.

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 is loaded.

bus

A channel (a set of wires) along which communication signals in a computer system travel.

byte

A group of 8 binary digits (bits).

cable

A sheathed group of electrical conductors.

caddy

The holder for a compact disc.

CD

See compact disc.

central processing unit (CPU)

The part of the system that controls the interpretation and execution of instructions.

command

A request you make to the operating system to perform a specific function; for example, a request to run a program.

compact disc

A flat, circular plate on which read-only optical data is stored. A laser optical reader retrieves this information.

computer system

A combination of system hardware, software, and external devices that together perform operations and tasks.

configuration

See **system configuration**.

connector

The end of a cable that plugs into another connector or a port. A BNC connector connects a section of ThinWire cable to a T-connector, to a system, or to a barrel connector.

console

A device through which an operator communicates with the computer.

console mode

The state in which the computer is controlled from the console terminal. Put your system in console mode by pressing the halt button on the rear panel of the system unit. Console mode is indicated by the console prompt (>>>) on the monitor screen. Compare **program mode**.

console prompt

A prompt used for communication between the user and the computer.

controller

A system component, usually a printed circuit board, that regulates the operation of one or more peripheral devices.

CPU

See **central processing unit**.

daisy-chain

To link a number of computers or expansion boxes sequentially.

data

A formal representation of information suitable for communication, interpretation, and processing by humans or computers.

DECconnect

Digital's cabling system for extending Ethernet and terminal interconnections into offices and work areas.

DECconnect faceplate

See faceplate.

DECnet software

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 in which several application programs can appear simultaneously.

default

The value of an argument, field, or part of a command line assumed by a program if a specific value is not supplied by the user.

DELNI

A local network interconnect product that provides eight separate network interfaces from a single transceiver tap.

device

The general name for any unit connected to the system that is capable of receiving, storing, or transmitting data.

device icon

An icon on the back of the system unit that identifies the device to be plugged into the corresponding port.

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 hard disk drive, whereas a diskette is removable.

disk drive

A device that holds a disk. The drive contains mechanical components that spin the disk and move the read/write heads that store and read information on the surface of the disk.

diskette

A flexible disk in a square jacket on which data is magnetically stored. Diskettes are inserted into and removed from diskette drives.

diskette drive

A disk drive that reads from or writes on removable diskettes.

diskless

With no built in storage capacity.

distributed

Pertaining to computer networks with decentralized network control where such functions as routing, formatting for transmission, and error-checking are equally distributed over all nodes.

distributed application

A program, such as a financial spreadsheet program, that performs end-user tasks.

error message

A message displayed by a system to indicate a mistake or malfunction.

Ethernet

A type of local area network based on Carrier Sense Multiple Access with Collision Detection (CSMA/CD).

Ethernet hardware address

The unique Ethernet physical address associated with a particular Ethernet communications controller.

faceplate

A wall receptacle that provides a single network connection for a workstation.

firmware

Software that is stored in a fixed or wired-in way, usually in read-only memory.

floppy diskette

See diskette.

formatting

An operation that divides a disk's magnetic surface into segments in a specific pattern. Formatting allows the drive to read and write useful data to the disk.

graphics tests

Computer tests that test the graphic axis of a display device.

graphics coprocessor

A special-purpose CPU—with its own set of commands, data formats, and an instruction counter—that executes a sequence of display instructions to create a drawing or graph on the display device.

ground

A voltage reference point in a system that has a zero voltage potential.

H4000

An Ethernet transceiver used to connect standard Ethernet communications equipment to standard Ethernet cable. The H4000 supports a heartbeat signal used in network diagnostics. The heartbeat signal indicates that the collision detection circuitry is functional.

H4005

An Ethernet transceiver, smaller and less expensive than the H4000 and H4000-BA. Its small dimensions permit installation in constricted spaces such as cable trays.

hard disk

A disk that resides permanently inside a disk drive. Compare **diskette**.

hard error

A nonrecoverable error.

hardware

The physical equipment—mechanical and electrical—that makes up a system. Compare **software**.

housing

The plastic case in which a compact disc sits.

icon

A graphic representation of an object, application, or window.

interface

An electronic circuit board that links an external device to a computer, or a device or piece of software that allows the components of the system to communicate with each other.

jumper

A removable electrical connector that is inserted into ID settings.

kilobyte (KB)

When referring to memory or secondary storage capacity, 1024 bytes.

LED

Light-emitting diode. LEDs are used as indicators on the system enclosure.

load

To copy software (usually from a peripheral device) to memory, or to place a disk in a disk drive or a tape in a tape drive.

local

In close proximity to the computer. Compare **remote**.

local area network (LAN)

A privately owned high-speed (upward of 1 megabit per second) communications network that covers a limited geographical area, such as a section of a building, an entire building, or a cluster of buildings.

log in

To identify 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

Process of systematically testing a link by sending a signal partway down the link and returning it.

medium

The devices used to communicate with a system. Examples of media are a disk drive, tape drive, and video monitor.

megabyte (MB)

A unit of measure equal to 1000 kilobytes or 1,048,576 bytes.

memory

The area of the system that electrically stores instructions and data, often temporarily.

memory module

A printed circuit board that contains additional memory for 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.

monochrome

Different shades of one color. On a monochrome monitor, screen displays are in one color only.

mouse

A hand-held input device that is moved across the desktop to move the pointer or mouse cursor on the monitor screen and that is used 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 communications lines to share information and resources. See also **local area network (LAN)** and **wide area network (WAN)**.

network interface

A device or equipment making possible interoperation between two systems.

operating system

An integrated collection of programs that controls the execution of computer programs and that performs system functions.

paging

The separation of a program and data into fixed blocks, often 1000 words, so that transfers between disk and memory can take place in page units rather than as entire programs.

password

A unique string of characters and/or numbers that identifies you to the computer.

peripheral device

A device that provides the CPU with additional memory storage or communication capability. Examples are disk drives, diskette drives, and printers.

pixel

A picture element. The basic unit of a graphic display, a pixel is a location on the monitor screen that can be selectively turned on or off.

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 into which a connector is plugged.

power up

A series of ordered events that occur when you supply power by turning on the system.

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 **console mode**.

prompt

A brief message printed or displayed by a program or an operating system, asking you 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**.

RAM

See **random-access memory**.

random-access memory (RAM)

Memory that can be both read and written to and that can randomly access any one location during normal operation. RAM is 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.

remote

Linked to a computer by communications lines. Compare local.

Remote System Manager (RSM)

Software that centralizes system management functions for multiple VAX computers. It provides software distribution, installation, backup, and restore services for VAX systems running the VMS operating system.

resolution

A measure of the precision or sharpness of a graphic image. Resolution is often a function of the number of pixels on a screen.

Rigel

A CPU chip set.

ROM

See read-only memory (ROM).

run

A single continuous execution of a program (noun). To execute a program (verb).

satellite

A system that is booted remotely from the system disk on a server system.

SCSI

See Small Computer System Interface.

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.

server

Hardware or software that provides a specific set of services to a satellite system. A computer that is used to start satellite systems and to manage their use of common resources.

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.

soft error

A recoverable error.

software

Programs executed by the system to perform a chosen or required function.
Compare hardware.

standard Ethernet network

An Ethernet network connected with standard Ethernet cable. Standard Ethernet is also known as thickwire Ethernet. Compare ThinWire Ethernet network.

storage device

A device, such as a diskette or tape, capable of recording information.

stylus

A penlike device that draws on the surface of a tablet and functions as a pointing device.

swapping

A process that transfers the contents of main storage to or from auxiliary storage.

system

A combination of hardware, software, and peripheral devices that 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.

tablet

A flat drawing surface used with a puck or stylus to move the cursor on the monitor screen, draw graphics, and make selections from the menu.

tape drive

A storage device that stores data by means of magnetic tape.

T-connector

Connector used to join ThinWire Ethernet cables.

terminator

A connector, used on one or both ends of an Ethernet segment, that provides the 60-ohm termination resistance needed for the cable.

ThinWire Ethernet network

An Ethernet network connected with Thinwire Ethernet cable and used for the 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.

transceiver

A device that provides a single physical connection between standard Ethernet and Ethernet communication equipment.

transparent

Pertaining to a function or object that a user can use without seeing it.

user interface

The interaction style 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: it is required to start the other computers, and it manages the resources they share.

VMS operating system

Digital Equipment Corporation's proprietary operating system.

VUPS

VAX units of performance (one VAX 11/780 = one VUP).

wide area network (WAN)

A network that covers a large geographical area, spanning buildings, cities, or countries. WANs typically use common carriers, such as telephone network, to transport messages over most or part of the distance between computers.

window

An area on your monitor screen in which you can start, run, and view a separate process.

workstation

A single-user system that offers high-performance, high-resolution graphics and can function in a network environment.

work group

Two or more systems connected for interactive use.

write-protecting

The process of preventing a diskette from having data written to it, thereby preventing the accidental erasure of information. Write-protection is set by a write-protect switch or a write-protect notch on the diskette.

write-protect notch

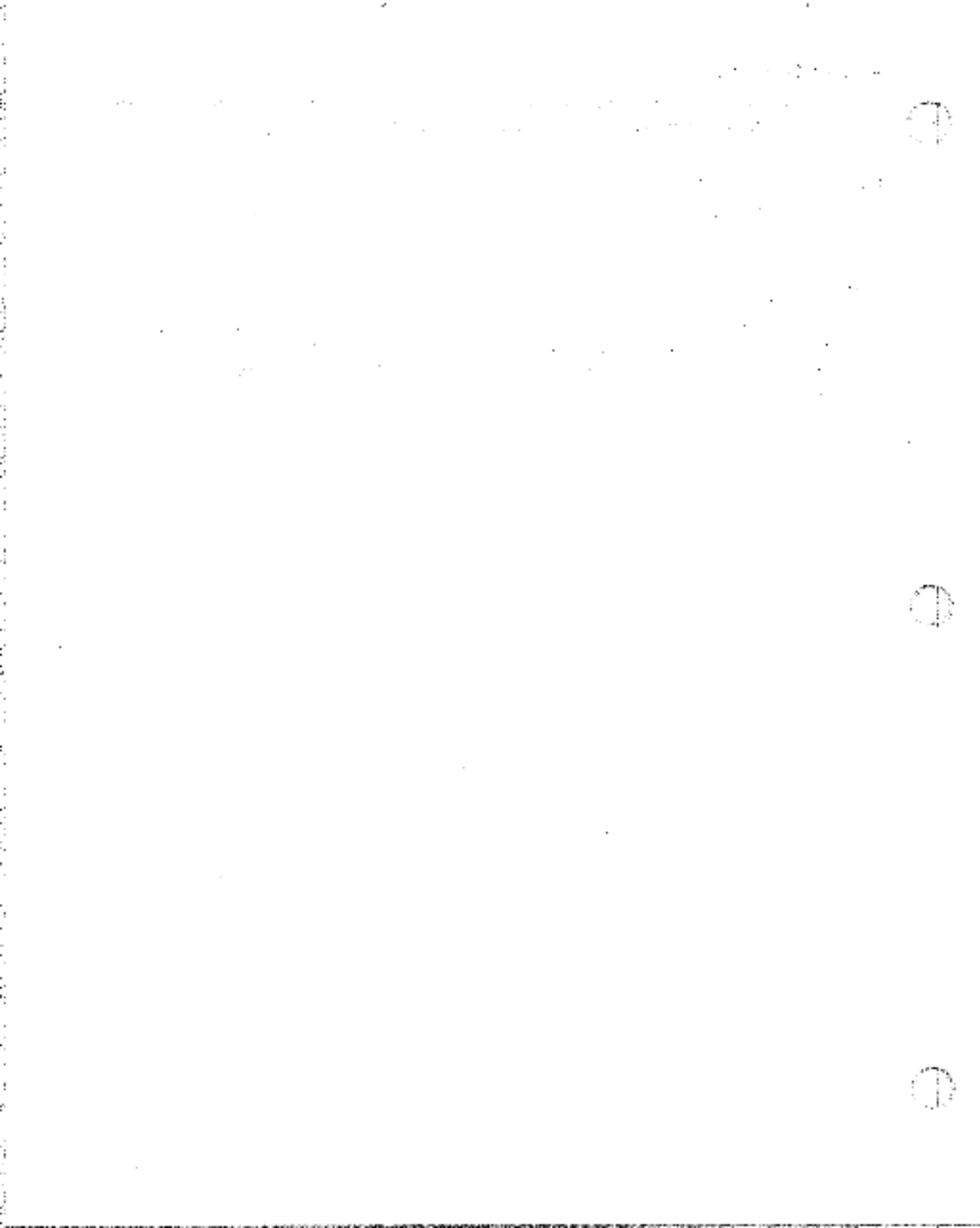
The small notch on the side of a diskette that you can cover with an adhesive-backed foil label or tab to prevent loss of data by accidental overwriting.

write-protect switch

The switch that you move on an RX23 diskette to prevent the loss of data by accidental overwriting.

X Window System

An industry-standard windowing system architecture that allows the independent execution and display of applications. Certain components of the architecture control the display of applications; other components determine how applications run.



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