Personal DECstation 5000

User's Guide

Contents

2 The Environment

3 Starting and Testing

4 Taking Your Workstation Apart

Part II External Additions to Your Workstation

5 Ethernet

6 External Storage Devices

7 Communication Devices

8 A Server Configuration

Part III Internal Additions to Your Workstation

9 Internal Storage Devices

10 Memory Modules

11 CPU Modules

Part IV Workstation Management

12 Using the Console Program

13 Troubleshooting

Part V Appendices

A Equipment Specifications

B The Audio I/O Port and Multimedia

C Part Numbers

D Connector Pin Assignments

E Regulatory Information for the UK

F Drives You Can Connect to Your Workstation

G Console Commands

Index

Figures

Tables

Using This Guide

This guide explains how to operate the hardware components of your Personal DECstation 5000 workstation shown in Figure 1. It uses the conventions shown in Table 1.

Table 1. Conventions Used in This Guide

Convention	Use
Monospace type	Anything that appears on your monitor is set in monospace type like this.
Boldface type	**Anything that you are asked to type is set in boldface type like this.**
Caution note	Information that protects the workstation from being damaged is set off in a caution note.
Warning note	Information that protects you from being harmed is set off in a warning note.
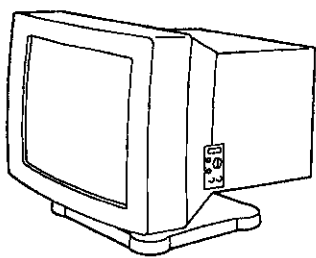
Color monitor
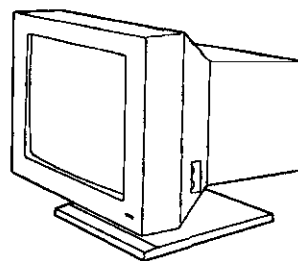
Gray-scale monitor

Keyboard
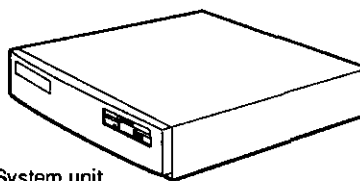
System unit

Mouse
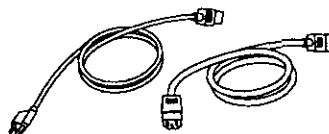
Power cables (2)

SCSI terminator

ThickWire Ethernet
loopback connector
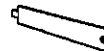
System tool

WSMXS002

Figure 1.   Hardware Components of the Personal DECstation 5000

Part I

Introducing Your Workstation

1

The Five Basic Parts

This chapter tells you about the parts of your system:

- System unit, including connectors, controls, and indicator lights
- Monitor
- Keyboard
- Mouse
- Power cord and cable

The Personal DECstation 5000 is a desktop workstation that can be configured in many different ways. Certain basic parts— the system unit, a monitor, a keyboard, a pointing device—will always be present[1] The type and number of other parts—such as memory modules and internal and external storage devices—will vary.

A basic system has 8 megabytes of memory and may include an internal hard disk drive and an internal floppy disk drive. There are two slots for TURBOchannel option modules. Later chapters of this guide explain how you can expand both the workstation's storage capacity and its memory.

---

[1] When used as a server, the Personal DECstation is usually configured without a graphics monitor and its corresponding LK501 keyboard, as explained in Chapter 8.

The System Unit
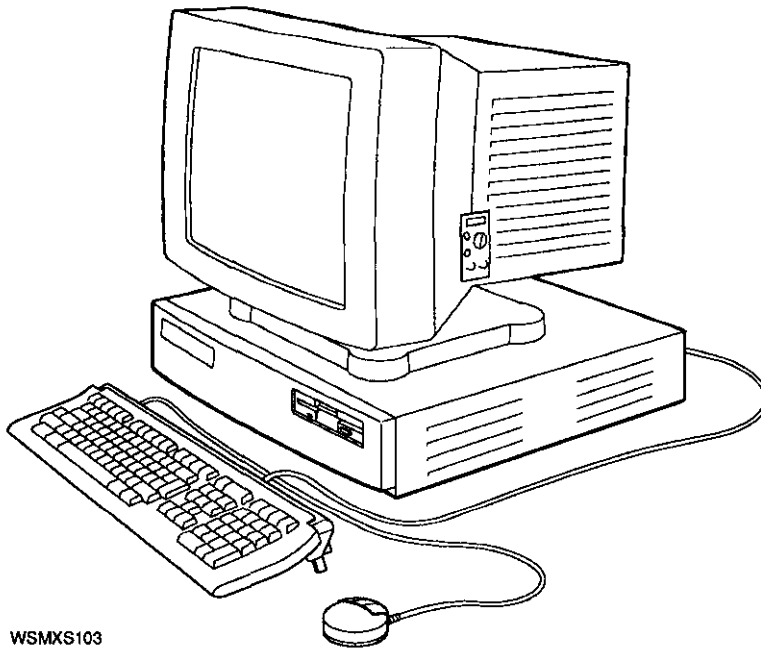
WSMXS103

Figure 1-1. The system unit

The system unit is designed to sit flat on a level surface with the monitor on top of or next to it.

Caution: Standing the system unit on its side can block the cooling vents and damage the unit.

The Front of the System Unit

The front of the system unit has a green indicator light (LED). When you turn on your workstation, the light flickers for a while as the system performs its self-tests and then glows steadily once the system is up and running.

Power-up
indicator light

WSMXS005
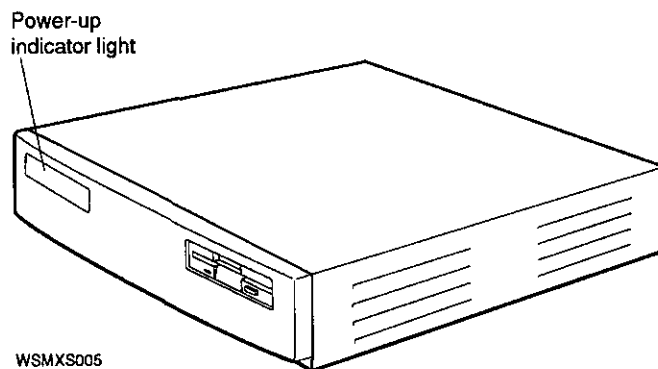
Figure 1-2. The front of the system unit

The Back of the System Unit

On the back of the system unit you'll find

- The on/off switch. Press the 1 on the switch to turn the power on. Press the 0 to turn the power off.

- The connectors shown in Figure 1-3.

1. Turbochannel option slot 0
2. Turbochannel option slot 1
3. On/off switch
4. System unit power connector
5. Monitor-to-system-unit power connector
6. Graphics video connector

7. Serial communications connector
8. Keyboard-mouse connector
9. Sound connector
10. Base system ThickWire Ethernet connector
11. Base system SCSI connector

WSMXS004

Figure 1-3. The back of the system unit

Above each connector is a small picture, or icon, that describes the purpose of that connector. Figure 1-4 lists the functions of the connectors that the icons identify.

Connector	Icon	Function
SCSI connector		Connects the workstation to small computer systems interface (SCSI) devices, such as disk drives and CD-ROM drives.
ThickWire Ethernet connector		Connects the workstation to a ThickWire Ethernet network or, with an adapter, to a ThinWire or twisted-pair Ethernet network.
Sound I/O		Connects the workstation to a speaker (such as a small headset or the handset of a phone) and a microphone.
Keyboard-mouse connector		Connects the workstation to the keyboard and mouse.
Communications connector		Connects the workstation to devices such as a printer, modem, or console terminal.
Video connector		Connects the monitor to the workstation.
Power plugs	None	The plug on the right connects the workstation to a power outlet; the plug on the left connects the monitor to the workstation power supply.

WSMXS117

Figure 1-4.   Connectors on the Back of the System Unit

Inside the System Unit

Occasionally you may need to get inside of your system unit–to add optional modules, for example, or to upgrade your system. The components in the system unit are delicate and can be damaged by the static electricity conducted by your body. Digital provides an antistatic wrist strap to ensure that this static discharge does not cause damage. Wear the antistatic wrist strap whenever you touch anything inside the system unit or any item stored in an antistatic bag. To use the wrist strap, follow the directions on the envelope it comes in.
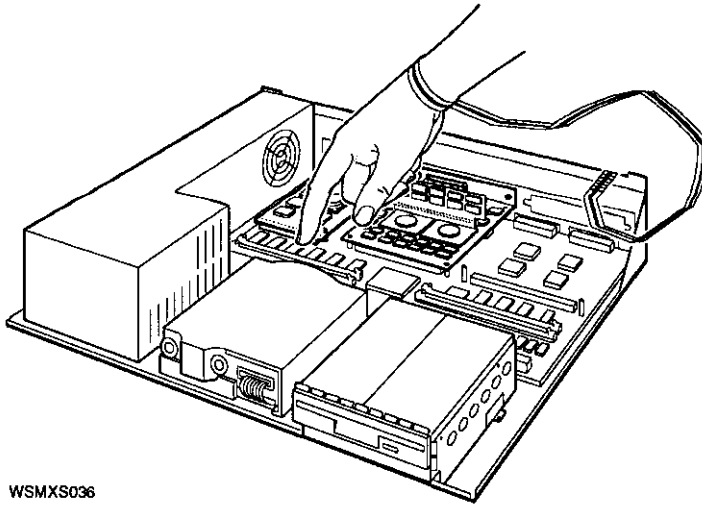
WSMXS036

Figure 1-5. Using the antistatic wrist strap

To open the system unit

1. If the workstation software is running, shut it down: Type **shutdown -h now** and press Return. *Note: You must be in superuser mode to shut down the system. This requires that you obtain superuser privileges from your system manager. Enter superuser mode by typing* **su***, pressing Return, and entering your password.*

2. Turn off the system unit by pressing the 0 on the on/off switch on the back of the unit.

3. Remove the two screws on the back edge of the system unit cover.
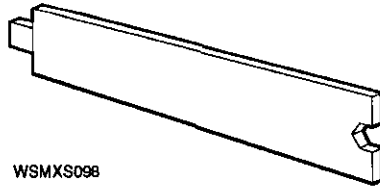
WSMXS098

Figure 1-6. System tool

4. Find the system tool that came with your workstation. Insert the system tool into one of the two small rectangular holes just beneath the edge of the cover on the back of the system unit. Lift up on the tool until the cover loosens. Insert the tool into the other hole and repeat the procedure.
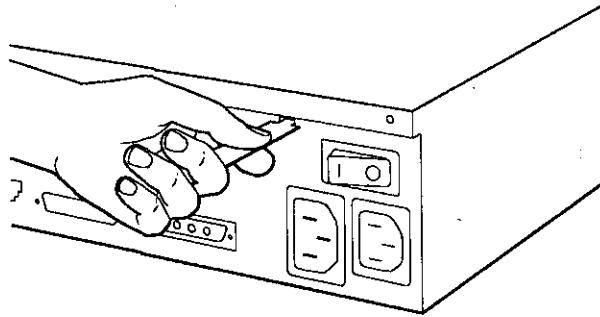
WSMXS088

Figure 1-7. Using the system tool to raise the cover

5. Pressing down on the two black leverage buttons on the back of the system unit and at the same time pressing up against the cover's edge, as shown in Figure 1-8, lift the back end of the cover about 6 inches.
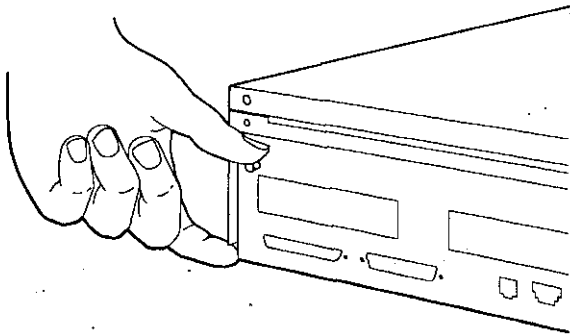
WSMXS089

Figure 1-8. Removing the cover of the system unit

6. Pivot the cover on the tabs that are along the lower part of the cover's front edge.

7. When the tabs are loose in their slots, lift the cover up and away from the system unit.

8. Notice the diagram on the inside of the cover. It illustrates four procedures:

   - How to replace the cover
   - How to install a hard disk drive
   - How to install memory modules
   - How to identify memory slots

Once the cover is off, you will see the base system module and the power supply. You'll also see any internal disk drives in your workstation and any memory cards and TURBOchannel modules.

TURBOchannel option modules

CPU module

Power supply

Power supply

System module

Internal drives
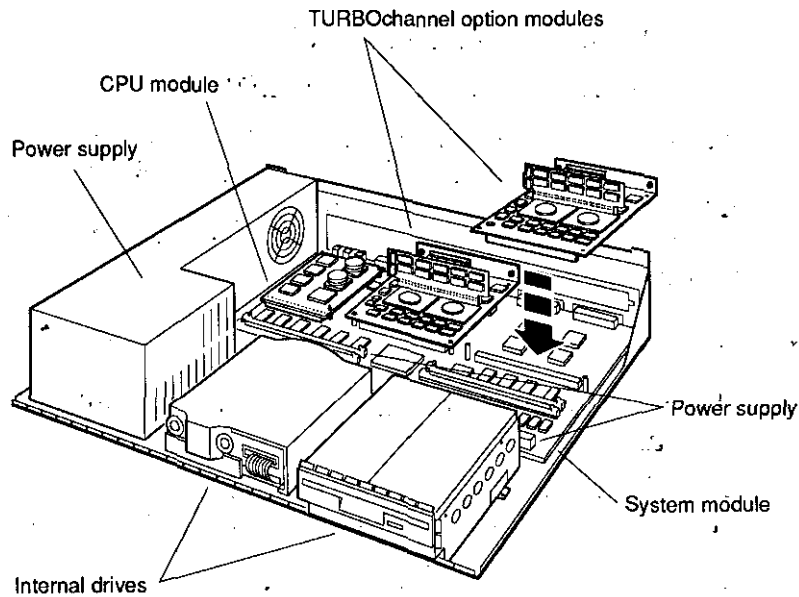
WSMXS003

Figure 1-9.   Inside the system unit

Your system unit may not contain everything shown in Figure 1-9.

To close the system unit

1. Tilt the cover so that the back is about 6 inches higher than the front.

2. Insert the tabs on the front edge of the cover into the slot along the front edge of the system unit.

3. Lower the back of the cover into place. Replace and tighten the screws that hold the cover.

The Monitor

Caution: *Connecting or disconnecting the monitor while the power is on can damage the monitor.*

Digital offers these two monitors for the Personal DECstation:

- 16-inch color monitor (VRC16)
- 17-inch gray-scale monitor (VRM17)

  Both these monitors connect to the video connector on the back of your system unit. They are 1024 x 768 pixels and have a 72 megahertz refresh rate. The identification plate on the back of the monitor tells you which kind of monitor you have.

Connecting a Monitor to the System Unit Video Connector

1. Connect the monitor video cable to the monitor (Figures 1-10 and 1-11).

2. The video cable for a color monitor divides into three cables at the end. Match the colors of the cables (or the letters on the cables) with the letters on the first three of the five video connectors on the monitor: The red cable plugs into the connector labeled R, the green cable plugs into the connector labeled G/S, and the blue cable plugs into the connector labeled B.
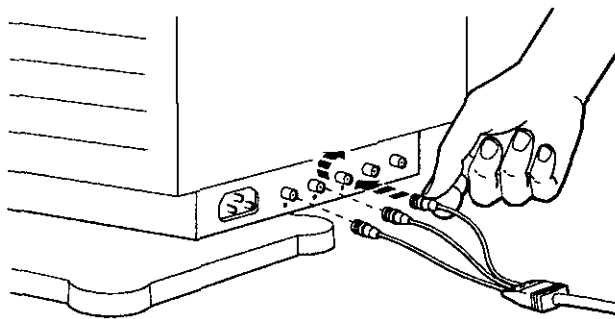
WSMXS007

Figure 1-10. Connecting the video cable to the VRC16 monitor
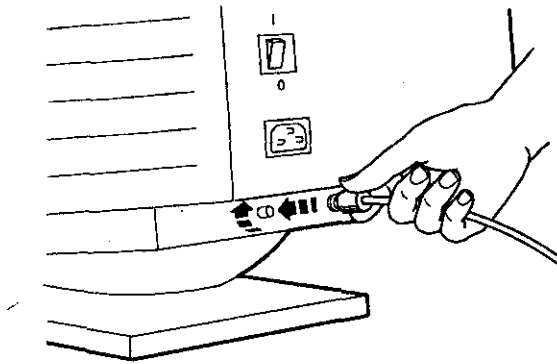
WSMXS013

Figure 1-11. Connecting the video cable to the VRM17 monitor

3. Connect the other end of the monitor video cable to the video connector on the back of the system unit (Figure 1-12).
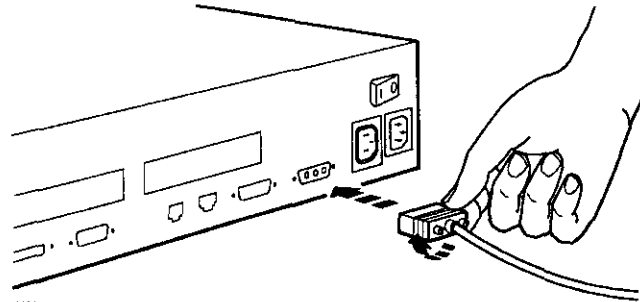
WSMXS014

Figure 1-12. Connecting the monitor cable to the video connector on the back of the system unit

4. Find the monitor power cable. Plug the cable into the power connector on the monitor and into the outlet to the left of the main power outlet on the back of the system unit. This connects the monitor to the system unit power supply. Leave the monitor power switch in the on position; when you turn on the power to the system unit, the monitor will go on, too.

5. You can order an additional power cord and connect your monitor to a power strip or wall outlet instead of to the system unit, if you want. In this case, you'll need to use the monitor's power switch to turn it on.

WSMXS038
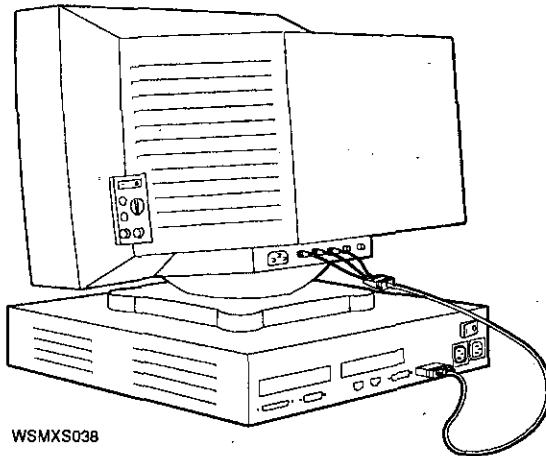
Figure 1-13. Connecting the monitor

If you want to connect your monitor at a distance from your system unit, you may need longer cords and cables than the ones that come with the workstation. You can order the following cables from Digital:

- 10-foot color video cable (customer order #BC29G-09)
- 10-foot grayscale cable (customer order #BC09M-10)

Connecting a Monitor to a TURBOchannel Connector

You can connect the following Digital monitors to your workstation by means of an optional TURBOchannel graphics module installed in your system unit:

- VRT16
- VRT19
- VR319
- VR320

The *TURBOchannel Options User's Guide* tells how to install, test, and troubleshoot monitors connected to a TURBOchannel option module.

The Keyboard

The LK501 keyboard comes with your workstation. Most of its keys work just like the keys on a typewriter keyboard. The keyboard also includes some special keys: function keys, an editing keypad, and a numeric/application keypad. Your software manuals explain how to use these special keys.

Indicator lights   Function keys   Keyboard cable

Main keys   Special editing keypad

WSMXS009   Numeric/application keypad
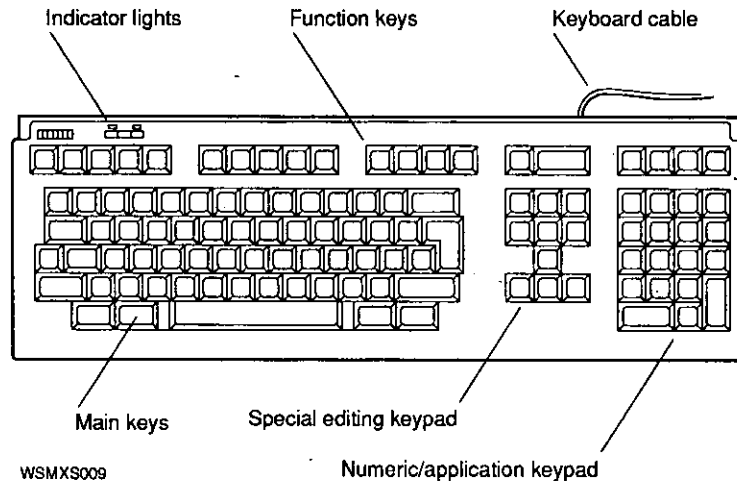
Figure 1-14. LK501 Keyboard

You can use the LK501 keyboard in either of two positions, depending on which you find more comfortable: The keyboard can lie flat on your work surface, or it can be tilted slightly up.

To tilt the keyboard, move the two legs on the bottom into the upright position.

Hinged feet on keyboard
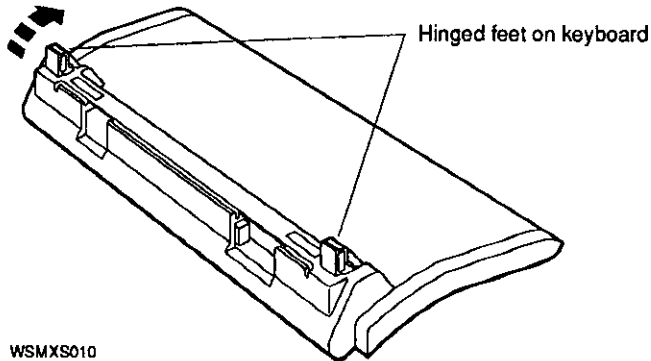
WSMXS010

Figure 1-15. Tilting the keyboard

Connecting the Keyboard to the Workstation

1. Plug one end of the keyboard cable (it doesn't matter which end) into the keyboard-mouse connector on the back of the system unit.
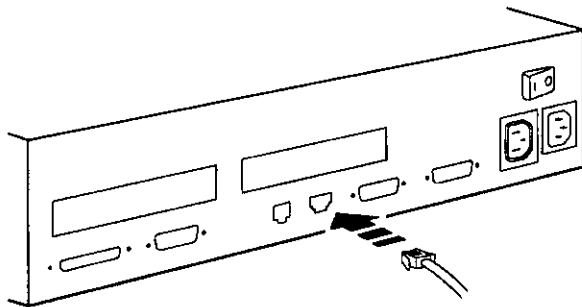
WSMXS056

Figure 1-16. Connecting the keyboard cable to the workstation

2. Plug the other end of the cable into either of the connectors at the keyboard's rear edge. (The other connector is for the mouse.)
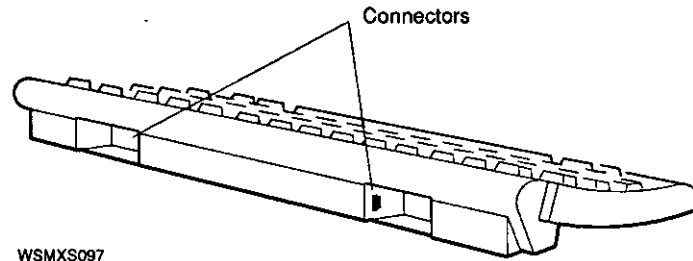
Connectors

WSMXS097

Figure 1-17. Connectors on the LK501 keyboard

If you want to connect your keyboard so you can use it at a distance from your system unit, you may need a longer cable than the one that comes with the workstation. You can order a 12-foot system-to-keyboard cable (customer order #17-03248-07) from Digital. This replaces the shorter cable that comes with the workstation.

The Mouse

You use a mouse to move the pointer on the screen.

WSMXS012

Figure 1-18.   Mouse

Connect the mouse by plugging its cable into either of the connectors at the rear edge of the keyboard.
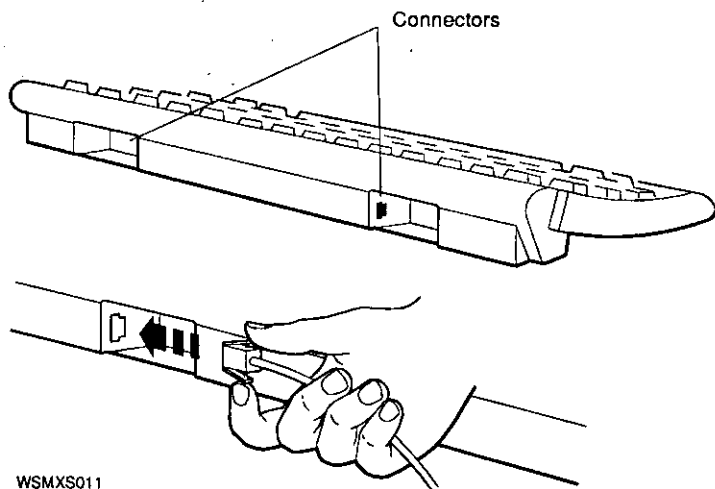
Connectors

WSMXS011

Figure 1-19.   Connecting the mouse

If you are using computer-aided design (CAD) applications with your workstation, you may want to connect a dial box or a button box as a pointing device. Connect these to the keyboard-mouse connector on the back of the system unit.

Power Cord and Monitor Cable

The workstation comes with a power cord for the system unit and a power cable that connects the monitor to the system unit.
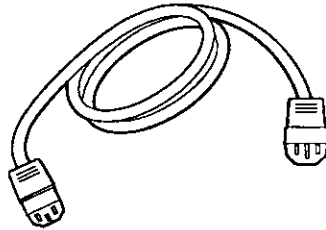
**Monitor-to-system-unit
power cable**
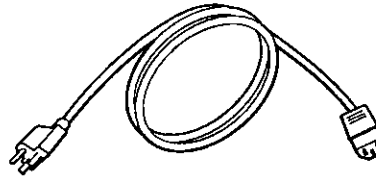
**System unit and monitor
power cord**

WSMXS099

Figure 1-20. Power cable and power cord

- Use the power cord to connect the system unit to a wall outlet or power strip.

- Use the power cable to connect the monitor to the power outlet on the back of the system unit.

Caution: *Only one device can be connected to the outlet on the back of the system unit. Do not use power cords to link devices together in a chain.*

If your monitor is at a distance from the system unit, you may need to order a longer power cord from Digital to connect the monitor to a wall outlet or power strip. For more information about connecting a monitor at a distance from the system unit, see "Connecting a Monitor to the System Unit Video Connector" on page 1-10.

2

The Environment

This chapter describes

- The environment in which your workstation functions most efficiently
- The voltage requirements for your workstation

Site Requirements

To operate at its best, your workstation must be set up in a place that meets certain requirements.

CAUTION: Failure to meet these requirements can damage the equipment.

Temperature and Humidity

- The temperature around the workstation should be between 5° F (10° C) and 104° F (40° C).

  The workstation should be set up away from heaters, photocopiers, and other sources of heat.

  Protect your workstation from direct sunlight.

- Air should flow freely around your workstation to keep heat from building up and damaging the equipment.

  Leave 4 inches (10 centimeters) between system unit vents and other objects.

  Leave 3 inches (7.6 centimeters) between monitor vents and other objects.

- Relative humidity should be between 10 and 80 percent.

- Store supplies (such as tape cartridges) within these same temperature and humidity limits.

Cleanliness

- Keep your work area as dust-free as possible.

Interference

- Set up your workstation at least 30 inches (76.2 centimeters) from any sources of electrical interference, such as other terminals or monitors, printers, or electric pencil sharpeners.

- To limit its exposure to static electricity and magnetized objects, set up your workstation away from busy corridors and other high-traffic areas and away from filing cabinets and steel beams in walls.

Power

- Reserve an entire circuit for your workstation power source. The fuse for the circuit must be at least 15 amperes.

- Be sure your electrical circuit is properly grounded and free from electrical noise. If possible, connect a surge-protected power strip to the outlet and plug your workstation power cord into the power strip.

- Be sure the voltage of the devices you connect to your workstation matches the voltage of your power source (see the following section, "Voltage Requirements").

Voltage Requirements

Many of the devices you connect to your workstation, including most monitors, must have voltages that match your power source, which is either 110/120 or 220/240 volts. Devices that require matching voltages have a yellow voltage label covering the power connector. This label tells you that device's power requirements.

CAUTION: *Connecting your equipment to a power source with the wrong voltage can damage the equipment.*

3

Starting and Testing

This chapter tells you how to

- Turn on your workstation
- Use the power-up and system self-tests
- Check your workstation configuration
- Boot the workstation software if your workstation has factory-installed software
- Boot the workstation software if your workstation is on a network
- Boot the workstation software if you are installing it from an external drive
- Turn off your workstation

Turning On Your Workstation

To turn on your workstation,

1. Press the 1 on the on/off switch on the back of the system unit.

2. If necessary, turn on your monitor.

   - If the monitor gets its power through the system unit, it will go on when you turn on the system unit.

   - If the monitor is plugged into a wall outlet, press the 1 on its on/off switch to turn it on.

3. As soon as you've turned on the system unit, the following things happen:

   - A green indicator light glows on the front of the system unit.

   - A green indicator light flashes quickly twice on the front of the monitor.

   - The system unit and the monitor run their power-up self-tests.

Using the Power-Up Self-Test

The power-up self-test verifies that the system is working correctly. It begins automatically when you turn on your workstation. As the system performs the test, you'll see flickering text in the lower-left corner of the screen. This flickering stops when the self-test is complete. If the test was successful, you'll see one of two console prompts on your screen:

- >> When this prompt is displayed, anyone can enter console commands.
- R > When this prompt appears, full console use is restricted to users who know the password.

If you don't know the password, you can use only two console commands: the boot command (type **boot** and press Return) and the password command (type **passwd** and press Return). If the software has been installed on your hard disk or another storage drive, and if the boot path is correctly set (see "Setting the Boot Path Variable" on page 11-4), the boot command will start up the workstation software.

If your system fails to turn on, or if the self-test is unsuccessful, see Chapter 13, "Troubleshooting," for instructions.

Using the System Self-Test

The system self-test, like the power-up self-test, checks to see that the system is functioning correctly. It's a more thorough test than the power-up self-test.

CAUTION: Before running the system self-test, make sure that your workstation is either connected to a network or has a loopback connector in the Ethernet connector on the back panel. Otherwise the test will fail. See Chapter 5 of this guide for more information about Ethernet connections.

Run the system self-test by following these steps:

1. Turn on your workstation and wait until the power-up self-test is complete.

2. When you see the console prompt (>>), type **test** and press Return.

3. The system self-test may take anywhere from one to five minutes, depending on how much memory you have in your system. As the system performs the test, you'll see flickering text in the lower-left corner of the screen. You'll also hear a beep when the system tests the speaker. When the self-test is complete, the flickering stops. If the self-test is successful, the console prompt (>> or R>) appears on your screen.

If your system fails to turn on, or if the self-test is unsuccessful, see Chapter 13, "Troubleshooting," for instructions.

Checking Your Workstation Configuration

The configuration test tells you what modules are present
in your system unit and where they are. Run this test
to make sure the workstation recognizes any optional
memory, TURBOchannel modules, serial bus devices, or disk
drives you have.

To run the configuration test, type **cnfg** and press Return.

You'll see a display that looks something like this:

```
3: KNO2-CA   DEC x1.2g   TCF0   (16 MB)
                                (CX - d=8)
                                (Sb: devs = 2)
                                (FDI: 1)
                                (enet: 08-00-2b-xx-xx-xx)
                                (SCSI = 7)
0: PMAG-DA   DEC V5.3g   TCF0   (PMAGB-EA: PXG- d=24)
```

The lines beginning with numbers (in the example, 3: and 0:)
indicate the workstation slots: the connectors inside the system
unit to which modules can be attached. The example shows two
slots: slot 3, which is the base system module and will always
be present, and slot 0, which is one of the TURBOchannel
option modules. *Listings for slot 0 and slot 1 appear only if you
have a TURBOchannel option module in one or both of those
slots.*

Each item following the 3: refers to a feature of the base system
module. In the example, these features are as follows:

```
(16 MB)                      The amount of memory installed
(CX - d=8)                   The base system video
(Sb: devs = 2)               The keyboard and mouse
(FDI: 1)                     The internal floppy disk drive
(enet: 08-00-2b-xx-xx-xx)    Your workstation Ethernet address
(SCSI = 7)                   The ID of the SCSI connector on the
                             base system module
```

The items following the 0 tells you what is in TURBOchannel
option slot 0. In the example, this slot contains a graphics card
to which you can connect a monitor. For more information
about TURBOchannel option slot displays, turn to the
TURBOchannel Options User's Guide.

You can also use the configuration test to see what devices are connected to a particular slot. To do this, type **cnfg** and the slot number and press Return. For example, to see the configuration for slot 3, the base system module, you would type **cnfg 3**.

The last several lines of the display you will see look something like this:

DEV	PID	VID	REV	SCSI	DEV
rz2	**RZ25**	(C)DEC	DEC	0400	DIR
tz5	**TZK10**	(C)DEC	DEC	00AA	SEQ

Look at the column headed DEV (device). This column lists the device code and SCSI ID for each drive your system recognizes. *All the SCSI drives connected to the SCSI connector on the back of the system unit should be listed here.* The sample shows the internal hard disk, with SCSI ID 2, and a tape drive, with SCSI ID 5.

The column headed PID (product ID) lists the names of the devices–in the sample, RZ25 and TZK10. Some device names will not appear in this column, so you should use the DEV column to verify the presence of SCSI drives.

Once you've turned on your workstation and checked its configuration, you're ready to boot the workstation software.

If your workstation has factory-installed software, you will see a sticker on the back of the system unit that reads: "If this system contains a hard disk with pre-installed software, see Installation Guide before booting system."

If your workstation has factory-installed software, see the next section.

If your workstation will be accessing software through a network, see "Booting the Software from a Network," on page 3-7.

If you will be installing software from an external drive, see page 3-8.

Booting Factory-Installed Software

At the console prompt (>>), type **setenv boot "3/rz2/vmunix -a"** and press Return.

Then type **boot** and press Return.

See the *ULTRIX Guide to Starting the Factory-Installed Software System* for further instructions.

Booting the Software from a Network

Your system manager will boot the software for you if your workstation is on a network. Make sure he or she has the following:

- The Ethernet station address for your workstation. (See "Finding Your Ethernet Address," page 5-15, to find your Ethernet station address.)
- The *Guide to Installing ULTRIX*
- The ULTRIX release notes

Booting the Software from an External Drive

If you are installing software from a CDROM or external tape drive, make sure you have the following before you begin the software installation:

- The *Guide to Installing ULTRIX*
- The ULTRIX release notes
- An ULTRIX TK50 Tape Cartridge Kit or an ULTRIX CDROM Optical Compact Disc Kit containing media and installation documents
- An optical compact disc or tape drive for loading the compact disc or tape
- The owner's guide for the drive you will use
- A hard disk drive on which to install the workstation software

Using the Workstation Software

Once you've installed the software, you can start it up in subsequent sessions just by typing **boot** at the console prompt and pressing Return.

The first thing you see once you've booted your workstation software is the log-in screen. This is where you type your user name and your password, if you have one. Both your user name and password are given to you by your system manager when you first begin using your workstation.

Once you've entered your user name and password, you can begin using your workstation software. When you're ready to conclude your session, choose Quit from the Session menu in your session manager window.

Turning Off Your Workstation

To turn off your workstation,

1. If the workstation software is running, type **shutdown -h now** and press Return. *Note: You must be in "superuser" mode in order to shut down the system. This requires that you obtain superuser privileges from your system manager. Enter superuser mode by typing* **su**, *pressing Return, and entering your password.*

2. Turn off any devices connected to your workstation, such as printers, modems, or external hard disks.

3. Turn off the system unit by pressing the 0 on the on/off switch on the back of the system unit.

4. If necessary, turn off the monitor.

   ■ If the monitor gets its power through the system unit, it will go off when you turn off the system unit.

   ■ If the monitor is plugged into a wall outlet, press the 0 on its on/off switch to turn it off.

4

Taking Your Workstation Apart

This chapter tells you how to disassemble your workstation and pack it for moving.

Dismantling Your Workstation

1. If the workstation software is running, type **shutdown -h now** and press Return.

2. Turn off any devices connected to your workstation, such as printers, modems, or external hard disks.

3. Turn off the system unit by pressing the 0 on the on/off switch on the back of the system unit.

4. If necessary, turn off the monitor.

   - If the monitor gets its power through the system unit, it will go off when you turn off the system unit.

   - If the monitor is plugged into a wall outlet, press the 0 on its on/off switch to turn it off.

5. Unplug all power cords from their power sources.

6. Disconnect all external devices, including the monitor and the keyboard, from the system unit. If two or more disk drives or other devices are chained together, disconnect them from each other.

7. If the SCSI connector on the back of the system unit contains a terminator, remove the terminator.

8. Disconnect the mouse from the keyboard.

9. If you're on a network, disconnect the Ethernet cable from the system unit. Otherwise, remove the loopback connector.

Packing Your Equipment

Pack each piece of equipment in the carton it came in. Use any padding that came in the carton to hold the equipment securely in place.

Be sure to include the following in each carton:

- Any cables, power cords, and terminators that came with that device

- Any documentation that came with that device

Part II

External Additions to Your Workstation

5

Ethernet

This chapter tells you

- How to connect your workstation to a ThickWire, ThinWire, or twisted-pair Ethernet network

- How to find the Ethernet station address for your system

The Personal DECstation is designed so that you can connect it easily to a ThickWire, ThinWire, or twisted-pair Ethernet network. You can also use it as a stand-alone workstation, not connected to any network.

If Your Workstation Is Not Part of a Network

If your workstation is not part of an Ethernet network, you
must have a loopback connector in the Ethernet connector
on the back of the system unit to run the system self-test
successfully. The system self-test will fail if your workstation
is not connected to a network and has no loopback connector
installed. The loopback connector comes with your workstation.

Connecting the Loopback Connector

1. Hold the loopback connector so its widest part is on top.
2. Push the loopback connector all the way into the ThickWire
   Ethernet connector on the system unit.
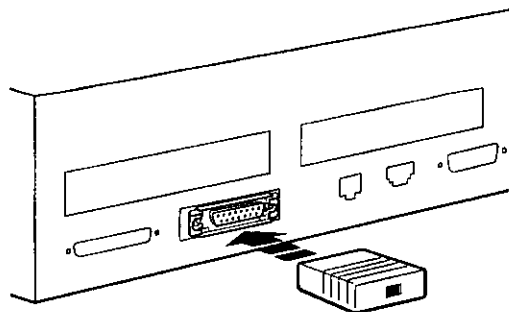
WSMXS062

Figure 5-1. Connecting the loopback connector

Connecting Your Workstation to a Network

The Personal DECstation has a ThickWire Ethernet connector on the back of the system unit. If your workstation is going to be part of a ThickWire network, you'll use the ThickWire cable to make a direct connection between the workstation and the network cable that comes from the wall. If you have a ThinWire or twisted-pair network, you'll use an adapter to make this connection.

Using the Sliding Locks

There are sliding locks on the Ethernet connector on the system unit and on one end of the ThickWire Ethernet cable.

- To unlock a sliding lock, use a flat-blade screwdriver to slide the lock in the direction of the small, u-shaped notch (either left or right, depending on the way the lock is mounted on your system).

Sliding lock on the base system ThickWire Ethernet connector   Large notch   Small notch
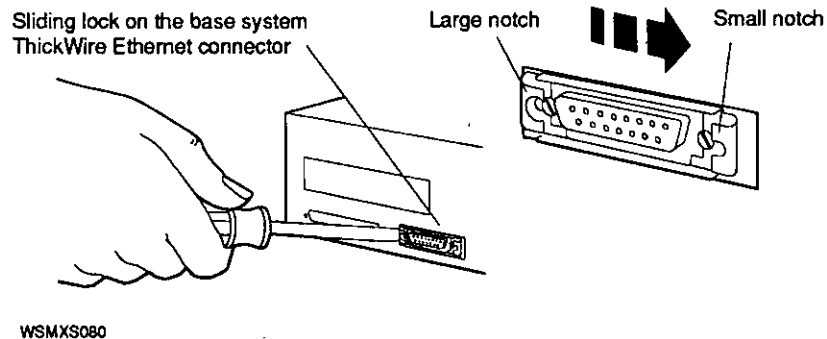
WSMXS080

Figure 5-2.   Unlocking the sliding lock on the system unit Ethernet connector

- To lock a sliding lock, use a flat-blade screwdriver to push the protruding edge of the lock toward the center of the connector until it clicks into place.
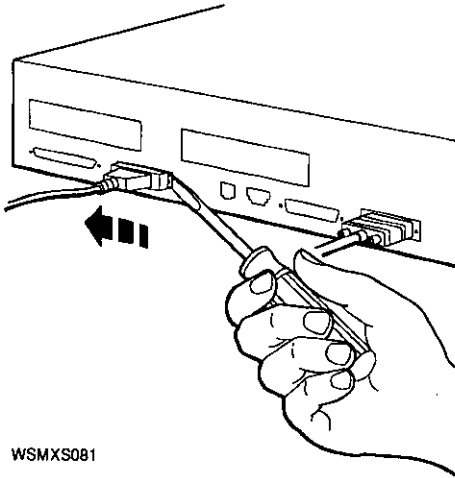
WSMXS081

Figure 5-3. Locking the sliding lock on the system unit Ethernet connector

The procedure you follow to connect your workstation to an Ethernet network depends on the kind of Ethernet network you have.

- To connect to a ThickWire network, see the next section, "Connecting to a ThickWire Network."

- To connect to a ThinWire network, see "Connecting to a ThinWire Network" on page 5-6.

- To connect to a twisted-pair network, see "Connecting to a Twisted-Pair Network" on page 5-10.

You can also connect your workstation to additional Ethernet networks, or to other kinds of networks, by using a TURBOchannel module. See the *TURBOchannel Options User's Guide* for information on how to do this.

Connecting to a ThickWire Network

1. If the workstation software is running, shut it down: Type
   shutdown -h now and press Return.

2. Turn off the system unit by pressing the 0 on the on/off
   switch on the back of the unit.

3. If a loopback connector is in the ThickWire connector on the
   system unit, pull it out.

4. Find the ThickWire Ethernet cable. Note that one end of
   the cable has a sliding lock on it and the other does not.

5. Find the end of the cable that doesn't have the sliding lock.
   Position it so its widest part is on top.
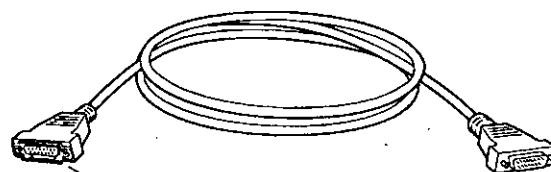
Sliding lock on
Thickwire Ethernet connector

WSMXS019

Figure 5-4.   ThickWire Ethernet cable

6. Push the cable connector all the way into the ThickWire connector on the system unit.

7. Lock the sliding lock on the system unit connector.
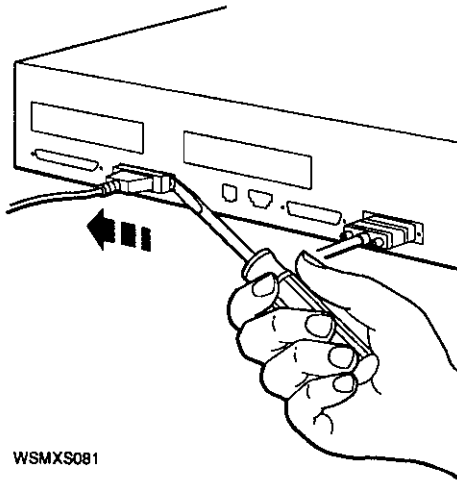
WSMXS081

Figure 5-5. Connecting the ThickWire Ethernet cable to the system unit

8. *Do not* attach the other end of the ThickWire cable at this time. Turn to "Finding Your Ethernet Address" on page 5-15 for instructions. Report your address to your system manager, who will complete the connection to the network.

Connecting to a ThinWire Network

1. If the workstation software is running, shut it down: Type **shutdown -h now** and press Return.

2. Turn off the system unit by pressing the 0 on the on/off switch on the back of the unit.

3. If a loopback connector is in the ThickWire connector on the system unit, pull it out.

4. Find the ThickWire Ethernet cable. Note that one end of the cable has a sliding lock on it and the other does not.

5. Find the end of the cable that doesn't have the sliding lock. Position it so its widest part is on top.

Sliding lock on
Thickwire Ethernet connector

WSMXS019

Figure 5-6. ThickWire Ethernet cable

6. Push the cable connector all the way into the ThickWire connector on the system unit.

7. Lock the sliding lock on the system unit connector.
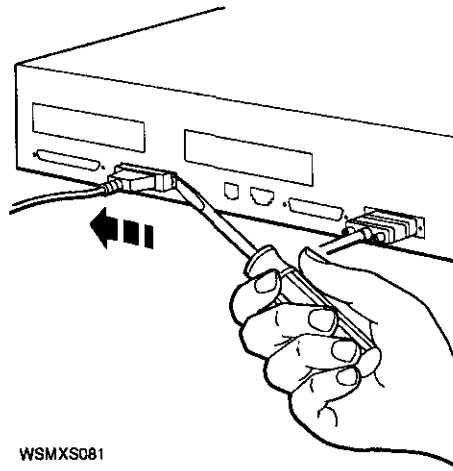
WSMXS081

Figure 5-7. Connecting the ThickWire Ethernet cable to the system unit

8. Find the T-connector with its two terminators and the ThickWire-to-ThinWire adapter.

ThinWire Ethernet connector

T-connector terminators

ThickWire Ethernet connector
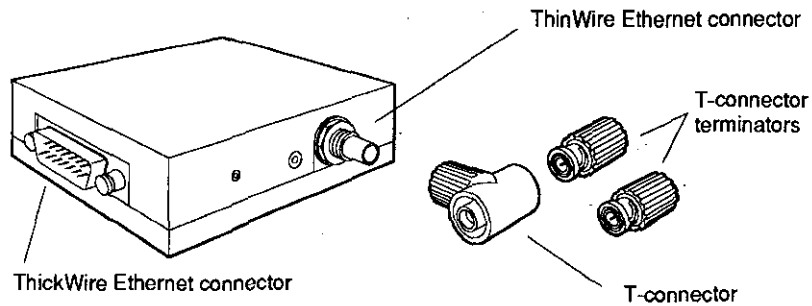
T-connector

WSMXS039

Figure 5-8. Parts for connecting to a ThinWire network

9. Notice that the ribbed part of the T-connector can be twisted from side to side. Press this ribbed part onto the ThinWire connector on the adapter and turn it to the right until it slides forward and locks into place.

ThickWire-to-ThinWire adapter

Press the T-connector into the adapter and turn the connector to the right until it slides forward and locks into place.

To the ThickWire Ethernet connector on the system unit
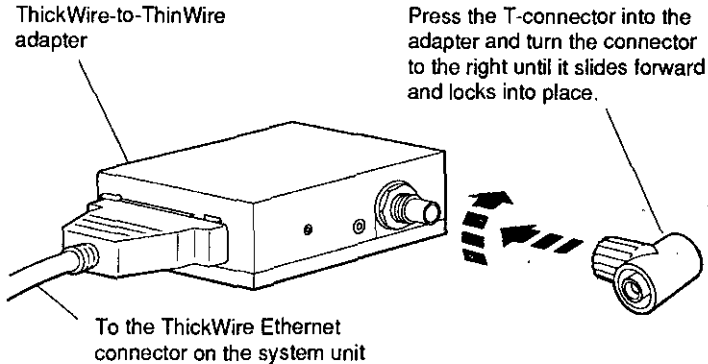
WSMXS083

Figure 5-9. Attaching the T-connector to the adapter

To Connect the ThickWire-to-ThinWire Adapter

1. If necessary, unlock the sliding lock on the cable connector. (See "Using the Sliding Locks" on page 5-3.)

2. Hold the ThickWire cable so the widest part of its connector aligns with the widest part of the ThickWire connector on the adapter.

3. Push the cable connector and the adapter connector together.

4. Push the sliding lock on the cable connector toward the connectors until it locks them in place.

ThickWire Ethernet cable

Base system
ThickWire Ethernet
connector

WSMXS084
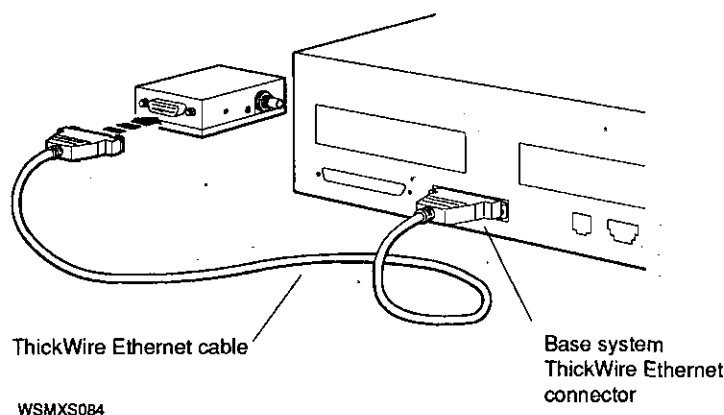
Figure 5-10. Connecting the ThinWire adapter to the ThickWire cable

To Connect the Workstation to the ThinWire Network

Your workstation may be either within a ThinWire cable segment or at the end of a segment. You connect your workstation differently depending on where it is.

- If your workstation is to be connected *at the end* of a ThinWire segment, attach a terminator to one end of the T-connector on the adapter.

- If your workstation is to be connected *within* a ThinWire segment, leave both ends of the T-connector free for attaching your in-house network cables

CAUTION: *Never attach a network cable directly to the adapter without using the T-connector.*

Press the T-connector terminator into the T-connector and turn the terminator to the right until it slides forward and locks into place.

ThickWire-to-ThinWire adapter

ThickWire Ethernet cable
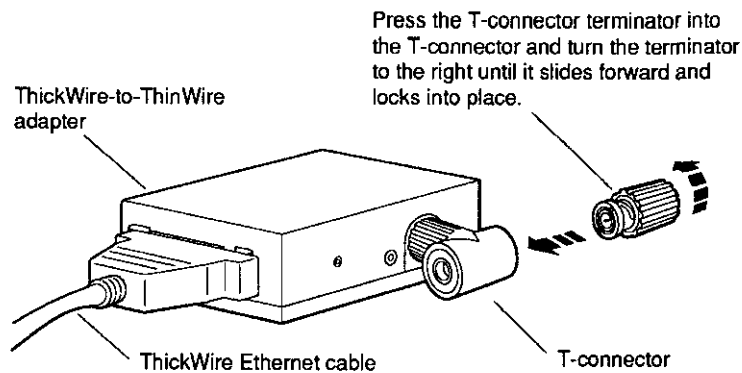
T-connector

WSMXS085

Figure 5-11. Attaching a T-connector terminator

Do not attach the other end of the ThickWire cable at this time. Turn to "Finding Your Ethernet Address" on page 5-15 for instructions. Report your address to your system manager, who will complete the connection to the network.

Connecting to a Twisted-Pair Network

1. If the workstation software is running, shut it down: Type **shutdown -h now** and press Return.

2. Turn off the system unit by pressing the 0 on the on/off switch on the back of the unit.

3. If a loopback connector is in the ThickWire connector on the system unit, pull it out.

4. Find the ThickWire Ethernet cable. Note that one end of the cable has a sliding lock on it and the other does not.

5. Find the end of the cable that doesn't have the sliding lock. Position it so its widest part is on top.

Sliding lock on
Thickwire Ethernet connector
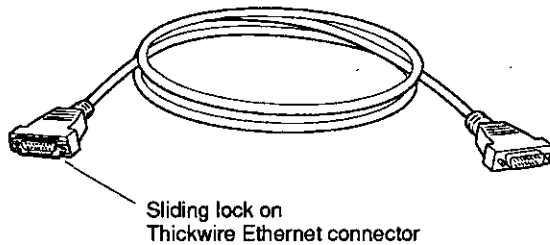
WSMXS019

Figure 5-12.   ThickWire Ethernet cable

6. Push the cable connector all the way into the ThickWire connector on the system unit.

7. Lock the sliding lock on the system unit connector.
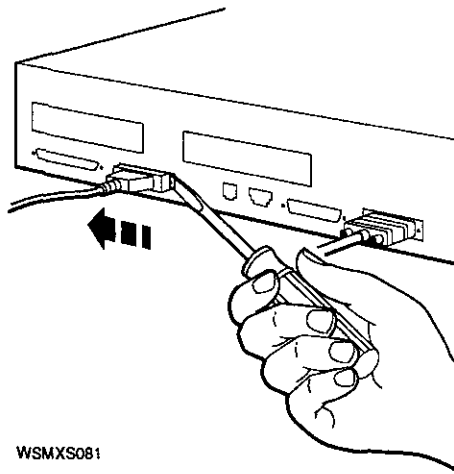
WSMXS081

Figure 5-13.   Connecting the ThickWire Ethernet cable to the system unit

8. Find the ThickWire-to-twisted-pair adapter and the twisted-pair Ethernet cable.
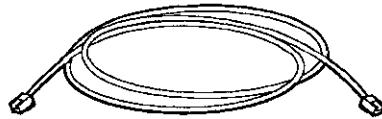
Twisted pair phone-jack

ThickWire Ethernet
connector

Twisted pair phone-jack
type of connector
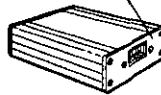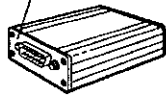
Front view

Back view

ThickWire-to-twisted-pair adapter

WSMXS040

Figure 5-14. Parts for connecting to a twisted-pair Ethernet network

To Connect the ThickWire-to-Twisted-Pair Adapter

1. If necessary, unlock the sliding lock on the cable connector. (See "Using the Sliding Locks" on page 5-3.)

2. Hold the ThickWire cable so that its widest part aligns with the widest part of the ThickWire connector on the adapter.

3. Push the cable connector and the adapter connector together.

4. Push the sliding lock on the cable connector toward the connectors until it locks them in place.

ThickWire-to-
twisted-pair adapter

ThickWire Ethernet cable

WSMXS086

Base system
ThickWire Ethernet
connector
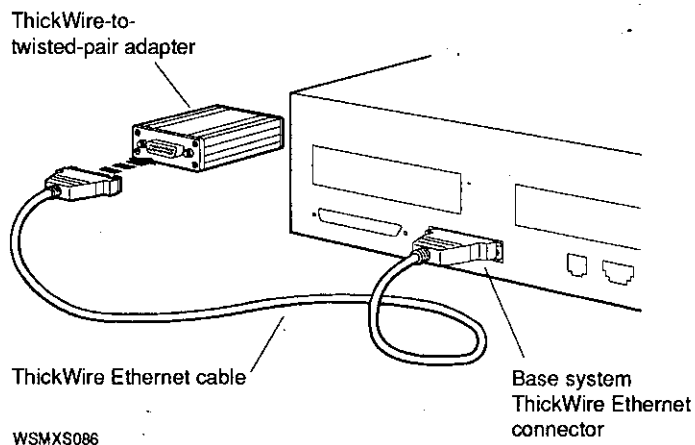
Figure 5-15. Connecting the adapter to the ThickWire cable

5. Find the twisted-pair cable. It has a telephone-jack type of connector.

6. Position the connector on the cable so the clip is on the bottom. Then push the connector into the empty connector on the adapter until you feel the connector click into place.

To ThickWire Ethernet connector on system unit

ThickWire-to-twisted-pair adapter

Hold the telephone-jack type of connector so the clip is on the bottom.
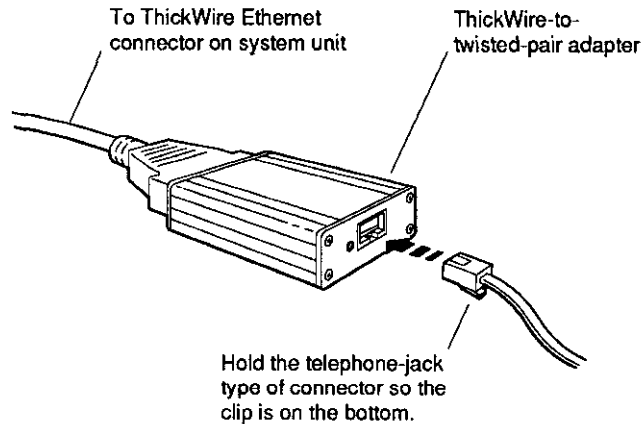
WSMXS087

Figure 5-16. Connecting the twisted-pair cable to the adapter

7. *Do not* attach the other end of the twisted-pair cable at this time. See the next section for instructions on finding your Ethernet station address. Report this address to your system manager, who will complete the connection to the network.

Finding Your Ethernet Address

To complete the connection to the network, you'll need to find your Ethernet station address.

1. If the workstation software is running, shut it down: type **shutdown -h now** and press Return.

2. When you see the prompt (>>), type **cnfg** and press Return.

    You'll see a display something like this on your screen:

    ```
    3:KN02-CA   DEC   T1.2a   TCF0   (16 MB)
                                     (CX -- d=8)
                                     (Sb: devs = 0)
                                     (FDI: 1)
                                     (enet: 08-00-2b-xx-xx-xx)
                                     (SCSI = 7)
    ```

3. Look at the leftmost column in the display and find the line that begins with 3:. The entries that follow the 3: describe the configuration of your base system.

4. Once you've found the 3:, look at the rightmost column in the display and find the entry that begins with enet:.

    The letters and numbers that follow enet: are the Ethernet station address for your base system. The address begins with 08-00-2b; the remaining characters, indicated in the example by x's, will be unique to your workstation.

5. Give your Ethernet station address to your system manager, who will complete the network installation.

    If you must complete the installation yourself, follow the instructions in the networking guide for your workstation software.

6

External Storage Devices

This chapter tells you

- What external storage devices you can add to your basic workstation
- The rules for connecting SCSI devices to your workstation
- How to verify and assign SCSI IDs
- How to link storage devices together

Storage Devices You Can Add to Your Workstation

A basic Personal DECstation system that includes internal drives will come with one 426-megabyte internal hard disk drive and one extra density (2.8-megabyte) internal floppy disk drive. You can expand your workstation storage capacity by adding other drives to your system. These can be tabletop drives, or they can be drives contained within an expansion box. For a list of the drives that can be connected to your workstation, see Appendix F.

All external storage devices are connected either by means of the SCSI connector on the back of the system unit or by means of a SCSI connector on a TURBOchannel option module.
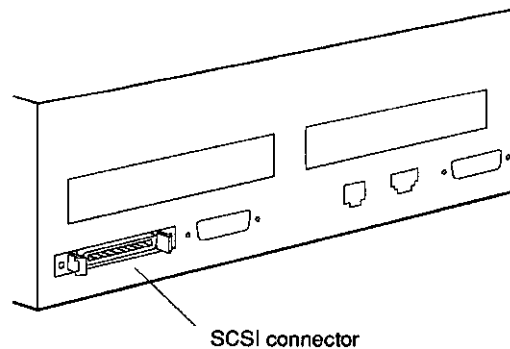
SCSI connector

WSMXS041

Figure 6-1. SCSI connector on the system unit

The system unit also has an internal SCSI connector to which the internal hard disk drive is connected. (The internal floppy disk drive is not a SCSI device.) For more information about connecting internal drives, see Chapter 9, "Internal Storage Devices."

Guidelines for Connecting SCSI Storage Devices

SCSI storage devices must be connected to your workstation according to the following guidelines for the system to work properly:

- If no external drives are connected, the SCSI connector on the back of the system unit must contain a SCSI terminator.

- A SCSI connector can accommodate up to seven drives, linked together in a chain. (On your workstation, the internal hard disk counts as the first drive; you can connect six more external drives to the SCSI connector on the back of the system unit.)

- Each drive enclosure (such as the SZ12 expansion box, for example) has two connectors, except for the TURBOchannel extender box, which has only one.

- The second connector of the last expansion box or tabletop drive enclosure in the chain must contain the large SCSI terminator that comes with the drive. The TURBOchannel extender (TCE) box has its own internal terminator. If you're using the TCE, you must always place it last in the chain.

- Each drive in the chain must have a unique SCSI ID. See the next section, "SCSI IDs," for information about determining and assigning IDs.

- No more than three external expansion boxes can be connected to the base SCSI connector on the system unit. (You can connect additional expansion boxes using a PMAZ-AB TURBOchannel SCSI adapter.)

- When you're starting up your system, turn on the devices attached to it first (in any order) and then turn on the system unit.

If you're connecting a TURBOchannel expansion box (TCE), refer to the instructions that come with it for additional information.

SCSI IDs

Every SCSI device attached to a given connector must have a unique SCSI ID. If two or more devices have the same ID, your workstation won't operate correctly.

SCSI storage drives are usually assigned a SCSI ID number at the factory where they're made. Certain kinds of drives have certain numbers, and the numbers are planned in such a way as to make it easy to link different types of drives together without running into number conflicts.

In some cases, however, a device may have a nonstandard ID, or you may want to link several of the same kinds of devices together. For these cases, you need to know how to determine the SCSI IDs of the devices you're using and how to change these numbers if necessary.

Factory-Assigned SCSI IDs

Table 6-1 shows the SCSI IDs usually preassigned to each kind of drive.

Table 6-1. Commonly Preassigned SCSI IDs

TYPE OF DRIVE	SCSI ID
Internal hard disk drive	2
Expansion box containing two hard disk drives	0 and 1
External floppy disk drive	4
CDROM drive	4
Tape drive	5
System SCSI connector	7

Because the internal floppy disk drive used in the Personal DECstation is not a SCSI drive, it does not have an ID.

Verifying SCSI IDs

To check the IDs of the SCSI devices connected to the base SCSI connector on the back of your system unit, follow these steps:

1. If the workstation software is running, shut it down: Type **shutdown -h now** and press Return.

2. When you see the console prompt (>>), type **cnfg 3** and press Return.

   The screen display will list the drives connected to slot 3 of your system, which is the base system module. The last several lines of the display you see will look something like this:

   ```
   DEV  PID     .VID   .   REV    SCSI    DEV
   -------------------------------------------
   rz2  RZ25    (C)DEC     DEC    0400    DIR
   tz5  TZK10   (C)DEC     DEC    00AA    SEQ
   ```

3. Look at the column headed PID (product ID). This column lists the drives your system recognizes: in the sample, a hard disk (RZ25) and a tape drive (TZK10). All the SCSI drives connected to the SCSI connector on the back of the system unit should be listed here.

4. Look at the column headed DEV (device). This column lists the device code and the SCSI ID for each listed drive. In the sample, the number of the hard disk is 2, and the number of the tape drive is 5. *No two of your drives may have the same number. If they do, one of the drives won't appear in this display.*

If any of the drives you've connected to your system do not appear in your configuration display, or if the information provided for a drive is incorrect, you may have two or more devices set to the same SCSI ID. You'll need to change the number for one or more of those drives before your system will work properly.

To check the IDs of SCSI devices connected to a TURBOchannel option module, follow the same steps as for checking devices connected to the SCSI connector on the system unit, except type **cnfg 0** or **cnfg 1** at the console prompt, depending on the TURBOchannel slot to which your external drive is connected.

Changing SCSI IDs

All SCSI storage devices have a set of small switches or a row of small pins and jumpers that are used to set the SCSI ID. You change the ID by flipping these switches or moving jumper blocks into different positions on the pins.

The switches on the various kinds of storage devices are all slightly different. For instructions on identifying or changing the SCSI IDs on the RZ23L, RZ24, and RZ25 hard disk drives, see "To Set SCSI IDs for the RZ23L, RZ24, and RZ25" on page 8-9. For information about other SCSI devices, refer to the guide that came with the expansion box that contains the device, and to the documentation that came with the device itself.

To Connect an Expansion Box to the System Unit

If you're connecting a TURBOchannel extender box (TCE) to the SCSI connector, see the guide that comes with the TCE.

To connect other expansion boxes to the SCSI connector, follow these steps:

1. Turn off the system unit.
2. Find the system-unit-to-expansion-box cable, which has a small metal connector on one end. Hold this connector so that its widest part is on top.
3. Pinch together the sides of the cable connector to open it. Push the cable connector all the way into the SCSI connector on the system unit.

Position the smaller
cable connector
so the widest part
is on top.

SCSI icon

Base system
SCSI connector

WSMXS091
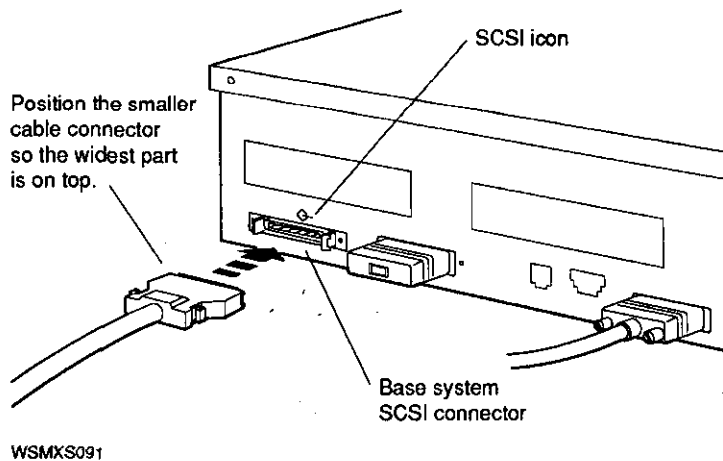
Figure 6-2. Attaching a system-unit-to-expansion-box cable to the SCSI
connector on the system unit

4. Attach the free end of the system-unit-to-expansion-box
   cable to one of the SCSI connectors (it doesn't matter which
   one) on the back of the expansion box.

   a. Press the two wire brackets on the expansion box
   connector away from the connector.

   b. Hold the cable connector so that its widest part is on
   top.

   c. Push the cable connector into the expansion box
   connector as far as it will go.

   If the expansion box is a TK50Z tape drive, slide the
   cable connector up between the handle and the back of
   the box.

   d. Press the two wire brackets firmly against the sides of
   the cable connector until they click into place.
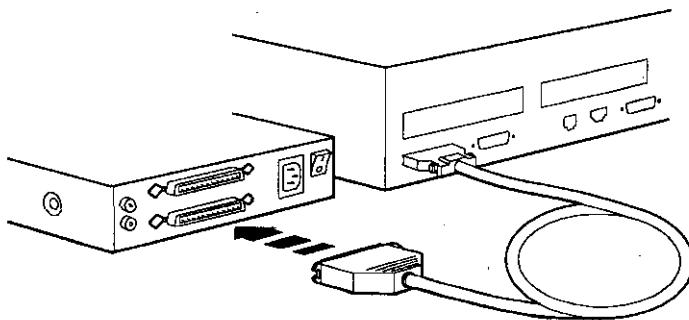
WSMXS094

Figure 6-3. Attaching a system-unit-to-expansion-box cable to a typical expansion box

5. If this is the only expansion box you're connecting, place a terminator on the unused expansion box SCSI connector. Use the terminator that came with the expansion box.

   CAUTION: The second connector of the last drive in a chain of SCSI devices must always contain a SCSI terminator. The TURBOchannel extender box (TCE) has its own internal terminator. If you're using the TCE, you must always place it last in the chain.

6. Turn on the expansion box power. Then turn on the system unit.

Linking Storage Devices Together

You can connect up to three expansion boxes, or a total of six individual drives, to the base system SCSI connector. Once you've connected one expansion box or drive, connect others as follows:

1. Plug one end of an 18-inch box-to-box expansion cable into the unused SCSI connector on the back of the expansion box you've already connected to your system unit.

2. Plug the other end of the cable into one of the SCSI connectors (it doesn't matter which one) on the new box in the chain.

   If the box is a TK50Z tape drive, slide the end of the cable up between the box and its handle.

3. Repeat steps 1 and 2 for each additional box.

1. Gently press the two wire brackets on the SCSI connector away from the connector.

2. Hold the connector so the widest part of the connector is on top and push it into the SCSI connector on the expansion box.

3. Press the two wire brackets firmly against the side of the cable connector until they lock into the groves on the sides of the connector.

RRD42 optical compact disc drive expansion box

Wire bracket

TK50Z tape drive expansion box

SZ12 storage expansion box
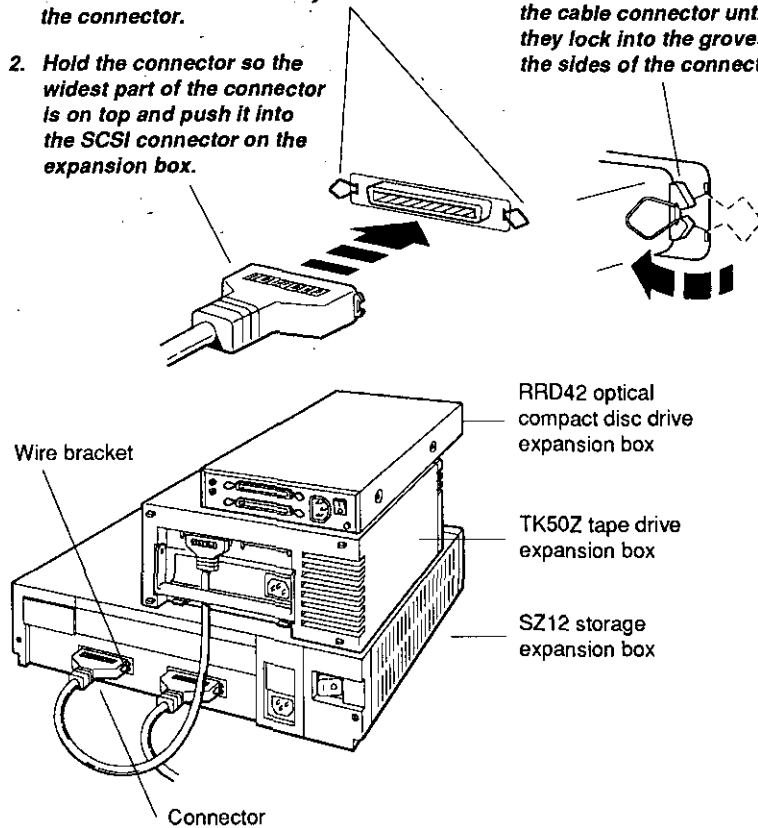
Connector

WSMXS092

Figure 6-4. Connecting expansion boxes in a chain

4. On the last box in the chain, connect an expansion box terminator to the unused SCSI connector. (If you're using a TURBOchannel extender box, place it last in the chain. It has its own internal terminator.)

Hold the terminator so the widest part of its connector is on top and push the terminator onto the unused SCSI connector.

Terminator

Wire brackets
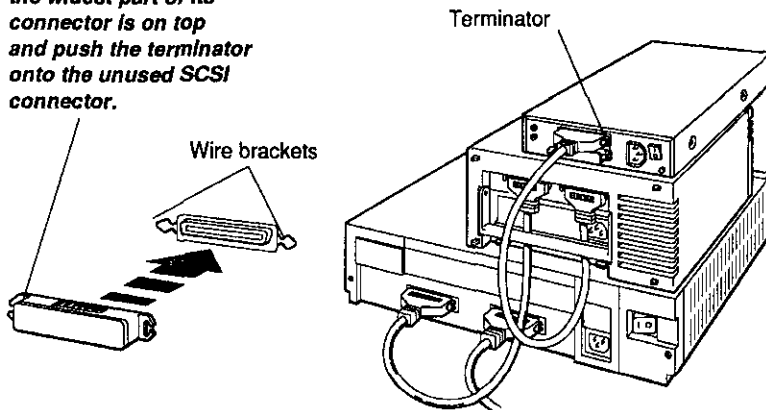
WSMXS093

Figure 6-5.   Terminating the final expansion box

5. Plug the end of a power cord into the power connector on each expansion box.
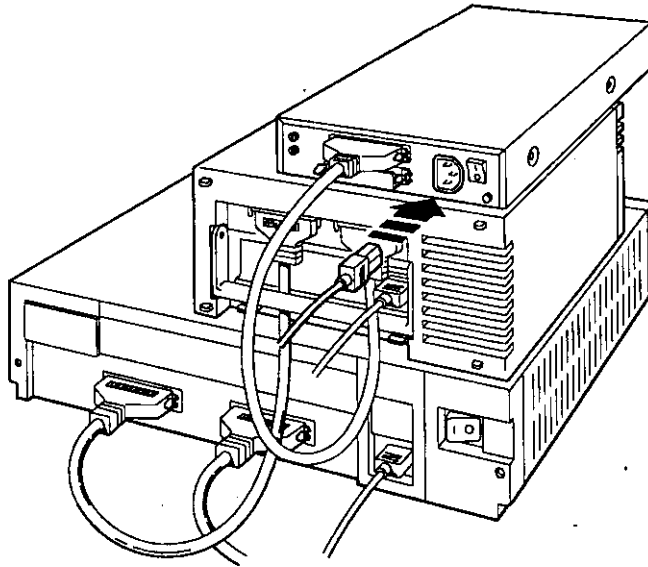
Figure 6-6. Connecting a power cord to an expansion box

WSMXS095

6. Plug the other end of each cord into a power outlet.
7. Turn on each expansion box and then the system unit.

Making Sure Your Workstation Recognizes a New Drive

To verify a drive attached to the base system SCSI connector, follow these steps:

1. At the console prompt (>>), type **cnfg 3** and press Return.

2. The screen display lists the drives connected to slot 3 of your system, which is the system module. The last several lines of the display you see will look something like this:

```
DEV    PID      VID      REV    SCSI   DEV
-------------------------------------------
rz2    RZ25     (C)DEC   DEC    0400   DIR
tz5    TZK10    (C)DEC   DEC    00AA   SEQ
```

3. Look at the column headed DEV (device). This column lists the device code and SCSI ID for each drive your system recognizes. *All the SCSI drives connected to the SCSI connector on the back of the system unit should be listed here.* The sample shows the internal hard disk, with SCSI ID 2, and a tape drive, with SCSI ID 5.

   The column headed PID (product ID) lists the names of the devices–in the sample, RZ25 and TZK10. Some device names will not appear in this column. Use the DEV column to verify the presence of SCSI drives.

4. If the drives you've connected aren't listed in the configuration display, or if they're listed incorrectly, turn off the system power, open the system unit, and check to make sure the drives are properly installed.

   If you've made sure the drives are properly installed and the configuration display still does not list them correctly, you may have two or more devices set to the same SCSI ID. You'll need to change the ID for one of these drives before your system will work properly. (See "Changing SCSI IDs" on page 6-6.)

7

Communication Devices

This chapter describes

- Communication devices, such as printers, plotters, and modems, that can be used with your workstation
- How to connect communication devices directly to the system unit
- How to use a communications connector adapter

Connecting Communication Devices to Your Workstation

Communication devices, such as printers, modems, and plotters, connect to your system unit by means of one of these types of connectors:

- A 25-pin connector, which attaches directly to the communications connector on the system unit

- A telephone-jack type of connector (MMJ, modified modular jack), which requires an adapter before it can be connected to the system unit

25-pin	Telephone-jack	25-pin
communications	type of	communications
connector	connector	connector
adapter		
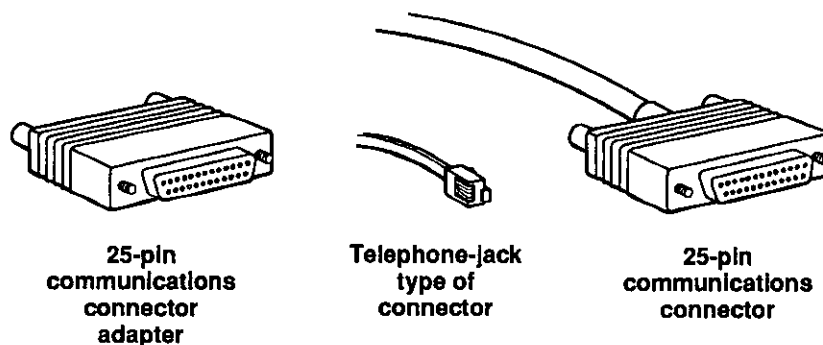
WSMXS042

Figure 7-1. Connectors and adapter for communication devices

To Connect a Device with a 25-Pin Connector

1. Prepare your printer, plotter, or modem according to the instructions that came with the device:

   - Set the proper baud rate, if necessary, and other controls.

   - Set up the device and attach its cable and power cord.

2. Connect the free end of the device cable to the communications connector on the back of the system unit:

   a. Align the widest part of the cable connector with the widest part of the connector on the system unit.

b. Press the cable connector all the way into the system unit connector.

Hold the 25-pin cable connector so the widest part of the connector is on top.

Turn the screws to your right to hold the connector in place.
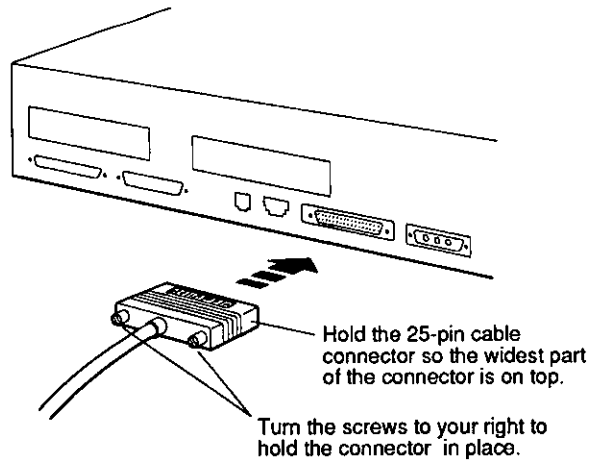
WSMXS043

Figure 7-2. Connecting a 25-pin connector

To Connect a Device with a Telephone-Jack Type of Connector (MMJ)

1. Find the communications connector adapter that came with your workstation.
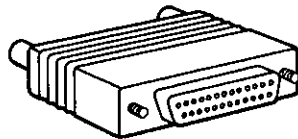
WSMXS045

Figure 7-3. A communications connector adapter

2. Hold the adapter so the widest part of the 25-pin connector is on top.

3. Press the adapter connector all the way into the communications connector on the system unit and tighten the screws until they hold the adapter firmly in place.

4. Hold the connector on your device cable so the clip is on your left.

5. Push the cable connector into the connector on the adapter until the cable connector clicks into place.

Hold the cable connector so the clip is to your left.

Hold the 25-pin communications connector adapter so its widest part is on top.

WSMXS044
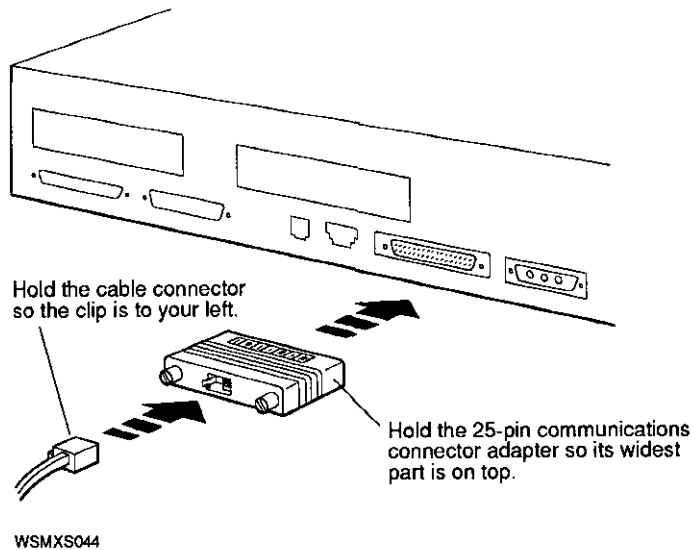
Figure 7-4. Using an adapter to connect a communications device to the system unit

If your printer, plotter, or modem fails to work, see the troubleshooting instructions in the documentation that came with the device or ask your system manager for help.

Installing a Console Terminal

If you are using one of the workstations on your network as a server, you may connect a terminal to it as a system console if a monitor is not available. The system console displays error messages and other system messages from the workstation, from networks, and from the workstation software. You also use the system console to enter console commands, and to read error messages if the monitor is not working.

A terminal can display text only; it cannot display illustrations or windowing applications. You cannot use a terminal as a standard workstation monitor, but it is adequate as a system console. Some users prefer to connect both a monitor and a terminal to their workstations. In console mode, with both a monitor and a terminal connected, graphics tests display on the monitor while other tests and text input display on the terminal.

To Connect the Terminal

1. Connect the terminal to the communications connector on the back of the system unit. If the terminal has a telephone-jack type of connector, use an adapter to make the connection.

2. Connect a power cord to the terminal and to a power outlet.

3. Turn on the terminal and set its transmit and receive speed to 9600 bps (bits per second).

To Activate the Terminal as the System Console

The system uses the presence or absence of an LK501 keyboard to determine the console device.

- If an LK501 keyboard is not detected during the power-up self-test, the system will use the terminal as the console device.

- If an LK501 keyboard is detected during the power-up self-test, the system checks the console environment variable to determine whether to use the monitor or the terminal as the console device.

You must set the console variable to s to make the terminal your system console. Do this by typing **setenv console s** at the workstation monitor console prompt. Then press Return.

The operating system will then be under the control of the terminal each time you boot the system, until you change the console environment variable again.

To Make Your Workstation Monitor the System Console

1. Type **setenv console *** at the console prompt on the terminal and press Return.

2. Turn off the terminal when it is not in use.

For information about using a console terminal as a troubleshooting device, see Chapter 13, "Troubleshooting."

8

A Server Configuration

The Personal DECstation has been designed to be configured as either a workstation or a server. (A server is used to provide other client systems in a network with distributed services such as filing, computation and printing.)

When performing distributed network server tasks, the Personal DECstation has no need for the expensive graphics hardware usually associated with workstations, so it is configured without a graphics monitor. However, to maintain a console window, you should connect the Personal DECstation to the input and outout from a VT320-type terminal attached to the RS232 port in the rear of the system unit, as shown in Figure 8-1.

Regular system monitor

Alternate
console
terminal

Alternate
terminal cable

Communications
connector

Communications
line adaptor

LK201 or LK401
keyboard

Alternate
terminal cable
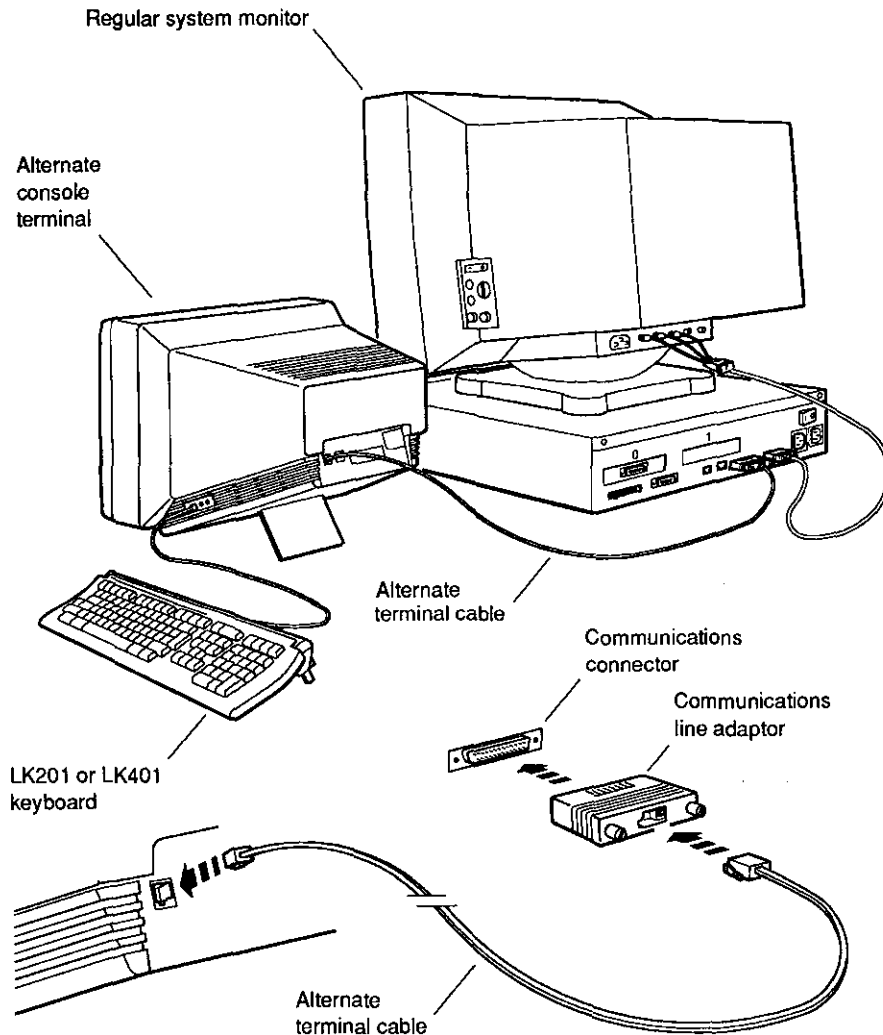
WSMXM074

Figure 8-1.   Installing a Console Terminal

Connecting a Console Terminal

Connect your terminal to the 25-pin RS232 connector, and
set your terminal as described in Table 8-1. You may notice
that these settings are the standard default settings for
Digital terminals. Some terminals may use the modular MMJ

telephone style connectors. If this is the case, an adapter (Part #H8571-A) can be used to make the connection.

Note: *Customers who have multiple servers may not have a terminal plugged into each unit. In this type of configuration, the system manager generally accesses the server via the Ethernet.*

Table 8-1. Alternate Terminal Settings

Setting	Value
Baud rate	9600
Bits	8
Parity	None
Stop bits	1
Flow Control	Xon/Xoff
Mode	Full duplex

Once you have connected the terminal to the RS232 port, you can now use the messages displayed on the terminal to perform system operations.

Halting a server

In general a server does not need to be halted during normal operations: it is usually shut down from the operations system with the *shut -a now* command. However, you may at times wish to abruptly halt the server to examine the contents of memory during code development and debug.

The Personal DECstation is halted as a server by the same technique that is used when it is halted as a workstation: namely, plug in an LK501 keyboard and type **Ctrl-Alt-Return**. We recommend that developers who do this type of work also set the console environmental variable to **s**, as explained in the next section.

Note: *The Personal DECstation does not have an explicit Halt switch.*

Default Settings for Using the Console Terminal

As an advanced user, you may from time to time wish to
alternate back and forth between use of a graphics monitor and
a console terminal. When using your console terminal, you can
defeat the default power-up console assignment by issuing the
following console command:

>> **setenv console s**

You can switch your console back to your graphics monitor with
the command:

>> **setenv console ***

Operational background information

Your system has the ability to display console and diagnostic
messages, either on the graphics monitor, or on a VT320-type
terminal connected to the RS232 port located on the rear of the
unit.

At powerup, the system looks for a keyboard plugged into the
SERIAL.bus. If one is found, the system will route all console
messages to the graphics monitor. If, however, no keyboard is
detected on the SERIAL.bus, all text will be sent directly to the
RS232 port.

Therefore, if you are using the Personal DECstation as a server
and you have an LK501 keyboard plugged in when the sytem
is powered on, the system will attempt to display console
output on a non-existent graphics monitor. To prevent this from
happening, you should establish your terminal as the default
console device by issuing the **setenv console s** command, as
described in the previous section.

Part III

Internal Additions to Your Workstation

9

Internal Storage Devices

This chapter tells you

- Which internal disk drives can be installed in your system unit
- How to install and remove a floppy disk drive
- How to install and remove a hard disk drive
- How to set SCSI IDs
- How to be sure your workstation recognizes the drives you've installed

Disk Drives That Digital Supports

You can install any of these four drives inside your system unit:

- RX26 floppy disk drive (2.8 megabytes)
- RZ23L hard disk drive (121 megabytes)
- RZ24 hard disk drive (209 megabytes)
- RZ25 hard disk drive (426 megabytes)

The hard disk drives are SCSI devices; the floppy disk drive is not.

All disk drives other than these four must be connected externally. Chapter 6 describes external storage devices you can connect to your workstation.

The *TURBOchannel Options User's Guide* tells you about SCSI
devices you can connect to the TURBOchannel option slots in
the system unit.

CAUTION: *Don't touch anything inside the system unit until you put
on the antistatic wrist strap provided by Digital. See Figure 1-5, on
page 1-6.*

Installing a Floppy Disk Drive

The internal floppy disk drive is not a SCSI drive, but it does
have a drive select number, which should be set at 0. This
number is preassigned at the factory; you will probably not
need to change it, but you can, if you wish, check the number
before you install the drive. If the workstation does not seem
to recognize the floppy drive, however, or if the message device
off-line appears on your screen, the floppy drive number may
be incorrectly set.

To Check the Drive Select Number

1. Remove the drive from its metal mounting bracket and
    from its perforated floppy drive shield.
2. The drive select switch is on the right side of the drive (as
    you face the front of the drive), toward the rear. Small
    numbers are printed on the green surface next to the
    switch. The switch should be set at 0.

WSMXS104
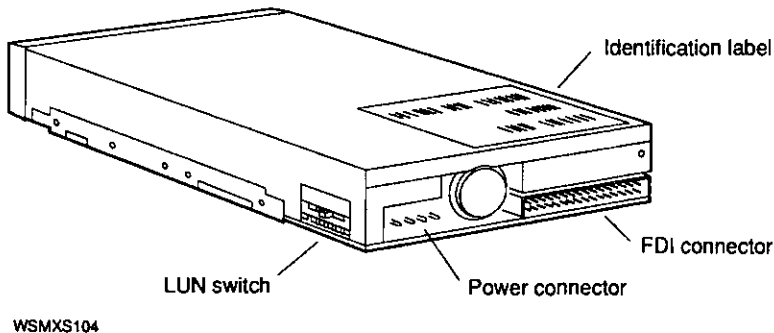
Figure 9-1.   Checking the drive select number on a floppy disk drive

To Install the Floppy Drive

1. If the workstation software is running, shut it down: Type **shutdown -h now** and press Return.

2. Turn off your workstation by pressing the 0 on the on/off switch on the back of the system unit.

3. Open the system unit. (See "To open the system unit" on page 1-6.)

4. The floppy disk drive comes in a metal mounting bracket. Hold the drive so that the bracket is on the bottom.

WSMXS046
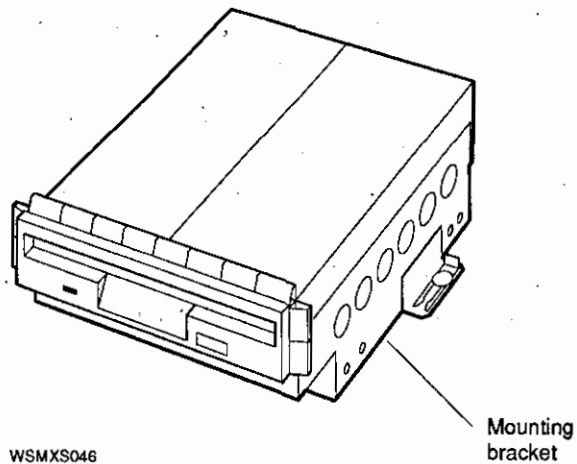
Figure 9-2. Floppy disk drive and mounting bracket

5. Connect the FDI cable to the drive.

6. Connect the long end of the internal drive power cable to the drive.

WSMXS057
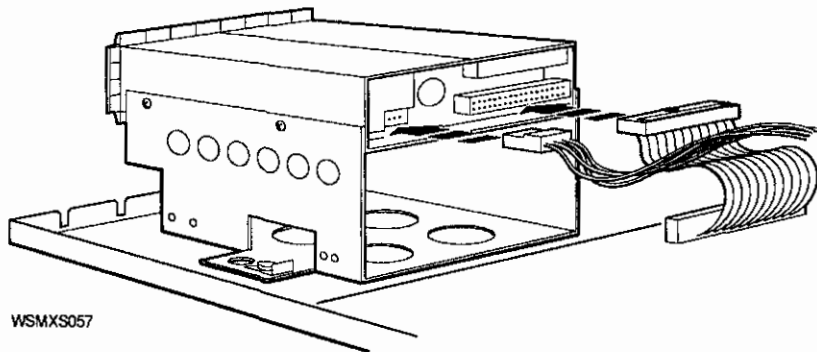
Figure 9-3. Connecting the FDI cable and the internal drive power cable to the floppy disk drive

7. Stand facing the front of the system unit. The space for the drive is in the right front corner. Fit the tabs on the left side of the mounting bracket into the slots in the base of the system unit.

Sliding latch

Post

Tabs

Slot
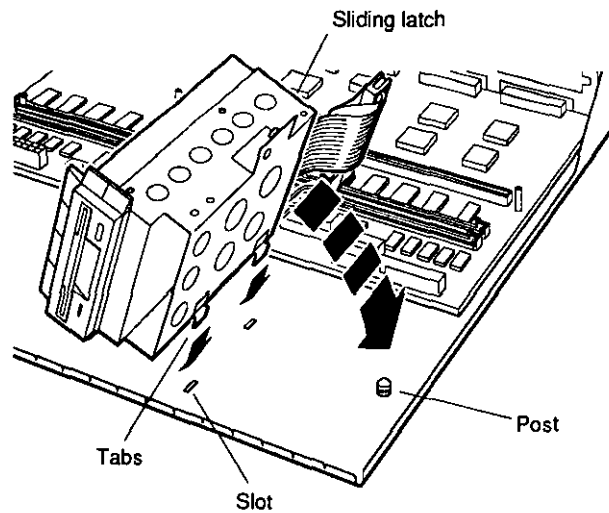
WSMXS100

Figure 9-4.   Installing the floppy disk drive in the system unit

8.   Lower the right side of the disk drive assembly so the hole in the mounting bracket fits over the post on the base of the system unit. Press the drive down firmly.

9.   Slide the latch beside the post into the locked position.

10.   Connect the floppy disk interface (FDI) cable to the FDI connector on the base system module as shown in Figure 9-5.

11.   Connect the internal drive power cable to the drive power connector on the base system module. (Note: The internal drive power cable serves both the floppy drive and the hard drive. If you've installed a hard drive, the power cable will already be connected to the base system module.)
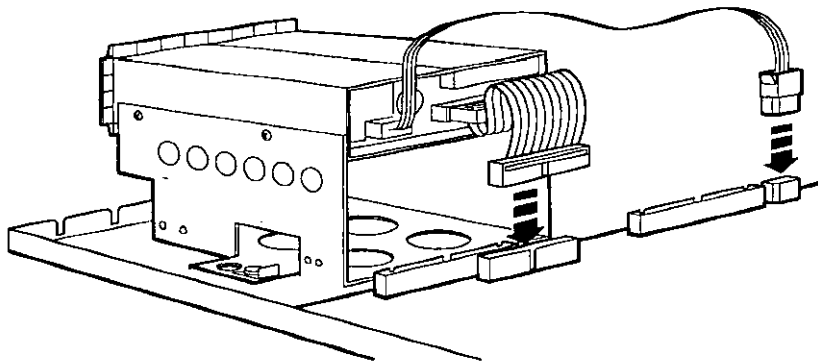
WSMXS101

Figure 9-5. Connecting the FDI cable and the internal drive power cable

12. Replace the cover of the system unit. (See "To close the system unit" on page 1-9.)

13. Turn on the workstation by pressing the 1 on the on/off switch on the back of the system unit.

Making Sure Your Workstation Recognizes the Floppy Disk Drive

1. If the workstation software is running, shut it down: Type **shutdown -h now** and press Return.

2. When you see the console prompt (>>), type **cnfg 3** and press Return.

   The display lists the drives connected to slot 3 of your system; this is the slot number for the base system module. The upper part of the display will look something like this:

```
3:  KN02-CA DEC    x1.2g    TCF0    (16 MB)
                                    (CX - d=8)
                                    (_b: devs = 2)
                                    (FDI:1)
                                    (enet: 08-00-2b-xx-xx-xx)
                                    (SCSI = 7)
```

The characters (FDI:1) tell you that the workstation recognizes the floppy disk drive. If you see (FDI:0) instead, or if the message device off-line appears on your screen, you either have no floppy drive installed in your system unit, or else the drive is not installed properly and the workstation does not recognize it. You'll need to open the system unit and check the drive's installation.

Removing a Floppy Disk Drive

1. If the workstation software is running, shut it down: Type **shutdown -h now** and press Return.

2. Turn off the workstation by pressing the 0 on the on/off switch on the back of the system unit.

3. Open the system unit. (See "To open the system unit" on page 1-6.)

4. Stand facing the front of the system unit. The floppy disk drive is in the right front corner.

5. Disconnect the FDI cable from the drive and from the connector on the base system module.

6. Disconnect the drive power cable from the drive. Disconnect the power cable from the drive power connector on the base system module, unless the cable is also providing power to an internal hard drive.

7. On the right side of the disk assembly, you'll see a sliding latch. Slide the latch backward to unlock it.

8. Raise the right side of the floppy disk assembly off the small post that holds it.

9. Keep lifting the disk assembly until you can slide the tabs on its left side out of the slots in the base of the system unit.

Sliding latch

Tabs

Slot

Post
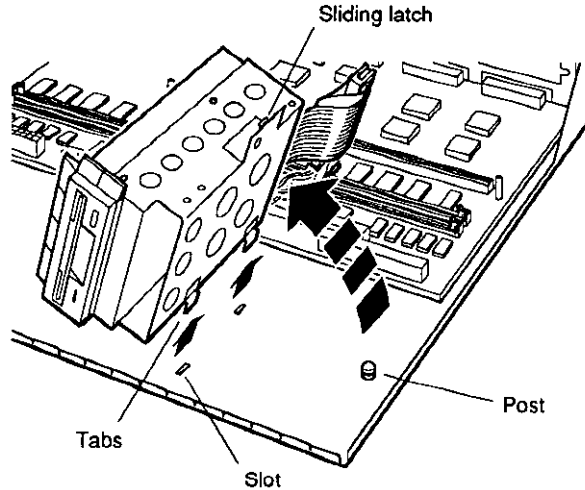
WSMXS048

Figure 9-6. Removing a floppy disk drive

10. Replace the cover of the system unit. (See "To close the system unit" on page 1-9.)

Installing a Hard Disk Drive

Before you install a hard disk drive in your system unit, you
need to make sure its SCSI ID is correct. (See "Guidelines
for Connecting SCSI Storage Devices" on page 6-3 for general
information about SCSI IDs.) The next section gives you
instructions for setting the SCSI IDs of the three most
commonly used internal hard disk drives.

To Set SCSI IDs for the RZ23L, RZ24, and RZ25

The internal hard disk drive is usually set to SCSI ID 2. To set
the SCSI ID of the three drives described here, you use a row
of small pins and jumper blocks. You set the ID by moving the
jumpers to different positions on the pins.

*CAUTION: Each SCSI device attached to a given connector must
have a unique ID. If two or more devices have the same ID, your
workstation won't recognize one or the other of those drives.*

RZ23L hard disk drive

The SCSI jumpers are on the underside of the RZ23L drive. Position the jumpers as shown in Figure 8-7 to set the SCSI ID. The ID should be 2 unless you have another device with SCSI 2 already attached to the SCSI connector at the back of the system unit.

WSMXS060
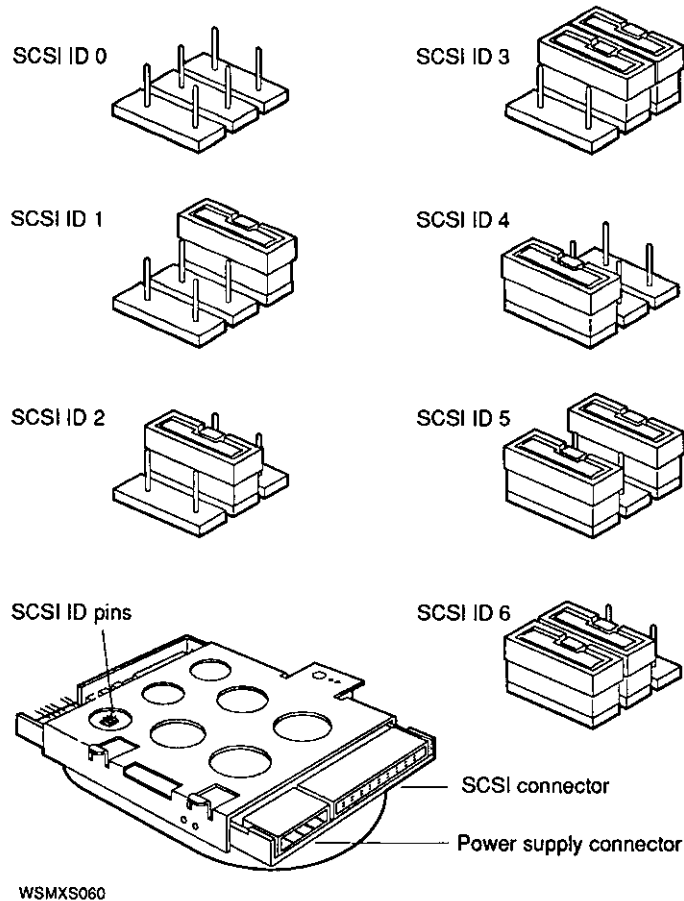
Figure 9-7. SCSI ID jumper settings for the RZ23L hard disk drive

RZ24 hard disk drive

The SCSI jumpers are on the underside of the RZ24 drive. Position the blocks as shown in Figure 8-8 to set the SCSI ID. The ID should be 2 unless you have another device with SCSI 2 already attached to the SCSI connector at the back of the system unit.

WSMXS059
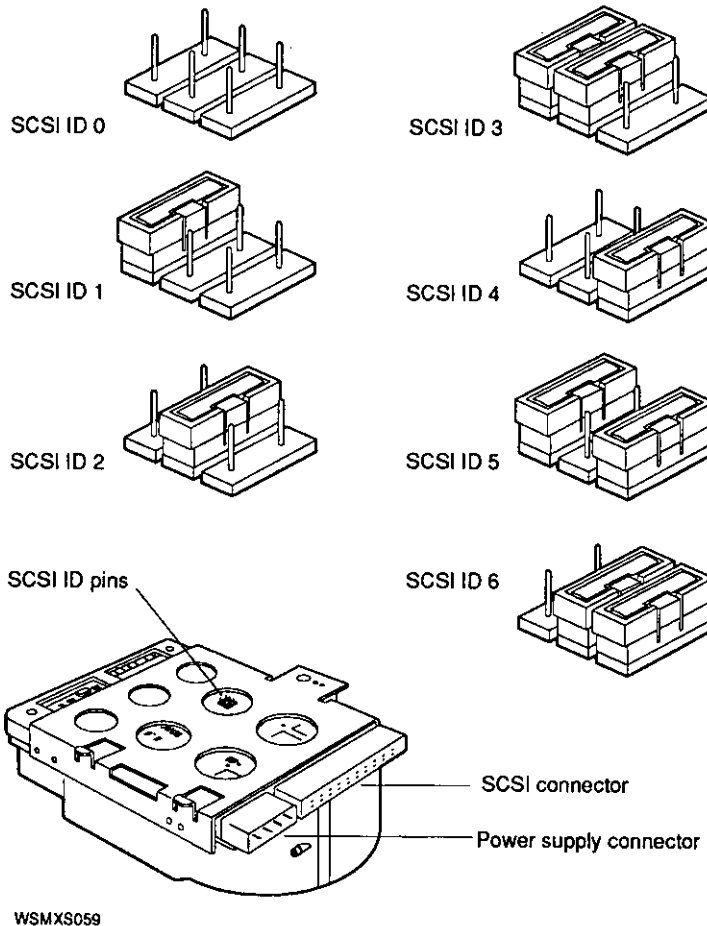
Figure 9-8. SCSI ID jumper settings for the RZ24 hard disk drive

RZ25 hard disk drive

The RZ25 drive has two sets of pins, one on the side of the drive and one at the front. The SCSI ID is factory-set at 2. If you need to change the setting, you can use either set of pins. To set the ID, do the following:

- If you use the pins on the side of the drive, remove all jumpers from the pins on the front of the drive except for the jumper located on pin 4.

IMPORTANT: *The drive ships with a jumper on pin 4 on the front of the drive. This jumper does not affect the SCSI ID number of the drive and must not be removed. If the jumper is removed, the drive will not function correctly.*

- If you use the pins on the front of the drive, remove all jumpers from the pins on the side of the drive before setting the ID.

SCSI ID 0 SCSI ID 3

SCSI ID 1 SCSI ID 4

SCSI ID 2 SCSI ID 5

SCSI ID 6

Front SCSI ID pins
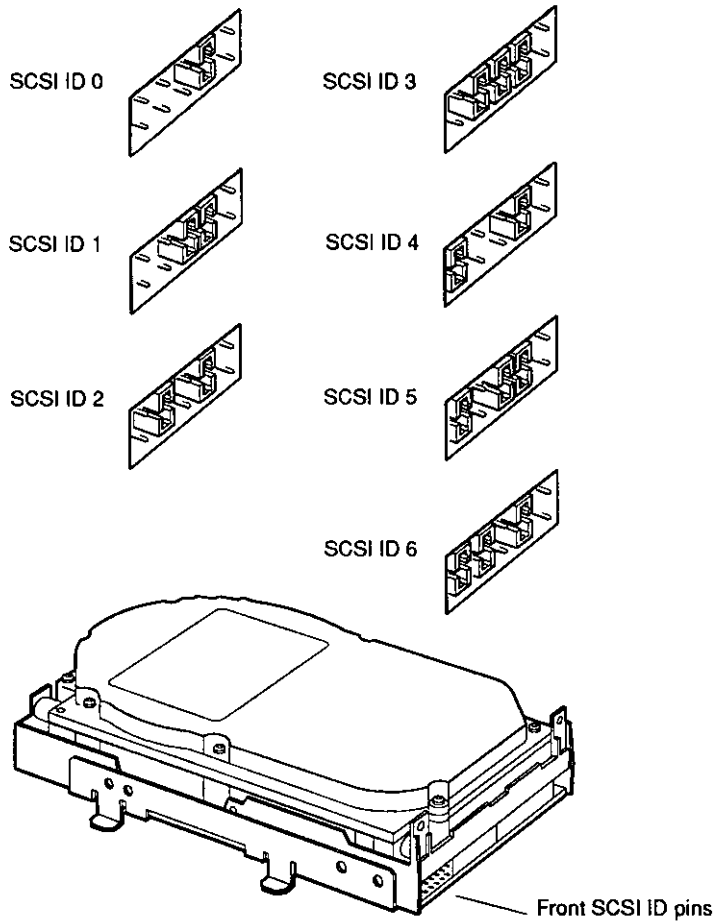
WSMXS058

Figure 9-9. SCSI ID jumper settings using the pins on the side of the drive

To set the SCSI ID on other disk drives, refer to the manual that comes with the drive.

SCSI ID 3

SCSI ID 0

SCSI ID 4

SCSI ID 1

SCSI ID 5

SCSI ID 2

SCSI ID 6

Side SCSI
ID pins

RZ 25 drive
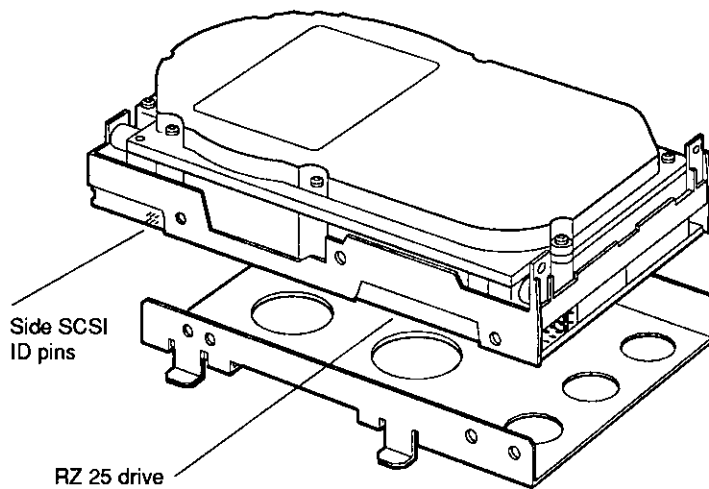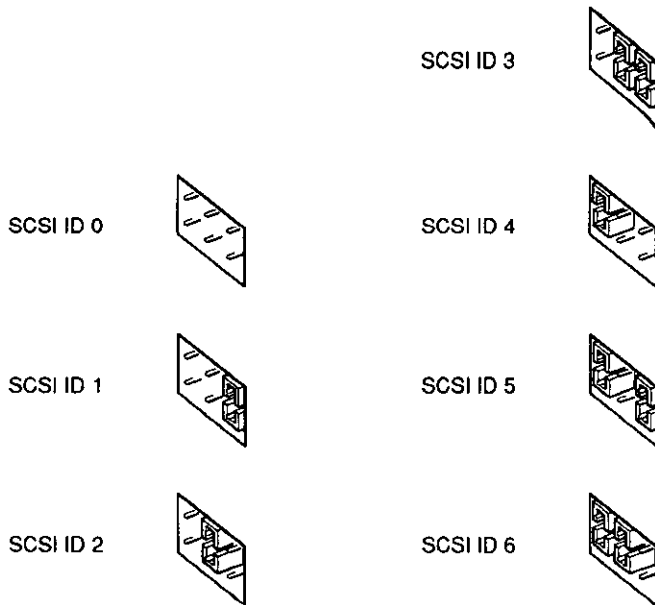
WSMXS108

Figure 9-10. SCSI ID settings using the pins on the front of the drive

Once you have verified or changed the SCSI ID, you can install
the drive in the system unit.

To Install the Hard Disk Drive

1. If the workstation software is running, shut it down: Type **shutdown -h now** and press Return.

2. Turn off the workstation by pressing the 0 on the on/off switch on the back of the system unit.

3. Open the system unit. (See "To open the system unit" on page 1-6.)

4. The hard disk drive comes in a metal mounting bracket. Hold the drive so the bracket is on the bottom.

Power connector

SCSI connector
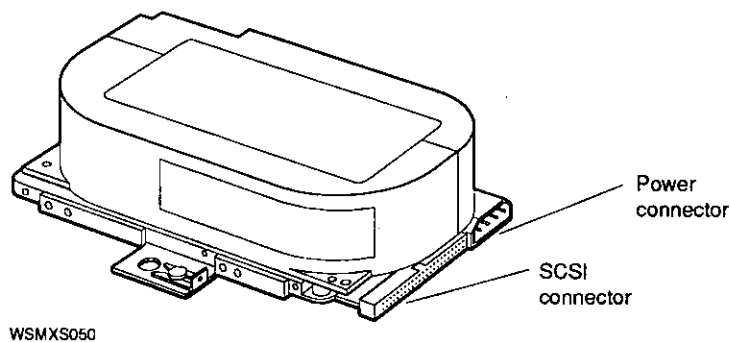
WSMXS050

Figure 9-11. Hard disk drive and mounting bracket

5. Connect the SCSI cable to the drive.

6. Connect one of the short ends of the internal drive power cable to the drive.
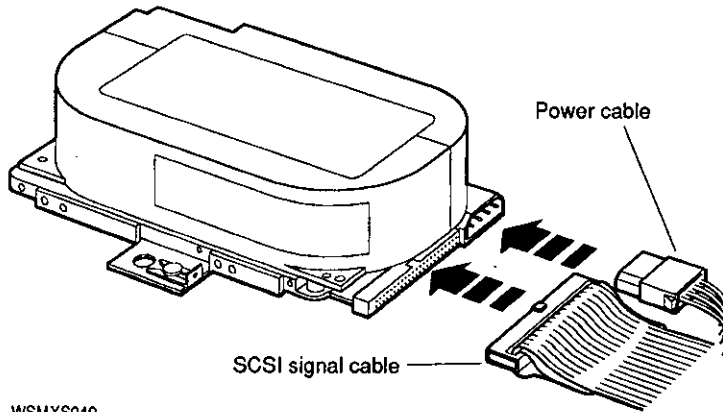
WSMXS049

Figure 9-12. Connecting the SCSI cable and the internal drive power cable to the hard disk drive

7. Stand facing the front of the system unit. The space for the hard disk drive is at the front of the unit, in the center. Fit the tabs on the left side of the mounting bracket into the slots in the base of the system unit.
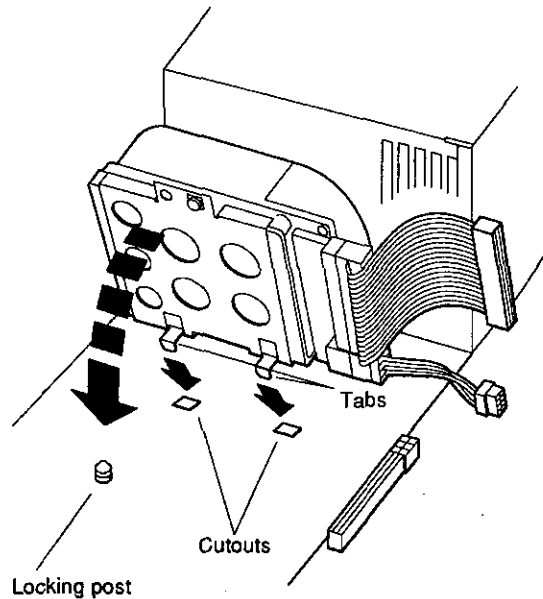
WSMXS102

Figure 9-13. Installing the hard disk drive in the system unit

8. Lower the right side of the disk drive assembly so the hole in the mounting bracket fits over the post on the base of the system unit. Press the drive down firmly.

9. Slide the latch beside the post into locked position.

10. Connect the SCSI cable to the SCSI connector on the base system module.

11. Connect the internal drive power cable to the drive power connector on the base system module. (Note: The internal drive power cable serves both the floppy drive and the hard drive. If you've installed a floppy drive, the power cable will already be connected to the base system module.)
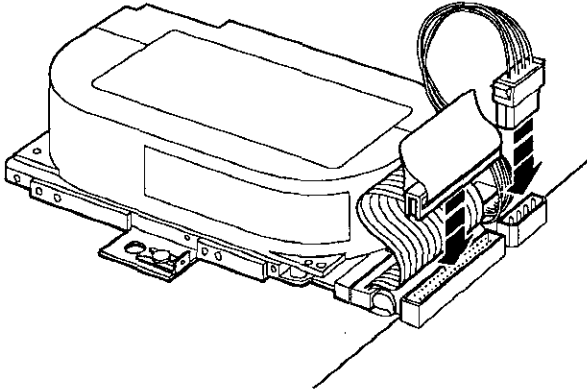
WSMXS096

Figure 9-14. Connecting the SCSI cable and the internal drive power cable to the base system module

12. Replace the cover of the system unit.

13. Turn on the workstation by pressing the 1 on the on/off switch on the back of the system unit.

Making Sure Your Workstation Recognizes the Hard Disk Drive

1. If the workstation software is running, shut it down: Type **shutdown -h now** and press Return.

2. At the console prompt (>>), type **cnfg 3** and press Return.

3. The screen display lists the drives connected to slot 3 of your system; this is the slot number for the system module. The last several lines of the display you see will look something like this:

```
DEV    PID       VID        REV    SCSI    DEV
-------------------------------------------------
rz2    RZ25      (C)DEC     DEC    0400    DIR
tz5    TZK10     (C)DEC     DEC    00AA    SEQ
```

4. Look at the column headed DEV (device). This column lists the device code and SCSI ID for each drive your system recognizes. *All the SCSI drives connected to the SCSI connector on the back of the system unit should be listed here.* The sample shows the internal hard disk, with SCSI ID 2, and a tape drive, with SCSI ID 5.

5. The column headed PID (product ID) lists the names of the devices–in the sample, RZ25 and TZK10. Some device names will not appear in this column. Use the DEV column to verify the presence of SCSI drives.

6. If the drives you've connected aren't listed in the configuration display, or if they're listed incorrectly, turn off the system unit, remove the cover, and check to make sure the drives are properly installed.

   If you've made sure the drives are properly installed and the configuration display still does not list them correctly, you may have two or more devices set to the same SCSI ID. You'll need to change the ID for one of these drives before your system will work properly. (See "To Set SCSI IDs for the RZ23L, RZ24, and RZ25" on page 8-9, or refer to the guide that came with the drive.)

Removing a Hard Disk Drive

1. Turn off the workstation by pressing the 0 on the on/off switch on the back of the system unit.

2. Open the system unit. (See "To open the system unit" on page 1-6.)

3. Stand facing the front of the system unit. The hard disk drive is at the front of the unit, in the center.

4. Disconnect the SCSI cable from the SCSI connector on the base system module.

5. Disconnect the power cable from the drive power connector on the base system module, unless the cable is also providing power to an internal floppy disk drive.

6. On the right side of the disk assembly, you'll see a sliding latch. Slide the latch backward to unlock it.

7. Raise the right side of the hard disk assembly off the small post that holds it.

8. Keep lifting the disk assembly until you can slide the tabs on its left side out of the slots in the base of the system unit.
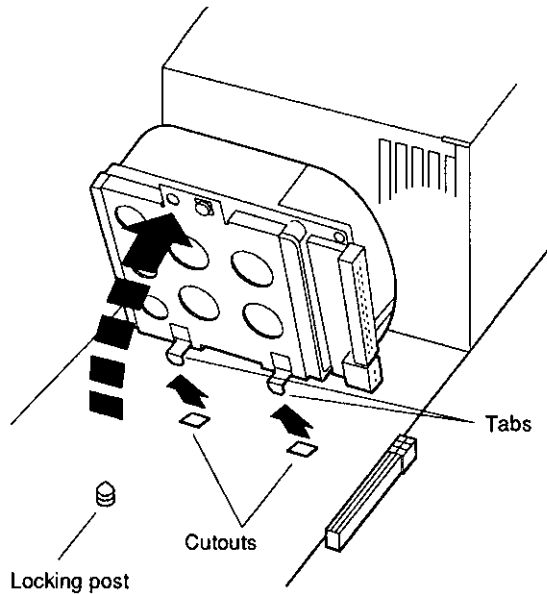
WSMXS052

Figure 9-15. Removing a hard disk drive

9. Disconnect the SCSI cable from the drive.

10. Disconnect the drive power cable from the drive.

11. Replace the cover of the system unit. (See "To close the system unit" on page 1-9.)

10

Memory Modules

This chapter tells you

- What options you have for expanding your workstation's memory
- How to install memory modules inside the system unit
- How to remove memory modules from the system unit
- How to make sure your workstation recognizes all your memory modules

Your workstation comes with 8 megabytes of memory built in. By adding memory modules, you can increase the amount of memory in your system to as much as 40 megabytes.

Adding Memory to Your Workstation

CAUTION: Touching the contacts that run along the bottom of a memory module can damage or destroy the module.

CAUTION: Don't touch anything inside the system unit until you put on the antistatic wrist strap provided by Digital. See Figure 1-5 on page 1-6.

Inside the system unit are the two pairs of connectors that hold your workstation's memory modules. They can hold either 2-megabyte or 8-megabyte modules. You can tell which type you have by looking at the *location* of the nine-digit etched part number on the module.

Identifying Memory Modules

Table 10-1 shows how to identify the two 2-megabyte modules from each other and the 8-megabyte module.

Table 10-1. Identifying Memory Modules

Customer Order No.	Module Part No.	Size	Distinguishing Features
MS01-AA	57-30735-02	2MB	Etched part number (of the form 50-xxxxx-xx)[1] is at the center of the top edge of the back of the module.
MS01-CA	57-34320-01	8MB	Etched part number (of the form 50-xxxxx-xx)[1] is at the top left corner on the front of the module.
MS01L-AA	54-21213-01[2]	2MB	There are no chips on one side of this module.

[1]Do not confuse the etched part number with the module part number, which has the prefix form 54-xxxxx-xx or 57-xxxxx-xx.

[2]The 54-21213-01 (MS01L-AA) memory module can be used interchangeably with the 57-30735-02 (MS01-AA) module and can be used with the DECstation 5000 Model 100 as well as the Personal DECstation but cannot be used with either the 2100 or 3100 models because of base system hardware incompatibility.

Figure 10-1 and Figure 10-2 show how to identify the earlier 2MB module versus the 8MB module.

- On the 2-megabyte module, the etched part number (not the module part number) is in the center of the top edge of the back of the module. (You are looking at the back of the module when you see a notch in its lower-left corner.)

- On the 8-megabyte module, the etched part number is on the top left corner on the front of the module. (You are looking at the front of the module when you see a notch in the lower right corner of the module.)

Front view

2-Mbyte SIMM:
Etch part number
in the center

XXXXXXX-XX
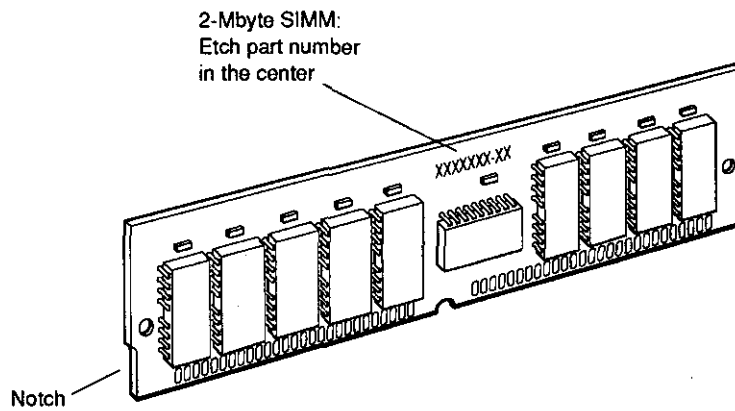
Notch

Back view

WSMXM021

Figure 10-1. Identifying 2-megabyte memory modules

8-Mbyte SIMM:
Etch part number
at the end farthest
from the notch

XX-XXXXX-XX

Notch
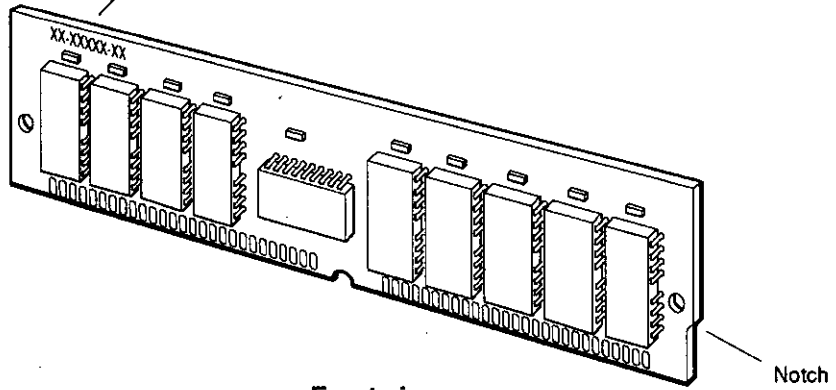
Front view
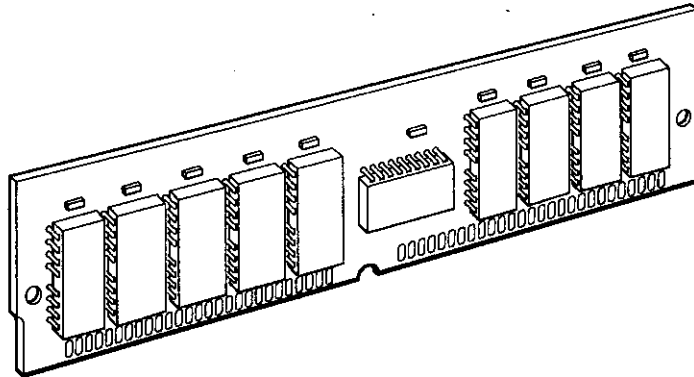
Back view

WSMXM022

Figure 10-2. Identifying 8-megabyte memory modules

Table 10-2 shows how to configure memory modules for the amount of memory you want in your system.

Table 10-2. Memory module configurations

SYSTEM MEMORY	MEMORY MODULES TO ADD
8 megabytes	None
12 megabytes	Two 2-megabyte modules
16 megabytes	Four 2-megabyte modules
24 megabytes	Two 8-megabyte modules
40 megabytes	Four 8-megabyte modules

CAUTION: *The connectors in your system unit must all contain the same type of memory module: either 2-megabyte or 8-megabyte modules. Your system won't work properly if you mix the two types.*

To Install Memory Modules

1. If the workstation software is running, shut it down: type **shutdown -h now** and press Return.

2. Turn off the system unit by pressing the 0 on the on/off switch on the back of the unit. Unplug the system unit power cord.

3. Open the system unit. (See "To open the system unit" on page 1-6.)

4. Put on the antistatic wrist strap. (See Figure 1-5 on page 1-6.)

5. Stand in front of the system unit. You'll see the two pairs of memory connectors on the base system module. Each pair constitutes one slot. The slot number is printed to the left of each pair of connectors. The slot closest to you is slot 1. Behind slot 1 is slot 0. Locate the lowest-numbered empty slot.

0 Slot

1 Slot
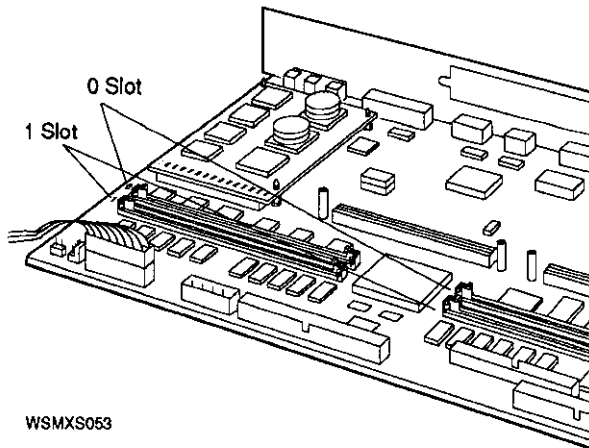
WSMXS053

Figure 10-3. **Memory module connectors**
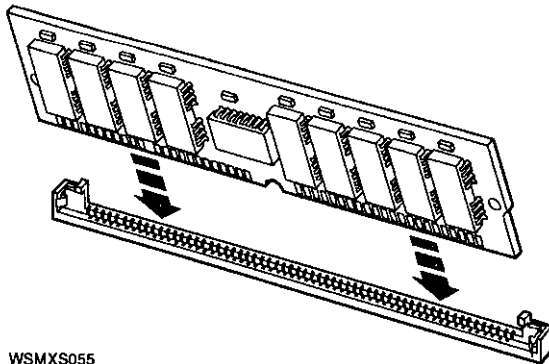
WSMXS055

Figure 10-4. **Inserting a memory module**

6. Memory modules are always installed in pairs (see Table 10-2 on page 9-3). Install the left module of the pair first, then the right.

   Keeping your fingers away from the contacts that run along the bottom of the memory module, hold the module so that the notch is on your right.

7. Tilt the top of the module toward the front of the system unit until you can push the connector on the module into the connector in the memory slot.

8. Move the top of the memory module back into the upright position until the latches snap into place.

WSMXS028
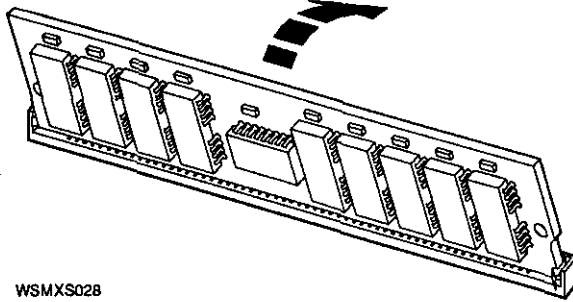
Figure 10-5. Installing a memory module

9. When you've installed all your memory modules, replace the cover of the system unit. (See "To close the system unit" on page 1-9.)

Making Sure Your Workstation Recognizes Its Memory Modules

Once you've installed new memory, you need to make sure your workstation recognizes it.

1. Turn on your system unit.

2. If your workstation software is set to start automatically, shut it down: Type **shutdown -h now** and press Return.

3. When you see the console prompt (>>), type **cnfg 3** and press Return. You'll see a display that begins with a line more or less like this:

```
3:  KN02-CA  DEC T1.2a TCF0  (16 MB)
```

Below this line you'll see several more lines of information. At the bottom of the display is a section that looks like this:

```
dcache  ( 64 KB), icache ( 64 KB)
mem( 0):   a0000000:   a03fffff   ( 4 MB)
mem( 1):   a0400000:   a07fffff   ( 4 MB)
mem( B):   a0800000:   a0ffffff   ( 8 MB)
```

4. The information in the parentheses at the end of the last three lines tells you how much memory your system is recognizing.

   In this example, the workstation recognizes 4 megabytes of memory in slot 0, 4 megabytes in slot 1, and 8 megabytes in the base system module (B).

If the configuration display shows some amount of memory other than what you've installed, turn to Chapter 12 for troubleshooting instructions or ask your system manager or Digital service representative for help.

Removing Memory from Your Workstation

1. If the workstation software is running, shut it down: type **shutdown -h now** and press Return.

2. Turn off the system unit by pressing the 0 on the on/off switch on the back of the unit. Unplug the system unit power cord.

3. Open the system unit. (See "To open the system unit" on page 1-6.)

4. Locate the slot from which you want to remove the memory modules. (Modules should always be removed in pairs.)

   If a module is in front of the one you're removing, you must remove that module first to gain access to the one you want to take out.

5. Pull out the latches on the ends of the connector until you can feel them release.
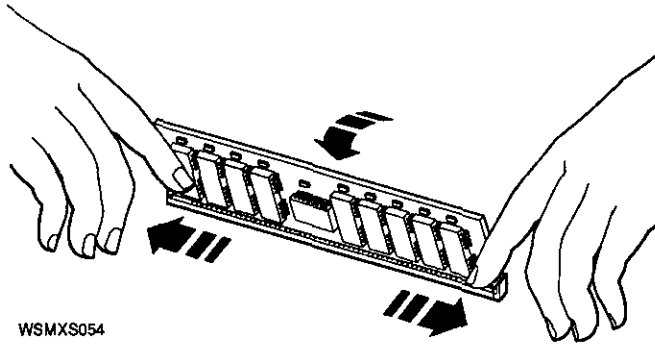
WSMXS054

Figure 10-6. Releasing the latches on a slot connector

6. Tilt the memory module toward the front of the system unit until you can lift it out of the slot connector.
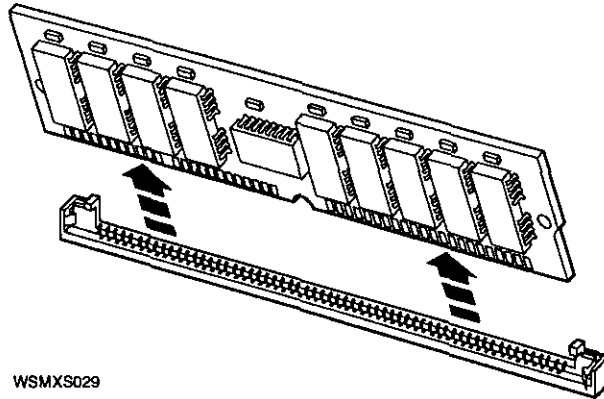
WSMXS029

Figure 10-7. Removing a memory module

11
CPU Modules

This chapter tells you

- What CPU modules your workstation can use
- How to remove and install CPU modules
- How to test CPU modules

The CPU module and the base system module, in combination, provide the computing power of your workstation. Your workstation can use any of these three CPU modules:

- 20-megahertz module
- 25-megahertz module
- 33-megahertz module

CPU module

Base system module

WSMXS030
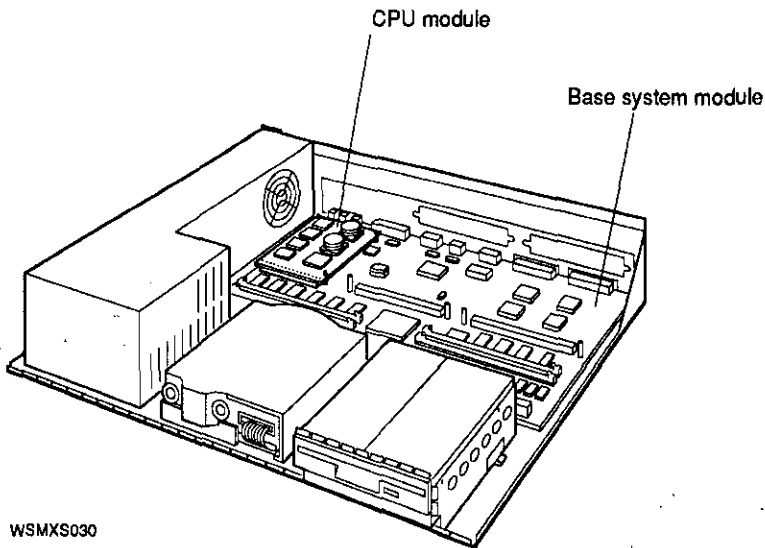
Figure 11-1. The CPU module and the base system module

To tell what kind of CPU module you have, look at the part number on it while referring to Table 11-1.

Table 11-1. CPU Modules

CPU type	FRU number	Customer order number
20-megahertz	54-20615-01 54-21337-01*	KN02-BC
25-megahertz	54-20615-02 54-21337-02*	KN02-CC
33-megahertz	54-21331-01	KN02-DA

*These are the newer plastic (as opposed to ceramic) parts; they are functionally equivalent to the earlier variety listed.

The CPU modules are similar in appearance. Look on the module for the adhesive label displaying the part number suffix (01 or 02) for help in identifying modules.

To upgrade your system—that is, to replace a 20- or 25-megahertz CPU module with either a 25- or 33-megahertz CPU module—follow the steps in this chapter.

Removing a CPU Module

1. If the workstation software is running, shut it down:
   type shutdown -h now and press Return.

2. Turn off the system unit by pressing the 0 on the on/off
   switch on the back. Unplug the system unit power cord.

3. The system unit. (See "To open the system unit" on
   page 1-6.)

4. Put on the antistatic wrist strap. (See Figure 1-5 on
   page 1-6.)

5. Locate the three mounting posts that fasten the CPU
   module to the base system module.
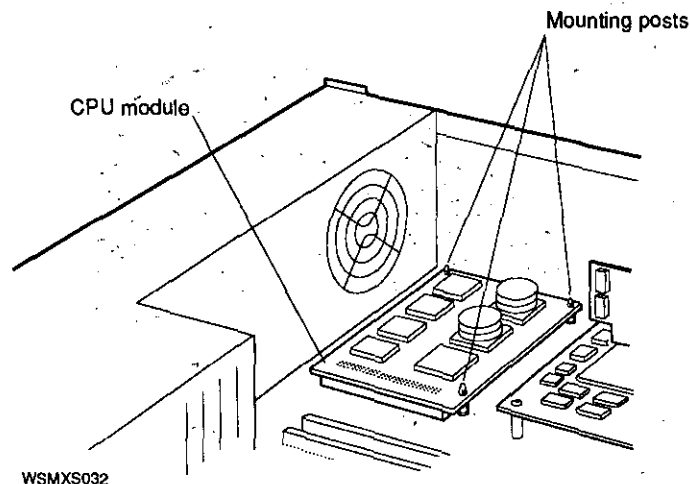
Figure 11-2. The CPU and its mounting posts

6. Use your fingers or a small pair of pliers to squeeze the lock on one of the mounting posts until it releases the corner of the CPU module. Lift the corner until it is free from the lock. Repeat this procedure with the posts on the other two locks.

CAUTION: Avoid touching the heat sinks on the CPU module; they break easily.
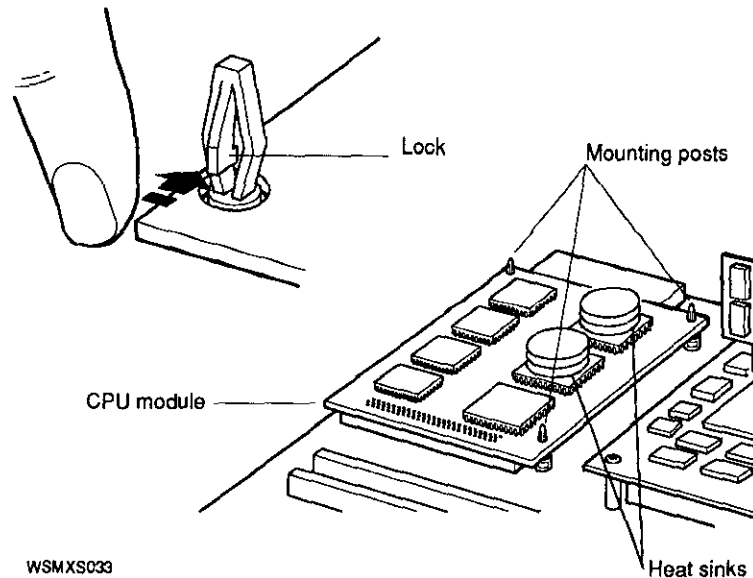
WSMXS033

Figure 11-3. Releasing the lock on a mounting post

7. Keeping your hands well away from the heat sinks, grip the edges of the module and lift it up until it moves out of the connector on the base module. You may need to rock the CPU module from side to side very gently to loosen it.

Heat sinks

CPU connector

Base module connector

WSMXS031
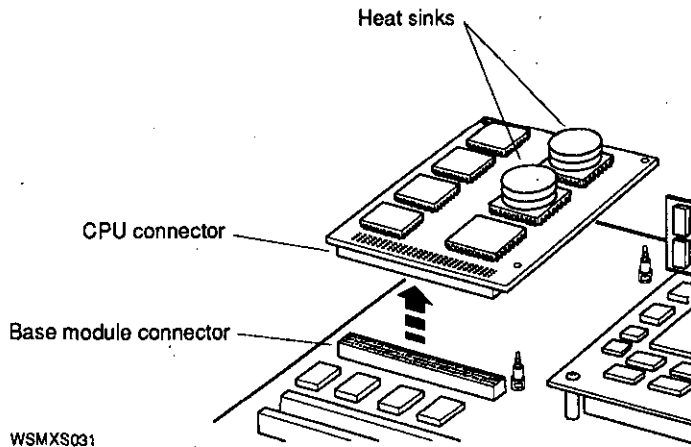
Figure 11-4. CPU module and base module connector

Installing a CPU Module

1. If necessary, open the system unit. (See "To open the system unit" on page 1-6.)

2. Put on the antistatic wrist strap. (See Figure 1-5 on page 1-6.)

3. Keeping your hands well away from the heat sinks, position the CPU module so its connector aligns with the connector on the base module.

4. Align the three holes in the CPU module with the mounting posts on the base module.

5. Push the CPU module straight down over the mounting posts. Press the CPU module connector into the connector on the base module. Press each of the three corner holes onto its corresponding mounting post.
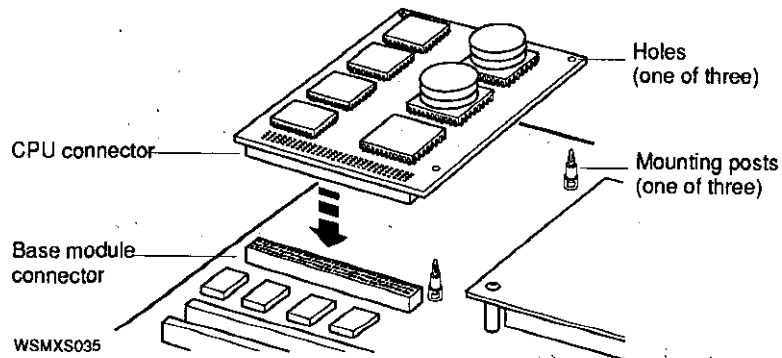
Figure 11-5. Attaching the CPU module

6. Replace the cover of your system unit. (See "To close the system unit" on page 1-9.)

Testing Your CPU Module

Once you've installed a new CPU module, you need to make sure your system recognizes it. Follow these steps:

1. Turn on your workstation.

2. At the console prompt (>>), type **t 3/misc/cpu-type** and press Return.

3. When the system recognizes a CPU module, it displays one of the following messages:

For a 20-megahertz module:

```
3/misc/cpu-type's code: NDX-91A
```

The 91A at the end of the message tells you that you have a 20-megahertz CPU.

For a 25-megahertz module:

```
3/misc/cpu-type's code: NDX-97A
```

The 97A at the end of the message tells you that you have a 25-megahertz CPU.

For a 33-megahertz module:

```
3/misc/cpu-type's code: NDX-103A
```

The NDX-103A at the end of the message tells you that you have a 33-megahertz CPU.

If your workstation fails to recognize the CPU you have just installed,

- Check to make sure that the connector on the CPU is pressed all the way into the connector on the base system module.

- Check to see whether you've bent any of the connector pins.

If you still have problems, call your system manager or your Digital service representative for help.

TURBOchannel Option Modules

For information about installing TURBOchannel option modules, turn to the *TURBOchannel Options User's Guide.*

Part IV

Workstation Management

12

Using the Console Program

This chapter tells you

- The difference between console and operating modes
- The uses of console mode
- How to enter console mode
- How to use console commands

Console and Operating Modes

Most of the time, you'll use your workstation in operating mode—that is, you'll use the workstation software for tasks like these:

- Creating and revising files (letters, charts, spreadsheets, and so on)
- Backing up files
- Sending and receiving electronic mail

You use console mode for communicating directly with your workstation to perform tasks like these:

- Running workstation self-tests
- Displaying workstation hardware configurations

- Displaying the list of available console commands and their formats

- Setting workstation environment variables

When you're using console mode, you see one of these two prompts on the screen:

- >> When this prompt is displayed, anyone can enter console commands.

- R > When this prompt appears, full console use is restricted to users who know the password.

If you don't know the password, you can use only two console commands: the boot command (type **boot** and press Return) and the password command (type **passwd** and press Return). If the software has been installed on your hard disk or another storage drive, and if the boot path is correctly set (see "Setting the Boot Path Variable" on page 11-4), the boot command will start up the workstation software.

For information about setting the password, see "The Password Command" on page 11-6.

Entering Console Mode

You can enter console mode in any of these ways:

- If the workstation software is running, shut it down by typing **shut down -h now** and pressing Return. *Note: You must be in superuser mode in order to shut down the system. This requires that you obtain superuser privileges from your system manager. Enter superuser mode by typing su, pressing Return, and entering your password.* Once you've shut down the software, the system enters console mode automatically. This is the most orderly way to enter console mode; it keeps your data from being lost or damaged.

- If the system software is hung up and you can't shut it down, press and hold down these three keys on the keyboard: CTRL, ALT, and DELETE. This resets the system.

(If you're having a recurring problem and want to make it possible for the system's memory to be examined, you can shut down the software by pressing CTRL, ALT, and Return. This halts the system but does not reset it.)

■ If the system is off, turn it on by pressing the 1 on the on/off switch on the back of the system unit. The system will enter console mode unless it's been set to start the system software automatically. (See "The Boot Command" on page 11-4.)

Console Commands

This section explains some of the most frequently used console commands.

For more detailed information on console commands, see Appendix F.

Be sure to follow these rules when you type console commands:

■ Type uppercase and lowercase letters exactly as they appear in command lines. The system treats uppercase and lowercase letters as different input.

■ Press Return after you type a command.

The following key combinations have an immediate effect in console mode:

■ Ctrl-s freezes the screen display.

■ Ctrl-q releases a frozen screen display.

The ? Command

Use the ? command to display a list of available console commands and their formats.

Give the ? command by typing ? and pressing Return.

The Boot Command

The boot command tells your system to start up the operating system software. Give the command by typing **boot** and pressing Return.

If the boot path variable is set correctly, the system will find the drive on which the workstation software is stored and start the software up. The boot path variable tells the system where to look for the software.

To see how the boot path variable is currently set, type **printenv boot** and press Return.

You should see this display:

```
boot = 3/rz2/vmunix -a
```

Each part of this instruction gives you a different piece of information:

- The 3 tells the slot number. Slot 3 is the base system module.

- rz2 describes the drive. The letters rz indicate a hard disk drive (yours may be the RZ23L, RZ24, or RZ25, for instance), and the 2 is the SCSI ID of that drive. (For information about SCSI IDs, see "SCSI IDs" on page 6-4.)

- vmunix names the file. The name of the operating system file is vmunix.

- -a instructs the system to start up in multi-user mode.

The instruction in this example, then, tells the workstation that the operating system software is stored in a file called vmunix on the hard disk drive with SCSI ID 2 connected to the base system module.

Setting the Boot Path Variable

If the boot path variable is wrong, or if you wish to change it, follow these steps:

1. Determine the name of the device that stores the operating system software and the number of the slot to which that device is connected. Most often, the software will be stored on the internal hard disk (rz2) connected to the base system

module (slot 3). If the software for your workstation is stored somewhere else, check the configuration display for the device name and slot number.

2. Using the slot number and device name you determined in step 1, type **setenv boot** "[*slot number*] /[*device name*]/ **vmunix-a**" and press Return.

3. Test your correction by typing **boot** and pressing Return. The operating system should start up.

You can also set your workstation to start the operating system software automatically when you turn on the power. Follow these steps:

1. At the console prompt (>>), type **setenv haltaction b** and press Return.

2. Turn off your workstation by pressing the 0 on the on/off switch on the back of the system unit.

3. Turn your workstation on again. The operating system should start automatically after the system has completed its power-up self-test.

If the operating system does not start up, you may have two or more SCSI devices set to the same SCSI ID number (see "SCSI IDs" on page 6-4 for more information), or there may be no software installed on your drive (see Chapter 3, "Starting and Testing," for information about software installation).

The Configuration Command

Use the cnfg command to display hardware configuration information.

- To display general system configuration information, type **cnfg** and press Return.

- To display detailed configuration information for an individual module, type **cnfg** and the slot number of the module for which you want a configuration display. To see the configuration for the base system module, for example, which is slot 3, type **cnfg 3** and press Return.

The Password Command

Use the password command to enter, set, or clear a password.

To enter a password

Type **passwd** and press Return.

At the pwd: prompt, enter your password. Then press Return.

To clear an existing password

Type **passwd** and press Return.

At the pwd: prompt, enter the existing password and press Return. When the console prompt appears, type **passwd -c** and press Return. The system removes the password requirement.

To set a new password

Type **passwd** and press Return.

At the pwd: prompt, enter the new password. When the pwd: prompt appears a second time, type the password again. If the two password entries match, the system sets the new value as the password.

The password must have at least 6 and no more than 32 characters. The system treats uppercase and lowercase letters as different characters.

The Environment Variables

Environment variables set system operating conditions. For a full list of environment variables and their formats, see Table G-2 in Appendix G.

You can display, set, and remove environment variables with these three console commands:

- setenv
- printenv
- unsetenv

The setenv command

Use this command to set or change environment variables.

The setenv command format is **setenv** *variable value*. Give the command by typing **setenv** and replacing *variable* with the name of the environment variable you want to set. (See Table G-2 in Appendix G.) Replace *value* with the new value that you want to assign to the environment variable. Then press Return.

Note that if the new value contains blank spaces or tabs, you must use double quotation marks (") at the beginning and end of the value.

The printenv command

The printenv command format is

***printenv** [variable]*

- To display the entire list of environment variables, type **printenv** and press Return.

- To display an individual environment variable, type **printenv**, replace *variable* with the name of the environment variable you want to display, and press Return.

The unsetenv command

The unsetenv command removes a standard environment variable during the current session. When the system is reset, the values of the standard environment variables revert to their previously set values.

The **unsetenv** command format is

***unsetenv** variable*

When you type the unsetenv command, replace *variable* with the name of the environment variable that you want to remove.

The Test Command

Use the test command to run a thorough test of all system hardware.

To give the command, type **test** and press Return.

For more information about the test command, see Chapter 3, "Starting and Testing."

13

Troubleshooting

This chapter discusses

- How to invoke the powerup self-test
- How to interpret video error messages
- How to connect and use an alternate terminal
- The powerup self-test sequence and the LED display
- How to perform minimum configuration troubleshooting with the system LED
- What to do when the powerup LED indicator is inactive

Troubleshooting Techniques

The first step in isolating and detecting problems on a Personal
DECstation is to interpret the results of the system's ROM-
based power-up self-test. One of the three procedures described
in this section can be used to identify the problem module.
These techniques will be explained in detail in this chapter.

1. Troubleshooting with the graphics monitor

The primary method of troubleshooting your workstation is
to interpret the console error messages which are displayed
on your video screen during the power-up self-test. Once
you have identified the problem module, replace it. The
power-up self-test should then be rerun to verify the system
is operational.

2. Troubleshooting with the alternate video

Some failures can prevent the system from displaying error
messages on the graphics monitor. In this case, connect
a VT320 terminal or equivalent to the RS232 port on the
back of the unit. You can then use this alternative video
display to troubleshoot your system.

3. Troubleshooting with the system LED

Customers who do not have access to a VT320 terminal or
equivalent can use the status LED as a troubleshooting
aid. A single green LED, mounted to the front of the power
supply, flashes several times during the system power-up.
These flashes indicate how far the the unit has progressed
through the power-up sequence.

By interpreting these flashes one can determine which
modules are operational and which modules are candidates
for replacement. How to interpret the system LED is
described in detail later in this chapter.

Invoking the Powerup Self-Test

The most straightforward way to invoke the power-up self-test diagnostics is to power-cycle the system. This is done by simply turning the power off and then turning it back on.

Note: *Power-cycling the machine will result in the erasure of the contents of memory.*

You can also type the commands **pst-q** or **pst-t** at the console prompt. **pst-t** will run a thorough test. **pst-q** will run a reduced version of the power-up self-test. This version tests all major sub-systems, but has been optimized to execute quickly.

When running the power-up self-test, it is important to either have a device connected to the Ethernet and SCSI ports, or to install the Ethernet loopback connector (Part #12-22196-02) and the SCSI terminator (Part #12-29635-01). If nothing is connected to these ports, the system may report false errors.

The Ethernet diagnostics used by **pst-t** actually send data out onto the network and then listen for a response. If none is received, an error is reported. The loopback connector routes this transmitted message back to the system, thereby enabling the Ethernet diagnostic to test the complete circuit path.

The basic design and architecture of the SCSI bus requires that a terminator be placed on the connector at the end of the bus. The SCSI I/O bus allows you to daisy chain up to seven devices together. These devices are most often disk drives that use the SCSI bus as a party line to communicate with the system.

Note: *This chapter focuses on how to use the power-up self-test diagnostics to isolate problem modules. There are additional diagnostics available to you. Their use is described in Appendix G, "Console Commands."*

Interpreting Video Error Messages

When the powerup self-test diagnostics encounter a failure,
a formatted error message is displayed such as shown in
Figure 13-1 below. In this particular example, a problem was
detected with the SCSI control portion of the base module.

The key pieces of information which led us to this conclusion
are that the failure was detected on TURBOchannel slot 3, the
base module. The problem was with the SCSI subsystem, and
was specifically the controller. Finally, the diagnostic identified
the module as the KN02-CA.
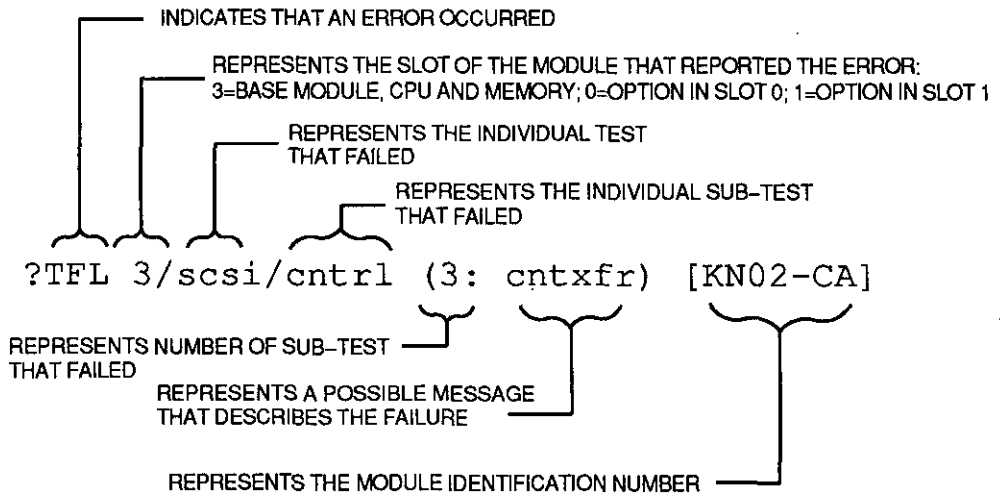
Figure 13-1.   Example of TURBOchannel Error Message Format

Table 13-1 and Table 13-2 contain reference material that is
useful when interpreting error messages.

Table 13-1. Diagnostic Tests for Base System

Test	Sub-system	Problem module
ab	SERIAL.bus	Base module, keyboard, or mouse
cache	CPU	CPU daughter card
crt	Video frame buffer	Base module
epm	EEPROM	Base module .
fdi	Floppy disk	Base module or floppy drive
fpu	CPU	CPU daughter card
isdn	Isdn and sound	Base module, ISDN peripherals
mem	Memory	Base module, memory SIMMs
ni	Ethernet	Base module, Enet card, Enet peripherals
rtc	Real time clock	Base module
scc	RS232	Base Module, RS232 peripherals
scsi	Scsi	Base Module, SCSI card, SCSI peripherals

Table 13-2. Identification Codes for Selected TURBOchannel Options

Module ID	Description
KN02-CA	Base module, CPU, memory
PMAG-AA	MX mono frame buffer
PMAG-BA	CX color frame buffer
PMAG-CA	PX 2D graphics accelerator
PMAG-DA	PXG 3D graphics accelerator
PMAG-FA	PXG turbo graphics accelerator
PMAGB-BA	HX smart frame buffer
PMAG-JA	TX true color frame buffer
PMAD-AA	NI thickwire Enet
PMAZ-BA	SCSI interface module

Connecting and Using an Alternate Terminal

Your system has the ability to display console and diagnostic messages, either on the graphics monitor, or on a VT320 terminal connected to the RS232 port located in the rear of the unit. At power-up, the system looks for a keyboard plugged into the SERIAL.bus. If one is found, the system will route all the console messages to the graphics monitor. If, however, no keyboard is detected on the SERIAL.bus, all text will be sent directly to the RS232 port.

Connect your terminal to the 25 pin RS232 connector, and set your terminal as described in Table 13-3. You may notice that these settings are the standard default settings for Digital terminals. Some terminals may use the modular MMJ telephone style connectors. If this is the case, an adapter (Part #H8571-A) can be used to make the connection.

Table 13-3. Alternate Terminal Settings

Setting	Value
Baud rate	9600
Bits	8
Parity	None
Stop bits	1
Flow Control	Xon/Xoff
Mode	Full duplex

Once you have connected the terminal to the RS232 port, it is important to remember to disconnect the keyboard from the serial port before turnning on the system power. This will insure that the text is routed to your terminal and not to the graphics connector.

You can now use the error messages displayed on the terminal to resolve failures and re-establish video on your graphics monitor.

After you establish video on your graphics monitor, you may from time to time wish to use a terminal as your console device. The default power-up console assignment can be defeated by issuing the following console command:

```
>> setenv console s
```

You can switch your console back to your graphics monitor with the command:

```
>> setenv console  *
```

Some users may configure their system with several graphics monitors to take advantage of the system's multi-screen capabilities. This raises the question of which graphics monitor will be used as the default console device after the system detects the SERIAL.bus keyboard.

The answer to this question in that the system selects the monitor connected to the video controller with the *lowest* TURBOchannel device number. Since the base video operates on slot 3, the system will select the controller located in slot 0 or 1 as the default console device.

Minimum Configuration Troubleshooting With the System LED

The most effective way to use the system LED to troubleshoot is to strip the unit to its bare essentials. Such a minimal system consists of the CPU module, base module, and the power supply.

To reduce the unit to a minimum configuration, disconnect all cables in the rear of the system. Then attach the Ethernet loopback connector (Part #12-22196-02) and the SCSI terminator (Part #12-29635-01). Then remove all TURBOchannel options that may be installed as well as all memory modules.

You can then run the power-up self-test and interpret the flashing system LED to isolate and correct problems with this core system.

The keyboard and video sub-system can then be reinstalled. If necessary the power-up self-test can again be used to isolate and correct problems with the video.

Once the video is re-established, the remaining components can be reinstalled one at a time. If a problem occurs at this point, the error messages displayed on the screen can be used to resolve the problem.

More experienced users may not need to strip the system down to a minimum configuration. However, troubleshooting a fully configured workstation with the system LED generally requires a significant amount of knowledge of system operation.

Understanding the Powerup Self-Test Sequence and the LED Display

A single LED, mounted on the front of the power supply, flashes several times during system power-up. These flashes indicate how far the unit has progressed through the power-up sequence.

By interpreting these flashes you can determine which pieces of the unit are operational and then deduce which modules are not functional. It is important to watch the LED closely during the entire power-up sequence.

Note: *The front-mounted system LED is a new feature which has been introduced with the Personal DECstation that is designed as a diagnostic substitute for the traditional eight-segment LED display located on the rear of DECstation models 100, 200, and 240. It is **not** a DCOK LED.*

The Power-up Sequence

- Immediately after the system power comes on, the firmware will begin to execute code.

  2 flashes will be displayed. This indicates that the power supply works, and that portions of the CPU and Base Module are operational.

- The LED then goes dark for about 30 seconds. During this time period the console code will be loaded into the memory. The system will then identify what hardware is present, and select which device is to be the default video console.

  Continuous flashes will be displayed if a problem is encountered using the memory contained on the base module.

  When the system reaches the point where text will be displayed on the default console device, the LED will flash one of two patterns:

  2 flashes indicate that a graphics monitor has been selected.

  3 flashes indicate that the RS232 port has been selected.

- The LED then goes dark a second time for about 30 seconds. The power-up self-test diagnostic is executed. At this point, status and error messages will be displayed on the console device.

  When the self-test is complete, the LED will be **turned on and will stay on**.

Figure 13-2, Table 13-4, Table 13-5, and Table 13-6 contain additional information which you may find useful when troubleshooting with the system LED.
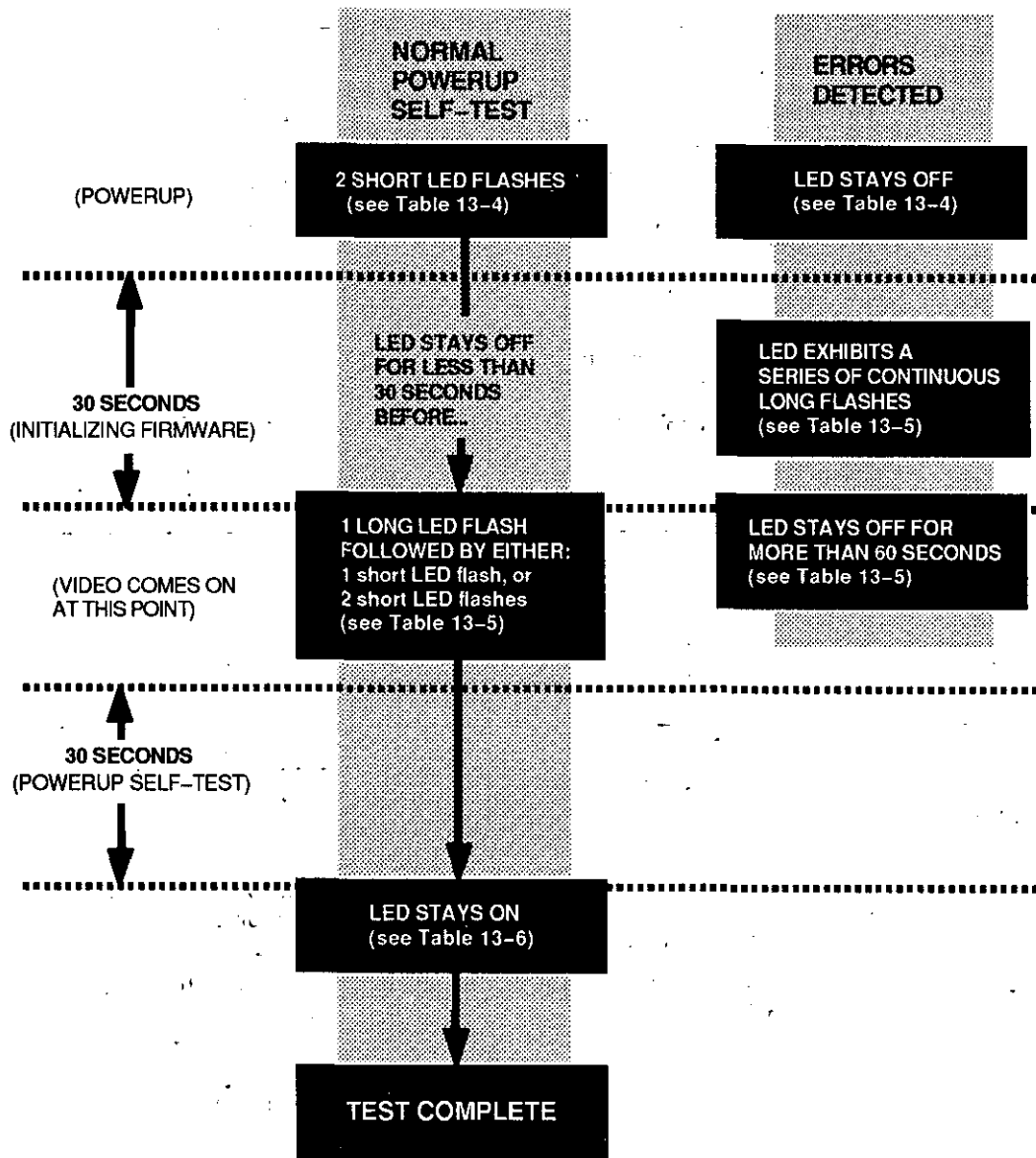
Figure 13-2. Flash Sequence of the Diagnostic LED Indicator

Table 13-4. Interpreting Diagnostic LED Indicator at Power-Up

LED Function	Meaning	Corrective Action
2 short flashes at power-up	Power-on indication set immediately after system firmware begins execution. Indicates that: 1. System is receiving DC power at correct voltage levels. 2. Instructions can be fetched from system ROM via TURBOchannel Read operations. 3. System processor is able to execute non-cached instructions. 4. Processor can perform TURBOchannel write operations to a register in the I/O CTRL ASIC that drives the power supply LED.	None.
LED stays off at Power-up	Power supply, CPU, TURBOchannel option, system ROM, or I/O CNTL ASIC could be at fault.	Check power supply, swap CPU, swap base module.

Table 13-5. Interpreting Diagnostic LED Indicator During First 30 Seconds After Power-Up (Firmware Initialization Period)

LED Function	Meaning	Corrective Action
Off for less than 30 seconds after first two flashes.	Power-up self test in progress.	None
Off for more than 30 seconds after first two flashes.	Some failure has been detected during the power-up self-test that could not be isolated.	Swap base module and/or CPU daughter card.
A continuous series of long flashes occurs.	Memory failed during firmware initialization.	Remove all memory SIMMs and retest to determine if the memory on the base module or on a SIMMs is faulty.
One long flash followed by 1 short flash	*kbd* (SERIAL.bus keyboard input) and *crt* have been selected as the firmware console devices: the system is configured as a workstation.	None.

Table 13-5 (Cont.). Interpreting Diagnostic LED Indicator During First 30 Seconds After Power-Up (Firmware Initialization Period)

LED Function	Meaning	Corrective Action
One long flash followed by two short flashes	*tty* (Serial line input/output) connected to the Personal DECstation's RS232 port has been selected as the firmware's console device: system is configured as a server.	None, unless you were expecting a workstation configuration, in which case you should troubleshoot the SERIAL.bus keyboard.

Note: Actual test time will vary depending on the memory and the *TUROBchannel* options which have been installed.

Table 13-6. Interpreting Diagnostic LED Indicator During 2nd 30 Seconds Following First Video (Power-Up Self-Test Period)

LED Function	Meaning	Corrective Action
LED stays on continuously	Firmware test sequence has completed without detection of any errors.	None.

What to do when the Powerup LED Indicator is Inactive

Sometimes the single powerup indicator of the Personal DECstation is itself not working.

When the powerup indicator is inactive, it means one of the three following parts are defective:

- the power supply
- the CPU daughter card, or
- the system module

To determine if the power supply is defective, turn on the power supply and place an Ethernet loopback connector (12-22196-01) on the Ethernet port (shown as slot number 10 in Figure 13-3. The LED in the loopback connector will glow when the power supply is generating correctly regulated DC power.

1. Turbochannel option slot 0
2. Turbochannel option slot 1
3. On/off switch
4. System unit power connector
5. Monitor-to-system-unit power connector
6. Graphics video connector
7. Serial communications connector
8. Keyboard-mouse connector
9. Sound connector
10. Base system ThickWire Ethernet connector
11. Base system SCSI connector

WSMXS004

Figure 13-3. External Connectors

If the loopback connector LED does *not* glow, replace the power supply.

If the loopback connector *does* glow and yet the powerup indicator LED is still inactive, replace the CPU daughter card.

If after having replaced the CPU daughter card problems persist, replace the system module.

Part V

Appendices

A

Equipment Specifications

This appendix lists the physical specifications, operating conditions, and nonoperating conditions for the following equipment:

- Personal DECstation 5000
- VRC16 monitor
- VRM17 monitor
- LK501 keyboard
- VSXXX-BB mouse
- RZ23L hard disk drive
- RZ24 hard disk drive
- RZ25 hard disk drive
- RX26 floppy diskette drive

Personal DECstation 5000 System Unit Equipment Specifications

Table A-1. System Unit Description

Weight	6.80 to 9.50 kg (15.00 to 21.00 lb)
Height	9.14 cm (3.60 in)
Width	40.64 cm (16.00 in)
Depth	43.18 cm (17.00 in)
Input voltage	Auto adjust 100–120 Vac or 220–240 Vac
Input current	1.6 A at 100–120 Vac
	0.8 A at 220–240 Vac
Power	
– Frequency	50 to 60 Hz
– Heat dissipation	123 watts, maximum

Table A-2. System Unit Operating Conditions

Temperature range[1]	10°C to 40°C (50°F to 104°F)
Temperature change rate	11°C (52°F) per hour, maximum
Relative humidity	10% to 90%, noncondensing
Maximum wet-bulb temperature	28°C (82°F)
Minimum dew-point temperature	2°C (36°F)
Altitude	2,400 m (8,000 ft) maximum

[1]Reduce maximum temperature by 1.8°C for each 1,000 meter (1.0°F for each 1,000 ft) increase in altitude.

Table A-3. System Unit Nonoperating Conditions

Temperature range	−40°C to 66°C (−40°F to 151°F)
Relative humidity	5% to 95%, noncondensing
Maximum wet-bulb temperature	46°C (115°F), packaged
Altitude	4,900 m (16,000 ft) maximum

Table A-4. Acoustics—Preliminary Declared Values per ISO 9296 and ISO 7779

	L_{WAd}	L_{pAm} (operator position)
Idle	4.5 bels	36 dBA
Operating	4.5 bels	36 dBA

(Current values for specific configurations are available from Digital representatives.)

VRC16 Monitor Equipment Specifications

Table A-5.   VRC16 Monitor Description

Weight	25 kg (55.00 lb)maximum
Height	43.18 cm (17 in)
Width	41.15 cm (16.2 in)
Depth	43.43 cm (17.1 in)
External controls, switches, and indicators	Brightness Contrast Power switch Power indicator User interface
Swivel range	±90°
Tilt range	−5° to +15°
Cathode-ray tube (CRT)	432 mm (17 in) diagonal INVAR shadow-mask, black matrix screen 0.26 mm maximum triad pitch 90° deflection angle 3 color Silica antiglare treatment, purity shielding, dynamic focus correction
Display characteristics	1024 by 768 pixels and 1280 by 1024 pixels Maximum brightness no less than 30 footlamberts (fl)
Video input	
– Termination	75 ohms ±2%
– Amplitude	Red: 0.714 Vpp ±2% Green (with sync): 1.0 Vpp ±10% Blue: 0.714 Vpp ± 2% Monitor syncs automatically to 66 hz (mode 1) or 72 hz (mode 2)
Horizontal rate timing	
– Active video	13.653 μs
– Back porch	1.813 μs
– Blanking interval	4.0533 μs (416 pixels)

Table A-5 (Cont.). VRC16 Monitor Description

– Frequency	56.476 kHz
– Front porch	0.32 μs
– Horizontal period	17.707 μs
– Sync pulse	1.920 μs
Vertical rate timing	
– Active video	13.599 ms
– Blanking interval	39.0.673 ms
– Frequency	70.069 Hz
– Front porch	0.053 ms
– Sync pulse	0.106 ms
– Vertical period	14.272 ms
Power	
– ac input voltage	100-120 or 220-240 Vac
– Frequency	47 to 63 Hz
– Power consumption	150 watts maximum

Table A-6. VRC16 Monitor Operating Conditions

Temperature range [1]	10°C to 40°C (50° to 104°F)
Relative humidity	10% or less to 95%
Maximum wet-bulb temperature	32°C (89°F)
Minimum dew-point temperature	2°C (36°F)
Altitude	10,000 ft maximum

[1]Reduce maximum temperature by 1.8°C for each 1,000 meter (1.0°F for each 1,000 ft) increase in altitude.

Table A-7. VRC16 Monitor Nonoperating Conditions

Temperature range	−40°C to 66°C (−8°F to 98°F)
Relative humidity	90% to 95%
Maximum wet-bulb temperature	66°C (98°F) packaged
Altitude	12,780 m (50,000 ft) maximum

VRM17 Monitor Equipment Specifications

Table A-8. VRM17 Monitor Description

Weight	81.57 kg (37 lb)
Height	41.91 cm (16.50 in)
Width	40.64 cm (16.0 in)
Depth	37.47 cm (14.75 in)
External controls, switches, and indicators	Brightness Contrast Power switch Power indicator High scan/low scan switch
Cathode-ray tube (CRT)	483 mm (431.8mm (17 in)) diagonal Monochrome high efficiency type phosphor
Display characteristics	1280 pixels by 1024 lines (high scan) or 1024 pixels by 768 lines (low scan) Picture size 295 by 236 mm (high scan) or 300 by 225mm (low scan) Maximum brightness no less than footlamberts (fl)
Video input	
– Termination	75 ohms ±2% BNC
– Amplitude	1.0 Vpp composite video
– Refresh rate	72 Hz Factory or field service configurable
Horizontal rate timing	
– Active video time	9.7853μs (high scan) and 13.7691 μs (low scan)
– Back porch	1.7124 μs (high scan) and 1.7211 μs (low scan)
– Blanking interval	3.1802 μs (high scan) and 3.6574 μs (low scan)
– Frequency	77.1273 kHz (high scan) and 57.384 kHz (low scan)
– Front porch	0.2446 μs (high scan) and 0.2151 μs (low scan)

Table A-8 (Cont.). VRM17 Monitor Description

– Horizontal period	12.9579 μs (high scan) and 17.4265 μs (low scan)
– Pixels displayed	1280 (high scan) and 1024 (low scan)
– Sync pulse	1.2232 μs (high scan) and 1.7211 μs (low scan)
Vertical rate timing	
– Back porch	0.427864 ms (high scan) and 0.3834 ms (low scan)
– Blanking interval	0.505658 ms (high scan) and 0.5054 ms (low scan)
– Front porch	0.038897 ms (high scan) and 0.0174 ms (low scan)
– Lines displayed	1024 (high scan) and 76 (low scan)
– Vertical period	13.7842 μs (high scan) and 13.8889 μs (low scan)
– Vertical sync pulse	0.038897 μs (high scan) and 0.1046 μs (low scan)
– Vertical frequency	72.5562 Hz (high scan) and 72.033 Hz (low scan)
Power	
– ac input	88 to 264 volts
– Frequency	47 to 63 Hz
– Power consumption	75 watts

Table A-9. VRM17 Monitor Operating Conditions

Temperature range [1]	10°C to 40°C (50°F to 104°F)
Temperature change rate	11° (20°F) per hour maximum
Relative humidity	10% to 90% noncondensing
Maximum wet-bulb temperature	28°C (82°F)
Minimum dew-point temperature	2°C (36°F)
Altitude	2400 m (8000 ft) maximum

[1]Reduce maximum temperature by 1.8°C for each 1,000 meter (1.0°F for each 1,000 ft) increase in altitude.

Table A-10. VRM17 Monitor Nonoperating Conditions

Temperature range	−40°C to 66°C (−40°F to 151°F)
Relative humidity	95% to noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	4900 m (16000 ft) maximum

LK501-AA Keyboard Equipment Specifications

Table A-11. LK501-AA Keyboard Description

Weight	1.16 kg (2.56 lb)
Height	4.76 cm (1.88 in)
Width	47.80 cm (19.00 in)
Depth	19.20 cm (7.56 in)
Number of keys	108
Number of indicators	2 status LEDs
Language variations	15 Software selectable (keycaps required)
Cable	1.8 m (6 ft) uncoiled length 4-pin mmj connector at one end
Baud rate	4800
Electrical interface	EIA RS 423
Power consumption	2.0 watts maximum
Power input	12 V ±6% at 350 ma
Volume control	8 levels, plus off
Keystroke timing	20 ms minimum

Table A-12. LK501-AA Keyboard Operating Conditions

Temperature range [1]	10°C to 40°C (50°F to 104°F)
Relative humidity	10% to 90% noncondensing
Maximum wet-bulb temperature	32°C (90°F)
Minimum dew-point temperature	15°C (60°F)
Altitude	2,400 m (8,000 ft) maximum

[1]Reduce maximum temperature by 1.8°C for each 1,000 meter (1.0°F for each 1,000 ft) increase in altitude.

Table A-13. LK501-AA Keyboard Nonoperating Conditions

Temperature range	−40°C to 66°C (−40°F to 151°F)
Relative humidity	10% to 95%, noncondensing
Maximum wet-bulb temperature	52°C (126°F), packaged
Altitude	4,900 m (16,000 ft) maximum

VSXXX-BB Mouse Equipment Specifications

Table A-14. VSXXX-BB Mouse Description

Weight	0.82 kg (0.37 lb)
Height	39.9 mm (1.57 in)
Diameter	88.9 mm (3.50 in)
Buttons	3
Cable length	1.5 m (5 ft) shielded, 6 conductors and terminals in a 7-pin micro-DIN-type connector (male)
Accuracy	±3% 0 to 24.5 cm (0 to 10 in) per second in any direction ±15% 24.5 to 49 cm (10 to 20 in) per second in any direction ±30% 49 to 73.5 cm (20 to 30 in) per second in any direction
Baud rate	4800
Data format	Delta binary
Electrical interfaces	Serial.bus
Operating modes	Incremental or polling
Resolution	79 counts per cm (200 counts per in)
Tracking speed	73.5 cm (30 in) per second
Tracking rate	In incremental mode: 55 reports per second In polling mode: up to 95 reports per second

Table A-15.   VSXXX-BB Mouse Operating Conditions

Temperature range [1]	10°C to 40°C (50°F to 104°F)
Relative humidity	10% to 90% noncondensing
Maximum wet-bulb temperature	28°C (82°F)
Minimum dew-point temperature	2°C (36°F)
Altitude	2,400 m (8,000 ft) maximum

[1]Reduce maximum temperature by 1.8°C for each 1,000 meter (1.0°F for each 1,000 ft) increase in altitude.

Table A-16.   VSXXX-BB Mouse Nonoperating Conditions

Temperature range	40°C to 66°C (40°F to 151°F)
Relative humidity	5% to 95% noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	4,900 m (16,000 ft) maximum

RZ23L SCSI Hard Disk Drive Equipment Specifications

Table A-17.   RZ23L SCSI Hard Disk Drive Description

Internal drive	
Weight	0.54 kg (1.20 lb)
Height	2.54 cm (1.00 in)
Width	10.16 cm (4.00 in)
Depth	14.61 cm (5.75 in)
Capacity	
– Bytes per drive	121.65 MB
– Blocks per drive	237,588
– Block size	512 bytes
Data transfer rate ·	
– Bus asynchronous mode	3.0 MB per second
– Bus synchronous mode	4.0 MB per second
– To and from media	1.5 MB per second
Seek time	8 ms track-to-track 19 ms average 35 ms maximum
Average latency	8.8 ms
Interface	SCSI

Table A-18. RZ23L SCSI Hard Disk Drive Operating Conditions

Temperature range[1]	10°C to 55°C (50°F to 128°F)
Temperature change rate per hour, maximum)	11°C (20°F
Relative humidity	8% to 80% noncondensing
Maximum wet-bulb temperature	26°C (78°F)
Minimum dew-point temperature	2°C (36°F)
Altitude	−300 to 4600 m (−1000 to 15,000 ft)

[1]Reduce maximum temperature by 1.8°C for each 1,000 meter (1.0°F for each 1,000 ft) increase in altitude.

Table A-19. RZ23L SCSI Hard Disk Drive Nonoperating Conditions

Temperature range	−40°C to 66°C (−40°F to 151°F)
Temperature change rate per hour, maximum)	20°C (36°F
Relative humidity	8% to 95% packaged, noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	−300 to 12,200 m (−1,000 to 40,000 ft)

RZ24 SCSI Hard Disk Drive Equipment Specifications

Table A-20.   RZ24 SCSI Hard Disk Drive Description

Internal drive	
– Weight	0.77 kg (1.70 lb)
– Height	4.14 cm (1.63 in)
– Width	10.16 cm (4.00 in)
– Depth	14.61 cm (5.75 in)
Capacity	
– Bytes per drive	209.7 MB
– Blocks per drive	409,802
– Block size	512 bytes
Data transfer rate	
– Bus asynchronous mode	3.0 MB per second
– Bus synchronous mode	4.0 MB per second
– To and from media	1.5 MB per second
Seek time	5 ms track-to-track
	16 ms average
	35 ms maximum
Average latency	8.3 ms
Interface	SCSI

Table A-21. RZ24 SCSI Hard Disk Drive Operating Conditions

Temperature range[1]	10°C to 55°C (50°F to 131°F)
Temperature change rate per hour, maximum)	11°C (20°F
Relative humidity	8% to 80% noncondensing
Maximum wet-bulb temperature	26°C (78°F)
Minimum dew-point temperature	2°C (36°F)
Altitude	−300 to 4600 m (−1000 to 15,000 ft)

[1]Reduce maximum temperature by 1.8°C for each 1,000 meter (1.0°F for each 1,000 ft) increase in altitude.

Table A-22. RZ24 SCSI Hard Disk Drive Nonoperating Conditions

Temperature range	−40°C to 66°C (−40°F to 151°F)
Temperature change rate per hour, maximum)	20°C (36°F
Relative humidity	8% to 95% packaged, noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	−300 m to 12,200 m (−1,000 ft to 40,000 ft)

RZ25 SCSI Hard Disk Drive Equipment Specifications

Table A-23.   RZ25 SCSI Hard Disk Drive Description

Internal drive	
– Weight	0.82 kg (1.8 lb)
– Height	4.14 cm (1.63 in)
– Width	10.16 cm (4.00 in)
– Depth	14.61 cm (5.75 in)
Capacity	
– Bytes per drive	426 MB
– Blocks per drive	832,527
– Block size	512 bytes
Data transfer rate	
– Bus asynchronous mode	3.0 MB per second
– Bus synchronous mode	4.0 MB per second
– To and from media	2.1–3.2 MB per second
Seek time	2.5 ms track-to-track 14 ms average 26 ms maximum
Average latency	6.8 ms
Interface	SCSI

Table A-24. RZ25 SCSI Hard Disk Drive Operating Conditions

Temperature range[1]	10°C to 55°C (50°F to 131°F)
Temperature change rate	11°C (20°F) per hour, maximum
Relative humidity	8% to 80% noncondensing
Maximum wet-bulb temperature	26°C (78°F)
Altitude	−300 to 3050 m (−1000 to 10,000 ft)

[1]Reduce maximum temperature by 1.8°C for each 1,000 meter (1.0°F for each 1,000 ft) increase in altitude.

Table A-25. RZ25 SCSI Hard Disk Drive Nonoperating Conditions

Temperature range	−40°C to 66°C (−40°F to 151°F)
Temperature change rate	20°C (36°F) per hour, maximum
Relative humidity	8% to 95% packaged, noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	−300 m to 12,200 m (−1,000 ft to 40,000 ft)

RX26 Diskette Drive Equipment Specifications

Table A-26.   RX26 Diskette Drive Description

Weight	Height	Width	Depth
425 g	25.4 mm	101.6 mm	150.0 mm
(0.94 lb)	(1.00 in)	(4.00 in)	(5.91 in)

Table A-27.   RX26 Diskette Disk Drive Specifications (formatted)

Number of cyclinders	80
Number of heads	2
Track density	135 tracks per inch
Diskette size	8.89 cm (3.50 in)
Recording surfaces per diskette	2
MFM data bit rate	250, 500, 1000 kHz
Sectors per track	9 double density
	18 high density
	36 extra density
Capacity	2.88 KB
– Bytes per drive	737,280 double density
	1,474,560 high density
	2,949,120 extra density
– Bytes per track	4608 double density
– Bytes per track	9216 high density
	18,432 extra density
Data transfer rate	250 Kbits per second double density
	500 Kbits per second high density
	1000 Kbits per second extra density
Seek time	3 ms minimum
	15 ms average
Average latency	100 ms
Operating power	1.25 watts (read/write)
	4.60 watts (seeking)
Standby power	0.30 watts

Table A-28. RX26 Diskette Drive Operating Conditions

Temperature range[1]	°5C to 50°C (40°F to 122°F)
Temperature change rate	11°C (20°F) per hour, maximum
Relative humidity	8% to 80%, noncondensing
Maximum wet-bulb temperature	25.6°C (78°F)
Altitude	-300 to 3050 m (-1000 to 10,000 ft) maximum

[1]Reduce maximum temperature by 1.8°C for each 1,000 meter (1.0°F for each 1,000 ft.) increase in altitude.

Table A-29. RX26 Diskette Drive Nonoperating Conditions

Temperature range	-40°C to 66°C (-40°F to 151°F))
Relative humidity	5% to 95%, noncondensing
Maximum wet-bulb temperature	46°C (115°F), packaged
Altitude	-300 to 12,200 m (-1000 to 40,000 ft) maximum

B

The Audio I/O Port and Multimedia

Along with the introduction of the Personal DECstation, Digital has introduced a new line of TURBOchannel-based multimedia[1] hardware options (called DECmedia) and corresponding multimedia software products (called XMedia Tools) which have been designed for use with the audio I/O port of the Personal DECstation (standard with each system).

The Personal DECstation audio I/O port provides for recording and playback, tone generation, or telephone quality sound generation using a codec (encoder/decoder) circuit.

The codec can process incoming audio data and store it on magnetic media. Conversely, the codec can produce a modulated analog output signal from voice-grade digital audio data stored on magnetic media or CD-ROM.

The analog audio input and output signals of the codec are connected to a 4-wire modular jack (visible on the rear panel), and the output signal also runs to a small speaker within the system enclosure (not externally visible).

---

[1] In the workstation context, the term *multimedia* refers to a set of new technologies that allow for the capture, manipulation, presentation, and integration of information involving diverse, time-dependent data types such as animated graphics, audio, scanned still images or video, as well as ordinary text or spreadsheet data. Existing or anticipated multimedia configurations connect the workstation with various sources and sinks of these data types: video cameras, tape recorders, laser disks, analog audio circuits, digital audio recording equipment or musical instrument interfaces, digital or analog telephone equipment, FAX, and other media.

You may connect the 4-wire modular jack to any 4-wire modular jack telephone handset or headset, though Digital recommends that, for the headset, you order DEC part number VSXXX-JA.

Note: *The 4-wire modular jack is intended to be connected to either a headset or a handset. It is not intended for connection to a telephone line cord. However, you may attach it to a telephone receiver cord (the cord that connects the receiver to the base of the telephone).*

All audio I/O port capabilities require the use of the XMedia Tools version 1.1 (or greater) software. This kit provides the means for application software to make use of the I/O capability and also includes some sample audio applications.

XMedia Tools also includes video as well as audio software. However, if you only require audio capability, you can enable your audio hardware with XMedia without requiring video hardware, just as you may enable video with XMedia without requiring audio hardware.

In addition, several independent software vendors have announced application and application-development products supporting DECmedia hardware and making use of the XMedia Tools software.

For order information on multimedia kits, refer to Table B-2 and Table B-1. For an explanation of Digital's DECstation 5000 multimedia offerings, refer to the documentation listed in Table C-8 and Table C-9.

Table B-1. XMedia (software) Kits

Order Number	Description
QA-MB4AA-H5/CDC	**XMedia Tools Software (TK50)** - Includes both the runtime kit and the developer kit software plus on-line documentation.
QB-XUVAA-AA/CDC	**XMedia Tools Developer Kit** - For subscribers to the ULTRIX software consolidated distribution CD-ROM. Contains developer kit software licenses and a compact disc of audio clip art.
QB-XUWAA-AA/CDC	**XMedia Tools Full Developer Kit** - For customers who do not subscribe to the ULTRIX consolidated distribution CD-ROM. Contains developer kit software licenses, software and on-line documentation on a TK50 tape, and a compact disc of audio clip art.

Note: *All systems require the XMedia Runtime license and software to operate audio applications.*

The XMedia Tools Developer Kit and Runtime Kit require ULTRIX/UWS V4.2-A and Motif 1.1. To use the on-line documentation, Bookreader 2.0 is required. (The Bookreader license is included in the ULTRIX/UWS license, and Bookreader documentation is included with the ULTRIX/UWS media and documentation kit.)

Table B-2. DECmedia (hardware) Kits

Order Number	Description
AV10A-AA	DECvideo/IN @ 66Hz (TX + DECvideo/PIP). This is the DECvideo/Picture-in-a-picture daughter card for the DECstation 5000 TX frame buffer, with XMedia Tools Runtime licenses.
AV10B-AA	DECvideo/IN @ 72Hz (TX + DECvideo/PIP). This is the DECvideo/Picture-in-a-picture daughter card for the DECstation 5000 TX frame buffer, with XMedia Tools Runtime licenses.
AV10U-DA	DECvideo/PIP (Upgrade from TX to DECvideo/IN) – Includes option card for TX 24-plane color frame buffer, attaches to TX TURBOchannel graphics card – Provides live NTSC, PAL or SECAM full-motion "video in a window" – Supports 8/24-bit access mode, scaling from 1:1 to icon, graphics overlay, frame grabbing, clipping (X Windows) – Includes XMedia Tools Runtime licenses required for operation

Note: Multimedia is memory-intensive: at least 16MB is recommended for video, 24MB or more is required when it is necessary to capture video frames, and 32MB is suggested for applications combining audio and video.

C

Part Numbers

This appendix lists part numbers for the Personal DECstation 5000:

- Basic System Components
- SCSI and Floppy Disk Hardware
- Monitors
- Input Devices
- Cables
- Connectors, Adapters, and Terminators
- Miscellaneous Hardware
- Software Documentation
- Hardware Documentation
- Multimedia Devices

Table C-1. Basic System Components

Item	FRU No.	Customer Order No.
System module	54-21325-01	PMBA-AB
CPU module only, 20 MHz	54-20615-01 54-21337-01[1]	KN02-BC
CPU module only, 25 MHz	54-20615-02 54-21337-02[1]	KN02-CC
CPU module only, 33 MHz	54-21331-01	KN02-DA
Power supply assembly	H7817-AA	H7817-AA
Memory module (SIMM), 2Mb, single	57-30735-02 54-21213-01[2]	
Memory modules, 4Mb pair, (two 2Mb SIMMs)	—	MS01-AA MS01L-AA[2]
Memory module (SIMM), 8Mb, single	57-34320-01	
Memory modules, 16Mb pair, (two 8Mb SIMMs)	—	MS01-CA
System unit cover	70-28353-01	—
System unit chassis	74-44241-01	—

[1]These are the newer plastic (as opposed to ceramic) parts; they are functionally equivalent to the earlier variety.

[2]The 54-21213-01 (MS01L-AA) memory module can be used interchangeably with the 57-30735-02 (MS01-AA) module and can be used with the DECstation 5000 Model 100 as well as the Personal DECstation but cannot be used with either the 2100 or 3100 models.

Table C-2. SCSI and Floppy Disk Hardware

Item	Part No.	Customer Order No.
SCSI controller option module	54-19876-01	PMAZ-AB
SCSI system-unit-to-expansion-box cable	17-02641-01	BC09D-03
SCSI controller terminator	12-33626-01	—
SCSI chain terminator	12-30552-01	—
Internal SCSI cable	17-01626-04	
RZ23L half-height hard disk drive	RZ23L-E	RZ23L-FL
RZ24 hard disk drive	RZ24-E	RZ24-FL
RZ24 hard disk drive PCB	29-28144-01	—
RZ25 hard disk drive	RZ25-E	RZ25-FL
Internal drive power cable	17-03357-01	
Floppy disk mounting bracket	74-44329-01	
Floppy disk drive shield	74-44330-01	
FDI cable	17-02221-02	
Floppy port plug	74-44333-02	
RX26 diskette drive	—	RX26-FN
RX26 diskette drive unit	RX26-AA	

Table C-3. Monitors

Item	Part No.	Customer Order No.
VRC16, 16-inch color monitor, 120/240 volts, Northern Hemisphere	–	VRC16-CA
VRC16, 16-inch color monitor, 120/240 volts, Southern Hemisphere	–	VRC16-C4
VRM17, 17-inch gray-scale monitor, 120/240 volts, Northern Hemisphere	—	VRM17-AA
VRM17, 17-inch gray-scale monitor, 120/240 volts, Southern Hemisphere	—	VRM17-A4

Table C-4. Input Devices

Item	Part No.	Customer Order No.
Keyboard, extended	—	LK501
Mouse	—	VSXXX-BB

Table C-5. Cables

Item	Part No.	Customer Order No.
Monitor-to-system-unit power cord (U.S.)	17-00442-25	BN19P-1K
Monitor-to-system-unit power cord (Europe)	17-00365-19	BN19A-2C
System unit or expansion box power cord	17-00606-10	BN19P-K
SCSI expansion-box-to-expansion-box cable	17-01351-04	BC19J-1E
Serial line cable	17-00811-02	BC16E-10
SCSI system-unit-to-expansion-box cable	17-02641-01	BC09D-03
ThickWire transceiver cable	17-01321-01	BNE4C-02
ThinWire cable, 12 ft	17-01241-12	BC16M-12
Video cable, color	17-02906-01	BC29G-09
Video cable, gray-scale	17-02878-01	BC09M-10
Video cable, monochrome	17-03054-01	—

Table C-6. Miscellaneous Hardware

Item	FRU No.	Customer Order No.
Blank bezel insert	74-44333-01	
TURBOchannel cover	74-41143-05	
CPU standoff post	12-35477-01	—
CPU standoff rivet	12-35477-02	—
Disposable grounding wrist strap	12-36175-01	
Light pipe	74-44244-01	

Table C-7. Connectors, Adapters, and Terminators

Item	FRU No.	Customer Order No.
MMJ loopback connector	12-25083-01	12-25083-01
ThickWire loopback connector	12-22196-02	12-22196-02
SCSI controller terminator	12-33626-01	—
SCSI chain terminator	12-30552-01	12-30552-01
ThinWire T-connector	12-25869-01	H8223-00
ThinWire terminators	12-26318-01	—
Jumper to clear NVR	12-14314-00	12-14314-00
Comm-line-to-MMJ adapter	12-33190-01	—
Comm modem loopback	29-24795-00	29-24795-00
ThinWire LAN assembly kit	22-00112-01	BC16T-12
DESTA ThickWire-to-ThinWire Ethernet adapter	70-22781-02	DESTA-BA
Twisted pair (10 base T) adapter	—	H3350-AA

Table C-8. Hardware Documentation

Item	Part No	Customer Order No.
Personal DECstation 5000 User Documentation Kit[1]	—	EK-PM300-DK
Personal DECstation 5000 Basic Hardware Installation Guide	—	EK-PM30A-IN
Personal DECstation 5000 User's Guide	—	EK-PM30E-RB
Personal DECstation 5000 Reference Card	—	EK-PM30B-RG
Personal DECstation 5000 Hardware Maintenance Guide	—	EK-PM30F-MG
Personal DECstation 5000 Pocket Service Guide	—	EK-PM30G-PG
TURBOchannel Options User's Guide	—	EK-TCOUG-TC
TURBOchannel Maintenance Guide	—	EK-TRBOC-MG
DECmedia User's Guide	—	EK-DECME-UG

[1]This kit includes the installation guide, user's guide, reference card, and monitor documentation.

Table C-9. Software Documentation

Item	FRU No.	Customer Order No.
ULTRIX Workstation Media (TK50) and Documentation Kit	—	QA-VV1AA-H5
ULTRIX Workstation Media (CD-ROM) and Documentation Kit	—	QA-VV1AA-H8
ULTRIX Workstation (OLD) On-line Documentation and Media Kit (on CD-ROM)	—	QA-VV1AL-H8
DECnet ULTRIX/RISC Media (TK50) and Documentation Kit	—	QA-YT9AA-H5
DEC C for ULTRIX/RISC (TK50)	—	QA-YSJAA-H5
ULTRIX Guide to the Error Logger	—	AE-ME95B-TE
Technical Summary for RISC Processors	—	AA-MM35A-TE
Documentation Overview for RISC Processors	—	AA-MM05A-TE
XMedia Concepts Guide	—	QA-MB4AA-GZ
XMedia Audio Developers Guide	—	AA-PQ0LA-TE
XMedia Audio Runtime Guide	—	AA-PQ0MA-TE
XMedia Video Developers Guide	—	AA-PQ0NA-TE
XMedia Video Runtime Guide	—	AA-PQ0PA-TE

Table C-10. Multimedia Devices

Item	Customer Order No.	FRU No.
DECvideo TX color frame buffer (66 Hz)	—	30-35790-01
DECvideo TX color frame buffer (72 Hz)	—	30-35790-02
DECvideo Input cable	—	17-03304-01
DECvideo/PIP module	—	30-35788-01
VRT19 color monitor cable	—	17-02906-01
DECaudio TC module[1]	—	54-21123-01
DECaudio cable[1]	—	17-03089-01
DECaudio distribution box[1]	—	70-28758-01
DECaudio power supply[1]	—	30-35431-01
AC cable for power supply	—	17-00606-10
DECvideo/IN @ 66Hz (TX + DECvideo/PIP)	AV10A-AA	
DECvideo/IN @ 72Hz (TX + DECvideo/PIP)	AV10B-AA	
DECvideo/PIP (Upgrade from TX to DECvideo/IN)	AV10U-DA	
DECvideo/OUT	AV11A-AA	
Audio headset (for use with the 4-wire audio I/O port)	VSXXX-JA	

[1]DECaudio devices are not used with the Personal DECstation since the Personal DECstation already has audio capability built into the base module.

D

Connector Pin Assignments

This appendix lists pin assignments for the following connector:

- SCSI
- EIA RS232
- ThickWire Ethernet
- Power supply
- ISDN
- Sound
- SERIAL.bus
- Modem loopback
- Ethernet loopback

Table D-1. SCSI Connector Pin Assignments

Pin	Signal	Pin	Signal
50	~ I/O	49	GND
48	~ REQ	47	GND
46	~ C/D	45	GND
44	~ SEL	43	GND
42	~ MSG	41	GND
40	~ RST	39	GND
38	~ ACK	37	GND
36	~ BSY	35	GND
34	GND	33	GND
32	~ ATN	31	GND
30	GND	29	GND
28	RSVD	27	RSVD
26	TERMPWR	25	NC
24	RSVD	23	RSVD
22	GND	21	GND
20	GND	19	GND
18	~ PARITY	17	GND
16	~ DATA<7>	15	GND
14	~ DATA<6>	13	GND
12	~ DATA<5>	11	GND
10	~ DATA<4>	9	GND
8	~ DATA<3>	7	GND
6	~ DATA<2>	5	GND
4	~ DATA<1>	3	GND
2	~ DATA<0>	1	GND

Table D-2. ThickWire Ethernet Connector Pin Assignments

Pin	Source	Signal	Description
1			Shield
2	XCVR	ACOL+	Collision presence
3	KNO2	ATX+	Transmission
4	GND	Ground	
5	XCVR	ARX+	Reception
6	XCVR	GND	Power return
7	CTL+	Control output	
8	GND	Ground	
9	XCVR	ACOL–	Collision presence
10	KNO2	ATX–	Transmission
11	GND	Ground	
12	XCVR	ARX–	Reception
13	KNO2	+12V	Power
14	GND	Ground	
15	CTL–	Control output	

Note: *In Table D-3*

Data Terninal Equipment (DTE) refers to signals whose source in the Personal DECstaion.

Data Comunications Equipment (DCE) refers to signals whose source is a peripheral, like a modem or a printer, that is attached to the system.

Table D-3. EIA RS232 Communications Connectors Pin Assignments

Pin	Source	Signal	CCITT[1]	EIA[2]	Description
1		GND	101	AB	Protective ground
2	DTE	TxD	103	BA	Transmitted data
3	DCE	RxD	104	BB	Received data
4	DTE	RTS	105	CA	Request to send
5	DCE	CTS	106	CB	Clear to send
6	DCE	DSR	107	CC	Data set ready
7		GND	102	AB	Signal ground
8	DCE	CD	109	CF	Carrier detect
9					Unconnected
10					Unconnected
11					Unconnected
12	DCE	SPDMI	112	CI	Speed mode indicator
13					Unconnected
14					Unconnected
15	DCE	TxClock	114	DB	Transmit signal element timing
16					Unconnected
17	DCE	RxClock	115	DD	Receive signal element timing
18					Unconnected
19					Unconnected
20	DTE	DTR	108.2	CD	Data terminal ready
21					Unconnected
22	DCE	RI	125	CE	Ring indicator
23	DTE	DSRS	111	CH	Data signal rate select
24					Unconnected
25					Unconnected

[1]Comite Consultatif International Telegraphique et Telephonique, an international consultative committee that sets international communications standards

[2]Electronic Industries Association

Table D-4. Power Supply Pin Assignments

Pin	Signal
1	Speaker [1]
2	DCOK
3	+5.1V
4	GND
5	+5.1V
6	GND
7	+12.1V
8	Speaker [2]
9	System-OK LED
10	GND
11	+5.1V
12	GND
13	+5.1V
14	GND

ISDN Connector Pin Assignments

The external ISDN connector is an 8-wire Modular Jack (RJ45). Pins 1, 2, 7, and 8 are not used. A four wire cable with 2 twisted pairs would be connected from this jack to an ISDN NT or PAXB card for ISDN voice and data connections. The following table shows a pinout for the ISDN connector.

Table D-5.   ISDN Connector

Pin	Signal	Function
1		No connection
2		No connection
3	LOUT1	Line output (-)
4	LIN1	Line input (-)
5	LIN2	Line input (+)
6	LOUT2	Line output (+)
7		No connection
8		No connection

SERIAL.bus

The SERIAL.bus uses a 4 pin shielded MOLEX SEMCONN or AMP SDL modular type connectors. The MOLEX version will be unkeyed. The AMP version will have key "D." This provides compatibility between the AMP and MOLEX part.

Data and power for the SERIAL.bus are transferred over low capacitance 4 wire shielded cable. The four conductors are used for: GND, SDA, SCL, and +12V (pins 1 through 4 respectively). Capacitance of the SCL and SDA conductors shall be less than 70pF/m (capacitance between one conductor and other conductors connected to shield). The S.b connector is located at the rear of the system enclosure and mounts to the base system module. The following table shows the pinout for the SERIAL.bus.

Table D-6. SERIAL.bus Pin Assignments

Pin	Signal	Function
1	GND	Ground
2	SDA	Serial data
3	SCL	Serial clock
4	+12V	+12Volts

Sound Connector

A 4-wire Modular Jack is provided for connection to an external telephone handset or headset. Note that a telephone should not be connected to this jack. The connection is intended for the external speaker and microphone that are contained in the headset. The headset or handset are connected to the sound jack with a 4-wire cable with 2 twisted pairs. The following table shows the pinout for the sound jack.

Table D-7. Sound Connector

Pin	Signal	Function
1	Audio In 1	Audio input
2	Audio Out 1	Audio output (+)
3	Audio Out 2	Audio output (-)
4	Audio in 2	Audio Input ground

Loopback Connector Pin Assignments

Table D-8. Summary of Loopback Connectors

Function	Standard/ Unique	Part Number	Option Number
Communications loopback connector	Standard	12-15336-13	H3200
ThickWire loopback connector	Standard	12-22196-02	NA
ThinWire T-connector	Standard	12-25869-01	H8223
ThinWire terminator	Standard	12-26318-01	H8225

Table D-9. Ethernet Loopback Connector Pin Assignments, Part #12-22196-02

From Pin No.	Signal	To Pin No.	Signal	Description
P6-3	TRA+	P6-5	REC+	Through capacitor
P6-10	TRA−	P6-12	REC−	Through capacitor
P6-13	PWR	P6-6	RET	Through resistor and LED

Table D-10. Modem Loopback Connector Pin Assignments, Part #12-15336-13, Option #H3200

From Pin No.	Signal	To Pin No.	Signal
P4-2	TX2	P4-3	RX2
P4-4	RTS2	P4-5	CTS2
P4-6	DSR2	P4-20	DTR2
P4-12	SPDMI2	P4-23	DSRS2
P4-18	LLPBK2	P4-8	CI2
P4-18	LLPBK2	P4-22	RI2
P4-18	LLPBK2	P4-25	TMI2

E

Regulatory Information for the UK

This appendix provides user information on the Personal
DECstation 5000 workstation that is required by the United
Kingdom.

The Personal DECstation 5000 workstation is manufactured
by Digital Equipment Corporation. The model number of the
communication option is PMBA-AA.

Service Requirements

The following table describes the service category, interface type, data rate, service requirements, and PTO for the PMBA-AA.

Table E-1. PMBA-AA service requirements

Service Category	Interface Type	Data Rate	Physical Requirements	Electrical Requirements	PTO BT[1]/Hull[2]/ MCL[3]
	CCITT	2400	ISO 2110	V.24/V.28	Yes/Yes/Yes
	Recommend	4800			Yes/Yes/Yes
1	X.21bis	9600	BS.6623:	Cable:	Yes/Yes/Yes
		19200	Part 1 1985	BC22F-10 BC22F-25	No/No/Yes

[1]BT - British Telecommunications plc

[2]Hull - Kingston Communications (Hull) plc

[3]MCL - Mercury Communications Limited

The maximum approved cable length is 25 feet, comprising:

```
Cat 1     V.24      25 feet for extension     BC22F-25
```

Communication Port Pin Assignments

See Appendix D of the *Personal DECstation 5000 User's Guide* for a complete list of communication port pin assignments.

Approvals for Digital Circuits

The PMBA-AA is approved for direct connection to a particular digital circuit. This approval includes interconnecting cable with mating connectors conforming to BS6623 part 1 and part 4.

If the product is connected to the service with anything other than its own approved cables, then those cables must benefit from the relevant general approval and/or conform with any other applicable requirements.

Caution: Ports J2, J3, J4, J5, J6, J7, J16, J17, J28, J33, J54, J55, J56, J57 (shown in the diagram at the end of this appendix) do not provide sufficient isolation to satisfy the requirements of the relevant parts of standard BS6301. Any product connected to these ports must meet one of the following conditions:

- Be covered by OFTEL's General Approval NS/G/1234/J/100003 (All products supplied by Digital comply with this General Approval.)

- Have been approved to the relevant parts of standard BS6301

- Have previously been evaluated against the British Telecom (Post Office) Technical Guide 2 or 26 and given permission to attach

Other usage will invalidate any approval given to this apparatus.

Interconnection directly, or by way of other apparatus, of ports marked by the safety warning label with other ports that are marked or not so marked, may produce hazardous conditions on the network. Seek advice from a competent engineer before making any such connection.

Host Independent Approvals

The PMBA-AA is approved only for installation in an approved host with approved attachments. For approval, the host and host attachments must be either of the following:

- Type-approved (meaning the equipment is built exactly like the models that were originally approved).

- If the equipment was supplied after 1st March 1989, it must be marked with or supplied with a statement that the host is supplied under General Approval Number NS/G/1234/J/100003.

Except at the edge connector which plugs into the host's expansion slot, clearance and creepage distances of Xmm and Ymm, as listed below must be maintained between the PMBA-AA and other parts of the host, including any other expansion cards fitted.

Table E-2. Clearance and Creepage Specs for PMBA-AA

Clearance Xmm	Creepage Ymm	Voltage[1]
2.0	2.4 (3.8)	up to 50
2.6	3.0 (4.8)	up to 125
4.0	5.0 (8.0)	up to 250
4.0	6.4 (10.0)	up to 300

[1]Used or generated by other parts of the host or expansion card (Vrms or Vdc)

The creepage distances apply when installed in a normal office environment. The creepage distance shown in parentheses apply where the local environment within the Host Computer is subject to conductive pollution or dry non-conductive pollution which could become conductive due to condensation. These distances can be checked by measuring between the adjacent parts. Clearance is the shortest distance in air between two points. Creepage is the shortest distance along continuous solid parts between the same two points.

If in doubt, advice should be obtained from a competent telecom safety engineer. Failure to install the PMBA-AA in accordance with these instructions will invalidate the approval.

Host Power Rating

The user must insure that the power drawn by the PMBA-AA together with the host and other auxiliary apparatus drawing power from the host, is within the rating of the host power supply.

Digital has designed all permutations of the host configuration to operate within the limits of the host power rating.

Table E-3. Module Power Rating for PMBA-AA

Supply (+/- 4%) (Volts)	Maximum Current (Amps)	Typical Current (Amps)
+5.1	16	4
+12.1	3.0	.4

Environmental Conditions

See Appendix A in the *Personal DECstation 5000 User's Guide* for further environmental information.

Apparatus Between the Approved Apparatus and a Digital Circuit (PTT)

If any apparatus, including cable or wiring, is to be connected between the approved apparatus and the point of connection to any particular digital circuit, then all the other apparatus must conform as follows:

1. The overall transmission characteristics of all the other apparatus shall be such as to introduce no material effect upon the electrical conditions presented to one another by the apparatus and the particular digital circuit.

2. All the other apparatus shall comprise only:

   - Apparatus approved (such apparatus may be subject to limitations on its use) for the purpose of connection between the apparatus and a particular digital circuit.

   - Cable or wiring complying with a code of practice for the installation of apparatus covered by this standard or such other requirements as may be applicable.
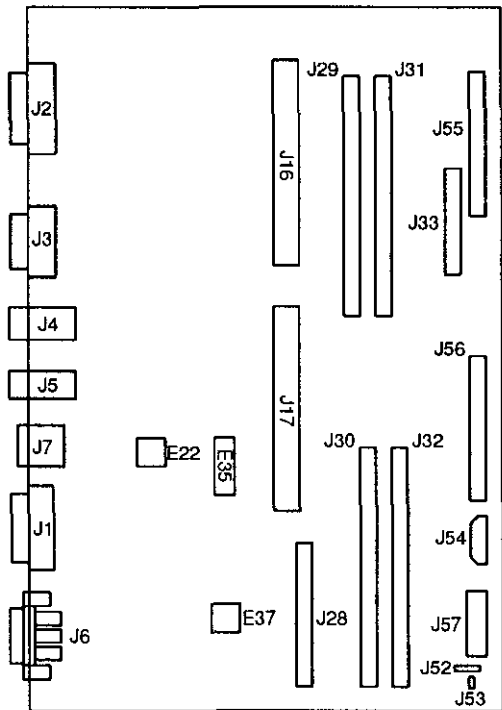
WSMXP004

Figure E-1.   System Module J-connector Locations

F

Drives You Can Connect to Your Workstation

The following list includes drives available at the time this guide was printed. Digital continues to produce new drives, however, to cover a complete range of computing needs. For information about drives that may not be included on this list, please contact your Digital sales representative.

In the SZ12 expansion box

Floppy disk drives

RX23 (1.4 megabytes)
RX33 (1.2-megabytes)

3-1/2 inch hard disk drive

RZ25 (426 megabytes)

5-1/4 inch hard disk drives

RZ55 (330 megabytes)
RZ56 (660 megabytes)
RZ57 (1.0 gigabytes)
RZ58 (1.4 gigabytes)

Tape drives

TZ30 (95 megabytes)
TZK10 (525 megabytes)

CDROM drives

RRD42

In the TURBOchannel extender box

Floppy disk drives

RX23 (1.4 megabytes)

3-1/2 inch hard disk drives

RZ23L (121 megabytes)
RZ24 (209 megabytes)
RZ25 (426 megabytes)

Tape drives

TZK10 (525 megabytes)

CDROM drives

RRD42 (600 megabytes)

Tabletop drives

Tape drives

TK50Z (95 megabytes)
TSZ05 (1600 bpi nine-track tape)
TSZ07 (1600/6250 bpi nine-track tape)
TLZ04 (1.2 gigabytes, RDAT tape)
TKZ08 (2.2 gigabytes, 8 mm tape)

CD-ROM drives

RRD42 (600 megabytes)

G

Console Commands

Console Command Conventions and Terms

Be sure to follow these rules when you type console commands:

- Type uppercase and lowercase letters exactly as they appear in command lines. The system treats uppercase and lowercase letters as different input.

- Press Return after you type a command.

- Enter number values as follows:
  - Enter decimal values as a string of decimal digits with no leading zeros (for example, 123).
  - Enter octal values as a string of octal digits with a leading zero (for example, 0177).
  - Enter hexadecimal values as a string of hexadecimal digits preceded by 0 and a lower-case letter (for example, 0xFE04).

- When reading or writing to memory, you have a choice of data sizes: byte, halfword, or word. Because a word is 4 bytes, successive addresses referenced by a word are successive multiples of 4. For example, the address following 0x80000004 is 0x80000008. An error occurs if you specify an address that is not on a boundary for the data size you are using.

- The following key combinations have an immediate effect in console mode:
  - **Ctrl-s** freezes the screen display.
  - **Ctrl-q** releases a frozen screen display.
  - **Ctrl-c** aborts a command.
  - **Ctrl-u** erases a partially typed command line.

Conventions Used in This Appendix

- **Letters in bold face type like this** are to be typed exactly as they appear.
- *Letters in italic type like this* are variables that you replace with actual values. (Note that the help and menu screens display these variables in all capital letters.)
- Arguments enclosed in square brackets ([ ]) are optional.
- Ellipses (...) follow an argument that can be repeated.
- A vertical bar (|) separates choices. You can think of the bar as a symbol meaning *or*.
- Parentheses enclose a group of values from which you must select one value. For example, -(b | h | w) means enter -b or -h or -w.

Definition of Terms

- Controller

  A hardware device that directs the operation and communications flow to and from other devices or other controllers. Each system controller has a unique controller ID.

- Script

  A collection of console commands that run in a set order. Test scripts, which are collections of individual tests and may also contain other test scripts, are commonly used for troubleshooting the system.

- Slot

The physical location of a module or modules.

- TURBOchannel option modules occupy slots 0 and 1.
- The base system occupies slot 3. Base system hardware includes the system module, CPU module, and memory modules. The system module contains the base system SCSI and Ethernet controllers.

Summary of Console Commands

Table G-1 gives a brief explanation of the function of each of the console commands. A more detailed explanation of each command follows the table.

Table G-1. Console Commands

Command	Description	Type
?	Displays a list of console commands and formats.	Displays system info
cnfg	Shows HW configuration.	Displays system info
printenv	Shows environmental variables.	Displays system info
erl	Shows error history.	Displays system info
setenv	Sets environmental variables.	Sets system parameters
unsetenv	Removes environmental variables .	Sets system parameters
passwd	Sets console password.	Sets system parameters
t #/?	Lists out test for slot #.	Lists Diagnostic routines
ls #	Lists out scripts.	Lists Diagnostic routines
cat Script	Lists test contained in a script.	Lists Diagnostic routines
t #/t_name	Executes a test on slot #.	Runs Diagnostics
script_name	Executes a script.	Runs Diagnostics
sh	Executes a script with options.	Runs Diagnostics
boot	Boots the System.	Operational commands
init	Initializes system.	Operational commnads
d	Deposits data into memory.	Miscellaneous commands
e	Examines memory locations.	Miscellaneous commands

Table G-1 (Cont.).   Console Commands

Command	Description	Type
go ·	Goto an address.	

? Command

Use the ? command to display a list of available console commands and their formats.

The ? command format is

? [*cmd*]

When you type the ? command,

- To display the format for all available console commands, omit the optional *cmd* parameter.
- To display the format for a single command, replace the optional *cmd* parameter with the name of the command for which you want the format displayed.

boot Command

Use the boot command to boot the system software.

The boot command format is

boot [-*z seconds*] [**-n**] [*bootpath*] [-*a*] [*args...*]

- Include the optional -*zseconds* parameter to have the system wait a certain number of seconds before starting. Replace *seconds* with the number of seconds the system should wait before starting.
- Include the optional -n parameter to have the boot command load, but not execute, the specified file.
- Replace the optional *bootpath* parameter with the specification for the file you are using to boot. The file specification form depends on the type of boot device you use.
  - To boot from Ethernet, use this form:

slot number/protocol[/*file*]. Replace *slot number* with the slot number of the Ethernet controller you are using to boot. The *protocol* parameter represents the name of the network protocol that performs the boot operation. Replace protocol with either mop or tftp. The optional *file* parameter represents a specific file that you use to boot.

For example, to use the protocol named mop to boot from the base system Ethernet, which uses slot number 3, type **boot 3/mop** and press Return.

- To boot from a drive, use this form:

slot number / (**rz** | **tz**) *scsi id* / *filename*.

  - Replace *slot number* with the SCSI controller slot number.
  - Use rz to boot from a hard disk or CDROM.
  - Use tz to boot from a tape drive.
  - Replace *scsi id* with the SCSI ID for the drive you are using to boot.
  - Replace *file name* with the name of the specific file you want to boot.

    For example, to boot the file named vmunix in multiuser mode from a hard disk drive with SCSI ID 2 that is connected to the SCSI connector on the back of the system unit, type **boot 3/rz2/vmunix -a** and press Return. To boot the file called vmunix from a tape drive that has SCSI ID 5 and is connected to a SCSI option module in slot 1, type **boot 1/tz5/vmunix** and press Return.

  - To perform a multiuser boot operation, include the -a argument. If you omit the -a argument, the system performs a single-user boot.
  - To use the base system frame buffer as an additional video display in part of multi-screen graphics configuration, include the -mg argument in the boot command. For example, type **boot 3/rz2/vmunix -a -mg** to use the base frame buffer as an additional graphics display. The -mg argument can also be saved as a boot environment variable—for example: **setenv "boot/rz2/ -a -mg"**.

  Bear in mind the following important information when typing the boot command:

- If you do not include a bootpath in the boot command, the system uses the boot environment variable.
- If you include any additional arguments, you must type the entire boot command. The system ignores the boot environment variable whenever you specify any arguments in the boot command.

- If you use any spaces or tabs in the boot environment variable, you must surround the entire value with double quotation marks. For example, to set the boot environment variable to use the mop protocol to perform a multiuser boot from the base system Ethernet controller in slot 3, type **setenv boot "3/mop -a"**.

- For details about the boot command parameters for each TURBOchannel option module, refer to the *TURBOchannel Options User's Guide*.

cat Command

Use the cat command to display the contents of a script.

The cat command format is

cat slot-number/script-name

When you type the cat command,

- Replace *slot-number* with the number of the module that has the contents you want to display. (The base system module is slot 3.)

- Replace *script-name* with the name of the script for which you want to display the contents.

cnfg Command

Use the cnfg command to display hardware configuration information.

The cnfg command format is

cnfg [*slot-number*]

- To display general system configuration information, type the cnfg command without the *slot-number* parameter.

- To display detailed configuration information for an individual module, replace the optional *slot-number* parameter with the slot number of the module for which you want a configuration display.

d Command

Use the d command to deposit values in memory.

The d command format is

d [-(b | h | w)] [-S *count*] *rng*

- Use one of the optional parameters -(b | h | w) to specify whether to deposit the contents as bytes (-b), halfwords (-h), or words (-w).

- Include the optional -S*count* parameter to store the same value more than once. Replace *count* with the number of times that you want the value to be stored.

- Use the *rng* parameter to set the range of addresses across which the values are stored.

  - To deposit values at a single address, replace *rng* with that address.

  - To deposit a number of values across a range of addresses, replace *rng* with the address range. Use the *form address-low:address-high* to define the range.

    When you enter the address range, replace *address-low* with the starting address for storing values and replace *address-high* with the ending address for storing values.

- To examine values at a series of addresses, replace *rng* with the starting address and the number of successive addresses you want to examine.

  Use the form *address-low # count* to specify the addresses where you store values. When you type this address range format, replace *address-low* with the starting address for storing values. Replace *count* with the number of addresses at which you want to store values.

- To specify more than one address range, separate each range specification with commas. Leave no spaces between the specifications.

erl Command

Use the erl command to display or clear the log of the errors
that occurred since the most recent power-up or reset operation.

The erl command format is

erl [-c]

- To display the current error log, use the erl command
  without the -c option.

- To clear the error log, include the -c option. When the error
  log buffer is full, no more messages are added until the
  buffer is cleared by the erl -c command.

go Command

Use the go command to transfer system control to a specific
system address.

The go command format is

go *[address]*

- To transfer system control to the address specified in the
  last boot -n command, type the go command without the
  address parameter. If you omit the *address* parameter, and
  if no previous boot -n command has been issued, the system
  ignores the go command.

- To transfer system control to the contents of a specific
  address, include the *address* parameter. Replace the
  address parameter with the address to which you want
  to transfer control.

init Command

Use the init command to initialize module hardware.

The init command format is

init *[slot-number]* [**-m**]

- To initialize the entire system, specify the init command
  with no additional arguments.

- To initialize an individual module, replace the optional *slot-number* parameter with the slot number of the module that you want to initialize.

- If you perform an init operation on the system module (slot 3), include the optional -m parameter to zero all memory modules in the system module.

ls Command

Use the ls command to list the scripts and other objects that are in system ROM.

The ls command format is

ls [*slot-number*]

To display a list of scripts or other objects that are available in an individual module, replace the optional *slot number* parameter with the slot number of the module that contains the files you want to display.

passwd Command

Use the passwd command to enter, set, or clear a password.

The passwd command format is

passwd [-c] [-s]

If the console prompt is R>, you can use only the boot and passwd commands until you enter the correct password.

To enter an existing password, type the passwd command without any additional parameters. At the pwd: prompt, enter the password. Then press Return.

After you enter the correct password, or if the system does not require a password, the system displays the console prompt (>>). You can use all console commands whenever the console prompt is >>.

- To clear an existing password, include the -c parameter when you type the passwd command. First use the passwd command to enter the existing password. After the console prompt >> appears, type **passwd -c** and press Return. The system then removes the password requirement.

- To set a new password, include the -s parameter. Enter the new password at the pwd: prompt. When the pwd: prompt appears a second time, type the password again. If the two password entries match, the system sets the new value as the password.

- The password must have at least 6 and no more than 32 characters. The system is case sensitive and treats uppercase and lowercase letters as different characters.

printenv Command

Environment variables set system operating conditions. You can display, set, and remove environment variables with console commands.

- Use the setenv command to set or change environment variables.

- Use the printenv command to display existing environment variables.

- Use the unsetenv command to remove environment variables.

Table G-2 later in this chapter lists the environment variables you can set.

The printenv command format is

printenv [*variable*]

- To display the entire list of environment variables, omit the optional *variable* parameter.

- To display an individual environment variable, replace *variable* with the name of the environment variable you want to display.

restart Command

Use the restart command to restart the system software. For the restart operation to succeed, the operating system software must have a restart block set up in memory.

The restart command format is

restart

script Command

Use the script command to create a temporary set of console commands that run in an order you specify.

The script command format is

script *name*

When you type the script command, replace *name* with the name you are giving the script. Then press Return.

After you press Return, type the commands you want to include in the script. Press Return after each command you type. Commands can be t or sh commands. Enter one command per line. When you finish typing the commands you're including, press Ctrl-d or press Return twice to complete the script.

To run the script, use the sh command described on page F-14. When you run the script, the commands execute in the order in which you entered them when you created the script.

setenv Command

Environment variables set system operating conditions. You can display, set, and remove environment variables with console commands.

- Use the setenv command to set or change environment variables.

- Use the printenv command to display existing environment variables.

- Use the unsetenv command to remove environment variables.

Table G-2 lists the environment variables you can set.

The setenv command format is

setenv *variable value*

When you type the setenv command,

- Replace *variable* with the name of the environment variable you want to set.

- Replace *value* with the new value you want to assign to the environment variable. Note that if the new value contains blank spaces or tabs, you must use double quotation marks (") at the beginning and end of the value.

Table G-2.   Environment Variables

ENVIRONMENT VARIABLE	DESCRIPTION
boot	Sets the default boot path.
console	Selects the system console.

- Set the console variable to s to enable the terminal connected to the communications connector as the active console.

- If the console variable is set to anything other than s, the monitor connected to the graphics module in the lowest-numbered slot is enabled. If no graphics module is installed and the keyboard is connected, the monitor is connected to the base system frame buffer. If the system does not detect a keyboard, even if a graphics option is installed, the terminal connected to the serial communications connector is the active console, and no console display will be seen on any of the graphics monitors.

haltaction   Specifies how the system responds if it halts.

- Set the haltaction variable to b to cause the console to boot after the console performs the appropriate initialization and self-tests.

- Set the haltaction variable to h to cause the console to halt and attempt no other action.

- Set the haltaction variable to r to cause the console to restart and then attempt to boot if the restart operation fails.

more   Sets the way in which the screen scrolls lines of text.

- Set the more variable to 0 to have text scroll to the end before stopping.

- Set the more variable to a number other than zero to have scrolling pause after that number of lines has been displayed.

Table G-2 (Cont.). Environment Variables

ENVIRONMENT VARIABLE	DESCRIPTION
osconsole	Contains the slot numbers of the console drivers. If a TTY driver from slot x serves as the console, osconsole is set to x. If a CRT driver from slot y and a kbd driver from slot z serve as the console, osconsole is set to y,z. Although the environment variable display includes the osconsole setting, you cannot set this variable. The system automatically sets the osconsole value.
testaction	Specifies the type of power-up self-test the system runs. ■ Specify q to run a quick test when the power-up self-test runs. ■ Specify t to run a thorough test when the power-up self-test runs.
#	Specifies the slot number of the module that contains the current script. If no script is active, the system specifies the base system module, which uses slot number 3. Although the environment variable display includes the # setting, you cannot set this variable.

sh Command

Use the sh command to run a script.

The sh command format is

sh [-b] [-e] [-l] [-v] [-S] [*slot-number/script*] [*arg...*]

When you type the sh command,

- Include the optional -b parameter to execute the script directly, instead of through a subshell.

- Include the optional -e parameter to stop the script if an error occurs.

- Include the optional -1 parameter to have the script loop until you press Ctrl-c.

- Include the optional -v parameter to echo the script to the console as the test runs.

- Include the optional -S parameter to suppress any error messages if the script is not found.

- To run a specific script, include the optional *slot number/script* parameter.

  - Replace *slot number* with the slot number of the module that has the script you want to run.

  - Replace *script* with the name of the script you want to run.

- The use of any additional arguments depends on the particular script you specified in the sh command.

You can also run a script by typing *slot number/script*.

- Replace *slot number* with the slot number of the module that contains the script you want to run.

- Replace *script* with the name of the script you want to run.

For example, to run the thorough power-up self-test script for a SCSI controller and drives in slot 2, type **sh 2/pst-t** and press Return.

t Command

Use the t command to run individual tests.

The t command format is

t [-l] *slot name/test name [arg...]*

When you type the t command,

- Include the optional -l parameter to have the test loop until you press Ctrl-c or reset the system.

- Replace *slot number* with the slot number of the module you want to test.

- Replace *test name* with the name of the individual test you want to run.

To display the name and format of all individual tests for a module, type **t** *slot number/***?**, where you replace *slot number* with the slot number of the module for which you want to display tests, and press Return.

test Command

Use the test command to run a thorough test of all system
hardware.

The test command format is

test

unsetenv Command

Environment variables set system operating conditions. You
can display, set, and remove environment variables with console
commands.

- Use the setenv command to set or change environment
  variables.
- Use the printenv command to display existing environment
  variables.
- Use the unsetenv command to remove environment
  variables.

Table G-2, earlier in this appendix, lists the environment
variables you can set.

The unsetenv command removes a standard environment
variable (except osconsole and #) during the current session
only. When the system is reset, reinitialized, or powered up,
the values of the standard environment variables revert to their
previously set values.

The unsetenv command format is

unsetenv *variable*

When you type the unsetenv command, replace *variable* with
the name of the environment variable you want to remove.

Index

TURBOchannel modules
    used to connect to additional networks
      , 5–4
TURBOchannel option modules, 3–5,
    11–7
    connecting monitors to, 1–13
TURBOchannel SCSI adapter, 6–3

U

unsetenv command, 12–7

V

video connector, 1–10
voltage, 2–2, 2–3

voltage requirements, 2–1
VRC16 monitor, 1–10
VRM17 monitor, 1–10

W

workstation
    dismantling, 4–1
    increasing memory, 10–1
    turning off, 3–9
workstation software
    halting, 12–3
workstation software, booting
    factory installed, 3–7
    from external drive, 3–8
    from network, 3–7