

Personal DECstation 5000 Model 50

Operator's Guide

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Preface

This guide explains how to operate the hardware components of your Personal DECstation 5000 Model 50 workstation.

Table 1 Conventions Used

Convention	Use
Boldface type	Indicates a command that you type.
Caution note	Information that protects the workstation from being damaged is set off in a caution note.
<i>italic type</i>	Indicates variables and complete titles of manuals.
Monospace type	Indicates type that appears on your monitor.

Part I

Introducing Your Workstation

1

The Five Basic Parts

This chapter describes the following topics:

- The System Unit
- Connecting the Monitor
- Connecting the Keyboard
- Connecting the Mouse
- Connecting the Power Cord and Monitor Cable

The Personal DECstation 5000 Model 50 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 present¹ The type and number of other parts—such as memory modules and internal and external storage devices—will vary.

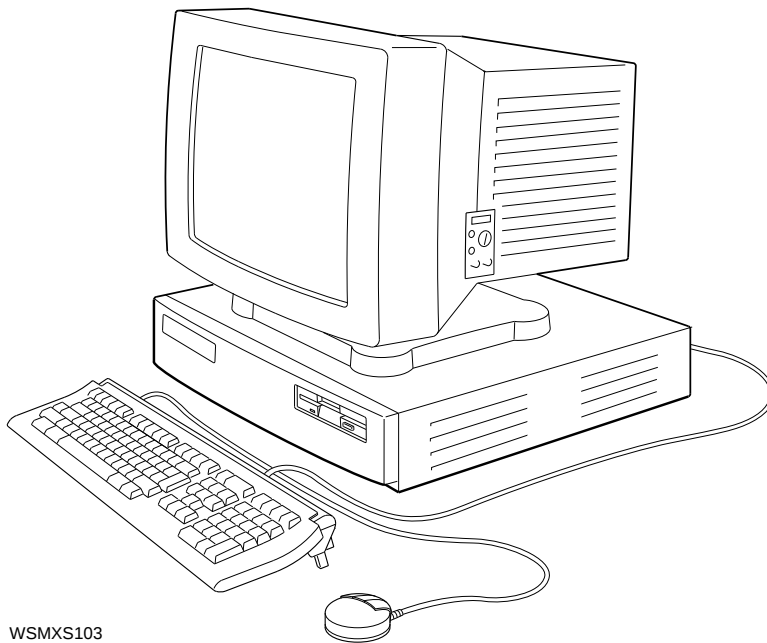
A basic system has 8 megabytes of memory and may include an internal hard disk drive and an internal floppy disk drive. There are two slots for TURBOchannel option modules. Later chapters of this guide explain how you can expand both the workstation's storage capacity and its memory.

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.

1.1 The System Unit

1.1 The System Unit

Figure 1-1 The System Unit



WSMXS103

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

Caution

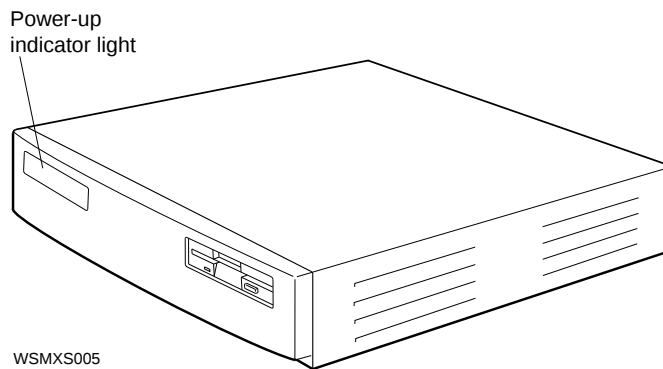
Do not stand the system unit on its side. This can block the cooling vents and damage the unit.

1.1 The System Unit

1.1.1 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.

Figure 1–2 The Front of the System Unit



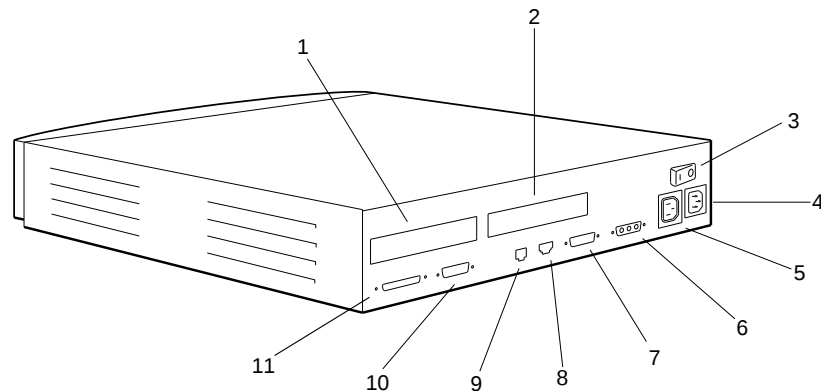
1.1 The System Unit

1.1.2 The Back of the System Unit

On the back of the system unit you will find:

- The On/Off switch. Press the I on the switch to turn the power on. Press the O on the switch to turn the power off.
- The connectors shown in Figure 1–3.

Figure 1–3 The Back of the System Unit



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

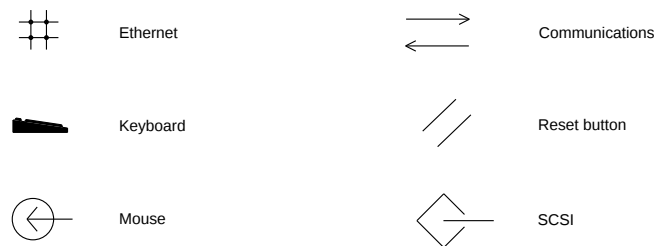
WSMXS004

1.1.3 Icons on the System Unit

Above each connector is a small picture, or icon, that describes the purpose of that connector. Figure 1–4 shows the icons found on the back of the system unit.

1.1 The System Unit

Figure 1-4 Icons on the Back of the System Unit



WSE20003

1.2 Connecting the Monitor

Digital supports two monitors for the base video on the Personal DECstation:

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

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

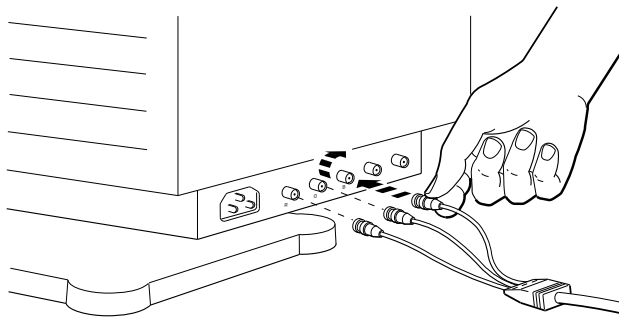
With the appropriate graphics board, any Digital monitor will work on the Personal DECstation.

Follow these steps to connect your monitor:

1. Connect the monitor video cable to the monitor, as shown in Figures 1-5 and 1-6.
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.

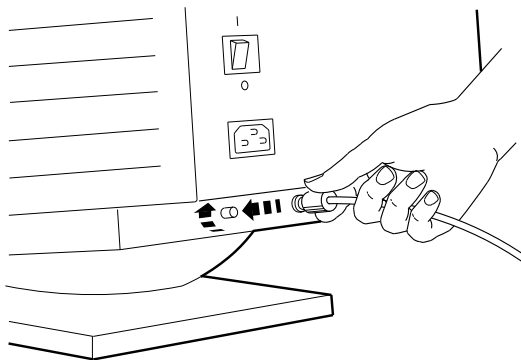
1.2 Connecting the Monitor

Figure 1–5 Connecting the Video Cable to the VRC16 Monitor



WSMXS007

Figure 1–6 Connecting the Video Cable to the VRM17 Monitor

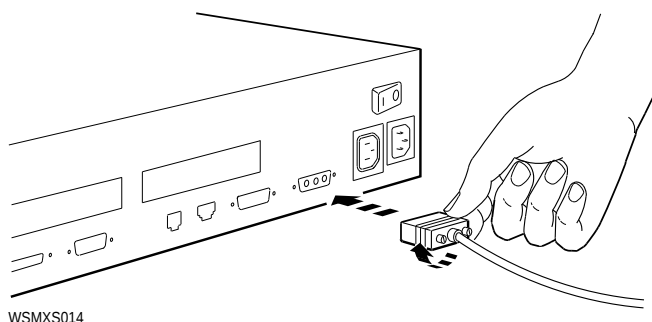


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1.2 Connecting the Monitor

3. Connect the other end of the monitor video cable to the video connector on the back of the system unit (Figure 1–7).

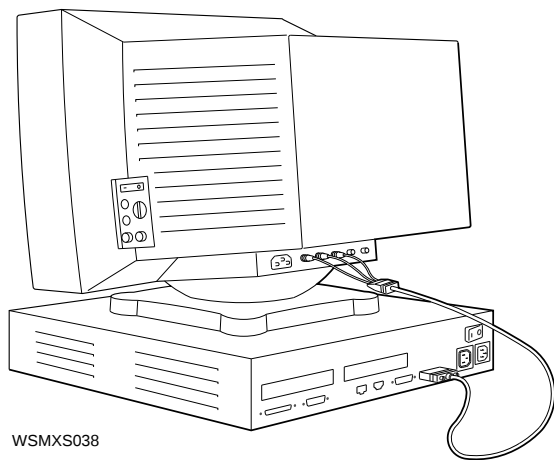
Figure 1–7 Connecting the Monitor Cable to the Video Connector on the Back of the System Unit



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. In this case, you will need to use the monitor's power switch to turn it on.

1.2 Connecting the Monitor

Figure 1-8 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 gray-scale cable (customer order #BC09M-10)

1.2 Connecting the Monitor

Connecting the 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:

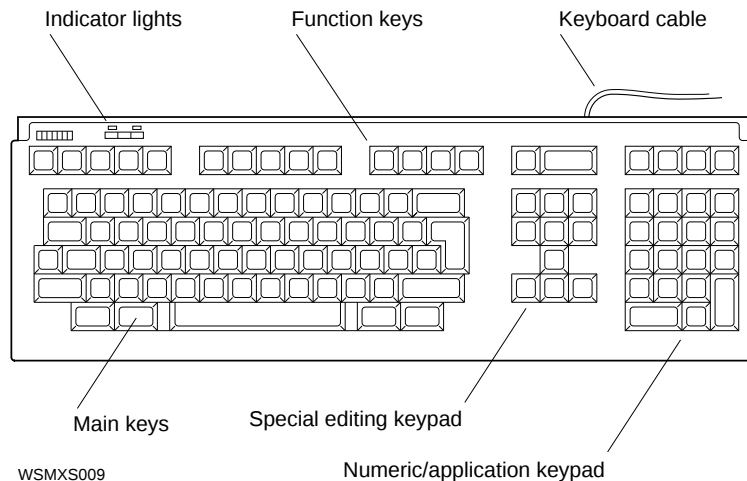
- VRT16
- VRT19
- VR319
- VR320

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

1.3 Connecting the Keyboard

The LK501 keyboard comes with your workstation. One set of keys works 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.

Figure 1-9 LK501 Keyboard

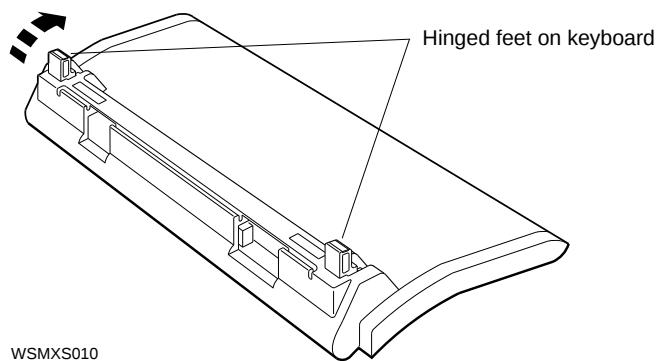


1.3 Connecting the Keyboard

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

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

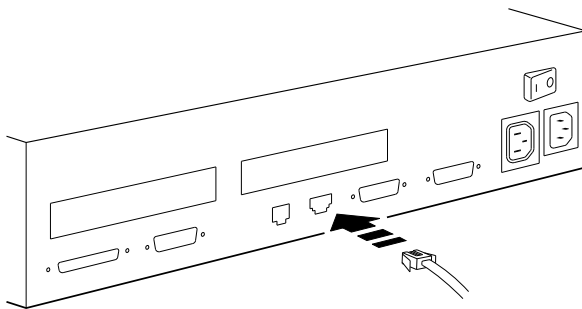
Figure 1-10 Tilting the Keyboard



1. Plug either end of the keyboard cable into the keyboard-mouse connector on the back of the system unit.

1.3 Connecting the Keyboard

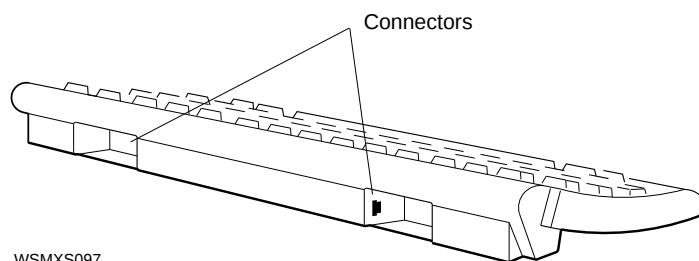
Figure 1–11 Connecting the Keyboard Cable to the Workstation



WSMXS056

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

Figure 1–12 Connectors on the LK501 Keyboard



WSMXS097

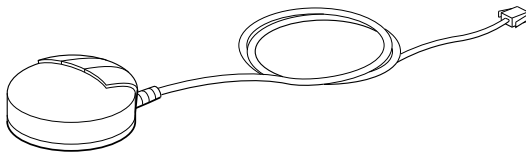
1.3 Connecting the Keyboard

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 to replace the shorter cable that comes with the workstation.

1.4 Connecting the Mouse

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

Figure 1-13 Mouse

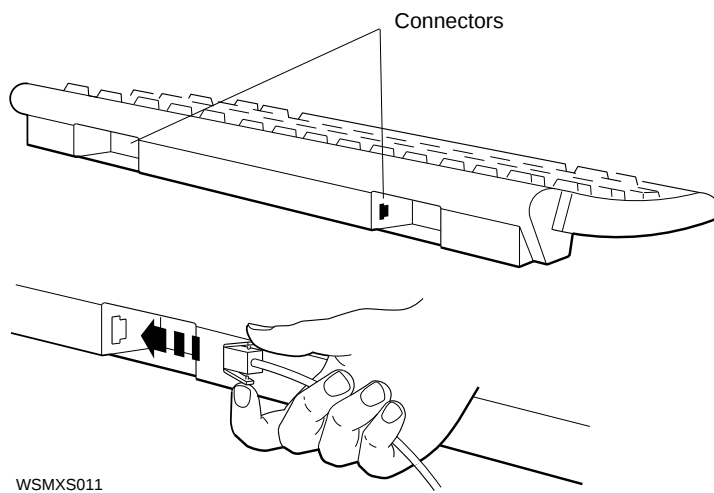


WSMXS012

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

1.4 Connecting the Mouse

Figure 1-14 Connecting the Mouse



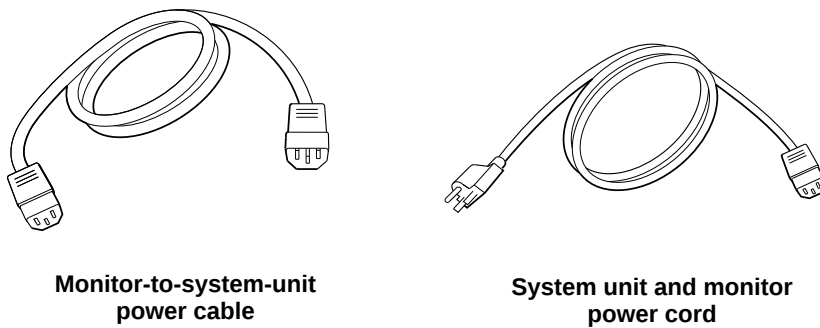
If you are using computer-aided design (CAD) applications with your workstation, you may want to connect a dial box or a button box as a pointing device. Connect these to the serial connector on the back of the system unit.

1.5 Connecting the 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.

1.5 Connecting the Power Cord and Monitor Cable

Figure 1–15 Power Cable and Power Cord



WSMXS099

- Use the power cable to connect the monitor to the power outlet on the back of the system unit.
- Use the power cord to connect the system unit to a wall outlet or power strip.

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.

2

The Environment

This chapter describes the following topics:

- Site Requirements
- Power Requirements

2.1 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.

2.1.1 Temperature and Humidity

- The temperature around the workstation should be between 50° F (10° C) and 95° F (35° C).

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

Protect your workstation from direct sunlight.

2.1 Site Requirements

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

2.1.2 Cleanliness

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

2.1.3 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.

2.2 Power Requirements

- Reserve an entire circuit for your workstation power source. The fuse for the circuit must be at least 20 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.

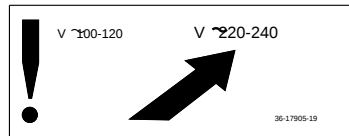
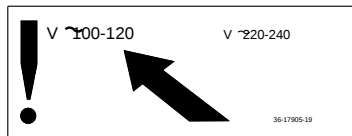
2.2 Power Requirements

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.

Figure 2-1 Voltage Labels



WSE21021

3

Starting and Testing

This chapter covers the following topics:

- Turning On Your Workstation
- Using the Power-Up Self-Test
- Using the System Self-Test
- Checking Your Workstation Configuration
- Booting Factory-Installed Software
- Installing Workstation Software
- Using the Workstation Software
- Turning Off Your Workstation

3.1 Turning On Your Workstation

To turn on your workstation:

1. Press the switch on the back of the system unit on (|).
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 its On/Off switch.
3. As soon as you turn on the system unit, the following things happen:
 - A green indicator light flashes quickly on the front of the system unit.
 - A green indicator light glows on the front of the monitor.
 - The system unit and the monitor run their power-up self-tests.

3.2 Using the Power-Up Self-Test

3.2 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 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 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 do not 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, 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 14 for instructions.

3.3 Using the System Self-Test

The system self-test checks to see that the system is functioning correctly. It is 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 Ethernet portion of the test will fail. See Chapter 5 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 usually takes from 1 to 5 minutes, depending on how much memory you have in your system. As the system performs the test, you see flickering text in the lower-left corner of the screen, and a beep sounds when the system tests the speaker. When the self-test is complete,

3.3 Using the System Self-Test

the flickering stops. If the self-test is successful, the console prompt (>>) appears on your screen.

If your system fails to turn on, or if the self-test is unsuccessful, see Chapter 14 for instructions.

3.4 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 optional memory, TURBOchannel modules, serial bus devices, or disk drives.

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

A display similar to this appears:

```
3: KN04      DEC V1.0a  TCF0  (12 MB)
                                (DV -- d=8)
                                (Sb: devs = 2)
                                (FDI: 0)
                                (enet: 08-00-2b-2f-e8-81)
                                (SCSI = 7)
```

The line beginning with the number (in the example, 3:) indicate a workstation slot: the connectors inside the system unit to which modules can be attached. The example shows slot 3, which is the base system module and will always be present.

Note

Listings for slot 0 and slot 1 appear only if you have a TURBOchannel option module in one or both of these slots. For more information about TURBOchannel option slot displays, see the *TURBOchannel Options User's Guide*.

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

(12 MB)	The amount of memory installed
(DV -- d=8)	The base system video
(Sb: devs = 2)	The keyboard and mouse
(FDI: 0)	The internal floppy disk drive
(enet: 08-00-2b-2f-e8-81)	Your workstation Ethernet address
(SCSI = 7)	The ID of the SCSI connector on the base system module

3.4 Checking Your Workstation Configuration

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 lines of the display 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

Look at the first 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.

After you turn on your workstation and check its configuration, you can boot the workstation software.

If your workstation has factory-installed software, a sticker on the back of the system unit will state: “If this system contains a hard disk with pre-installed software, see your *Installation Guide* before booting the system.”

3.5 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.

3.6 Installing Workstation Software

3.6 Installing Workstation Software

Follow the instructions in the *Guide to Installing ULTRIX* to install your workstation software.

Note

You must be running ULTRIX and UWS V4.3A or later. Earlier versions of ULTRIX do not support the Personal DECstation Model 50.

3.7 Using the Workstation Software

After installing the software, you can start it up in subsequent sessions just by typing **boot** at the console prompt and pressing Return.

You will see some ULTRIX start up messages, and then the log-in screen will appear. 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.

After entering your user name and password, you can begin using your workstation software. When you are ready to conclude your session, choose Quit from the Session menu in your session manager window.

3.8 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 O on the On/Off switch on the back of the system unit.

3.8 Turning Off Your Workstation

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 O on the On/Off switch.

Moving Your Workstation

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

4.1 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 expansion boxes.
3. Turn off the system unit by pressing the O 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 O on the On/Off switch.
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 are on a network, disconnect the Ethernet cable from the system unit. Otherwise, remove the loopback connector.

4.2 Packing Your Equipment

4.2 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

Connecting to a Network

This chapter covers the following topics:

- If Your Workstation Is Not Part of a Network
- Connecting Your Workstation to a Network
- Finding Your Ethernet Address

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.

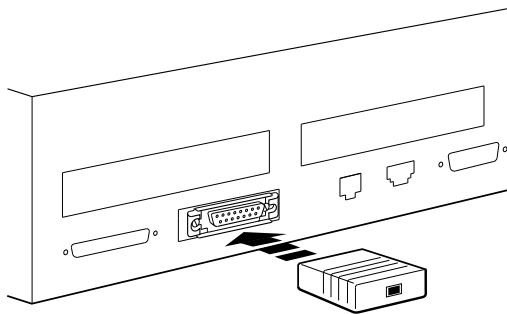
5.1 If Your Workstation Is Not Part of a Network

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 Ethernet part of 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 that its widest part is on top.
2. Push the loopback connector all the way into the ThickWire Ethernet connector on the system unit.

Figure 5-1 Connecting the Loopback Connector



WSMXS062

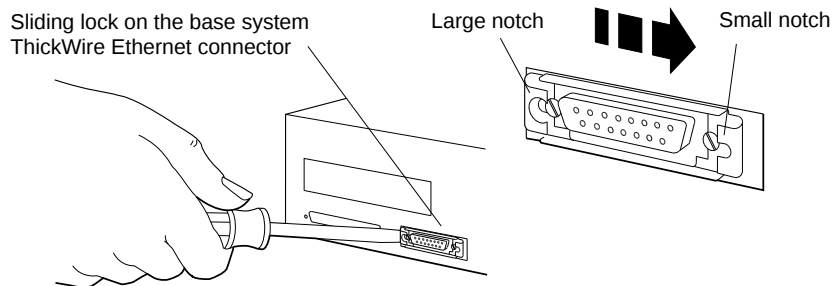
5.2 Connecting Your Workstation to a Network

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, 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, use an adapter to make this connection.

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).

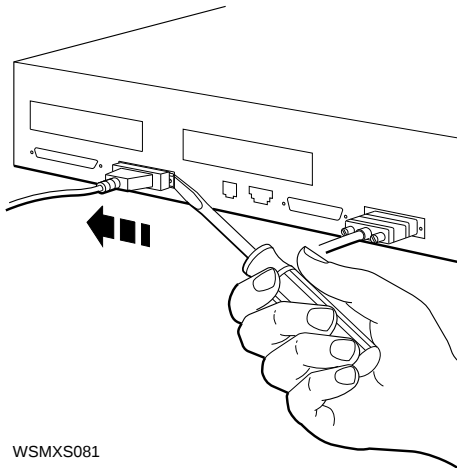
Figure 5-2 Unlocking the Sliding Lock on the System Unit Ethernet Connector



WSMXS080

- 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.

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 Section 5.2.1.
- To connect to a ThinWire network, see Section 5.2.2.
- To connect to a Twisted-pair network, see Section 5.2.3.

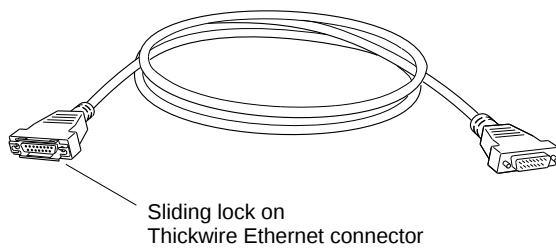
You can also connect your workstation to additional Ethernet networks, or to other kinds of networks, by using a TURBOchannel module. See the *TURBOchannel Options User's Guide* for information on how to do this.

5.2.1 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 O 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. Take the end of the cable without the sliding lock and position it so that its widest part is on top.

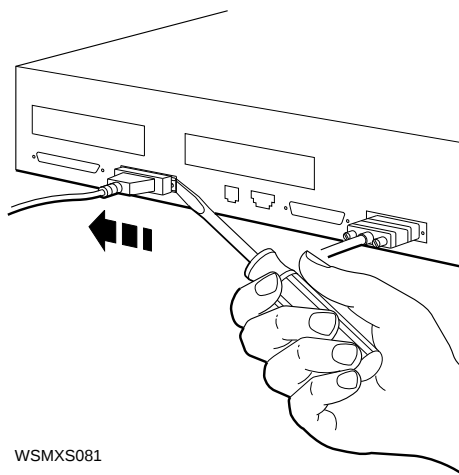
Figure 5-4 ThickWire Ethernet cable



WSMXS019

5. Push the cable connector all the way into the ThickWire connector on the system unit.
6. Lock the sliding lock on the system unit connector.

Figure 5-5 Connecting the ThickWire Ethernet Cable to the System Unit



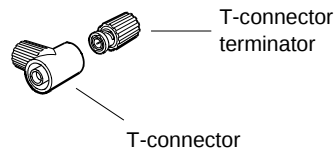
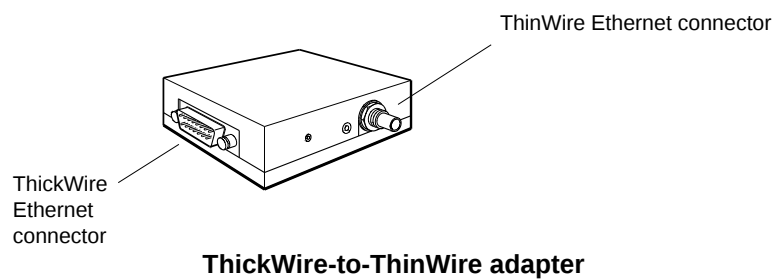
7. *Do not* attach the other end of the ThickWire cable at this time. Turn to Section 5.3. Report your address to your system manager, who will complete the connection to the network.

5.2.2 Connecting to a ThinWire Network

Connect the PersonalDECstation 5000 Model 50 workstation to the ThinWire Ethernet network cable using the ThickWire-to-ThinWire adapter, as follows:

1. Follow the instructions in Section 5.2.1 to connect the ThickWire cable to the system unit.
2. Find the ThickWire-to-ThinWire adapter, the T-connector, and the T-connector terminator that you ordered for your workstation.

Figure 5-6 Parts Used to Connect a ThinWire Network



T- connector and terminator

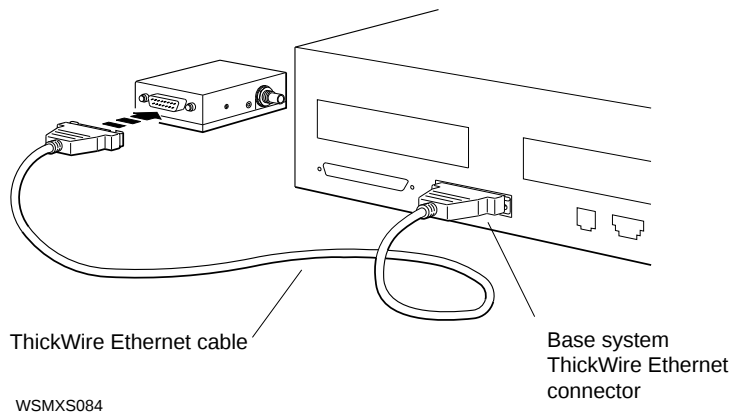
WS3PO078

3. Find the connector with the sliding lock on the other end of the ThickWire Ethernet cable you connected to the workstation.

Make sure the sliding lock on the cable connector is in the unlocked position.

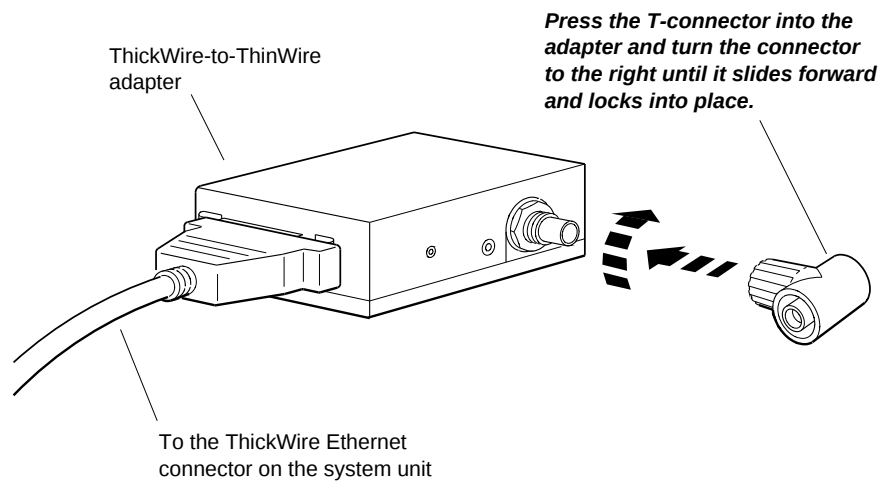
4. Hold the ThickWire-to-ThinWire adapter and the free end of the ThickWire cable so that the connectors match. Push the ThickWire cable connector with the sliding lock onto the ThickWire connector on the adapter.
5. Slide the lock on the cable attached to the adapter to the locked position.

Figure 5-7 Connecting a ThickWire cable to the ThinWire Adapter



6. Attach the T-connector to the ThinWire Ethernet connector on the adapter.

Figure 5-8 Attaching a T-connector

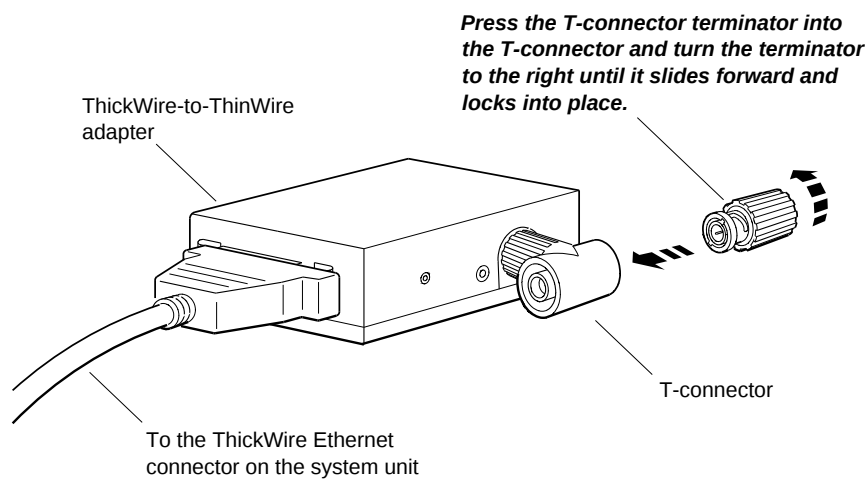


WS3PO074

7. If you are connecting the workstation *within* a network cable segment, leave both ends of the T-connector free to attach your in-house network cables.

If you are connecting the workstation at the end of a network cable segment, attach a T-connector terminator to the open end of the T-connector on the adapter.

Figure 5-9 Attaching a T-connector Terminator



WS3PO093

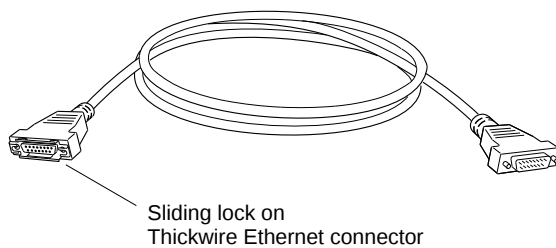
8. Put an Ethernet loopback connector on any unused Ethernet connectors in the TURBOchannel slots.

After you test the workstation, use the config command (see Section 13.4.4) to find the Ethernet station address of your workstation. Give the address to your system manager, and ask the manager to complete the network connection.

5.2.3 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 O 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. Take the end of the cable without the sliding lock and position it so that its widest part is on top.

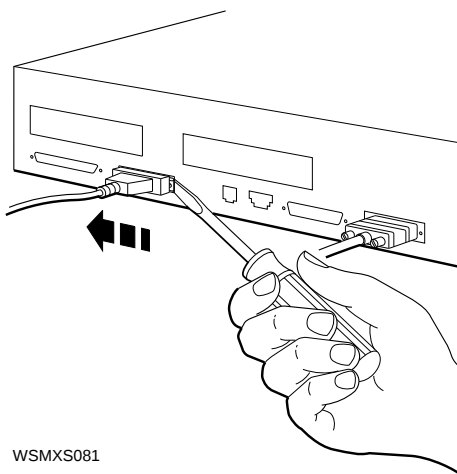
Figure 5-10 ThickWire Ethernet Cable



WSMXS019

5. Push the cable connector all the way into the ThickWire connector on the system unit.
6. Lock the sliding lock on the system unit connector.

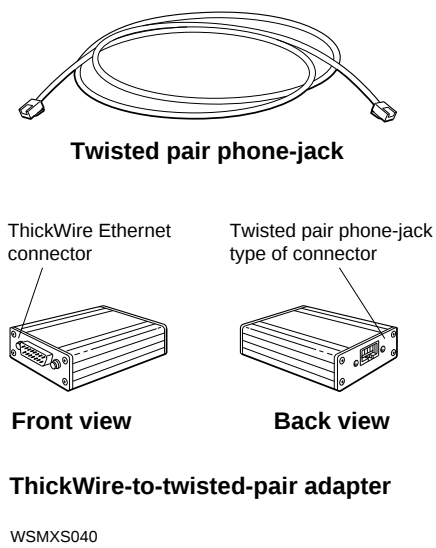
Figure 5-11 Connecting the ThickWire Ethernet Cable to the System Unit



WSMXS081

7. Find the ThickWire-to-twisted-pair adapter and the twisted-pair Ethernet cable.

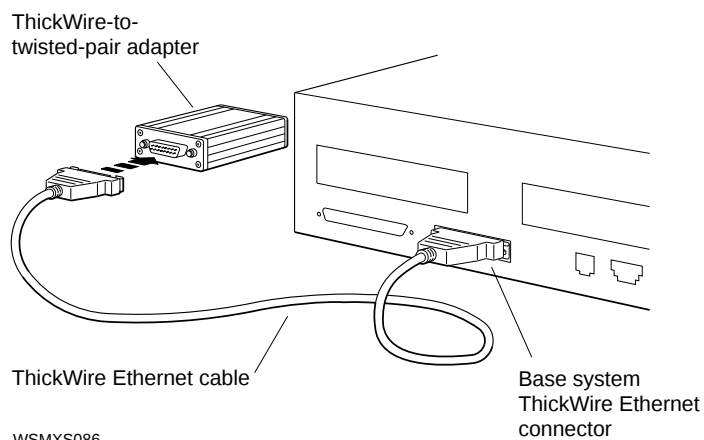
Figure 5-12 Parts for Connecting to a Twisted-Pair Ethernet Network



To Connect the ThickWire-to-Twisted-Pair Adapter

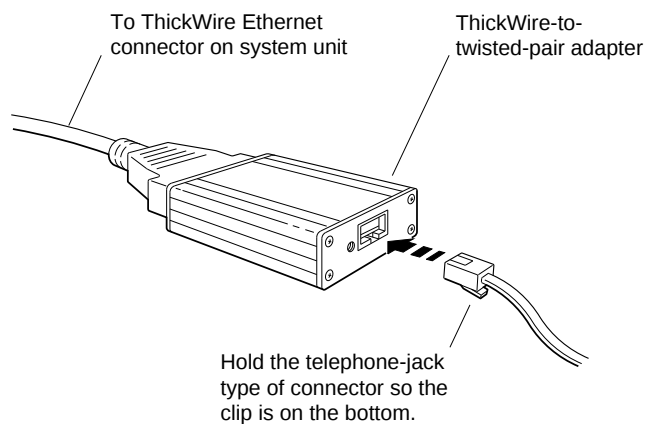
1. If necessary, unlock the sliding lock on the cable connector.
2. Hold the ThickWire cable so that its widest part aligns with the widest part of the ThickWire connector on the adapter.
3. Push the cable connector and the adapter connector together.
4. Push the sliding lock on the cable connector toward the connectors until it locks them in place.

Figure 5-13 Connecting the Adapter to the ThickWire Cable



5. Find the twisted-pair cable. It has a telephone-jack type of connector and position the connector on the cable so that the clip is on the bottom.
6. Push the connector into the empty connector on the adapter until you feel the connector click into place.

Figure 5-14 Connecting the Twisted-Pair Cable to the Adapter



WSMXS087

7. *Do not* attach the other end of the twisted-pair cable at this time. See Section 5.3 for instructions on finding your Ethernet station address. Report this address to your system manager, who will complete the connection to the network.

5.3 Finding Your Ethernet Address

To complete the connection to the network, you will 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 console prompt (**>>**), type **cnfg** and press Return.

A display similar to this appears on your screen:

```
3:  KN04      DEC  V1.0a  TCF0  (12 MB)
                                   (DV -- d=8)
                                   (Sb: devs = 2)
                                   (FDI: 0)
                                   (enet: 08-00-2b-2f-e8-81)
                                   (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. 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 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 covers the following topics:

- Storage Devices You Can Add to Your Workstation
- Guidelines for Connecting SCSI Storage Devices
- Verifying the SCSI ID Settings
- Connecting an Expansion Box to the System Unit
- Linking Storage Devices Together
- Testing an Expansion Box Installation

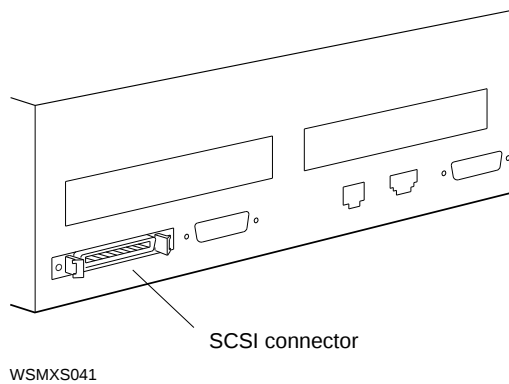
6.1 Storage Devices You Can Add to Your Workstation

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 drives contained within an expansion box. For a list of the drives that can be connected to your workstation, see Appendix E.

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

6.1 Storage Devices You Can Add to Your Workstation

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 10.

6.2 Guidelines for Connecting SCSI Storage Devices

6.2 Guidelines for Connecting SCSI Storage Devices

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

- 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.)
- The maximum length of a SCSI bus is 6 m (19.8 ft).
- Each drive enclosure (such as the SZ12 expansion box) 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 which comes with the drive. The TURBOchannel extender (TCE) box has its own internal terminator. If you are using the TCE, you must always place it last in the chain.
- Each drive in the chain must have a unique SCSI ID. See Section 6.3 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 starting up your system, turn on the devices attached to it first (in any order) and then turn on the system unit.

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

6.3 Verifying the SCSI ID Settings

6.3 Verifying the SCSI ID Settings

Every SCSI device attached to a given connector must have a unique SCSI ID. If two or more devices have the same ID, one device will not be recognized in the system configuration.

SCSI storage drives are usually assigned a SCSI ID number at the factory where they are 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 are using and how to change these numbers if necessary.

6.3.1 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
CD-ROM 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.

6.3.2 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.

6.3 Verifying the SCSI ID Settings

The screen display will list the drives connected to slot 3 of your system, which is the base system module. The last lines of the display 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 second column, labeled 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 first column, labeled 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 can have the same number. If they do, one of the drives will not appear in this display.*

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

6.3 Verifying the SCSI ID Settings

To check the IDs of SCSI devices connected to a TURBOchannel option module, type **cnfg 0** or **cnfg 1** at the console prompt, depending on which TURBOchannel slot your external drive connects to.

6.3.3 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, RZ24L, RZ25, and RZ26 hard disk drives, see Section 10.5. 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.

6.4 Connecting an Expansion Box to the System Unit

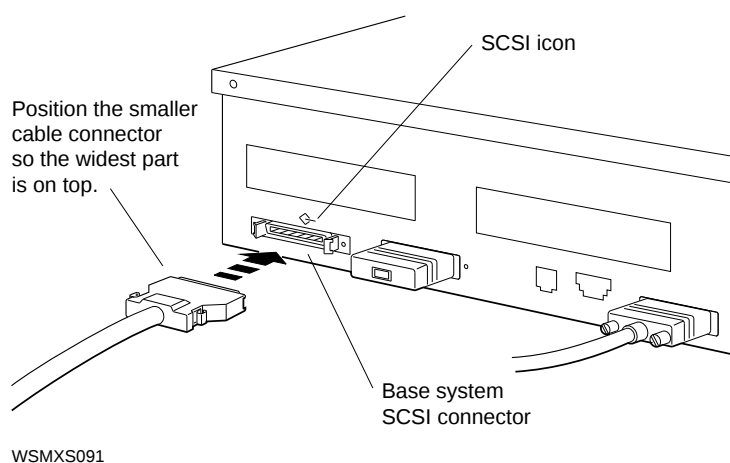
If you are connecting a TURBOchannel extender box (TCE) to the SCSI connector, see the guide that comes with the TCE.

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.

6.4 Connecting an Expansion Box to the System Unit

Figure 6-2 Attaching a System-Unit-to-Expansion-Box Cable to the SCSI Connector on the System Unit

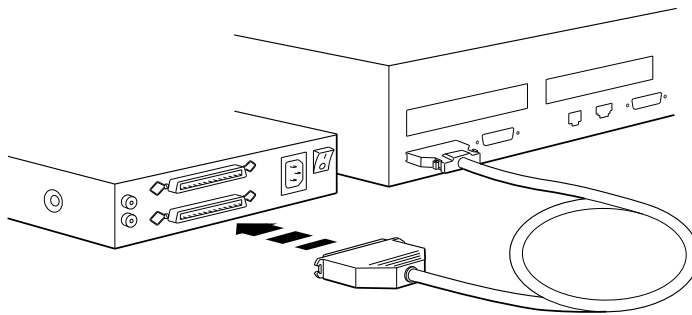


4. Attach the free end of the system-unit-to-expansion-box cable to either of the SCSI connectors on the back of the expansion box.
 - a. Press the two wire brackets on the expansion box connector away from the connector.
 - b. Hold the cable connector so that its widest part is on top.
 - c. Push the 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.

6.4 Connecting an Expansion Box to the System Unit

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 are 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 are 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.

6.5 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 have connected one expansion box or drive, connect others as follows:

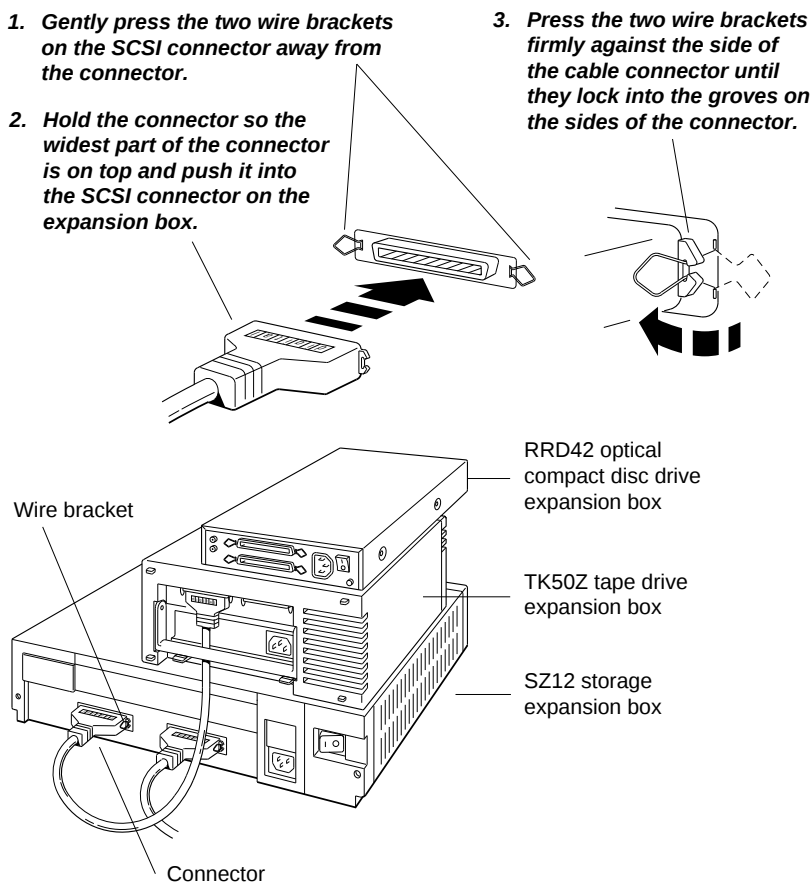
1. Plug one end of a box-to-box expansion cable into the unused SCSI connector on the back of the expansion box that you connected to your system unit.
2. Plug the other end of the cable into either of the SCSI connectors on the new box in the chain.

6.5 Linking Storage Devices Together

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.

Figure 6-4 Connecting Expansion Boxes in a Chain

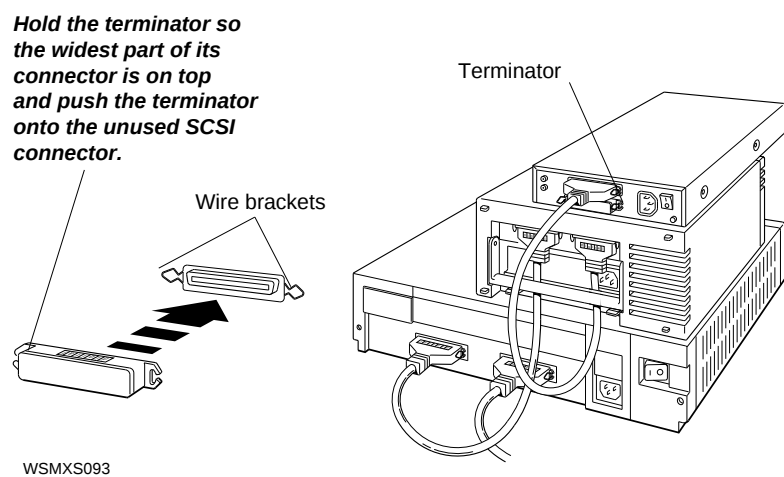


WSMXS092

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

6.5 Linking Storage Devices Together

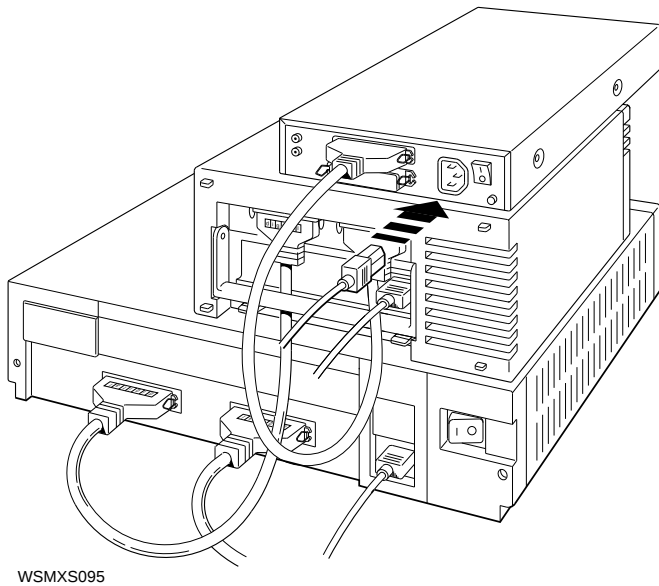
Figure 6-5 Terminating the Final Expansion Box



6.5 Linking Storage Devices Together

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



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

6.6 Testing an Expansion Box Installation

6.6 Testing an Expansion Box Installation

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 lines of the display 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 first column labeled 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 have connected are not listed in the configuration display or if they are listed incorrectly, turn off the system power, open the system unit, and check to make sure the drives are properly installed.

If you have made sure the drives are properly installed and the configuration display still does not list them correctly, two or more devices might be set to the same SCSI ID. You will need to change the ID for one of these drives before your system will work properly. (See Section 6.3.3.)

Communication Devices

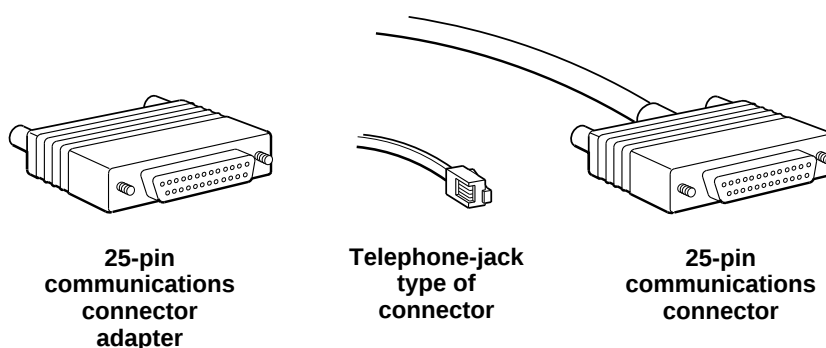
This chapter describes how to connect communication devices.

7.1 Connecting Communication Devices

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

Figure 7-1 Connectors and Adapter for Communication Devices



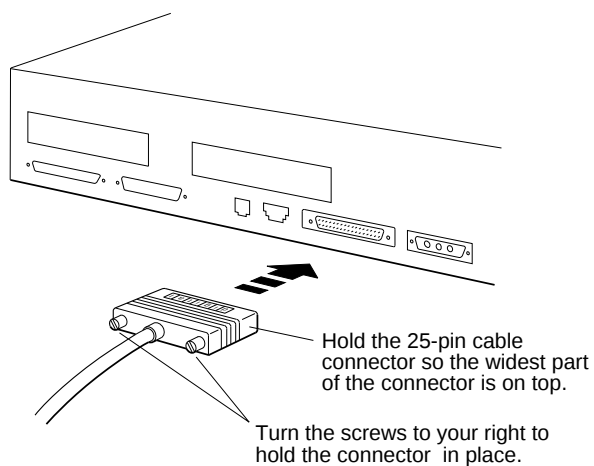
WSMXS042

7.1 Connecting Communication Devices

7.1.1 Connecting 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.

Figure 7-2 Connecting a 25-pin Connector



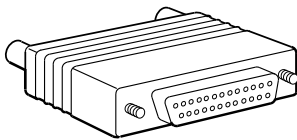
WSMXS043

7.1 Connecting Communication Devices

7.1.2 Connecting with a Telephone-Jack Type of Connector (MMJ)

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

Figure 7-3 A Communications Connector Adapter

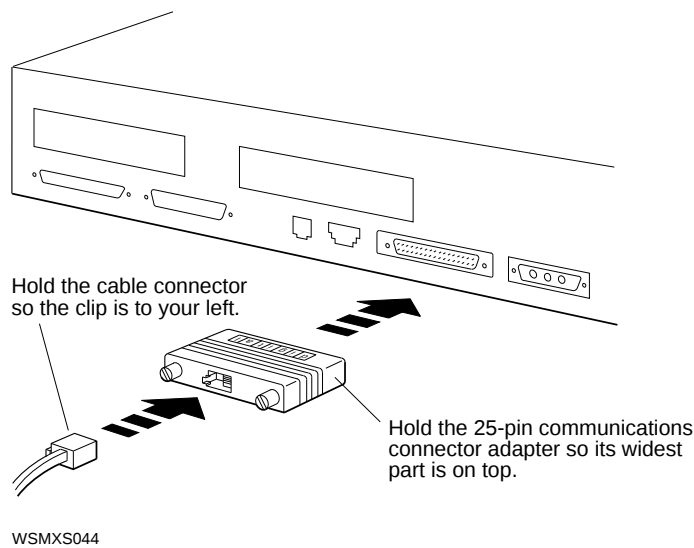


WSMXS045

2. Hold the adapter so that 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 that the clip is on your left.
5. Push the cable connector into the connector on the adapter until the cable connector clicks into place.

7.1 Connecting Communication Devices

Figure 7-4 Using an Adapter to Connect a Communications Device to the System Unit



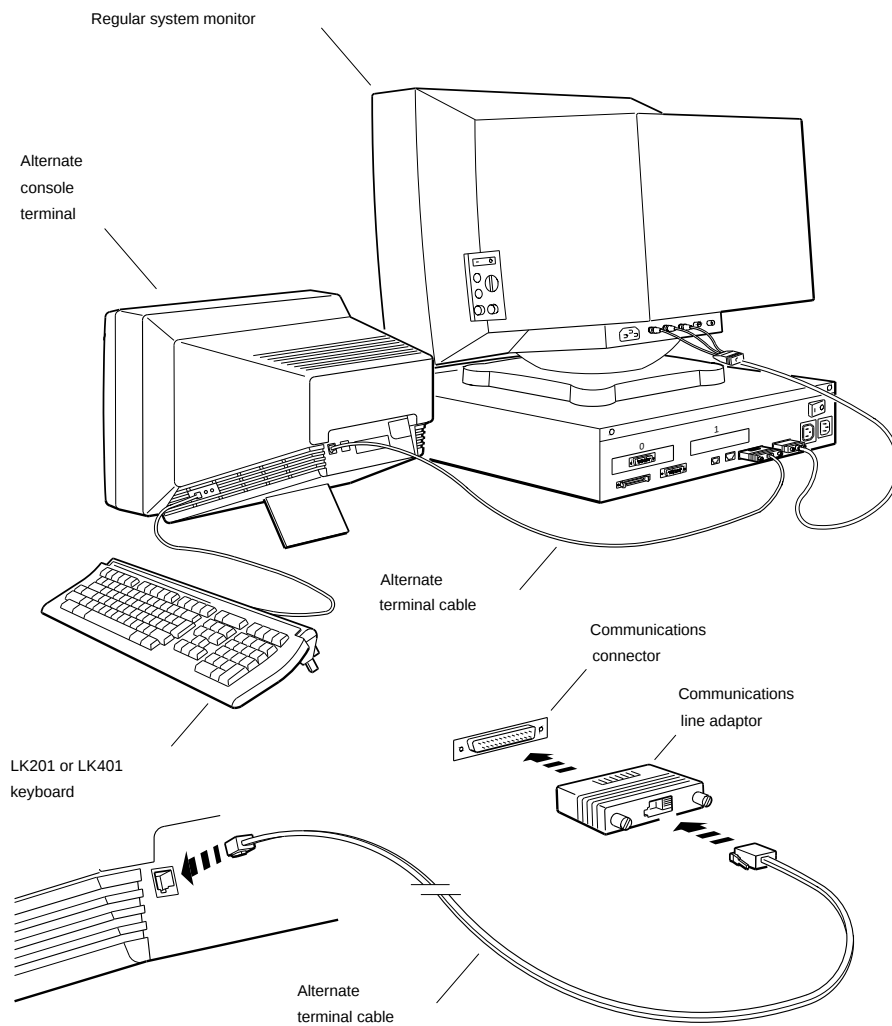
If your printer, plotter, or modem fails to work, see the troubleshooting instructions in the documentation that came with the device or ask your system manager for help.

The Server Configuration

The Personal DECstation can 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 output from a VT320-type terminal attached to the RS232 port in the rear of the system unit.

Figure 8-1 Installing a Console Terminal



WSMXM074

8.1 Connecting a Console Terminal

8.1 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

Users 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.

8.2 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 press Ctrl, Alt, and Return. Digital recommends that developers who might need to do this also set the console environmental variable to **s**, as explained in the next section.

8.2 Halting a Server

Note

The Personal DECstation does not have an explicit Halt switch.

8.2.1 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 *
```

8.2.2 Operational Background Information

Your system can 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 power up, the system looks for a keyboard plugged into the ACCESS.bus. If one is found, the system routes all console messages to the graphics monitor. If, however, no keyboard is detected on the ACCESS.bus, all text is 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 system 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 Section 8.2.1.

Part III

Internal Additions to Your Workstation

9

Opening and Closing the System Unit

This chapter explains the following topics:

- Opening the System Unit
- Using the Antistatic Wrist Strap
- Closing the System Unit

9.1 Opening the System Unit

Occasionally you may need to get inside your system unit—to add optional modules, for example, or to upgrade your system. To remove the cover from the system unit, follow these steps:

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

Note

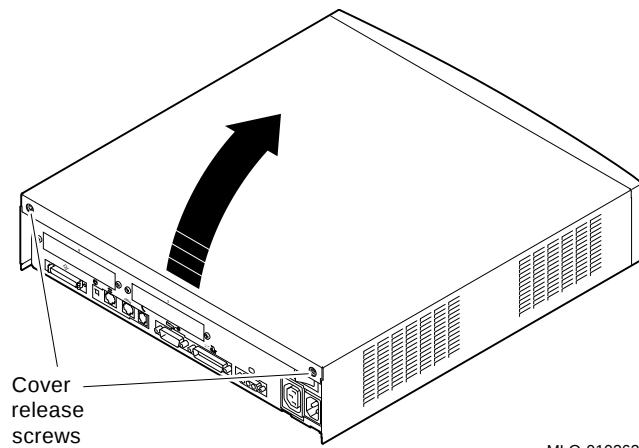
You must be in superuser mode to shut down the system. This requires that you obtain superuser privileges from your system manager. Access superuser mode by typing **su**, pressing Return, and entering your password.

2. Turn off the system unit by pressing O on the On/Off switch on the back of the unit.

9.1 Opening the System Unit

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

Figure 9-1 Removing the System Unit Cover



MLO-010262

4. Pivot the cover on the tabs that are along the lower part of the cover's front edge.
5. When the tabs are loose in their slots, lift the cover up and away from the system unit.

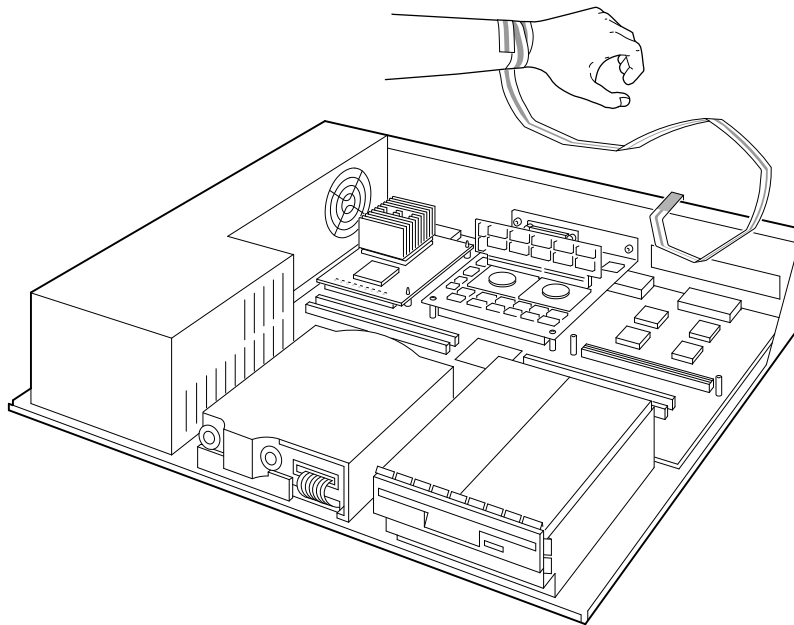
9.2 Using the Antistatic Wrist Strap

9.2 Using the Antistatic Wrist Strap

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

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.

Figure 9-2 Attaching the Antistatic Wrist Strap



MLO-010082

Your system unit may not contain everything shown in Figure 9-2.

9.3 Closing the System Unit

9.3 Closing the System Unit

To replace the cover on the system unit, follow these steps:

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.

10

Internal Storage Devices

This chapter covers the following topics:

- Disk Drives That Digital Supports
- Installing a Floppy Disk Drive
- Testing a Floppy Disk Drive Installation
- Removing a Floppy Disk Drive
- Setting the Hard Disk Drive SCSI IDs
- Installing a Hard Disk Drive
- Testing a Hard Disk Drive Installation
- Removing a Hard Disk Drive

10.1 Disk Drives That Digital Supports

You can install several different drives inside your system unit, including:

- RX26 floppy disk drive (2.8 megabytes)
- RZ23L hard disk drive (121 megabytes)
- RZ24L hard disk drive (245 megabytes)
- RZ25 hard disk drive (426 megabytes)
- RZ26 hard disk drive (1.05 gigabytes)

The hard disk drives are SCSI devices; the floppy disk drive is not. Digital will make other drives available from time to time. Please consult your Digital representative about these devices as they are released.

All disk drives other than these must be connected externally. Chapter 6 describes external storage devices that 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.

10.2 Installing a Floppy Disk Drive

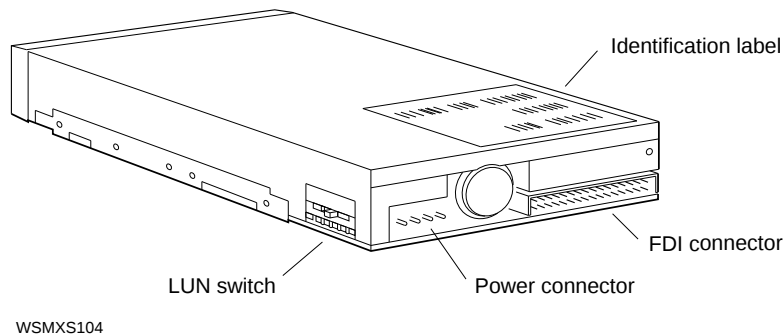
10.2 Installing a Floppy Disk Drive

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.

10.2.1 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 (LUN) 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. Check that the switch is set at 0.

Figure 10–1 Checking the Drive Select Number on a Floppy Disk Drive



10.2.2 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 system unit by pressing the O on the On/Off switch on the back of the system unit.

10.2 Installing a Floppy Disk Drive

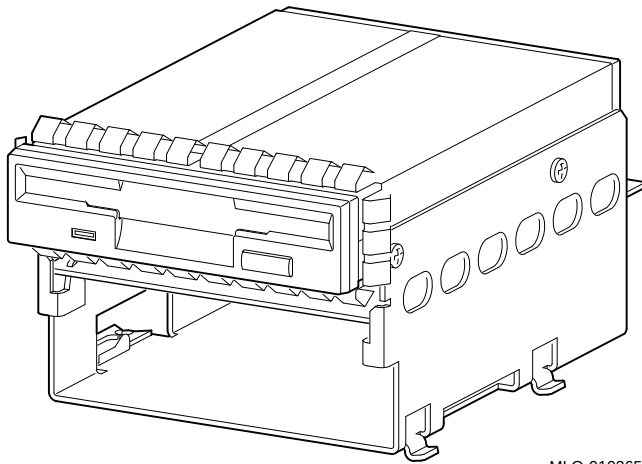
3. Open the system unit. (See Section 9.1.)

Caution

Attach the antistatic wrist strap before you touch anything inside the system unit. Always use this strap when you work inside the system unit to avoid damage to internal devices from static discharge.

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

Figure 10–2 Floppy Disk Drive and Mounting Bracket

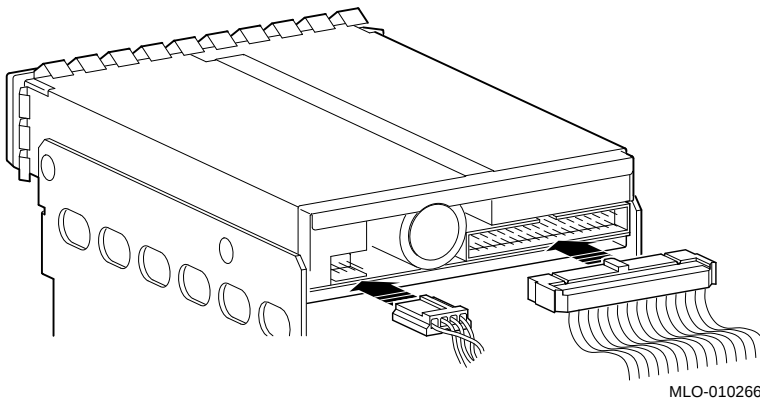


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5. Connect the FDI cable to the drive.
6. Connect the long end of the internal drive power cable to the drive.

10.2 Installing a Floppy Disk Drive

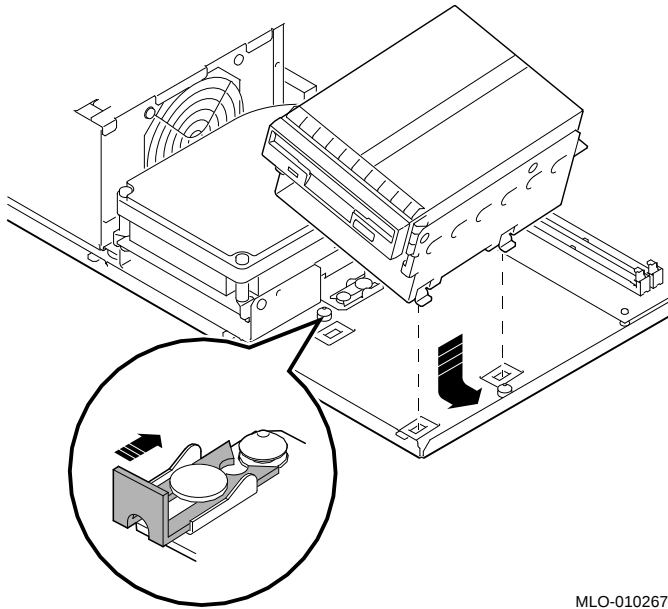
Figure 10–3 Connecting the FDI Cable and the Internal Drive Power Cable to the Floppy Disk Drive



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 right side of the mounting bracket into the slots in the base of the system unit.

10.2 Installing a Floppy Disk Drive

Figure 10–4 Installing the Floppy Disk Drive in the System Unit



MLO-010267

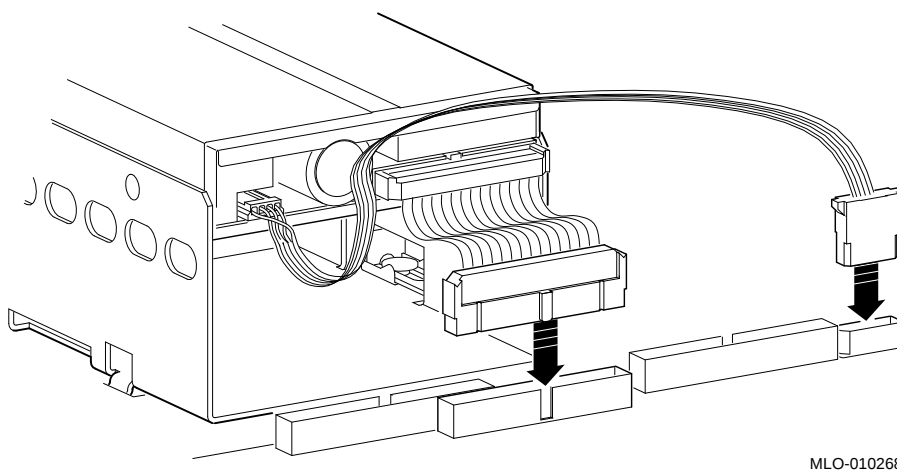
8. Lower the left side of the disk drive assembly so that the hole in the mounting bracket fits over the post on the base of the system unit. Press the drive down firmly.
9. Slide the latch beside the post into the locked position.
10. Connect the floppy disk interface (FDI) cable to the FDI connector on the base system module as shown in Figure 10–5.
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 have installed a hard drive, the power cable will already be connected to the base system module.

10.2 Installing a Floppy Disk Drive

Figure 10–5 Connecting the FDI Cable and the Internal Drive Power Cable



12. Replace the cover of the system unit. (See Section 9.3.)
13. Turn on the system unit by pressing the **|** on the On/Off switch on the back of the system unit.

10.3 Testing a Floppy Disk Drive Installation

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:KN04      DEC V1.0a TCF0 (12 MB)
              (DV -- d=8)
              (Sb: devs = 2)
              (FDI: 0)
              (enet: 08-00-2b-2f-e8-81)
              (SCSI = 7)
```

10.3 Testing a Floppy Disk Drive Installation

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, either you have no floppy drive installed in your system unit, or the drive is not installed properly and the workstation does not recognize it. You will need to open the system unit and check the drive's installation.

10.4 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 system unit by pressing the O on the On/Off switch on the back of the system unit.
3. Open the system unit. (See Section 9.1.) The floppy disk drive is in the right front corner.

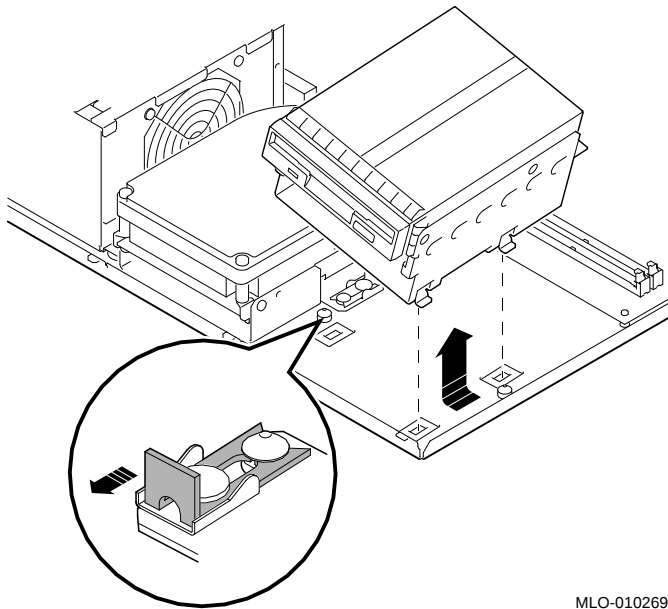
Caution

Attach the antistatic wrist strap before you touch anything inside the system unit. Always use this strap when you work inside the system unit to avoid damage to internal devices from static discharge.

4. Disconnect the FDI cable from the drive and from the connector on the base system module.
5. 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.
6. On the left side of the disk assembly, you will see a sliding latch. Slide the latch backward to unlock it.
7. Raise the left side of the floppy disk assembly off the small post that holds it.

10.4 Removing a Floppy Disk Drive

Figure 10–6 Removing a Floppy Disk Drive



MLO-010269

8. Keep lifting the disk assembly until you can slide the tabs on its right side out of the slots in the base of the system unit.
9. Replace the cover of the system unit. (See Section 9.3.)

10.5 Setting the Hard Disk Drive SCSI IDs

10.5 Setting the Hard Disk Drive SCSI IDs

Before you install a hard disk drive in your system unit, you need to make sure its SCSI ID is correct. (See Section 6.3 for general information about SCSI IDs.) The next section gives you instructions for setting the SCSI IDs of the most commonly used internal hard disk drives.

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

Caution

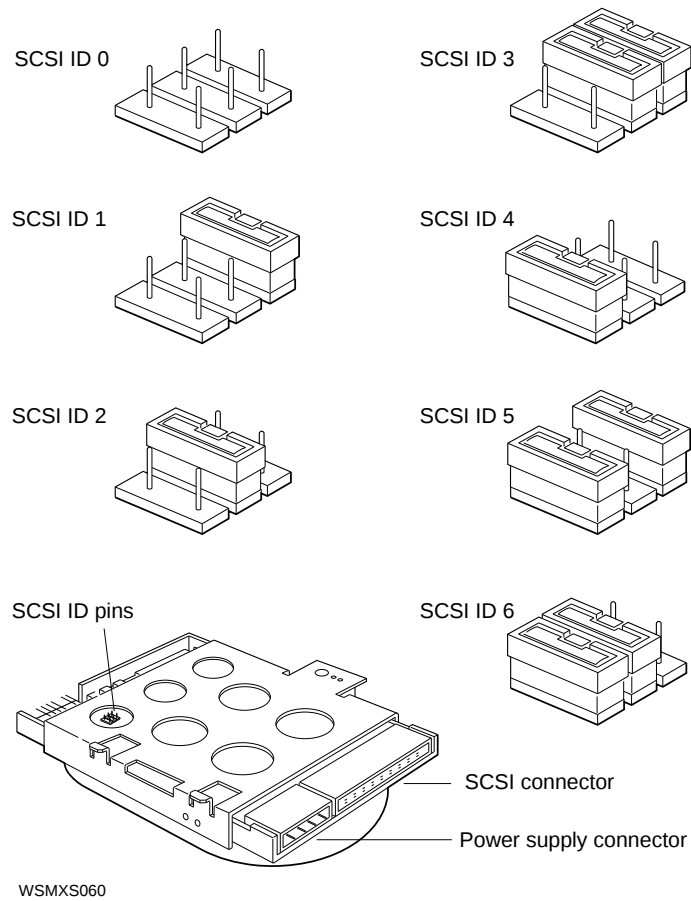
Each SCSI device attached to a given connector must have a unique ID. If two or more devices have the same ID, your workstation will not recognize one or the other of those drives.

10.5 Setting the Hard Disk Drive SCSI IDs

10.5.0.1 RZ23L Hard Disk Drive

The SCSI jumpers are on the underside of the RZ23L drive.

Figure 10–7 SCSI ID Jumper Settings for the RZ23L Hard Disk Drive

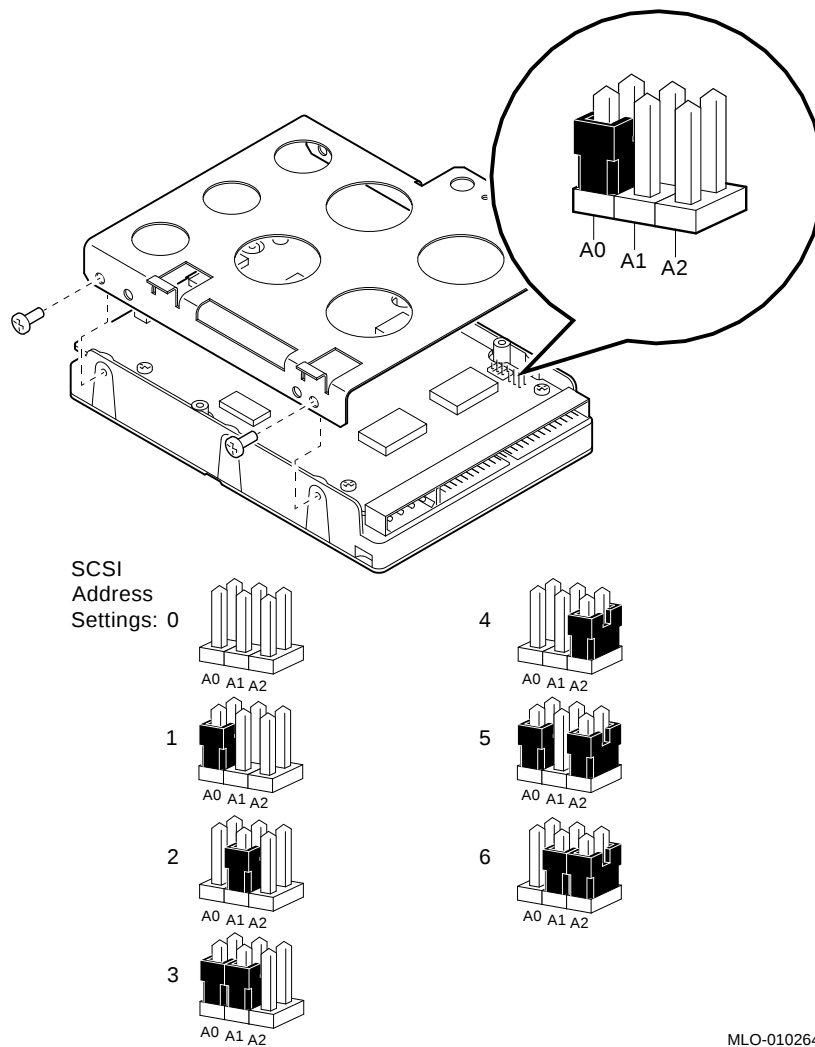


10.5 Setting the Hard Disk Drive SCSI IDs

10.5.0.2 RZ24L Hard Disk Drive

The SCSI jumpers are on the underside of the RZ24L drive.

Figure 10–8 SCSI ID Jumper Settings for the RZ24L Hard Disk Drive



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10.5 Setting the Hard Disk Drive SCSI IDs

10.5.0.3 RZ25 Hard Disk Drive

The RZ25 drive has two sets of pins, one on the side of the drive and one at the front.

Note

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.

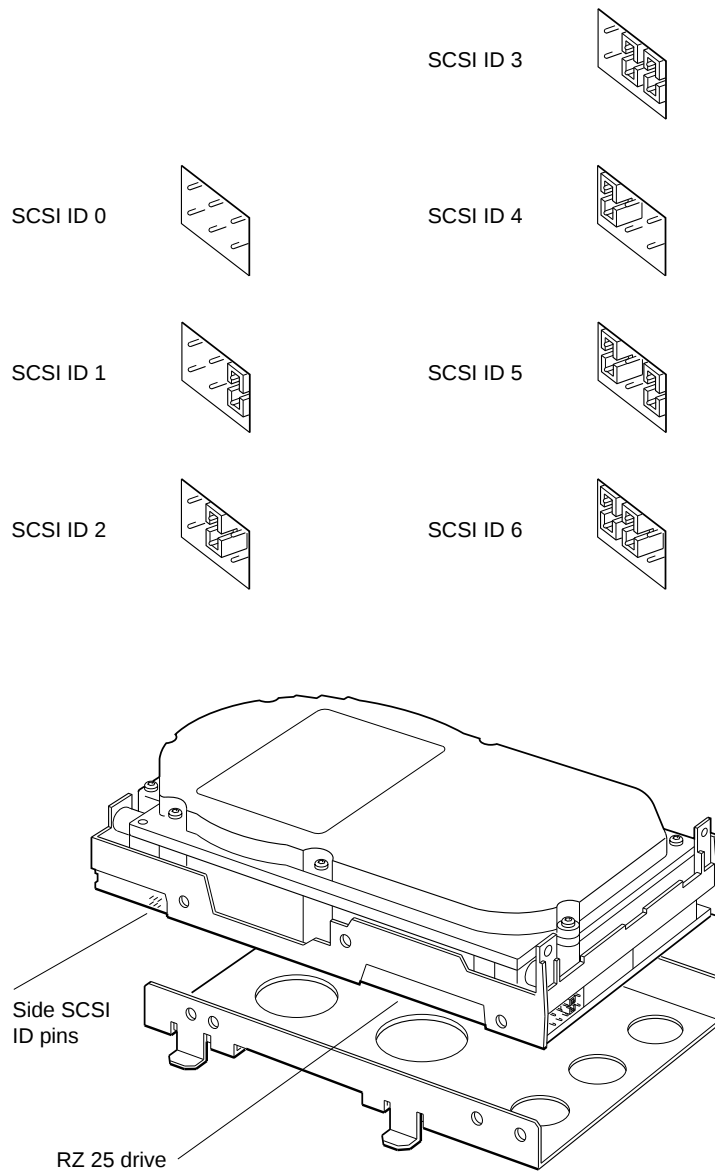
A factory-installed drive is set at SCSI ID 2. If you need to change the setting, you can use either set of pins. To set the ID, do the following:

- 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.
- 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.

An add-on drive ships set at SCSI ID 7 (all jumpers installed). It is important to set these jumpers to a different SCSI ID since SCSI ID 7 is assigned to the system SCSI controller.

10.5 Setting the Hard Disk Drive SCSI IDs

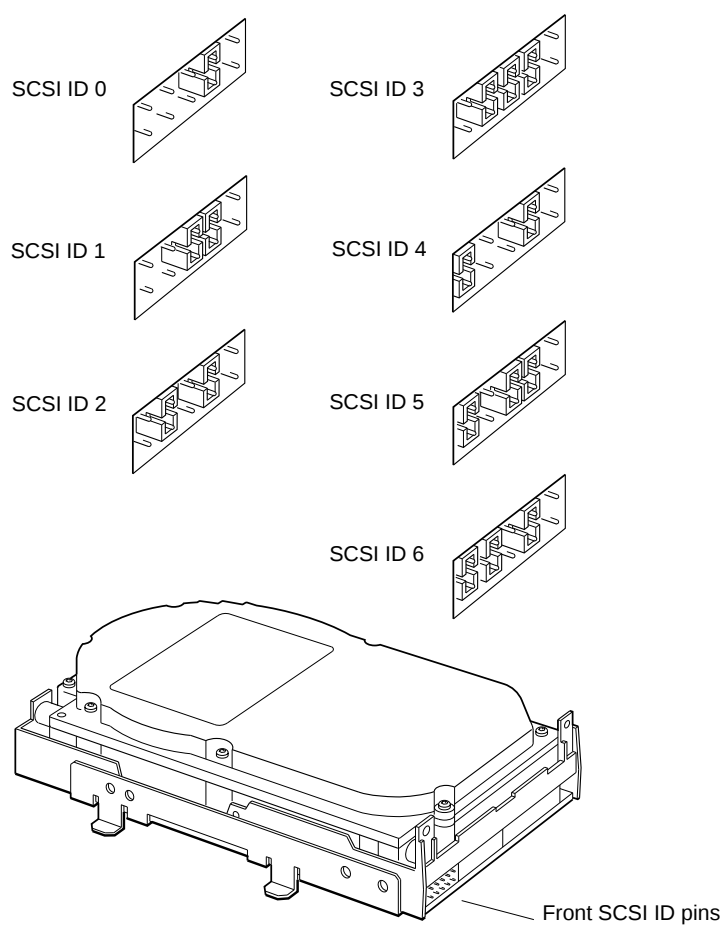
Figure 10–9 SCSI ID Settings Using the Pins on the Side of the RZ25 Drive



WSMXS108

10.5 Setting the Hard Disk Drive SCSI IDs

Figure 10–10 SCSI ID Jumper Settings Using the Pins on the Front of the RZ25 Drive



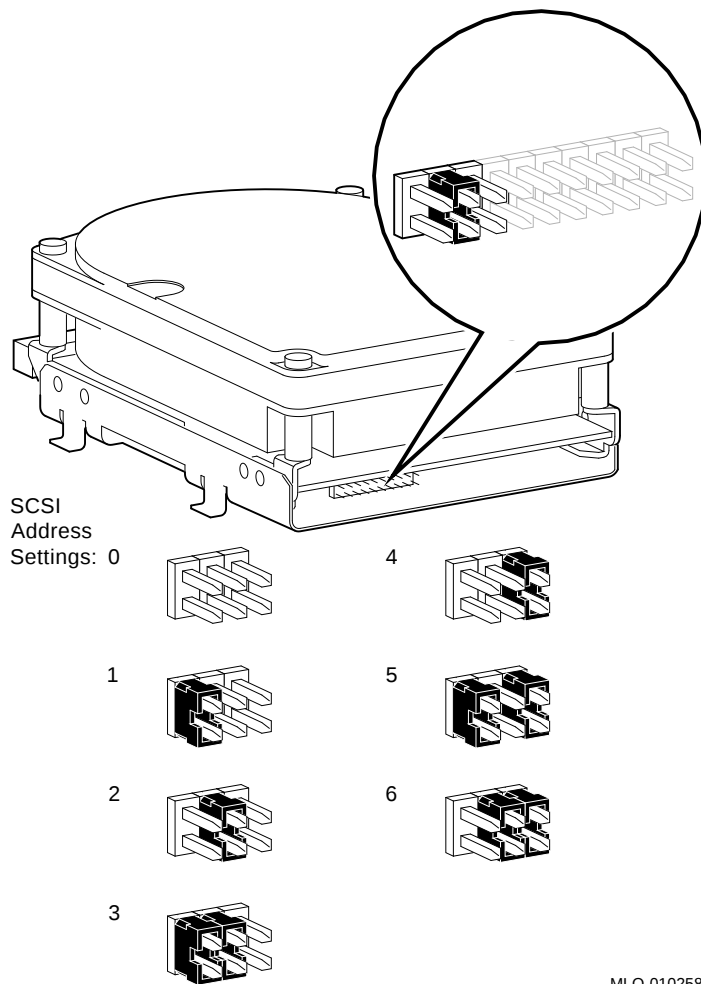
WSMXS058

10.5 Setting the Hard Disk Drive SCSI IDs

10.5.0.4 RZ26 Hard Disk Drive

Set the SCSI ID on the RZ26 drive to 2 unless you have another device with SCSI 2 already attached to the SCSI connector at the back of the system unit.

Figure 10–11 SCSI ID Jumper Settings for the RZ26 Hard Disk Drive



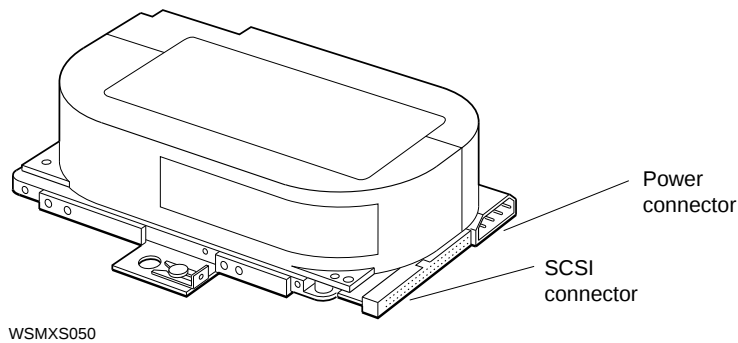
MLO-010258

10.6 Installing a Hard Disk Drive

10.6 Installing a Hard Disk Drive

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 O on the On/Off switch on the back of the system unit.
3. Open the system unit. (See Section 9.1.)
4. The hard disk drive comes in a metal mounting bracket. Hold the drive so that the bracket is on the bottom.

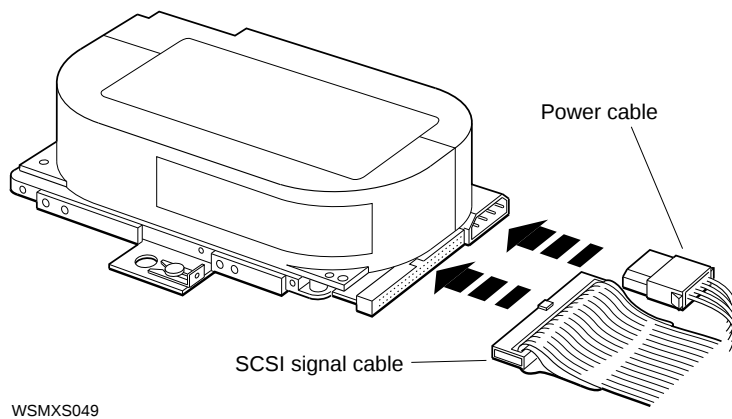
Figure 10–12 Hard Disk Drive and Mounting Bracket



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

10.6 Installing a Hard Disk Drive

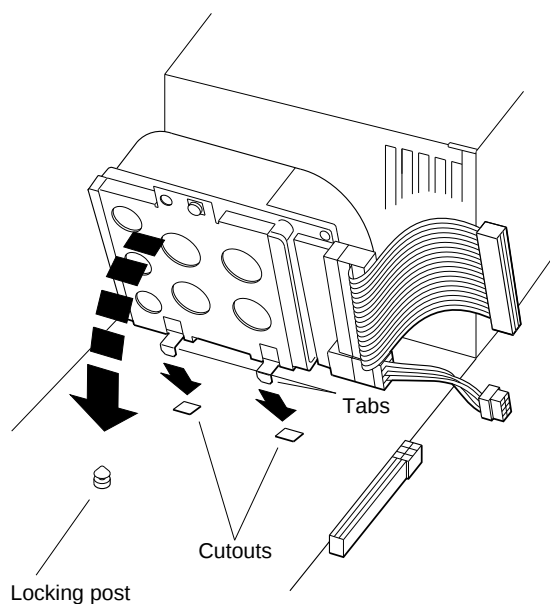
Figure 10–13 Connecting the SCSI Cable and the Internal Drive Power Cable to the Hard Disk Drive



7. The space for the hard disk drive is at the front of the system 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.

10.6 Installing a Hard Disk Drive

Figure 10–14 Installing the Hard Disk Drive in the System Unit



WSMXS102

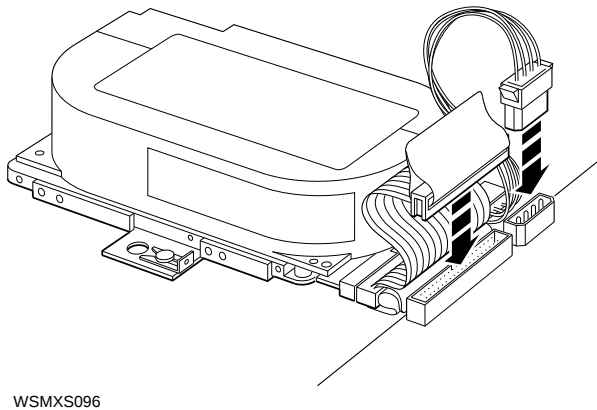
8. Lower the right side of the disk drive assembly so that the hole in the mounting bracket fits over the post on the base of the system unit. Press the drive down firmly.
9. Slide the latch beside the post into locked position.
10. Connect the SCSI cable to the SCSI connector on the base system module.
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 have installed a floppy drive, the power cable will already be connected to the base system module.

10.6 Installing a Hard Disk Drive

Figure 10–15 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 system unit by pressing the **|** on the On/Off switch on the back of the system unit.

10.7 Testing a Hard Disk Drive Installation

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 lines of the display 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 first 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.

10.7 Testing a Hard Disk Drive Installation

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 have connected are not listed in the configuration display or if they are listed incorrectly, turn off the system unit, remove the cover, and check to make sure that the drives are properly installed.

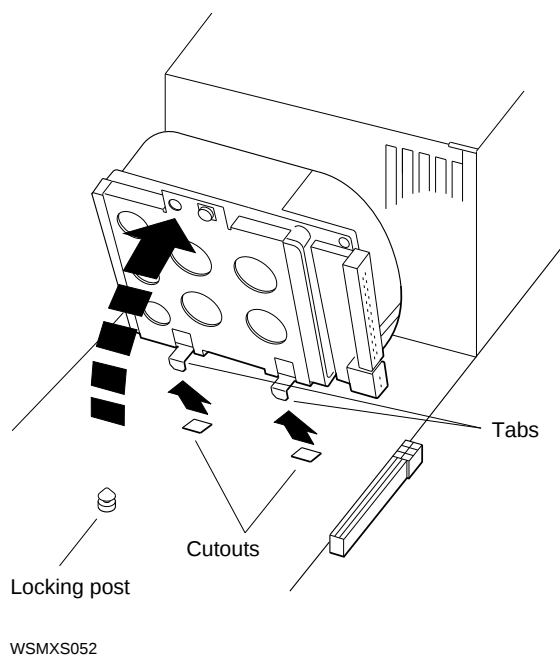
If you have made sure that the drives are properly installed and the configuration display still does not list them correctly, two or more devices might be set to the same SCSI ID. You will need to change the ID for one of these drives for your system to work properly. (See Section 10.5 or refer to the guide that came with the drive.)

10.8 Removing a Hard Disk Drive

1. Turn off the system unit by pressing the O on the On/Off switch on the back of the system unit.
2. Open the system unit. (See Section 9.1.) The hard disk drive is at the front of the unit, in the center.
3. Attach the antistatic wrist strap.
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 will 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.

10.8 Removing a Hard Disk Drive

Figure 10–16 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 Section 9.3.)

11

Memory Modules

This chapter covers the following topics:

- Identifying Memory Modules
- Adding Memory to Your Workstation
- Testing the Memory Module Installation
- Removing Memory from Your Workstation

11.1 Identifying 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.

Caution

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

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 part number etched on the module.

Caution

Do not touch anything inside the system unit until you put on the antistatic wrist strap provided by Digital.

11.1 Identifying Memory Modules

Table 11–1 shows how to distinguish the two 2-megabyte modules from each other and the 8-megabyte module.

Table 11–1 Identifying Memory Modules

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

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

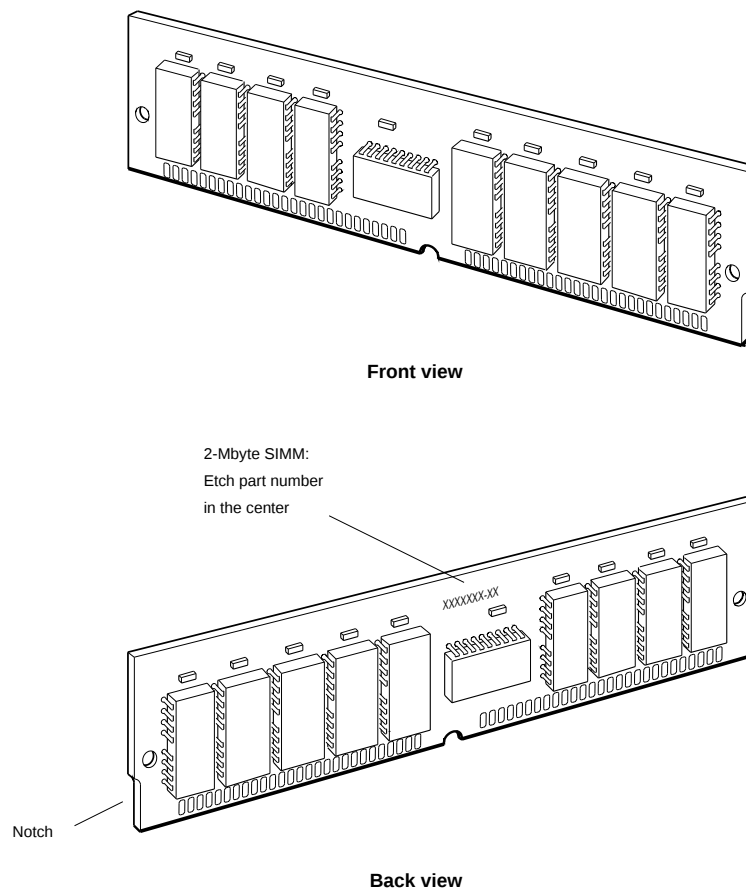
²The 54-21213-01 (MS01L-AB) memory module can be used interchangeably with the 57-30735-02 (MS01-AA) module and can be used with the DECstation 5000 Model 100 as well as the Personal DECstation but cannot be used with either the 2100 or 3100 models because of base system hardware incompatibility.

Figure 11–1 and Figure 11–2 show how to distinguish the earlier 2-MB module from the 8-MB module.

- On the 2-MB 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-MB 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.)

11.1 Identifying Memory Modules

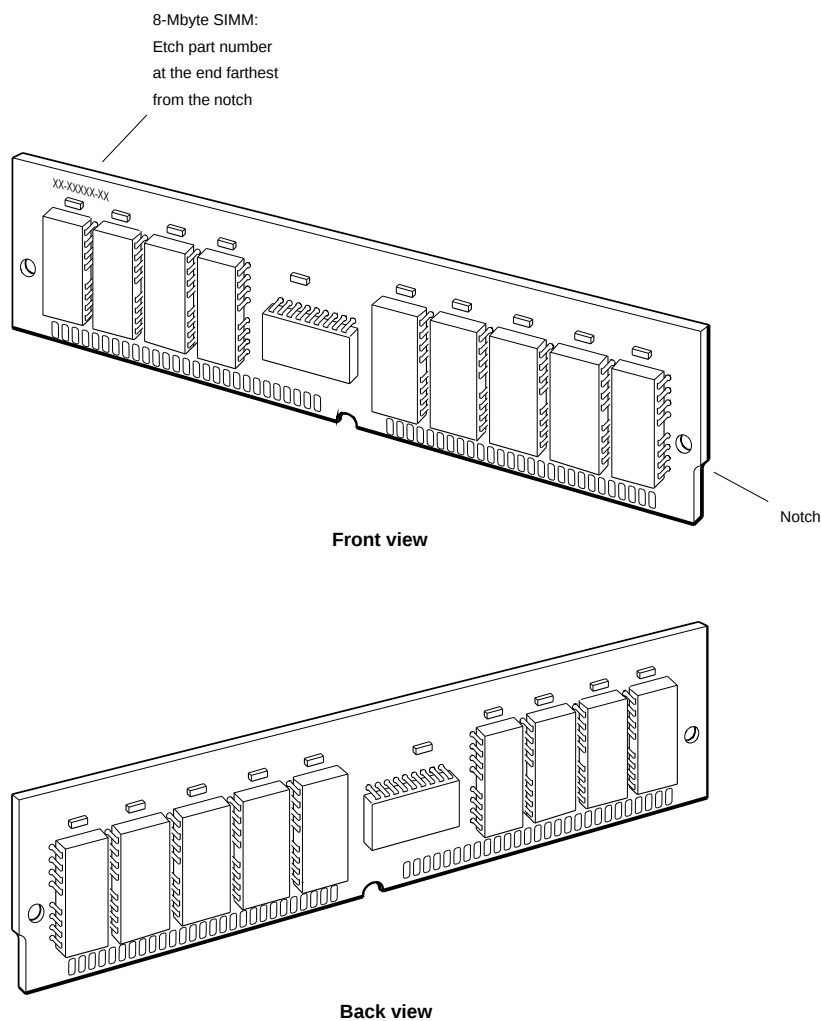
Figure 11–1 Identifying 2-MB Memory Modules



WSMXM021

11.1 Identifying Memory Modules

Figure 11–2 Identifying 8-MB Memory Modules



11.1 Identifying Memory Modules

Table 11–2 shows how to configure memory modules for the amount of memory you want in your system.

Table 11–2 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 will not work properly if you mix the two types.

11.2 Adding Memory to 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 O on the On/Off switch on the back of the system unit. Unplug the system unit power cord.
3. Open the system unit. (See Section 9.1.)
4. Put on the antistatic wrist strap.
5. In the front of the system unit, you will 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.

11.2 Adding Memory to Your Workstation

Figure 11–3 Memory Module Connectors

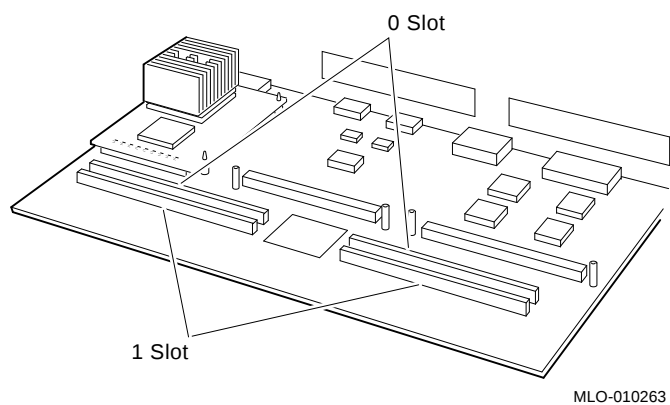
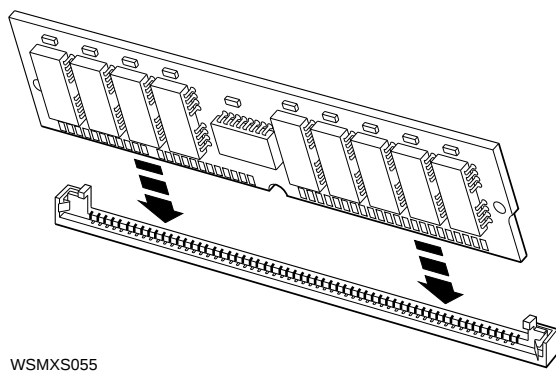


Figure 11–4 Inserting a Memory Module

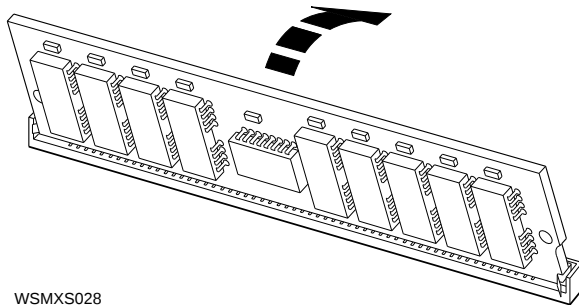


6. Memory modules are always installed in pairs. (See Table 11–2.) Install the left module of the pair first, then the right.
Keeping your fingers away from the contacts that run along the bottom of the memory module, hold the module so that the notch is on your right.
7. Tilt the top of the module toward the front of the system unit until you can push the connector on the module into the connector in the memory slot.

11.2 Adding Memory to Your Workstation

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

Figure 11-5 Installing a Memory Module



9. When you have installed all your memory modules, replace the cover of the system unit. (See Section 9.3.)

11.3 Testing the Memory Module Installation

Once you have installed new memory, you need to make sure that 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 will see a display that begins with a line similar to this:

```
3: KN04          DEC    V1.0a  TCF0    (12 MB)
```

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

```
cache: I(8 KB), D(8 KB), S(1024 KB); Scache line (32 bytes)
R4000 revision (3.0)
mem( 0):  a0000000:  a03ffffff  ( 4 MB)
mem( B):  a0400000:  a0bffffff  ( 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.

11.3 Testing the Memory Module Installation

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 have installed, turn to Chapter 14 for troubleshooting instructions or ask your system manager or Digital service representative for help.

11.4 Removing Memory from Your Workstation

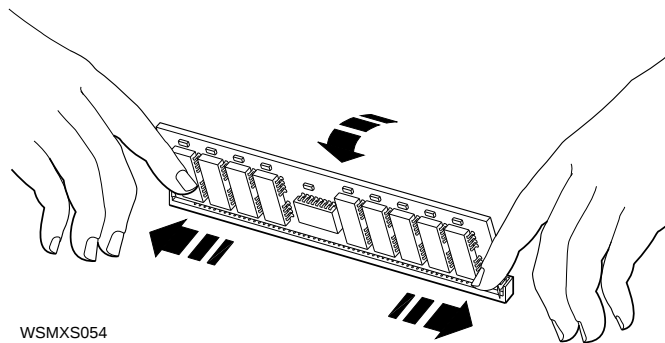
1. If the workstation software is running, shut it down: type **shutdown -h now** and press Return.
2. Turn off the system unit by pressing the O on the On/Off switch on the back of the system unit. Unplug the system unit power cord.
3. Open the system unit. (See Section 9.1.)
4. Locate the slot from 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 are removing, you must remove that module first to gain access to the one you want to take out.

11.4 Removing Memory from Your Workstation

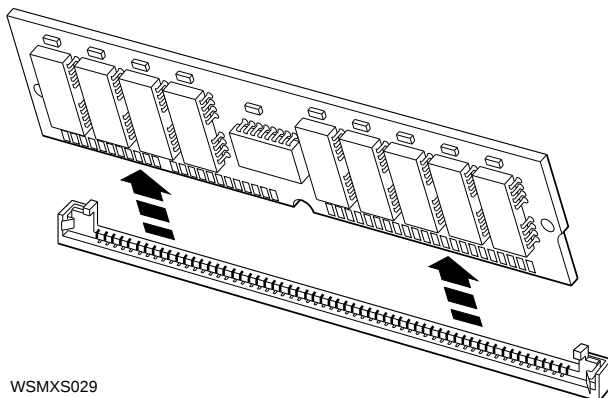
5. Pull out the latches on the ends of the connector until you can feel them release.

Figure 11-6 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.

Figure 11-7 Removing a Memory Module



12

CPU Modules

This chapter covers the following topics:

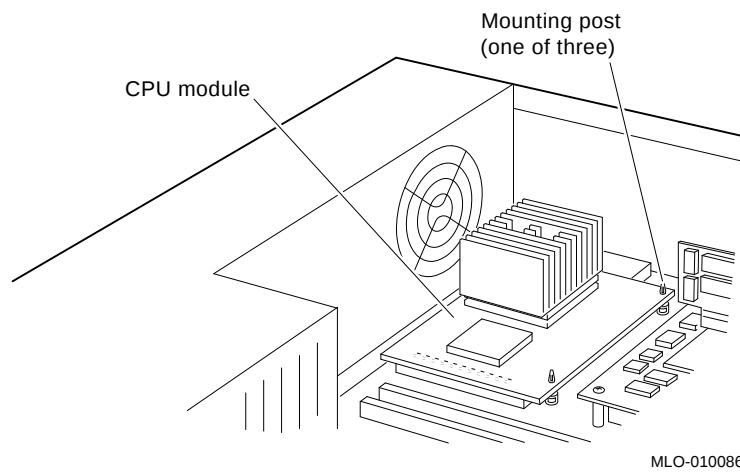
- Removing a CPU Module
- Installing a CPU Module
- Testing Your CPU Module

12.1 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 O on the On/Off switch on the back of the system unit. Unplug the system unit power cord.
3. Open the system unit. (See Section 9.1.)
4. Put on the antistatic wrist strap.
5. Locate the three mounting posts that fasten the CPU module to the base system module.

12.1 Removing a CPU Module

Figure 12–1 The CPU and its Mounting Posts



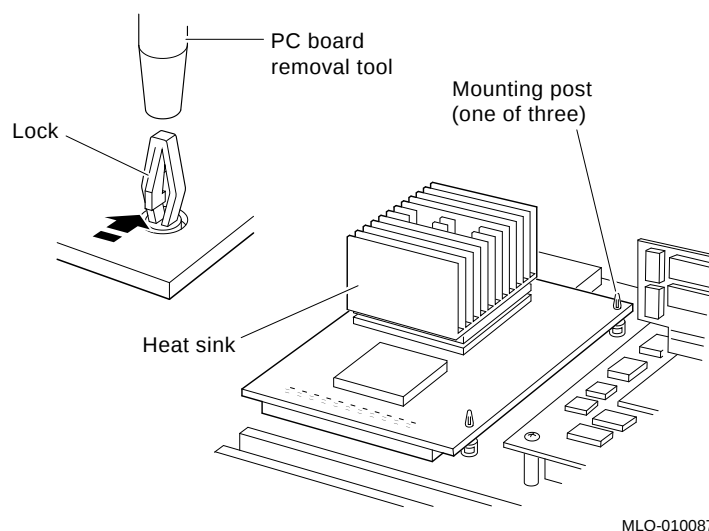
12.1 Removing a CPU Module

6. Use the PC removal tool 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.

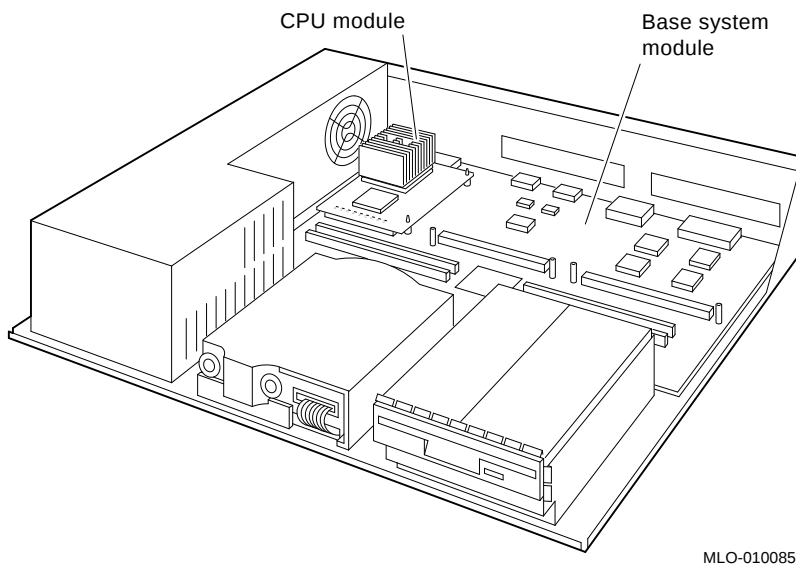
Figure 12–2 Releasing the Lock on a Mounting Post



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.

12.1 Removing a CPU Module

Figure 12–3 CPU Module and Base Module Connector



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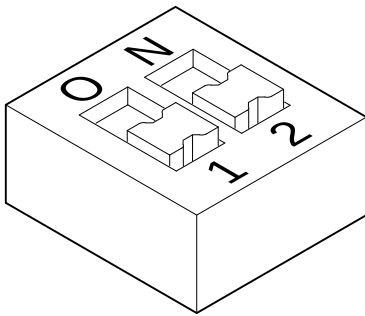
12.2 Installing a CPU Module

1. If necessary, open the system unit. (See Section 9.1.)
2. Put on the antistatic wrist strap.

12.2 Installing a CPU Module

3. Check the switch packet on the module to make certain both switches are in the off position, as shown in Figure 12–4.

Figure 12–4 R4000 CPU Module Switch Packet Settings



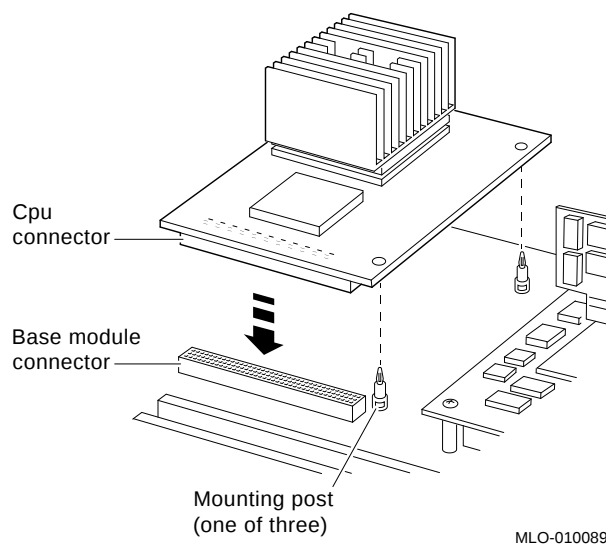
MLO-010466

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

12.2 Installing a CPU Module

5. Align the three holes in the CPU module with the mounting posts on the base module.
6. 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.

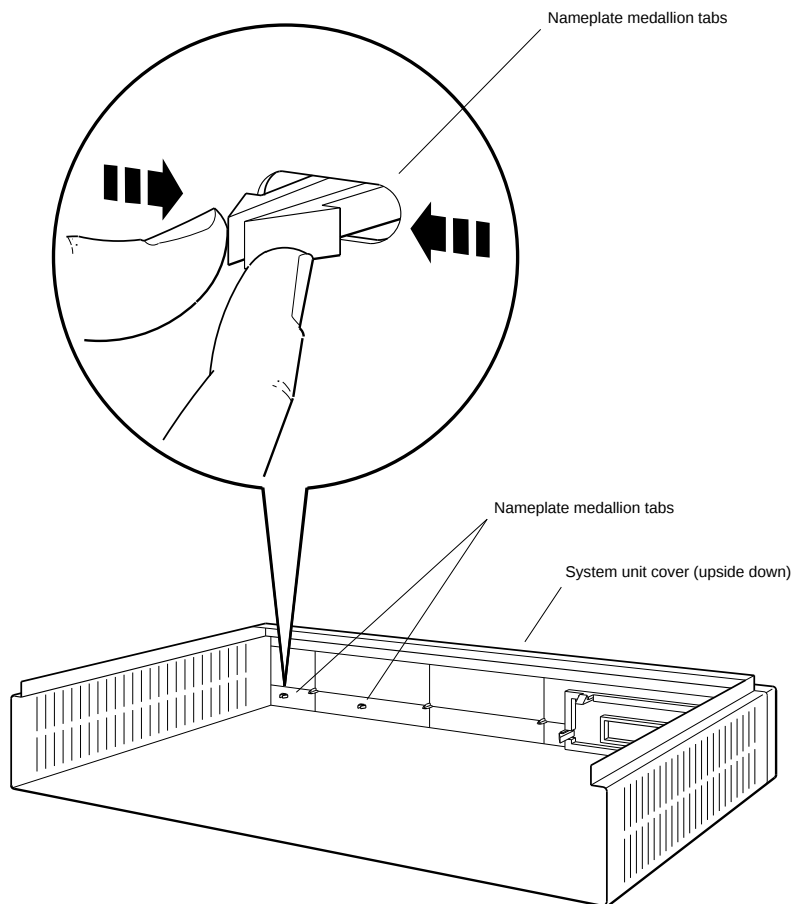
Figure 12-5 Attaching the CPU Module



7. If you installed a different model CPU module than the old one, turn the system unit cover upside down and remove the nameplate medallion, as shown in Figure 12-6. Replace it with the new nameplate medallion.
8. Replace the cover of your system unit. (See Section 9.3.)

12.2 Installing a CPU Module

Figure 12–6 Removing the Nameplate Medallion

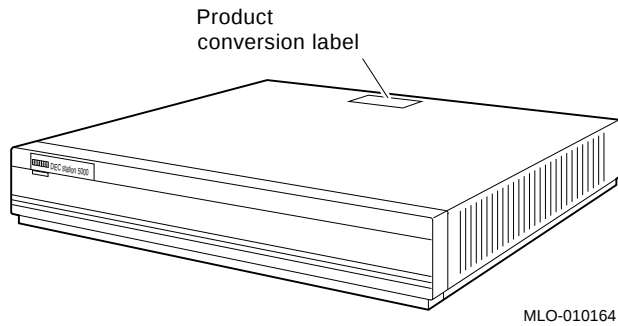


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12.2 Installing a CPU Module

9. Attach the product conversion label to the top of the system unit.

Figure 12–7 Attaching the Product Conversion Label



12.3 Testing Your CPU Module

Once you have installed a new CPU module, you need to make sure that 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 the following message:

3/misc/cpu-type's code: NDX-64A

If you install the CPU module incorrectly, the system will not come up. Check the following:

- Make sure that the connector on the CPU is pressed all the way into the connector on the base system module.
- Make sure that the connector pins are not bent.

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

Part IV

Workstation Management

13

Using the Console Program

This chapter covers the following topics:

- Operating and Console Modes
- Entering Console Mode
- Console Command Conventions and Terms
- Summary of Console Commands

13.1 Operating and Console Modes

Most of the time, you use your workstation in operating mode—that is, you 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

13.1 Operating and Console Modes

- Displaying the list of available console commands and their formats
- Setting workstation environment variables

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

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

If you do not 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, the boot command will start up the workstation software.

13.2 Entering Console Mode

You can enter console mode in any of these ways:

- If the workstation software is running, shut it down by typing **shutdown -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 have 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 cannot shut it down, press and hold down these three keys on the keyboard: Ctrl, Alt, and Delete. This resets the system.

(If you are 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.)

13.2 Entering Console Mode

- If the system is off, turn it on by pressing **I** on the On/Off switch on the back of the system unit. The system will enter console mode unless it has been set to start the system software automatically.

13.3 Console Command Conventions and Terms

Be sure to follow these guidelines 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 a zero and a lowercase 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. You must specify an address that is on a boundary for the data size you are using.

13.3 Console Command Conventions and Terms

- 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.

13.3.1 Conventions Used

- **Letters in bold face type** are to be typed exactly as they appear.
- *Letters in italic type* 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.

13.3.2 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.

13.3 Console Command Conventions and Terms

- 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.

13.4 Summary of Console Commands

13.4 Summary of Console Commands

Table 13–1 gives a brief explanation of the function of each of the console commands. A more detailed explanation of each command follows the table.

Table 13–1 Console Commands

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

13.4 Summary of Console Commands

13.4.1 ? Command

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

The ? command format is

? [cmd]

Keep the following points in mind about 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.

13.4.2 boot Command

Use the boot command to start up the system software.

The boot command format is

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

Keep the following points in mind about the boot command:

- Include the optional -z *seconds* 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].
 - *slot number* is the slot number of the Ethernet controller you are using to boot.
 - *protocol* is the name of the network protocol that performs the boot operation—either mop or tftp.
 - *file* 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.

13.4 Summary of Console Commands

- To boot from a drive, use this form:

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

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

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. 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 use the base system frame buffer as an additional video display in part of a 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"**.
- 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.

13.4 Summary of Console Commands

- 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*.

13.4.3 cat Command

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

The cat command format is

cat *slot-number/script-name*

- *slot-number* is the number of the module that has the contents you want to display. (The base system module is slot 3.)
- *script-name* is the name of the script for which you want to display the contents.

13.4.4 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.

This example shows a previously installed internal tape drive (tz1) connected to the system unit or base slot 3: The numbers in black circles are explained in the text that follows the example.

13.4 Summary of Console Commands

```

>>cnfg 3
❶ ❷
3:  KN04-AA      DEC      V1.0a      TCF0      ❸
                                           (12 MB)
                                           (DV -- d=8)
                                           (Sb: devs = 2)

      Name      Rev.      Vendor
      =====
      VSXXX-BB   AV1.0     DEC
      LK501-AA   AV1.0     DEC
                                           (FDI: 0)
                                           (enet: 08-00-2b-2f-e8-81)❹
                                           (SCSI = 7)

      ❺ ❻
      -----
      DEV  PID      VID      REV  SCSI DEV
      =====
      RZ1  -----
                                           ❷
                                           DIR

cache: I(8 KB), D(8 KB), S(1024 KB); Scache line (32 bytes)
R4000 revision (3.0)
❸
mem( 0):  a0000000:a03ffffff ( 4 MB)
mem( B):  a0400000:a0bffffff ( 8 MB)
❹

```

- ❶ Slot number.
- ❷ Model code of the hardware item. For example, KN04--AA is the model code of the system module.
- ❸ Module code. This code shows what kind of module is installed in the slot. Table 13–2 explains the codes.
- ❹ Ethernet address number.
- ❺ Device code with SCSI ID number of the device. For example, the entry of rZ1 means that 1 is the SCSI ID number. Table 13–3 explains each device code.
- ❻ Product ID. Some devices have an entry in this column, but others do not.
- ❼ Device descriptor. This is a general description of the device. There are three device descriptors: DIR for direct access drives, such as hard disk and floppy drives; SEQ for sequential access drives, such as tape drives; and CD--ROM, for optical compact disc drives.
- ❸ Memory slot number.
- ❹ Amount of memory in the slot.

13.4 Summary of Console Commands

Table 13–2 show module codes, including examples of codes for some TURBOchannel option modules. For more information about specific option modules, refer to the documentation that came with the module.

Table 13–2 Module Codes

Code	Description
MX	Monochrome frame buffer.
CX	Color frame buffer.
PX	2D graphics accelerator.
DA: PXG	Low 3D graphics accelerator. Installed in two adjacent slots, but shown as being installed in the lower-numbered slot.
EA: PXG	Mid 3D graphics accelerator. Installed in two adjacent slots, but shown as being installed in the lower-numbered slot.
FA:PXG_T	High 3D graphics accelerator. Installed in all three slots, but shown as being installed in slot 1.
SCSI	SCSI module. Base slot 3 always has a SCSI module.
enet:	Ethernet module. Base slot 3 always has a ThickWire Ethernet module. Every Ethernet module has a unique Ethernet station address which identifies the module for the network software. The number after <code>enet:</code> is the Ethernet station address.
12 MB	Memory module. Base slot 3 always contains a memory module. The number indicates how many megabytes of memory are installed.

Table 13–3 describes each SCSI device code.

Table 13–3 SCSI Device Codes

Device Code	Device Descriptor	Type of Drive
rx	DIR	Floppy disk and diskette
rz	CD-ROM	Optical compact disc
rz	DIR	Hard disk
tz	SEQ	Tape

13.4 Summary of Console Commands

13.4.5 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.

13.4.6 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.

13.4 Summary of Console Commands

- 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.

13.4.7 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.

13.4.8 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.

13.4.9 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.

13.4 Summary of Console Commands

13.4.10 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 **passwd** 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 between 6 and 32 characters. The system is case-sensitive and treats uppercase and lowercase letters as different characters.

13.4.11 printenv Command

Environment variables set system operating conditions. You can display (using **printenv**), set or change (using **setenv**), and remove (using **unsetenv**) environment variables with console commands. Table 13–4 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.

13.4 Summary of Console Commands

13.4.12 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

13.4.13 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, press Ctrl-d or press Return twice to complete the script.

- To run the script, use the `sh` command. When you run the script, the commands execute in the order in which you entered them when you created the script.

13.4.14 setenv Command

Environment variables set system operating conditions. You can display (using `printenv`), set or change (using `setenv`), and remove (using `unsetenv`) environment variables with console commands. Table 13–4 lists the environment variables you can set.

The `setenv` command format is

setenv *variable value*

- 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.

13.4 Summary of Console Commands

Table 13–4 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.
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. It is automatically set by the system.

(continued on next page)

13.4 Summary of Console Commands

Table 13–4 (Cont.) Environment Variables

Environment Variable	Description
testaction	Specifies the type of power-up self-test the system runs. • Specify <i>q</i> to run a quick test when the power-up self-test runs. • Specify <i>t</i> 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. It is automatically set by the system.

13.4.15 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...*]

- 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 *-l* 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.
- Include the optional *slot number/script* parameter to run a specific script.
 - *slot number* is the slot number of the module that has the script you want to run.
 - *script* is the name of the script you want to run.
- You can also run a script by typing *slot number/script*.
 - *slot number* is the slot number of the module that contains the script you want to run.

13.4 Summary of Console Commands

- *script* is 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.

13.4.16 t Command

Use the t command to run individual tests.

The t command format is

t [-l] *slot name/test name* [arg...]

- 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/?**, (replacing *slot number* with the slot number of the module for which you want to display tests) and press Return.

13.4.17 test Command

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

The test command format is

test

13.4.18 unsetenv Command

Environment variables set system operating conditions. You can display (using `printenv`), set or change (using `setenv`), and remove (using `unsetenv`) environment variables with console commands. Table 13–4, 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.

14

Troubleshooting

This chapter covers the following topics:

- Troubleshooting Techniques
- Invoking the Power-up Self-Test
- Interpreting Video Error Messages
- Minimum Configuration Troubleshooting with the System LED
- Understanding the Power-up Self-Test Sequence and the LED Indicator

14.1 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 that 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.

14.1 Troubleshooting Techniques

3. Troubleshooting with the system LED

If you do not have access to a terminal or equivalent, you 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 unit has progressed through the power-up sequence.

By interpreting these flashes you can determine which modules are operational and which modules are candidates for replacement. How to interpret the system LED is described in detail in Section 14.5.

14.2 Invoking the Power-up 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 erase 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 to test all major subsystems and 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 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.

14.3 Interpreting Video Error Messages

14.3 Interpreting Video Error Messages

When the power-up self-test diagnostics encounter a failure, a formatted error message displays. In the example below, a problem was detected with the SCSI control portion of the base module.

The key pieces of information which led to this conclusion are that the failure was detected on TURBOchannel slot 3, the base module. The problem was with the SCSI subsystem, specifically the controller. Finally, the diagnostic identified the module as the KN04.

Error Message Format:

?TFL slot_number/test_name (n:description) [module]

Example:

```

Example 10:
Name of the test
-----
|
| Name sub test which failed
|-----
|           |           |
|           |           | Descriptive failure info
|           |           |-----
|           |           |
?TFL 3/scsi/cntrl (3: cntxfr) [KN04]
|
| ID of failed module
|-----
|
Number of sub test which failed

```

TURBOchannel slot
Slot number

3= Base module, CPU and Memory

0= TURBOchannel option in slot 0

```
1= TURBOchannel option in slot 1
```

Table 14–1 and Table 14–2 contain information that is useful when interpreting error messages.

14.3 Interpreting Video Error Messages

Table 14–1 Diagnostic Tests for Base System

Test	Subsystem	Problem module
ab	ACCESS.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
scache	Secondary cache	CPU daughter card
scc	RS232	Base module, RS232 peripherals
scsi	SCSI	Base module, SCSI card, SCSI peripherals

Table 14–2 Identification Codes for Selected TURBOchannel Options

Module ID	Description
KN04	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-AA	SCSI host adapter

14.4 Minimum Configuration Troubleshooting with the System LED

14.4 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 subsystem 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 reestablished, 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.

14.5 Understanding the Power-up Self-Test Sequence and the LED Indicator

14.5 Understanding the Power-up Self-Test Sequence and the LED Indicator

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. It is designed as a diagnostic substitute for the traditional eight-segment LED display located on the rear of DECstations. It is *not* a DCOK LED.

14.5 Understanding the Power-up Self-Test Sequence and the LED Indicator

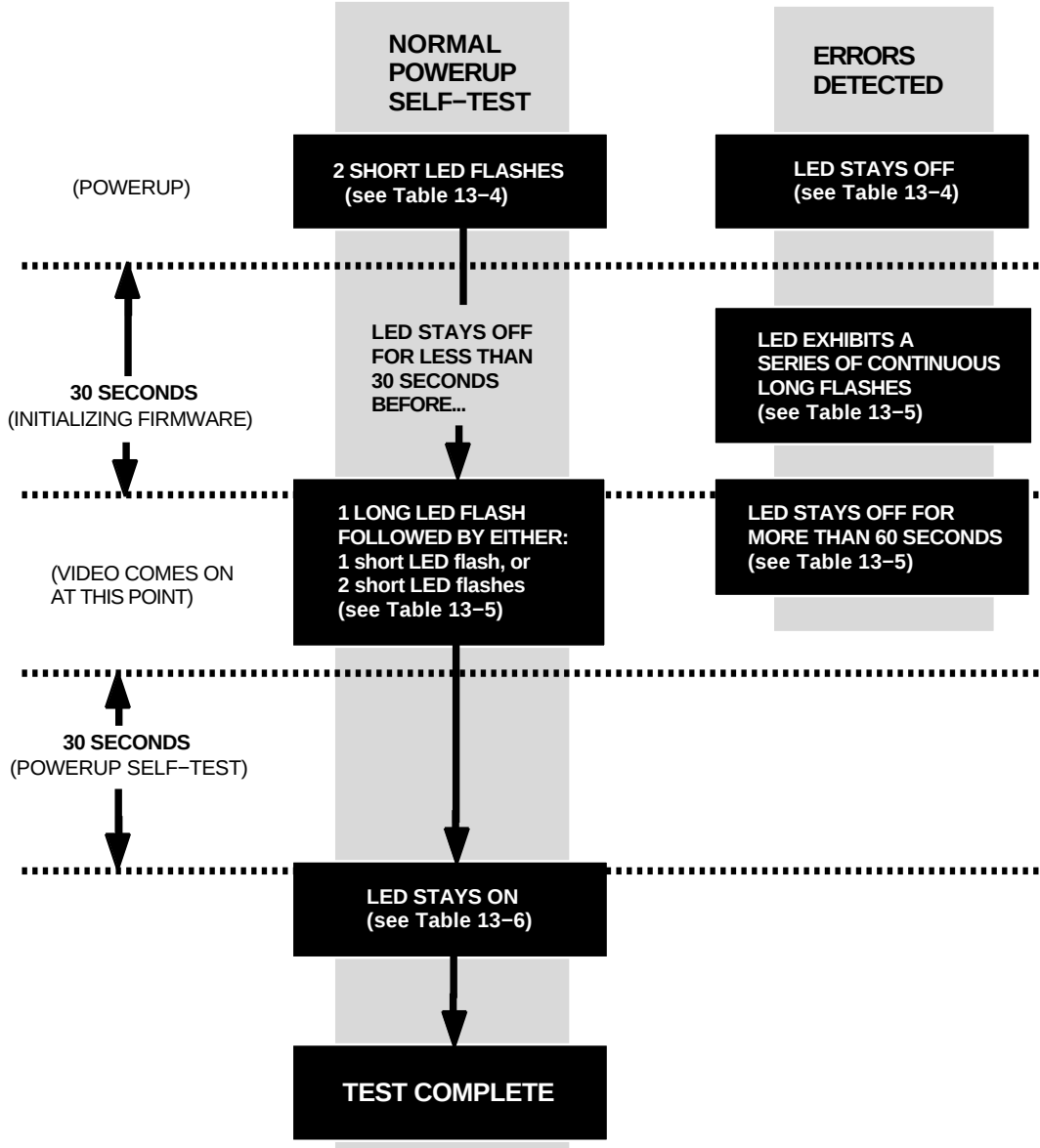
14.5.1 The Power-up Sequence

- 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 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 turn on and stay on.

Figure 14–1, Table 14–3, Table 14–4, and Table 14–5 contain additional information which you may find useful when troubleshooting with the system LED.

14.5 Understanding the Power-up Self-Test Sequence and the LED Indicator

Figure 14–1 Flash Sequence of the Diagnostic LED Indicator



14.5 Understanding the Power-up Self-Test Sequence and the LED Indicator

Table 14–3 Interpreting Diagnostic LED Indicator at Power-Up

LED Function	Meaning	Corrective Action
Two 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 can 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

Note

Actual test time will vary depending on the memory and the TURBOchannel options which have been installed.

Table 14–4 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 detected during power-up self-test that could not be isolated.	Swap base module and/or CPU daughter card
A continuous series of long flashes	Memory failed during firmware initialization.	Remove all memory SIMMs and retest to determine if the memory on the base module or on a SIMM is faulty

(continued on next page)

14.5 Understanding the Power-up Self-Test Sequence and the LED Indicator

Table 14–4 (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 one short flash	<i>kbd</i> (ACCESS.bus keyboard input) and <i>crt</i> selected as firmware console devices: system configured as a workstation.	None
One long flash followed by two short flashes	<i>tty</i> (Serial line input/output) connected to the Personal DECstation's RS232 port selected as firmware console device: system configured as a server.	None, unless expecting a workstation configuration, in which case troubleshoot the ACCESS.bus keyboard

Table 14–5 Interpreting Diagnostic LED Indicator During Second 30 Seconds Following First Video (Power-Up Self-Test Period)

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

14.5.2 When the Power-up LED Indicator Is Inactive

Sometimes the single power-up indicator of the Personal DECstation is itself not working. This means that one of the following parts is defective:

- Power supply
- CPU daughter card
- System module

To determine if the power supply is defective, turn on the power supply and place an Ethernet loopback connector on the Ethernet port. The LED in the loopback connector will glow when the power supply is generating correctly regulated dc power.

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

If the loopback connector *does* glow and yet the power-up 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

Appendixes

A

Regulatory Information for the UK

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

- Service Requirements
- Approvals for Digital Circuits
- Host Independent Approvals
- Host Power Rating
- Environmental Conditions
- Apparatus Between the Approved Apparatus and a Digital Circuit (PTT)

The Personal DECstation 5000 Model 50 workstation is manufactured by Digital Equipment Corporation. The model number of the communication option is PMBA-AA.

A.1 Service Requirements

A.1 Service Requirements

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

Table A-1 PMBA-AA Service Requirements

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

¹BT - British Telecommunications plc
²Hull - Kingston Communications (Hull) plc
³MCL - Mercury Communications Limited

The maximum approved cable length is 25 feet, comprising:

Cat 1	V.24	25 feet for extension	BC22F-25
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A.2 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, those cables must benefit from the relevant general approval and/or conform with any other applicable requirements.

A.2 Approvals for Digital Circuits

Caution

Ports J2, J3, J4, J5, J6, J7, J16, J17, J28, J33, J54, J55, J56, J57 (shown in Figure A–1) 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.

A.3 Host Independent Approvals

A.3 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:

- Type-approved (meaning the equipment is built exactly like the models that were originally approved)
- Marked with or supplied with a statement that the host is supplied under General Approval Number NS/G/1234/J/100003, if the equipment was supplied after 1st March 1989.

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 A-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

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

Clearance is the shortest distance in air between two points. Creepage is the shortest distance along continuous solid parts between the same two points. 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.

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.

A.4 Host Power Rating

A.4 Host Power Rating

The user must ensure 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 A-3 Module Power Rating for PMBA-AA

Supply (+/- 4%) (Volts)	Maximum Current (Amps)	Typical Current (Amps)
+5.1	16	4.0
+12.1	3.0	0.4

A.5 Environmental Conditions

See Appendix C for environmental information.

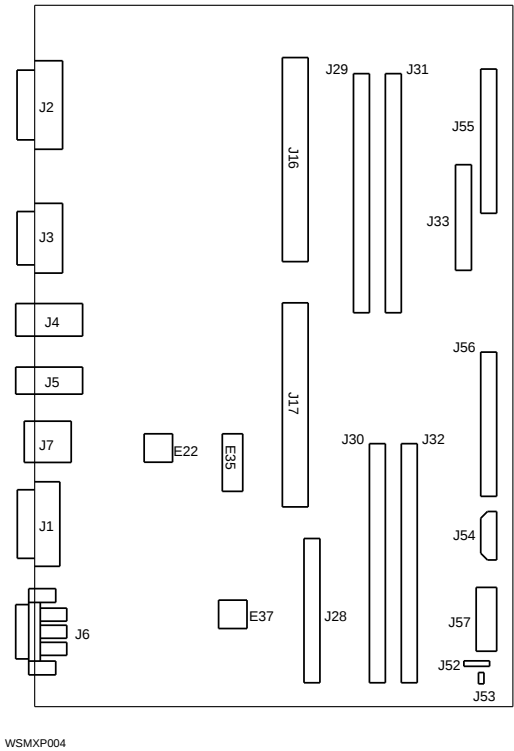
A.6 Apparatus Between the Approved Apparatus and a Digital Circuit (PTT)

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, 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.

A.6 Apparatus Between the Approved Apparatus and a Digital Circuit (PTT)

Figure A-1 System Module J-Connector Locations



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 multimedia¹ 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).

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.

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.

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 allows application software to make use of the I/O capability and also includes some sample audio applications.

XMedia Tools 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-1 and Table B-2.

Table B-1 XMedia (Software) Kits

Order Number	Description
QA-MB4AA-H5/CDC	XMedia Tools Software (TK50) - Includes both the run-time kit and the developer kit software plus online 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 online documentation on a TK50 tape, and a compact disc of audio clip art.

Note

All systems require the XMedia Run-time license and software to operate audio applications.

The XMedia Tools Developer Kit and Run-time Kit require ULTRIX/UWS V4.2-A and Motif 1.1. To use the online 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 @ 66 Hz (TX + DECvideo/PIP). This is the DECvideo/Picture-in-a-picture daughter card for the DECstation 5000 TX frame buffer, with XMedia Tools Run-time licenses.
AV10B-AA	DECvideo/IN @ 72 Hz (TX + DECvideo/PIP). This is the DECvideo/Picture-in-a-picture daughter card for the DECstation 5000 TX frame buffer, with XMedia Tools Run-time 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 Run-time licenses required for operation

Note

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

C

Equipment Specifications

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

- Personal DECstation 5000 System Unit
- RZ23L Hard Disk Drive
- RZ24L Hard Disk Drive
- RZ25 Hard Disk Drive
- RZ26 Hard Disk Drive
- RX26 Diskette Drive

C.1 Personal DECstation 5000 System Unit

C.1 Personal DECstation 5000 System Unit

Table C-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 , maximum

Table C-2 System Unit Operating Conditions

Temperature range ¹	10°C to 35°C (50°F to 95°F)
Temperature change rate	11°C (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

¹Reduce maximum temperature by 1.8°C for each 1000 meter (1.0°F for each 1000 ft) increase in altitude.

C.1 Personal DECstation 5000 System Unit

Table C-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	4900 m (16,000 ft) maximum

Table C-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

C.2 RZ23L Hard Disk Drive

Table C-5 RZ23L 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	121.65M
– Blocks per drive	237,588
– Block size	512 bytes
Data transfer rate	
– Bus asynchronous mode	3.0 MB/s
– Bus synchronous mode	4.0 MB/s
– To and from media	1.5 MB/s
Seek time	

(continued on next page)

C.2 RZ23L Hard Disk Drive

Table C–5 (Cont.) RZ23L Hard Disk Drive Description

– Track-to-track	8 ms
– Average	19 ms
– Maximum	35 ms
Average latency	8.8 ms
Interface	SCSI

Table C–6 RZ23L Hard Disk Drive Operating Conditions

Temperature range ¹	10°C to 55°C (50°F to 128°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)
Minimum dew-point temperature	2°C (36°F)
Altitude	–300 to 4600 m (–1000 to 15,000 ft)

¹Reduce maximum temperature by 1.8°C for each 1000 meter (1.0°F for each 1000 ft) increase in altitude.

Table C–7 RZ23L 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 to 12,200 m (–1000 to 40,000 ft)

C.3 RZ24L Hard Disk Drive

C.3 RZ24L Hard Disk Drive

Table C–8 RZ24L Hard Disk Drive Description

Capacity	
– Bytes per drive	245.4M
– Blocks per drive	479,350
– Block size	512 bytes
Data Transfer Rate	
– Bus asynchronous mode	3.0 MB/s
– Bus synchronous mode	4.0 MB/s
– To and from media	1.5 MB/s
Seek time	
– Track-to-track	5 ms
– Average	16 ms
– Maximum	35 ms
Average latency	8.3 ms
Interface	SCSI

Table C–9 RZ24L Hard Disk Drive Operating Conditions

Temperature range ¹	10°C to 55°C (50°F to 131°F)
Relative humidity	8% to 80% noncondensing
Maximum wet-bulb temperature	26°C (78°F)
Altitude	–300 to 4600 m (–1000 to 15,000 ft)

¹Reduce maximum temperature by 1.8°C for each 1000 meter (1.0°F for each 1000 ft) increase in altitude.

C.3 RZ24L Hard Disk Drive

Table C–10 RZ24L Hard Disk Drive Nonoperating Conditions

Temperature range	–40°C to 66°C (–40°F to 151°F)
Relative humidity	8% to 95% packaged, noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	–300 m to 12,200 m (–1000 ft to 40,000 ft)

C.4 RZ25 Hard Disk Drive

Table C–11 RZ25 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	426M
– Blocks per drive	832,527
– Block size	512 bytes
Data transfer rate	
– Bus asynchronous mode	3.0 MB/s
– Bus synchronous mode	4.0 MB/s
– To and from media	2.1–3.2 MB/s
Seek time	
– Track-to-track	2.5 ms
– Average	14 ms
– Maximum	26 ms
Average latency	6.8 ms
Interface	SCSI

C.4 RZ25 Hard Disk Drive

Table C–12 RZ25 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)

¹Reduce maximum temperature by 1.8°C for each 1000 meter (1.0°F for each 1000 ft) increase in altitude.

Table C–13 RZ25 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 (–1000 ft to 40,000 ft)

C.5 RZ26 Hard Disk Drive

Table C–14 RZ26 Hard Disk Drive Specifications

Internal drive	
– Weight	0.9 kg (1.9lb)
– Height	4.13 cm (1.625 in)
– Width	10.2 cm (4.00 in)
– Depth	14.6 cm (5.75 in)
Capacity	
– Bytes per drive	1050M
– Bytes per surface	75M
– Bytes per track	29,640
– Buffer size	512 KB

(continued on next page)

C.5 RZ26 Hard Disk Drive

Table C–14 (Cont.) RZ26 Hard Disk Drive Specifications

Data transfer rate	
– To and from media	2.6 MB/s
Seek time	
– Track to track	1 ms
– Average	10 ms
– Maximum (full stroke)	≤ 20 ms
Average latency	5.6 ms
Rotational speed	5363 rpm

Table C–15 RZ26 Hard Disk Drive Operating Conditions

Ambient temperature	10°C to 50°C (50°F to 122°F)
Relative humidity	10%–90%

Table C–16 RZ26 Hard Disk Drive Nonoperating Conditions

Ambient temperature	–40°C to 66°C (–40°F to 151°F)
Relative humidity	8%–95% (non-condensing)

C.6 RX26 Diskette Drive

C.6 RX26 Diskette Drive

Table C-17 RX26 Diskette Drive Specifications (formatted)

Dimensions	
– Weight	425 g (0.94 lb)
– Height	25.4 mm (1.00 in)
– Width	101.6 mm (4.00 in)
– Depth	150.0 mm (5.91 in)
Number of cylinders	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
	9216 high-density
	18,432 extra-density
Data transfer rate	250 Kbits/s double-density
	500 Kbits/s high-density
	1000 Kbits/s extra-density
Seek time	
– Minimum	3 ms
– Average	15 ms
Average latency	100 ms

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C.6 RX26 Diskette Drive

Table C–17 (Cont.) RX26 Diskette Drive Specifications (formatted)

Operating power	1.25 W (read/write) 4.60 W (seeking)
Standby power	0.30 W

Table C–18 RX26 Diskette Drive Operating Conditions

Temperature range ¹	°5C to 50°C (41°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	–305 to 3050 m (–1000 to 10,000 ft) maximum

¹Reduce maximum temperature by 1.8°C for each 1000 meter (1.0°F for each 1000 ft.) increase in altitude.

Table C–19 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	–305 to 12,200 m (–1000 to 40,000 ft) maximum

D

Connector Pin Assignments

This appendix lists pin assignments for the following:

- SCSI Connector
- ThickWire Ethernet Connector
- EIA RS232 Communications Connectors
- Power Supply
- ISDN Connector
- ACCESS.bus
- Sound Connector
- Loopback Connector

D.1 SCSI Connector

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

(continued on next page)

D.1 SCSI Connector

Table D–1 (Cont.) SCSI Connector Pin Assignments

Pin	Signal	Pin	Signal
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

D.2 ThickWire Ethernet Connector

D.2 ThickWire Ethernet Connector

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	

D.3 EIA RS232 Communications Connectors

D.3 EIA RS232 Communications Connectors

Data Terminal Equipment (DTE) refers to signals whose source is in the Personal DECstation.

Data Communications Equipment (DCE) refers to signals whose source is a peripheral, like a modem or printer, which 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

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

²Electronic Industries Association

(continued on next page)

D.3 EIA RS232 Communications Connectors

Table D–3 (Cont.) EIA RS232 Communications Connectors Pin Assignments

Pin	Source	Signal	CCITT ¹	EIA ²	Description
22	DCE	RI	125	CE	Ring indicator
23	DTE	DSRS	111	CH	Data signal rate select
24					Unconnected
25					Unconnected

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

²Electronic Industries Association

D.4 Power Supply

Table D–4 Power Supply Pin Assignments

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

D.5 ISDN Connector

D.5 ISDN Connector

The external ISDN connector is an 8-wire Modular Jack (RJ45). Pins 1, 2, 7, and 8 are not used. A 4-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. Table D–5 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

D.6 ACCESS.bus

The ACCESS.bus uses a 4-pin shielded MOLEX SEMCONN or AMP SDL modular type connector. 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 ACCESS.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 A.b connector is located at the rear of the system enclosure and mounts to the base system module. Table D–6 shows the pinout for the ACCESS.bus.

D.6 ACCESS.bus

Table D–6 ACCESS.bus Pin Assignments

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

D.7 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 in the headset. The headset or handset are connected to the sound jack with a 4-wire cable with 2 twisted pairs. Table D–7 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

D.8 Loopback Connector

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

D.8 Loopback Connector

Table D–9 Ethernet Loopback Connector Pin Assignments

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

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

Drives You Can Connect to Your Workstation

The following list includes drives available at the time this guide was printed. However, Digital continues to produce new drives 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 $\frac{1}{2}$ -inch hard disk drive
 - RZ25 (426 megabytes)
 - RZ26 (1.05 gigabytes)
- 5 $\frac{1}{4}$ -inch hard disk drives
 - RZ58 (1.4 gigabytes)
- Tape drives
 - TZ30 (95 megabytes)
 - TZK10 (525 megabytes)
- CD-ROM drive
 - RRD42 (600 megabytes)

- **In the TURBOchannel extender box**

- Floppy disk drive
 - RX23 (1.4 megabytes)
- 3 $\frac{1}{2}$ -inch hard disk drives
 - RZ23L (121 megabytes)

- RZ24 (209 megabytes)
 - RZ25 (426 megabytes)
 - RZ26 (1.05 gigabytes)
 - Tape drive
 - TZK10 (525 megabytes)
 - CD-ROM drive
 - RRD42 (600 megabytes)
- **Tabletop drives**
 - Tape drives
 - TK50Z (95 megabytes)
 - TLZ04 (1.2 gigabytes, RDAT tape)
 - TLZ06 (4.0 gigabytes, RDAT tape)
 - TKZ08 (2.2 gigabytes, 8-mm tape)
 - TKZ09 (5.0 gigabytes, 8-mm tape)
 - CD-ROM drive
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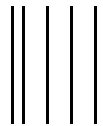
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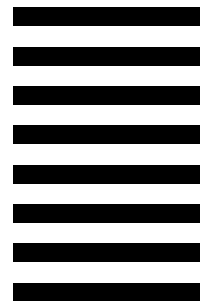
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