

EK-PM32C-OG-003

DECstation 5000 Model 100 Series

Hardware Operator's Guide

digital equipment corporation
maynard, massachusetts

Third printing, January 1992

The information in this document is subject to change without notice and should not be construed as a commitment by Digital Equipment Corporation. Digital Equipment Corporation assumes no responsibility for any errors that may appear in this document.

The software described in this document is furnished under a license and may be used or copied only in accordance with the terms of such license.

Digital Equipment Corporation assumes no responsibility for the use or reliability of its software on equipment that is not supplied by Digital or its affiliated companies.

© Digital Equipment Corporation 1992.
All Rights Reserved
Printed in U.S.A.

U.S.A.

This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such radio frequency interference. Operation of this equipment in a residential area may cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

The following are trademarks of Digital Equipment Corporation:

DEC	MicroVMS	VAX
DECnet	PDP	VAXBI
DECstation	ThinWire	VAXcluster
DECsystem	TURBOchannel	VAXstation
DECUS	ULTRIX	VMS
DESTA	ULTRIX-32	VT
MicroVAX	UNIBUS	digital [™]

Contents

Using This Guide	xv
-------------------------------	----

Part I Basic Workstation Hardware

1 Getting Started

The Basic DECstation 5000 Model 100 Series Workstation	1-2
Workstation Site Requirements	1-5
Temperature	1-5
Humidity	1-5
Cleanliness	1-5
Interference	1-5
Power	1-6
Supplies	1-6
Workstation Voltage Requirements	1-7

2 System Unit, Monitor, Keyboard, Mouse, and Tablet

The System Unit	2-2
Connectors, Controls, and Indicator Lights on the System Unit	2-2
Icons on the System Unit and Its Cables	2-4
The Monitor	2-5
To Connect the Monitor to the System Unit	2-5
The Keyboard	2-11
To Adjust the Keyboard	2-12

The Mouse and Tablet	2-13
The Dial and Button Box	2-14
Connecting the Keyboard and Mouse or Tablet to the System Unit	2-15
To Connect the Cable Assembly to the System Unit	2-15
To Position the Connector Block	2-17
To Connect the Keyboard to the Connector Block	2-18
To Connect the Mouse or Tablet to the Connector Block	2-19
Attaching a SCSI Terminator to the Base System SCSI Connector	2-20
Supplying Power to the System Unit and Monitor	2-22
To Connect the System Unit to a Power Outlet	2-23
To Connect the Monitor to a Power Outlet	2-24

3 Ethernet Hardware for the Basic Workstation

Installing ThickWire Ethernet Loopback Connectors	3-2
To Install ThickWire Ethernet Loopback Connectors....	3-2

4 Moving the Workstation

Dismantling Your Workstation	4-2
Packing Your Equipment	4-2
Reinstalling Your Workstation	4-2

Part II Optional Hardware

5 Internal Hardware Options

Installing and Removing Memory	5-2
To Install Memory Modules	5-2
Open the system unit	5-2
Install pairs of memory modules	5-8
Close the system unit	5-11
To Test Memory Modules	5-13
To Remove Memory Modules	5-14
Open the system unit	5-14
Remove the memory modules	5-15
Close the system unit	5-17
Changing CPU Modules	5-19

To Remove a CPU Module	5-19
To Install a New CPU Module	5-22
To Test the CPU Module	5-24
Installing and Removing Drives in the System Unit	5-25
Understanding SCSI ID Numbers	5-27
Setting the SCSI ID numbers on your drives	5-27
To Install a Drive in the System Unit	5-28
Set the SCSI ID number for the hard disk	
drive	5-31
Fasten the hard disk drive in the system unit ...	5-31
Close the system unit	5-39
To Test for a Drive in the Base Slot of the System	
Unit	5-40
To Remove a Hard Disk Drive from the Base of the	
System Unit	5-41
To Install a Removable Media Drive Inside the System	
Unit	5-42
Unpack the removable media drive	5-42
Set the SCSI ID number for removable media	
drives	5-43
Install the removable media drive in the front	
drive panel	5-44
Close the system unit	5-46
To Test for a Drive in the Front Drive Panel	5-52
To Remove a Drive from the Front Drive Panel	5-53

6 Optional Network Connections

Connecting the Workstation to a ThickWire Ethernet	
Network	6-3
Connecting the Workstation to a ThinWire Ethernet	
Network	6-6
Connecting the Workstation to an Unshielded Twisted-Pair	
Ethernet Network	6-10
Finding Your Ethernet Station Addresses	6-13

7 External Communications Options

External Communications Options	7-2
Installing a Device with a 25-Pin Connector	7-4

8 External Storage Devices

External Storage Devices That SCSI Connectors Can Use	8-2
Installing and Removing External Storage Devices	8-3
To Install External Storage Devices	8-3
Set up your storage expansion boxes	8-4
Set the SCSI switches for each device	8-5
Connect expansion boxes to the system unit	8-7
To Test External Storage Devices	8-13
To Remove a Drive Expansion Box	8-14
Installing a Drive in a BA42 Storage Expansion Box	8-14

Part III Testing and Troubleshooting

9 Starting and Testing Workstation Hardware

Turning On Your Workstation	9-2
Turn On External Devices	9-3
Turn On the Monitor	9-4
Turn On the System Unit	9-5
If Your System Unit Fails to Turn On	9-6
Testing Your Workstation	9-7
Run the System Self-Test	9-7
If a Self-Test Fails	9-7
Check Your Configuration Displays	9-7
Stopping the Workstation Without Turning It Off	9-8
Turning Off the Workstation	9-9

10 Troubleshooting

Where to Look for Troubleshooting Information	10-2
Contacting Your Customer Support Center	10-3
Is It On?	10-4
Is It Connected?	10-6
Is It Working?	10-14
How to Run a Self-Test	10-14
How to Interpret Self-Test Messages	10-15

11 Using the Console Commands

Console and Operating Modes	11-2
Using Console Mode	11-2
Console prompts	11-3
Using Operating Mode	11-3
Typing Console Commands	11-5
Conventions Used in This Chapter	11-6
Console Commands	11-7
Description of the Console Commands	11-9
?	11-9
boot	11-9
cat	11-10
cnfg	11-11
d	11-15
e	11-16
erl	11-17
go	11-17
init	11-17
ls	11-18
passwd	11-18
printenv	11-19
restart	11-19
script	11-20
setenv	11-20
sh	11-20
t	11-21
unsetenv	11-21
Environment Variables	11-22

Part IV Appendixes

A Equipment Specifications

DECstation 5000 Model 100 Series System Unit Equipment Specifications	A-3
VR262 Monitor Equipment Specifications	A-4
VR297 Monitor Equipment Specifications	A-6
VR299 Monitor Equipment Specifications	A-8
VR319-CA and VR319-C4 Monitor Equipment Specifications	A-10
VR319-DA and VR319-D4 Monitor Equipment Specifications	A-13

VRT16-DA and VRT16-D4 Monitor Equipment Specifications	A-16
VRT19-DA and VRT19-D4 Monitor Equipment Specifications	A-18
LK201 Keyboard Equipment Specifications	A-20
LK401-AA Keyboard Equipment Specifications	A-22
VSXXX-GA Mouse Equipment Specifications	A-24
VSXXX-AB Tablet Equipment Specifications	A-26
BA42 Storage Expansion Box Equipment Specifications	A-28
RZ23 SCSI Hard Disk Drive Equipment Specifications	A-29
RZ23L SCSI Hard Disk Drive Equipment Specifications	A-31
RZ24 SCSI Hard Disk Drive Equipment Specifications	A-33
RZ25 SCSI Hard Disk Drive Equipment Specifications	A-35
RZ55 SCSI Hard Disk Drive Equipment Specifications	A-37
RZ56 SCSI Hard Disk Drive Equipment Specifications	A-39
RZ57 SCSI Hard Disk Drive Equipment Specifications	A-41
TK50Z Tape Drive Equipment Specifications	A-43
TZ30 Tape Drive Equipment Specifications	A-45
TZK10 QIC Tape Drive Equipment Specifications	A-47
TLZ04 Cassette Tape Drive Equipment Specifications	A-49
RRD40 Compact Disc Drive Equipment Specifications	A-50
RRD42 Compact Disc Drive Equipment Specifications	A-51
RX23 Diskette Drive Equipment Specifications	A-52
RX33 Diskette Drive Equipment Specifications	A-54

B Part Numbers

C Connector Pin Assignments

D Setting SCSI ID Switches

Index

Figures

1-1	Typical DECstation 5000 Model 100 Series workstation	1-2
1-2	Parts of a basic workstation	1-4
1-3	Voltage labels	1-7
2-1	Back of the system unit	2-2
2-2	Icons on the workstation	2-4
2-3	Video cable assemblies	2-5
2-4	Turning off your monitor	2-6
2-5	Connecting a color or gray-scale video cable to the system unit	2-7
2-6	Connecting a video cable assembly to a color monitor	2-8
2-7	Connecting a video cable assembly to a VR262 19-inch gray-scale monitor	2-9
2-8	Connecting a video cable assembly to a monochrome monitor	2-10
2-9	Keyboard	2-11
2-10	Hinged feet on the keyboard	2-12
2-11	A mouse	2-13
2-12	A tablet with its puck and stylus	2-13
2-13	Dial and button box	2-14
2-14	Connecting the keyboard-mouse cable	2-16
2-15	Positioning the connector block	2-17
2-16	Connecting the keyboard to the connector block	2-18
2-17	Connecting the mouse or tablet to the connector block	2-19
2-18	Attaching a terminator to the system SCSI connector	2-21
2-19	A monitor-to-system-unit power cable and two power cords	2-22
2-20	Connecting the power cord to the system unit	2-23
2-21	Connecting the monitor to the system unit	2-24
2-22	Connecting the monitor to a power outlet	2-25
3-1	Attaching a ThickWire Ethernet loopback connector	3-3
5-1	Removing the cover from the system unit	5-3
5-2	Using an antistatic wrist strap	5-4
5-3	Inside the system unit	5-5
5-4	Removing the front drive panel	5-6
5-5	Memory slots inside the system unit	5-8
5-6	Memory module	5-9
5-7	Inserting a memory module	5-10
5-8	Installing the front drive panel	5-12

5-9	Memory modules in memory slots 0 and 1	5-15
5-10	Removing a memory module	5-16
5-11	Replacing the cover on the system unit	5-18
5-12	Typical CPU module	5-21
5-13	Installing a CPU module	5-22
5-14	Removing the nameplate	5-24
5-15	Where to install drives in the system unit	5-26
5-16	Typical hard disk drive	5-30
5-17	Inside the system unit before the drives are installed	5-32
5-18	Locations for internal hard disk drives	5-33
5-19	Power supply cable in the system unit	5-34
5-20	SCSI cable in the system unit	5-35
5-21	Power supply cable connector	5-36
5-22	SCSI connector	5-37
5-23	Inserting the hard disk drive	5-38
5-24	Inside the system unit before the drive is installed	5-45
5-25	Inserting a removable media drive into the drive bracket ...	5-46
5-26	SCSI cable connector	5-48
5-27	Plugging the cable straight into the connector	5-49
5-28	Removing the existing bezel	5-50
5-29	Installing a new bezel	5-51
6-1	Base system ThickWire Ethernet connector	6-2
6-2	ThickWire Ethernet cable	6-3
6-3	Removing a loopback connector from a ThickWire Ethernet connector	6-4
6-4	Connecting a ThickWire Ethernet cable to the system unit ..	6-5
6-5	A DESTA and a ThinWire Ethernet T-connector	6-8
6-6	A ThickWire-to-twisted-pair adapter and twisted-pair-adapter-to-ThickWire cable	6-11
7-1	Communications connectors on the system unit	7-2
7-2	Communications device connectors and an adapter	7-3
7-3	Connecting a communications device with a 25-pin connector	7-5
8-1	Typical storage expansion boxes	8-2
8-2	Expansion box cables and an expansion box power cord and terminator	8-4
8-3	Expansion box SCSI switches	8-6
8-4	Attaching a system-unit-to-expansion-box cable to a SCSI connector on the system unit	8-8

8-5	Attaching a system-unit-to-expansion-box cable to a SCSI connector on an expansion box	8-9
8-6	Connecting expansion boxes in a chain	8-10
8-7	Terminating the final expansion box	8-11
8-8	Connecting power cords	8-12
9-1	Expansion box on/off switches	9-3
9-2	Turning on your monitor	9-4
9-3	Turning on the system unit	9-5
9-4	Halt button and system unit on/off switch	9-8
10-1	Diagnostic indicator lights	10-4
11-1	Display of general configuration information	11-11
11-2	Display of slot configuration information	11-11
D-1	Jumper settings for an RZ23L hard disk drive	D-2
D-2	Jumper settings for an RZ24 hard disk drive	D-3
D-3	RZ25 hard disk drive front jumper settings	D-4
D-4	RZ25 hard disk drive side jumper settings	D-5
D-5	Switch settings for RX23 and RX33 floppy disk drives	D-6
D-6	Jumper settings for an RRD42 optical compact disc drive ...	D-7
D-7	Jumper settings for a TZK10 QIC tape drive	D-8

Tables

1	Conventions Used in This Guide	xvi
2-1	Connectors, Controls, and Indicator Lights on the System Unit	2-3
5-1	Default SCSI ID Numbers for Internal Drives	5-27
8-1	SCSI Cable Lengths	8-5
8-2	SCSI ID Switch Settings	8-7
10-1	Interpreting Diagnostic Indicator Lights	10-5
10-2	Solutions to Common Problems	10-6
10-3	Self-Test Error Messages for the Base System Slot	10-16
11-1	Console Commands	11-7
11-2	Module Codes	11-14
11-3	SCSI Device Codes and Descriptors	11-15
11-4	Console Commands for Environment Variables	11-22
11-5	Environment Variables Set by the User	11-22
A-1	System Unit Description	A-3
A-2	System Unit Operating Conditions	A-3
A-3	System Unit Nonoperating Conditions	A-3

A-4	VR262 Monitor Description	A-4
A-5	VR262 Monitor Operating Conditions	A-5
A-6	VR262 Monitor Nonoperating Conditions	A-5
A-7	VR297 Monitor Description	A-6
A-8	VR297 Monitor Operating Conditions	A-7
A-9	VR297 Monitor Nonoperating Conditions	A-7
A-10	VR299 Monitor Description	A-8
A-11	VR299 Monitor Operating Conditions	A-9
A-12	VR299 Monitor Nonoperating Conditions	A-9
A-13	VR319-CA and VR319-C4 Monitor Description	A-10
A-14	VR319-CA and VR319-C4 Monitor Operating Conditions	A-11
A-15	VR319-CA and VR319-C4 Monitor Nonoperating Conditions	A-12
A-16	VR319-DA and VR319-D4 Monitor Description	A-13
A-17	VR319-DA and VR319-D4 Monitor Operating Conditions	A-14
A-18	VR319-DA and VR319-D4 Monitor Nonoperating Conditions	A-15
A-19	VRT16-DA and VRT16-D4 Monitor Description	A-16
A-20	VRT16-DA and VRT16-D4 Monitor Operating Conditions ...	A-17
A-21	VRT16-DA and VRT16-D4 Monitor Nonoperating Conditions	A-17
A-22	VRT19-DA and VRT19-D4 Monitor Description	A-18
A-23	VRT19-DA and VRT19-D4 Monitor Operating Conditions ...	A-19
A-24	VRT19-DA and VRT19-D4 Monitor Nonoperating Conditions	A-19
A-25	LK201 Keyboard Description	A-20
A-26	LK201 Keyboard Operating Conditions	A-20
A-27	LK201 Keyboard Nonoperating Conditions	A-21
A-28	LK401-AA Keyboard Description	A-22
A-29	LK401-AA Keyboard Operating Conditions	A-22
A-30	LK401-AA Keyboard Nonoperating Conditions	A-23
A-31	VSXXX-GA Mouse Description	A-24
A-32	VSXXX-GA Mouse Operating Conditions	A-24
A-33	VSXXX-GA Mouse Nonoperating Conditions	A-25
A-34	VSXXX-AB Tablet Description	A-26
A-35	VSXXX-AB Tablet Operating Conditions	A-27
A-36	VSXXX-AB Tablet Nonoperating Conditions	A-27
A-37	BA42 Storage Expansion Box Description	A-28
A-38	BA42 Storage Expansion Box Operating Conditions	A-28
A-39	BA42 Storage Expansion Box Nonoperating Conditions	A-28

A-40	RZ23 SCSI Hard Disk Drive Description	A-29
A-41	RZ23 SCSI Hard Disk Drive Operating Conditions	A-29
A-42	RZ23 SCSI Hard Disk Drive Nonoperating Conditions	A-30
A-43	RZ23L SCSI Hard Disk Drive Description	A-31
A-44	RZ23L SCSI Hard Disk Drive Operating Conditions	A-31
A-45	RZ23L SCSI Hard Disk Drive Nonoperating Conditions	A-32
A-46	RZ24 SCSI Hard Disk Drive Description	A-33
A-47	RZ24 SCSI Hard Disk Drive Operating Conditions	A-33
A-48	RZ24 SCSI Hard Disk Drive Nonoperating Conditions	A-34
A-49	RZ25 SCSI Hard Disk Drive Description	A-35
A-50	RZ25 SCSI Hard Disk Drive Operating Conditions	A-35
A-51	RZ25 SCSI Hard Disk Drive Nonoperating Conditions	A-36
A-52	RZ55 SCSI Hard Disk Drive Description	A-37
A-53	RZ55 SCSI Hard Disk Drive Operating Conditions	A-38
A-54	RZ55 SCSI Hard Disk Drive Nonoperating Conditions	A-38
A-55	RZ56 SCSI Hard Disk Drive Description	A-39
A-56	RZ56 SCSI Hard Disk Drive Operating Conditions	A-39
A-57	RZ56 SCSI Hard Disk Drive Nonoperating Conditions	A-40
A-58	RZ57 SCSI Hard Disk Drive Description	A-41
A-59	RZ57 SCSI Hard Disk Drive Operating Conditions	A-41
A-60	RZ57 SCSI Hard Disk Drive Nonoperating Conditions	A-42
A-61	TK50Z Tape Drive Description	A-43
A-62	TK50Z Tape Drive Operating Conditions	A-43
A-63	TK50Z Tape Drive Nonoperating Conditions	A-44
A-64	TZ30 Tape Drive Description	A-45
A-65	TZ30 Tape Drive Operating Conditions	A-45
A-66	TZ30 Tape Drive Nonoperating Conditions	A-46
A-67	TZK10 QIC Tape Drive Description	A-47
A-68	TZK10 QIC Tape Drive Operating Conditions	A-47
A-69	TZK10 QIC Tape Drive Nonoperating Conditions	A-48
A-70	TLZ04 Cassette Tape Drive Description	A-49
A-71	TLZ04 Cassette Tape Drive Operating Conditions	A-49
A-72	TLZ04 Cassette Tape Drive Nonoperating Conditions	A-49
A-73	RRD40 Compact Disc Drive Description (Tabletop)	A-50
A-74	RRD40 Compact Disc Drive Operating Conditions (Tabletop)	A-50
A-75	RRD40 Compact Disc Drive Nonoperating Conditions (Tabletop)	A-50
A-76	RRD42 Compact Disc Drive Description	A-51

A-77	RRD42 Compact Disc Drive Operating Conditions	A-51
A-78	RRD42 Compact Disc Drive Nonoperating Conditions	A-51
A-79	RX23 Diskette Drive Description	A-52
A-80	RX23 Diskette Drive Operating Conditions	A-53
A-81	RX23 Diskette Drive Nonoperating Conditions	A-53
A-82	RX33 Diskette Drive Description	A-54
A-83	RX33 Diskette Drive Operating Conditions	A-55
A-84	RX33 Diskette Drive Nonoperating Conditions	A-55
B-1	Basic Components	B-2
B-2	Cords, Cables, and Connectors	B-3
B-3	Software Documentation	B-4
B-4	Hardware Documentation	B-4
C-1	SCSI Cable Connector Pin Assignments	C-2
C-2	Keyboard and Mouse or Tablet Connector Pin Assignments	C-3
C-3	Communications Connectors Pin Assignments	C-4
C-4	ThickWire Ethernet Connector Pin Assignments	C-5
C-5	Power Supply Pin Assignments	C-5
C-6	Modem Loopback Connector Pin Assignments	C-6
C-7	Ethernet Loopback Connector Pin Assignments	C-6
C-8	Summary of Loopback Connectors	C-6

Using This Guide

This guide explains how to operate the hardware components of your DECstation 5000 Model 100 Series workstation. It discusses

- How to use the connectors and controls and interpret the indicator lights on your workstation hardware
- How to adjust your workstation hardware for your comfort
- What options you can add to improve workstation performance
- How to use console commands
- How to interpret the results of the power-up self-test and the system self-test
- How to read the configuration displays
- How to diagnose and solve basic hardware problems
- How to dismantle your workstation in preparation for moving
- What the specifications are for your workstation components
- What the part numbers are for your workstation components
- What the pin assignments are for your workstation cables and connectors

Table 1. Conventions Used in This Guide

Convention	Use
Monospace type	Anything that appears on your monitor screen is set in monospace type like this.
Boldface type	Anything that you are asked to type is set in boldface type like this.

Part I

Basic Workstation Hardware

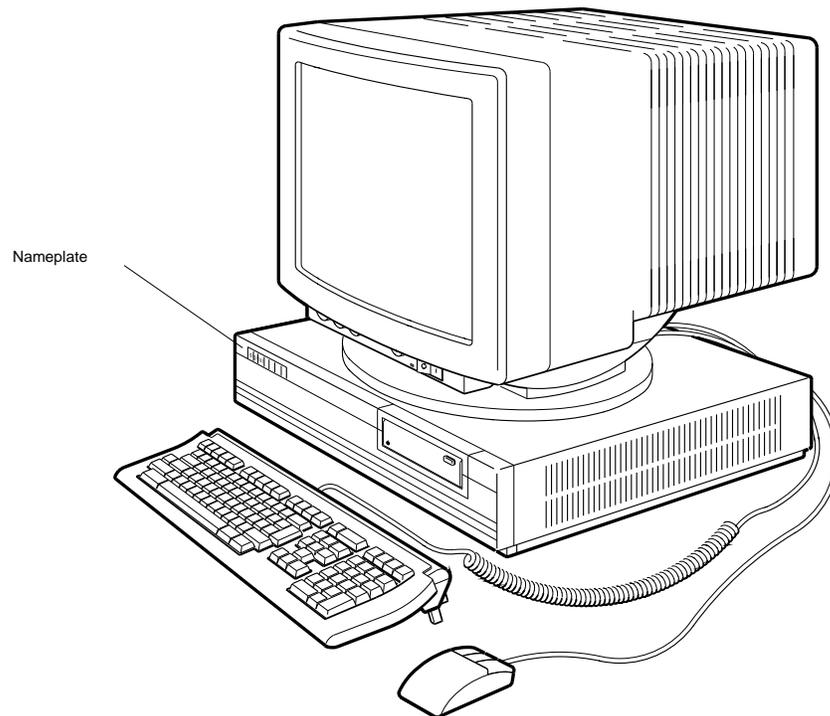
Getting Started

This chapter explains

- What parts make up the basic workstation
- What site requirements must be met so your hardware can operate efficiently and safely
- How to check the voltage requirements of the devices that make up your workstation

The Basic DECstation 5000 Model 100 Series Workstation

The DECstation 5000 Model 100 Series includes three workstations: the Model 120, the Model 125, and the Model 133. The nameplate on the front of the system unit shows which model you have.



WS330137

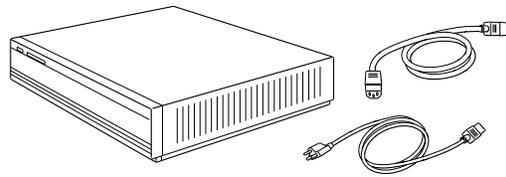
Figure 1-1. Typical DECstation 5000 Model 100 Series workstation

The only difference between the three models is the central processing unit (CPU) module. The CPU in the Model 120 workstation operates at a speed of 20 megahertz (MHz), the CPU in the Model 125 operates at a speed of 25 MHz, and the the CPU in the Model 133 operates at a speed of 33 MHz.

In addition to the manual you are reading, you should have

- Any options you ordered.
- Any software you ordered.
- All the items shown in Figure 1-2, on page 1-4, with one exception. You should only have one type of video cable assembly: color, monochrome, or gray-scale. However, you may have more than one cable assembly of that type.

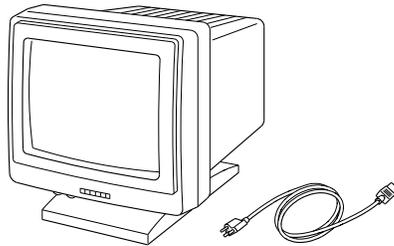
Save the cartons that your workstation is packed in. You may need them later.



System unit, power cord, and monitor-to-system-unit power cable



Color video cable assembly



Monitor and monitor power cord



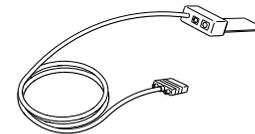
Monochrome video cable assembly



Gray-scale video cable assembly



Keyboard with cable
(Keyboard ordered may vary from the one shown)



Keyboard-mouse cable assembly



Communication connector adapter



SCSI terminator



Antistatic wrist strap



Mouse with cable



ThickWire Ethernet loopback connector



Screwdrivers

WS330131

Figure 1-2. Parts of a basic workstation

Workstation Site Requirements

For your workstation to function efficiently, your work environment must meet the requirements listed here.

Caution: Failure to meet these requirements can damage equipment.

Temperature

- Keep the temperature around the workstation between 50°F and 104°F (10°C and 40°C).
 - Set up your workstation away from heaters, photocopiers, and other sources of heat.
 - Protect your workstation from direct sunlight.
- Allow air to flow freely around your workstation to keep heat from building up and damaging your equipment.
 - Leave 4 inches (10 centimeters) of space between system unit vents and other objects.
 - Leave 3 inches (7.6 centimeters) of space between monitor vents and other objects.

Humidity

- Keep relative humidity within the range of 10 to 80 percent.

Cleanliness

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

Interference

- Set up your workstation at least 30 inches (76.2 centimeters) away from other terminals or monitors and from other sources of electrical interference, such as printers or electric pencil sharpeners.
- Limit exposure to static electricity and magnetized objects by setting up your workstation away from busy corridors and other high-traffic areas and away from filing cabinets and steel beams in walls.

Power

- The fuse for your outlet must be at least 15 amperes.
- Be sure your electrical circuit is properly grounded. If possible, use a surge-protected power strip to connect the power cord to your workstation.
- Be sure the voltage for workstation devices matches that of your power source.

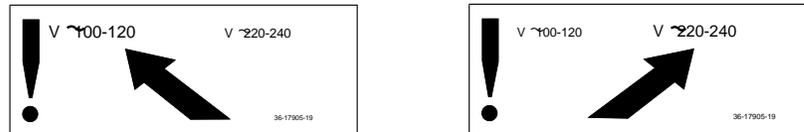
Supplies

- Store supplies, such as tape cartridges, within the same temperature and humidity limits as those for your workstation.

Workstation Voltage Requirements

The voltage for many devices, including most monitors, must match that of your power source. Your power source is either 110/120 or 220/240 volts. Where necessary, a yellow voltage label that covers the power connector on your device tells you the voltage requirements for that device.

Caution: *Connecting a device to a power source that does not meet the voltage requirements of that device can damage the device.*



WSE21021

Figure 1-3. Voltage labels

2

System Unit, Monitor, Keyboard, Mouse, and Tablet

This chapter explains

- What connectors, controls, and indicator lights are present on the system unit and monitor and what they do
- How to connect the monitor, keyboard, and mouse or tablet to the system unit
- When to use the monitor power cord instead of the monitor-to-system-unit power cable
- How to connect the system unit power cord and the monitor-to-system-unit power cable or the monitor power cord

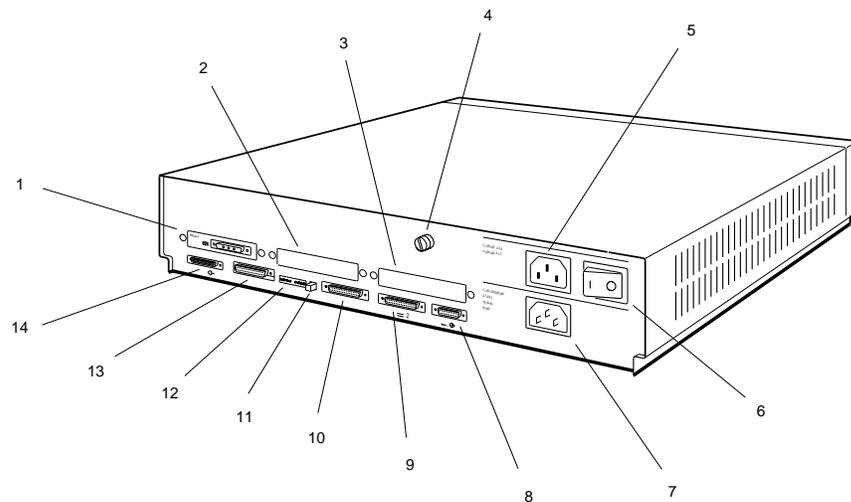
The System Unit

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

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

Connectors, Controls, and Indicator Lights on the System Unit

Figure 2-1 shows the connectors and switches on the back of the system unit. Table 2-1, on page 2-3, explains each item.



- | | |
|---|--|
| 1. TURBOchannel option slot 0. | 9. Communications connector 2 |
| 2. TURBOchannel option slot 1 | 10. Communications connector 3 |
| 3. TURBOchannel option slot 2 | 11. Halt button |
| 4. Cover-release screw | 12. Diagnostic indicator lights |
| 5. Monitor-to-system-unit power connector | 13. Base system ThickWire Ethernet connector |
| 6. On/off switch | 14. Base system SCSI connector |
| 7. System unit power connector | |
| 8. Keyboard-mouse connector | |

WS330094

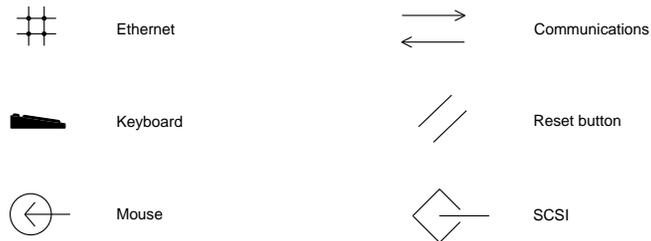
Figure 2-1. Back of the system unit

Table 2-1. Connectors, Controls, and Indicator Lights on the System Unit

Item	Function
TURBOchannel option slots 0, 1, and 2	The points at which optional TURBOchannel hardware can connect to the system unit. In Figure 2-1, on page 2-2, TURBOchannel slot 0 contains a video connector, the point at which a video cable connects the monitor to the system unit.
Cover-release screw	A captive screw that allows the cover to be removed from the system unit.
Monitor-to-system-unit power connector	The point at which power can pass from the system unit to the monitor.
On/off switch	The switch that turns the system unit on and off. Pressing the 1 turns the system unit on. Pressing the 0 turns it off.
System unit power connector	The point at which power from the power source reaches the system unit.
Keyboard-mouse connector	The point at which the keyboard-mouse cable connects the keyboard and mouse or tablet to the system unit.
Communications connectors	The points at which communications devices, such as modems and printers, connect to the system unit.
Halt button	The switch that stops the worksystem software and puts the workstation in console mode.
Diagnostic indicator lights	Lights can indicate where system failures have occurred. These lights are useful when there is no display on the monitor.
Base system ThickWire Ethernet connector	The point at which Ethernet network cables connect to the system unit.
Base system SCSI connector	The point at which external small computer system interface (SCSI) storage devices connect to the base system.

Icons on the System Unit and Its Cables

Many of your workstation connectors and cables use icons to remind you of their functions. Figure 2-2 shows the icons used on your workstation.



WSE20003

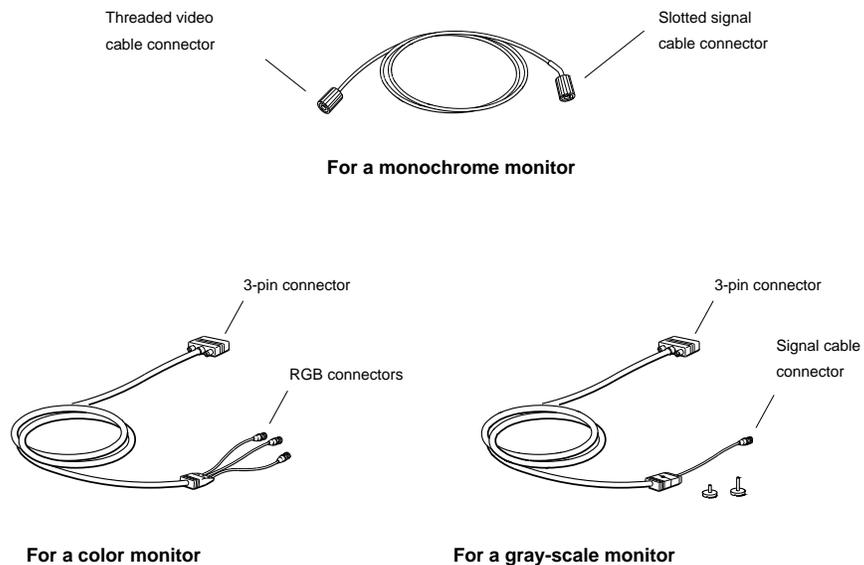
Figure 2-2. Icons on the workstation

The Monitor

Caution: Make sure the monitor and system unit are turned off. Connecting or disconnecting your monitor while power is turned on can damage the monitor.

To Connect the Monitor to the System Unit

1. Select the appropriate video cable assembly for your workstation.
 - The video cable assembly for a color monitor has a set of red, green, and blue (RGB) signal cables at one end and a 3-pin connector at the other.
 - The video cable assembly for a gray-scale monitor has a round signal cable connector at one end and a 3-pin connector at the other end.
 - The video cable assembly for a monochrome monitor has a threaded video cable connector on one end and a slotted connector on the other end.



WS330040

Figure 2-3. Video cable assemblies

2. Place the monitor next to or on top of the system unit.

Caution: *Placing the monitor near an electromagnetic device, such as a printer or an electric pencil sharpener, or near magnetized objects, such as filing cabinets or steel beams in walls, can interfere with its performance.*

3. Turn off the monitor.



Press the 0 on this type of switch.



Press and release this type of switch.

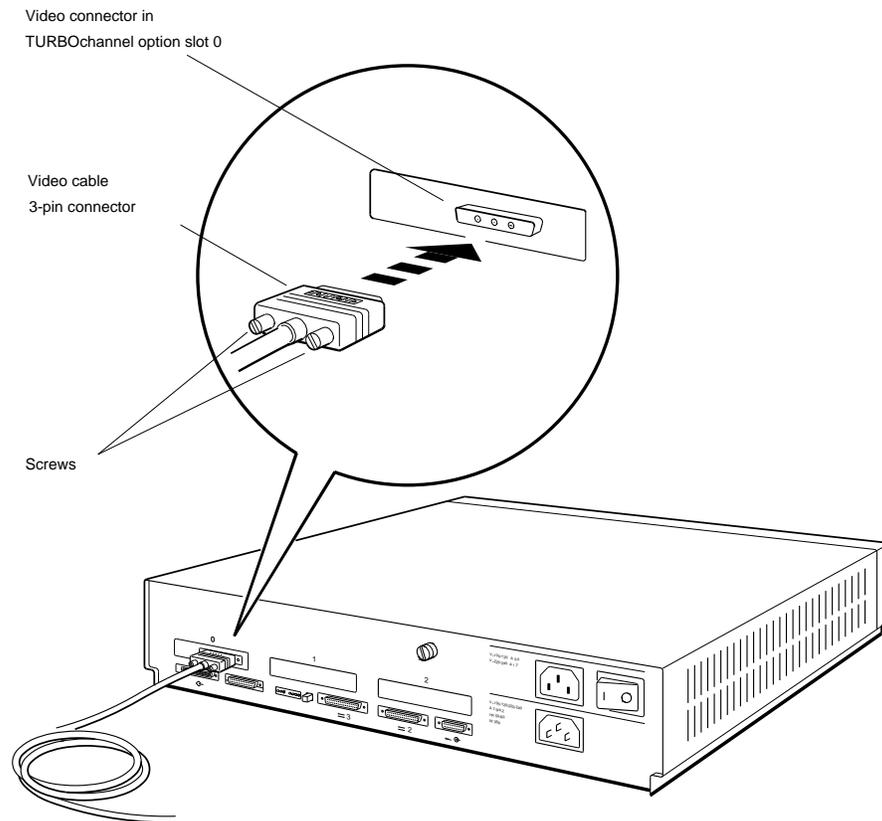


Press this type of switch so it is out.

WSE21101

Figure 2-4. Turning off your monitor

4. Connect the video cable assembly to the system unit and monitor with one of the following procedures.
 - Color monitor
 - a. Hold the 3-pin connector of the cable assembly so the widest part of the connector is on top.
 - b. Firmly push the cable connector into the video option connector on the system unit.
 - c. Tighten the screws on the 3-pin connector to lock the connector securely in place. If the 3-pin connector is inserted upside down, the colors red and blue are displayed in reverse on color monitors. Check to see that the connection is correct.



WS330028

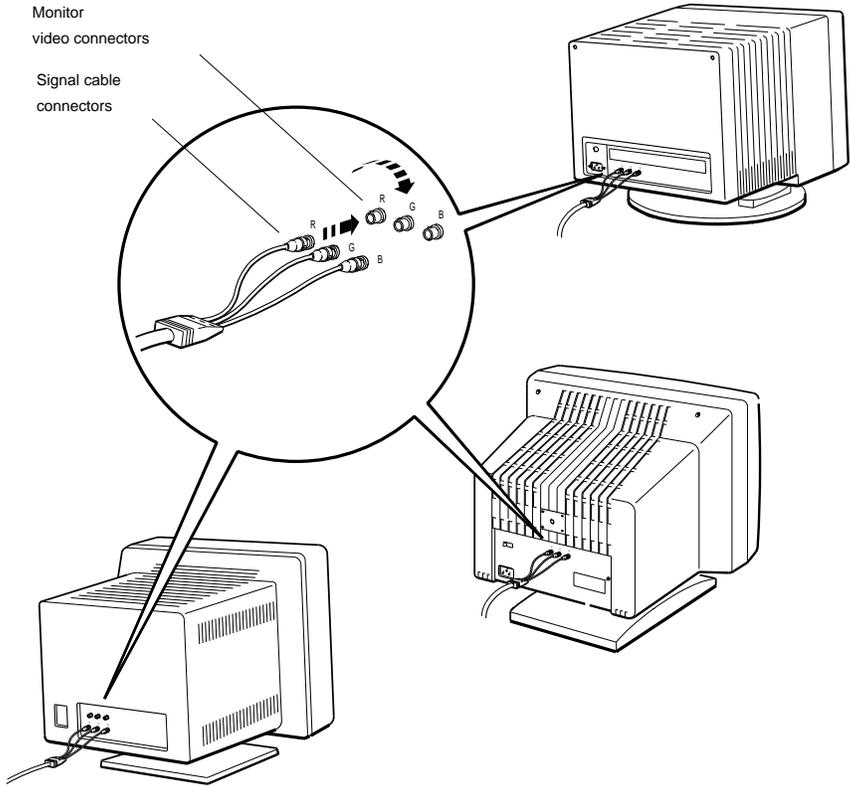
Figure 2-5. Connecting a color or gray-scale video cable to the system unit

- d. Connect the red, green, and blue signal cables to the round connectors on the monitor labeled R, G, and B.

If your monitor has two sets of round RGB connectors, use the ones labeled VIDEO IN. The monitor will have no display if you use the other set of connectors.

- Align the slots on the collar of the red signal cable connector with the pins on the monitor connector labeled R.
- Push the signal cable connector onto the monitor connector. Then twist the cable connector to the right to lock it.

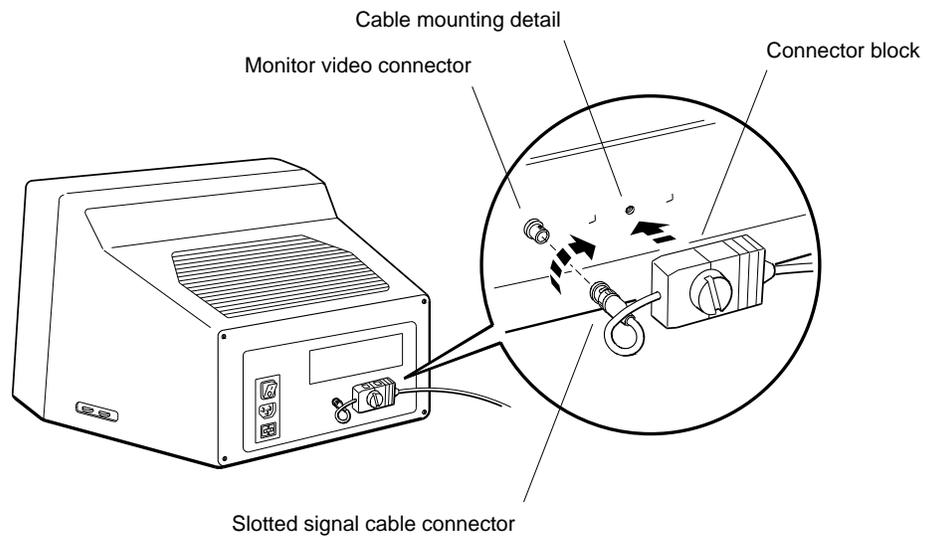
Repeat this procedure with the green and blue signal cables. The green signal cable connects to the monitor connector labeled G, and the blue signal cable connects to the monitor connector labeled B.



WS330071

Figure 2-6. Connecting a video cable assembly to a color monitor

- Gray-scale monitor
 - a. Hold the 3-pin connector of the cable assembly so the widest part of the connector is on top.
 - b. Firmly push the cable connector into the video option connector on the system unit.
 - c. Tighten the screws on the 3-pin connector to lock the connector securely in place.
 - d. Align the slots on the collar of the signal cable connector with the pins on the monitor video connector.
 - e. Push the slotted signal cable connector onto the monitor video connector. Then twist the cable connector to the right to fasten it.



WS33O095

Figure 2-7. Connecting a video cable assembly to a VR262 19-inch gray-scale monitor

- Monochrome monitor
 - a. Press the threaded signal cable connector onto the system unit video connector to tighten it.
 - b. Align the slots on the collar of the signal cable connector with the pins on the monitor video connector.
 - c. Push the slotted signal connector onto the monitor video connector. Then twist the connector to the right to lock it.

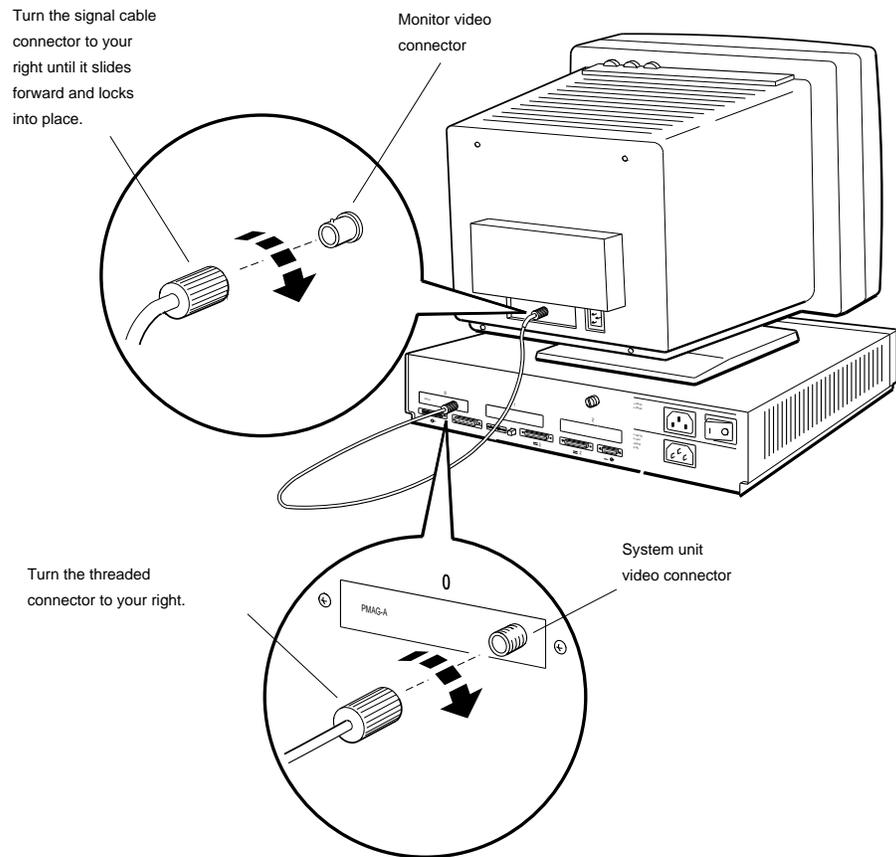


Figure 2-8. Connecting a video cable assembly to a monochrome monitor

The Keyboard

The main part of the keyboard resembles a typewriter keyboard. In addition to the main keys, the keyboard has some special function keys, a special editing keypad, and a numeric/application keypad. The manuals for your software explain how to use the keys.

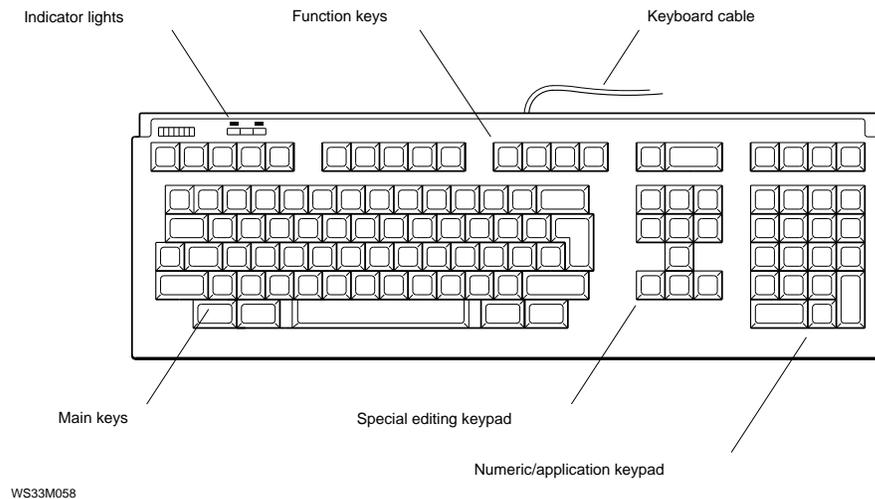
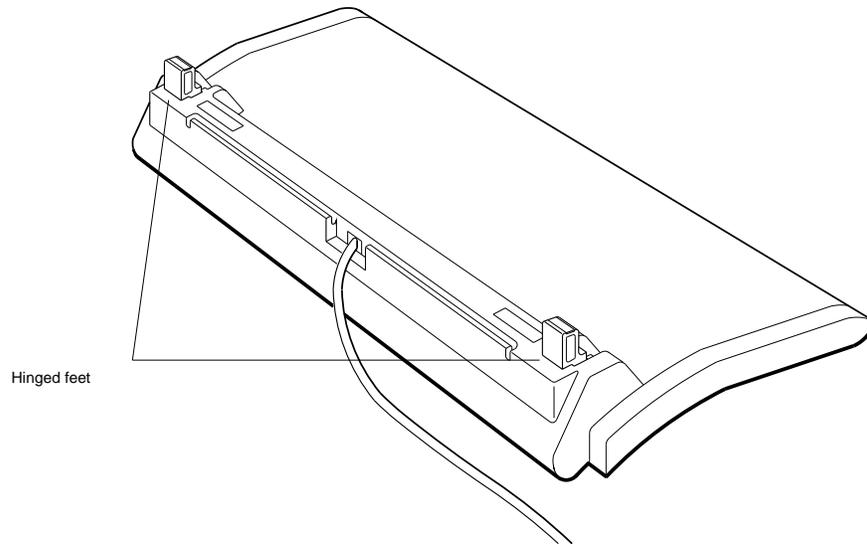


Figure 2-9. Keyboard

To Adjust the Keyboard

You can tilt the keyboard or let it lie flat. To tilt it, press up on the hinged feet.



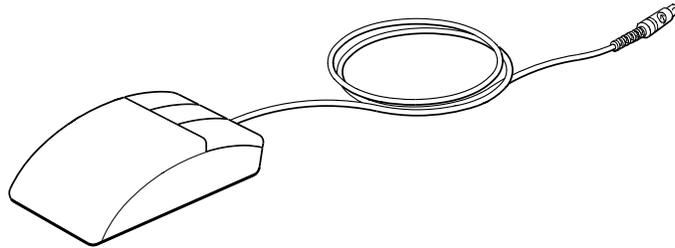
WS330105

Figure 2-10. Hinged feet on the keyboard

The Mouse and Tablet

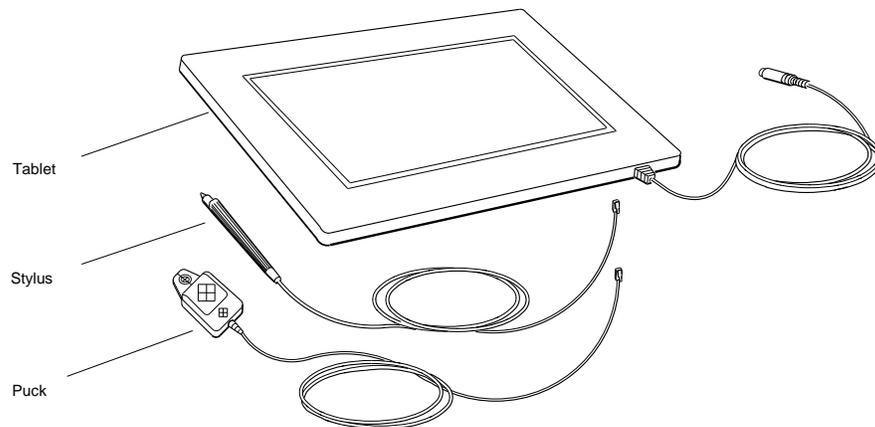
The mouse and the tablet and puck or stylus are pointing devices to position the cursor on your monitor screen. You can use one or the other device, but not both at the same time.

Your software manuals explain how to use the devices.



WS331106

Figure 2-11. A mouse



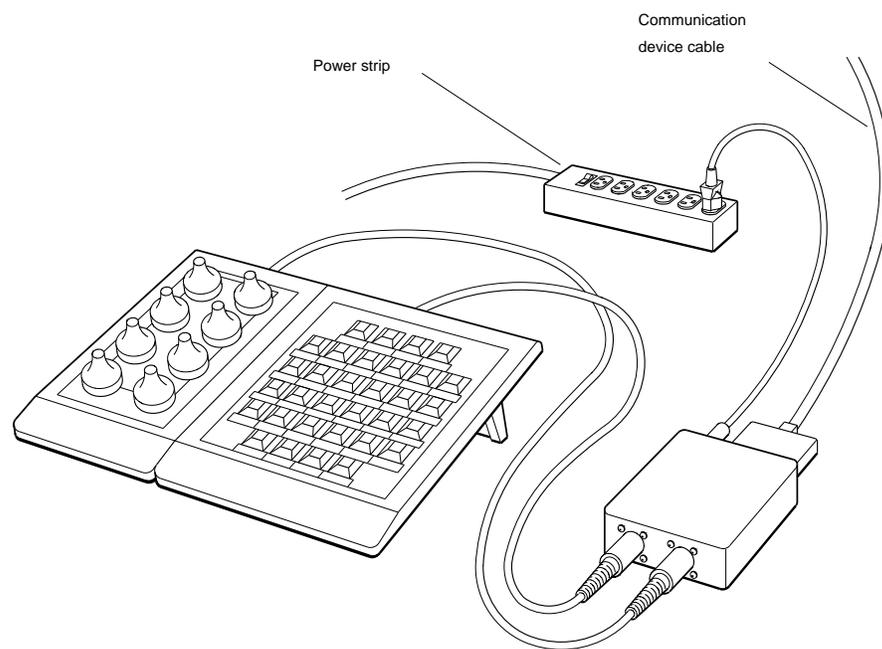
Tablet with puck and stylus

WS330132

Figure 2-12. A tablet with its puck and stylus

The Dial and Button Box

You can use the optional dial and button box with your workstation. The dial and button box allow you to move data on the monitor screen. The documentation supplied with these options explains their installation and use.



WS33M057

Figure 2-13. Dial and button box

Connecting the Keyboard and Mouse or Tablet to the System Unit

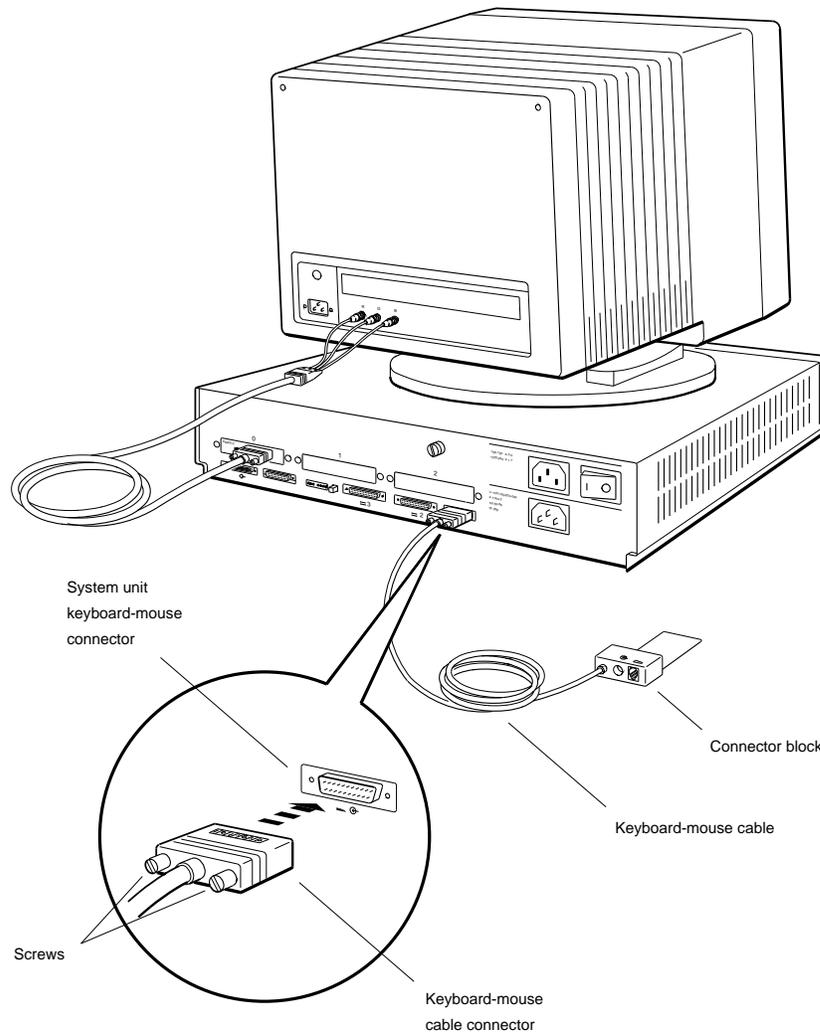
The keyboard and mouse or tablet are connected to a keyboard-mouse cable assembly that connects to the system unit.

The keyboard-mouse cable assembly has a 15-pin connector at one end and a connector block with connectors for the keyboard and mouse or tablet at the other end.

The 15-pin connector attaches to the back of the system unit. The plastic flap on the connector block slides under the base of the monitor.

To Connect the Cable Assembly to the System Unit

1. Hold the cable connector so the widest part of the connector is on top.
2. Push the cable connector onto the connector on the system unit.
3. Tighten the screws on the cable connector.

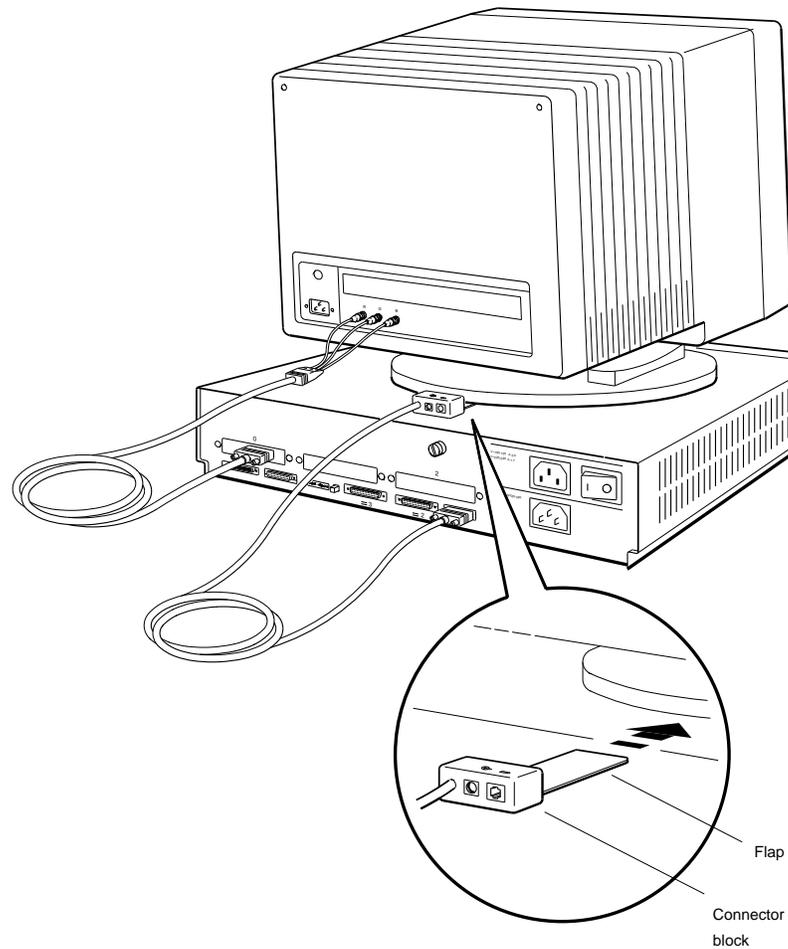


WS330030

Figure 2-14. Connecting the keyboard-mouse cable

To Position the Connector Block

1. Hold the connector block so the keyboard and mouse icons are on top.
2. Tilt the monitor base forward slightly and slide the flap on the connector block under the base.
3. Lower the monitor base onto the flap. Be sure that the whole flap is under the base.

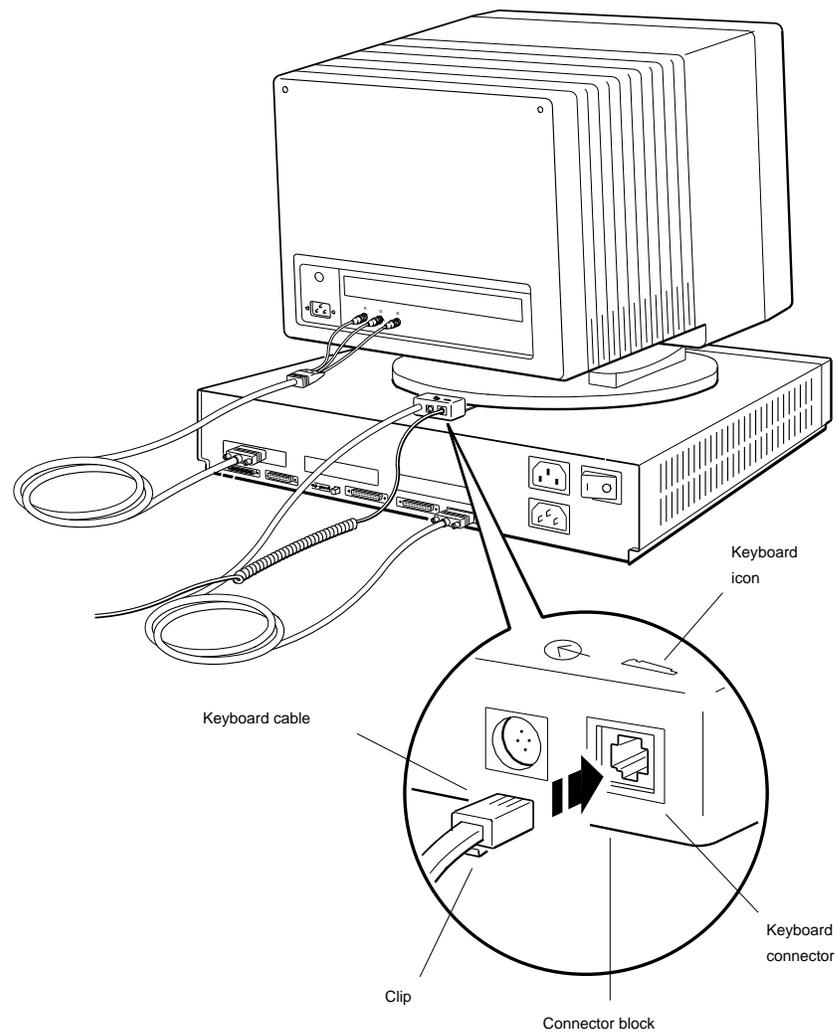


WS330031

Figure 2-15. Positioning the connector block

To Connect the Keyboard to the Connector Block

1. Hold the keyboard cable connector so the clip on the connector faces down.
2. Push the cable connector into the connector block. The cable connector snaps into place.

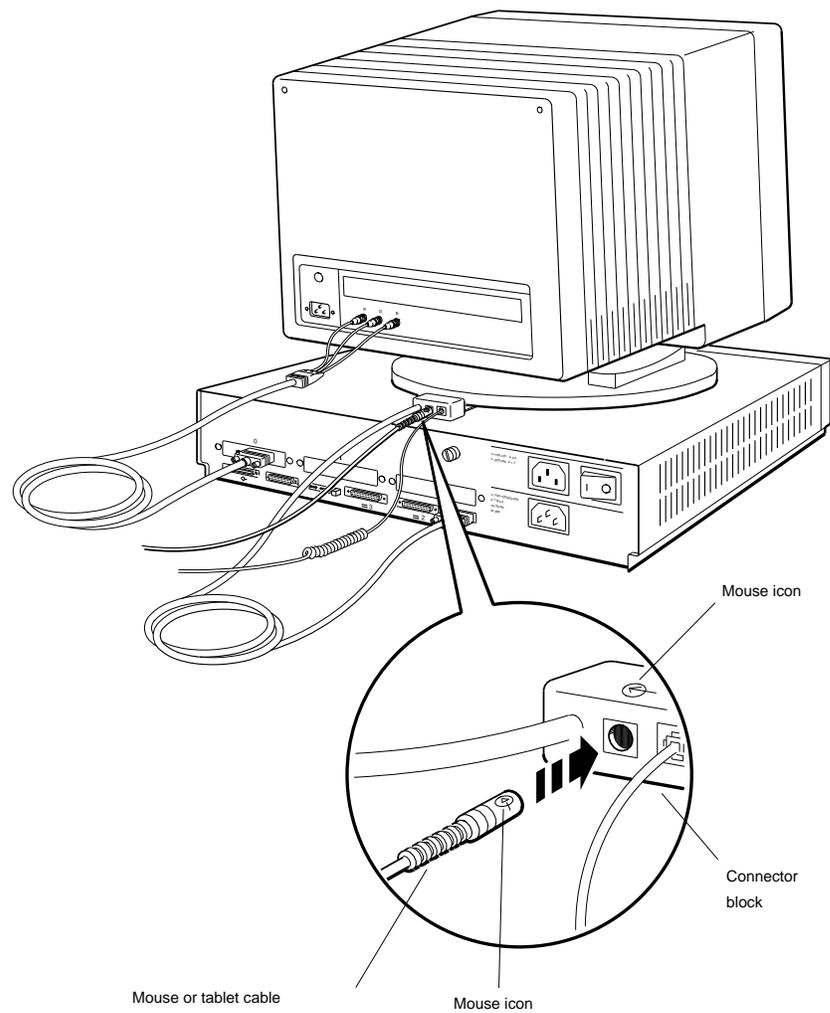


WS330032

Figure 2-16. Connecting the keyboard to the connector block

To Connect the Mouse or Tablet to the Connector Block

1. Carefully align the icon on the top of the mouse or tablet cable connector with the mouse icon on the connector block.
2. Push the cable connector all the way into the connector block.



WS330039

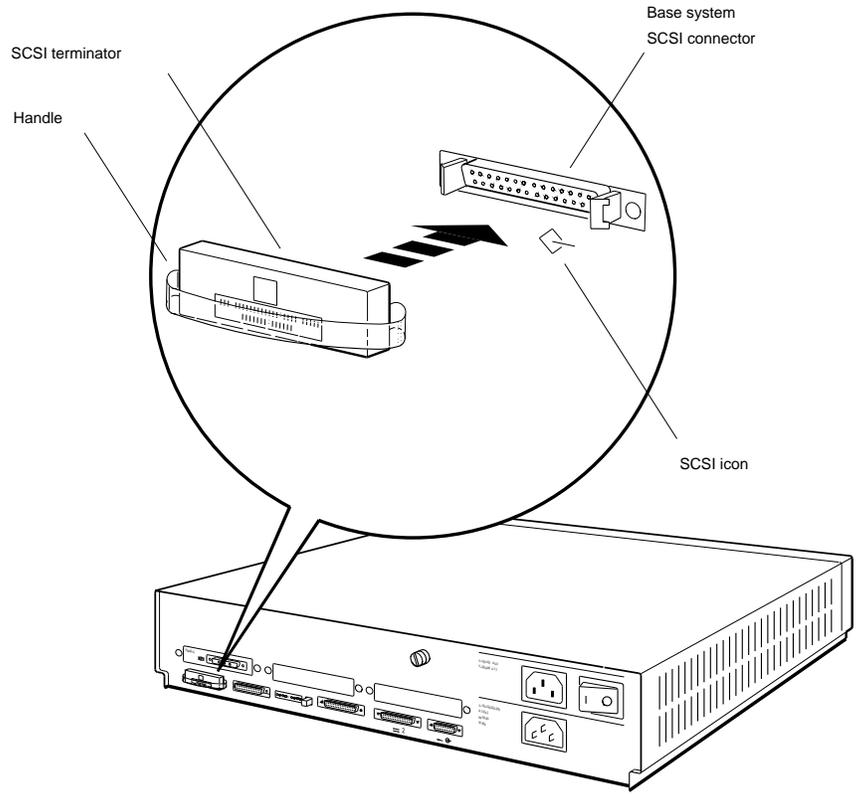
Figure 2-17. Connecting the mouse or tablet to the connector block

Attaching a SCSI Terminator to the Base System SCSI Connector

A connector for a small computer system interface (SCSI) is built into the base system hardware, as shown in Figure 2-1, on page 2-2. When the connector is not connected to a SCSI device (a disk drive or other device that uses a SCSI interface), it must be terminated with a SCSI terminator. Otherwise, the workstation may not function properly.

For the time being, put a SCSI terminator on the SCSI connector on the system unit. You can remove the terminator later if you connect SCSI devices to the system unit.

Your system unit may have additional SCSI connectors in option slots. Do not attach SCSI terminators to these connectors.



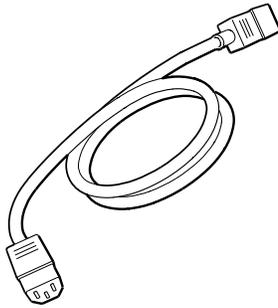
WS330087

Figure 2-18. Attaching a terminator to the system SCSI connector

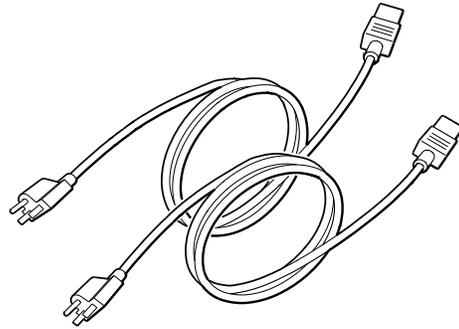
Supplying Power to the System Unit and Monitor

The system unit takes power from a power outlet, and the monitor, in turn, takes power from the system unit. The monitor connects to the system unit with a short cable.

Sometimes the workstation is supplied with an extra power cord. In this case, you can also connect the monitor to a power outlet. The power cord is longer than the monitor-to-system-unit power cable, allowing you to move the monitor away from the system unit.



Monitor-to-system-unit
power cable



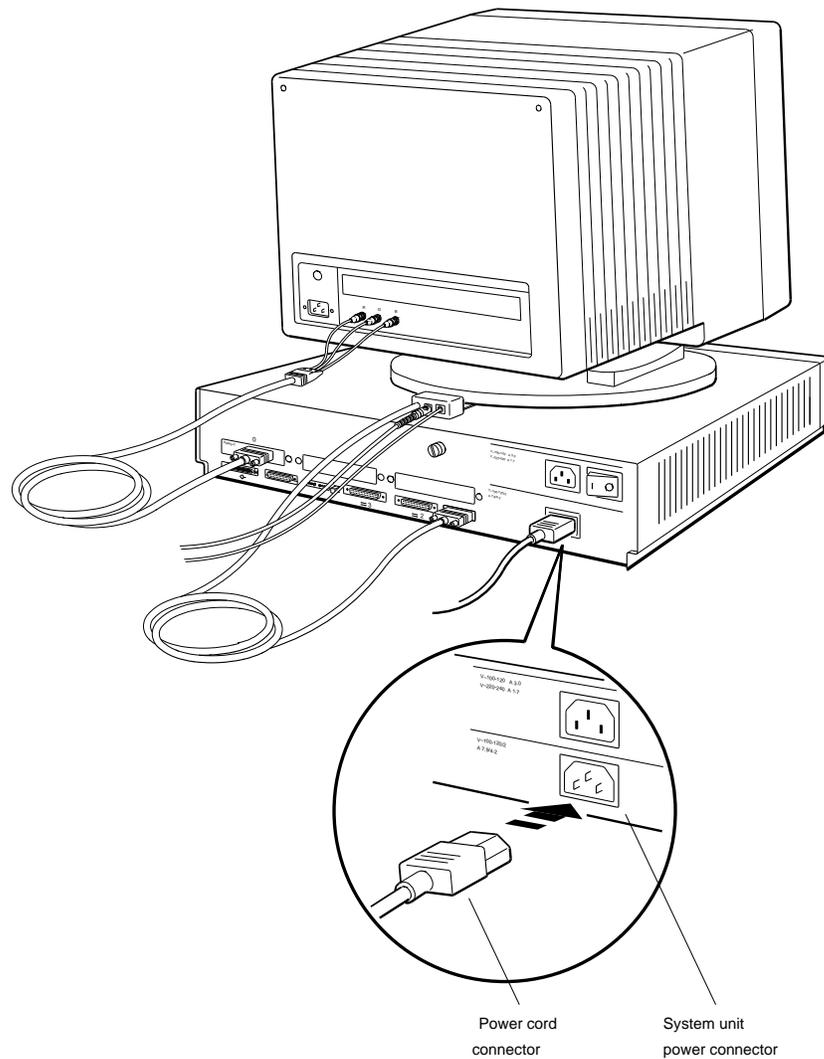
Two power cords

WS331004

Figure 2-19. A monitor-to-system-unit power cable and two power cords

To Connect the System Unit to a Power Outlet

1. Plug the connector on the power cord into the power connector on the back of the system unit.
2. Plug the other end of the power cord into a power outlet.

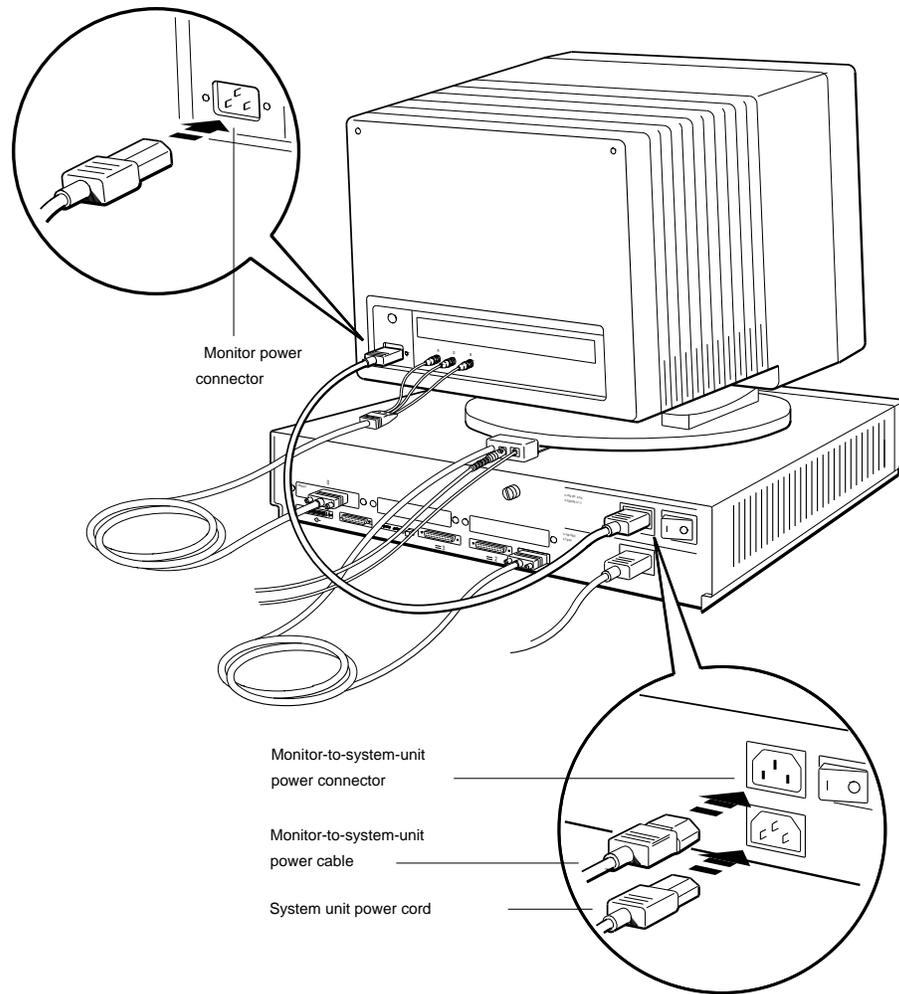


WS330113

Figure 2-20. Connecting the power cord to the system unit

To Connect the Monitor to a Power Outlet

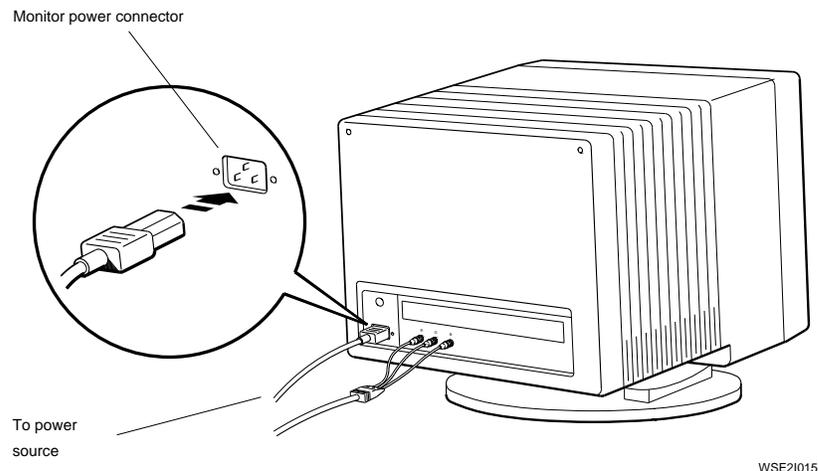
- Connecting to the power outlet on the system unit
 1. Plug the connector on the monitor-to-system-unit power cable into the power connector on the back of the monitor.
 2. Plug the other end of the cable into the extra power outlet on the back of the system unit.



WS331001

Figure 2-21. Connecting the monitor to the system unit

- Connecting to an independent power outlet
 1. Plug the connector on the extra power cord into the power connector on the back of the monitor.
 2. Plug the other end of the power cord into a power outlet.



WSE21015

Figure 2-22. Connecting the monitor to a power outlet

3

Ethernet Hardware for the Basic Workstation

This chapter explains how to connect ThickWire Ethernet loopback connectors to all ThickWire Ethernet connectors on the system unit. Ethernet is a standard set of conventions or rules for network communications. A network is a group of computers and other communications devices that are linked together.

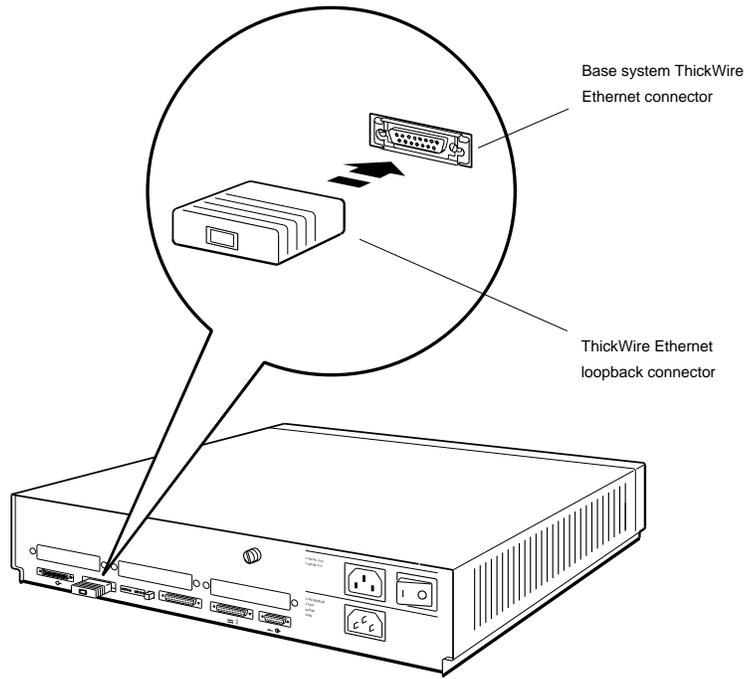
Installing ThickWire Ethernet Loopback Connectors

A ThickWire Ethernet connector is built into the base system hardware, as shown in Figure 2-1, on page 2-2. If your workstation is equipped with the TURBOchannel options, you have additional ThickWire Ethernet connectors in the TURBOchannel option slots. All of the connectors must be either connected to an Ethernet cable or closed with a loopback connector.

For the time being, put a loopback connector on every ThickWire Ethernet connector on the system unit. You can remove the loopback connectors later, when you connect the workstation to your networks. See Chapter 6, section “Connecting the Workstation to a ThickWire Ethernet Network”, on page 6-3 for an explanation on how to connect to a network.

To Install ThickWire Ethernet Loopback Connectors

1. For each ThickWire Ethernet connector on the system unit, find the square ThickWire Ethernet loopback connector that came with your workstation.
2. Hold the loopback connector so that the widest part of the connector is on top.
3. Firmly press the loopback connector onto the ThickWire Ethernet connector on the system unit.



WS330115

Figure 3-1. Attaching a ThickWire Ethernet loopback connector

4

Moving the Workstation

This chapter explains how to take your workstation apart and pack it for moving to another location.

Dismantling Your Workstation

1. Follow the procedures for turning off your workstation described on page 9-9 of this guide.
2. Unplug all power cords from their power sources.
3. Disconnect all external devices and expansion boxes from the system unit and from each other.
4. Disconnect the monitor, the mouse or tablet, and the keyboard from the system unit.
5. Disconnect the keyboard and the mouse or tablet from the connector block on the keyboard-mouse cable.
6. If you are on a network, disconnect your Ethernet cable from the connector on the system unit.

Packing Your Equipment

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

Be sure to include the following in each carton:

- Cables, power cords, and terminators that came with each component
- Manuals and other documentation for each component

Caution: The end of the SCSI cable is heavy. It can damage the components in the system unit if you do not fasten it securely.

Reinstalling Your Workstation

To reinstall your workstation, follow the instructions in the *DECstation 5000 Model 100 Series Hardware Installation Guide*.

Part II

Optional Hardware

5

Internal Hardware Options

This chapter explains

- How to remove and replace the cover of the system unit
- How to use the antistatic wrist strap
- How to install and remove memory modules in the system unit
- How to install and remove CPU modules
- How to install and remove hard disk drives and removable media drives in the system unit

Installing and Removing Memory

DECstation 5000 Model 100 Series workstations use pairs of 2-megabyte or 8-megabyte memory modules. Your workstation can hold up to eight pairs of memory modules.

The system unit comes with at least four 2-megabyte MS01-AA or MS01L-AA memory modules or two 8-megabyte MS01-CA memory modules in place.

- With pairs of 2-megabyte MS01-AA or MS01L-AA memory modules, you can install up to 32 megabytes of memory.
- With pairs of 8-megabyte MS01-CA memory modules, you can install up to 128 megabytes of memory.

The `cnfg` command shows how much memory is installed in your workstation. Chapter 11 explains how to use the command.

To Install Memory Modules

Use either 2-megabyte or 8-megabyte memory modules in your workstation. The MS01-AA and the MS01L-AA can be used interchangeably.

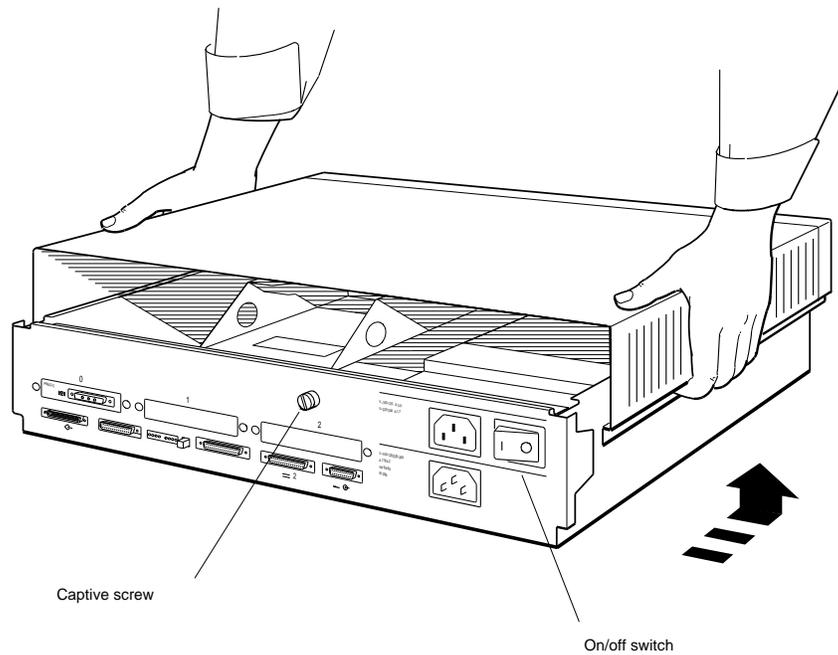
Caution: *Do not mix 2-megabyte and 8-megabyte memory modules in the same system. This will cause the 8-megabyte modules to act as 2-megabyte modules.*

You need a medium Phillips screwdriver.

Open the system unit

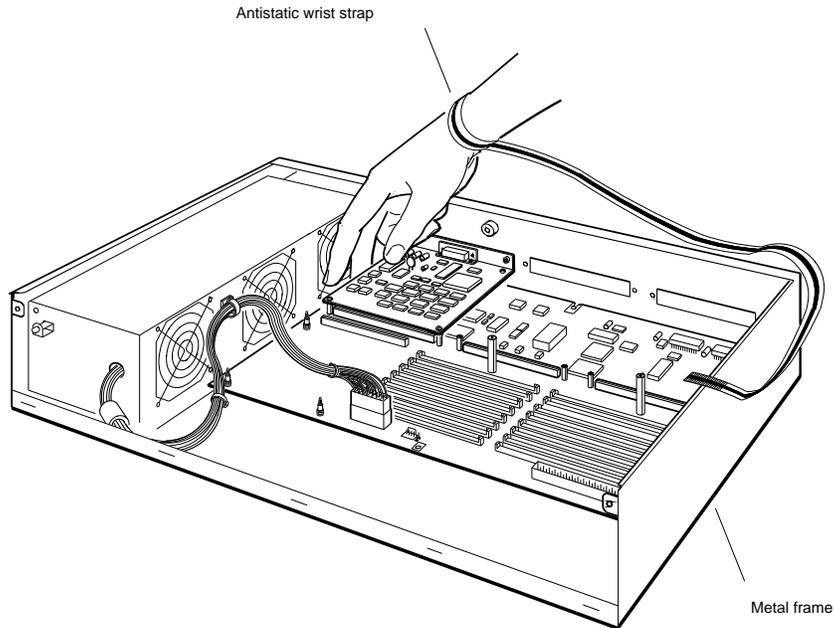
1. Follow the instructions that came with your worksystem software to shut down the software.
2. Turn off the system unit by pressing the 0 on the on/off switch on the back of the unit.
3. Loosen the cover-release screw on the back of the system unit. This is a captive screw. It can be loosened but not removed.

4. Stand in front of the system unit, grasp each side of the cover with your hands, and pull the cover straight toward you about 2 inches (5.5 centimeters). Then pull up.



WS33O102

Figure 5-1. Removing the cover from the system unit



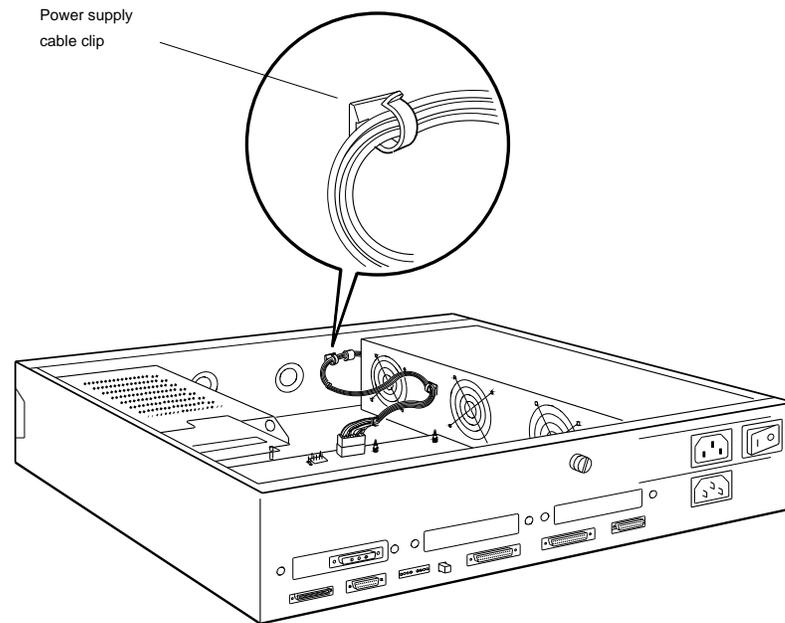
WS330136

Figure 5-2. Using an antistatic wrist strap

5. Attach the antistatic wrist strap that came in the workstation accessories kit.
 - a. Unwrap the first section of the antistatic wrist strap and wrap the adhesive side firmly around your wrist.
 - b. Peel the liner from the copper foil at the opposite end and attach the copper foil to the metal frame that encloses the unit.

Caution: Always use the antistatic wrist strap when working inside the system unit or handling items stored in antistatic bags. Failure to use the antistatic wrist strap can result in damage to equipment.

6. Unhook the power supply cable from the white loop on the inside of the front drive panel, as shown in Figure 5-3.



WS330101

Figure 5-3. Inside the system unit

7. Loosen the two screws that hold the front drive panel in place. They are captive screws and cannot be removed.
8. Unhook the power supply cable from the white loop on the end of the drive bracket on the front drive panel and loosen the two captive screws on the end of the bracket.
9. Pull up carefully on the end of the drive bracket. As you raise the end of the bracket, be sure not to damage any SCSI and power supply cables that pass through the cutout in the end of the bracket.

Set the front drive panel aside. Handle it carefully if a drive is in the bracket.

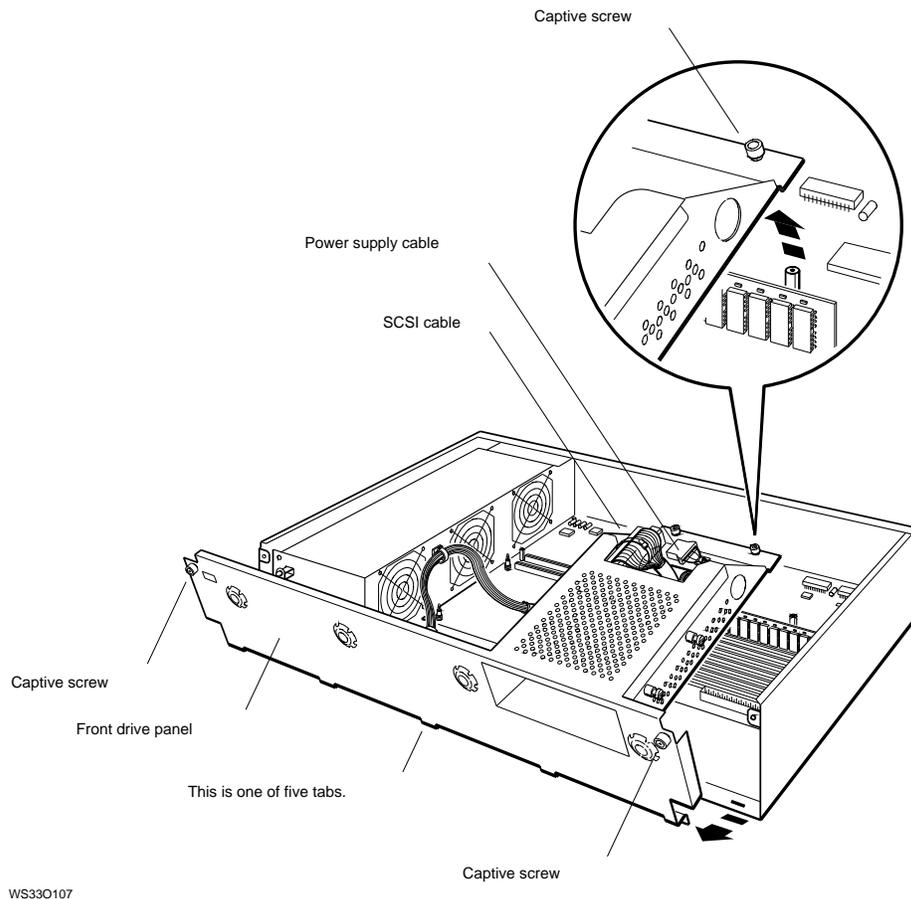


Figure 5-4. Removing the front drive panel

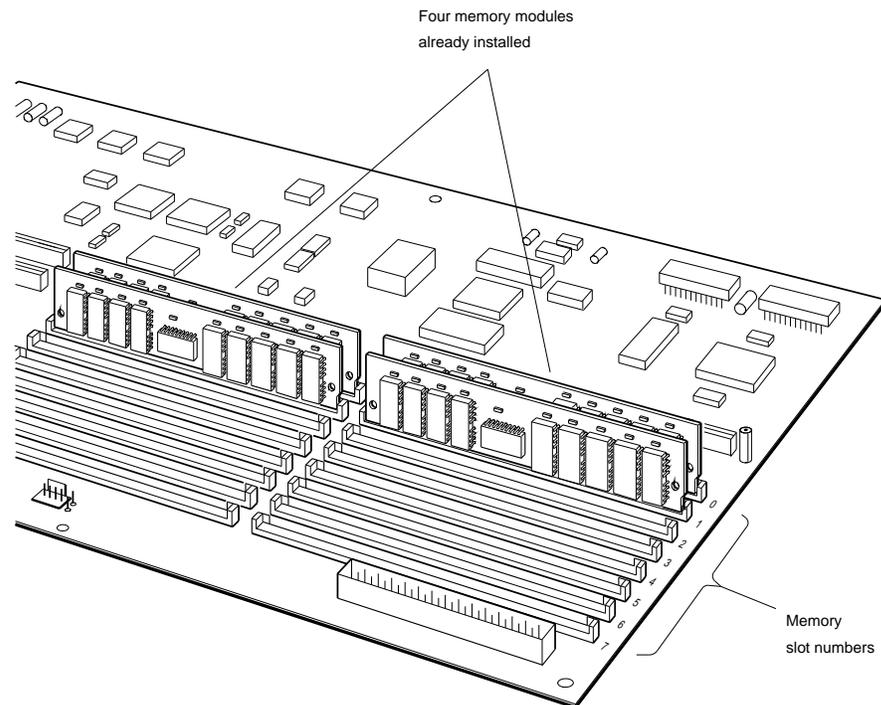
10. Unhook the power supply cable from the white loop on the end of the drive bracket on the front drive panel and loosen the two captive screws on the end of the bracket.
11. Pull up carefully on the end of the drive bracket. As you raise the end of the bracket, be sure not to damage any SCSI and power supply cables that pass through the cutout in the end of the bracket.

Set the front drive panel aside. Handle it carefully if a drive is in the bracket.

Install pairs of memory modules

1. Look at the numbers printed beside the memory slots inside the system unit. Find the empty slot with the lowest number.

Notice that each memory slot has two connectors. You must install memory modules in pairs, one in each connector of a slot.

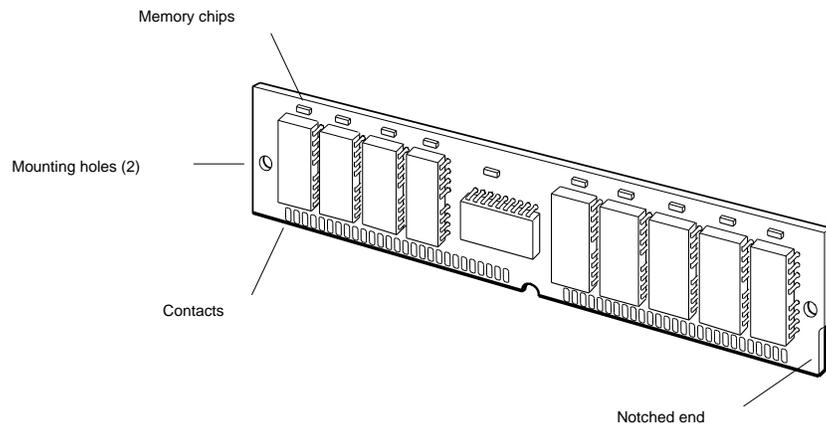


WS330033

Figure 5-5. Memory slots inside the system unit

2. Hold the memory module so that the notched end faces right and the contacts face down.

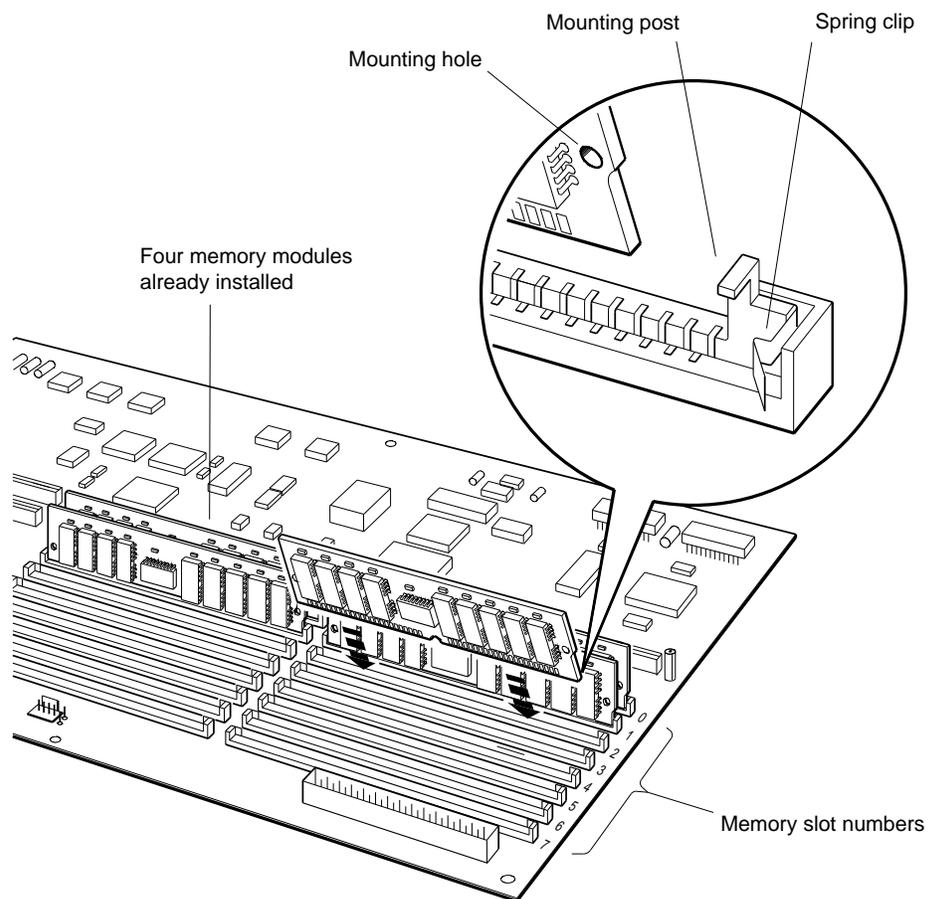
Caution: Do not touch the contacts on the memory modules. A static charge could damage the module.



WS33O103

Figure 5-6. Memory module

3. Tilt the top of the memory module toward the front of the system unit and insert the memory module into the empty connector.
4. Make sure the mounting holes in the module line up with the mounting posts at the ends of the connector, as shown in Figure 5-7.
5. Tilt the top of the memory module up and press the module against the mounting posts until the module snaps past the spring clips. These clips lock the memory module onto the mounting posts.



WS331104

Figure 5-7. Inserting a memory module

6. Repeat steps 1 to 5 to install another memory module in the other empty connector of the same slot.

Repeat the installation for every pair of memory modules that you are installing. Be sure to install each pair of modules in the slot with the lowest number.

Close the system unit

1. Insert the tabs on the front drive panel into the cutouts on the system unit and tilt the panel halfway down into the system unit.
2. If you disconnected cables from a drive in the drive bracket, hold the panel while you pass the loose ends of the cables through the large cutout in the end of the drive bracket. Plug the ends of the cables into the connectors on the drive.

If there is no drive in the drive bracket, pass the cables through the large cutout and tuck the ends of the cables into the bracket.

3. Carefully lower the end of the bracket onto the two posts that support it.

If you cannot seat the drive bracket on the two posts, lift the end of the bracket and rearrange the cables. Then lower the bracket again.

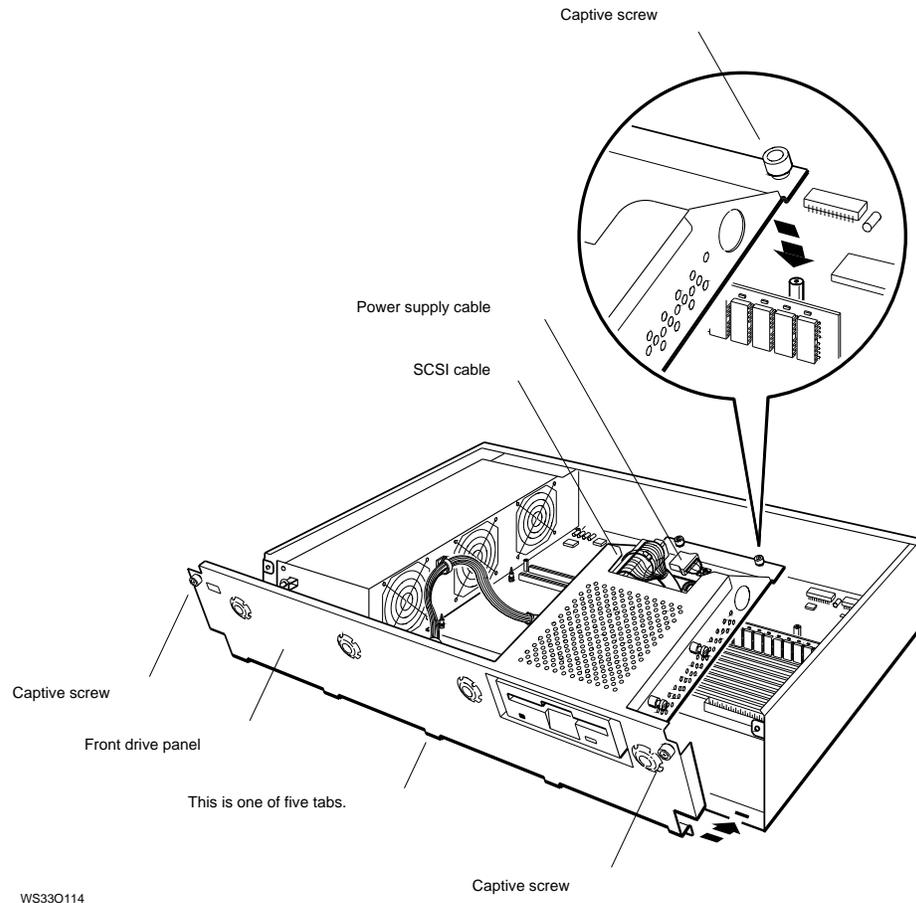


Figure 5-8. Installing the front drive panel

4. Tighten the two captive screws on the end of the bracket until they are at least finger tight.
5. Tighten the two captive screws that hold the front drive panel on the system unit until they are at least finger tight.
6. Remove the antistatic wrist strap from your wrist and from the system unit.
7. Standing at the front of the system unit, position the cover slightly above the system unit about 2 inches (5.5 centimeters) from the back of the unit.

8. Rest the cover on the system unit. Then slide it all the way to the back of the unit, as shown in Figure 5-11, on page 5-18.
9. Press the cover-release screw on the back of the unit and tighten it.

To Test Memory Modules

1. Turn on the monitor. Then turn on the system unit.
When the system unit completes the power-up self-test successfully, the console prompt (>>) appears on the screen.
2. Type **t 3/mem** followed by a space and the number of the memory slot into which you installed the modules. Then press Return. For example, to test the modules in memory slot 2, type **t 3/mem 2**.

A display similar to the following appears on your screen as the memory test progresses:

```
**\
```

When the test is done, the console prompt (>>) appears. If something other than the console prompt appears, turn to Chapter 10 for troubleshooting instructions.

3. Use the **t 3/mem** command to test the rest of the memory slots in which you installed memory modules.
4. Type **cnfg** at the console prompt and press Return to see the total amount of memory in the workstation. A display like the following appears on your screen:

```
>>cnfg
3:  KN02-BA   DEC      V5.7e   TCF0   ( 24 MB)
                                     (enet: 08-00-2b-0f-45-72)
                                     (SCSI = 7)
```

This example shows a workstation with 24 megabytes (24 MB) of memory.

The display should show the total amount of memory in your workstation. If it does not, turn to Chapter 10 for troubleshooting instructions.

To Remove Memory Modules

Follow these rules when you remove memory modules:

- Remove memory modules from one memory slot at a time, starting with the highest-numbered slot. Always remove memory modules from the highest-numbered slots first.
- Remove both memory modules from a slot. Do not leave a slot with one memory module in it.
- You need at least 8 megabytes of memory to use your workstation.

Open the system unit

1. Follow the instructions that came with your worksystem software to shut down the software.
2. Turn off the system unit by pressing the 0 on the on/off switch on the back of the unit.
3. Loosen the cover-release screw on the back of the system unit. This is a captive screw. It can be loosened but not removed.
4. Stand in front of the system unit, grasp each side of the cover with your hands, and pull the cover straight toward you about 2 inches (5.5 centimeters). Then pull up, as shown in Figure 5-1, on page 5-3.

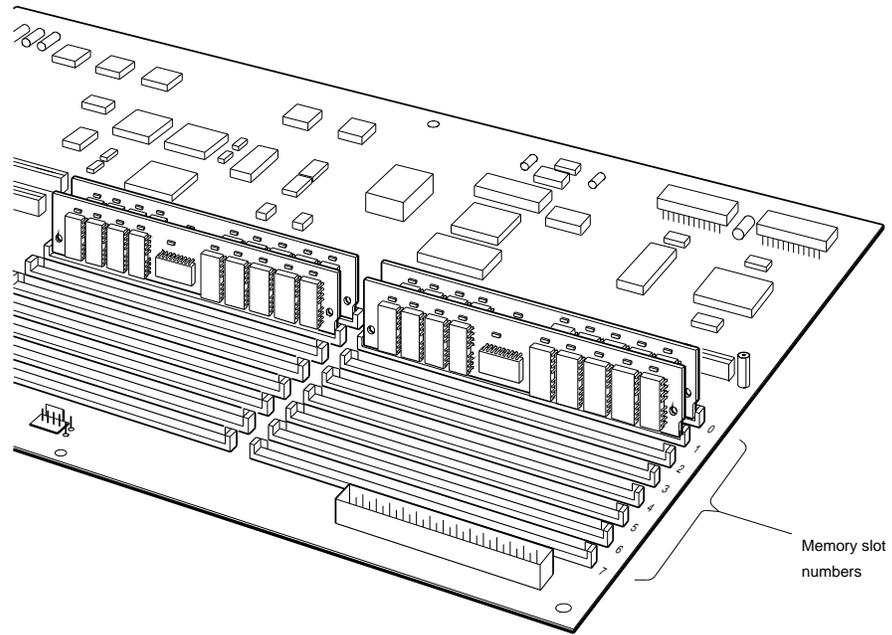
***Caution:** Before opening the system unit, find the antistatic wrist strap that came in the workstation accessories kit. Always use the antistatic wrist strap when you work inside the system unit or with items stored in antistatic bags, as shown in Figure 5-2, on page 5-4.*

5. Place the loop on the antistatic wrist strap around your wrist and clip the other end to the metal frame that closes the system unit, as shown in Figure 5-2, on page 5-4.
6. Unhook the power supply cable from the white loop on the inside of the front drive panel and loosen the two captive screws on the end of the bracket.

Set the front drive panel aside. Handle it carefully if a drive is in the bracket, as shown in Figure 5-4, on page 5-6.

Remove the memory modules

1. Locate the memory modules in the highest numbered memory slot.



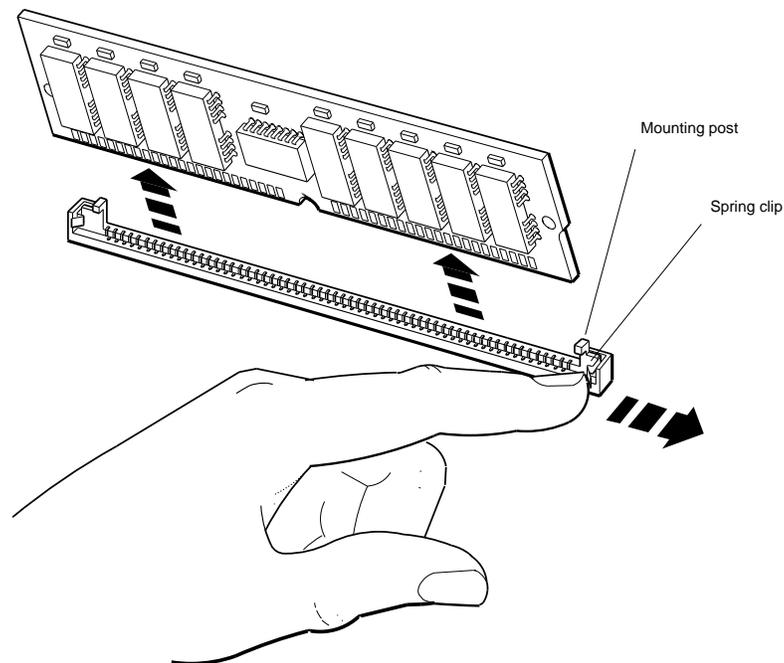
WS330090

Figure 5-9. Memory modules in memory slots 0 and 1

2. Release, but do not remove, one of the two memory modules in the highest-numbered memory slot.

Use your finger to press the spring clip on one end of the memory slot connector. Press the spring clip away from the mounting post on the connector. At the same time, press the memory module toward the front of the system unit.

Release the other end of the memory module the same way.



WS33O099

Figure 5-10. Removing a memory module

3. Lift the memory module out of the connector. Store the module in an antistatic bag.
4. Remove the other memory module from the same slot.

5. Keep removing memory modules two at a time until you have removed all that you intend to. Always remove memory modules from the highest-numbered memory slots first.

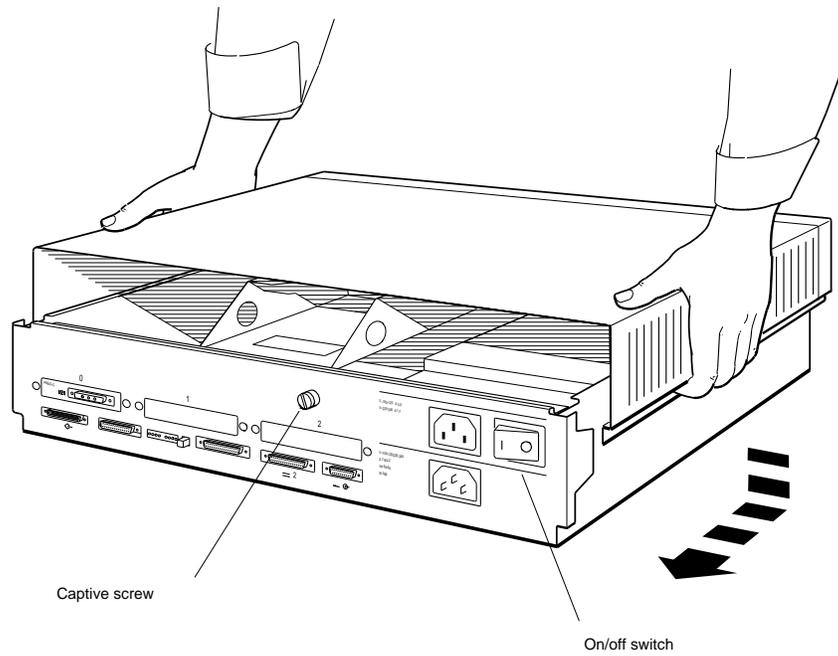
Close the system unit

1. If you are replacing the existing memory modules with new ones, turn to the section “To Install Memory Modules”, on page 5-2.
2. Insert the tabs on the front drive panel into the cutouts on the system unit and tilt the panel halfway down into the system unit.

If there is no drive in the drive bracket, thread the cables through the large cutout and tuck the ends of the cables into the bracket, as shown in Figure 5-8, on page 5-12.

3. Carefully lower the end of the drive bracket onto the two posts that support it.

4. Remove the antistatic wrist strap from the system unit and replace the cover on the system unit, as shown in Figure 5-11.



WS330122

Figure 5-11. Replacing the cover on the system unit

Changing CPU Modules

You may need a flat-blade screwdriver to install a new central processing unit (CPU module).

To Remove a CPU Module

1. Open the system unit.
2. Follow the instructions that came with your worksystem software to shut down the software.
3. Turn off the system unit by pressing the 0 on the on/off switch on the back of the unit.
4. Loosen the cover-release screw on the back of the system unit. This is a captive screw. It can be loosened but not removed.
5. Stand in front of the system unit, grasp each side of the cover with your hands, and pull the cover straight toward you about 2 inches (5.5 centimeters). Then pull up, as shown in Figure 5-1, on page 5-3.

***Caution:** Before opening the system unit, find the antistatic wrist strap that came in the workstation accessories kit. Always use the antistatic wrist strap when you work inside the system unit or with items stored in antistatic bags.*

6. Place the loop on the antistatic wrist strap around your wrist and clip the other end to the metal frame that encloses the system unit, as shown in Figure 5-2, on page 5-4.
7. Unhook the power supply cable from the white loop on the inside of the front drive panel and loosen the two captive screws on the end of the bracket, as shown in Figure 5-3, on page 5-5.
8. Pull up carefully on the end of the drive bracket. As you raise the end of the bracket, be sure to not damage any SCSI and power supply cables that pass through the cutout in the end of the bracket, as shown in Figure 5-4, on page 5-6.

Set the front drive panel aside. Handle it carefully if a drive is in the bracket.

9. Find the CPU module inside the system unit, as shown in Figure 5-12, on page 5-21.
10. With one hand, pull up carefully on a corner of the CPU module where there is a mounting post. With the other hand, use your fingernails to press the lock at the top of the mounting post into the post until you can pull the module free of the lock. Do not lift the module completely off the mounting post.
11. Use the same procedure to pull the module free of the lock on the other two mounting posts.

Caution: Do not pull the heat sinks. You can damage the CPU module if you do.
12. Pull the other end of the module completely out of the module connector. Then remove the CPU module from the system unit.
13. Set the CPU module aside carefully. Put it in an antistatic bag, if you have one, or use the bag from the new CPU module after you unpack it.

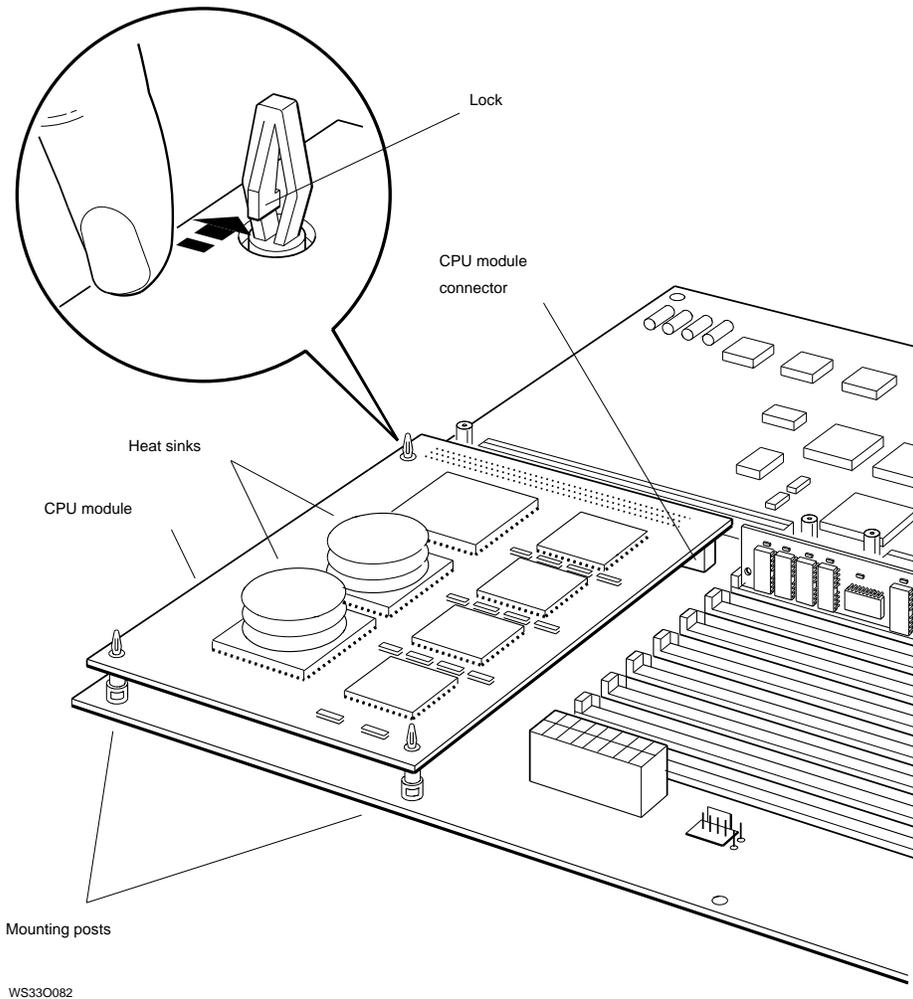


Figure 5-12. Typical CPU module

To Install a New CPU Module

1. Be sure to use the antistatic wrist strap when installing a new CPU module.
2. Remove the new CPU module from the antistatic bag.

Caution: Do not touch the pins in the module connector. A static charge could damage the CPU module components.

3. Align the mounting holes on the CPU module with the mounting posts in the system unit.
4. Carefully press the CPU module partially onto the mounting posts. Do not seat the module fully.

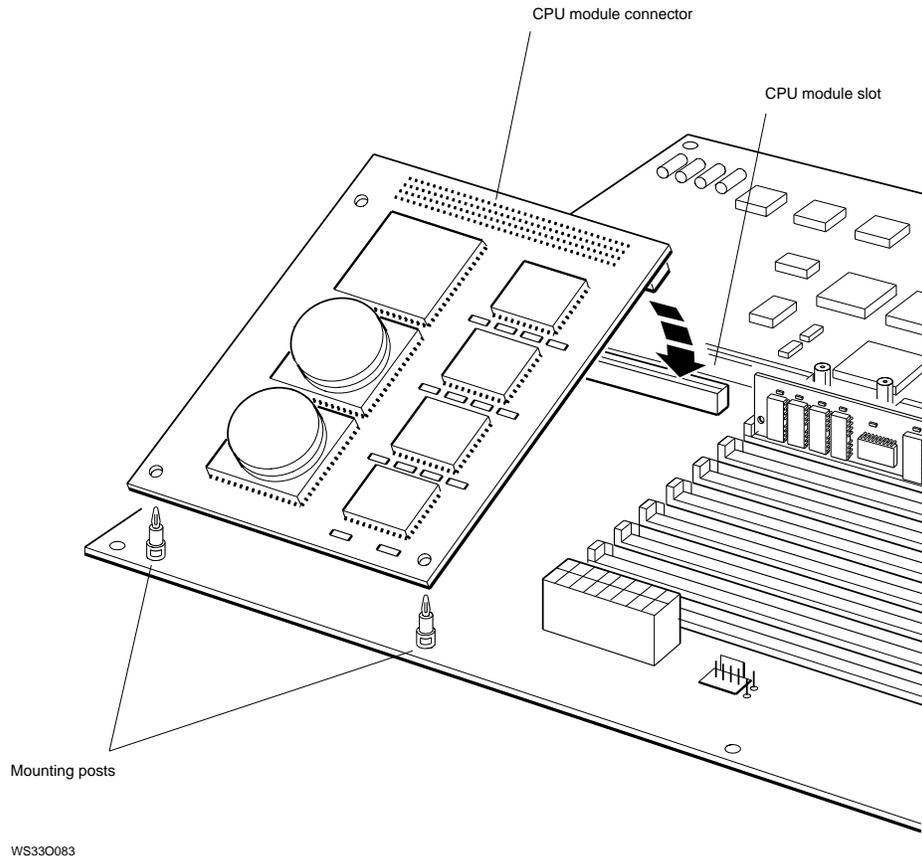
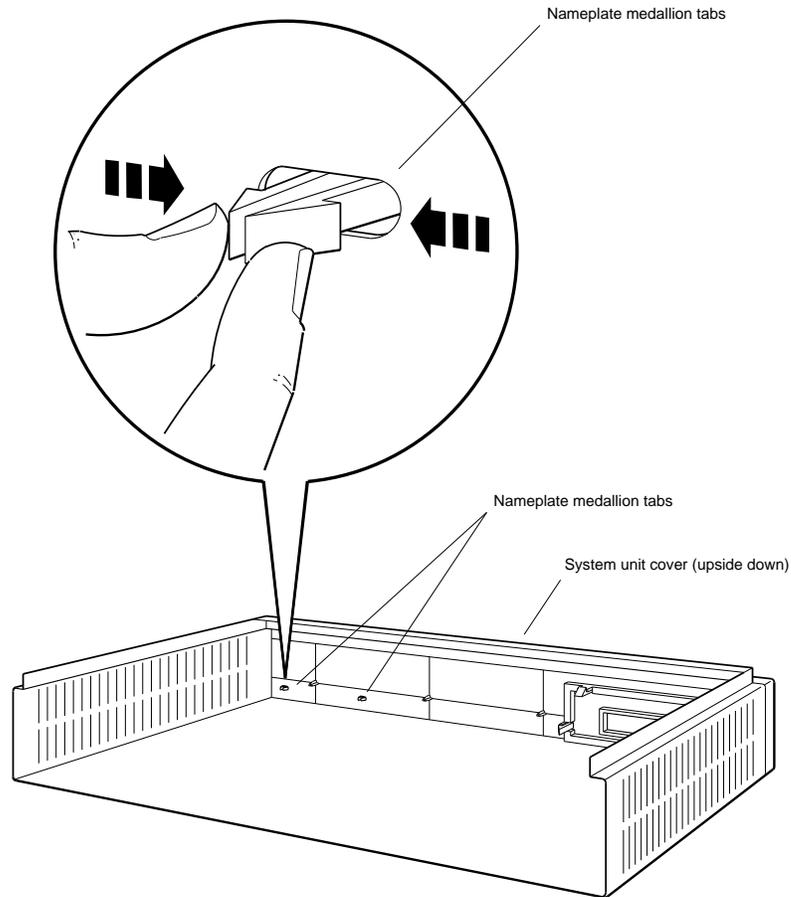


Figure 5-13. Installing a CPU module

5. Press the other end of the CPU module firmly into the CPU module slot in the system unit.
6. Seat the CPU module on the mounting posts and connector.
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 5-14 on page 5-24. Squeeze the tabs on the back of the medallion and push them through the holes. Then press the medallion for the new CPU module onto the cover from the front.
8. Replace the cover on the system unit, as shown in Figure 5-1, on page 5-3.



WS330104

Figure 5-14. Removing the nameplate

To Test the CPU Module

1. Turn on the monitor. Then turn on the system unit.
2. The workstation runs the power-up self-test. When the system completes the power-up self-test successfully, the console prompt (>>) appears on the screen.

If the test fails, the module connectors may not be aligned correctly. Open the system unit and install the CPU module again. If the test fails again, call your Digital Customer Support Center.

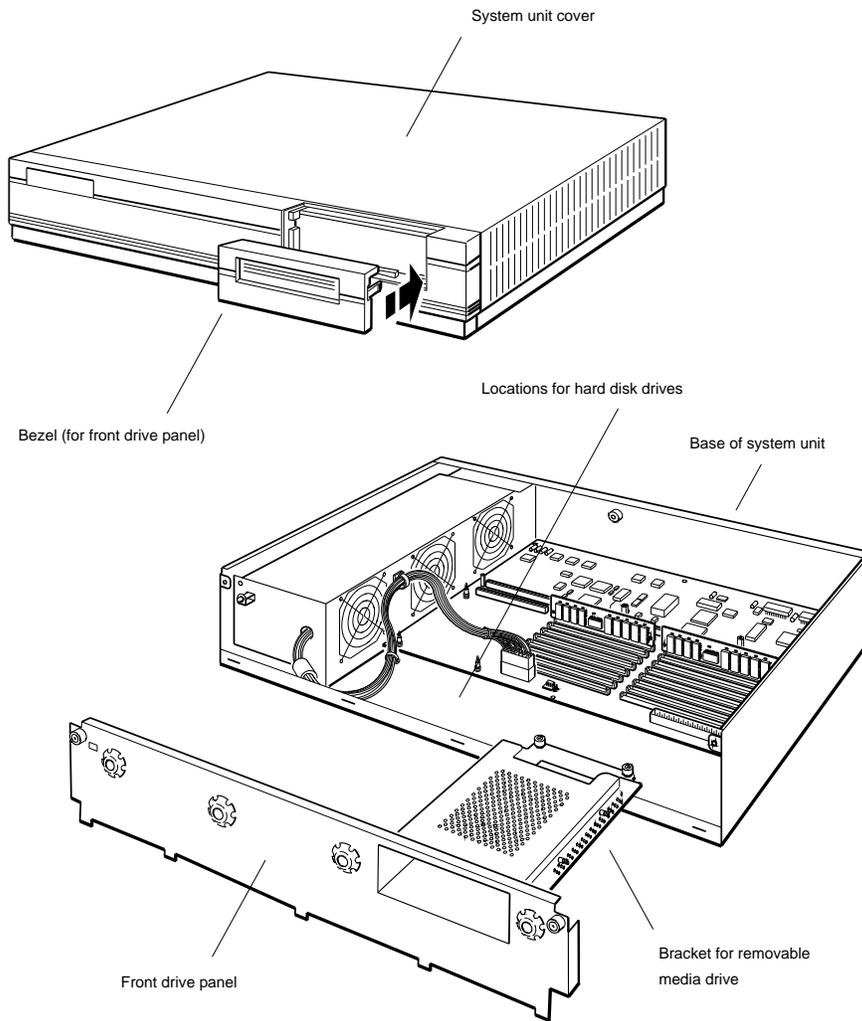
Installing and Removing Drives in the System Unit

You can install drives in three places in your workstation:

- In the base of the system unit
- In the front drive panel of the system unit
- In expansion boxes that can be connected to the system unit

To install hard disk drives in the base of the system unit, turn to the section “To Install a Drive in the System Unit”, on page 5-28. Hard disk drives are drives in which the recording media are disks fastened permanently inside the drive.

To install removable media drives in the front drive panel, turn to the section “To Install a Removable Media Drive Inside the System Unit”, on page 5-42. Removable media drives are drives where the recording media are disks and tapes that you can remove and insert as you need them. Diskette drives and tape drives are examples of removable media drives.



WS330088

Figure 5-15. Where to install drives in the system unit

To install drives in external storage boxes, see Chapter 8, “External Storage Devices”.

Understanding SCSI ID Numbers

The workstation distinguishes each internal and external drive connected to a small computer system interface (SCSI) connector by the SCSI ID number (0 to 6) assigned to that drive.

Each drive comes from the factory with a SCSI ID number already set. These factory settings, called default settings, are listed in Table 5-1.

Table 5-1. Default SCSI ID Numbers for Internal Drives

Drive	Type	Default Setting
RZ23L	Hard disk	2 (and 3)*
RZ24	Hard disk	2 (and 3)*
RZ25	Hard disk	2 (and 3)*
RRD42	Compact disc drive	4
RX23	Diskette drive	5
RX33	Diskette drive	5
TZK10	Tape drive	5

* If the system contains two RZ23L, RZ24, or RZ25 drives, the ID numbers are preset to 2 and 3 at the factory.

Setting the SCSI ID numbers on your drives

Each drive within a group (or chain) of drives must have its own unique SCSI ID number (0 to 6), in order to function properly.

To avoid the problem of duplicate SCSI ID numbers within the same group, don't use more than one drive that has the same default setting.

To check for duplicate SCSI ID numbers, you must examine the settings on your drives, as shown in Appendix D of this guide.

To Install a Drive in the System Unit

All internal hard disk drives are installed in the same way.

1. Unpack the hard disk drives.
2. Follow the instructions that came with your worksystem software to shut down the software.
3. Type **cnfg 3** and press Return. The workstation displays the configuration for the base system hardware and any previously installed SCSI drives.

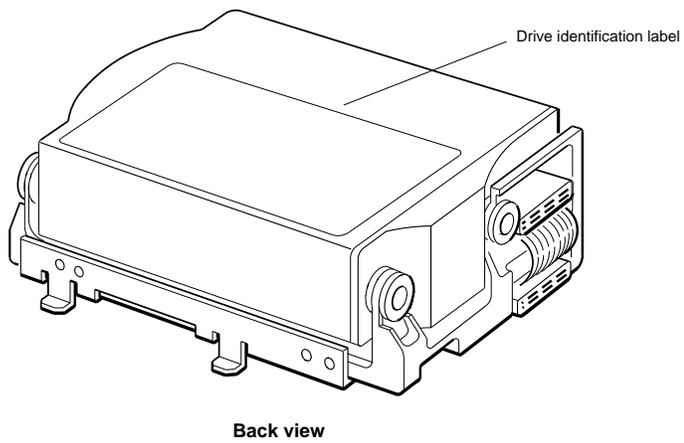
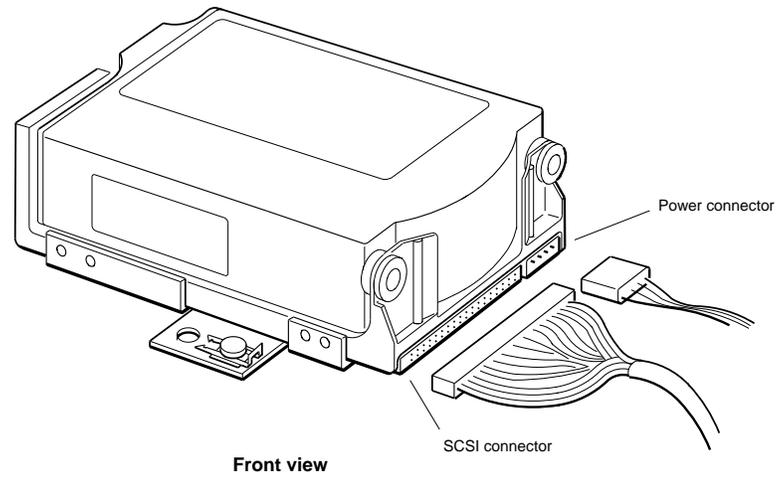
The following example of a cnfg display shows no drives or other options connected to the base system unit (which is represented by the 3 in >>cnfg 3, and in the following line by 3:).

```
>>cnfg 3
3:  KN02-BA   DEC       V5.7e   TCF0   ( 24 MB)
                                     (enet: 08-00-2b-0f-45-72)
                                     (SCSI = 7)
-----
DEV   PID                               VID       REV       SCSI DEV
=====
dcache ( 64 KB), icache ( 64 KB)
mem( 0): a0000000:a03ffffff ( 4 MB)
mem( 1): a0400000:a07ffffff ( 4 MB)
mem( 2): a0800000:a0bffffff ( 4 MB)
mem( 3): a0c00000:a0fffffff ( 4 MB)
mem( 4): a1000000:a13ffffff ( 4 MB)
mem( 5): a1400000:a17ffffff ( 4 MB)
```

Here is an example showing a previously installed internal tape drive (tz1) connected to the system unit or base slot 3:

```
>>cnfg 3
3:  KN02-BA   DEC       V5.7e   TCF0   ( 24 MB)
                                     (enet: 08-00-2b-0f-45-72)
                                     (SCSI = 7)
-----
DEV   PID                               VID       REV       SCSI DEV
=====
tz1                                     SEQ
-----
dcache ( 64 KB), icache ( 64 KB)
mem( 0): a0000000:a03ffffff ( 4 MB)
mem( 1): a0400000:a07ffffff ( 4 MB)
mem( 2): a0800000:a0bffffff ( 4 MB)
mem( 3): a0c00000:a0fffffff ( 4 MB)
mem( 4): a1000000:a13ffffff ( 4 MB)
mem( 5): a1400000:a17ffffff ( 4 MB)
```

4. The difference in these two displays is that `tz1` appears in the `DEV` column of the second display. Write down any device codes that appear in the `DEV` column of your display. In this example, we would write down `tz1`.
5. Turn off the system unit by pressing the 0 on the on/off switch on the back of the unit.
6. Remove the cover from the system unit, as shown in Figure 5-1, on page 5-3.
7. Place the loop of the antistatic strap around your wrist and clip the other end of the strap to the metal frame of the system unit.
8. Unpack the hard disk drive that you are installing. Figure 5-16, on page 5-30, shows a typical drive.



WS33M025

Figure 5-16. Typical hard disk drive

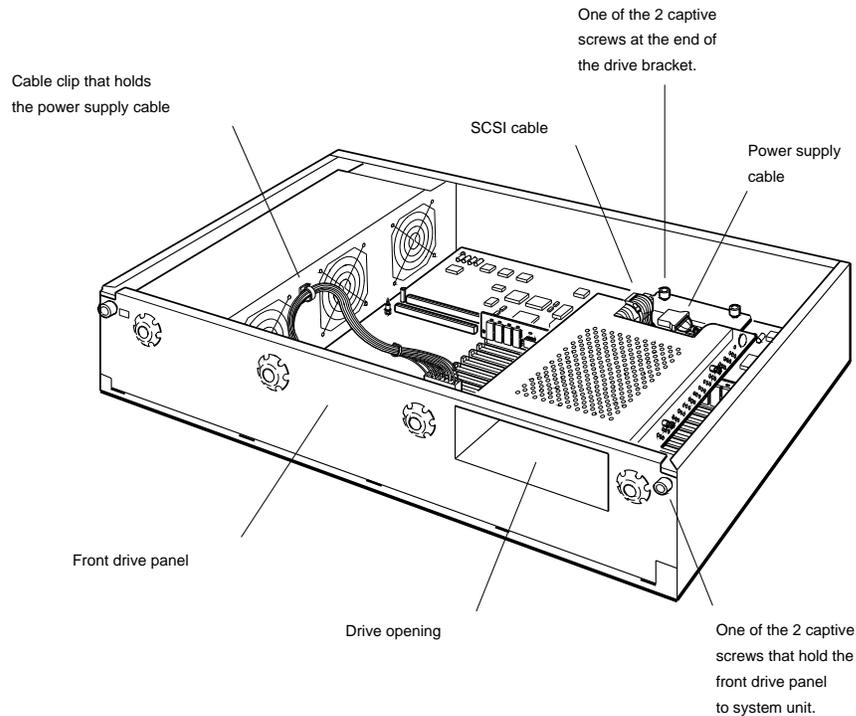
Set the SCSI ID number for the hard disk drive

1. Choose a SCSI ID number (0 to 6) for the drive. Choose a number that is different from any SCSI ID numbers noted in the DEV column of the display.
 - a. Read the device codes that you wrote down. In the example, `tz1.` was written.
 - b. Choose any number from 0 to 6 that is not the same as the numbers in the device codes. In the example, we can choose 0, 2, 3, 4, 5, or 6, because the only number in the device codes is 1. In this example, assume that we chose 2.
 - c. Write down the new number on the same paper where you wrote the device codes.
2. Use a pair of needle-nose pliers to set the SCSI ID on the drive that you are installing. Set the ID to the new number that you chose by arranging the SCSI switches or jumpers to indicate the number. Jumpers are small rectangular collars that fit over the ID pins on drives and other components. If your drive uses jumpers, the jumpers are already on the pins, and you have to arrange them appropriately.

In Appendix D, Figures D-1 through D-7 show how to arrange the jumpers on each hard disk drive. They also show the connectors for the power supply and SCSI cables.

Fasten the hard disk drive in the system unit

1. Look inside the drive bracket on the front drive panel.
 - If the end of the SCSI cable is fastened to the drive bracket with a tie-wrap, cut the tie-wrap.
 - If the power supply cable and SCSI cable are tucked inside the bracket, pull them out carefully.
 - If there is a drive in the drive bracket, leave the cables attached to the drive.



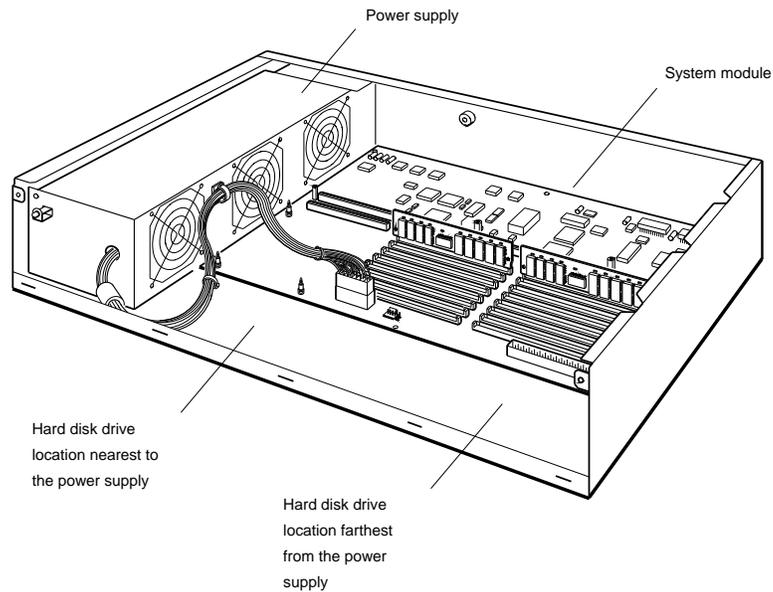
WS330008

Figure 5-17. Inside the system unit before the drives are installed

2. Loosen the two captive screws at the end of the drive bracket. These are captive screws and cannot be removed.
3. Loosen the two captive screws that hold the front drive panel to the system unit.
4. Pull up carefully on the end of the drive bracket. If the power supply and SCSI cables are threaded through the cutout in the end of the drive bracket, ease them through the cutout as you pull up, as shown in Figure 5-4, on page 5-6.
5. Carefully remove the front drive panel from the system unit. Set it next to the system unit. Handle it carefully if a drive is in the drive bracket.

6. Choose the location for the hard disk drive that you are installing.

If you are installing one drive, it is usually convenient to install it next to the power supply. If you are installing two drives, install the one farthest from the power supply first.

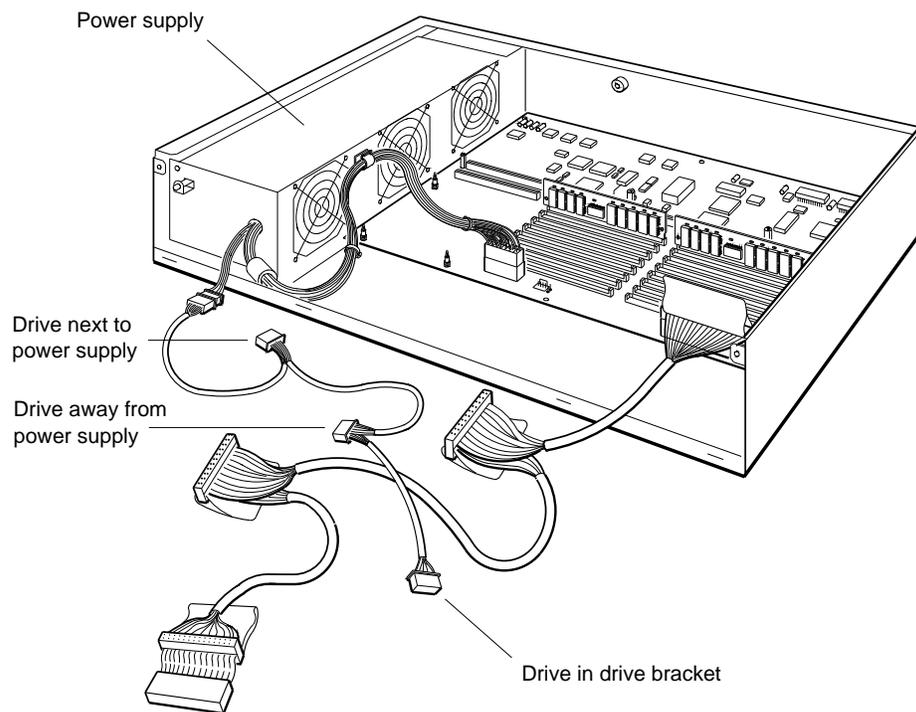


WS330111

Figure 5-18. Locations for internal hard disk drives

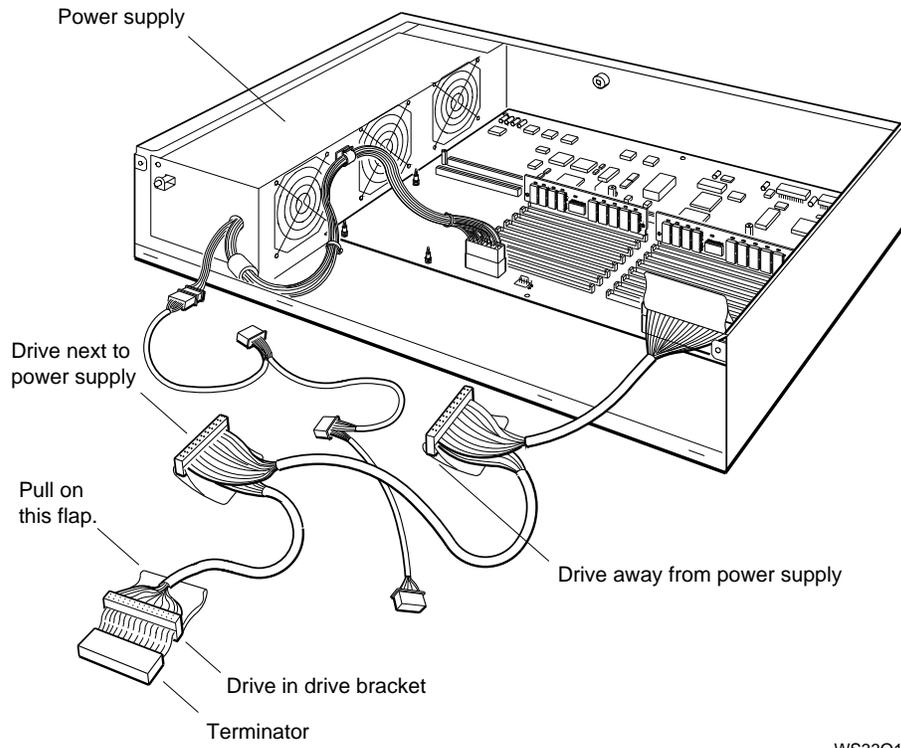
7. Find the connectors on the power supply and SCSI cables that correspond to the drive location that you chose.

Figures 5-19 and 5-20, on pages 5-34 and 5-35, show the power supply and the SCSI cables and their connectors. Figures 5-21 and 5-22, on page 5-36 and page 5-37, show close-up views of the connectors.



WS33O050

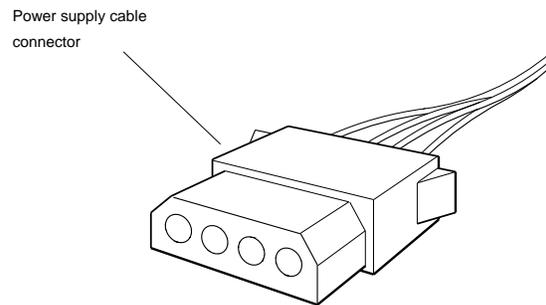
Figure 5-19. Power supply cable in the system unit



WS33O110

Figure 5-20. SCSI cable in the system unit

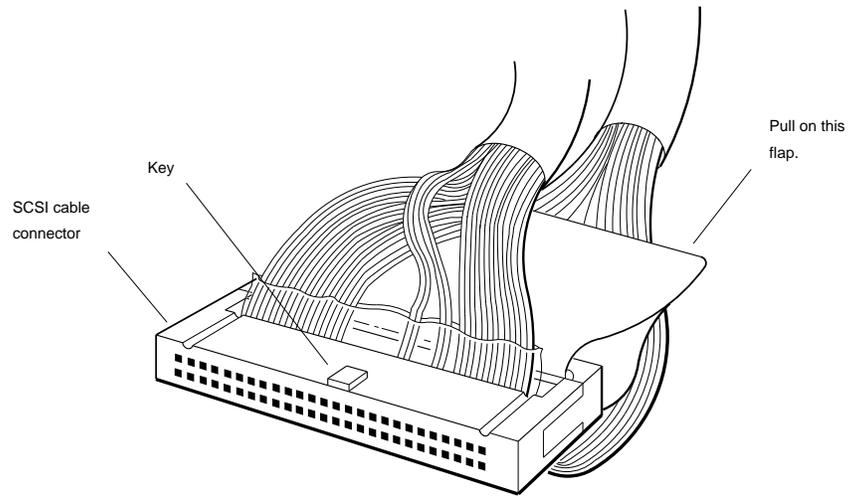
8. Plug the power supply cable connector into the power supply connector on your hard disk drive. The connectors are shaped so that they fit together only one way.



WS330012

Figure 5-21. Power supply cable connector

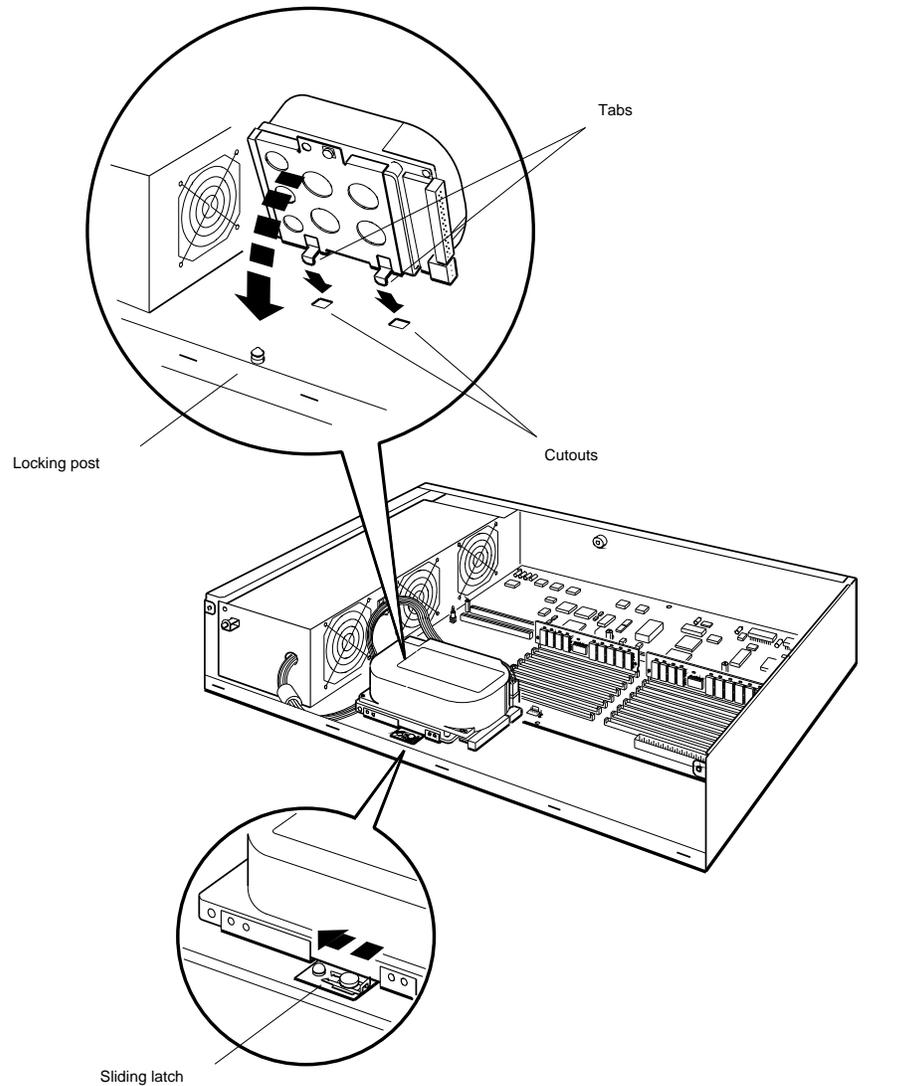
9. Position the SCSI cable connector so the key is on top, as shown in Figure 5-22.
10. Plug the cable connector into the SCSI connector on the hard disk drive.



WS330106

Figure 5-22. SCSI connector

11. If you are installing two hard disk drives, unpack the second drive as described in Appendix D, and connect the appropriate power supply cable and SCSI cable to it.
12. Tilt the hard disk drive as shown in the large circle in Figure 5-23, on page 5-38.



WS330051

Figure 5-23. Inserting the hard disk drive

13. Insert the tabs on the hard disk drive into the cutouts in the bottom of the system unit. Then carefully swing the drive down onto the locking post. Move the cables so that they are not underneath the drive.

The drive should rest flat in the system unit, and the locking post should stick up through the mounting hole on the drive mounting bracket.

14. Press the sliding latch so that it snaps firmly onto the post.
15. If you are installing two hard disk drives, insert the tabs on the second drive into the system unit cutouts and lock the drive onto the mounting post.
16. Press all the cables carefully around the hard disk drive or drives, so that there is room for the drive bracket on the front drive panel.

Close the system unit

1. Insert the tabs on the front drive panel into the system unit cutouts and tilt the panel halfway down into the system unit, as shown in Figure 5-17, on page 5-32.
2. Hold the panel while you thread the loose ends of the power supply cable and SCSI cable through the large cutout in the end of the drive bracket.

If there is no drive, tuck the ends of the cables into the bracket.

3. Carefully lower the end of the bracket onto the two posts that support it. Make sure that the cables have been correctly pressed around the internal hard disk drive or drives. If this is not done properly, the bracket cannot be seated.
4. Tighten the two captive screws on the end of the bracket until they are at least finger tight.
5. Tighten the two captive screws that hold the front drive panel on the system unit until they are at least finger tight.
6. Remove the antistatic wrist strap from your wrist and from the system unit.
7. Standing at the front of the system unit, position the cover slightly above the system unit about 2 inches (5.5 centimeters) from the back of the unit.
8. Rest the cover on the system unit. Then slide it all the way to the back of the unit.

9. Press the cover-release screw on the back of the unit and tighten it.
10. Turn on the system unit and monitor and test the drive with the `cnfg` command.

To Test for a Drive in the Base Slot of the System Unit

At the console prompt (`>>`), type **cnfg 3** and press Return. The screen shows the configuration of components in your system unit (also called base slot 3). The `DEV` column lists the disk drive numbers. The drive that you installed should be listed in this column with the SCSI ID number that you gave it. Here is an example display:

```
>>cnfg 3
3: KN02-BA DEC V5.7e TCF0 ( 24 MB)
      (enet: 08-00-2b-0f-45-72)
      (SCSI = 7)
-----
DEV  PID                               VID      REV      SCSI DEV
=====
tz1
rz2  RZ24          (C) DEC  DEC      0700    DIR
dcache ( 64 KB), icache ( 64 KB)
mem( 0): a0000000:a03ffffff ( 4 MB)
mem( 1): a0400000:a07ffffff ( 4 MB)
mem( 2): a0800000:a0bffffff ( 4 MB)
mem( 3): a0c00000:a0fffffff ( 4 MB)
mem( 4): a1000000:a13ffffff ( 4 MB)
mem( 5): a1400000:a17ffffff ( 4 MB)
```

In this example, the new hard disk drive was given an ID number of 2. The number is in the device code in the `DEV` column: in this example, `rz2`. The tape drive that was already connected to the system unit is also shown: in this example, in the code `tz1`.

If the drive is not listed at all,

- The cables to the drive might not be plugged in all the way.
- You might have set a SCSI ID number that was already set on another drive inside the system unit.

Open the system unit and check for these two possibilities. Then use the `cnfg` command to test the drive again. If your new drive is still not listed properly, tell your system manager or call your Digital Customer Support Center.

To Remove a Hard Disk Drive from the Base of the System Unit

Removing a hard disk drive from the system unit follows the same procedure as installing one. Use the previous detailed instructions for installing the drive to perform these steps:

1. Shut down the software.
2. Remove the cover from the system unit, as shown in Figure 5-1, on page 5-3.
3. Attach the antistatic wrist strap, as shown in Figure 5-2, on page 5-4.
4. Unhook the power supply cable from the white loop on the front drive panel.
5. Loosen the two screws that hold the front drive panel in place.
6. Loosen the two screws at the end of the drive bracket.
7. Remove the front drive panel and the drive bracket attached to it.
8. Unlock the sliding latch on the hard disk drive that you are removing.
9. Lift the drive off the mounting post and out of the chassis cutouts.
10. Unplug the power supply cable and SCSI cable from the drive. Pull on the SCSI connector flap to remove the connector.
11. Set the drive aside carefully. Store it in an antistatic bag if you have one.
12. Press all the cables back into the system unit carefully.

13. Insert the tabs on the front drive panel into the cutouts on the system unit.
14. Thread the loose ends of the power supply cable and SCSI cable through the large cutout in the bracket.

If a drive is in the bracket, make sure the ends of the cables are correctly plugged into the connectors on the drive. If there is no drive, tuck the ends of the cables into the bracket.
15. Carefully lower the end of the bracket onto the two posts that hold the bracket.
16. Tighten the two captive screws on the end of the bracket until they are at least finger tight.
17. Tighten the two captive screws that hold the front drive panel on the system unit until they are at least finger tight.
18. Remove the antistatic wrist strap.
19. Replace the cover on the system unit, as shown in Figure 5-1, on page 5-3.
20. Turn on the system unit and monitor and check the workstation with the `cnfg` command.

To Install a Removable Media Drive Inside the System Unit

To install a removable media drive in the front drive panel, you need medium flat-blade and Phillips screwdrivers, and you may need small needle-nose pliers.

Unpack the removable media drive

1. Follow the instructions that came with your worksystem software to shut down the software.
2. Type **cnfg 3** and press Return. The workstation displays the configuration for the system unit, which is called base slot 3. Internal disk drives are connected to base slot 3.

Here is an example configuration display. It shows one internal hard disk drive (`rz2`) and one internal tape drive (`tz1`) connected to base slot 3. This information appears on the monitor screen in the `DEV` column.

```

>>cnfg 3
3:  KN02-BA   DEC      V5.7e   TCF0   ( 24 MB)
                                           (enet: 08-00-2b-0f-45-72)
                                           (SCSI = 7)
-----
DEV      PID                               VID      REV      SCSI DEV
=====
tz1
rz2      RZ23      (C) DEC  DEC      0700    SEQ
DIR
dcache ( 64 KB), icache ( 64 KB)
mem( 0): a0000000:a03ffffff ( 4 MB)
mem( 1): a0400000:a07ffffff ( 4 MB)
mem( 2): a0800000:a0bffffff ( 4 MB)
mem( 3): a0c00000:a0fffffff ( 4 MB)
mem( 4): a1000000:a13ffffff ( 4 MB)
mem( 5): a1400000:a17ffffff ( 4 MB)

```

3. Write down any device codes that are displayed in the DEV column on your screen. In this example, we would write down `rz2` and `tz1`.
4. Turn off the system unit by pressing 0 on the on/off switch on the back of the unit.
5. Remove the cover from the system unit, as shown in Figure 5-1, on page 5-3.
6. Place the loop of the antistatic strap around your wrist and clip the other end of the strap to the metal frame of the system unit.
7. Unpack the removable media drive that you are installing. Figure D-5, on page D-6, shows an RX23 disk drive and SCSI switch settings.

Set the SCSI ID number for removable media drives

1. Choose a SCSI ID number for the drive. Follow these steps:
 - Read the device codes that you wrote down in step 4. In the example, we wrote `rz2` and `tz1`.
 - Choose any number from 0 to 6 that is not already used in the device codes displayed on the screen in the DEV column. In this example, we can choose 0, 3, 4, 5, or 6 because the numbers in the device codes are 1 and 2. In this example, assume that we chose 4.

- Write down the new number on the same paper where you wrote the device codes.
2. Use a pair of needle-nose pliers to set the SCSI ID number on the drive that you are installing. Set the new SCSI ID number that you chose by arranging the SCSI switches or jumpers to that number, as illustrated in Appendix D of this guide.

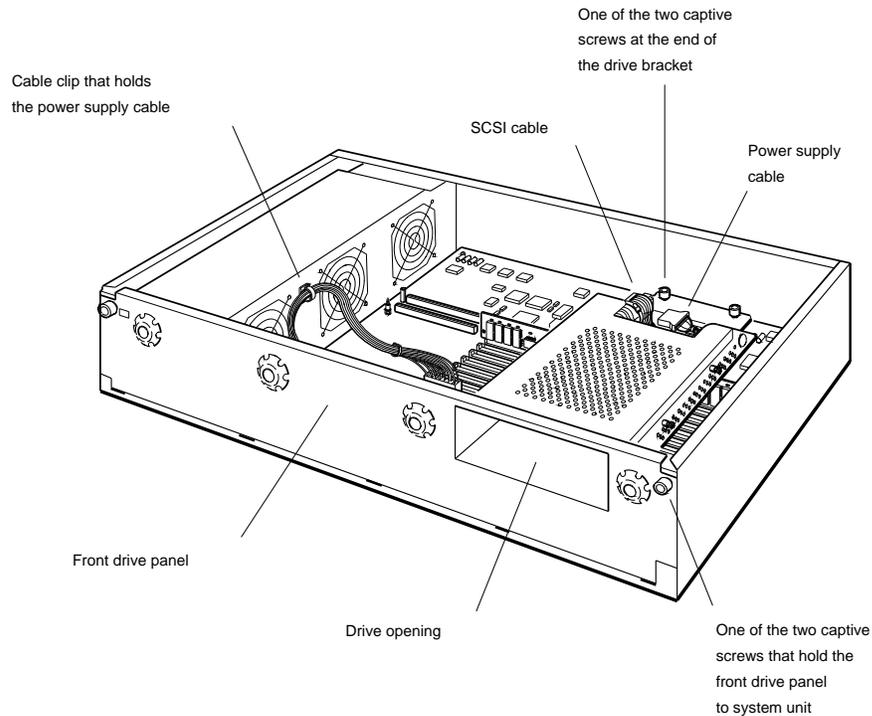
If your drive uses jumpers, the jumpers are already on the pins, and you have to arrange them appropriately. Each removable media drive must have its own unique SCSI ID number to function properly.

Caution: *Some drives have extra switches and pins. The drives use them for other settings, and you should not change them. For example, on the RRD42 optical compact disc drive, the pin on the left adjusts the drive for your worksystem operating system. The drive is shipped to you with a jumper on the pin, and you should leave the jumper there. Figure D-6, on page D-6, shows the RRD42 drive.*

Install the removable media drive in the front drive panel

1. Turn off the system unit by pressing the 0 on the on/off switch on the back of the unit.
2. Remove the cover from the system unit, as shown in Figure 5-1, on page 5-3.

Figure 5-24, on page 5-45, shows the inside of a system unit without a drive.

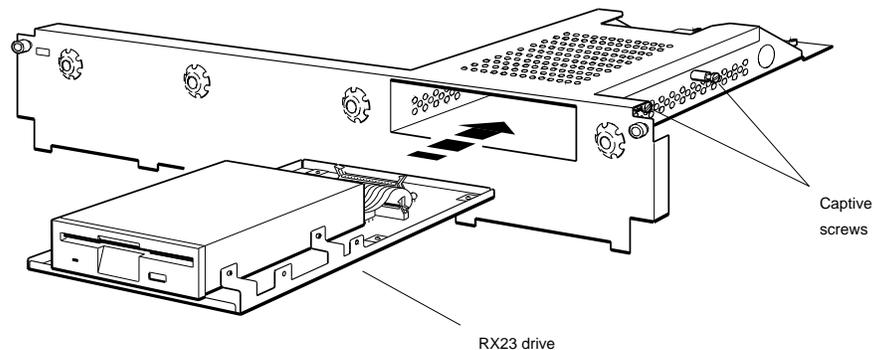


WS330108

Figure 5-24. Inside the system unit before the drive is installed

3. Look inside the drive bracket.
 - If the end of the SCSI cable is fastened to the drive bracket with a tie-wrap, cut the tie-wrap.
 - If the power supply and SCSI cables are tucked inside the bracket, pull them out carefully.
 - If there is a drive in the drive bracket, you have to remove the drive after you remove the front drive panel from the system unit. The section “To Remove a Drive from the Front Drive Panel”, on page 5-53, lists the steps to take.
4. Loosen the two captive screws at the end of the drive bracket. Captive screws cannot be removed.
5. Loosen the two captive screws that hold the front drive panel to the system unit.

6. Pull up carefully on the end of the drive bracket. If the power supply and SCSI cables are threaded through the cutout in the end of the drive bracket, ease them through the cutout as you pull up, as shown in Figure 5-4, on page 5-6.
7. Carefully remove the front drive panel from the system unit. Set it next to the system unit.
8. Slide the removable media drive that you are installing into the drive bracket from the front of the front drive panel.



WS330059

Figure 5-25. Inserting a removable media drive into the drive bracket

9. Use a flat-blade screwdriver to tighten the screws on both sides of the drive bracket. There are two screws on each side. You may have to push the screws in first, so that they fit into the threaded holes in the drive.

Close the system unit

1. Insert the tabs on the bottom edge of the front drive panel, as shown in Figure 5-4, on page 5-6, into the cutouts in the bottom of the system unit.
2. Lower the end of the drive bracket far enough to thread the power supply and SCSI cables through the large cutout in the drive bracket.

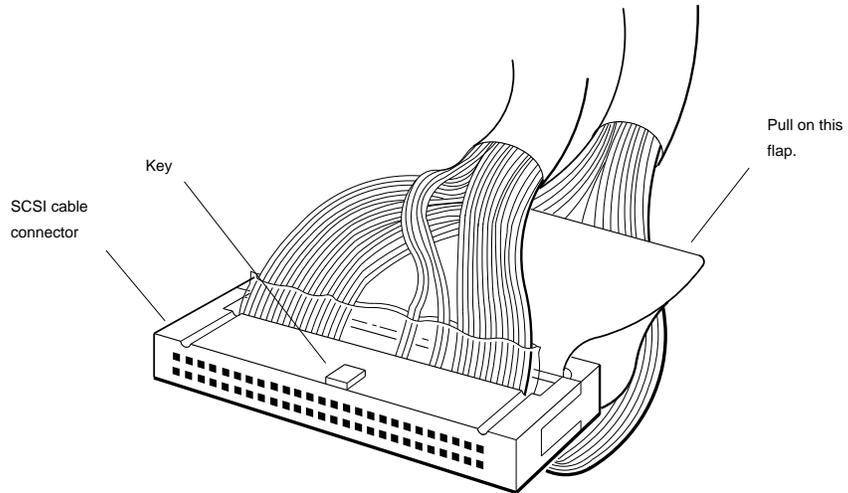
Hold the drive bracket with one hand as you thread the cables through the cutout with your other hand.

3. Still holding the drive bracket, carefully press the middle lengths of the power supply and SCSI cables down into the system unit, so that they won't interfere with the drive bracket when you lower it further. If the system unit has internal, hard disk drives, carefully press the cables around the drives.
4. Lower the end of the drive bracket all the way onto the two posts that support it.

If you cannot seat the end of the bracket on the posts, you probably didn't press the power supply and SCSI cables all the way down into the system unit. Raise the end of the bracket and arrange the cables again.

5. Tighten the two captive screws on the end of the drive bracket until they are at least finger tight.
6. Tighten the two captive screws that hold the front drive panel to the system unit.
7. Look carefully at the SCSI connectors on the SCSI cable. Find the key on the cable connector.

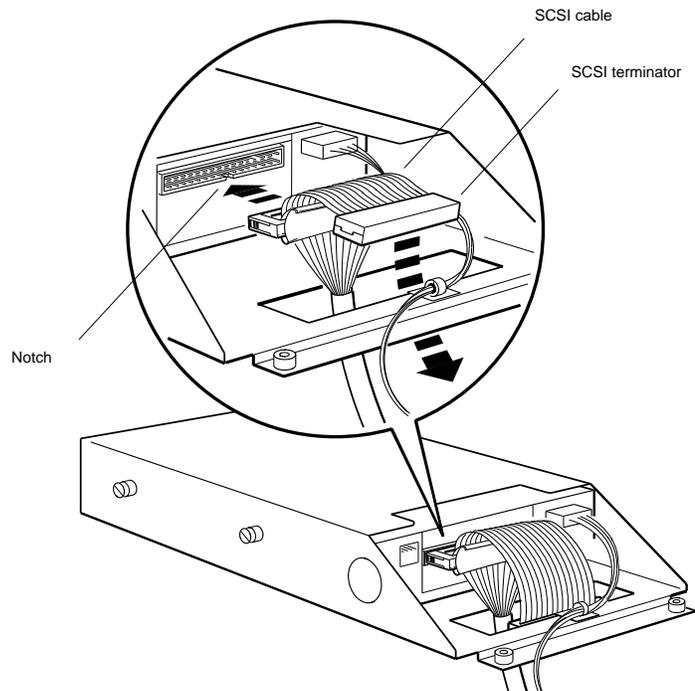
The SCSI connector on some drives has a slot for the key on the cable connector, and the cable connector fits only one way. The connector on other drives does not have that slot, but you should still hold the cable connector so that the key faces up. Always pull on the flap when you remove SCSI connectors.



WS330106

Figure 5-26. SCSI cable connector

8. Plug the SCSI cable connector into the drive.
9. If the notch on the connector on the drive is on the bottom edge, plug the SCSI cable straight into the connector.
10. If the notch on the connector on the drive is on the top edge, roll the end of the SCSI cable around the terminator. Then plug the SCSI cable into the connector on the drive.



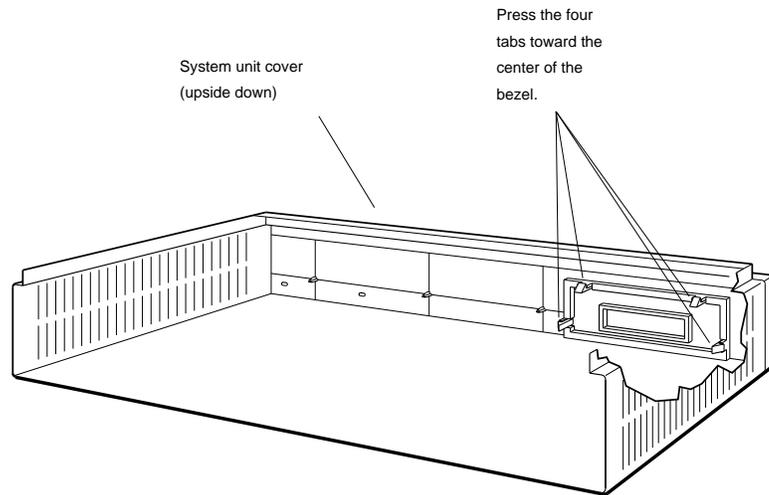
WS330121

Figure 5-27. Plugging the cable straight into the connector

Caution: *If you install the SCSI cable as shown in Figure 5-27 be careful when you replace the system unit cover. The cover can catch the end of the cable and disconnect the cable from the drive. A way to avoid catching the cover is to tuck the SCSI terminator into the large rectangular cutout in drive bracket.*

11. Plug the power supply cable connector into the power supply connector on the drive. The connectors are shaped so that they fit together only one way, as shown in Figure 5-21, on page 5-36.
12. Remove the antistatic wrist strap from your wrist and from the system unit.

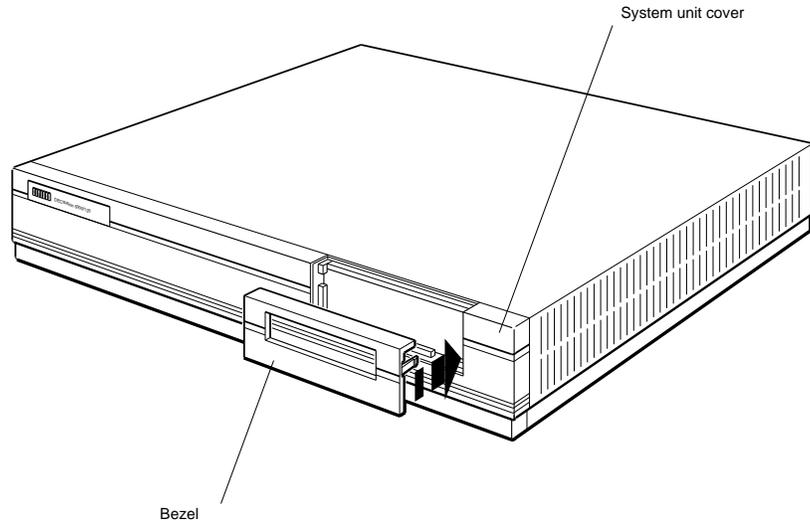
13. Turn the system unit cover upside down and remove the existing bezel from the cover by pressing the tabs that lock the bezel in place. Press the tabs toward the center of the bezel. Then push on the back of the bezel to remove it.



WS330091

Figure 5-28. Removing the existing bezel

14. Find the bezel for the drive that you installed.
15. Press the new bezel into the opening in the system unit cover from the front of the cover.



WS33M023

Figure 5-29. Installing a new bezel

16. Replace the cover on the system unit, as shown in Figure 5-1, on page 5-3.

Caution: *Be careful not to catch the end of the SCSI cable in the cover.*

17. Turn on the system unit and monitor and test the drive with the `cnfg` command.

To Test for a Drive in the Front Drive Panel

1. At the console prompt (>>), type **cnfg 3** and press Return. The screen shows the detailed configuration (or list of components in your system unit, or base slot 3). The display should list the drive that you installed along with the SCSI number that you gave it. Here is an example display:

```
>cnfg 3
3:  KN02-BA   DEC       V5.7e   TCF0   ( 24 MB)
      (enet: 08-00-2b-0f-45-72)
      (SCSI = 7)
-----
DEV   PID                               VID       REV       SCSI DEV
=====
tz1
rz2   RZ55           (C) DEC   DEC       0700     DIR
rz4   RX23           (C) DEC   DEC       0700     DIR

dcache ( 64 KB), icache ( 64 KB)
mem( 0): a0000000:a03ffffff ( 4 MB)
mem( 1): a0400000:a07ffffff ( 4 MB)
mem( 2): a0800000:a0bffffff ( 4 MB)
mem( 3): a0c00000:a0fffffff ( 4 MB)
mem( 4): a1000000:a13ffffff ( 4 MB)
mem( 5): a1400000:a17ffffff ( 4 MB)
```

In this example, the new drive is an RX23 floppy disk drive. We gave it a SCSI ID number of 4. This number, in this case, `rz4`, is listed in the `DEV` column. The tape drive and internal hard disk drive (`tz1` and `rz2`) that were already connected to system unit are also shown.

If the new drive is not listed at all,

- The cables to the drive may not be plugged in all the way.
- You may have set a SCSI ID number that was already set on another drive inside the system unit.

Open the system unit and check for these two possibilities. Then use the `cnfg` command to test the drive again. If your new drive is still not listed properly, tell your system manager or call your Digital Customer Support Center.

To Remove a Drive from the Front Drive Panel

Removing a drive follows the same procedure as installing one. Use the detailed instructions for installing the drive to perform these steps:

1. Shut down the software.
2. Remove the cover from the system unit, as shown in Figure 5-1, on page 5-3.
3. Attach the antistatic wrist strap, as shown in Figure 5-2, on page 5-4.
4. Unplug the power supply cable and SCSI cable from the drive. Pull on the SCSI connector flap to remove the connector.
5. Remove the front drive panel from the system unit.
6. Loosen the captive screws on each side of the drive bracket. Captive screws cannot be removed.
7. Slide the drive out of the bracket through the opening in the front drive panel.
8. Set the drive aside carefully. Store it in an antistatic bag if you have one.
9. Install the front drive panel on the system unit.
10. Tuck the loose ends of the power supply cable and SCSI cable into the drive bracket.
11. Remove the antistatic wrist strap from the system unit and your wrist.
12. Replace the cover on the system unit, as shown in Figure 5-1, on page 5-3. Replace the drive bezel in the front panel with a blank bezel.
13. Turn on the system unit and monitor and check the workstation with the `cnfg` command.

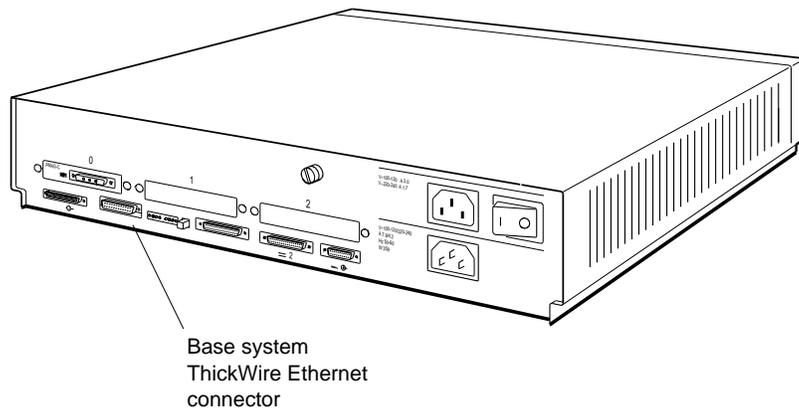
6

Optional Network Connections

This chapter explains

- How to connect your workstation to ThickWire, ThinWire, and twisted-pair Ethernet cables
- How to find Ethernet station addresses for your workstation

All DECstation 5000 Model 100 Series workstations have a ThickWire Ethernet connector on the base system unit. You can install additional ThickWire Ethernet modules in TURBOchannel option slots 0, 1, and 2. The *TURBOchannel Options Operator's Guide* explains how to do this.

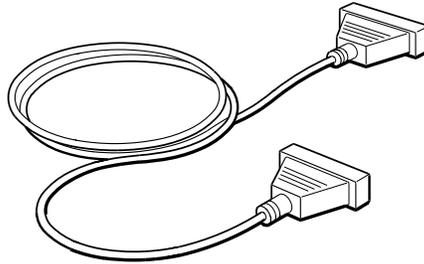


WS33O089

Figure 6-1. Base system ThickWire Ethernet connector

Connecting the Workstation to a ThickWire Ethernet Network

1. Find a ThickWire Ethernet cable in the networking kit that came with your workstation.

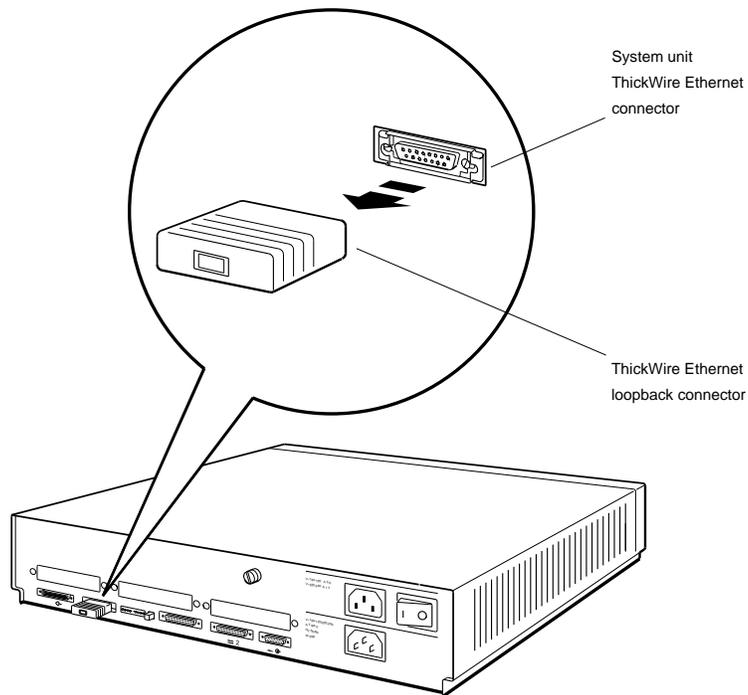


WSE21034

Figure 6-2. ThickWire Ethernet cable

2. If necessary, follow the instructions that came with your worksystem software to shut down the software.
3. Turn off the system unit by pressing the 0 on the on/off switch on the back of the unit. Leave the power cord plugged in.

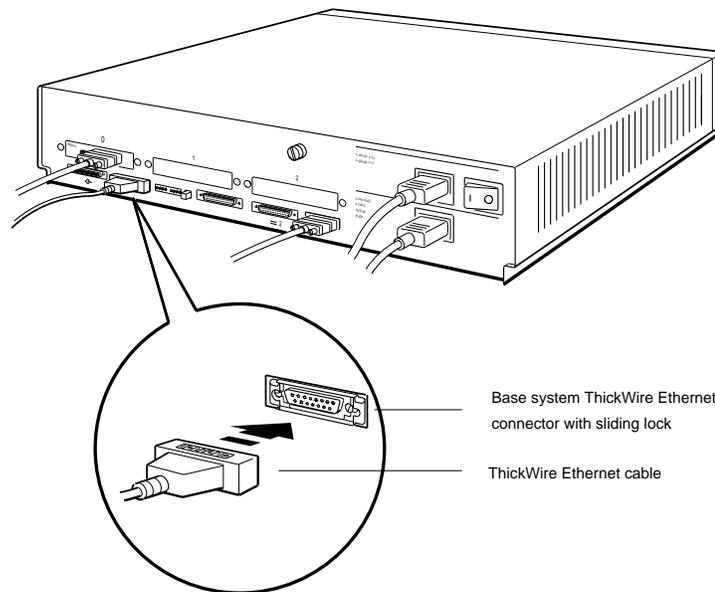
4. The ThickWire Ethernet connector that you are going to use on the system unit should have a loopback connector attached. Remove the loopback connector.



WS330119

Figure 6-3. Removing a loopback connector from a ThickWire Ethernet connector

5. Choose the end of the Ethernet cable that has no sliding lock. Hold it so that the widest part of the connector faces up.
6. Push the connector all the way into the ThickWire Ethernet connector on the system unit.
7. Use your finger or a simple tool, such as a flat-blade screwdriver, to slide the connector lock on the system unit.
8. Connect the other end of the cable to the Ethernet network cable the same way.
9. Follow the directions in the section "Finding Your Ethernet Station Addresses", on page 6-13, to find the address of the Ethernet controller that you are using.



WS330017

Figure 6-4. Connecting a ThickWire Ethernet cable to the system unit

Connecting the Workstation to a ThinWire Ethernet Network

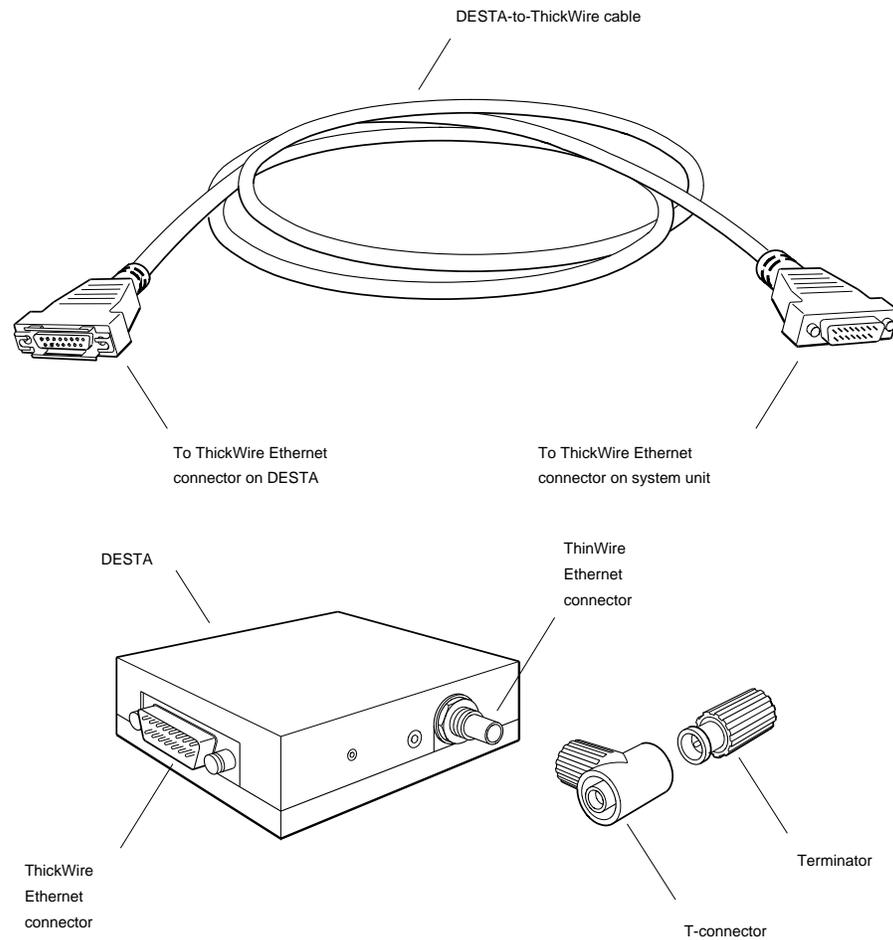
To connect a ThinWire Ethernet cable to the workstation, you need a ThickWire-to-ThinWire adapter called a DESTA, a ThinWire Ethernet T-connector, a ThinWire Ethernet terminator, and a DESTA-to-ThickWire cable. These are optional items that you must order separately.

You need the terminator only if your workstation connects at the end of the ThinWire Ethernet cable. You do not need it if your workstation connects in the middle of the cable. Ask your system manager if you need the terminator.

1. Unpack the DESTA, ThinWire Ethernet T-connector, ThinWire Ethernet terminator, and DESTA-to-ThickWire cable.
2. Follow the instructions that came with your worksystem software to shut down the software.
3. Turn off the system unit by pressing the 0 on the on/off switch on the back of the unit.
4. The ThickWire Ethernet connector that you are going to use on the system unit should have a loopback connector attached. Use your finger or a simple tool, such as a flat-blade screwdriver, to unlock the loopback connector by sliding the lock on the system unit. Then remove the loopback connector, as shown in Figure 6-3, on page 6-4.
5. Choose the end of the DESTA-to-ThickWire cable that has no sliding lock. Hold it so that the widest part of the connector faces up.
6. Push the connector all the way into the ThickWire Ethernet connector on the system unit.
7. Use your finger or a simple tool, such as a flat-blade screwdriver, to slide the connector lock on the system unit.
8. Hold the other end of the DESTA-to-ThickWire cable so that the widest part of the connector is on top, and hold the DESTA so that the ThickWire Ethernet connector on it is aligned with the cable connector. Notice that the connectors are shaped so that they fit only one way, as shown in Figure 6-5, on page 6-8.

9. Push the cable connector all the way into the DESTA connector.
10. Use your finger or a simple tool, such as a flat-blade screwdriver, to slide the connector lock on the system unit.
11. Hold the ThinWire Ethernet T-connector and DESTA, as shown in Figure 6-5, on page 6-8. Notice that the collar on the T-connector has two slots that fit over corresponding pins on the DESTA connector.

Align the slots on the collar of the T-connector with the pins on the DESTA connector, push the T-connector onto the DESTA connector, and twist the T-connector to the right to lock it.



WS330096

Figure 6-5. A DESTA and a ThinWire Ethernet T-connector

12. Connect the terminator and a ThinWire Ethernet network cable, *or* connect two ThinWire Ethernet network cables.

- If you are connecting the terminator,

You can connect the terminator to either end of the T-connector. Align the slots inside the terminator cap with the pins on the end of the T-connector, push the terminator onto the T-connector, and twist the terminator to the right to lock it.

Attach the ThinWire Ethernet network cable to the other end of the T-connector. Align the slots on the collar of the network cable connector with the pins on the T-connector, push the network cable connector onto the T-connector, and twist the network cable connector to the right to lock it.

- If you are *not* connecting the terminator,

Attach two ThinWire Ethernet network cables to the T-connector. You can attach either cable to either end of the T-connector.

Align the slots on the collars of the network cable connectors with the pins on the T-connector, push the network cable connectors onto the T-connector, and twist the network cable connectors to the right to lock them.

13. Follow the directions in the section "Finding Your Ethernet Station Addresses", on page 6-13, to find the address of the Ethernet controller that you are using.

Connecting the Workstation to an Unshielded Twisted-Pair Ethernet Network

To connect an unshielded twisted-pair Ethernet cable to the workstation, you need a ThickWire-to-twisted-pair adapter and a twisted-pair-adapter-to-ThickWire cable. These are optional items that you must order separately.

1. Unpack the ThickWire-to-twisted-pair adapter and the twisted-pair-adapter-to-ThickWire cable.

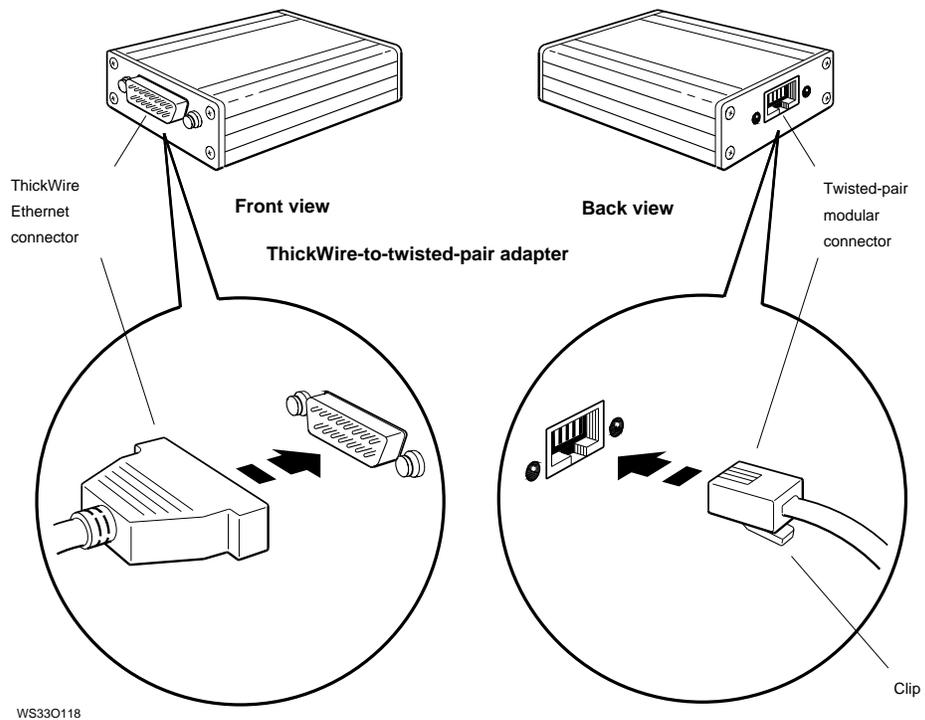
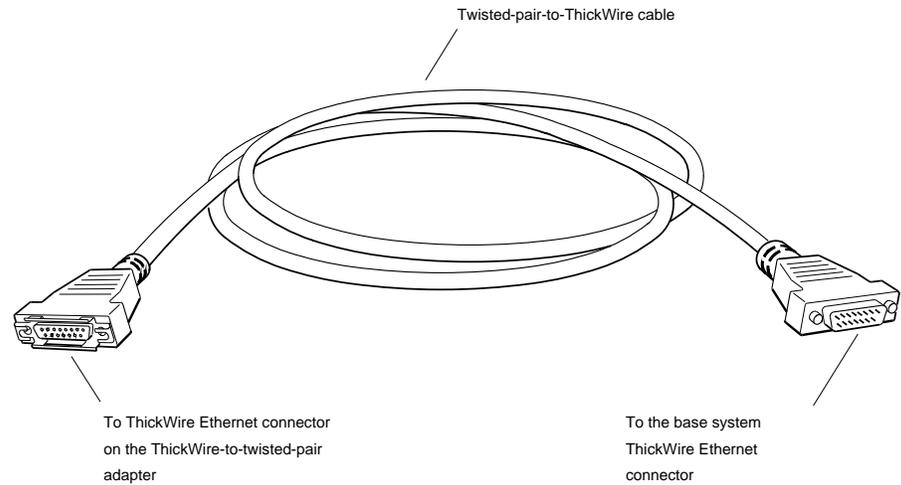


Figure 6-6. A ThickWire-to-twisted-pair adapter and twisted-pair-adapter-to-ThickWire cable

2. Follow the instructions that came with your worksystem software to shut down the software.
3. Turn off the system unit by pressing the 0 on the on/off switch on the back of the unit.
4. The ThickWire Ethernet connector that you are going to use on the system unit should have a loopback connector attached. Use your finger or a simple tool, such as a flat-blade screwdriver, to unlock the loopback connector by sliding the lock on the system unit. Then remove the loopback connector, as shown in Figure 6-3, on page 6-4.
5. Choose the end of the twisted-pair-adapter-to-ThickWire cable that has no sliding lock. Hold it so that the widest part of the connector faces up.
6. Push the connector all the way into the ThickWire Ethernet connector on the system unit.
7. Use your finger or a simple tool, such as a flat-blade screwdriver, to slide the connector lock on the system unit.
8. Hold the other end of the twisted-pair-adapter-to-ThickWire cable so that the widest part of the connector is on top and hold the media access unit so that the ThickWire Ethernet connector on it is aligned with the cable connector. Notice that the connectors are shaped so that they fit only one way, as shown in Figure 6-5, on page 6-8.
9. Push the cable connector into the connector on the media access unit.
10. Use your finger or a simple tool, such as a flat-blade screwdriver, to slide the connector lock on the system unit.
11. Align the clip on the modular connector on the unshielded twisted-pair cable with the twisted-pair modular connector on the media access unit.
12. Push the cable connector into the connector on the media access unit.
13. Follow the directions in the section "Finding Your Ethernet Station Addresses", on page 6-13, to find the address of the Ethernet controller that you are using.

Finding Your Ethernet Station Addresses

Every Ethernet connector has a built-in controller. That controller has a unique ID number called an Ethernet station address. Find the station addresses of your workstation and tell your system manager what they are. He or she will complete the Ethernet installation by entering your name and station addresses in the database of network users.

1. Type **cnfg** at the console prompt (>>) and press Return. A display similar to the following example will appear on your screen:

```
>>cnfg
3:  KN02-BA  DEC    V5.7e    TCF0    ( 24 MB)
      (enet: 08-00-2b-0f-45-72)
      (SCSI = 7)
0:  PMAG-DA  DEC    V5.3d    TCF0
1:  PMAD-AA  DEC    V5.3d    TCF0    (enet: 08-00-2b-0f-45-31)
      (DA:PXG -- D=8, z=24)
```

In the display, lines 3: and 1: show Ethernet station addresses:

```
3:  KN02-BA  DEC    V5.7e    TCF0    ( 24 MB)
      (enet: 08-00-2b-0f-45-72)
      (SCSI = 7)
1:  PMAD-AA  DEC    V5.3d    TCF0    (enet: 08-00-2b-0f-45-31)
```

- ① Ethernet address for the Ethernet connector in base slot 3. The address is 08-00-2b-0f-45-72.
 - ② Ethernet address for the Ethernet connector in option slot 1. The address is 08-00-2b-0f-45-31.
2. Write down the addresses of the slot or slots on which you installed cables. Then ask your system manager to finish the installation.

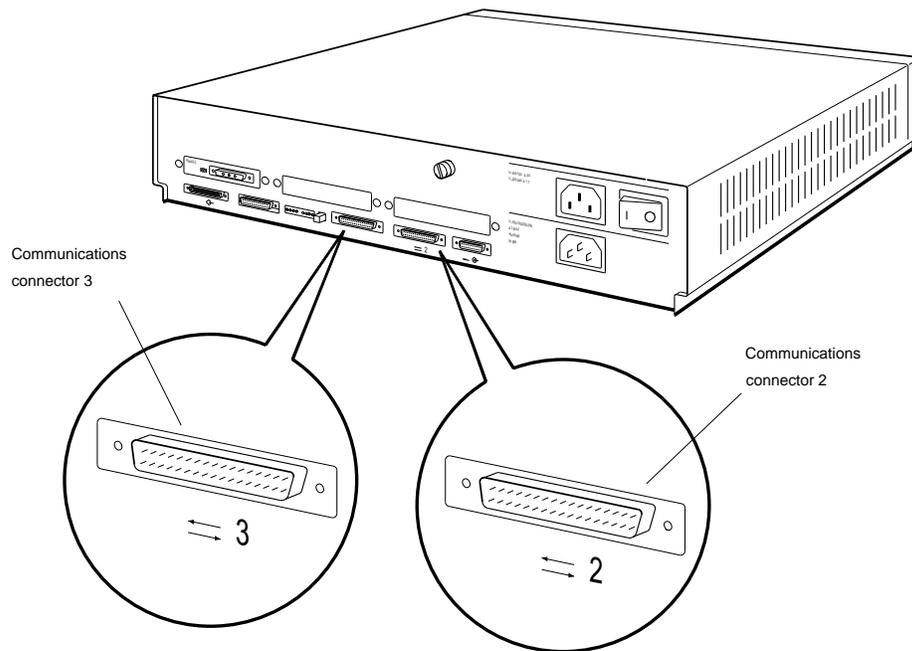
External Communications Options

This chapter explains

- How to connect a communication device directly to the system unit
- How to use a communications connector adapter

External Communications Options

Communications devices that can be used with your DECstation 5000 Model 100 Series workstation include printers, plotters, modems, and console terminals. The devices connect to the communications connectors on the system unit.

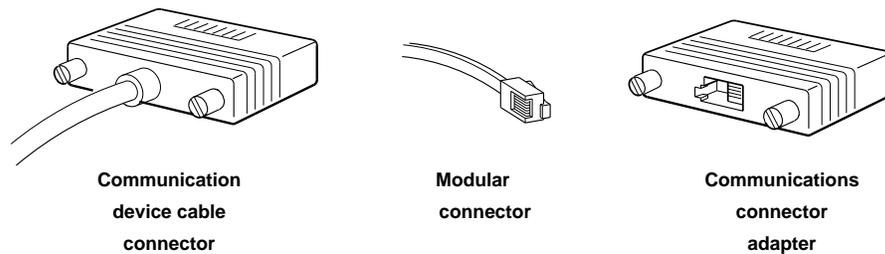


WS33O077

Figure 7-1. Communications connectors on the system unit

The devices have two types of connectors :

- A 25-pin connector, which can be attached directly to the communications connectors on the system unit
- A modular connector, which requires a communications connector adapter before it can be connected to the system unit



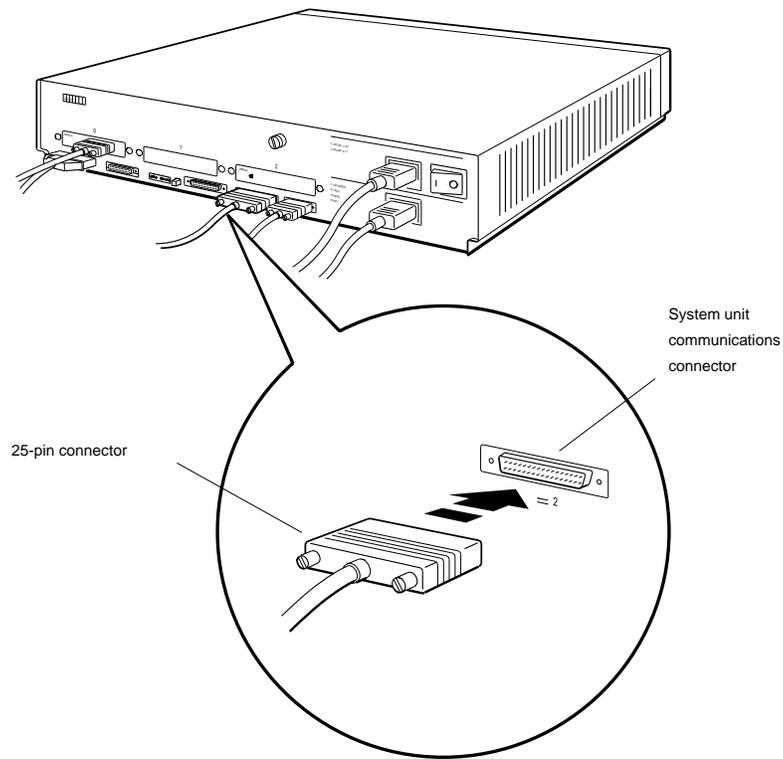
WS330034

Figure 7-2. Communications device connectors and an adapter

Installing a Device with a 25-Pin Connector

You can connect 25-pin communication connectors directly to the system unit.

1. Follow the instructions that came with your device to perform these tasks:
 - Be sure the device is turned off.
 - Set up the device and attach the cable and power cord that came with it.
 - Set the proper baud rate and control settings on the device and in the worksystem software, if that is appropriate.
2. Follow the instructions that came with your worksystem software to shut down the software.
3. Turn off the system unit by pressing the 0 on the on/off switch on the back of the unit.
4. Connect the end of the communications device cable to the system unit, as shown in Figure 7-3, on page 7-5. The connectors are shaped so that they go together only one way.



WS331008

Figure 7-3. Connecting a communications device with a 25-pin connector

5. Plug the power cord into the power outlet.
6. Turn on the communications device.
7. Turn on the system unit by pressing the 1 on the on/off switch on the back of the unit.

The workstation performs the automatic power-up self-test and displays the console prompt (>>).

External Storage Devices

This chapter describes external storage devices that can attach to a SCSI connector. The description includes

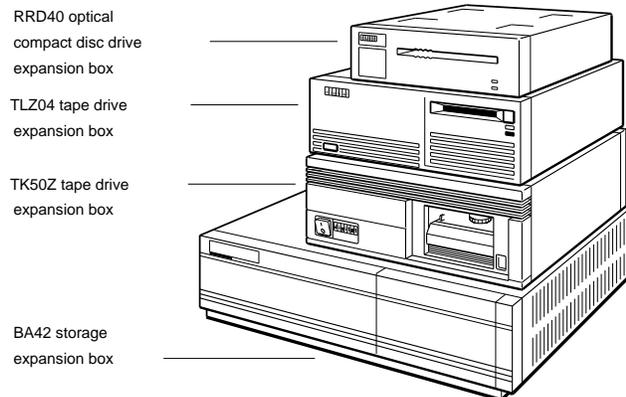
- The type and number of devices you can connect
- How to connect external storage devices
- How to check storage devices after they are installed

External Storage Devices That SCSI Connectors Can Use

Each SCSI connector can support up to seven storage devices. The devices can be any of the following:

- Any drive installed in a BA42 expansion box
- A TK50Z tape drive
- A TLZ04 digital audio tape drive
- An RRD40 optical compact disc drive
- Any internal drives that attach to the SCSI connector

The external drives are contained in expansion boxes that connect together to form a chain. The chain attaches to the SCSI connector on the back of the system unit.



WSE20017

Figure 8-1. Typical storage expansion boxes

Installing and Removing External Storage Devices

To Install External Storage Devices

Connect external storage devices to form a chain, including as many as seven devices in each chain. Each device must have a separate SCSI ID number so the workstation can identify the device.

If your workstation has more than one SCSI connector, distribute the devices among all the SCSI connectors on the system unit. For example, if you have seven devices, one base system SCSI controller, and one TURBOchannel SCSI controller option module, install three drives on one SCSI connector and four drives on the other.

Set up your storage expansion boxes

1. Place the external drives for each chain as near as possible to the SCSI connector to which you will attach the chains.
2. For each expansion box, locate these cables and terminators:
 - One system-unit-to-expansion-box cable that has a different connector at each end
 - One expansion box terminator
 - One power cord for each expansion box you are using
 - One 18-inch box-to-box expansion cable with identical connectors at each end for every expansion box except the last box at the SCSI connector

Figure 8-2 shows the cables that you should use. Cable lengths are listed in Table 8-1, on page 8-5.

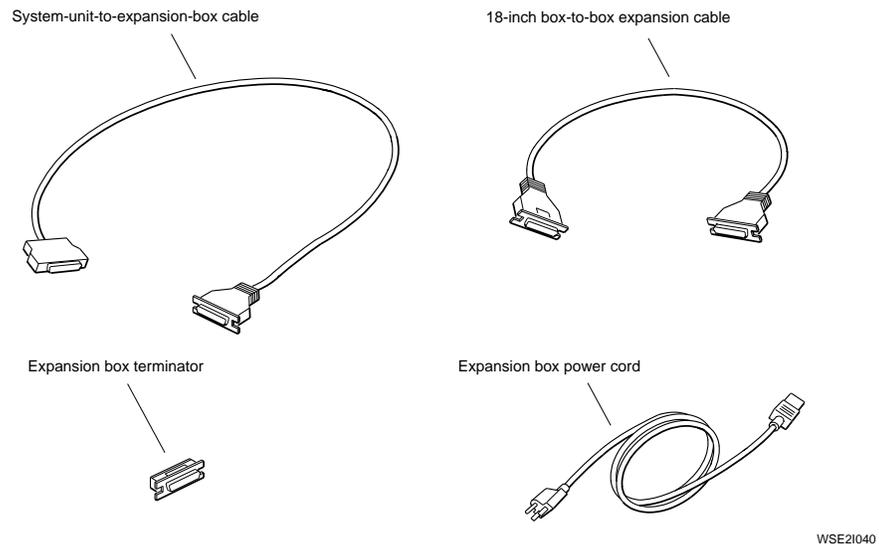


Figure 8-2. Expansion box cables and an expansion box power cord and terminator

Do not use more than 236 inches (6 meters) of cable, including the cable inside the expansion boxes and system unit, to connect a chain of drives. If the chain has more than 236 inches of cable, some of the data stored on the drives may be lost.

Table 8-1 lists the length of the cables that you are using. The table is as accurate as possible, but actual lengths may vary by an inch or two.

Table 8-1. SCSI Cable Lengths

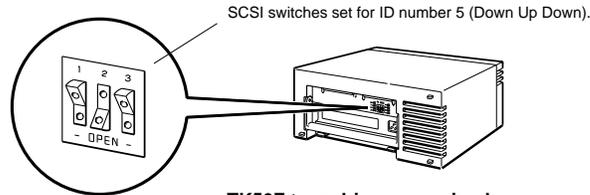
Cable	Length
Internal cable for the base system SCSI connector	52 inches (132.1 centimeters)
Expansion box internal cable	
—For TK50Z tape/drive	14 inches (35.6 centimeters)
—For RRD40 optical compact disc drive	6.5 inches (16.5 centimeters)
—For TLZ04 tape drive	38 inches (96.5 centimeters)
50-pin to 50-pin box-to-box cable	26 inches (66.0 centimeters)
68-pin to 50-pin system-unit-to-expansion-box cable	74 inches (188.0 centimeters)

Set the SCSI switches for each device

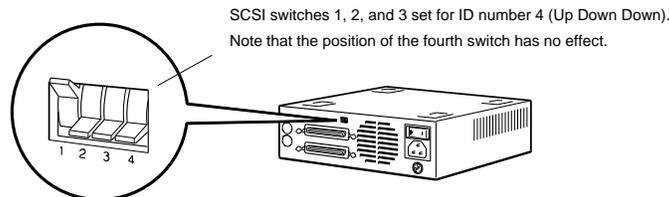
You can assign any ID number to a device, as long as you

- Use the numbers 0 to 6. The numbers do not have to be consecutive.
- Use each number only once per chain. For example, use the numbers 3 and 4 instead of using 4 twice.

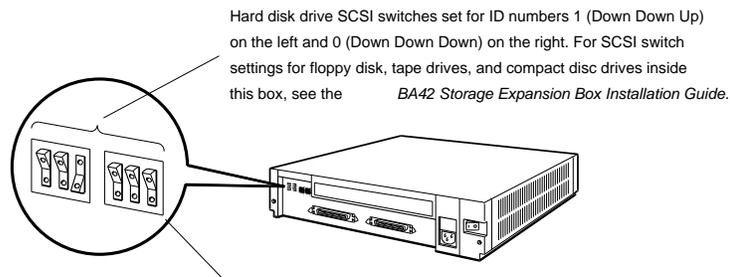
Figure 8-3, on page 8-6, shows the SCSI switches on the drive expansion boxes that can connect to a TURBOchannel SCSI controller module. Table 8-2, on page 8-7, lists the SCSI ID settings for the drive expansion boxes.



TK50Z tape drive expansion box

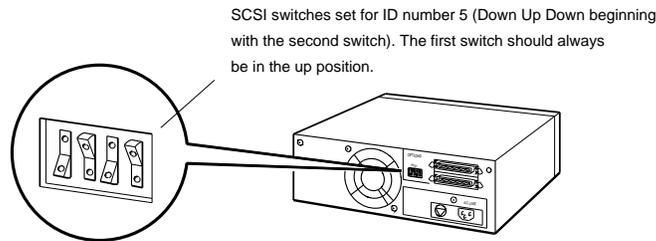


RRD40 optical compact disc drive expansion box



If the box has only one drive, set the switches on the right.

BA42 storage expansion box



TLZ04 tape drive expansion box

WS331007

Figure 8-3. Expansion box SCSI switches

Table 8-2. SCSI ID Switch Settings

SCSI ID Number	Hard Disk Drives in a BA42 Expansion Box or RRD40 Compact Disc Drive ¹	TK50Z Tape Drive or TLZ04 Tape Drive ²
6	Up Up Down	Down Down Up
5	Up Down Up	Down Up Down
4	Up Down Down	Down Up Up
3	Down Up Up	Up Down Down
2	Down Up Down	Up Down Up
1	Down Down Up	Up Up Down
0	Down Down Down	Up Up Up

¹Switch 4 on the RRD40 optical compact disc drive has no effect on the ID number.

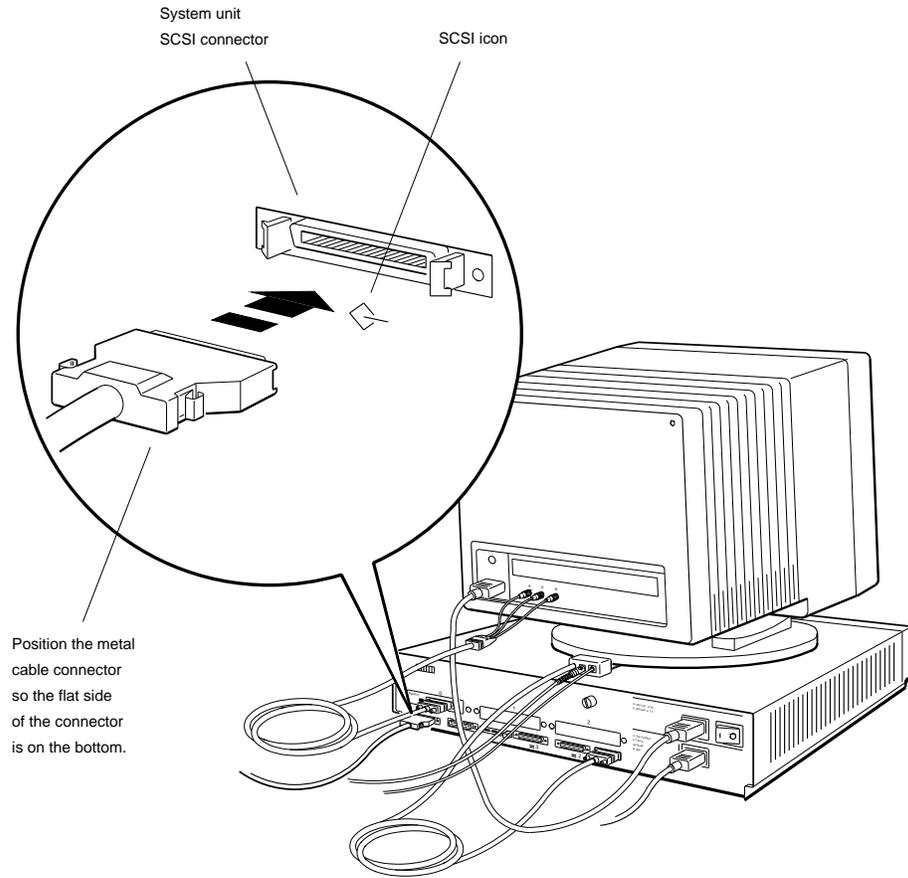
²Switch 1 (the left switch) on the TLZ04 tape drive should always be in the up position.

For more information about setting SCSI IDs on a specific drive, see the user's guide that came with that drive.

Connect expansion boxes to the system unit

To connect external drives to a SCSI controller, do the following:

1. Follow the instructions that came with your worksystem software to shut down the software.
2. Turn off the system unit and any expansion boxes. Then unplug the system unit power cord.
3. Hold the smaller, metal connector on the system-unit-to-expansion-box cable so the flat side of the connector faces down.
4. Push the cable connector into the SCSI connector on the system unit until it clicks into place.

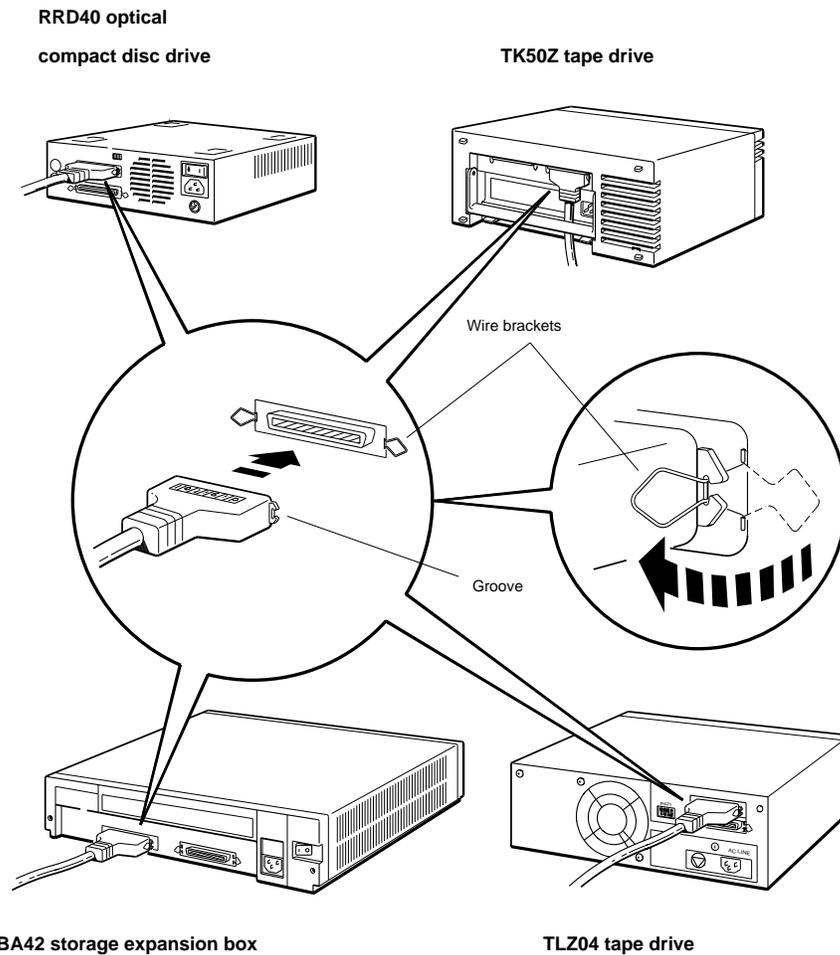


WS331002

Figure 8-4. Attaching a system-unit-to-expansion-box cable to a SCSI connector on the system unit

5. Attach the free end of the system-unit-to-expansion-box cable to one of the connectors on the back of the first expansion box.
 - a. Press the two wire brackets on the expansion box connector away from the connector.
 - b. Hold the cable connector so the DIGITAL logo faces up.
If the box is a TK50Z tape drive, slide the cable connector up between the handle and the back of the box.

- c. Push the cable connector into the expansion box connector as far as it will go.
- d. Press the two wire brackets firmly against the sides of the cable connector until they click into the grooves on the connector.

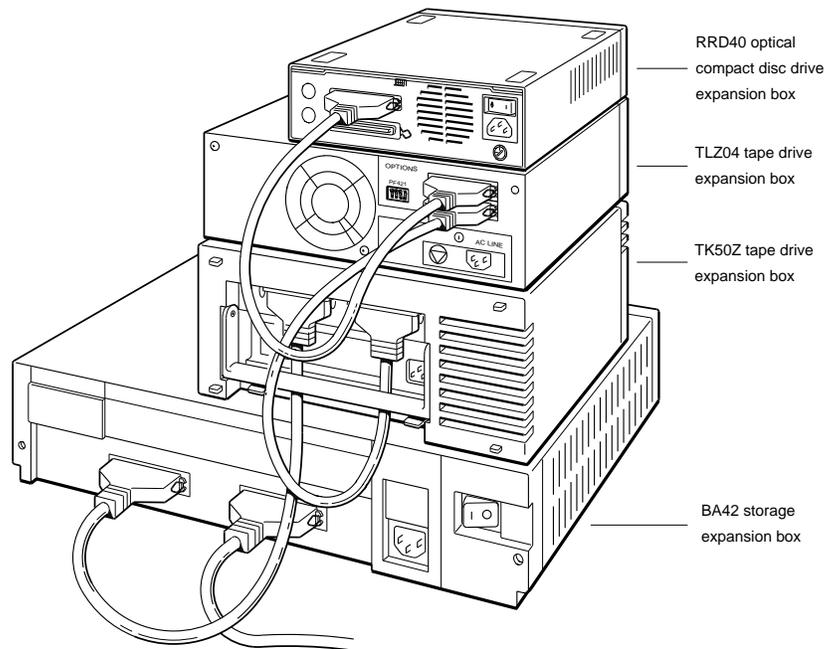


WS330054

Figure 8-5. Attaching a system-unit-to-expansion-box cable to a SCSI connector on an expansion box

6. Connect any additional expansion boxes.
 - a. Plug one end of an 18-inch box-to-box expansion cable into the unused SCSI connector on the back of the expansion box on the end of the chain.
 - b. Plug the other end of the cable into a SCSI connector on the new box in the chain.

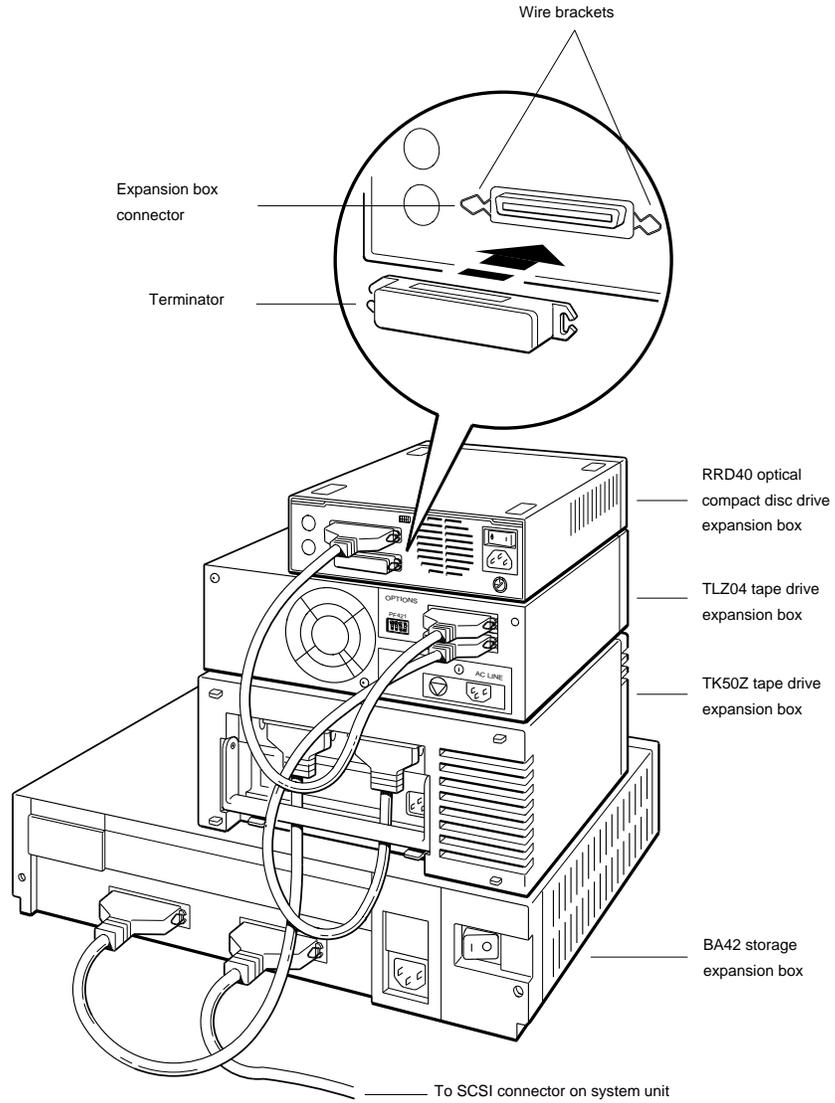
If the box is a TK50Z tape drive, slide the end of the cable between the box and its handle.
 - c. Repeat steps a and b for each additional box.



WSE21049

Figure 8-6. Connecting expansion boxes in a chain

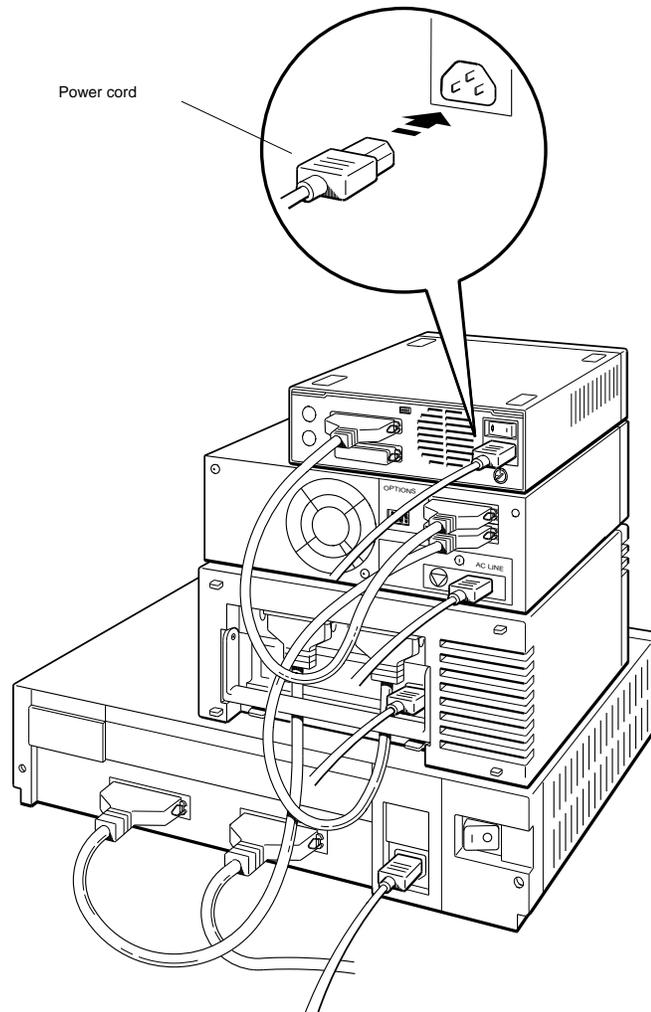
- d. On the last box in the chain, connect an expansion box terminator to the unused SCSI connector.



WS330064

Figure 8-7. Terminating the final expansion box

7. Plug the end of a power cord into the power connector on each expansion box as shown in Figure 8-8.
8. Plug the other end of each cord into a power outlet.
9. Turn on each expansion box and then the system unit.



WSE21052

Figure 8-8. Connecting power cords

To Test External Storage Devices

1. Turn on the system unit.

When the system unit has completed the power-up self-test successfully, type **cnfg** followed by the slot number of the SCSI connector to which you attached the boxes. Then press Return.

A display that describes the SCSI connector and the drives attached to it then appears on the monitor. This is a sample display for a SCSI controller and drives in option slot 2.

```
>>cnfg 2
2:  PMAZ-AA  DEC      V7.1e   TCF0      (scsi = 7)
-----
DEV  PID                               VID      REV      SCSI DEV
===  =====
rz3  RRD40      (C) DEC  DEC      0700    CD-ROM
tz4                               SEQ
```

This sample display shows two external devices in the base slot. The device codes in the DEV column show that the devices are a hard disk drive (rz3) and a tape drive (tz4).

If an expansion box that you installed fails to appear in the configuration display,

- Be sure that all cables are securely connected and a terminator has been installed on the unused connector on the last box.
- Be sure that each drive in the chain has a different SCSI ID number.
- Be sure that the box is connected to an active power source and switched on.

To Remove a Drive Expansion Box

The following steps show you how to remove a drive expansion box. For detailed information about any of these steps, see the explanation of that step earlier in this chapter.

1. Shut down the software.
2. Turn off all system hardware. First turn off the expansion boxes and other external devices. Then turn off the monitor. Then turn off the system unit.
3. Disconnect the expansion box that you are removing.
If the box is in the middle of a chain of devices, be sure to reconnect all of the remaining devices. Be sure that a terminator is on the unused connector of the last device on the chain.
4. Turn the system hardware on again. First turn on the drive expansion boxes and other external devices. Next, turn on the monitor. Then turn on the system unit.
5. Use the `cnfg` command to test the slot from which you removed the expansion box.

Installing a Drive in a BA42 Storage Expansion Box

To install a drive in a BA42 storage expansion box, see the *BA42 Storage Expansion Box Installation Guide*, which came with that box.

Part III

Testing and Troubleshooting

Starting and Testing Workstation Hardware

This chapter explains

- How to turn your workstation on and off
- How the power-up and system self-tests operate
- How to set your keyboard language
- How to check the configuration of your workstation

Turning On Your Workstation

Before turning on your workstation,

- Check to be sure that the power cord is plugged into an electrical outlet.
- If your workstation is on a power strip, be sure the power strip is plugged into a power outlet and turned on.

Every component of your workstation has a power indicator light that glows when you switch on the power. If a component fails to turn on,

- Make sure that it is plugged into a live power outlet.
- Determine whether both ends of the power cable are plugged securely into the appropriate connectors.
- If you are using a power strip, make sure it is turned on.
- Make sure there is power at the wall outlet.
- Determine whether you have pressed the right on/off switch.

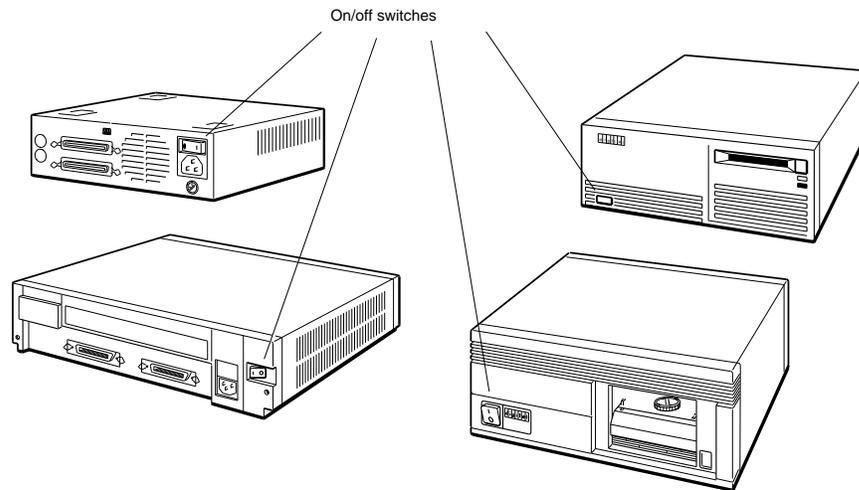
If you cannot fix the problem, turn to Chapter 10 for troubleshooting tips.

You should always turn on the components of your workstation in the following order:

1. Turn on external devices.
2. Turn on the monitor.
3. Turn on the system unit.

Turn On External Devices

- Turn on each expansion box. Most boxes have rocker switches. Some have push switches.
- Turn on your communications device, if you have one.



WSE20019

Figure 9-1. Expansion box on/off switches

Turn On the Monitor

Most monitor on/off switches are rocker switches marked 1 for on and 0 for off. Press the 1 to turn on the power. Some monitors have a push switch instead of a rocker switch. Press the switch in to turn on the power.



Press the 1 on
this type of switch.



Press and release this
type of switch.



Press this type
of switch in.

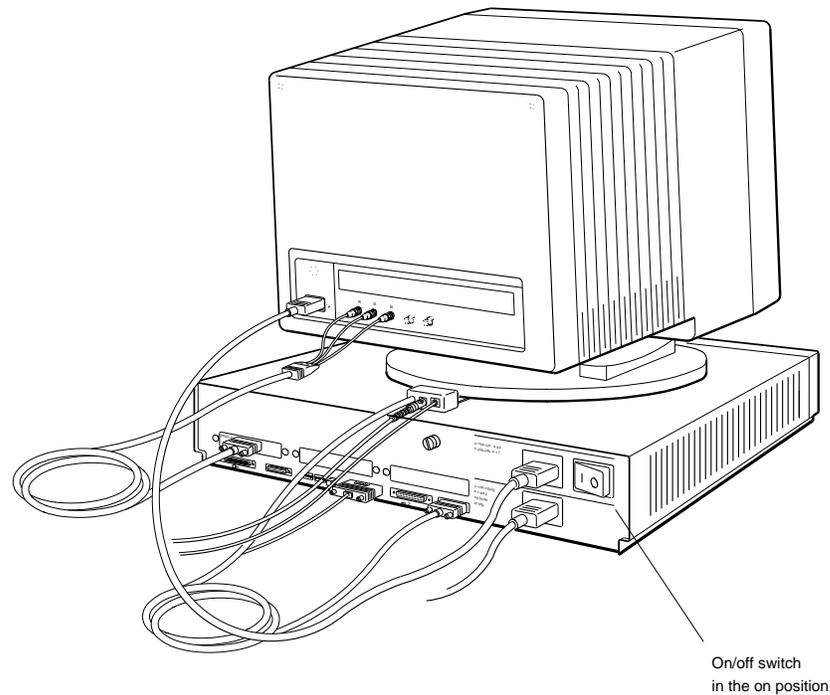
WSE21142

Figure 9-2. Turning on your monitor

If your monitor receives power from the system unit, the screen remains blank after you turn on the monitor. The system unit must be turned on before the screen can display anything.

Turn On the System Unit

The system unit on/off switch is on the back of the system unit. Turn on the system unit by pressing the 1 on the on/off switch.



WS330037

Figure 9-3. Turning on the system unit

These actions occur when the system unit turns on:

- The power indicator light on the front of the system unit glows.
- If the monitor takes power from the system unit, the monitor turns on.
- The system unit runs the automatic power-up self-test. At the bottom of the screen, it displays the names of each subtest that it runs.

- If your workstation language has been set, the system unit displays text like the following (unless a serial-line console is in use):

```
KNO2-BA    V5.7e
>>
```

If the workstation language has not been set, the system unit displays the following language menu first:

```
1) Dansk                      9) Français (Suisse Romande)
2) Deutsch                    10) Italiano
3) Deutsch (Schweiz)         11) Nederlands
4) English                    12) Norsk
5) English (British/Irish)  13) Português
6) Español                    14) Suomi
7) Français                  15) Svenska
8) Français (Canadien)      16) Vlaams

(1..16): _
```

Type the number displayed to the left of the language you want to use. Then press Return.

The console prompt (>>) appears when your language is set.

You can change the workstation language by redisplaying the language menu. Use the **setenv** command, in section “setenv”, on page 11-20, to set the console environment variable to 0 (zero). The language selection menu will immediately appear, and a new language can be selected.

If Your System Unit Fails to Turn On

If nothing happens when you turn on the system unit, turn it off and check to be sure that

- Power cords are connected properly and that the power strip, if there is one, is plugged in and turned on.
- There is power at all power outlets.
- All power switches are set to the on position.

If the system unit still fails to work, turn to Chapter 10 for troubleshooting instructions.

Testing Your Workstation

Run the System Self-Test

Type **test** and press Return to run the system self-test. As the system performs the subtests that make up the self-test, it briefly displays the name of each subtest on the screen. The tests can take 15 minutes or more to run. When all tests have been completed successfully, the system unit displays the console prompt (>>).

If a Self-Test Fails

At the end of the system self-test, error messages that have been generated are displayed above the console prompt (>>). You should also use the **erl** command to look for other messages. Type **erl** at the console prompt and press Return. Chapter 10 explains all the test messages.

Check Your Configuration Displays

The configuration test tells you which option modules are in your system unit. It identifies each module in your system unit by slot number and by a special option module code.

Use the **cnfg** command to check the workstation configuration, in Chapter 11, see section “cnfg”, on page 11-11. Check to be sure that the screen display lists all the modules ordered for your workstation. The packing list for your shipment shows the modules you ordered.

Stopping the Workstation Without Turning It Off

If ULTRIX is your worksystem software, you can shut it down by typing **shutdown -h now** at the ULTRIX prompt and pressing Return.

If you are unable to return to console mode using this shutdown command, you can stop your workstation and all worksystem software by pressing the halt button on the back of the system unit. The workstation and software stop whatever they were doing, and the monitor displays the console prompt (>>). Save your work, if you can, before pressing the halt button.

Caution: *Pressing the halt button with your workstation and any worksystem software running may result in the loss or corruption of data.*

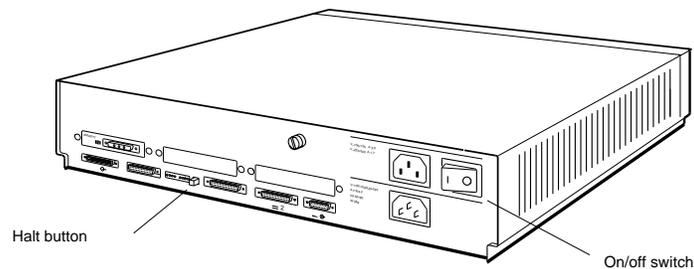


Figure 9-4. Halt button and system unit on/off switch

The specific result of pressing the halt button is determined by the setting of the haltaction environment variable. Table 11-4, on page 11-22, explains how to set this variable.

Turning Off the Workstation

1. If your worksystem software has been installed, follow the instructions that came with that software to shut down the software.
2. Turn off the power.
 - If your workstation takes power from a power strip, turn off the power strip.
 - If your workstation is not on a power strip,
 - Turn off any communications device by following its instructions.
 - Turn off each expansion box.
 - If the monitor receives its power from a separate wall outlet, turn off the monitor.
 - Turn off the system unit.

10

Troubleshooting

This chapter explains

- What kind of information your Customer Support Center needs when you ask for help
- How to be sure all components of your workstation are functioning
- How to use the system self-tests to diagnose common problems new users often have
- How to diagnose and solve other problems

Where to Look for Troubleshooting Information

- If some part of your workstation fails to turn on, look in the section “Is It On?”, on page 10-4.
- If the workstation turns on, but a component doesn’t function properly, look in the section “Is It Connected?”, starting on page 10-6.
- If the workstation turns on and everything is connected, but the workstation still doesn’t function properly, look in the section “Is It Working?”, starting on page 10-14.

Contacting Your Customer Support Center

If you follow the recommendations in this chapter and your system problem is still not fixed, call your Customer Support Center.

The service representative at the center will ask you these questions:

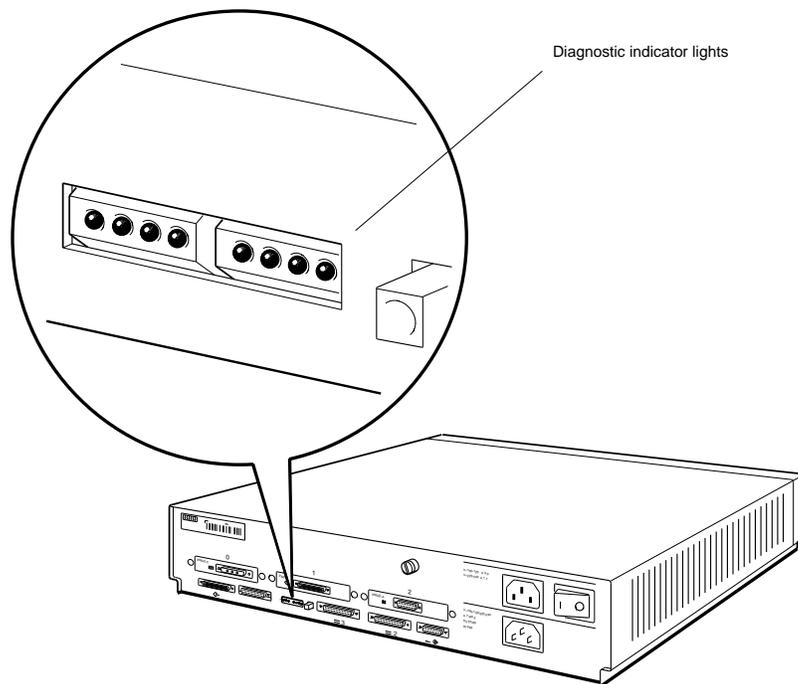
- What kind of workstation do you have?
- What is its serial number?
- How much memory does it have?
- What kind of monitor is connected to it?
- What internal drives does it have?
- What external storage devices and other options does it have?
- What is wrong?
- What error messages were displayed? What diagnostic indicator lights were on?
- Did you try to fix the problem yourself? What did you do?

The service representative will try to help you fix the problem while you are on the telephone, so make your call from a telephone near the workstation.

Is It On?

The diagnostic indicator lights are eight small lights on the back of the system unit. They show whether the basic components of the workstation are turned on and ready for use.

If the workstation does not turn on and no error message appears on the monitor, the pattern of the indicator lights indicates which portion of the power-up self-test failed.



WS331010

Figure 10-1. Diagnostic indicator lights

Table 10-1, on page 10-5, shows you how to interpret the diagnostic indicator lights. If you have a problem, call your system manager or Customer Support Center. This information will be useful in diagnosing the problem.

Table 10-1. Interpreting Diagnostic Indicator Lights

Lights	Meaning
○○○○ ○○○○	<i>If the workstation does not turn on</i> , a device or module is not connected properly or is broken.
	<i>If the workstation turns on</i> , all components of the workstation have been initialized, and the workstation is ready for use.
●●●● ●●●●	Workstation hardware initialization could not begin.
○○●● ○●●●	The firmware could not calculate the cache size.
○○●● ●●●○	The firmware could not calibrate the millisecond delay loop.
○○●● ●●○○	The firmware could not start the power-up versus reset code.
○○●● ○●●○	Memory bank 0 could not be initialized.
○○●● ○●○○	The firmware could not initialize the IO ASIC to a known state.
○○●● ●●●●	The read-only memory (ROM) in the system module or in one of the option modules could not be initialized.
○○●● ●○○●	The system console programs could not be initialized.
○○○○ ○●●○	The system module or one of the option modules could not be initialized. The lights on the left show the slot number of the module.
○○○● ○●●○	This table shows slot numbers 0 (Off Off Off Off) to 3 (Off Off On On).
○○●○ ○●●○	
○○●● ○●●○	
○○○○ ○●●●	The workstation was initialized, but there is a problem in the system module or one of the option modules. The lights on the left show the slot number of the module with the problem. This table shows slot numbers 0 (Off Off Off Off) to 3 (Off Off On On).
○○○● ○●●●	
○○●○ ○●●●	
○○●● ○●●●	
○○○○ ○●○○	The worksystem software could not be loaded. The lights on the left show the slot number of the module where the software is stored. This table shows slot numbers 0 (Off Off Off Off) to 3 (Off Off On On).
○○○● ○●○○	
○○●○ ○●○○	
○○●● ○●○○	

Notes:

- Light is off.
- Light is on.

Is It Connected?

Many problems that you are likely to have when you first start using your workstation can be solved easily. Table 10-2 lists some problems that occur with new users and some problems that occur after new hardware has been installed. The table gives some solutions. If these solutions do not work, call your system manager or Customer Support Center.

Table 10-2. Solutions to Common Problems

Problem	Solution
The screen is blank.	<ol style="list-style-type: none">1. Press any key on your keyboard. If your screen saver was active, the display will reappear.2. Make sure the system unit and monitor are turned on.3. Adjust the brightness and contrast controls.4. Turn off the system unit and monitor.5. Make sure the system unit power cord and the monitor-to-system-unit power cable or the monitor power cord are connected correctly.6. Make sure the video cable is securely connected to the monitor and system unit.7. Look in Appendix A to be sure the monitor is appropriate for a System 100 Series workstation.8. Turn on the system unit and monitor.

(continued on next page)

Table 10-2 (Cont.). Solutions to Common Problems

Problem	Solution
The screen display is distorted or unstable.	<ol style="list-style-type: none">1. Shut down your worksystem software, if necessary, and turn off the system unit and monitor.2. Make sure the video cable connectors are correctly attached to the monitor and system unit.3. Check Appendix A to be sure that your monitor is the right one for the graphics module that you are using.4. Turn on the system unit and monitor.
Color is distorted or unclear.	<ol style="list-style-type: none">1. Move such items as magnetic paper clip holders and electric pencil sharpeners or other electromechanical devices away from the monitor.2. If your monitor has a degauss button, press it for 5 seconds. If the monitor has no degauss button, turn the monitor off and then on again.3. See the manuals for your monitor for further troubleshooting instructions.
Red or blue is missing from the display on your color monitor.	<ol style="list-style-type: none">1. Shut down your worksystem software and turn off the system unit and monitor.2. Make sure the video cable connectors are attached to the monitor correctly. Chapter 2 explains how to connect the monitors in "To Connect the Monitor to the System Unit", on page 2-5.3. Turn on the system unit and monitor.

(continued on next page)

Table 10-2 (Cont.). Solutions to Common Problems

Problem	Solution
The DIGITAL logo is red instead of blue on the login screen on your color monitor.	<ol style="list-style-type: none">1. Shut down your worksystem software and turn off the system unit and monitor.2. Remove the video cable connector from the video connector on the system unit.3. Unplug the cable connector. Holding the cable connector so the widest part of the connector is on top, reattach the cable connector to the system unit.4. Turn on the system unit and monitor.
Nothing happens on the screen when you type.	<ol style="list-style-type: none">1. Check the Hold Screen indicator light on the keyboard. If the light glows green, press the Hold Screen key.2. Shut down your worksystem software, if necessary, and turn off the system unit.3. Disconnect the keyboard cable from its connector on the keyboard-mouse connector block and then reconnect it.4. Make sure the keyboard-mouse cable is firmly attached to the system unit and turn on the system unit.5. Turn off the system unit and monitor, connect another keyboard, and turn on the system unit and monitor again.

(continued on next page)

Table 10-2 (Cont.). Solutions to Common Problems

Problem	Solution
You cannot connect to your networks, and you know the worksystem and network software are functioning.	<ol style="list-style-type: none">1. Shut down your worksystem software and turn off the system unit.2. Make sure the Ethernet connectors on the system unit are attached correctly (see Chapter 6 “Connecting the Workstation to a ThickWire Ethernet Network”, on page 6-3). If you are using adapters to connect ThinWire or twisted-pair Ethernet cable to your workstation, check those connectors, too.3. Turn on the system unit.
No cursor appears on the screen	<ol style="list-style-type: none">1. Check the Hold Screen indicator light on the keyboard. If the light glows green, press the Hold Screen key.2. Move the mouse around on your desktop, or move the puck or stylus around on your tablet, to see if you accidentally moved the cursor off the screen.3. Shut down your worksystem software and turn off the system unit.4. Make sure the mouse cable is correctly connected to the keyboard-mouse connector blocks and the keyboard-mouse cable is correctly connected to the system unit.5. Turn on the system unit.6. If the problem is not fixed, install another mouse or tablet.

(continued on next page)

Table 10-2 (Cont.). Solutions to Common Problems

Problem	Solution
The cursor on the screen fails to follow the movement of your pointing device (mouse, puck, or stylus).	<ol style="list-style-type: none">1. Shut down your worksystem software and turn off the system unit.2. Make sure the cable for the device is connected securely to the keyboard-mouse connector block and to the device itself.3. Turn on the system unit.4. If the problem is not fixed, install another pointing device.
You cannot install worksystem software from an external storage device.	<p><i>If you have only one external storage device,</i></p> <ol style="list-style-type: none">1. Make sure that the device is turned on, and that the power outlet it is plugged into has power.2. Use the <code>cnfg</code> command to determine whether the workstation is configured for the device.3. If the device is missing from the display, turn off the device and the system unit.4. Make sure that the system unit expansion cable is correctly connected to the device and the system unit.5. Make sure a terminator is correctly attached to the second SCSI connector on the device.6. Turn on the device and the system unit. <p>If the problem is still not fixed, look in the manuals for the devices and the installation guide for your workstation software.</p>

(continued on next page)

Table 10-2 (Cont.). Solutions to Common Problems

Problem	Solution
	<p data-bbox="594 512 1208 539"><i>If you have more than one external storage device,</i></p> <ol data-bbox="594 562 1385 695" style="list-style-type: none"><li data-bbox="594 562 1385 621">1. Make sure that all the devices are turned on, and that the power outlets they are plugged into have power.<li data-bbox="594 638 1385 695">2. Type cnfg and the number of the slot in which the device is connected. <p data-bbox="654 722 1385 926">If the device does not appear in the configuration display on the screen, turn off all devices connected to the system unit and then turn off the system unit. Then see the instructions for installing the device in Chapter 8, "Installing and Removing External Storage Devices", on page 8-3. For a discussion of configuration displays, see Chapter 11, "cnfg", on page 11-11.</p> <ol data-bbox="594 945 1385 1089" style="list-style-type: none"><li data-bbox="594 945 1385 1089">3. If the device is listed properly in the configuration display and it is an external device, make sure the SCSI and power cables are connected to all the devices in the chain and to the system unit. The SCSI cables between devices should be 18-inch Digital cables. <p data-bbox="654 1113 1385 1171">Make sure a terminator is firmly attached to the second connector on the last device in the chain.</p> <ol data-bbox="594 1190 1385 1409" style="list-style-type: none"><li data-bbox="594 1190 1385 1362">4. Make sure that the total length of all internal and external SCSI cable does not exceed 19 feet 8 inches (6 meters). In Chapter 8, see Table 8-1, on page 8-5, shows the length of every SCSI cable. Remember that cable length calculations <i>must</i> include the length of the cable in each device box and in the base system.<li data-bbox="594 1381 1385 1409">5. Turn on the system unit and the devices. <p data-bbox="654 1436 1385 1518">If the problem is not fixed, look in the manuals for the devices and in the installation guide for your workstation software.</p>

(continued on next page)

Table 10-2 (Cont.). Solutions to Common Problems

Problem	Solution
A red light blinks rapidly on the front of your TK50Z tape drive.	<ol style="list-style-type: none">1. Push the load/unload button four times.2. Turn the tape drive off and then on once.
Nothing happens when you try to use your printer.	<ol style="list-style-type: none">1. Make sure the printer is turned on.2. Check your worksystem and communications software to be sure that the device is installed and enabled properly.3. Check your system software to be sure the printer is installed in the software.4. Shut down your worksystem software, if necessary, and turn off the printer and the system unit.5. Make sure the printer power cord is connected to an active power source.6. Make sure the printer cable connector is correctly attached to one of the communications connectors on the system unit.7. Turn on the system unit and the printer. <p>If the problem is not fixed, see the manuals for your printer.</p>

(continued on next page)

Table 10-2 (Cont.). Solutions to Common Problems

Problem	Solution
Nothing happens when you try to use a communications device.	<ol style="list-style-type: none">1. Make sure the device is turned on.2. Shut down your worksystem software, if necessary, and turn off the device and the system unit.3. Make sure the device power cord is connected to an active power source.4. Make sure the connector on the communications device cable is correctly attached to the communications connector or the communications connector adapter on the system unit.5. Make sure the right type of cable is connected to the device. Check the guide that came with the device to determine the proper cables.6. Verify that the proper type of cable is being used.7. Turn on the system unit and the device. <p>If the problem is not fixed, see the manuals for the device.</p>

Is It Working?

Self-tests are programs that check your workstation hardware to be sure that it is functioning properly.

Self-tests have numerous subtests that examine specific workstation components. When a subtest discovers a problem, it displays a coded message, called an error message, on the screen. When all the tests are done, the workstation displays the console prompt (>>).

How to Run a Self-Test

- The workstation runs a small set of power-up self-tests automatically when you turn on the power. It can run two versions of the set, depending on the setting of the testaction environment variable. Chapter 11, “Environment Variables”, on page 11-22, explains how to set environment variables.
- You can run the full set of self-tests, collectively called the system self-test, at any time. However, you must shut down your ULTRIX worksystem software first. To do so, type **shutdown -h now** at the ULTRIX prompt and press Return. Then, at the console prompt (>>), type **test** and press Return.

How to Interpret Self-Test Messages

Self-tests display error messages when they discover problems in the hardware.

- If the slot number is 0, 1, or 2, the problem is in the TURBOchannel option slot that has the same number.
- If the slot number is 3, the problem is in the base system hardware. Copy the messages and then look for them in Table 10-3, on page 10-16. This table explains how you can probably fix the problem. If you cannot fix it, call your system manager or Customer Support Center.

Here is a sample error message, with an explanation of every part:

① ?TFL: ② 3/ni/promisc ③ (903: LANCE-start timeout.) ④ [KNO2-BA] ⑤ ⑥

- ① Indicates that this is a test failure message. You can fix problems when the error message begins with TFL.
- ② Slot number of the hardware that reported a problem.
- ③ Subtest that found the problem.
- ④ Part of the subtest that found the problem. Some messages do not have this information.
- ⑤ Explanation of the problem.
- ⑥ ID of the module in the slot.

Table 10-3. Self-Test Error Messages for the Base System Slot

cache/data cache/fill cache/isol cache/reload cache/seg	The RAM cache in the CPU module is faulty. Copy the entire message and call your system manager or Customer Support Center.
fpu	The math coprocessor in the CPU module is faulty. Copy the entire message and call your system manager or Customer Support Center.
mem	<p>RAM is faulty. Make sure that all memory modules are firmly seated in their connectors in the system unit. Then run the memory test. Type t 3/mem * and press Return. The memory test checks every memory module, taking several minutes for each one. If it finds a problem, it displays one of two types of message. The first type of message has this format:</p> <pre>?TFL: 3/mem (PER, cause=0000001C, DBE = 004000c, Bank 1, D16-31, d23-d16)</pre> <p>The message identifies the faulty memory modules. The bank number is the number of the memory slot. Bank 1 is the bank number in the example. Bank numbers can be 0 to 7. Bank 0 is the memory slot nearest the back of the system unit; bank 7 is the slot nearest the front. The SIMM number is the memory module in the slot. D16-31 is the SIMM number in the example. SIMM numbers can be D0-15 or D16-31. D0-15 is the memory module next to the power supply; D16-31 is the memory module away furthest the power supply.</p> <p>You should replace every memory module for which an error message appears. Chapter 4 explains how to replace memory modules.</p> <p>If the messages show that all memory modules are faulty, remove all of them. Then install at least 8 megabytes of memory with new memory modules and run the system memory test again. If the test still reports a problem, copy the entire message and call your system manager or Customer Support Center.</p> <p>The second type of message that the memory test displays has this format:</p> <pre>?TFL: 3/mem (@ A04000000=55550055, sb 55555555)</pre> <p>(continued on next page)</p>

Table 10-3 (Cont.). Self-Test Error Messages for the Base System Slot

	The message indicates that a memory module does not read and write values correctly. If this type of message appears, copy the entire message and call your system manager or Customer Support Center.
mem/float10	A part of the memory module failed to read and write a one and zero pattern. Copy the entire message and call your system manager or Customer Support Center.
mem/init	The system could not write a pattern of zeros to the memory module. Copy the entire message and call your system manager or Customer Support Center.
mem/select	The workstation could not read and write a pattern to a memory module correctly. Copy the entire message and call your system manager or Customer Support Center.
misc/halt	The halt button or the built-in halt program is faulty. Copy the entire message and call your system manager or Customer Support Center.
misc/kbd	The keyboard, keyboard cable, or keyboard connectors are faulty. To make sure that the cable is connected properly, see Chapter 2, “To Connect the Keyboard to the Connector Block”, on page 2-18. Then turn the system unit off and on again. If the test message is displayed again, try replacing first the keyboard cable and then the keyboard. If the message is still displayed, copy the entire message and call your system manager or Customer Support Center.
misc/mouse	The mouse, mouse cable, or mouse connector is faulty. Make sure that the cable is connected properly, see Chapter 2, “To Connect the Mouse or Tablet to the Connector Block”, on page 2-19. Then turn the system unit off and on again. If the message appears again, replace the mouse. If your workstation is connected to a network, disconnect from the network, attach the loopback connector, and retry the test. If the message still appears, copy the entire message and call your system manager or Customer Support Center.
misc/pstemp	The flow of air through the system unit is inadequate, or the temperature in your office is more than 104°F (40°C). Make sure that there is at least 4 inches (10 cm) between the vents in the system unit cover and other items on your worktable. Then turn the system unit off, wait a moment, and turn it on. If the message appears again, turn off the system unit, copy the entire message, and call your system manager or Customer Support Center.
misc/wbpart	The CPU module or system memory is faulty. Copy the entire message and call your system manager or Customer Support Center.

(continued on next page)

Table 10-3 (Cont.). Self-Test Error Messages for the Base System Slot

ni/cllsn ni/common ni/crc ni/ctrs ni/dma1 ni/dma2 ni/int ni/int-lb ni/m-cst ni/promisc ni/regs ni/setup	The Ethernet controller in the base system slot is faulty. Copy the entire message and call your system manager or Customer Support Center.
ni/esar	The Ethernet address chip is faulty. Copy the entire message and call your system manager or Customer Support Center.
ni/ext-lb	The built-in Ethernet connector in the base system slot or the loopback connector attached to the Ethernet connector is faulty. Replace the loopback connector, if there is one, or make sure that the network cable is connected properly, see Chapter 3, “To Install ThickWire Ethernet Loopback Connectors”, on page 3-2. If this message appears again, copy the entire message, and call your system manager or Customer Support Center.
rtc/nvr rtc/period rtc/regs rtc/time	Interrupt handling or timekeeping in the system module is faulty. Copy the entire message and call your system manager or Customer Support Center.
scc/access scc/dma	The controller for a communications connector is faulty. Copy the entire message and call your system manager or Customer Support Center.
scc/int	The controller for a communications device fails to interrupt the communications signals when appropriate. Copy the entire message and call your system manager or Customer Support Center.

(continued on next page)

Table 10-3 (Cont.). Self-Test Error Messages for the Base System Slot

scc/io	The controller for one of the communications connectors, the connector itself, or a cable attached to the connector is faulty. Make sure that the cables to all your communications devices are plugged in. Then turn the system unit off and on. If the message appears again, copy the entire message and call your system manager or Customer Support Center.
scc/pins	One of the communications connectors is faulty. Copy the entire message and call your system manager or Customer Support Center.
scc/tx-rx	The controller for one of the communications connectors, the connector itself, or a cable attached to the connector is faulty. Make sure that the cables to all your communications devices are plugged in. Then turn the system unit off and on. If the message appears again, copy the entire message and call your system manager or Customer Support Center.
scsi/cntl	The controller for the built-in SCSI connector in the base system slot is faulty. Turn the system unit off and on. If the test message appears again, copy the entire message and call your system manager or Customer Support Center. Note that you can still use SCSI connectors in the option slots.
scsi/sdiag	A SCSI device connected to the built-in SCSI connector in the base system slot is faulty, or one of the SCSI cables that is connected to a device in that slot is faulty. Make sure that all SCSI cables are plugged in securely. If you connected a chain of external devices to the slot, make sure that the last device has a SCSI terminator on the unused SCSI connector. Then turn the system unit off and on. If the test message appears again, copy the entire message and call your system manager or Customer Support Center. Note that you can still use SCSI connectors in the option slots.
	Caution: <i>scsi/target destroys data on the medium that it tests.</i>
tlb/prb tlb/reg	The CPU module is faulty. Copy the entire message and call your system manager or Customer Support Center.

Using the Console Commands

This chapter tells you how to

- Select console and operating modes
- Use the console commands
- Set environment variables

Console and Operating Modes

Your workstation functions in two modes: console mode and operating mode. Console mode lets you use the setup and testing software that is built into the workstation. Operating mode lets you use your worksystem software.

This manual explains how to use the workstation in console mode. Your worksystem software manuals explain how to use the workstation in operating mode.

Using Console Mode

The workstation starts in console mode and stays in that mode until you start your worksystem software. While you are in console mode, you can use the console commands, which are the commands of the built-in setup and testing software.

You enter console commands at the system console. If you connected only one monitor to your workstation, that monitor is your system console. If you connected multiple monitors, the monitor in the TURBOchannel option slot with the lowest number is the system console. If you connected a separate system console, such as a VT320, and you have typed **setenv console s**, that console is your system console.

You use console mode and console commands for such tasks as

- Running workstation self-tests
- Displaying workstation hardware configurations
- Setting workstation environment variables
- Booting (starting) the operating system

To choose console mode, take one of the following actions:

- If you are using ULTRIX worksystem software, type **shutdown -h now** at the ULTRIX prompt and press Return, or

***Caution:** If you do not shut down ULTRIX, you may lose the work that you were doing.*

- Press the halt button on the back of the system unit, *or*

- Turn off the power to the system unit and turn it back on again.

Caution: Turning off the power or pressing the halt button with your workstation and any worksystem software running may result in the loss or corruption of data.

Console prompts

When you use console mode, the workstation displays one of these two prompts on the system console screen: >> or R>.

- The >> prompt means that the workstation is in privileged mode. Anyone can use all the console commands.
- The R> prompt means that the workstation is in restricted mode. Users who don't know the password can use only the boot and password console commands.

Using Operating Mode

You use the workstation in operating mode most of the time, because that is the mode for using your worksystem software. This software consists of an operating system and applications. You use it for such activities as

- Running applications in DECwindows
- Backing up files
- Sending and receiving electronic mail

To choose operating mode, boot (start) the operating system in either of these ways:

- Type **boot** at the console prompt and press Return, *or*
- Set the worksystem software to boot the operating system automatically.

For either of these procedures to work, you must set the boot environment variable for your workstation and set the haltaction environment variable to b. Until you set these variables, you must use the boot command. This chapter explains how to use the boot command and how to set the environment variables.

When you start in operating mode, you must supply your worksystem software user name and password.

Your worksystem software manuals explain how to use operating mode.

Typing Console Commands

You can use the console commands when the system monitor displays the prompt `>>` or `R>`. Follow these rules:

- Type uppercase and lowercase letters exactly as they appear in this manual. The system recognizes uppercase and lowercase letters as different input.
- Press Return after typing a command.
- Use these key combinations:
 - 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.
 - DEL erases the last character typed.
- To type a hexadecimal number, precede the number with 0x (zero x). To type an octal number, precede the number with 0 (zero). To type a decimal number, do not precede the number with any leading 0's (zeroes).
- To use the Ctrl commands, hold down the Ctrl key while you type the letter of the command. For example, to use Ctrl-s, hold down Ctrl while you type s.

Conventions Used in This Chapter

- **Letters in boldface type like this** should be typed exactly as they appear.
- *Words in italic type like this OR LIKE THIS* are options and arguments for the commands. You have to replace them with the appropriate information. For example, the `script` command has a *scriptname* argument. When you type the command, you replace *scriptname* with the name of the script that you are typing.
- Options are read by the console programs, whereas arguments are read by the worksystem software.
- When options and arguments are shown in brackets, you should use them only if they are appropriate. When they are not in brackets, you must use them all the time. For example, the `printenv` command is shown like this:

```
printenv [env]
```

Because [*env*] is enclosed in brackets, you should use it only when it is appropriate, which in this case is when you want to display the setting of one environment variable.

The `script` command is shown like this:

```
script scriptname
```

Because *scriptname* is not shown in brackets, you must include it in every `script` command.

Do not enclose options and arguments in brackets when you type them. The brackets are just this manual's way of showing you when to use options and arguments.

- When an argument is followed by an ellipsis (...), you can use more than one argument with the command.

Console Commands

This section explains all of the console commands, but you will probably use only a few of them. The rest are for system managers, service representatives, and other technical specialists.

Table 11-1 lists the console commands.

Table 11-1. Console Commands

Command	Function
?	Displays a list of console commands and formats
boot	Boots the system
cat	Displays contents of scripts
cnfg	Displays system configuration information
d	Deposits data into memory
e	Examines memory contents
erl	Displays a log of error messages
go	Transfers control to a specific address
init	Resets the system
ls	Displays a list of objects present in a module
passwd	Sets and clears the console password
printenv	Prints environment variables
restart	Restarts the worksystem software
script	Enters a short script at the console
setenv	Sets environment variables
sh	Starts a script
t	Starts module diagnostic tests
unsetenv	Deletes environment variables

This list shows the console commands as they appear in the help menu on the screen. To display the help menu, type a question mark (?) and press Return.

```
boot [[-z #] [-n] #/path [ARG...]]  
cat SCRIPT  
cnfg [#]  
d [-bhw] [-S #] RNG val  
e [-bhwdoux] [-S #] RNG  
erl [-c]  
go [ADR]  
init [#] [-m] [ARG...]  
ls [#]  
passwd [-c] [-s]  
printenv [EVN]  
restart  
script SCRIPT  
setenv EVN STR  
sh [-belvS] [SCRIPT] [ARG..]  
t [-l] #/STR] [ARG..]  
unsetenv EVN
```

The following sections describe the console commands in detail. Note that the command descriptions do not always use the format that appears in the help menu.

Description of the Console Commands

To use a console command, type the command as shown, add appropriate options and arguments, and press Return.

For clarity, the console prompt (>>) precedes the format descriptions.

?

>>? [*command*]

The **?**, or **help**, command displays the list of console commands, as shown on page 11-8. If you name a specific command, the screen displays the help message for that command only.

boot

>>boot [*OPTIONS*] [*#/path*] [*argument...*]

Options can be

-a	Use a multiuser bootstrap.
-n	Load, but do not execute, <i>path</i> program.
-z number	Wait for <i>number</i> seconds; then boot.

The **boot** command loads and executes the program specified by *#/path*, where *#* is the slot number of the device that you are booting from, and *path* is the file specification of the program. The **-a** argument boots for a multiuser environment; to perform a single user boot, enter the **boot** command without the **-a** argument. The **-n** option suppresses execution of the program after it is loaded. The **-z** option causes the system to wait before booting. When you enter the command with no options, *path*, or *argument*, it uses the options, *path*, and *argument* in the boot environment variable (see “Environment Variables” on page 11-22).

The following example of the boot command uses the options and arguments set in the boot environment variable:

```
boot
```

The following command boots from a tape drive (tz5) in base slot 3; tz5 is the SCSI code of the drive:

```
boot 3/tz5
```

The following command boots from the network that is connected to your workstation at option slot 2:

```
boot 2/mop
```

The following example shows a multiuser boot (-a) using the vmunix file on an internal drive (rz1) in base slot 3; rz1 is the SCSI code of the drive:

```
boot 3/rz1/vmunix -a
```

```
cat
```

```
>>cat #/scriptname
```

The cat command displays the contents of the script specified by *scriptname*. The # argument indicates the number of the slot where the script is stored.

cnfg

```
>>cnfg [#]
```

The `cnfg` command displays important information about the configuration of your workstation. The information tells you what kind of hardware is in the workstation and connected to the workstation. If you type a slot number for [#], the command displays configuration information for that slot. Otherwise, it displays general information for all the slots. Here is an example of the general information:

```
>>cnfg
3:  KN02-BA   DEC      V5.7e    TCF0    ( 24 MB)
                                     (enet: 08-00-2b-0f-45-72)
                                     (SCSI = 7)
0:  PMAG-AA   DEC      V5.3d    TCF0    (CX -- D=8)
1:  PMAD-AA   DEC      V5.3d    TCF0    (enet: 08-00-2b-0f-45-31)
```

Figure 11-1. Display of general configuration information

This information shows what kind of modules are in the base system slot (base slot 3) and the option slots. The workstation has option modules in slots 0 and 1, but not in slot 2.

Here is an example of information for just one slot: in this case, for base slot 3, the base system slot:

```
>>cnfg 3
3:  KN02-BA   DEC      V5.7e    TCF0    ( 24 MB)
                                     (enet: 08-00-2b-0f-45-72)
                                     (SCSI = 7)
-----
DEV   PID                               VID           REV          SCSI DEV
=====
rz0   RZ55          (C) DEC      DEC          0700        DIR
rz1   RRD40        (C) DEC      DEC          0700        CD-ROM
tz2
dcache ( 64 KB), icache ( 64 KB)
mem( 0): a0000000:a03ffffff ( 4 MB)
mem( 1): a0400000:a07ffffff ( 4 MB)
mem( 2): a0800000:a0bffffff ( 4 MB)
mem( 3): a0c00000:a0fffffff ( 4 MB)
mem( 4): a1000000:a13ffffff ( 4 MB)
mem( 5): a1400000:a17ffffff ( 4 MB)
```

Figure 11-2. Display of slot configuration information

Notice that the display begins with the same general information as in Figure 11-1, on page 11-11. The rest of the display shows information regarding the devices and memory that are installed in the base slot (three devices and six memory modules).

Here is an explanation of the information in both displays. The numbers in black circles refer to the text that follows.

```

1 3: 2 KN02-BA DEC V5.7e TCF0 (3 ( 24 MB)
      (enet: 08-00-2b-0f-45-72)
      (SCSI = 7)

      4 5 ----- 6
      DEV PID VID REV SCSI DEV
      =====
      rz2 RZ55 (C) DEC DEC 0700 DIR
      rz4 RX23 (C) DEC DEC 0700 DIR
      tz1 SEQ

      dcache ( 64 KB), icache ( 64 KB)
      7 mem( 0): a0000000:a03ffffff (8 ( 4 MB)
      mem( 1): a0400000:a07ffffff ( 4 MB)
      mem( 2): a0800000:a0bffffff ( 4 MB)
      mem( 3): a0c00000:a0fffffff ( 4 MB)
      mem( 4): a1000000:a13ffffff ( 4 MB)
      mem( 5): a1400000:a17ffffff ( 4 MB)
  
```

- 1** Slot number.
- 2** Model code of the hardware item. For example, KN02-BA is the model code of the system module.
- 3** Module code. This code shows what kind of module is installed in the slot. Table 11-2, on page 11-14, explains the codes. The system module slot, base slot 3, always contains three modules: memory (MB), Ethernet (enet), and SCSI (SCSI).
The module code for memory shows the total amount of memory installed in the workstation. The 7 is the SCSI ID of the SCSI controller for the slot.
- 4** Device code with SCSI ID number of the device. For example, in the code rz4, 4 is the SCSI ID number.
- 5** Product ID. Some devices show a product ID in this column, but others do not.

- ⑥ 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.
- ⑦ Memory slot number.
- ⑧ Amount of memory in the slot. The amount can be 4 or 16 megabytes. All slots should have the same amount of memory, because all memory modules in a workstation should be the same size.

Table 11-2 shows 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 11-2. 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 that identifies the module for the network software. The long number after enet : in the parentheses is the Ethernet station address. For example, the Ethernet address for the module in slot 1 in the sample display is 08-00-2b-0f-45-72.
24 MB	Memory module. Base slot 3 always contains a memory module. The number indicates how many megabytes of memory are installed. In the sample display, the system unit has 24 megabytes of memory.

Table 11-3 shows the device codes and device descriptors of SCSI devices.

Table 11-3. SCSI Device Codes and Descriptors

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

d

>>d [*OPTIONS*] *RANGE value*

Options can be

-w Word (default)
-h Halfword
-b Byte
-S count Repeat deposit *count* times

Ranges can be

address Single address
address:address Start and end address
address#count Start address and count
range,range More than one range

The d, or deposit, command writes values to memory. Values can be stored as words, halfwords, or bytes. The default option is word. The command writes the specified *value* through the range of specified addresses. No intervening blanks are allowed in an address range. You can specify the address range as follows:

- A single address (*address*).
- A starting and an ending address (*address:address*).
- A starting address and the total number of addresses (*address#count*).

- Multiple address ranges separated by commas (*range,range*). Note that no space follows the comma in an address range.

The **-S** option causes a value to be stored repeatedly in memory. The value is stored *count* times at each address in the address range.

e

>>**e** [*OPTIONS*] *RANGE*

Options can be

-w	Word (default)
-h	Halfword
-b	Byte
-S <i>count</i>	Repeat examine <i>count</i> times
-x	Display in hexadecimal format
-o	Display in octal format
-u	Display in unsigned decimal format
-d	Display in decimal format
-c	Display as ASCII characters

Ranges can be

<i>address</i>	Single address
<i>address:address</i>	Start and end address
<i>address#count</i>	Start address and count
<i>range,range</i>	More than one range

The **e**, or examine, command examines the contents of memory. Memory can be examined as words, halfwords, or bytes. The default option is word. The **e** command examines values in the range of addresses specified. You can specify the address range as follows:

- A single address (*address*).
- A starting and an ending address (*address:address*).
- A starting address and the number of addresses (*address#count*).

- Multiple address ranges separated by commas (*range,range*). Note that no intervening space follows the comma in an address range.

You can choose how to display the memory data with the format options -x, -o, -u, -d, and -c. You can use more than one option, in which case the data is displayed in every format that you choose. If you do not indicate a format, the system displays the data in hexadecimal format.

The -S option fetches the contents of each address in the address range *count* times. The screen displays only the final value in each range.

erl

```
>>erl [-c]
```

The `erl` command displays the log of error messages. The system records error messages in a special error log buffer, and the `erl` command displays the contents of this buffer. If you specify -c, the buffer is cleared. The system stops recording error messages when the buffer is full and resumes when the buffer is cleared.

go

```
>>go [address]
```

The `go` command transfers control of the workstation to the specified address. If you do not specify an address, `go` uses the execution address returned by the last `boot -n` command. If the `boot -n` command has not been executed and no address is specified, the system ignores the `go` command.

init

```
>>init [#] [argument...]
```

The `init` command initializes module hardware. If you specify a slot number (#), the command initializes the modules in that slot only.

Arguments are specific to each module.

ls

```
>>ls [#]
```

The `ls` command displays a list of the files in a module ROM. If you do not specify a slot number (#), the command lists the files for all modules.

passwd

```
>>passwd [OPTIONS]
```

Options can be

- s** Set a new console password.
- c** Clear the console password.

Use the `passwd` command to enter, set, or clear your console password.

The console password keeps unauthorized people from using the console commands on your workstation. You do not need to use the password if security is not an issue in your workplace.

When you first set up your workstation, you do not need a console password. The only way that a console password can be required is if you choose to start using one.¹

To start using a console password, type **passwd -s** and press Return. The system displays a prompt (`pwd:`) asking you to type the password that you want to use. Type a word with at least six characters. You can use letters and numbers; the system recognizes the difference between uppercase and lowercase letters.

The system displays the `pwd:` prompt twice. Type the same password each time. For the sake of security, the screen does not display what you type, so type something that is easy to remember.

Once you choose a password, the system displays the restricted console prompt `R>` when you first start up your workstation.

¹ The console password is not the same as the passwords required by your worksystem software or networks. The console password protects your workstation hardware by controlling access to the console commands.

At this prompt, you can only boot your worksystem software or enter your console password.

- Boot your worksystem software. Type **boot** and press Return. This is the only boot command that you can use. It has no options or arguments. It uses the values that you set in the boot environment variable (see “Environment Variables”, on page 11-22). If you have not set the boot variable, the command does not work.
- Enter your console password. Type **passwd** and press Return. Then type your console password at the `pwd:` prompt. For the sake of security, the screen does not display what you type.

After you enter your console password, the prompt changes to the standard console prompt (`>>`), and you can use all the console commands that are described in this chapter.

To stop using your console password, type **passwd -c** at the standard console prompt and press Return. You will then have unrestricted access to the console commands.

printenv

```
>>printenv [env]
```

The `printenv` command displays the values of environment variables. If you specify the name of an environment variable, the command displays the value of only that variable. See “Environment Variables”, on page 11-22 for more information.

restart

```
>>restart
```

The `restart` command attempts to restart the worksystem software. This command relies on a restart facility in the worksystem software that you have to enable.

script

```
>>script scriptname
```

The `script` command allows you to write a short, temporary script, or small program, at the system console. After you write the script, you can run it with the `sh` command, or you can type the name *scriptname* of the script alone.

To write a script, type **script** and a name for the script. Then press Return. Then write the script line by line. When you are done, go to a new line and press Return.

setenv

```
>>setenv env value
```

The `setenv` command sets the value of an environment variable. Note that you must enclose the command in double quotation marks if *value* contains blank spaces. See “Environment Variables” on page 11-22 for more information.

sh

```
>>sh [OPTIONS] [#!/scriptname] [argument...]
```

Options can be

-e	Exit on error.
-b	Branch to script.
-v	Verbose; echo to console.
-S	Suppress script-not-found errors.
-l	Execute in a loop. (Note that this option is the letter “l,” not the number 1.)

The `sh`, or shell, command activates, or runs, a script. Replace # with the slot number of the module that contains the script.

If you specify a script name for *scriptname*, the script is used as the input. Otherwise, what you type at the console is the input, and a subshell is created. When you run a shell script, environment variable 0 is set to the script name, 1 is set to the first argument in the script, 2 is set to the second argument, and so on.

The `-e` option directs the shell to exit when an error occurs. Normally, the shell ignores errors. The `-b` option executes the script specified by *scriptname* instead of creating a subshell. The `-v` option causes the script to be echoed to the console when it is executed. The default option is no echo. The `-S` option suppresses any error message if the script is not found and causes the `sh` command to return a status that indicates success. The `-l` option causes a script to be executed continuously until a system reset occurs or you press Ctrl-c.

t

```
>>t [OPTIONS] #/testname [argument...]
```

Options can be

-l Execute in a loop. (Note that this option is the letter “l” and not the number 1.)

The `t`, or `test`, command runs module tests. Specify a test with `#/testname`, where `#` is the slot number and *testname* is a module-specific test.

The `-l` option makes the test run continuously until a system reset occurs or you press Ctrl-c.

If the `t` command is part of a script, the system console displays `#/testname` as each test is run.

To display the tests and test formats for a specific module, type `t #/?`, where `#` is the slot number of the module.

Type **test** to run the script that performs a thorough test of the entire system. Typing **test** is a shorthand way of typing **sh 3/test**. If you type **sh -l 3/test**, the test runs continuously.

unsetenv

```
>>unsetenv env
```

The `unsetenv` command deletes the value of an environment variable. See “Environment Variables” on page 11-22 for more information.

Environment Variables

Environment variables store system parameters and scripts and pass information to the operating system. Some environment variables stay in memory, but others are lost when you turn off the power.

Table 11-4 summarizes the console commands for setting environment variables. Table 11-5 lists the standard environment variables that you can set.

Table 11-4. Console Commands for Environment Variables

Command	Description
printenv	Displays the value of environment variables
setenv	Sets the value of an environment variable
unsetenv	Deletes the value of an environment variable

Table 11-5. Environment Variables Set by the User

boot ¹	Specifies arguments for the boot command (see page 11-9).
console ¹	<p>Chooses the system console. You normally do not set this variable, instead leaving your monitor and keyboard set as the system console. This “blank” setting and any setting other than s also select autoconfiguration, which causes the system module to scan the rest of the hardware on the workstation so that the module can use the hardware correctly. Autoconfiguration makes the monitor in the lowest-numbered option slot the system console. If the option slots do not contain any graphics modules, communications connector 3 is the system console slot.</p> <p>To display the language menu on the system console, set console to zero.</p> <p>If more than one monitor is connected to the system unit, the monitor in the lowest-numbered slot is the system console.</p>

¹These environment variables stay in memory until you delete them.

(continued on next page)

Table 11-5 (Cont.). Environment Variables Set by the User

haltaction ¹	Specifies what happens when you press the halt button or turn on the power: <ul style="list-style-type: none">b Boots the worksystem software, as specified by the boot environment variable.h Halts the worksystem software and displays the console prompt.r Restarts the worksystem software. If the restart fails, boots the software.
more	Specifies the greatest number of lines of text that can fit on the screen at one time. When text scrolls on the screen, the system stops the scrolling at the number of lines that you set. If you set the number to zero, the text scrolls continuously.
testaction ¹	Controls the power-up self-test: <ul style="list-style-type: none">t Specifies a thorough (but slow) testing of the system.q Specifies a quicker but less thorough test.m Specifies manufacturing tests. You should not use this setting.
#	The number of the module that contains the current script. If no script is active, the system module is assumed.

¹These environment variables stay in memory until you delete them.

There are other environmental variables. Some, like **oconsole**, should not be changed. Others can be set as implementation-specific side effects of various bootstrap and test procedures.

Part IV

Appendixes

A

Equipment Specifications

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

- DECstation 5000 Model 100 Series system unit
- VR262 monitor
- VR297 monitor
- VR299 monitor
- VR319-CA and VR319-C4 monitor
- VR319-DA and VR319-D4 monitor
- VRT16 monitor
- VRT19 monitor
- LK201 keyboard
- LK401 keyboard
- VSXXX-GA mouse
- VSXXX-AB tablet
- BA42 expansion box
- RZ23 hard disk drive
- RZ23L hard disk drive
- RZ24 hard disk drive
- RZ25 hard disk drive
- RZ55 hard disk drive
- RZ56 hard disk drive

- RZ57 hard disk drive
- TK50Z tape drive
- TZ30 tape drive
- TZK10 QIC tape drive
- TLZ04 cassette tape drive
- RRD40 optical compact disc drive
- RRD42 optical compact disc drive
- RX23 diskette drive
- RX33 diskette drive

DECstation 5000 Model 100 Series System Unit Equipment Specifications

Table A-1. System Unit Description

Weight	12.70 to 22.70 kg (28.00 to 50.00 lb)
Height	10.16 cm (4.00 in)
Width	51.03 cm (20.09 in)
Depth	43.48 cm (17.12 in)
Input voltage	Auto adjust 100–120 or 220–240 Vac
Input current	4.2 A at 100–120 Vac 2.3 A at 220–240 Vac
Power	
– Frequency	50 to 60 Hz
– Heat dissipation	302 watts maximum

Table A-2. System Unit Operating Conditions

Temperature range ¹	10°C to 40°C (50°F to 104°F)
Temperature change rate	11°C (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	2,400 m (8,000 ft) maximum

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

Table A-3. System Unit Nonoperating Conditions

Temperature range	–40°C to 66°C (–40°F to 151°F)
Relative humidity	10% to 95% noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	4,900 m (16,000 ft) maximum

VR262 Monitor Equipment Specifications

Table A-4. VR262 Monitor Description

Weight	19.05 kg (42.00 lb)
Height	39.37 cm (15.50 in)
Width	45.47 cm (17.90 in)
Depth	39.12 cm (15.40 in)
External controls, switches, and indicators	Brightness Contrast Power switch Power indicator
Cathode-ray tube (CRT)	483 mm (19 in) diagonal Monochrome Paper-white phosphor High-efficiency antiglare treatment
Display characteristics	1,024 pixels horizontal by 864 pixels vertical Approximate picture size 334 by 282 mm Maximum brightness no less than 30 footlamberts (fl)
Video input	
– Termination	75 ohms BNC
– Amplitude	1.0 Vpp composite video
Horizontal rate timing	
– Active video time	14.8 μ s
– Back porch	1,690 ns
– Blanking interval	3.70 μ s maximum
– Frequency	54.054 kHz
– Front porch	160 ns
– Horizontal period	18.5 μ s
– Pixels displayed	1,024
– Sync pulse	1,850 ns
Vertical rate timing	
– Active video time	16.0 ms
– Blanking interval	37 horizontal lines maximum

(continued on next page)

Table A-4 (Cont.). VR262 Monitor Description

– Frequency	60 Hz
– Front porch	0 horizontal lines
– Lines displayed	864
– Sync pulse	3 horizontal lines
– Vertical period	16.67 ms
Power	
– Power supply type	Transistor, switch mode ac to dc converter
– ac input	100–120 Vac or 220–240 Vac Switch selectable
– Frequency	47 to 63 Hz
– Power consumption	Approximately 65 watts
Fuse	
	100–120 Vac: 1 A 6.35 by 31.8 mm (0.25 by 1.25 in) slow blow (Digital part number 90-07212-00)
	220 to 240 Vac: 1 A 5 by 20 mm time lag (Digital part number 12-19283-00)

Table A-5. VR262 Monitor Operating Conditions

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

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

Table A-6. VR262 Monitor Nonoperating Conditions

Temperature range	–40°C to 66°C (–40°F to 151°F)
Relative humidity	10% to 95% noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	4,900 m (16,000 ft) maximum

VR297 Monitor Equipment Specifications

Table A-7. VR297 Monitor Description

Weight	29.03 kg (64.00 lb)
Height	40.64 cm (16.00 in)
Width	40.64 cm (16.00 in)
Depth	45.07 cm (17.75 in)
External controls, switches, and indicators	Contrast Power switch Power indicator V-STAT, H-STAT, V-CENT
Tilt range	-5° to 15°
Swivel range	±60°
Cathode-ray tube (CRT)	432 mm (17 in) diagonal Color 0.26 mm phosphor pitch aperture grill 90° deflection High-efficiency antiglare treatment
Display characteristics	1,024 pixels horizontal by 864 pixels vertical Maximum brightness no less than 30 footlamberts (fl)
Video input	
– Termination	75 ohms BNC
– Amplitude	Red: 0.7 Vpp Green (with sync): 1 Vpp Blue: 0.7 Vpp
Horizontal rate timing	
– Active video	14.8 μs
– Back porch	1,680 ns
– Blanking interval	3.70 μs
– Frequency	54.054 kHz
– Front porch	160 ns
– Sync pulse	1.850 μs
Vertical rate timing	
– Active video	16.0 ms

(continued on next page)

Table A-7 (Cont.). VR297 Monitor Description

– Blanking interval	37 lines
– Frequency	60 Hz
– Front porch	0 lines
– Sync pulse	3 lines
– Vertical period	16.67 ms
Video rate	
– Pixel frequency	69.189 MHz
– Pixel period	14.45 ns nominal
Power	
– ac input	110–120 or 220–240 Vac Switch selectable
– Frequency	47 to 63 Hz
Fuse	100–120 V for VR297-DA Domestic 220–240 V for VR297-D3 Northern Hemisphere

Table A-8. VR297 Monitor Operating Conditions

Temperature range ¹	10°C to 40°C (50°F to 104°F)
Relative humidity	10% to 90% noncondensing
Maximum wet-bulb temperature	28°C (82°F)
Minimum dew-point temperature	2°C (36°F)
Altitude	2600 m (10,000 ft) maximum

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

Table A-9. VR297 Monitor Nonoperating Conditions

Temperature range	–40°C to 66°C (–40°F to 151°F)
Relative humidity	10% to 95% noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	13,000 m (50,000 ft) maximum

VR299 Monitor Equipment Specifications

Table A-10. VR299 Monitor Description

Weight	31.75 kg (70.00 lbs)
Height	46.99 cm (18.50 in)
Width	50.55 cm (19.90 in)
Depth	52.58 cm (20.70 in)
External controls, switches, and indicators	Brightness Contrast Degauss Power switch Power indicator Voltage selector switch
Swivel range	$\pm 120^\circ$
Tilt range	-5° to $+15^\circ$
Cathode-ray tube (CRT)	Color 508 mm (20 in) diagonal Medium persistence P22 RGB phosphor 0.32 mm pitch shadow mask High-efficiency antiglare treatment
Display characteristics	1,024 pixels horizontal by 864 pixels vertical Approximate picture size 326 by 275 mm Contrast 35 footlamberts (fl) maximum
Video input	
– Termination	75 ohms BNC
– Amplitude	Red: 0.7 Vpp Green (with sync): 1 Vpp Blue: 0.7 Vpp
Horizontal rate timing	
– Active video time	14.8 μ s
– Back porch	1,680 ns
– Blanking interval	3.69 μ s maximum
– Frequency timing	54.054 kHz
– Front porch	159 ns
– Horizontal period	18.5 μ s

(continued on next page)

Table A-10 (Cont.). VR299 Monitor Description

– Sync pulse	1,850 ns
Vertical rate timing	
– Active video time	16.0 ms
– Blanking interval	37 horizontal lines
– Frequency	60 Hz
– Front porch	0 horizontal lines
– Sync pulse	3 horizontal lines
– Vertical period	16.67 ms
Power	
– ac input voltage	Switch selectable 88–132 Vac or 185–254 Vac
– Frequency	47 to 63 Hz
– Power consumption	150 watts maximum
Fuse	
	3.2 A for 120 V system 1.6 A for 240 V system

Table A-11. VR299 Monitor Operating Conditions

Temperature range ¹	10°C to 40°C (50° to 104°F)
Relative humidity	10% to 95% noncondensing
Maximum wet-bulb temperature	32°C (89°F)
Minimum dew-point temperature	2°C (36°F)
Altitude	2,400 m (8,000 ft) maximum

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

Table A-12. VR299 Monitor Nonoperating Conditions

Temperature range	–40°C to 66°C (–40°F to 150°F)
Relative humidity	10% to 95% noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	4,900 m (16,000 ft) maximum

VR319-CA and VR319-C4 Monitor Equipment Specifications

Table A-13. VR319-CA and VR319-C4 Monitor Description

Weight	22.68 kg (50.00 lb)
Height	45.72 cm (18.00 in)
Width	49.55 cm (19.50 in)
Depth	40.13 cm (15.80 in)
External controls, switches, and indicators	Brightness Contrast Degauss Power switch Power indicator Rotation H-center V-center
Tilt range	5° to 15°
Swivel range	±90°
Cathode-ray tube (CRT)	483 mm (19 in) diagonal Monochrome High resolution Paper-white phosphor High-efficiency antiglare treatment
Display characteristics	1280 pixels horizontal by 1024 lines vertical Approximate picture size 342 by 273 mm Maximum brightness no less than 30 footlamberts (fl)
Video input	
– Termination	75 ohms BNC
– Amplitude	1.0 Vpp composite video
Refresh rate	66 Hz Factory or field service configurable
Horizontal rate timing	
– Active video time	10.6806 μ s
– Back porch	1.8691 ns
– Blanking interval	3.4712 μ s
– Frequency	70.662 kHz

(continued on next page)

Table A-13 (Cont.). VR319-CA and VR319-C4 Monitor Description

– Front porch	0.2670 ns
– Horizontal period	14.1519 μ s
– Pixels displayed	10.6806
– Sync pulse	1.3351 ns
Vertical rate timing	
– Active video time	14.4915 μ s
– Back porch	0.467011 ns
– Blanking interval	0.551922 μ s
– Front porch	0.042455 ns
– Horizontal period	15.0434 μ s
– Lines displayed	14.4915
– Sync pulse	0.042455 ns
Power	
– Power supply type	Switch mode ac to dc converter
– ac input	Automatic voltage select
– Frequency	47 to 63 Hz
– Power consumption	Approximately 123 watts
Fuse	
	250 V: 5 A
	6.35 by 31.8 mm (0.25 by 1.25 in) slow blow

Table A-14. VR319-CA and VR319-C4 Monitor Operating Conditions

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

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

Table A-15. VR319-CA and VR319-C4 Monitor Nonoperating Conditions

Temperature range	–40°C to 66°C (–40°F to 151°F)
Relative humidity	10% to 95% noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	4,900 m (16,000 ft) maximum

VR319-DA and VR319-D4 Monitor Equipment Specifications

Table A-16. VR319-DA and VR319-D4 Monitor Description

Weight	22.68 kg (50.00 lb)
Height	45.72 cm (18.00 in)
Width	49.55 cm (19.50 in)
Depth	40.13 cm (15.80 in)
External controls, switches, and indicators	Brightness Contrast Degauss Power switch Power indicator Rotation H-center V-center
Tilt range	5° to 15°
Swivel range	±90°
Cathode-ray tube (CRT)	483 mm (19 in) diagonal Monochrome High resolution Paper-white phosphor High-efficiency antiglare treatment
Display characteristics	1280 pixels horizontal by 1024 lines vertical Approximate picture size 342 by 273 mm Maximum brightness no less than 30 footlamberts (fl)
Video input	
– Termination	75 ohms BNC
– Amplitude	1.0 Vpp composite video
Refresh rate	72 Hz Factory or field service configurable
Horizontal rate timing	
– Active video time	9.7853 μ s
– Back porch	1.7124 ns
– Blanking interval	3.1802 μ s
– Frequency	77.173 kHz

(continued on next page)

Table A-16 (Cont.). VR319-DA and VR319-D4 Monitor Description

– Front porch	0.2446 ns
– Horizontal period	12.9579 μ s
– Pixels displayed	9.7853
– Sync pulse	1.2232 ns
Vertical rate timing	
– Active video time	13.2767 μ s
– Back porch	0.427864 ns
– Blanking interval	0.505658 μ s
– Front porch	0.038897 ns
– Horizontal period	13.7842 μ s
– Lines displayed	13.2767
– Sync pulse	0.038897 ns
Power	
– Power supply type	Switch mode ac to dc converter
– ac input	Automatic voltage select
– Frequency	47 to 63 Hz
– Power consumption	Approximately 123 watts
Fuse	250 V: 5 A 6.35 by 31.8 mm (0.25 by 1.25 in) slow blow

Table A-17. VR319-DA and VR319-D4 Monitor Operating Conditions

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

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

Table A-18. VR319-DA and VR319-D4 Monitor Nonoperating Conditions

Temperature range	–40°C to 66°C (–40°F to 151°F)
Relative humidity	10% to 95% noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	4,900 m (16,000 ft) maximum

VRT16-DA and VRT16-D4 Monitor Equipment Specifications

Table A-19. VRT16-DA and VRT16-D4 Monitor Description

Weight	25.00 kg (56.00 lb)
Height	40.90 cm (16.10 in)
Width	40.60 cm (16.00 in)
Depth	45.30 cm (17.80 in)
External controls, switches, and indicators	Brightness Contrast Power switch Power indicator V-CENT, H-STAT, V-STAT
Swivel range	$\pm 45^\circ$
Tilt range	-5° to $+15^\circ$
Cathode-ray tube (CRT)	432 mm (17 in) diagonal Trinitron aperture grill 0.25 mm triad pitch 90° deflection angle 3 color High-efficiency antiglare treatment
Display characteristics	1,280 by 1,024 pixels Maximum brightness no less than 30 footlamberts (fl)
Video input	
– Termination	75 ohms BNC
– Amplitude	Red: 0.7 Vpp Green (with sync): 1 Vpp Blue: 0.7 Vpp
Horizontal rate timing	
– Active video	10.6806 μ s
– Back porch	1,869.1 ns
– Blanking interval	3.4712 μ s
– Frequency	70.6621 kHz
– Front porch	267 ns
– Horizontal period	14.1518 μ s

(continued on next page)

Table A-19 (Cont.). VRT16-DA and VRT16-D4 Monitor Description

– Sync pulse	1,335.1 ns
Vertical rate timing	
– Active video	14.4915 ms
– Blanking interval	39 horizontal lines
– Frequency	66.4743 Hz
– Front porch	3 horizontal lines
– Sync pulse	3 horizontal lines
– Vertical period	15.0434 ms
Video rate	
– Pixel frequency	119.843 MHz
– Pixel period	8.3443 ns nominal
Power	
– ac input voltage	90–132 or 198–264 Vac Switch selectable
– Frequency	47 to 63 Hz
– Power consumption	200 watts maximum

Table A-20. VRT16-DA and VRT16-D4 Monitor Operating Conditions

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

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

Table A-21. VRT16-DA and VRT16-D4 Monitor Nonoperating Conditions

Temperature range	–40°C to 60°C (–40°F to 145°F)
Relative humidity	10% to 95%
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	12,780 m (50,000 ft) maximum

VRT19-DA and VRT19-D4 Monitor Equipment Specifications

Table A-22. VRT19-DA and VRT19-D4 Monitor Description

Weight	34.02 kg (75.00 lb)
Height	47.55 cm (18.72 in)
Width	49.94 cm (19.66 in)
Depth	46.96 cm (18.49 in)
External controls, switches, and indicators	Brightness Contrast Power switch Power indicator V-CENT, H-STAT, V-STAT
Swivel range	$\pm 45^\circ$
Tilt range	-5° to $+15^\circ$
Cathode-ray tube (CRT)	508 mm (20 in) diagonal Trinitron aperture grill 0.31 mm triad pitch 90° deflection angle 3 color High-efficiency antiglare treatment
Display characteristics	1,280 by 1,024 pixels Maximum brightness no less than 30 footlamberts (fl)
Video input	
– Termination	75 ohms BNC
– Amplitude	Red: 0.7 Vpp Green (with sync): 1 Vpp Blue: 0.7 Vpp
Horizontal rate timing	
– Active video	10.6806 μ s
– Back porch	1,869.1 ns
– Blanking interval	3.4712 μ s
– Frequency	70.6621 kHz
– Front porch	267 ns
– Horizontal period	14.518 μ s

(continued on next page)

Table A-22 (Cont.). VRT19-DA and VRT19-D4 Monitor Description

– Sync pulse	1,335.1 ns
Vertical rate timing	
– Active video	14.4915 ms
– Blanking interval	39 horizontal lines
– Frequency	66.4743 Hz
– Front porch	3 horizontal lines
– Sync pulse	3 horizontal lines
– Vertical period	15.0434 ms
Power	
– ac input voltage	90–132 to 198–264 Vac
– Frequency	47 to 63 Hz
– Power consumption	220 watts maximum

Table A-23. VRT19-DA and VRT19-D4 Monitor Operating Conditions

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

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

Table A-24. VRT19-DA and VRT19-D4 Monitor Nonoperating Conditions

Temperature range	–40°C to 60°C (–40°F to 145°F)
Relative humidity	10% to 95%
Maximum wet-bulb temperature	46°C (115°F) packaged
Minimum dew-point temperature	2°C (36°F)
Altitude	12,780 m (50,000 ft) maximum

LK201 Keyboard Equipment Specifications

Table A-25. LK201 Keyboard Description

Weight	2.04 kg (4.50 lb)
Height	5.08 cm (2.00 in)
Width	53.34 cm (21.00 in)
Depth	17.15 cm (6.75 in)
Number of keys	105
Number of indicators	4 status LEDs
Language variations	15 Software selectable (keycaps required)
Cable	1.8 m (6 ft) uncoiled length detachable 4-pin mmj connector at both ends
Baud rate	4800
Electrical interface	EIA RS 423
Power consumption	4.2 watts maximum
Power input	11.8 V \pm 6% at 350 ma
Volume control	8 levels, plus off Maximum 65 dba 1 ft above keyboard
Keystroke timing	20 ms minimum

Table A-26. LK201 Keyboard Operating Conditions

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

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

Table A-27. LK201 Keyboard Nonoperating Conditions

Temperature range	–40°C to 66°C (–40°F to 151°F)
Relative humidity	10% to 95%, noncondensing
Maximum wet-bulb temperature	46°C (115°F), packaged
Altitude	4,900 m (16,000 ft) maximum

LK401-AA Keyboard Equipment Specifications

Table A-28. LK401-AA Keyboard Description

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

Table A-29. LK401-AA Keyboard Operating Conditions

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

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

Table A-30. LK401-AA Keyboard Nonoperating Conditions

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

VSXXX-GA Mouse Equipment Specifications

Table A-31. VSXXX-GA Mouse Description

Weight	97 g (3.4 oz) without cable
Height	32.5 mm (1.28 in)
Diameter	60.9 mm (2.4 in)
Buttons	3
Cable length	1.5 m (5 ft) shielded, 5 conductors and terminals in a 7-pin micro-DIN-type connector (male)
Accuracy	±3% 0 to 25 cm (0 to 10 in) per second in any direction ±15% 25 to 50 cm (10 to 20 in) per second in any direction ±30% 50 to 75 cm (20 to 30 in) per second in any direction
Baud rate	4800
Data format	Delta mode
Electrical interfaces	RS-232 or TTL
Operating modes	Incremental or polling
Power requirements	+5 V ±5% at 130 ma –8 to –13 V at 20 ma (RS-232 mode)
Resolution	79 counts per cm (200 counts per in)
Tracking speed	76 cm (30 in) per second
Tracking rate	In incremental mode: 55 reports per second In polling mode: up to 95 reports per second

Table A-32. VSXXX-GA Mouse Operating Conditions

Temperature range ¹	10°C to 40°C (50°F to 104°F)
Relative humidity	10% to 90% noncondensing
Maximum wet-bulb temperature	18°C (64°F)
Minimum dew-point temperature	2°C (36°F)
Altitude	3,050 m (10,000 ft) maximum

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

Table A-33. VSXXX-GA Mouse Nonoperating Conditions

Temperature range	–40°C to 66°C (–40°F to 151°F)
Relative humidity	5% to 95% noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	7,600 m (25,000 ft) maximum

VSXXX-AB Tablet Equipment Specifications

Table A-34. VSXXX-AB Tablet Description

Weight	3.18 kg (7.00 lb)
Height	20.32 cm (8.00 in)
Width	40.64 cm (16.00 in)
Depth	41.15 cm (16.20 in)
Puck	4 buttons
Stylus	2 buttons
Cable length	1.5 m (5 ft), terminated in a 7-pin micro-DIN-type connector
Output connector (power and data)	7-pin micro-DIN (pronged)
Mating connector	7-pin micro-DIN (prongless)
Active area	280 mm by 280 mm (11 in by 11 in)
Baud rate	4800 or 9600 baud (software selectable)
Electrical interfaces	Serial, asynchronous, full-duplex EIA RS-232-C signal levels
Incremental	Position reports generated when cursor is in motion and when pushbuttons are pressed or released
Operating modes	Incremental and polling
Power requirements	+12 V dc $\pm 10\%$ at 0.3 A
Proximity (nominal)	1.27 cm (5 in) cursor
Resolution	79 counts per cm (200 counts per in) 0.63 cm (0.25 in) stylus
Remote request	X-Y coordinate update and proximity report when polled by host
Tracking rates	
– In incremental mode	55, 72, or 120 reports per second
– In polling mode	50 reports per second at 4800 baud 80 reports per second at 9600 baud

Table A-35. VSXXX-AB Tablet Operating Conditions

Temperature range ¹	10°C to 40°C (50°F to 104°F)
Relative humidity	20% to 80% 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 1,000 meter (1.0°F for each 1,000 ft) increase in altitude.

Table A-36. VSXXX-AB Tablet Nonoperating Conditions

Temperature range	-40°C to 66°C (-40°F to 151°F)
Relative humidity	10% to 95% noncondensing
Maximum wet bulb temperature	46°C (115°F) packaged
Altitude	4900 m (16,000 ft) maximum

BA42 Storage Expansion Box Equipment Specifications

Table A-37. BA42 Storage Expansion Box Description

Weight	17.24 kg (38.00 lb) maximum
Height	10.16 cm (4.00 in)
Width	46.02 cm (18.12 in)
Depth	40.64 cm (16.00 in)
Input voltage	Automatically adjusting ac input 120–240 Vac
Frequency range	47 to 63 Hz
Power	90 watts maximum

Table A-38. BA42 Storage Expansion Box Operating Conditions

Temperature range ¹	10°C to 40°C (50°F to 104°F)
Temperature change rate	11°C (20°F) per hour maximum
Relative humidity	20% to 80% 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 1,000 meter (1.0°F for each 1,000 ft) increase in altitude.

Table A-39. BA42 Storage Expansion Box Nonoperating Conditions

Temperature range	5°C to 50°C (41°F to 122°F)
Relative humidity	10% to 95% noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	4900 m (16,000 ft) maximum

RZ23 SCSI Hard Disk Drive Equipment Specifications

Table A-40. RZ23 SCSI Hard Disk Drive Description

Internal drive	
– Weight	0.83 kg (1.82 lb)
– Height	42.16 cm (1.66 in)
– Width	10.16 cm (4.00 in)
– Depth	14.61 cm (5.75 in)
Capacity	
– Bytes per drive	104 MB
– Blocks per drive	204,864
– Block size	512 bytes
Data transfer rate	
– To and from media	1.25 MB per second
– To and from buffer	1.66 MB per second
Seek time	
	8 ms track-to-track
	25 ms average
	45 ms maximum
Average latency	8.4 ms
Interface	SCSI

Table A-41. RZ23 SCSI Hard Disk Drive Operating Conditions

Temperature range ¹	10°C to 60°C (50°F to 140°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 3000 m (–1000 to 10,000 ft)

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

Table A-42. RZ23 SCSI Hard Disk Drive Nonoperating Conditions

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

RZ23L SCSI Hard Disk Drive Equipment Specifications

Table A-43. RZ23L SCSI Hard Disk Drive Description

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

Table A-44. RZ23L SCSI Hard Disk Drive Operating Conditions

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

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

Table A-45. RZ23L SCSI Hard Disk Drive Nonoperating Conditions

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

RZ24 SCSI Hard Disk Drive Equipment Specifications

Table A-46. RZ24 SCSI Hard Disk Drive Description

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

Table A-47. RZ24 SCSI Hard Disk Drive Operating Conditions

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

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

Table A-48. RZ24 SCSI Hard Disk Drive Nonoperating Conditions

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

RZ25 SCSI Hard Disk Drive Equipment Specifications

Table A-49. RZ25 SCSI Hard Disk Drive Description

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

Table A-50. RZ25 SCSI Hard Disk Drive Operating Conditions

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

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

Table A-51. RZ25 SCSI Hard Disk Drive Nonoperating Conditions

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

RZ55 SCSI Hard Disk Drive Equipment Specifications

Table A-52. RZ55 SCSI Hard Disk Drive Description

Expansion box	
– Weight	13.15 kg (29.00 lb)
– Height	13.97 cm (5.50 in)
– Width	32.39 cm (12.75 in)
– Depth	28.55 cm (11.25 in)
Internal drive	
– Weight	3.81 kg (8.40 lb)
– Height	8.26 cm (3.25 in)
– Width	14.61 cm (5.75 in)
– Depth	20.83 cm (8.20 in)
Capacity	
– Bytes per drive	332.3 MB
– Blocks per drive	649,040
– Block size	512 bytes
Data transfer rate	
– Bus asynchronous mode	1.5 MB per second
– Bus synchronous mode	4 MB per second
– To and from media	1.25 MB per second
Seek time	
	4 ms track-to-track
	16 ms average
	35 ms maximum
Average latency	8.3 ms
Interface	SCSI

Table A-53. RZ55 SCSI Hard Disk Drive Operating Conditions

Temperature range ¹	10°C to 55°C (50°F to 131°F)
Temperature change rate	11°C (20°F) per hour, maximum
Relative humidity	20% to 80% noncondensing
Maximum wet-bulb temperature	25.6°C (78°F)
Minimum dew-point temperature	2°C (36°F)
Altitude	–300 to 4600 m (–1000 ft to 15,000 ft)

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

Table A-54. RZ55 SCSI Hard Disk Drive Nonoperating Conditions

Temperature range	–40°C to 66°C (–40°F to 151°F)
Temperature change rate	20°C (36°F) per hour, maximum
Relative humidity	20% to 95% packaged
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	–300 to 12,200 m (–1000 ft to 40,000 ft)

RZ56 SCSI Hard Disk Drive Equipment Specifications

Table A-55. RZ56 SCSI Hard Disk Drive Description

Internal drive	
Weight	3.81 kg (8.40 lb)
Height	8.26 cm (3.25 in)
Width	14.61 cm (5.75 in)
Depth	20.32 cm (8.00 in)
Capacity	
– Bytes per drive	655.17 MB
– Blocks per drive	1,299,174
– Block size	512 bytes
Data transfer rate	
– Bus asynchronous mode	1.6 MB per second
– Bus synchronous mode	4.0 MB per second
– To and from media	1.875 MB per second
Seek time	
	4 ms track-to-track
	16 ms average
	35 ms maximum
Average latency	8.3 ms
Interface	SCSI

Table A-56. RZ56 SCSI Hard Disk Drive Operating Conditions

Temperature range ¹	10°C to 55°C (50°F to 131°F)
Temperature change rate	11°C (20°F) per hour, maximum
Relative humidity	8% to 80% noncondensing
Maximum wet-bulb temperature	25.6°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 1,000 meter (1.0°F for each 1,000 ft) increase in altitude.

Table A-57. RZ56 SCSI Hard Disk Drive Nonoperating Conditions

Temperature range	–40°C to 66°C (–40°F to 151°F)
Temperature change rate	20°C (36°F) per hour, maximum
Relative humidity	8% to 95% packaged
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	–300 to 12,200 m (–1000 to 40,000 ft)

RZ57 SCSI Hard Disk Drive Equipment Specifications

Table A-58. RZ57 SCSI Hard Disk Drive Description

Internal drive	
– Weight	3.81 kg (8.40 lb)
– Height	8.26 cm (3.25 in)
– Width	14.61 cm (5.75 in)
– Depth	20.32 cm (8.00 in)
Capacity	
– Bytes per drive	1.0 gigabytes
– Blocks per drive	1,954,050
– Block size	512 bytes
Data transfer rate	
– Bus asynchronous mode	1.6 MB per second
– Bus synchronous mode	4.0 MB per second
– To and from media	2.5 MB per second
Seek time	
	4 ms track-to-track
	14.5 ms average
	33 ms maximum
Average latency	8.3 ms
Interface	SCSI

Table A-59. RZ57 SCSI Hard Disk Drive Operating Conditions

Temperature range ¹	10°C to 55°C (50°F to 131°F)
Temperature change rate	11°C (20°F) per hour, maximum
Relative humidity	8% to 80%, noncondensing
Maximum wet-bulb temperature	26°C (78°F)
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 1,000 meter (1.0°F for each 1,000 ft) increase in altitude.

Table A-60. RZ57 SCSI Hard Disk Drive Nonoperating Conditions

Temperature range	–40°C to 66°C (–40°F to 151°F)
Temperature change rate	20°C (36°F) per hour, maximum
Relative humidity	8% to 95%, packaged
Maximum wet-bulb temperature	46°C (115°F), packaged
Altitude	–300 to 12,200 m (–1000 to 40,000 ft)

TK50Z Tape Drive Equipment Specifications

Table A-61. TK50Z Tape Drive Description

Expansion box	
– Weight	12.70 kg (28.00 lb)
– Height	13.97 cm (5.50 in)
– Width	32.39 cm (12.75 in)
– Depth	28.58 cm (11.25 in)
Bit density	6,667 bits per in
Cartridge capacity	95 MB approximate
Frequency	50 to 60 Hz
Heat dissipation	32 watts maximum
Input current	2.4 A: 100 to 120 Vac 1.3 A: 220 to 240 Vac
Media	12.77 mm (0.5 in), 183 m (600 ft) long magnetic tape
Mode of operation	Streaming
Number of tracks	22
Power	160 watts
Track format	Serpentine
Data transfer rate	360 Kbits per second (45 KB per second)
Tape speed	75 in per second

Table A-62. TK50Z Tape Drive Operating Conditions

Temperature range ¹	10°C to 40°C (50°F to 104°F)
Temperature change rate	11°C (20°F) per hour, maximum
Relative humidity	10% to 80% noncondensing
Maximum wet-bulb temperature	28°C (82°F)
Minimum dew-point temperature	2°C (36°F)
Altitude	2,400 m (8,000 ft) maximum

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

Table A-63. TK50Z Tape Drive Nonoperating Conditions

Temperature range	–30°C to 66°C (–22°F to 151°F)
Temperature change rate	20°C (36°F) per hour, maximum
Relative humidity	10% to 95% noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged
Altitude	9,140 m (30,000 ft) maximum

TZ30 Tape Drive Equipment Specifications

Table A-64. TZ30 Tape Drive Description

Internal drive	
– Weight	1.50 kg (3.31 lb)
– Height	4.14 cm (1.63 in)
– Width	14.48 cm (5.70 in)
– Depth	21.59 cm (8.50 in)
Bit density	2624 bits per cm (6667 bits per in)
Cartridge capacity	95 Mbytes, formatted (approximate)
Media	12.77 mm (0.5 in) unformatted magnetic tape
Mode of operation	Streaming
Number of tracks	22
Tape speed	190 cm per second (75 in per second)
Track format	Multiple track serpentine recording
Data transfer rate	62.5 Kbytes per second

Table A-65. TZ30 Tape Drive Operating Conditions

Temperature range ¹	10°C to 40°C (50°F to 104°F)
Temperature change rate	11°C (20°F) per hour, maximum
Relative humidity	20% to 80% noncondensing
Maximum wet-bulb temperature	25°C (77°F)
Minimum dew-point temperature	2°C (36°F)
Altitude	2400 m (8000 ft) maximum

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

Table A-66. TZ30 Tape 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	10% to 95%
Maximum wet-bulb temperature	2°C (36°F)
Altitude	9100 m (30,000 ft) maximum

TZK10 QIC Tape Drive Equipment Specifications

Table A-67. TZK10 QIC Tape Drive Description

Internal drive	
– Weight	1.09 kg (2.40 lb)
– Height	4.39 cm (1.73 in)
– Width	14.61 cm (5.75 in)
– Depth	20.83 cm (8.20 in)
Cartridge capacity	320 MB (approximate) with DC6320 525 MB (approximate) with DC6525
Data density	16,000 bits per in
Drive interface	SCSI-2
Media	DC6320, DC6525, or Digital-approved equivalent
Mode of operation	Streaming
Number of tracks	26
Power consumption, normal	20 watts
Power consumption, peak	33 watts
Transfer rate	200 KB per second at average streaming mode 1.5 MB per second at SCSI maximum
Tape speed	305 cm (120 in) per second
Track format	Multiple track serpentine recording

Table A-68. TZK10 QIC Tape Drive Operating Conditions

Temperature range ¹	5°C to 40°C (50°F to 104°F)
Temperature change rate	11°C (20°F) per hour, maximum
Relative humidity	2% to 80% noncondensing
Maximum wet-bulb temperature	28°C (82°F)
Minimum dew-point temperature	2°C (36°F)
Altitude	3900 m (13,000 ft) maximum

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

Table A-69. TZK10 QIC Tape Drive Nonoperating Conditions

Temperature range	–30°C to 60°(–22°F to 151°F)
Temperature change rate	20°C (36°F) per hour, maximum
Relative humidity	10% to 95%
Maximum wet-bulb temperature	46°C (115°F)
Altitude	12,200 m (40,000 ft) maximum

TLZ04 Cassette Tape Drive Equipment Specifications

Table A-70. TLZ04 Cassette Tape Drive Description

Expansion box	
– Weight	7.7 kg (17.00 lb)
– Height	11.50 cm (4.50 in)
– Width	35.00 cm (14.00 in)
– Depth	30.00 cm (12.00 in)
Cassette capacity	1.2 gigabyte
Drive interface	SCSI
Media	TLZ04-CA cassette tape
Mode of operation	Streaming and start/stop
Power consumption	230 watts
Power requirements	1.6 A: 100 to 120 Vac 1.0 A: 200 to 240 Vac
Track format	Digital data storage (DDS)
Transfer rate	156 KB per second

Table A-71. TLZ04 Cassette Tape Drive Operating Conditions

Temperature range ¹	10°C to 40°C (50°F to 104°F)
Relative humidity	20% to 80% noncondensing
Altitude	0 m to 4600 m (0 to 15,000 ft)

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

Table A-72. TLZ04 Cassette Tape Drive Nonoperating Conditions

Temperature range	–40°C to 70°C (40°F to 158°F)
Relative humidity	5% to 95% noncondensing
Altitude	0 m to 15,200 m (0 to 50,000 ft)

RRD40 Compact Disc Drive Equipment Specifications

Table A-73. RRD40 Compact Disc Drive Description (Tabletop)

Weight	3.99 kg (8.80 lb)
Height	7.62 cm (3.00 in)
Width	23.19 cm (9.13 in)
Depth	27.94 cm (11.00 in)
Access time	Maximum 1,000 ms, including latency Average 500 ms
Average latency	155 ms at outer track 60 ms at inner track
Average transfer rate	175.2 KB per second
Capacity per disc	635 MB
Heat dissipation	14 watts (typical)
Initialization startup time	Less than 6 second
Interface	SCSI

Table A-74. RRD40 Compact Disc Drive Operating Conditions (Tabletop)

Temperature range ¹	10°C to 50°C (50°F to 122°F)
Relative humidity	10% to 80% noncondensing
Maximum wet-bulb temperature	28°C (82°F)
Minimum dew-point temperature	2°C (36°F)
Altitude	3400 m (11,150 ft) maximum

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

Table A-75. RRD40 Compact Disc Drive Nonoperating Conditions (Tabletop)

Temperature range	4°C to 70°C (40°F to 158°F)
Relative humidity	5% to 95% noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged
Minimum dew-point temperature	2°C (36°F)
Altitude	13,600 m (44,600 ft) maximum

RRD42 Compact Disc Drive Equipment Specifications

Table A-76. RRD42 Compact Disc Drive Description

RRD42-AA	
– Weight	1.3 kg (2.8 lb)
– Height	4.15 cm (1.63 in)
– Width	14.60 cm (5.75 in)
– Depth	20.81 cm (8.2 in)
Capacity	600 MB
Seek time	450 ms average (typical) 700 ms maximum (typical)
Burst transfer rate	1.5 MB per second
Sustained transfer rate	150 KB per second
Heat dissipation	14 watts (typical)
Initialization startup time	2.0 seconds maximum
Interface	SCSI

Table A-77. RRD42 Compact Disc Drive Operating Conditions

Temperature range ¹	5°C to 50°C (41°F to 122°F)
Relative humidity	10% to 90% noncondensing
Maximum wet-bulb temperature	28°C (82°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 1,000 meter (1.0°F for each 1,000 ft) increase in altitude.

Table A-78. RRD42 Compact Disc Drive Nonoperating Conditions

Temperature range	–30 °C to 55°C (–22°F to 131°F)
Relative humidity	10 to 90% packaged, noncondensing
Maximum wet-bulb temperature	46°C (115°F) packaged, noncondensing
Altitude	–300 to 12,200 m (–1000 to 40,000 ft)

RX23 Diskette Drive Equipment Specifications

Table A-79. RX23 Diskette Drive Description

Internal drive	
– Weight	0.48 kg (1.06 lb)
– Height	3.00 cm (1.18 in)
– Width	10.16 cm (4.00 in)
– Depth	15.01 cm (5.91 in)
Number of tracks	80
Number of heads	2
Step rate	3 ms per track
Diskette size	8.9 cm (3.5 in)
Recording surfaces per diskette	2
Sectors per track	9 double density 18 high density
Capacity	
– Bytes per drive	737 KB double density 1,474 KB high density
– Blocks per drive	1,440 double density 2,880 high density
– Block size	512 bytes
Data transfer rate	
– To and from media	250 Kbits per second double density 500 Kbits per second high density
Operating power	3.0 watts
Standby power	0.3 watts

Table A-80. RX23 Diskette Drive Operating Conditions

Temperature range ¹	5°C to 50°C (40°F to 122°F)
Temperature change rate	11°C (20°F) per hour, maximum
Relative humidity	8% to 80%, noncondensing
Maximum wet-bulb temperature	29°C (80°F)
Minimum dew-point temperature	2°C (36°F)
Altitude	–300 to 3060 m (–1,000 ft to 10,000 ft)

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

Table A-81. RX23 Diskette Drive Nonoperating Conditions

Temperature	–40°C to 66°C (–40°F to 151°F)
Temperature change rate	20°C (36°F) per hour, maximum
Relative humidity	5% to 95%, packaged
Maximum wet-bulb temperature	46°C (115°F), packaged
Altitude	–300 to 12,300 m (–1,000 ft to 40,000 ft)

RX33 Diskette Drive Equipment Specifications

Table A-82. RX33 Diskette Drive Description

Internal drive	
– Weight	1.10 kg (2.43 lb)
– Height	4.32 cm (1.70 in)
– Width	14.61 cm (5.75 in)
– Depth	20.32 cm (8.00 in)
Number of tracks	80
Number of heads	2
Track density	96 tracks per inch
Step rate	3 ms per track
Diskette size	13.13 cm (5.25 in)
Recording surfaces per diskette	2
Sectors per track	10 normal density 15 high density
Capacity	
– Bytes per drive	409 KB normal density 1200 KB high density
– Blocks per drive	800 normal density 2400 high density
– Block size	512 bytes
Data transfer rate	
– To and from media	250 Kbits per second normal density 500 Kbits per second high density
Operating power	4.1 watts
Standby power	1.5 watts

Table A-83. RX33 Diskette Drive Operating Conditions

Temperature range ¹	10°C to 46°C (50°F to 115°F)
Temperature change rate	11°C (20°F) per hour, maximum
Relative humidity	20% to 80% noncondensing
Maximum wet-bulb temperature	45°C (113°F)
Minimum dew-point temperature	2°C (36°F)
Altitude	2400 m (8000 ft) maximum

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

Table A-84. RX33 Diskette Drive Nonoperating Conditions

Temperature	–34°C to 60°C (–30°F) to 140°F)
Temperature change rate	20°C (36°F) per hour, maximum
Relative humidity	5% to 90%
Maximum wet-bulb temperature	45°C (113°F) packaged
Altitude	9100 m (30,000 ft) maximum

B

Part Numbers

This appendix lists the order numbers and part numbers for the components of the DECstation 5000 Model 100 Series workstations.

Table B-1. Basic Components

Item	Order Number
VR262, 19-inch monochrome monitor, 120 volts	VR262-AA
VR262, 19-inch monochrome monitor, 240 volts	VR262-A3
VR297, 16-inch color monitor, 120 volts	VR297-DA
VR297, 16-inch color monitor, 240 volts, Northern Hemisphere	VR297-D3
VR297, 16-inch color monitor, 240 volts, Southern Hemisphere	VR297-D4
VR299, 19-inch color monitor, 120 volts	VR299-DA
VR299, 19-inch color monitor, 240 volts, Northern Hemisphere	VR299-D3
VR299, 19-inch color monitor, 240 volts, Southern Hemisphere	VR299-D4
VR319, 19-inch monochrome monitor, 120/240 volts, Northern Hemisphere	VR319-DA
VR319, 19-inch gray scale monitor, 120/240 volts, Southern Hemisphere	VR319-CA
VR319, 19-inch monochrome monitor, 120/240 volts, Southern Hemisphere	VR319-D4
VR319, 19-inch grayscale monitor, 240 volts, Southern Hemisphere	VR319-C4
VRT16, 16-inch color monitor, 120/240 volts, Northern Hemisphere	VRT16-DA
VRT16, 16-inch color monitor, 120/240 volts, Southern Hemisphere	VRT16-D4
VRT19, 19-inch color monitor, 120 volts	VRT19-DA
VRT19, 19-inch color monitor, 240 volts, Northern Hemisphere	VRT19-D3
VRT19, 19-inch color monitor, 240 volts, Southern Hemisphere	VRT19-D4
RZ25 hard disk drive, 426 Mbytes	RZ25-E
RZ55 hard disk drive, 332 Mbytes	RZ55-E
- RZ55 hard disk drive PCB	29-27347-01
RZ56 hard disk drive, 665 Mbytes	RZ56-E
- RZ56 hard disk drive HDA and frame assembly	29-27890-01

(continued on next page)

Table B-1 (Cont.). Basic Components

Item	Order Number
- RZ56 hard disk drive PCB	29-27889-01
RZ57 hard disk drive, 1.2 Gbytes	RZ57-E
- RZ57 hard disk drive HDA and frame assembly	29-28158-01
- RZ57 hard disk drive PCB	29-28159-01
RRD40 optical compact disc drive, 600 Mbytes	RRD40-FA
TK50Z tape drive, 95 Mbytes, 120 volts	TK50Z-GA
TK50Z tape drive, 95 Mbytes, 240 volts	TK50Z-G3
TLZ04 tape drive, 1.2 Gbytes, 120 volts	TLZ04-DA
Mouse	VSXXX-GA
Keyboard	LK201
Keyboard	LK401

Table B-2. Cords, Cables, and Connectors

Item	Part Number	Order Number
Monitor-to-system-unit power cord (U.S.)	17-00442-26	—
System unit or expansion box power cord	17-00606-10	BN19P-K
Expansion-box-to-expansion-box cable	17-01351-04	BC19J-1E
Keyboard-mouse cable	17-02640-01	—
Serial line cable	—	BC16E-10
System-unit to expansion-box cable	17-02641-02	BC09D-06
ThickWire cable	17-01321-01	BNE4C-02
ThinWire cable (12 ft)	17-01241-12	BC16M-12
ThinWire LAN assembly kit	22-00112-01	BC16T-12
Video cable, color, for use with color frame buffer graphics module	17-02720-01	—
Video cable, monochrome	17-02878-01	—

Table B-3. Software Documentation

Item	Order Number
ULTRIX Media and Doc-TK50	QA-VV1AA-H5
<i>ULTRIX Guide to the Error Logger</i>	AE-ME95B-TE
<i>Technical Summary for RISC Processors</i>	AA-MM35A-TE
<i>Documentation Overview for RISC Processors</i>	AA-MM05A-TE

Table B-4. Hardware Documentation

Item	Order Number
DECstation 5000 Model 100 User Documentation Kit	EK-PM32A-DK
<i>DECstation 5000 Model 100 Hardware Installation Guide</i>	EK-PM32B-IN
<i>DECstation 5000 Model 100 Hardware Operator's Guide</i>	EK-PM32C-OG
<i>DECstation 5000 Model 100 Workstation Reference Card</i>	EK-PM32D-RC
<i>DECstation 5000 Model 100 Maintenance Guide</i>	EK-PM32G-MG
<i>DECstation 5000 Model 100 Field Service Pocket Guide</i>	EK-PM32E-PS
Components and Add-Ons	
<i>The RZ25 Disk Drive Service Manual</i>	EK-RZ25D-SV
<i>The RZ55 Disk Drive Service Manual</i>	EK-RZ55D-SV
<i>The RZ56 Disk Drive Subsystem Service Manual</i>	EK-RZ56D-SV
<i>The RZ57 Disk Drive Subsystem Service Manual</i>	EK-RZ57D-SV
<i>The RRD40 Owner's Manual</i>	EK-RRD40-OM
<i>The TLZ04 Cassette Tape Drive Owner's Manual</i>	EK-TLZ04-OM
<i>Installing and Using the LN03</i>	EK-0LN03-UG
<i>LN03 PLUS User Guide</i>	EK-LN03S-UG
<i>ScriptPrinter Installation Guide</i>	EK-LN03R-UG
<i>ScriptPrinter Operator Guide</i>	EK-LN03R-OG
<i>LA100 Letterwriter User Documentation Kit</i>	EK-LW100-UG
<i>Installing and Using the LA75 Companion Printer</i>	EK-0LA75-UG

(continued on next page)

Table B-4 (Cont.). Hardware Documentation

Item	Order Number
<i>Installing and Using the LJ250/252 Companion Color Printer</i>	EK-LJ250-DK
<i>TK50Z Tape Drive Subsystem Owner's Manual</i>	EK-LEP05-OM
<i>TK50Z User's Guide</i>	EK-OTK50-UG
<i>TK50Z Technical Manual</i>	EK-OTK50-TM

C

Connector Pin Assignments

This appendix lists pin assignments for the following connectors:

- SCSI cable connectors
- Keyboard and mouse or tablet
- Communications
- ThickWire Ethernet
- Power supply
- Modem loopback
- Ethernet loopback

It also provides a

- Summary of loopback connectors

Table C-1. SCSI Cable Connector Pin Assignments

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

Table C-2. Keyboard and Mouse or Tablet Connector Pin Assignments

Pin	Source	Signal	Description
1		GND	Ground
2		KEY.TX	Keyboard transmitted data
3	Keyboard	KEY.RX	Keyboard received data
4		+12V	Keyboard/tablet power
5		GND	Ground
6	Mouse/Tablet	MSE.RX	Mouse received data
7		MSE.TX	Mouse transmitted data
8		GND	Ground
9		GND	Ground
10		NC	
11		NC	
12		NC	
13		+5V	Mouse power
14		-12V	Mouse power
15		GND	Ground

Table C-3. Communications Connectors Pin Assignments

Pin	Source	Signal	CCITT ¹	EIA ²	Description
1		GND	102	AB	Signal ground
2	KNO2	TX	103	BA	Modem transmitted data
3	Modem/printer	RX	104	BB	Modem received data
4	KNO2	RTS	105	CA	Request to send
5	Modem/printer	CTS	106	CB	Clear to send
6	Modem/printer	DSR	107	CC	Data set ready
7		GND	102	AB	Signal ground
8	Modem/printer	CD	109	CF	Carrier detector
9					Unconnected
10					Unconnected
11					Unconnected
12					Unconnected
13					Unconnected
14					Unconnected
15					Unconnected
16					Unconnected
17					Unconnected
18					Unconnected
19					Unconnected
20	KNO2	DTR	108.2	CD	Data terminal ready
21					Unconnected
22	Modem/printer	RI	125	CE	Ring indicator
23					Unconnected
24					Unconnected
25					Unconnected

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

²Electronic Industries Association

Table C-4. 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

Table C-5. Power Supply Pin Assignments

Pin	Signal	Wire Gauge
1	+12 volt	18
2	Ground	18
3	-12 volt	22
4	Ground	22
5	POK	22
6	Warning	22

Table C-6. 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

Table C-7. 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 C-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	N/A
ThinWire T-connector	Standard	12-25869-01	H8223
ThinWire terminator	Standard	12-26318-01	H8225

D

Setting SCSI ID Switches

If two or more drives have been given the same SCSI ID numbers, you must reset the SCSI ID numbers on these drives, so that each drive will have its own unique SCSI ID number.

Depending on the type of drive you are installing, different methods may be required to set the SCSI ID switches that set the SCSI ID numbers. Some drives use toggle switches to set the SCSI ID numbers, and other drives use a system of pins and jumpers, as shown in Figures D-1 through D-7.

To set the SCSI ID numbers on your drives, you may need medium flat-blade and Phillips screwdrivers and small needle-nose pliers.

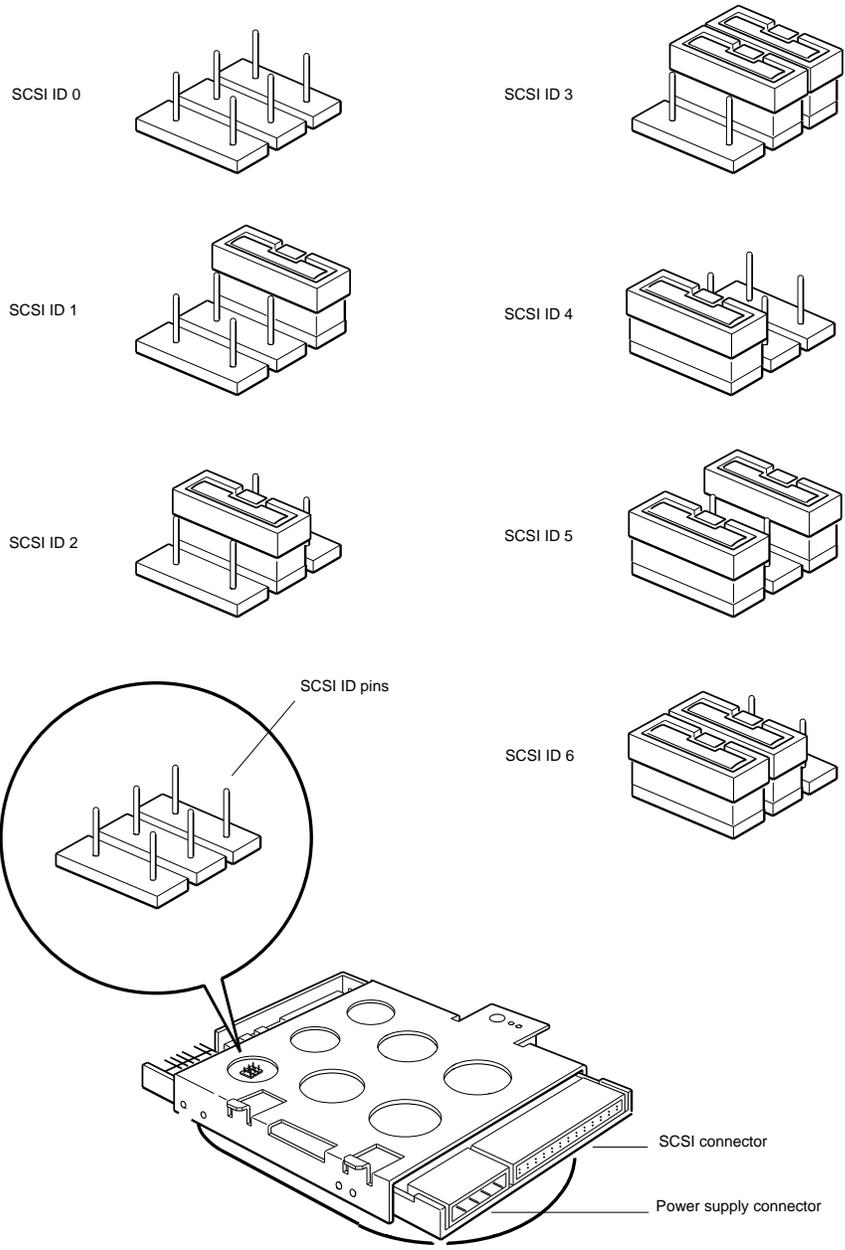
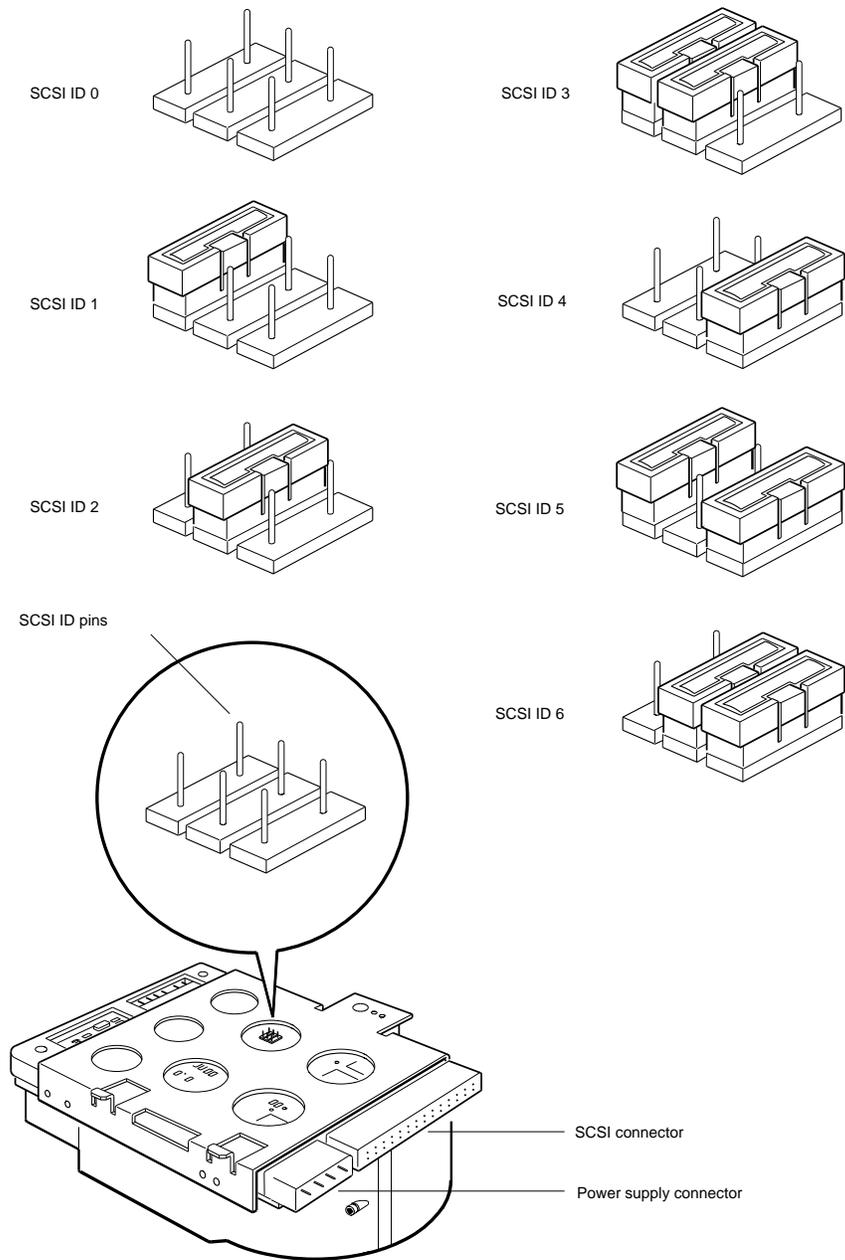
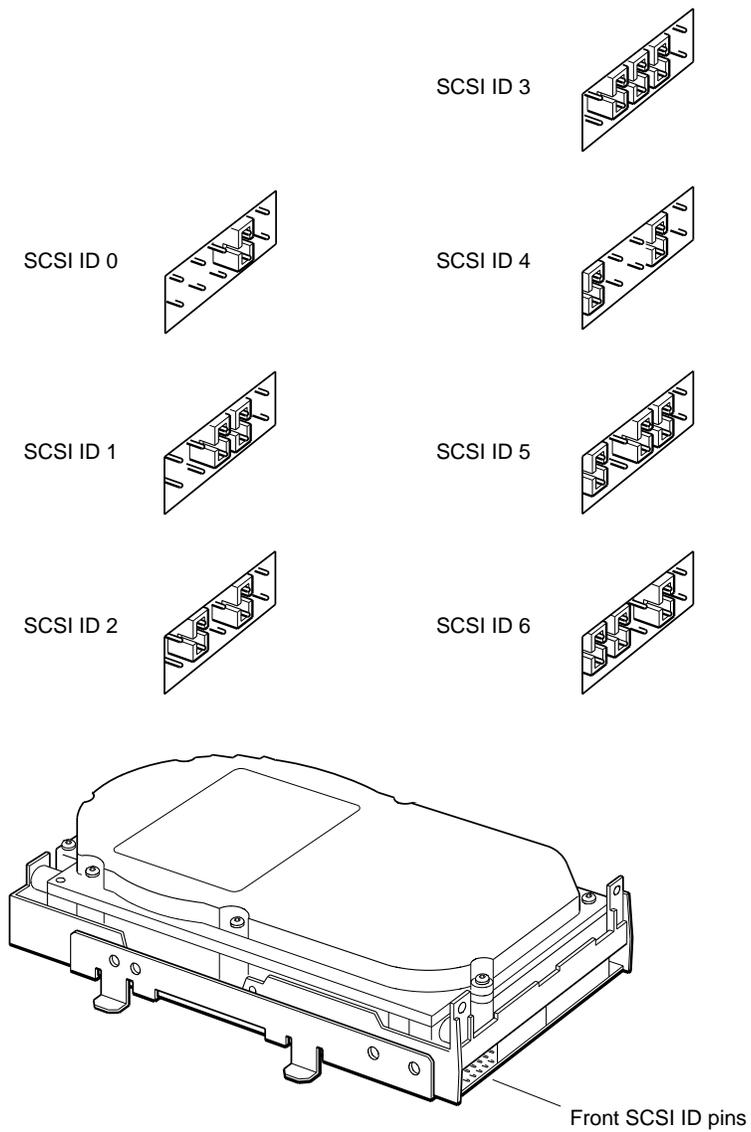


Figure D-1. Jumper settings for an RZ23L hard disk drive



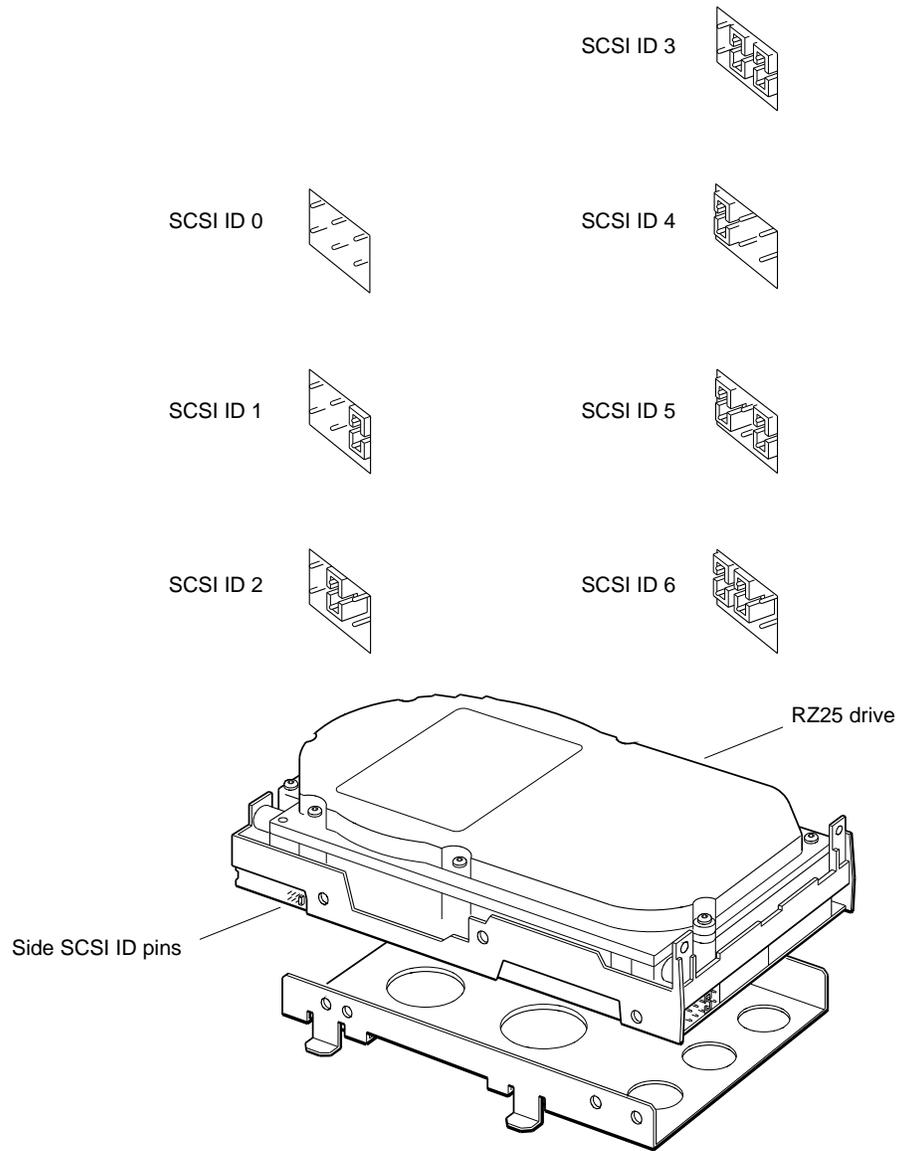
WS330046

Figure D-2. Jumper settings for an RZ24 hard disk drive



WSTCU048

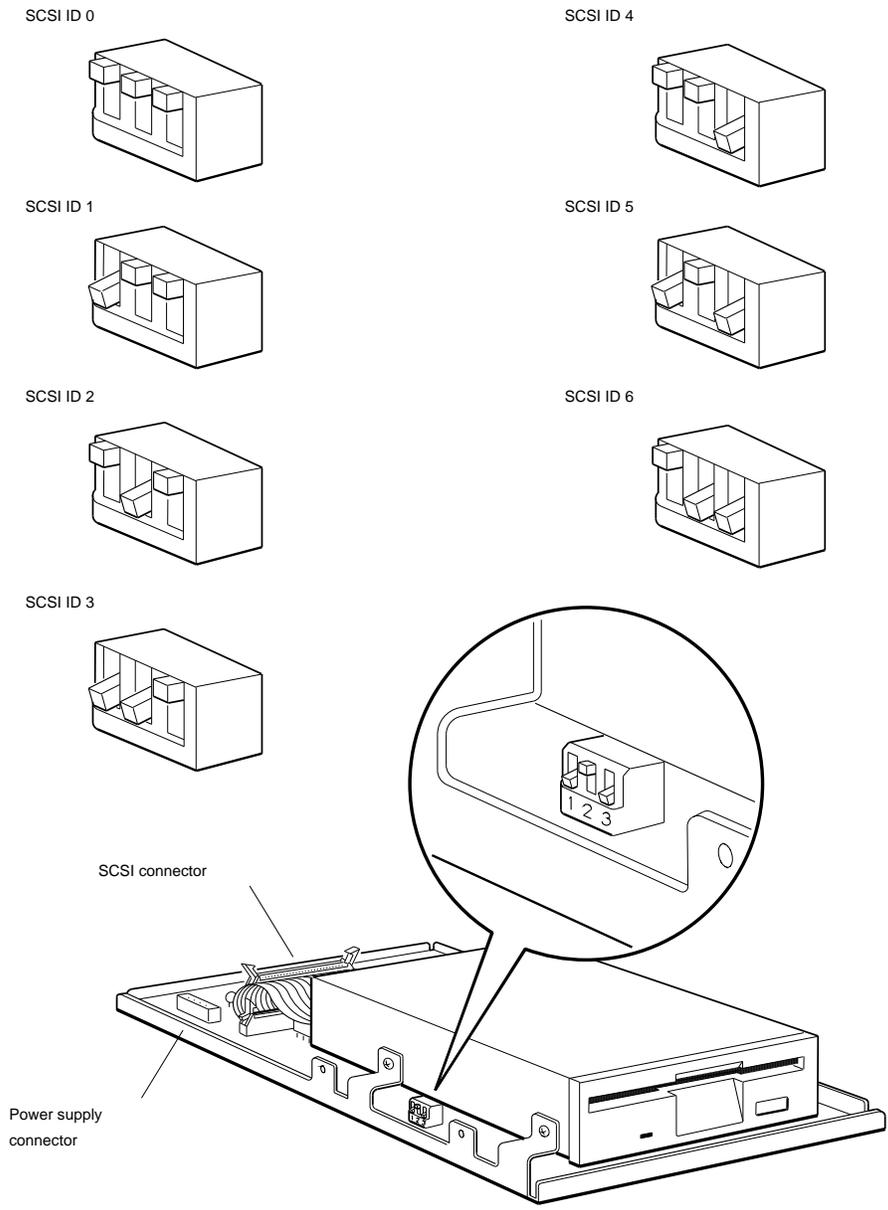
Figure D-3. RZ25 hard disk drive front jumper settings



WSTCU047

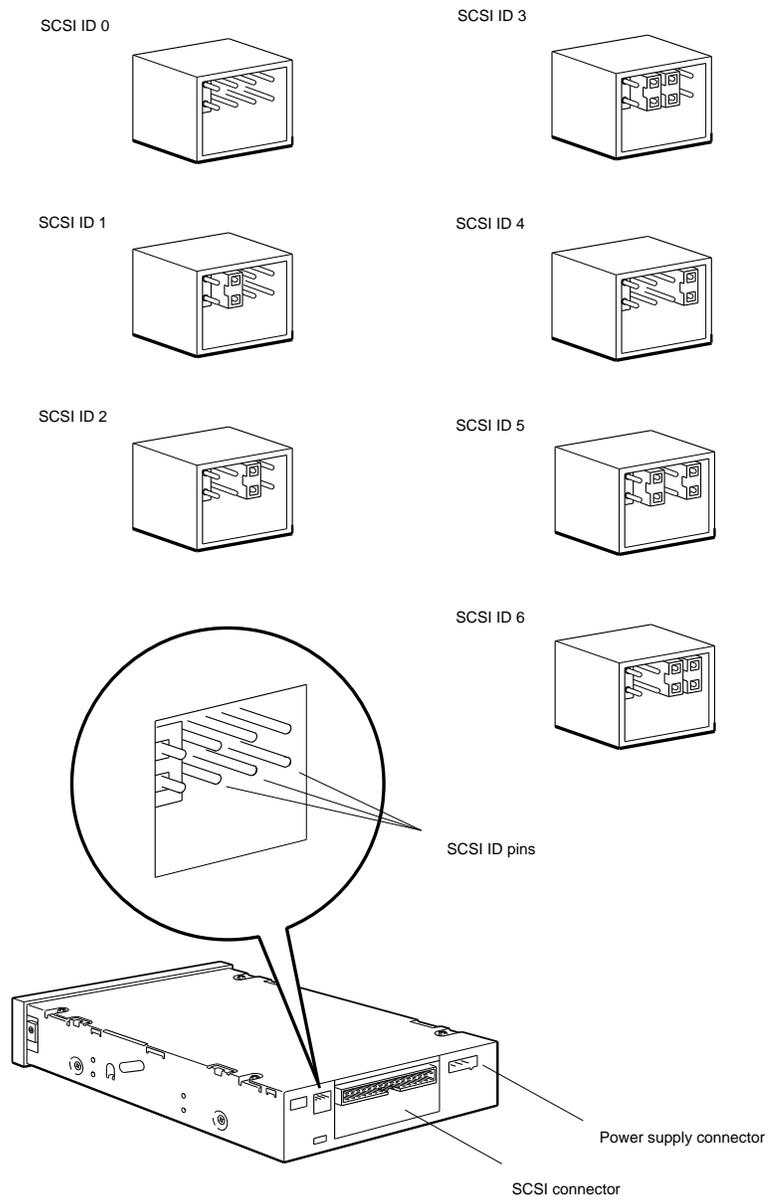
Figure D-4. RZ25 hard disk drive side jumper settings

The RZ25 has front and side jumpers. Pin 4 on the front jumpers must always be in place. When the side jumpers are used, all pins except pin 4 must be removed from the front jumpers.



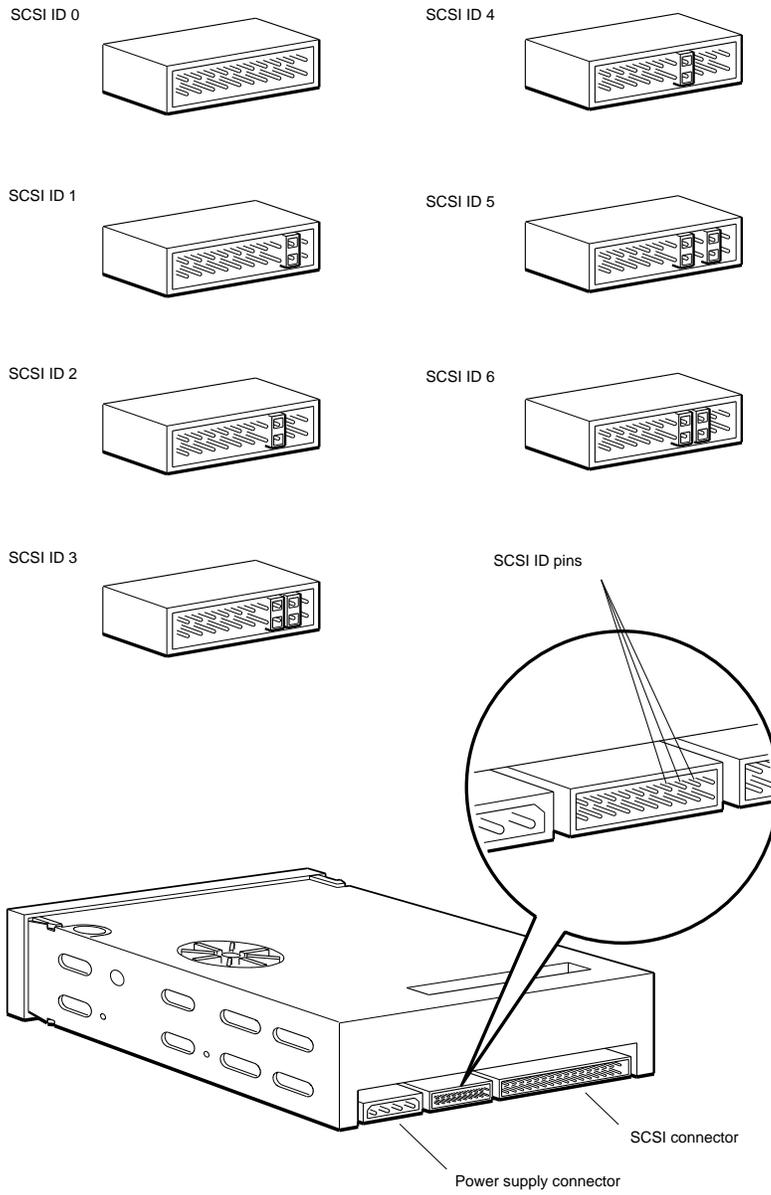
WS330065

Figure D-5. Switch settings for RX23 and RX33 floppy disk drives



WS330056

Figure D-6. Jumper settings for an RRD42 optical compact disc drive



WS330048

Figure D-7. Jumper settings for a TZK10 QIC tape drive

Index

A

Antistatic wrist strap, 5-4, 5-14, 5-19

B

Booting the workstation

See Console commands, boot

See Environment variables, boot

See Turning on the workstation

C

Communications devices

connectors, 7-2 to 7-3

installing, 7-1

Configuration

See Workstation, configuration

Connector pin assignments, C-1 to C-6

Connectors

communications, 1-4, 2-3

communications device connectors on
cables, 7-3

communications device connectors on
system unit, 7-2

keyboard-mouse, 2-3

monitor-to-system unit, 2-3

on system unit, 2-2

SCSI, 2-3

system-unit power, 2-3

Connectors (Cont.)

ThickWire Ethernet connectors on
system unit, 2-3, 6-2

ThickWire Ethernet loopback
connectors, 1-4, 3-1 to 3-3

ThinWire Ethernet, 6-8, 6-11

Console commands, 11-7 to 11-22

?, 11-9

boot, 11-9 to 11-10

cat, 11-10

cnfg, 11-11 to 11-14

console mode, 11-2

d, or deposit, 11-15 to 11-16

e, or examine, 11-16 to 11-17

erl, 11-17

for environment variables, 11-22

go, 11-17

init, 11-17

ls, 11-18

passwd, 11-18 to 11-19

printenv, 11-19

restart, 11-19

script, 11-20

setenv, 11-20

sh, or shell, 11-20 to 11-21

syntax, 11-6 to 11-21

t, or test, 11-21

typing the commands, 11-5

unsetenv, 11-21

Console program

Console program (Cont.)
 See Console commands
 See Modes, console
Conventions used in the manual, xvi,
 11-6
Cover-release screw, 2-3
CPU modules, 1-2, 5-19 to 5-24
 installing, 5-22
 removing, 5-19
 testing, 5-24
Customer Support Center, 10-3

D

DESTA, 6-8, 6-11
Device code, 11-12
Device descriptor, 11-13
Diagnostic indicator lights, 2-3
 troubleshooting the workstation,
 10-4 to 10-5
Drives
 See also Floppy disk drives, 8-1
 See also Hard disk drives, 8-1
 See also Optical compact disc drives,
 8-1
 See also Tape drives, 8-1
Drives in front drive panel, 5-53
 installing, 5-42 to 5-51
 removing, 5-53
 testing, 5-52

E

Electrical and magnetic interference,
 1-5
Electrical power for the workstation,
 1-6
Environment variables, 11-22 to 11-23
 boot, 11-4, 11-9, 11-19
 console, 9-6
 deleting their values, 11-21
 haltaction, 9-8, 11-4
 setting their values, 11-20
 showing their values, 11-19
 testaction, 10-14

Equipment specifications

BA42 storage expansion box, A-28
LK201 keyboard, A-20 to A-21
LK401-AA keyboard, A-22 to A-23
RRD40 optical compact disc drive,
 A-50
RRD42 optical compact disc drive,
 A-51
RX23 diskette drive, A-52 to A-53
RX33 diskette drive, A-54 to A-55
RZ23 hard disk drive, A-29 to A-30
RZ23L hard disk drive, A-31 to
 A-32
RZ24 hard disk drive, A-33 to A-34
RZ25 hard disk drive, A-35 to A-36
RZ55 hard disk drive, A-37 to A-38
RZ56 SCSI hard disk drive, A-39 to
 A-40
RZ57 SCSI hard disk drive, A-41 to
 A-42
system unit, A-3
TK50Z tape drive, A-43 to A-44
TLZ04 cassette tape drive, A-49
TZ30 tape drive, A-45 to A-46
TZK10 QIC tape drive, A-47 to A-48
VR262 monitor, A-4 to A-6
VR297 monitor, A-6 to A-7
VR299 monitor, A-8 to A-9
VR319-C4 monitor, A-10 to A-12
VR319-CA monitor, A-10 to A-12
VR319-D4 monitor, A-13 to A-15
VR319-DA monitor, A-13 to A-15
VRT16-D4 monitor, A-16 to A-17
VRT16-DA monitor, A-16 to A-17
VRT19-D4 monitor, A-18 to A-19
VRT19-DA monitor, A-18 to A-19
VSXXX-AB tablet, A-26 to A-27
VSXXX-GA mouse, A-24 to A-25
Ethernet, 3-1
 See also Connectors
 connecting to Ethernet networks, 6-2
 to 6-13
 DESTA, 6-8, 6-11
 installing

Ethernet
installing (Cont.)
 ThickWire Ethernet cables, 6-3
 to 6-5
 ThinWire Ethernet cables, 6-6
 to 6-9
 unshielded twisted-pair Ethernet
 cables, 6-10 to 6-12
station addresses, 6-13
ThickWire loopback connectors, 3-1
to 3-3
External storage devices, 8-1 to 8-14
 See also Equipment specifications
 in BA42 storage expansion boxes,
 8-14
installing, 8-3 to 8-12
removing, 8-14
testing, 8-13

F

Floppy disk drives
 RX23, 5-44, 8-1
 RX33, 5-44, 8-1
Front drive panel
 installing, 5-11 to 5-13
 removing, 5-6

H

Halt button, 2-3, 9-8
Hard disk drives, 5-25 to 5-42
 See also Equipment specifications
 installing in system unit, 5-25 to
 5-40
 removing from system unit, 5-41 to
 5-42
 RZ23, 5-31
 RZ24, D-3
 RZ25, D-4, D-5
 RZ55, 8-1
 RZ56, 8-1
 RZ57, 8-1
 testing, 5-40 to 5-41
Humidity of worksite, 1-5

I

Icons, 2-4
Internal drives
 See Drives in front drive panel
 See Hard disk drives

K

Keyboard, 2-11 to 2-12

L

Language menu, 9-6
Lights
 See Diagnostic indicator lights
 See Monitors

M

Memory modules, 5-2 to 5-18
 information in cnfg displays, 11-13
 installing, 5-2 to 5-13
 memory slots in system unit, 5-8
 removing, 5-14 to 5-18
 testing, 5-13
Model 120, 1-2
Model 125, 1-2
Model 133, 1-2
Model codes, 11-12
Modes
 console, 11-2 to 11-3
 operating, 11-2, 11-3 to 11-4
 privileged, 11-3
 restricted, 11-3
Module codes, 11-12, 11-14
Monitors
 cables, 1-4
 installing, 2-5 to 2-25
 on/off switches, 2-6
Mouse, 2-13
 See also Pointing devices
Moving the workstation, 4-1 to 4-2

N

- Nameplate, 1–2
 - replacing, 5–23 to 5–24
- Nameplate medallion, 5–23
- Networks
 - See Ethernet

O

- Optical compact disc drives
 - RRD40, 8–6
 - RRD42, 5–44, 8–1, D–7
- Optical compact disk drives
 - See also Equipment specifications
- Option slots, 2–3

P

- Part numbers
 - basic components, B–1
 - cords, cables, and connectors, B–3
- Passwords
 - console password, 11–18 to 11–19
 - worksystem software, 11–4
- Pin assignments
 - Ethernet loopback connector, C–6
 - I/O cover SCSI cable, C–2
 - keyboard/mouse/tablet connector, C–3
 - modem loopback connector, C–5
 - printer/communications connector, C–4
 - printer/console loopback connector, C–5
 - summary of loopback connections, C–6
 - ThickWire Ethernet connector, C–4
- Pointing devices, 2–13 to 2–19
 - installing, 2–15 to 2–19
- Problems
 - See Troubleshooting
- Product ID, 11–12
- Prompts
 - >>, 11–3

Prompts (Cont.)

- console, 9–6, 11–3
- R>, 11–3

S

- Scripts, 11–10, 11–20
 - running scripts with the sh command, 11–20 to 11–21
- SCSI
 - cable lengths, 8–5
 - choosing SCSI IDs, 5–42 to 5–44, 8–3
 - code, 11–12
 - ID = 7, 11–12
 - ID settings
 - RRD42 optical compact disc drive, D–7
 - RX23 floppy disk drive, D–6
 - RZ23L hard disk drive, 5–31
 - RZ24 hard disk drive, D–3
 - RZ25 hard disk drive, D–4, D–5
 - storage expansion boxes, 8–7
 - TZK10 QIC tape drive, D–8
 - information in cnfg displays, 11–12
 - terminators, 2–20
- Self-tests
 - messages, 10–15 to 10–19
 - power-up self-test, 10–14
 - system self-test, 10–14
- Serial cable, 1–4
- Site and workstation requirements, 1–5 to 1–7
- small computer system interface
 - See SCSI
- Stopping the workstation, 9–8
- Storage expansion boxes, 8–1
 - BA42, 8–6
 - cables, 8–4
- System console
 - console mode, 11–2
- System unit, 2–2
 - bezel for removable media drive, 5–51
 - cables, 1–4

System unit (Cont.)

- connectors, 2-2
- cooling vents, 2-2
- general view of inside, 5-5
- installing, 2-22 to 2-25

T

Tablet, 2-13

See also Pointing devices

Tape drives

See also Equipment specifications

TK50Z, 8-6

TLZ04, 8-6

TZK10 QIC, D-8

Tape Drives

TZ30, 8-1

TZK10 QIC, 8-1

Temperature of worksite, 1-5

Terminators

external storage devices, 8-11

ThinWire Ethernet, 6-8, 6-11

Testing

CPU modules, 5-24

drives in front drive panel, 5-52

hard disk drives, 5-40

memory modules, 5-13

the workstation, 9-7

ThickWire

See Ethernet

ThinWire

See Ethernet

Troubleshooting, 10-1 to 10-19

See also Testing

colors are inappropriate, 10-7 to 10-8

communications devices, 10-13

component connections, 10-6 to 10-13

components functioning, 10-14 to 10-19

contacting your Customer Support Center, 10-3

cursor does not move, 10-9

Troubleshooting (Cont.)

diagnostic indicator lights, 10-4 to 10-5

error message log, 11-17

external storage devices, 8-13

initializing the workstation, 10-4 to 10-5

interpreting self-test messages, 10-15

keyboard does not seem to work, 10-8

networks, 10-9

pointing devices, 10-9

printers, 10-12

running the power-up self-tests, 10-14

running the system self-test, 10-14

screen is blank or distorted, 10-6 to 10-7, 10-8, 10-9

self-test error messages

base system slot, 10-16 to 10-19

system self-tests, 9-7

system unit, 9-6

TK50Z tape drive, 10-12

worksystem software, 10-10 to 10-11

Turning off the workstation, 9-9

Turning on the workstation, 9-2 to 9-6

Twisted-pair

See Ethernet

Twisted-pair Ethernet

See Ethernet, installing unshielded twisted-pair Ethernet

U

ULTRIX

quitting from ULTRIX, 11-3

V

Video cables, 1-4

W

Workstation

- basic parts, 1–4
- configuration, 9–7, 11–11 to 11–14
- stopping, 9–8
- testing, 9–7
- total installed memory, 11–12
- turning off, 9–9
- turning on, 9–2 to 9–6