
SCSI

SCSI Removable Disk Subsystem Service Manual

Order Number EK-RZREA-SV-001

Digital Equipment Corporation
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About This Manual

This manual describes the SCSI Removable Disk Subsystem, its installation and verification, as well as user and maintenance information.

STRUCTURE OF THIS MANUAL

Chapter 1 introduces the SCSI Removable Disk Subsystem and its components. It includes a brief description of the disk drive/canister, enclosure, and specifications.

Chapter 2 contains unpacking and installation instructions for the SCSI Removable Disk Subsystem. It includes details for unpacking, configuring, cabling, and verifying the installation.

Chapter 3 provides additional information needed to use the SCSI Removable Disk Subsystem. It describes handling, mounting and dismounting, and write-protection.

Chapter 4 contains disassembly and maintenance information for the customer service engineer.

Appendix A provides information on SCSI address selection.

INTENDED AUDIENCE

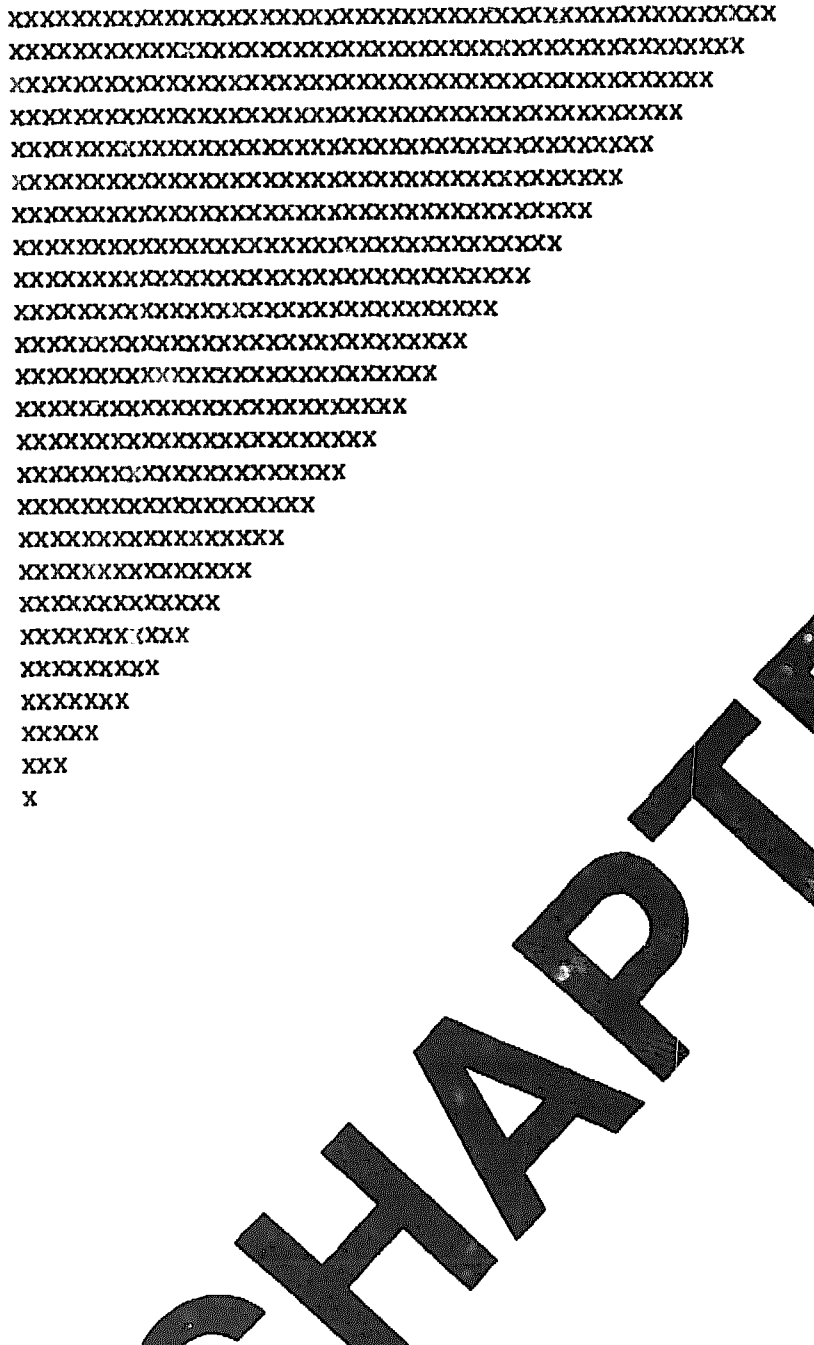
This manual is intended for anyone installing, using, and maintaining the SCSI Removable Disk Subsystem.

ASSOCIATED DOCUMENTATION

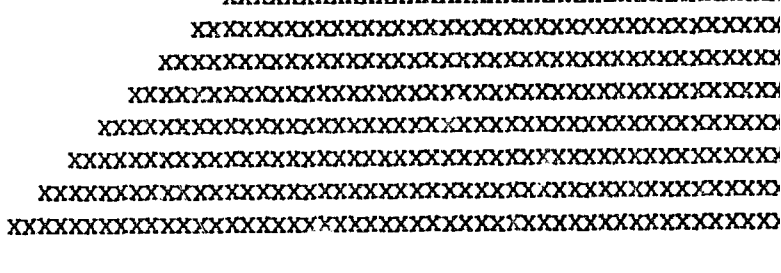
For system-specific details, refer to host system documentation listed in Table 1.

Table 1 Documentation

Title	Order Number
VAXstation 3100 - Model 30 Owner's Manual	EK-265AA-OM
VAXstation 3100 - Model 40 Owner's Manual	EK-266AA-OM
VAXstation 3520/3540 Hardware Installation Guide	EK-250AA-IN
MicroVAX 3100 Owner's Manual	EK-392AA-IL
DECstation 2100/3100 Documentation Kit	EK-308AB-DK
VAXstation 3100 Maintenance Guide	EK-285AA-MG
VAXstation 3520/3540 Maintenance Guide	EK-258AA-MG
MicroVAX 3100 Maintenance Guide	EK-393AA-IL
DECstation 2100/3100 Maintenance Guide	EK-291AB-MG



CHAPTER 1



1
DESCRIPTION

1.1 INTRODUCTION

This chapter introduces the SCSI Removable Disk Subsystem. It includes a brief description of the disk drive/canister, enclosure, and specifications.

1.2 GENERAL DESCRIPTION

The SCSI Removable Disk is a desktop subsystem designed for use with the VAXstation 3100, MicroVAX 3100, VAXstation 3520, or VAXstation 3540. It consists of two parts:

- A high-capacity, formatted hard disk drive in a removable canister. The removable canister assembly provides a shock-mounted protective housing for the high-capacity hard disk drive.
- Desktop chassis with a built-in power supply. The disk canister is connected to the chassis by a low insertion force (LIF) connector. The desktop chassis makes it convenient to remove and store the canister.

No user serviceable parts or option switches are accessible by disassembling the chassis or canister. The canister is easily inserted and removed from a desktop chassis. Figure 1–1 shows the complete assembly.

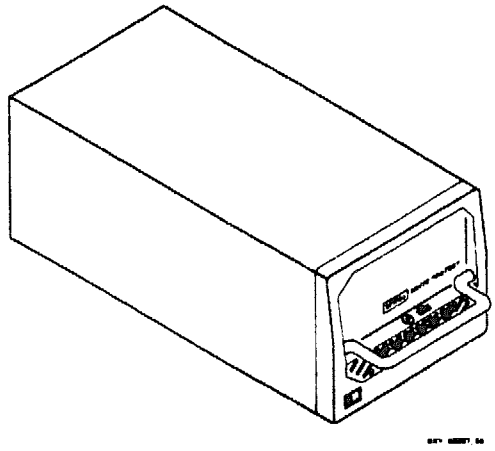


Figure 1–1 SCSI Removable Disk Subsystem

WARNING
The canister is not locked in and could slide out of the chassis. Therefore, DO NOT lift the entire assembly using only the disk canister handle and DO NOT transport the chassis with the canister installed.

1.2.1 Disk Drive/Canister

Figure 1–2 shows the canister that houses the disk drive. The canister is designed to protect the internal disk drive from damage.

The front panel of the canister contains a write-protect switch and a red status light emitting diode (LED). The drive is write-protected and the LED is illuminated when the switch is on.

The disk drive comes preformatted (additional preparation is not necessary). Utility Test 75, run in the console mode, can be used to reformat the drive. Refer to the appropriate workstation installation and owner's manual for additional information.

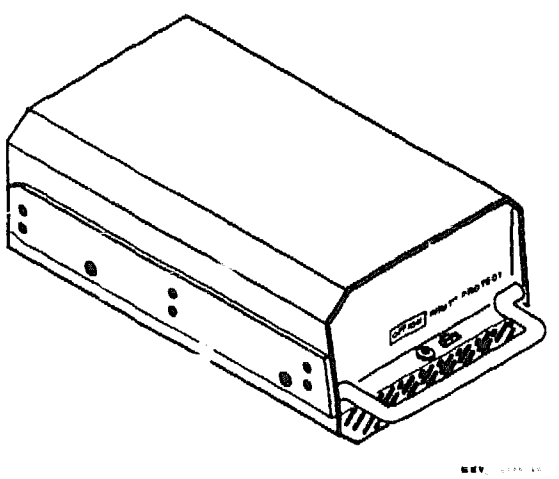


Figure 1–2 Disk Drive and Canister Assembly

CAUTION
DO NOT set the canister on its rear panel. This may create an unstable condition, allowing the drive to be knocked over and damaged.

1.2.2 Chassis

Figure 1–3 shows the chassis into which the canister slides. The canister's rear panel low insertion force (LIF) connector mates with the chassis's LIF connector. The chassis has a built-in power supply that provides protection from line surge, transients, and line voltage variations. The power supply is switch-selected from the rear panel for either 110 Vac or 220 Vac (Figure 1–4). The ac input module, also rear panel mounted, combines the ac input line filter with the line fuse and ac power switch. The line fuse must be changed when switching to 220 Vac operation. Also located in the chassis is a unit select switch. The unit select switch (Figure 2–3) is used to set the device address and will be described in the installation chapter. Chassis and canister cooling is achieved with a fan that draws air from the front of the subsystem, and exhausts through the rear.

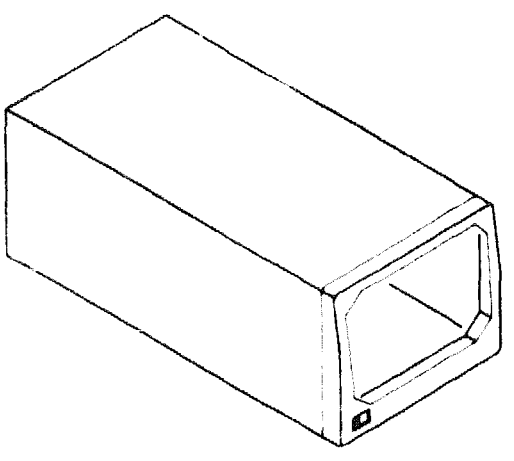


Figure 1–3 Chassis (Front View)

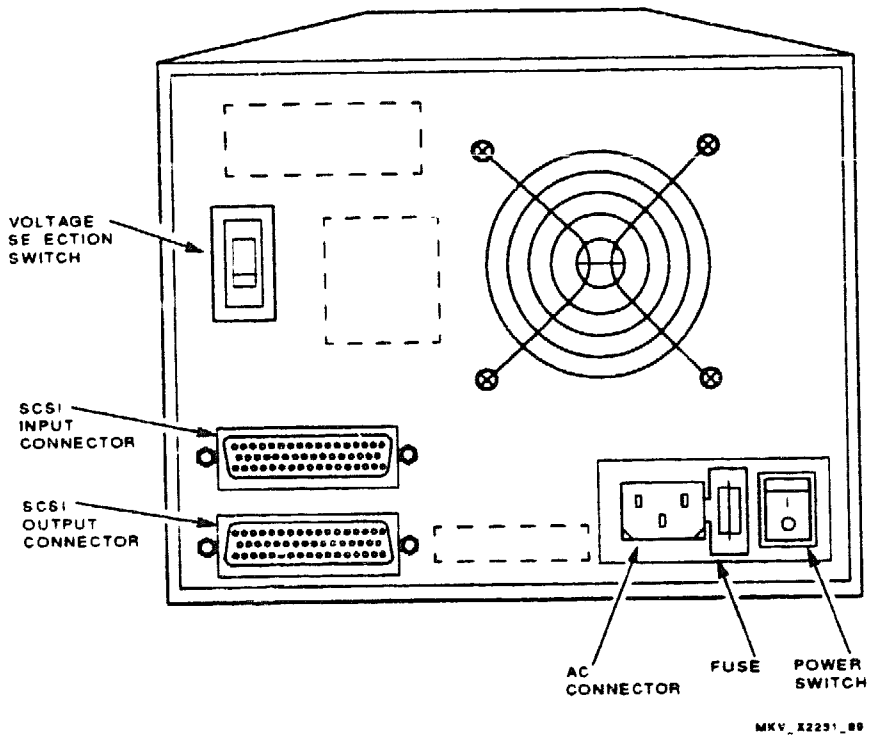


Figure 1–4 Chassis (Rear View)

1.3 SPECIFICATIONS

1.3.1 Environmental Specifications

Table 1–1 lists the environmental specifications required for the proper operation of the chassis.

After initial power-up temperature stabilization, components should not be subjected to a change of more than 3°C (37.4°F) per hour.

All the equipment can be air-transported.

Table 1–1 Environmental Specifications

Ambient Temperature	
Operating	10 to 40°C (50 to 104°F)
Nonoperating	-30 to 66°C (-22 to 151°F)
Relative Humidity	
Operating	8 to 80%
Nonoperating	8 to 95%
Maximum Wet Bulb	
Operating	25.6°C (78°F) non-condensing
Nonoperating	46°C (115°F) packaged, non-condensing
Shock (Canister)	
Operating	2 g-force for 10 ms (no errors)
Altitude	
Operating	-61 to 3,048 m (-200 to 10,000 ft)
Nonoperating	-305 to 12,192 m (-1000 to 40,000 ft)

1.3.2 Electrical Specifications

Table 1–2 list the chassis power requirements.

Table 1–2 Electrical Specifications

Line Voltage [1]	90 - 132 Vac at 50/60 Hz
Line Voltage [2]	180 - 265 Vac at 50/60 Hz
Fuse, Rear Panel [1]	2 A Slow-Blow 3AG
Fuse, Rear Panel [2]	1 A Slow-Blow 3AG
Power Consumption	230 W

[1]110 Vac Input

[2]220 Vac Input

1.3.3 Mechanical Specifications

Table 1–3 lists the canister and chassis mechanical requirements.

Table 1–3 Mechanical Specifications

Measurement	Canister	Chassis
Height	11.18 cm (4.4 in.)	14.61 cm (5.75 in.)
Depth	29.46 cm (11.6 in.)	44.45 cm (17.5 in.)
Width	19.76 cm (7.78 in.)	21.84 cm (8.6 in.)
Weight	5.22 kg (11.5 lbs) [1]	5.54 kg (12.2 lbs) [2]

[1]Complete assembly (canister and drive).

[2]10.76 kg (23.7 lbs) maximum, with disk drive and canister installed.

1.4 OPTION AND PART NUMBERS

1.4.1 Disk Subsystem

The SCSI Removable Disk Subsystem can be ordered with either a 332 megabyte disk drive (formatted) or a 665 megabyte disk drive (formatted).

- Table 1–4 lists the parts supplied with the 332 Mbyte SCSI Removable Disk Subsystem (2R-RZREA-AA).
- Table 1–5 lists the parts supplied with the 665 Mbyte SCSI Removable Disk Subsystem (2R-RZR6A-AA).

Table 1–4 332 Mbyte SCSI Removable Disk Subsystem (2R-RZREA-AA)

Item	Description	Option Number	Qty
1	RZ55-E in canister	2R-RZREB-AA	1
2	Chassis with power cord	2R-RZREC-AA	1

Table 1–5 665 Mbyte SCSI Removable Disk Subsystem (2R-RZR6A-AA)

Item	Description	Option Number	Qty
1	RZ56-E in canister	2R-RZR6B-AA	1
2	Chassis with power cord	2R-RZREC-AA	1

1.4.2 Cable Kits

The cable kits for the SCSI Removable Disk Subsystem configurations are listed in Table 1–6. The actual kits received are configuration-dependent.

Table 1–6 (CK-2RRZR-XX) SCSI Removable Disk Subsystem Cable Kits

Item	Description	Digital PN	-AE	-BE	-CB	-03
1	Data Cable (VS3100 to Disk Subsystem)	17-02626-01	1	0	0	0
2	Data Cable (VS3520/40 to Disk Subsystem)	17-02623-01	0	1	0	0
3	Internal VS3520/40 Ribbon Cable	17-02622-01	0	1	0	0
4	Data Cable (Daisy-Chain)	17-02624-01	0	0	1	0
5	Terminator	12-32616-01	1	1	0	0
6	Data Cable (Disk Subsystem to DEC SCSI Device)	17-02745-01	0	0	0	1

Items 1 through 6 (Table 1–6) are described below:

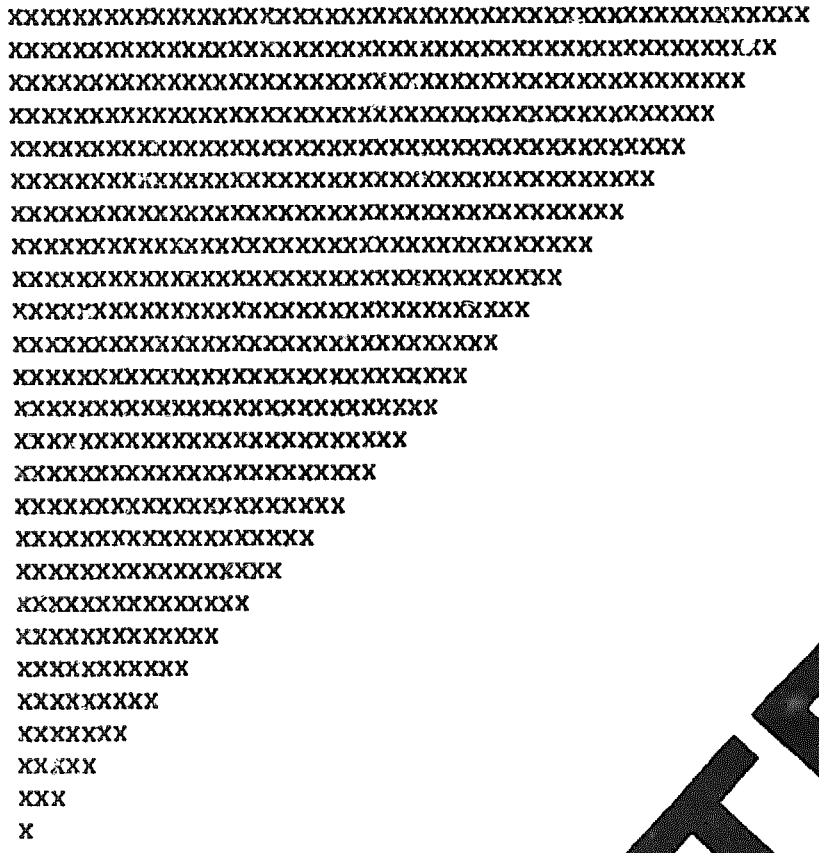
- Item # 1 is a 6-foot data cable that connects the SCSI Removable Disk Subsystem to the VAXstation 3100.
- Item #2 is a 7-foot data cable that connects the SCSI Removable Disk Subsystem to the VAXstation 3520/40 or MicroVAX 3100.
- Item #3 is a 2-foot twisted-pair ribbon cable that is internal to the VAXstation 3520 and 3540.

CAUTION
This cable must be installed by Digital Equipment Corporation Customer Service personnel.

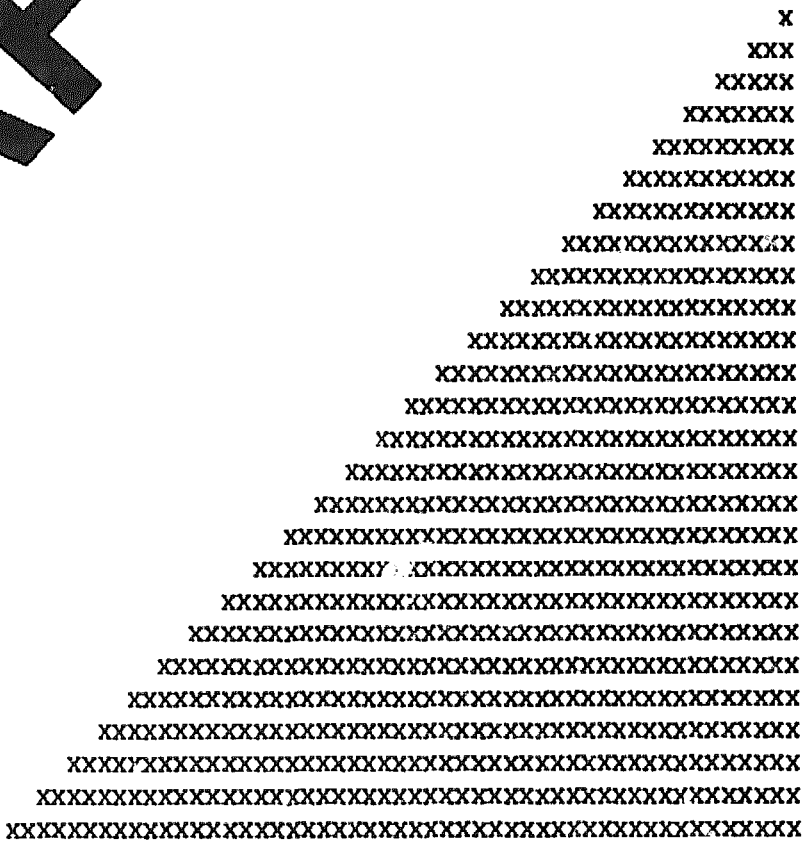
- Item #4 is a 1-foot daisy-chain data cable that connects from an existing SCSI Removable Disk Subsystem (already connected to the host workstation) to another SCSI Removable Disk Subsystem.
- Item #5 is a terminator for the SCSI Removable Disk Subsystem and is connected to the last physical SCSI Removable Disk Subsystem on the line.

- Item #6 is a 3-foot data cable that connects from the SCSI Removable Disk Subsystem to a DEC SCSI device.

  NOTE
  The DEC SCSI device must be plugged in after the SCSI Removable Disk Subsystem on the SCSI bus.



CHAPTER 2



2
INSTALLATION

2.1 INTRODUCTION

This chapter contains instructions for unpacking, configuring, cabling, and verifying the installation of the SCSI Removable Disk Subsystem.

2.2 UNPACKING

The SCSI Removable Disk Subsystem is shipped in individually packed cartons that contain the following items:

- Disk Drive/Canister
- Chassis
- Cable Kit(s)

Perform the following steps when unpacking and inspecting the contents of the SCSI Removable Disk Subsystem shipping containers.

1. Check the shipping container for external damage such as dents, holes, and crushed corners.
2. Unpack and check the contents against the packing slip.
3. Inspect the contents of each shipping container for damage.
4. Save all shipping materials in case any items need to be returned.
5. List any missing or damaged items.
6. Notify the Digital Equipment Corporation sales representative and the delivery agent if any items are missing or damaged.
7. Place the chassis on a hard stable surface near the workstation.
8. Place the disk drive/canister next to the chassis.

You will receive one or more of the items listed in Table 2–1, depending on the configuration ordered.

Table 2–1 Contents of Each Carton

Description	Option Number
332 Megabyte SCSI Removable Disk and Canister	2R-RZREB-AA
665 Megabyte SCSI Removable Disk and Canister	2R-RZR6B-AA
Chassis and Power Cord	2R-RZREC-AA
Cable Kit (VS3100 Data Cable and Terminator)	CK-2RRZR-AE
Cable Kit (VS3520/VS3540 Data Cable and Terminator)	CK-2RRZR-BE
Cable Kit (Daisy-Chain Cable)	CK-2RRZR-CB [1]

[1]Use with either the CK-2RRZR-AE or CK-2RRZR-BE when two drives are connected together.

2.3 GENERAL INSTALLATION PROCEDURE

After unpacking, continue installing the SCSI Removable Disk Subsystem by following the procedure below.

1. Using a long nonconductive tool, set the device address switches inside the enclosure. Figure 2–3 shows the location of the switchpack and Table 2–2 lists the switch settings.
2. Using moderate pressure, insert the disk drive/canister into the enclosure.
3. Connect the interface cables between the enclosure and the host workstation. (See Figure 2–5 through Figure 2–8.)
4. Verify that the ac select switch is set to the correct line voltage.
5. Connect the ac line cord to a standard ac outlet.
6. Power up all devices as described in Section 2.7, STARTING THE SYSTEM AFTER INSTALLATION.
7. Verify the installation (See Section 2.8, INSTALLATION VERIFICATION .

2.4 CHASSIS INSTALLATION

Figure 2–1 shows the rear of the chassis. AC power should be applied to the chassis before the disk drive/canister is installed.

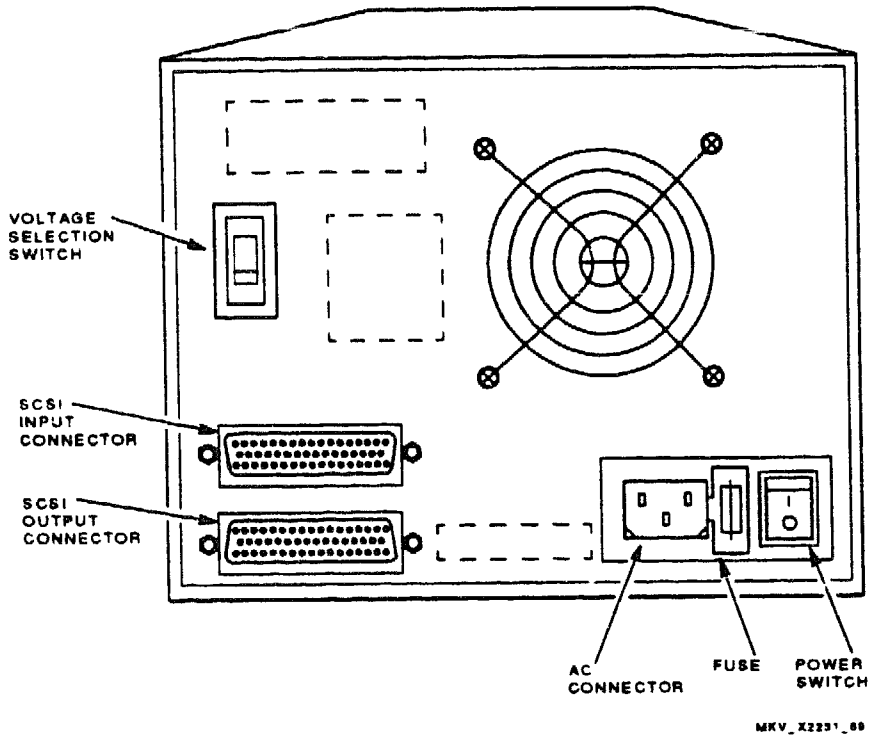


Figure 2–1 Chassis (Rear View)

When using more than one enclosure, place the units side-by-side on a hard stable surface (Figure 2–2).

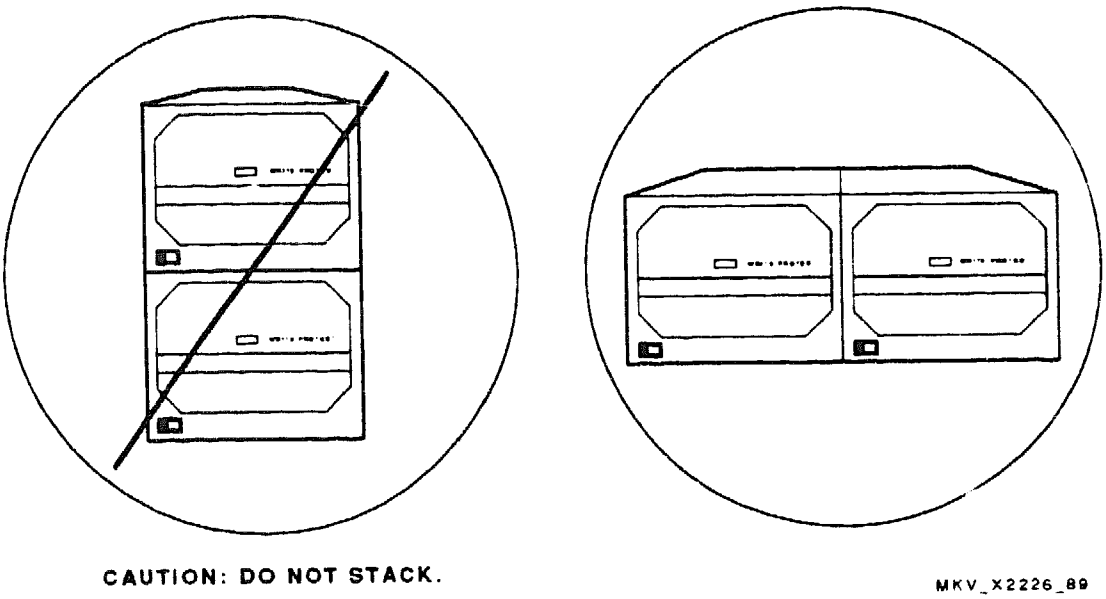


Figure 2–2 Multiple Units (Side-by-Side)

2.4.1 Unit Select Switches

The unit select switchpack (Figure 2–3) is located inside the enclosure behind the canister. It can be accessed only when the canister is removed. It is approximately 30 cm (12 in.) from the front of the chassis to the unit select switchpack. A nonmetallic tool (not supplied) should be used when setting the unit select switch.

The unit select switchpack is preset to address zero, and should be checked before installation. When connecting more than one disk subsystem to the same SCSI bus, the unit select switchpack on the second disk will need resetting.

See Appendix A, SCSI ADDRESSING , for instructions on how to locate an open SCSI address.

Figure 2–3 shows the switchpack location and Table 2–2 defines the switches' meanings. The switches are numbered left to right with the left-most switch position being switch 1. Only switches 1, 2, and 3 are functional. Switches 4, 5, 6, and 7 are NOT used. A switch is **CLOSED** when it is in the **DOWN** position.

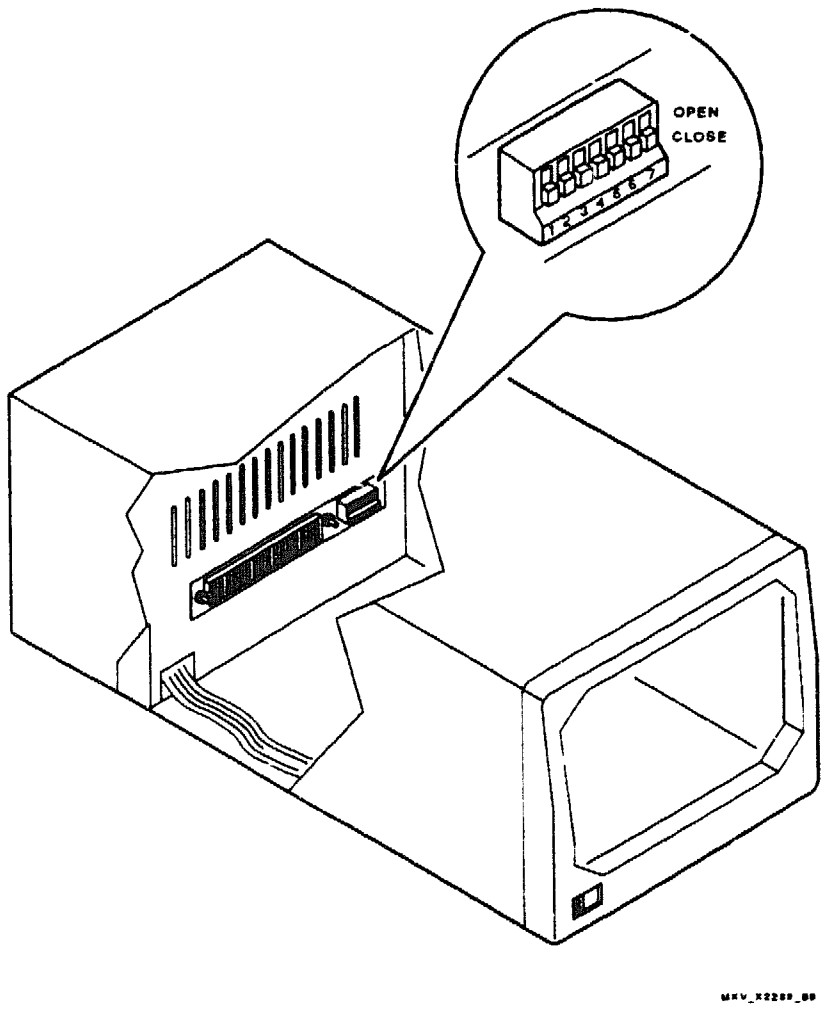


Figure 2–3 Switchpack Location

Table 2–2 Unit Select Switches

Drive	SCSI ID	SW1	SW2	SW3
1	0	OPEN	OPEN	OPEN
2	1	CLOSED	OPEN	OPEN
3	2	OPEN	CLOSED	OPEN
4	3	CLOSED	CLOSED	OPEN
5	4	OPEN	OPEN	CLOSED
6	5	CLOSED	OPEN	CLOSED
7	6	OPEN	CLOSED	CLOSED
8	7	CLOSED	CLOSED	CLOSED

2.4.2 Voltage Select Switch

The SCSI Removable Disk Subsystem is designed to operate on either 110 Vac or 220 Vac. The chassis comes preset for 110 Vac with the appropriate fuse installed. If the line voltage must be changed to 220 Vac, contact your Digital Equipment Corporation Customer Service representative.

WARNING
The line voltage select switch must be correctly selected before connecting to any ac line voltage.

2.5 CANISTER INSTALLATION

The canister should be inserted into the chassis with the ac power up. Use moderate pressure to install the canister (see Figure 2–4). The chassis should not be moved when dc power is applied to the disk canister. The dc power to the disk canister can be interrupted or applied by pressing and releasing the momentary push button (MPB) on the front panel of the chassis. The two chassis power status LEDs on the MPB indicate the power condition of the disk drive/canister. These LEDs are listed in Table 2–3.

CAUTION
The disk may be damaged if the subsystem is moved while the drive is spinning.

Data may be lost if the disk drive/canister is removed during a Write operation to the disk. The green LED should be ON and the yellow LED should be OFF before inserting or removing the disk drive/canister. The chassis should not be moved when the yellow LED is blinking.

Table 2–3 Chassis Power Status LEDs

Green	Yellow	Condition
OFF	OFF	No ac power has been applied
OFF	ON	Disk drive is running
OFF	BLINKING	Disk drive is spinning down
ON	OFF	Safe to remove the canister

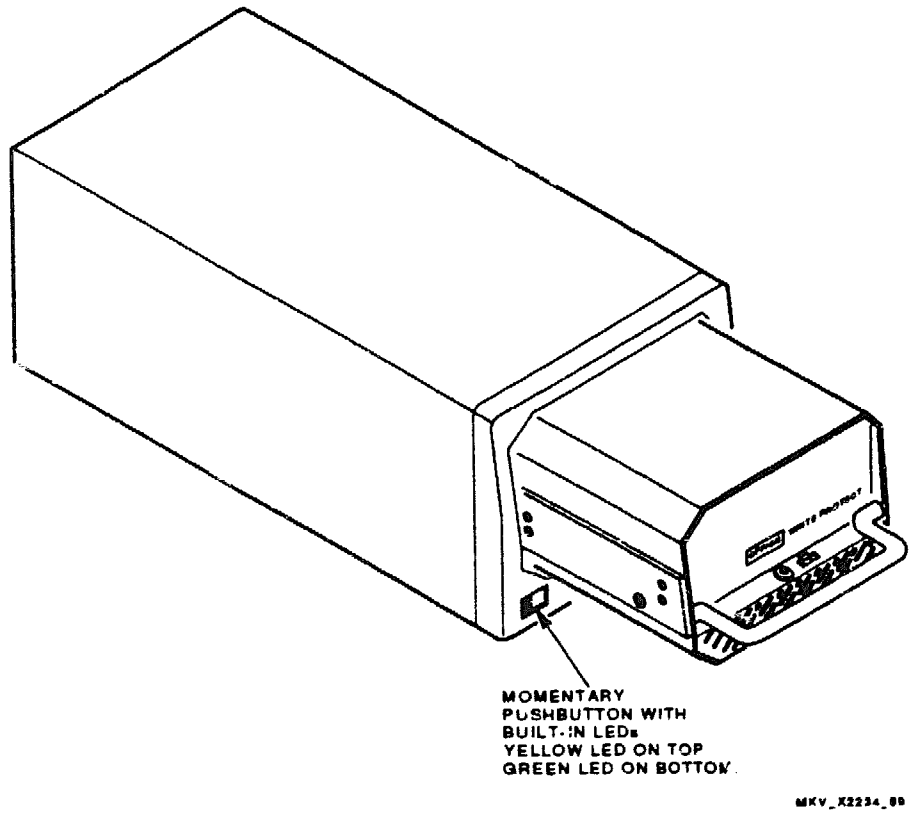


Figure 2–4 Installing the Disk Drive/Canister

2.6 CABLING

The SCSI Removable Disk Subsystem can be cabled to a VAXstation 3100, MicroVAX 3100, VAXstation 3520/3540, or DECstation 2100/3100.

CAUTION
Power down all devices before attempting any cable connections.

Use the following procedure to connect the SCSI Removable Disk Subsystem to the host workstation:

1. Power down the workstation and all devices to be interconnected.
2. Remove the terminator attached to the SCSI port of the workstation. (For more information, refer to the owner's manual for your workstation.)
3. Attach the SCSI interface cable between the workstation SCSI port and the SCSI Removable Disk Subsystem.
4. Connect the terminator (PN 12-32616-01) to the last SCSI Removable Disk Subsystem on the bus.
5. Connect all devices to the ac supply and then power up. (See Section 2.7, STARTING THE SYSTEM AFTER INSTALLATION.)
6. Connect the workstation to the ac supply and power it up.

Figure 2–5 and Figure 2–6 illustrate VAXstation to SCSI Removable Disk Subsystem connections.

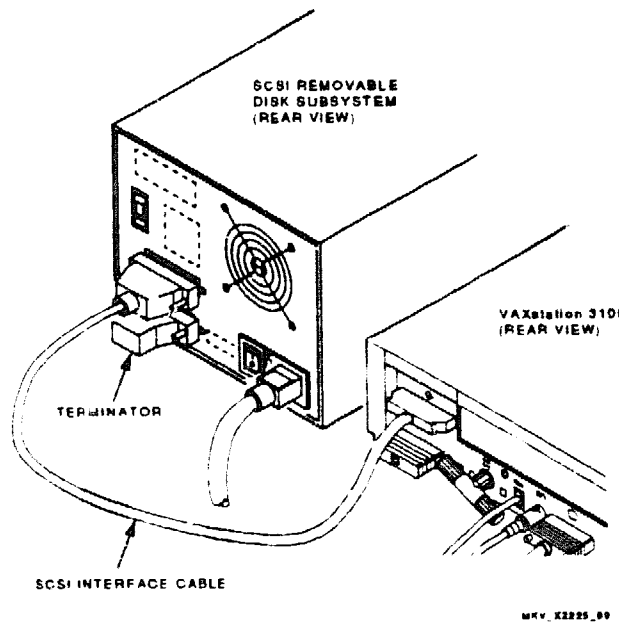


Figure 2–5 VAXstation 3100 Connections

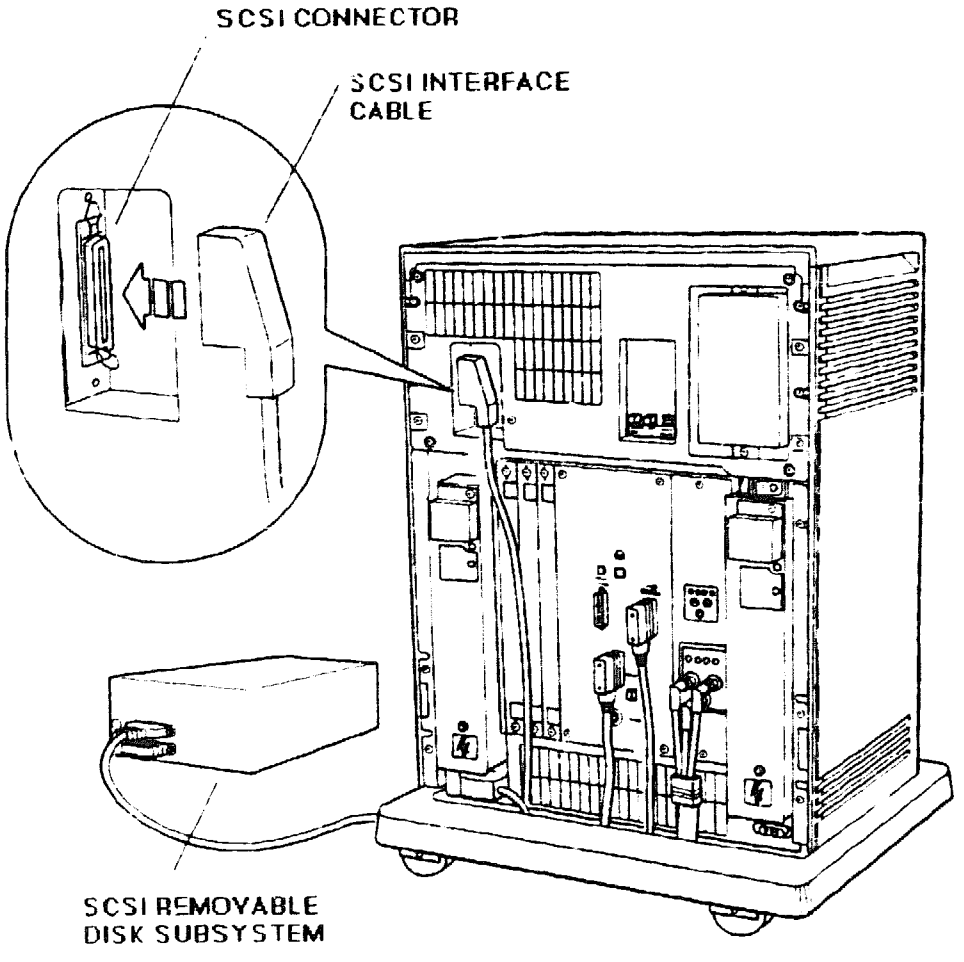


Figure 2–6 VAXstation 3520/3540 Connections

NOTE

Not all VAXstation 3520s or VAXstation 3540s support connections to the SCSI Removable Disk Subsystem. If your VAXstation 3520 or VAXstation 3540 was NOT ordered with this SCSI Removable Disk Subsystem, ask you Digital Equipment Corporation Customer Service representative to install the internal cable (PN 17-02622-01). The existing internal disk(s) cannot be used after the internal cable (PN 17-02622-01) is installed.

Figure 2–7 shows the SCSI interface cabling for a single-disk subsystem.

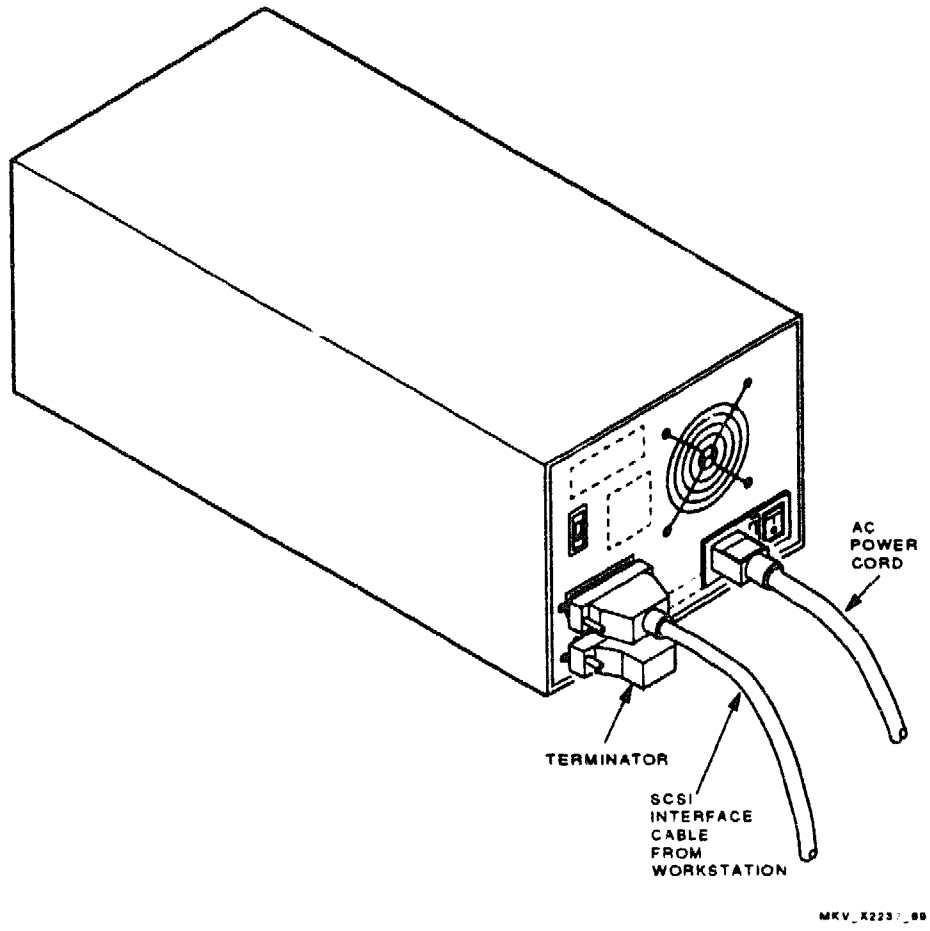


Figure 2–7 Cabling Single SCSI Removable Disk Subsystem

Figure 2–8 illustrates two SCSI Removable Disk Subsystems interconnected. When two drives are daisy-chained together, both should be powered up before starting the system.

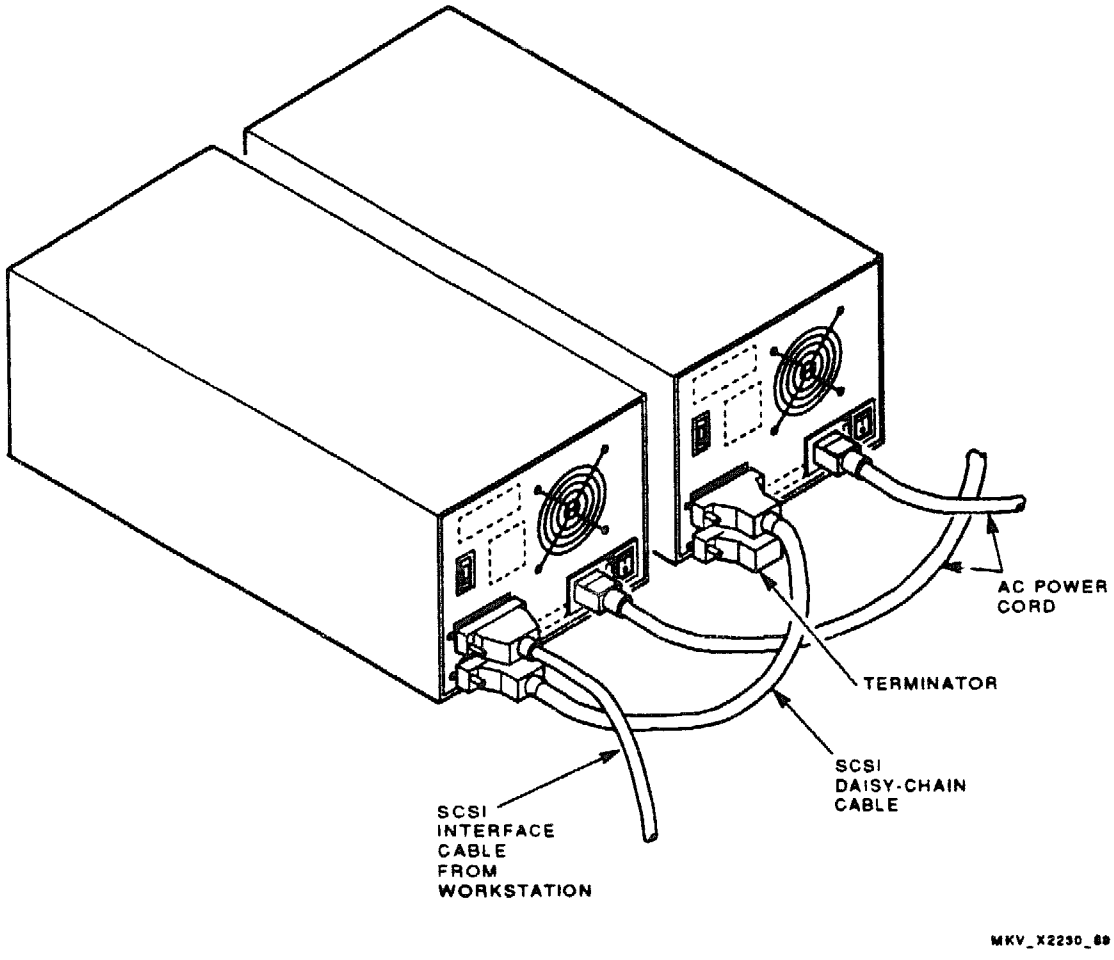


Figure 2–8 Daisy-Chaining SCSI Removable Disk Subsystems

2.7 STARTING THE SYSTEM AFTER INSTALLATION

When starting your system, set the ON/OFF switch to the ON (1) position for all the devices in the order listed below. (Note: Not all of these devices may be cabled to your system.)

1. SCSI Removable Disk Subsystem chassis (canister NOT installed)
2. RZ55/RZ56 hard disk expansion box
3. TK50Z tape expansion box
4. RRD40 compact disc expansion box
5. Printer and modem
6. Monitor
7. System

This procedure ensures that external devices should be ready for use, and will be included in the system's firmware configuration. Failure to apply power to any device on the SCSI bus will cause that device to not be seen on the SCSI bus.

NOTE
All SCSI devices must be powered up and the SCSI Removable Disk(s) must be on-line prior to booting up the operating system.

2.7.1 Dynamic Reconfiguration Of Devices

Devices on the SCSI bus may not be added to the bus, removed from the bus, or re-cabled while the system is in operation. Failure to meet this requirement may cause loss of user data or system failure.

2.7.2 External Boxes

Devices residing outside of the main system box should remain powered-on at all times while the system is in operation.

- Some powered-off SCSI devices fail to present a high impedance to the SCSI bus, leaving the bus unusable.
- A powered-off device can reduce the terminator power on the bus to unacceptable levels, causing user data corruption or system failure.
- The device can spike various SCSI bus signals during power-on or power-off, leading to user data corruption or system failure.

Although you may successfully power on or off external boxes while the system is running, Digital recommends that external devices remain powered-on at all times during system operation.

2.7.3 Power Failures

In the event of a power failure, power off all devices and the workstation. Follow the power-up procedure in Section 2.7 to ensure that all devices and the workstation have been properly powered up.

2.8 INSTALLATION VERIFICATION

2.8.1 VAXstation 3100/MicroVAX 3100

Verify the SCSI Removable Disk Subsystem installation using the *SHOW DEVICE* command at the console prompt (>>>). Example 2–1 shows a VAXstation 3100 display similar to one used to verify a newly instalied device. (Actual displays are configuration-dependent and additional information can be obtained in your owner's manual.)

```
>>> SHOW DEVICE
VMS/VMB       ULTRIX  ADDR          DEVTYP   NUMBYTES   RM/FX  WP DEVNAM  REV
-------       ------  ----          ------   --------   -----  -- ------  ---

ESA0           SEO  08-00-2B-07-E3-83

DKA300        RZ3      A/3/0/00     DISK     104 MB     FX        RZ23    0A18
...HostID....          A/6          INITR

DKB100        RZ1      B/1/0/00     DISK     332 MB     FX        RZ55    0A18
DKB200        RZ2      B/2/0/00     DISK     104 MB     FX        RZ23    0A18
DKB300        RZ3      B/3/0/00     DISK     104 MB     FX        RZ23    0A18
...HostID....          B/6          INITR

>>>
```

Example 2–1 VAXstation 3100 SHOW DEVICE Command

Your newly added SCSI Removable Disk Subsystem should be displayed at address zero (DKB0) or address one (DKB100). Example 2–1 shows a newly added SCSI Removable Disk Subsystem at address one (DKB100).

If the address of the device you just added does not appear when the *SHOW DEVICE* command is issued, refer to Section 2.8.4, Installation Verification Checklist.

2.8.2 VAXstation 3520/VAXstation 3540

Enter the *SHOW SCSI* command at the console prompt (CPUxx>>>) to verify the SCSI Removable Disk Subsystem installation (Example 2–2).

```
CPUxx>>> SHOW SCSI
ADDR    VMB       DEVTYP   DEVNAM   NUMBYTS      REV    CHAR
-----   -------   ------   ------   -------      ----   ----
5.1.0   DKA100    DISK     RZ55     332  MB      0700
5.3.0   DKA300    DISK     RZ56     665  MB      0200
5.4.0   DKA400    RODISK   RRD40    599  MB      250E   RM,WP
5.6               HOST     SII-A
```

Example 2–2 SHOW SCSI Command

To determine which addresses are in use, look at the ADDR column in the display. The second digit in the number under the ADDR column is the SCSI ID. In Example 2–2, SCSI IDs 1,3,4, and 6 are being used. (Actual displays are configuration-dependent and additional information can be obtained in the *VAXstation 3520/3540 Hardware Installation Guide*.)

If the address of the device you just added does not appear when the *SHOW SCSI* command is issued, refer to Section 2.8.4, Installation Verification Checklist.

2.8.3 DECstation 2100/3100

At the console prompt (>>), use the *test -c* command to display the system configuration table as shown in Example 2–3.

```
>> test -c

MEM: 16Mbytes
VIDEO: MONO
ETHERNET STA ADDR: 08-00-2b-0c-4a-8b
SCSI DEVS:
U[7]
U[6]KN01--SII
U[5]
U[4]
U[3] Dev typ   0 DISK
          RMB                    0x0
          Vrs                    1
          Format                 1 CCS
          Add len                31
          Vndr                   DEC
          PID                    RZ5[illegible]   (C) DEC
          Frevlvl                0200
U[2]
U[1]
U[0]
```

Example 2–3 test -c Command

Where,

```
ETHERNET STA ADDR:  =  ETHERNET STATION ADDRESS:
SCSI DEV:           =  SCSI DEVICES:
U[7]                =  Unit[7]
U[3] Dev typ 0 DISK =  Unit[3] Device type  0 DISK
Vrs          1      =  Version                 1
Format       1 CCS  =  Response data format    1 CCS
Add len      31     =  Additional length       31
Vndr         DEC    =  Vendor                  DEC
PID          RZ56   =  Product identification  RZ56 (C) DEC
Frevlvl      0200   =  Firmware revision level 0200
```

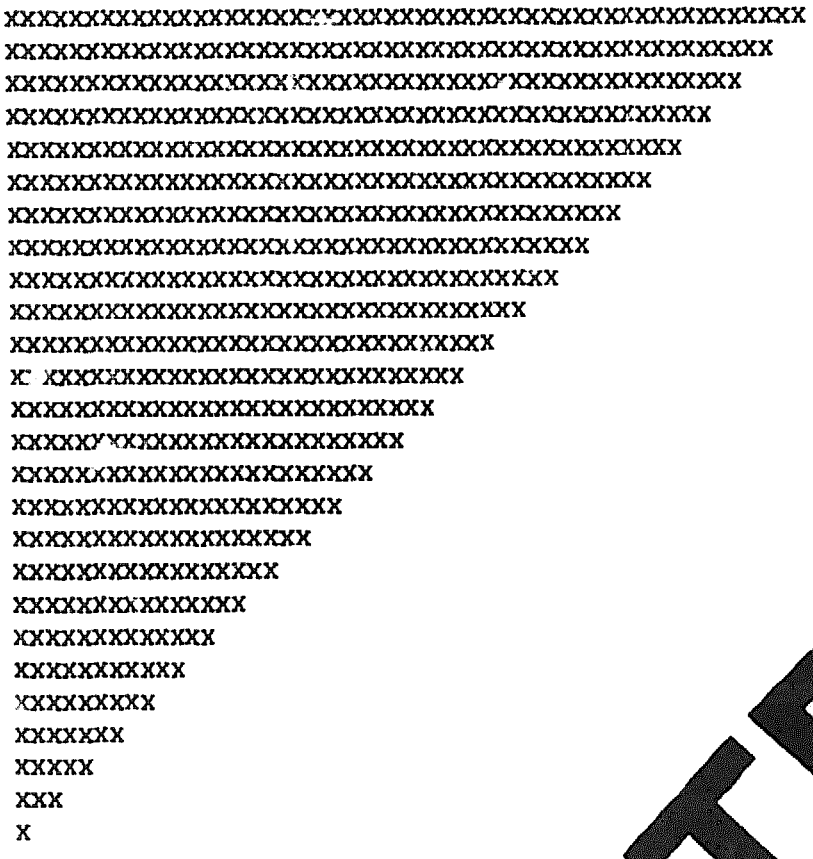
In Example 2–3 device numbers listed (such as U[4]) without any additional information can be used for expansion, as they are not currently configured. The actual display is configuration dependent and may be different when using the *test -c* command, on any other system. Refer to Section 2.8.4, if the device added does not appear in the configuration table.

2.8.4 Installation Verification Checklist

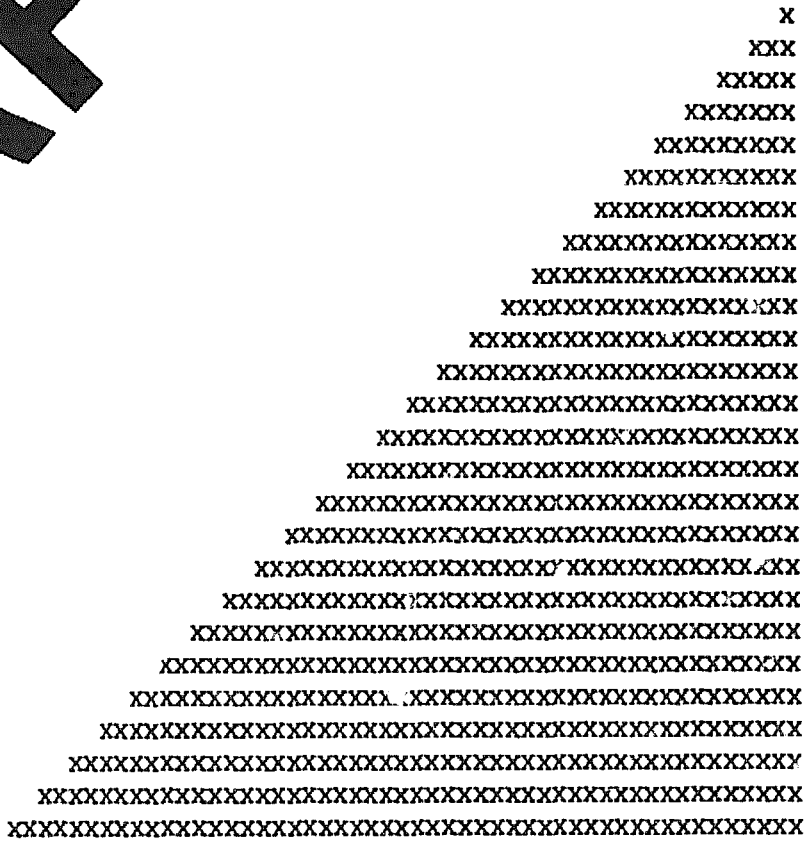
If the address of the device you just added does not appear when the *SHOW DEVICE* command (VAXstation 3100 or MicroVAX 3100), *SHOW SCSI* command (VAXstation 3520/40), or *test -c* command (DECstation 2100/3100) is issued, the following checklist will assist you in isolating the problem:

- Verify that the expansion box has power and is switched on, and that the yellow LED on the momentary push button is ON.
- Check that the SCSI terminator is on the last physical device connected to the SCSI bus.
- Verify that the SCSI port cable is correctly connected to the SCSI port and to the back of the disk subsystem.
- Verify that the address select switch in the chassis is correctly set, and that there are no conflicting addresses.
- Check to see if the power supply is operating correctly. See that the LEDs are ON and the fan is rotating.
- Halt and power down the system. Then, follow the power-up sequence in Section 2.7, making sure all devices are powered up before applying power to the workstation.
- Halt and power down the system, disconnect all devices except one. Repeat this step, adding one device at a time, until the defective device is isolated.

When daisy-chaining a second disk drive, verify that the cable connections are firmly attached, and that power is applied to both drives. If the drive is still not seen by the system, contact your Digital Equipment Corporation Customer Services representative.



CHAPTER 3



3
USING THE DISK

3.1 INTRODUCTION

This chapter provides additional information needed to use the SCSI Removable Disk Subsystem. It includes helpful information on handling, mounting and dismounting, and write-protecting the SCSI Removable Disk Subsystem.

3.2 HANDLING

The disk is shock-mounted in the canister; however, take care when moving the canister from location to location. When removing the disk from the chassis, slide the disk out slowly and keep a firm secure grasp on the handle. While pulling out the disk, support the back end of the disk to prevent it from swinging freely when fully extracted.

When storing, place the disk canister on a flat, level surface. Do not stand the canister on end because it could easily fall over.

When moving the entire subsystem, remove the canister first before transporting the chassis to a new location. Do not attempt to lift the entire subsystem by the canister handle because it was not designed for this purpose.

Never move the chassis while the drive is spinning. Always make sure that the drive is powered down and removed first.

Do not remove the canister during an access to the disk, loss of data could result. Or, if a second disk is connected a soft error could occur on that disk. Always dismount the disk first, then power down the drive using the momentary pushbutton (MPB) before removal.

If there is a power failure, data already residing on the disk will not be lost or destroyed. If a write was occurring during the power failure, data may be lost.

3.3 MOUNTING AND DISMOUNTING

The following subsections discuss precautions that should be noted when mounting and dismounting the SCSI Removable Disk Subsystem.

3.3.1 VMS Operating System

Before changing the disk canisters, the drive must be dismounted, using the *DISMOUNT* command. Failure to do so will cause the drive to remain configured. The system will not permit access to another volume (disk) at that same SCSI ID.

If the disk canisters were mistakenly swapped without dismounting, power down and remove the second disk. Replace it with the original disk, power up, and then dismount the volume.

The SCSI ID is unique to the chassis, and the volume label is unique to the drive. When mounted, the system logs both the SCSI ID and the volume label. When another drive is plugged into the same chassis with a different volume label, it will not be recognized if the previous volume was not properly dismounted.

3.3.2 VAXstation ULTRIX Operating System

When an ULTRIX operating system is built on a SCSI Removable Disk Subsystem at a specific address, that is the only address at which the system can be booted. This can be avoided by building a kernel for each address in which that drive could be used.

CAUTION:
When running an ULTRIX operating system, always dismount the SCSI Removable Disk before it is removed, using the *umount* command. Depending on the situation prior to the removal of the disk, the partition can be corrupted, information lost, and the disk cannot be remounted.

3.3.3 RISC ULTRIX Operating System

SCSI Removable Disk Subsystems connected to a DECstation 2100/3100 can be mounted and dismounted, using the *mount* and *umount* commands. If the disks are removed, powered down, or taken off-line using the momentary push button (MPB), the system will have to be rebooted before the drives can be recognized again.

CAUTION:
Always dismount the disk prior to removing. If the disk is not dismounted the partition can be corrupted, information lost, and the disk cannot be remounted.

3.4 WRITE PROTECT

NOTE:
If your system disk is a removable disk, that volume cannot be write-protected. If the system disk is write-protected, the system will not boot.

3.4.1 VMS Operating System

When the SCSI Removable Disk Subsystem is powered up with the canister installed, the disk (when mounted) will reflect the position of the write-protect switch. For example, if the write-protect switch is in the "ON" position when the unit is powered up (by means of the OFF/ON switch on the back of the chassis), the yellow LED on the momentary pushbutton (MPB) will light and the red write-protect LED will light. When you mount the disk, the volume will now be write-locked.

The following procedure should be used to write protect the SCSI Removable Disk Subsystem (Figure 3–1):

CAUTION
DO NOT change the position of the write-protect switch without dismounting and powering down the unit. Failure to do so will result in an inaccurate write-protection indication.

1. Dismount the disk (if mounted).
2. Press and release the momentary pushbutton (MPB) on the front panel of the chassis to remove power from the disk. Wait for the green LED to illuminate and the yellow LED to extinguish.
3. Slide the write-protect switch to the ON position.
4. Press and release the momentary pushbutton (MPB) on the front panel of the chassis, which applies power to the disk. The yellow LED should illuminate. The red write-protect LED will illuminate, indicating the write-protected mode.
5. Mount the disk.

The previous procedure can be repeated to set the write-protect switch to the OFF position. The red write-protect LED will be extinguished when the SCSI Removable Disk Subsystem is in write mode.

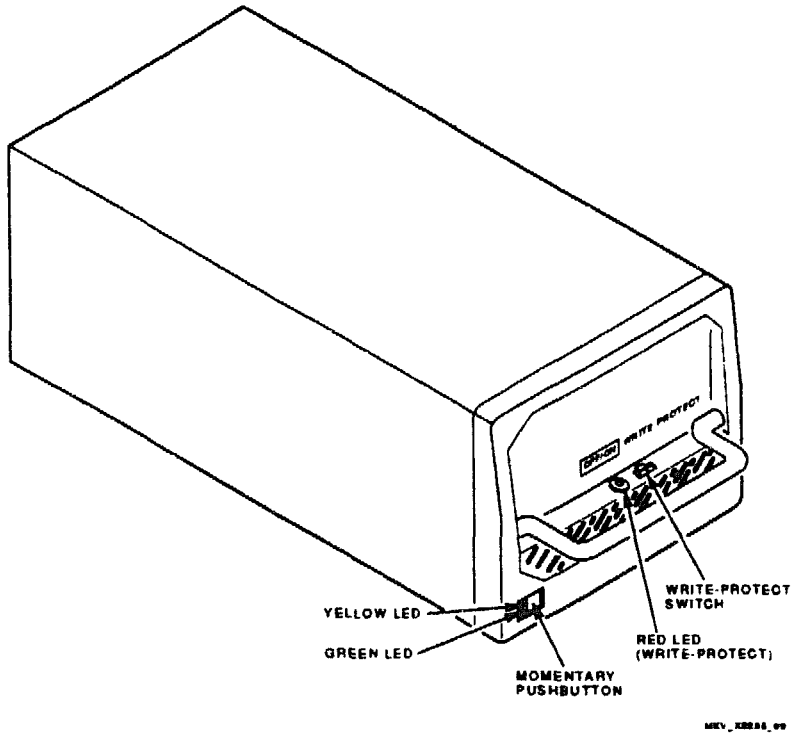
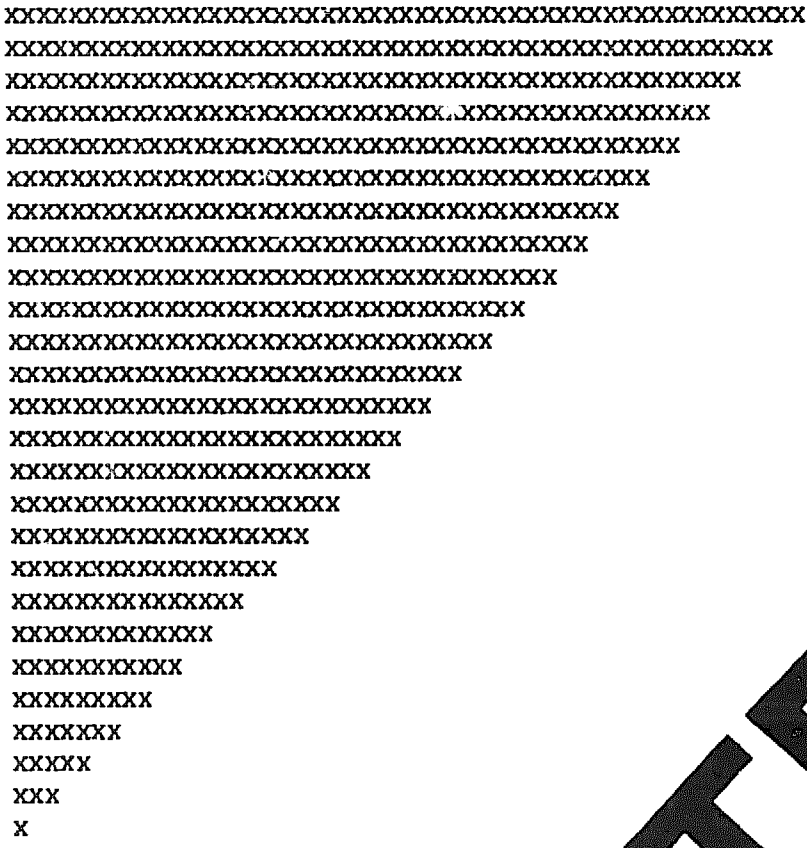


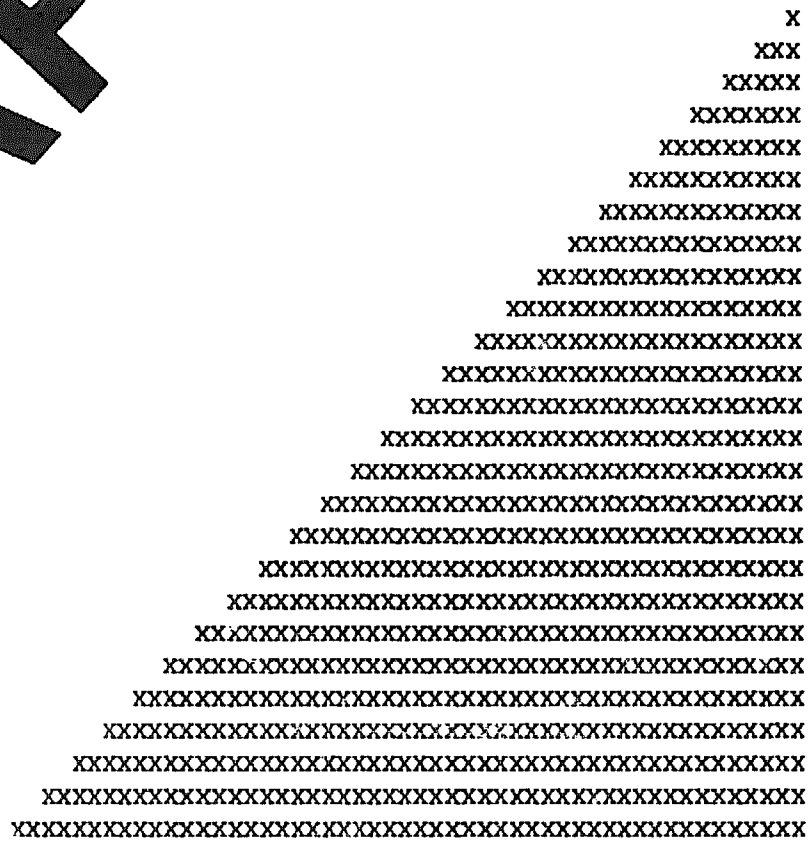
Figure 3–1 Write-Protect

3.4.2 ULTRIX Operating System

When using the SCSI Removable Disk Subsystem with a workstation running ULTRIX, the write protect switch should always be set to the OFF position. If a disk needs to be write protected it should be mounted "read-only". Refer to the workstation user's manual for further information.



CHAPTER 4



4
SERVICE

4.1 INTRODUCTION

This chapters provides disassembly and maintenance information for the field service engineer.

4.2 CHASSIS

The chassis has three parts that can be removed and replaced in the normal service mode.

4.2.1 Voltage Select Switch and Line Fuse

The SCSI Removable Disk Subsystem is designed to operate on either 110 Vac or 220 Vac. The chassis comes preset to 110 Vac with the appropriate fuse installed. When changing the line voltage to 220 Vac, both the switch setting and the fuse must be changed.

The line voltage select switch and ac line fuse holder are located on the rear panel of the chassis (see Figure 2-1). The ac line fuse, adjacent to the ac input cord connector, can be removed using a small blade screwdriver or similar instrument to pry off the cover. Replace with the appropriate fuse listed below:

Fuses:

110 Vac configuration uses a 2 amp slow blow 3AG
220 Vac configuration uses a 1 amp slow blow 3AG

The line voltage select switch can be changed using the same small blade screwdriver, or similar instrument, by moving the slide switch up or down until the desired line voltage is visible on the switch.

WARNING:
THE LINE VOLTAGE SELECT SWITCH AND FUSED VALUE MUST BE CORRECTLY SELECTED BEFORE CONNECTING TO ANY A/C LINE VOLTAGE.

4.2.2 Power Supply

The power supply located in the chassis provides the necessary power to ensure error free disk operation. Forced-air cooled and strategically located, the power supply is protected from line surges, transients, and line variations to assure years of trouble free operation.

4.2.3 Power Control Board

The Power Control Board is located in the rear of the chassis below the integral power supply and performs the following functions:

- Switches the power to the disk canister, using proprietary MOSFETs.
- Generates an internal 24 Vdc for MOSFET switching.
- Provides a noise filter to eliminate dc fan noise.
- Interfaces to the front panel Select Switch and controls the LED status indicators.
- Detects and disables the dc power when a powered up drive is being removed.
- Provides terminator power to the rear panel connector where data and control lines are terminated. This power is fused as shown in Figure 4–1.
- Controls the timing of the chassis power status LEDs.
- Provides signal distribution between the rear panel 50-pin I/O connector and the disk drive.
- Provides a mounting platform for the LIF (Low Insertion Force) connector, that mates with the canister's LIF connector.
- Contains the drive unit select switches mounted on the front edge of the board.

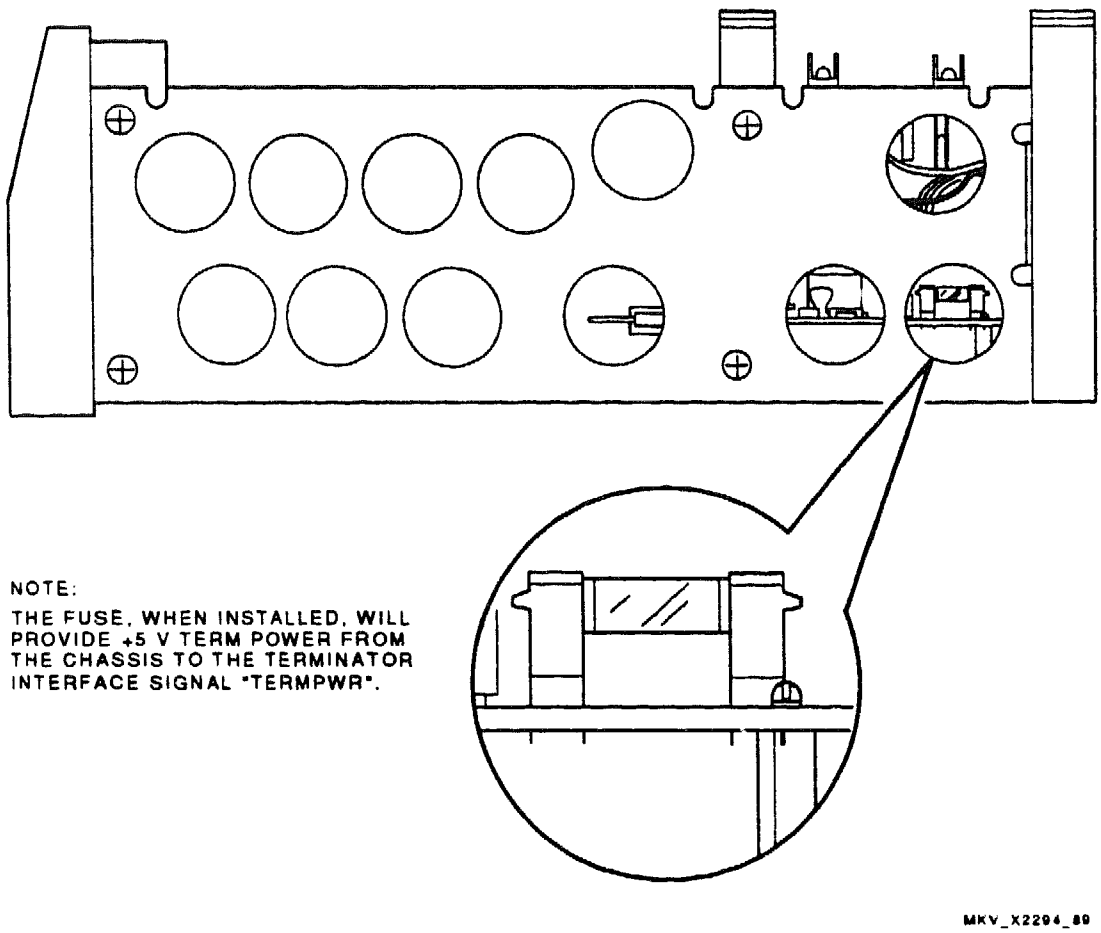


Figure 4–1 Terminator Fuse (located on the power control board)

4.3 CANISTER

The canister is designed to house a 5.25–inch half or full height disk drive and protect it from shock and vibration damage.

4.3.1 Internal Distribution Board

The Internal Distribution board (shown in Figure 4–2) is designed to accommodate SCSI disk drives. Unit select is handled by a command sent to the drive. The unit select switches on the disk drive auxiliary connector are connected to the internal distribution board (connector J3) using a unit select ribbon cable (PN 17-02625-01). Table 4–1 lists the unit select ribbon cable signals.

Table 4–1 Unit Select Ribbon Cable Definitions

Pin	Signal	Description
1	ID0	Drive Select 0
2	GND	Signal Ground
3	ID1	Drive Select 1
4	GND	Signal Ground
5	ID2	Drive Select 2
6	GND	Signal Ground
7	—	No Connection
8	—	No Connection
9	—	No Connection
10	GND	Signal Ground
11	WPT	Write Protect
12	—	No Connection
13	READY	Drive Ready Signal
14	—	No Connection

Several jumpers are provided on the Internal Distribution Board for controlling the interface signals of SCSI disk drives. Table 4–2 lists the default jumper configurations. The *PARK POSITION* jumpers shown in Figure 4–2 are not used.

Table 4–2 Jumper Configurations

Jumper	Status	Function (when installed)
JP 1	Removed	Automatic motor spin-up
JP 2	Removed	Enable SCSI bus parity
JP 3	Removed	Reserved
JP 4	Installed	Termination power select

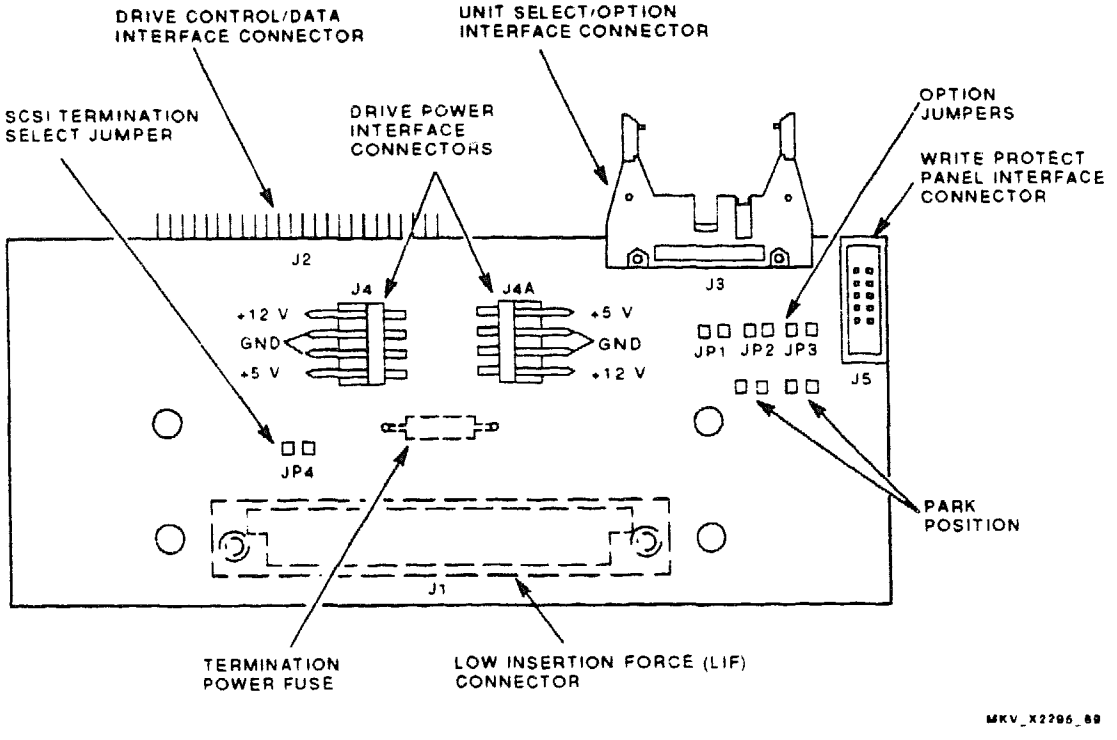


Figure 4–2 Internal Distribution Board

4.3.2 Disk Drive Installation

Install the disk drive in the canister as described below:

1. Remove the top cover and remove the mounting parts wrapped in plastic. Remove any masking tape.
2. Check the mounting hardware listed in Table 4–3 for all pieces. Disregard any ribbon cable or round cable with a connector (unless marked with the Digital part number 17-02625-01).

Table 4–3 Mounting Hardware

Description	Quantity
#6–32 x 3/8 inch Flathead Screw	6
#6–32 x 1/4 inch Phillips Head Screw	4
#6 Lockwashers	4
1/4–20 x 5/8 inch Flathead Screw	4
Shock Mount Bar	2

3. Attach the shock mount bars with the 6–32 x 1/4" Phillips screws and lock washers, 2 on each side. (see Figure 4–3).

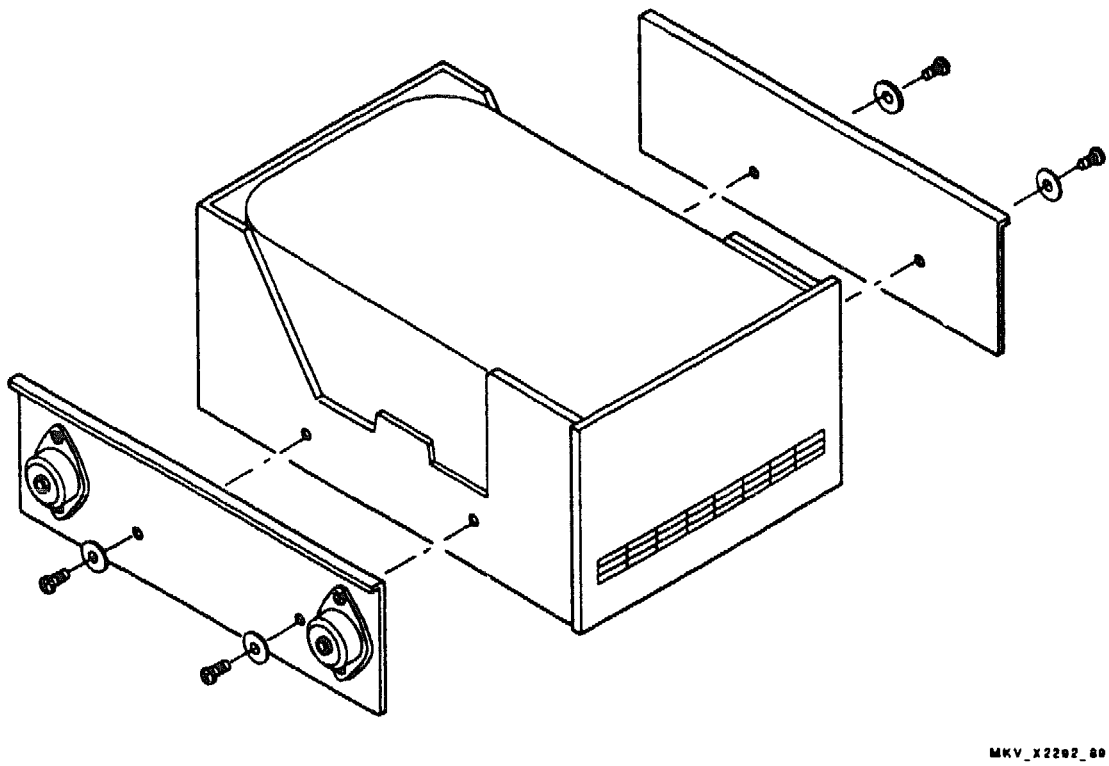


Figure 4–3 Shockmount Assembly Installation

4. Remove any jumpers from the J2 connector on the drive. (The 24 position connector is J2.)
5. Verify the configuration of internal distribution board, using Table 4–2.
6. Attach the unit select ribbon cable (17-02625-01) to the canister, 14 position connector, matching pin 1 markings.
7. Attach the three connectors to the drive (J1 - 50 position connector, J2 - 24 position connector, and J3 - power connector).
8. Insert the disk drive into the canister and mount using four 1/4–20 x 5/8" flat head screws. Do not tighten fully until cover is in place. (see Figure 4–4)

9. Place the canister cover on and secure it with 6-32 x 3/8" flat head screws (three per side).
10. Tighten all 16 (8 on each side) screws.

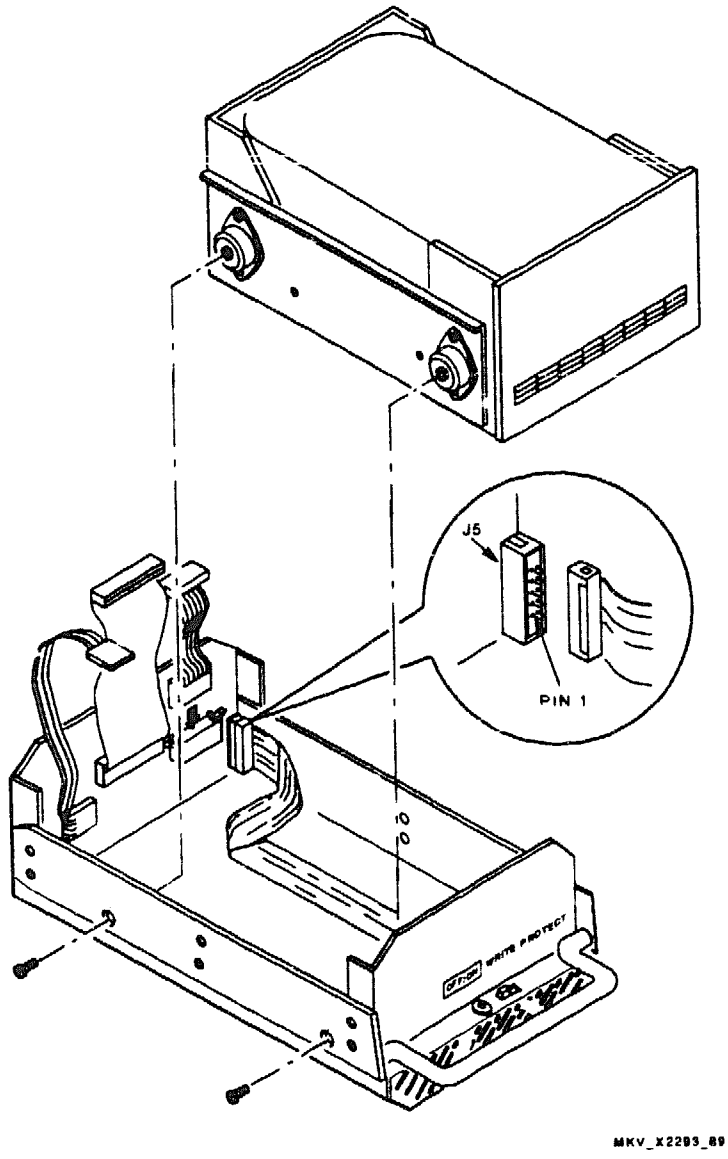


Figure 4–4 Disk Drive Installation

4.4 SYSTEM UPGRADE REQUIREMENTS

There are no modifications required for the VS3100 or MicroVAX 3100 systems, if an existing system is being upgraded with a SCSI Removable Disk Subsystem, follow the instructions in Appendix A for finding an open SCSI address.

For the VS3520 or VS3540 system upgrades, there is a cable replacement required before attaching the SCSI Removable Disk Subsystem to an existing VS3520/3540. If the VS35xx was ordered with the SCSI Removable Disk Subsystem then this cable was factory installed.

NOTE:
If the VS35xx currently has internal RZ55's or RZ56's, these disks will no longer be physically attached to the SCSI bus. If these disks still need to be accessed, they can be installed in a canister as described in Section 4.3.2, Disk Drive Installation .

4.4.1 Internal Ribbon Cable Installation

To remove the existing cable, remove the front cover, the mass-storage cover, the SCSI terminator, and the control panel assembly of the VS35xx (see VAXstation 3520/3540 Maintenance Guide). Remove the I/O cover, that covers slots 4 through 9. Slot 5 contains the (L2003) I/O module. Attached to the upper connector is a 50 conductor twisted-pair ribbon-cable (P/N 17-02237-01). Remove this cable and disconnect it from the control panel assembly. Attach the new 2–foot ribbon cable (P/N: 17-02622-01) to the upper connector of the I/O module and thread the cable up into the mass-storage area, and over to the SCSI connector area on the control panel assembly. Snap the connector into the mounting recess for the SCSI connector, as shown in Figure 4–5. Replace all covers.

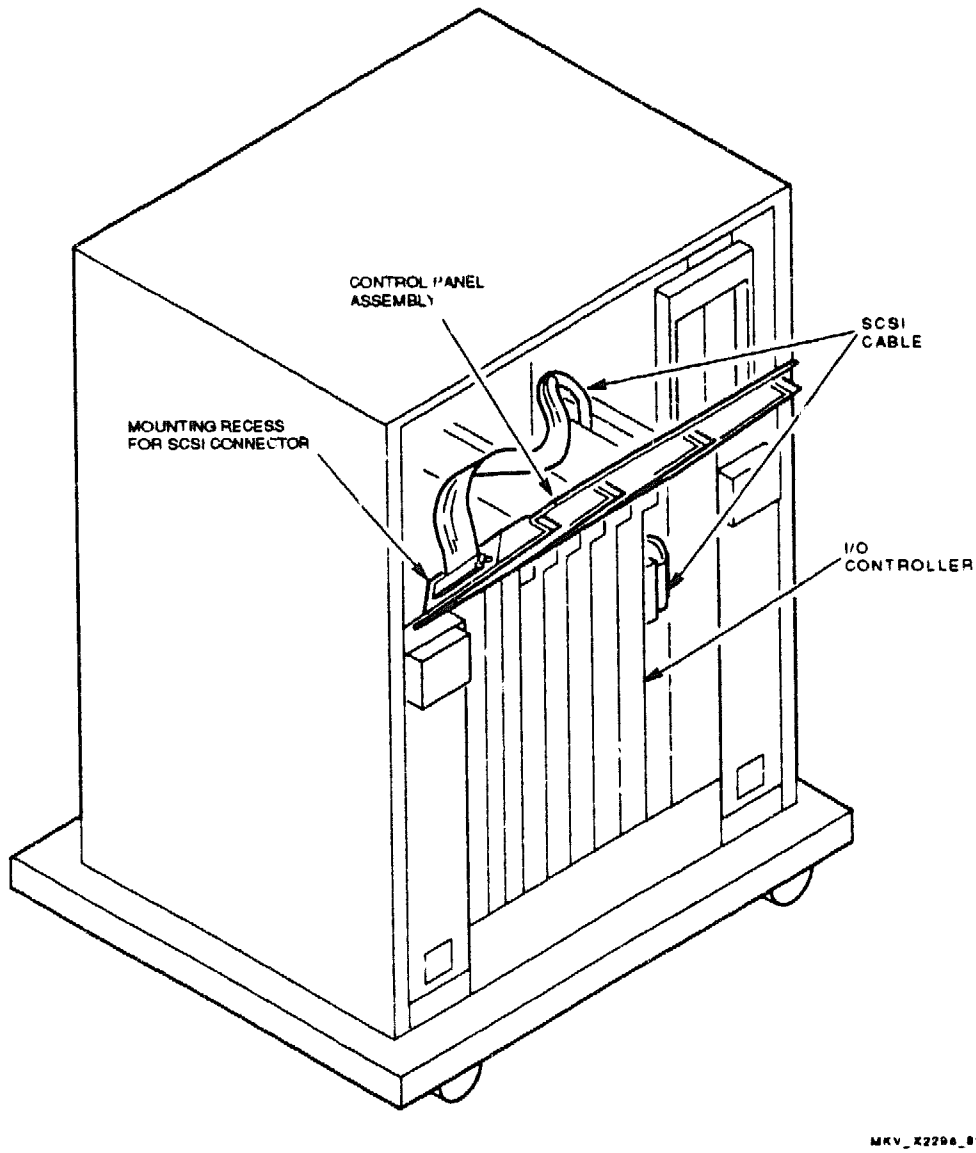


Figure 4–5 Ribbon Cable Installation

4.5 SETUP VERIFICATION

Attach the SCSI Removable Disk Subsystem(s) and power up as described in Section 2.7, STARTING THE SYSTEM AFTER INSTALLATION.

The console prompt field service exerciser diagnostics can be used to verify the disk operations Refer to your system maintenance manual for instructions on how to run the field service mode system exerciser (a loopback connector may be required for some tests).

4.5.1 Software Requirements

When upgrading a system with an RZ56, VMS V5.2–1 or ULTRIX V3.1/UWS V2.0 (or greater) is required.

4.5.2 System Requirements

To use an RZ56 in a VAXstation 3520/3540, the I/O ROMs must be version V1.3 or greater.

To determine what version of I/O ROMs are currently in the I/O module in the system, follow theses procedures:

- In the console mode, type the following at the prompt (>>>):

  >>> test 50

- You should see a display similar to the following:

```
>>> test 50

KA60      V1.0
MID         ODTYPE          ID          SLOT      ERR
 0            .            L2008         9
 1        01020310         L2007CA        8
 2        01010108         L2001          7
 3        01010108         L2001          6
 4        01020310         L2007CA        5
 5        01010004         L2003          4
 6        01010002         L2004          3
 7            .            L2005          2
 8            .            L2006          1
```

Example 4–1 Test 50

- The "MID" number or M-bus module ID is located in the left most column. For the I/O module (L2003) the MID number is 5. Note that the *slot* number and the *MID* number are not the same.

- At the console prompt (>>>), type the following command:

  >>> TEST 50 5

  Where, the number 5 is the MID ID of the module to be tested.

- You should see a display similar to the following:

```
>>> test 50 5

    5       01010004       L2003     4     V1.1
1   SSC     00000001
2   DZ      00000001
3   NI      00000701
4   SCSI    00000901
5   SYS     00000001
```

Example 4–2 Test 50 5

- The version of I/O ROMs in this particular example are V1.1 as seen at the end of the first line.
- If the I/O ROMs are not at V1.3 or greater, replace them. Replacement ROMs and their locations are shown in Table 4–4. Always use an antistatic wrist strap when replacing ROMs.

  To replace the I/O ROMs remove the front cover, the mass-storage cover, the SCSI terminator and the control panel assembly of the VS35xx (see VAXstation 3520/3540 Maintenance Guide). Remove the I/O cover that covers slots 4-9. Slot 5 contains the I/O module (L2003). Disconnect any I/O cables and remove the I/O module. Using Table 4–4 locate and replace the existing ROMs. To assemble reverse the procedure and replace all covers.

Table 4–4 ROM Part Numbers

DEC P/N	Rev	Location
23-062E8-00	1.3	E23
23-063E8-00	1.3	E4

4.6 TROUBLESHOOTING

4.6.1 Device Address Does Not Appear

If after going through the installation verification Section 2.8 and the address of the SCSI Removable Disk Subsystem still does not appear, follow the procedure below:

1. Shutdown and halt the system, power down the system and all devices.
2. After the drive has spun down, remove the canister.
3. With a Phillips screwdriver, remove the lid to the canister and check to be sure that all cable connections are secure.

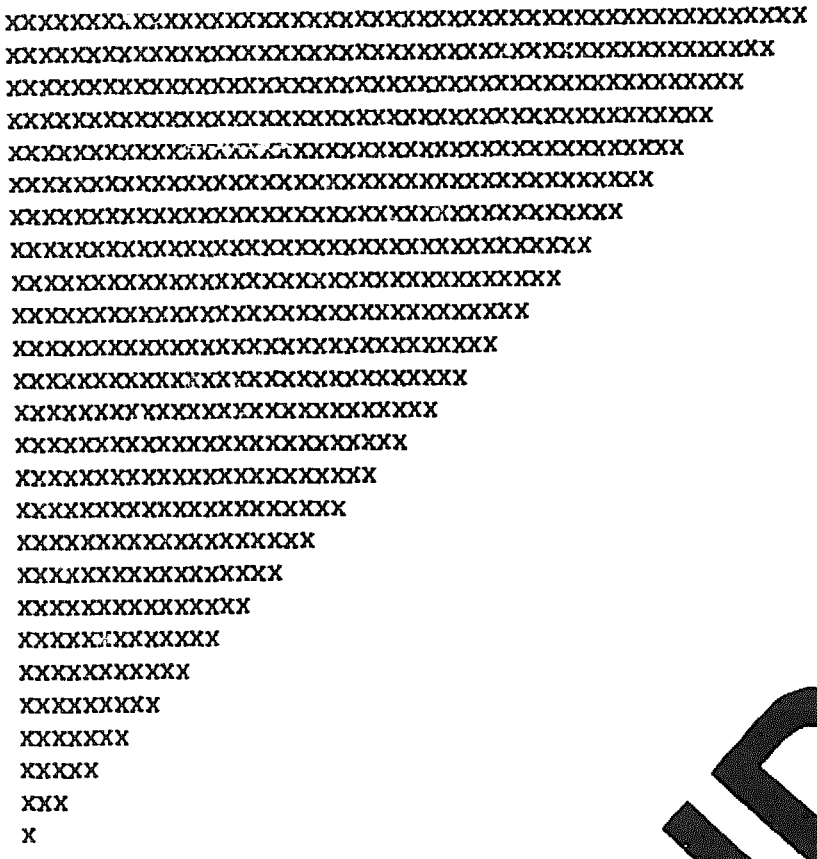
4.6.2 Drive Problems

If the problem appears to be the drive, consult the maintenance manual for your system (see About This Manual). This may isolate the problem by returning an error code that could indicate that the disk may be bad.

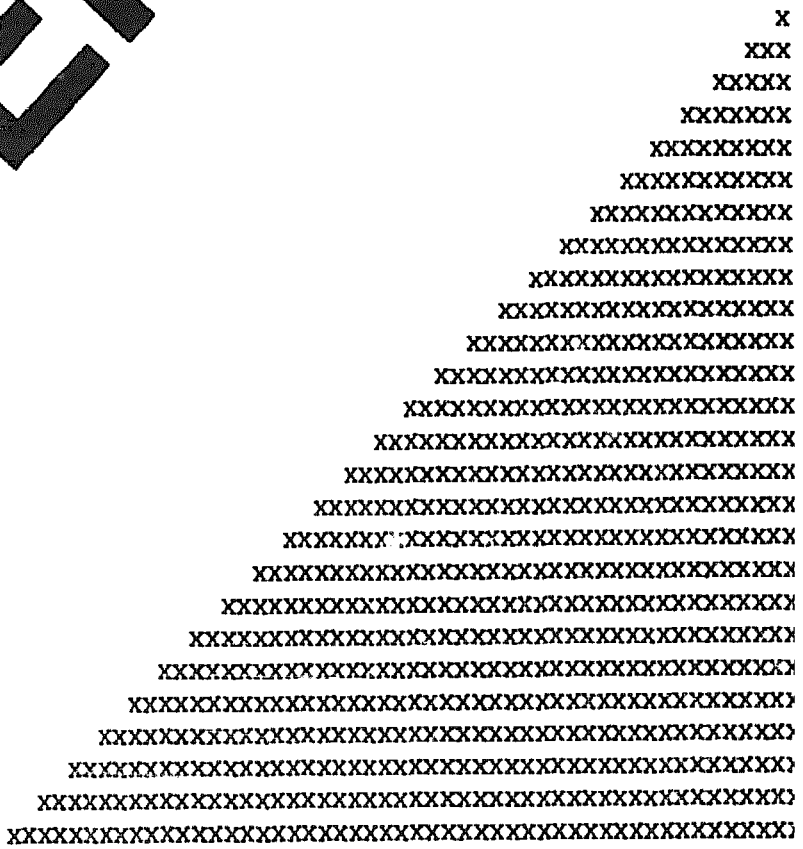
4.6.3 Write Protect Switch Does Not Function

If the write protect switch does not light after following the procedures in Section 3.4, do the following:

- Follow the procedures outlined in section Section 4.6.1, Device Address Does Not Appear to access and check the internal cables.
- Inspect the ribbon cable that runs from the front of the canister, where the write protect switch is located, to connector J3 on the internal distribution board (it may be necessary to remove the disk). Check to make sure that at the internal distribution board side connector J3 is firmly connected and that Pin 1 (the red side) of the cable is closest to the bottom of the canister.



APPENDIX A



A
SCSI ADDRESSING

A.1 INTRODUCTION

This appendix provides additional information on SCSI addressing.

A.2 SCSI ADDRESSING RULES AND CONVENTIONS

SCSI devices use identification numbers 0 through 7, with 7 being the highest priority ID. Address 7 is reserved and address 6 is used for the SCSI controller. Six device addresses (0—5) are available for custom configuring. Table A–1 lists the suggested addresses for each device connected to the bus.

Follow these rules when you are selecting the SCSI address:

- There can be up to eight SCSI devices (including the controller) on the bus.
- Each device must have a unique address. The same address cannot be used for two or more devices on the same SCSI bus.
- Each SCSI bus must be terminated at the last physical device on the bus.

Table A–1 Unit Select Addresses (Recommended)

Device Address	Device Type	Intended Use
0	Open	SCSI Removable Disk Subsystem (First Unit)
1	Open	SCSI Removable Disk Subsystem (Second Unit)
2	Disk Drive	User Disk
3	Disk Drive	System Disk
4	Disk Drive	RRD40
5	Tape Drive	TK50Z or TZ30
6	Reserved	SCSI Controller
7	Reserved	Reserved

A.3 VAXstation 3100 and MicroVAX 3100 SCSI BUS ADDRESS ID SETTINGS

To determine the available addresses on the SCSI bus, enter *TEST 50* at the console prompt (>>>) then press the Return key. Your system's configuration will appear on the console screen. The new drive should be set to an *OPEN* (not used) SCSI ID. If a SCSI device is not connected and powered on before *TEST 50* is entered, the system firmware will not include the device in its configuration.

Example A–1 shows a fully configured VAXstation 3100 Model 30 system. *FFFFFF05* indicates an open SCSI address.

```
>>> TEST 50
SCSI-B      1C1C.0001      V1.0

FFFFFF05 FFFFFF05 FFFFFF05 00000001 05020001 01000000 FFFFFF03 FFFFFF05
❶        ❷        ❸        ❹        ❺        ❻        ❼        ❽

     (LINES OMITTED to simplify this example)
```

❶ SCSI ID 0—OPEN

❷ SCSI ID 1—OPEN

❸ SCSI ID 2—OPEN

❹ SCSI ID 3—RZ23

❺ SCSI ID 4—RRD40

❻ SCSI ID 5—TK50Z

❼ SCSI ID 6—SCSI-B controller

❽ SCSI ID 7—OPEN (This ID is reserved for devices requiring the highest priority.)

Example A–1 TEST 50

NOTE

To simplify this example, lines of information have been omitted in Example A–1. *TEST 50* displays data concerning the entire system. Refer to the specific workstation user manual for additional information (see Table 1 in the About This Manual section).

Table A–2 lists the normal status codes for each SCSI device in the system. Status codes other then those listed indicate a device error at that address.

Table A–2 SCSI Devices Self-Test Status Codes

Status Code	SCSI Device
FFFFFF05	Device is off-line or not installed at this address
FFFFFF03	SCSI Bus Controller
FFFFFFFF	Device not tested - possible SCSI bus controller error
00000001	Disk Drive (RZ22, RZ23, or RZ55)
01000001	Tape Drive (TZ30 or TK50Z)
05020001	RRD40 Compact Disc Drive

A.4 VAXstation 3520 or VAXstation 3540 SCSI BUS ADDRESS ID SETTINGS

To determine the available addresses on the SCSI bus, enter *SHOW SCSI* command at the console prompt (CPU xx >>>) then press the Return key. Your system's configuration will appear on the console screen. If a SCSI device is not connected and powered up before the *SHOW SCSI* command is entered, the system's firmware will not include that device in its configuration.

In Example A–2, SHOW SCSI Command shows a display similar to the one you should see for your VAXstation 3520 or VAXstation 3540.

```
CPU xx >>> SHOW SCSI
 ADDR    VMB       DEVTYP    DEVNAM     NUMBYTS      REV       CHAR
 -----   ------    ------    -------    -------      ------    ------
 5.1.0   DKA100    DISK      RZ55       332  MB      0700
 5.3.0   DKA300    DISK      RZ56       665  MB      0200
 5.4.0   DKA400    RODISK    RRD40      599  MB      250E      RM,WP
 5.6               HOST      SII-A
```

Example A–2 SHOW SCSI Command

To determine which addresses are in use, look at the ADDR column in the *SHOW SCSI* example. The second digit in the address is the SCSI ID. In Example A–2, SCSI IDs 1, 3, 4, and 6 are in use. IDs 0, 2, or 5 are available for use (7 is reserved).

A.5 DECstation 2100/3100 SCSI BUS ADDRESS ID SETTINGS

At the system console (>>), use the *test -c* command to display the system configuration table as shown in Example A–3.

```
>> test -c

MEM: 16Mbytes
VIDEO: MONO
ETHERNET STA ADDR: 08-00-2b-0c-4a-8b
SCSI DEVS:
U[7]
U[6]KN01--SII
U[5]
U[4]
U[3] Dev typ    0 DISK
          RMB                    0x0
          Vrs                    1
          Format                 1 CCS
          Add len                31
          Vndr                   DEC
          PID                    RZ56    (C) DEC
          Frevlvl                0200
U[2]
U[1]
U[0]
```

Example A–3 test -c Command

Where,

```
ETHERNET STA ADDR:  =  ETHERNET STATION ADDRESS:
SCSI DEV:           =  SCSI DEVICES:
U[7]                =  Unit[7]
U[3] Dev typ 0 DISK =  Unit[3] Device type  0 DISK
Vrs          1      =  Version                1
Format       1 CCS  =  Response data format   1 CCS
Add len      31     =  Additional length      31
Vndr         DEC    =  Vendor                 DEC
PID          RZ56   =  Product identification RZ56 (C) DEC
Frevlvl      0200   =  Firmware revision level 0200
```

Example A–3 shows SCSI ID's 3 and 6 are in use. All other SCSI ID's (except 7) are available for use.