

VMS Installation and Operations: VAXstation 3100, MicroVAX 3100 Series

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This guide describes the startup, shutdown, and backup operations for the VAXstation 3100 and MicroVAX 3100 series. It also explains what you need to know to install the VMS operating system.

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Preface

VMS Installation and Operations: VAXstation 3100, MicroVAX 3100 Series contains specific installation and operations information for these VAX computers. Use it in conjunction with the current version of *VMS Upgrade and Installation Procedures* when you want to install or upgrade the VMS operating system. Store this guide in the binder that contains the current version of the *VMS Release Notes*. Place it in the section after the *VMS Release Notes*.

This guide often refers to computers by their abbreviated names. For example, the VAXstation 3100 computer is referred to as the VAXstation 3100.

Intended Audience

This guide is for system managers, operators, and users of the VAXstation 3100 and MicroVAX 3100 series of computers.

Document Structure

VMS Installation and Operations: VAXstation 3100, MicroVAX 3100 Series is organized into two parts. Part I provides an overview of the system and covers what you need to know to install the VMS operating system on a VAXstation 3100 or MicroVAX 3100 series computer. Part II describes operations that you perform frequently on the system such as system startup, shutdown, and backup.

Part I

- Chapter 1 describes the VMS operating system installation, upgrade, and update procedures.
- Chapter 2 describes the system hardware that you use during the installation.
- Chapter 3 summarizes the basic information you need to know before installing the VMS operating system.
- Chapter 4 describes some of the tasks you perform when you install the VMS operating system. These tasks are specific to the VAXstation 3100 and MicroVAX 3100 series.

Part II

- Chapter 5 contains instructions for starting up the system. It also describes shutdown procedures.
- Chapter 6 describes backup procedures that you should perform on a regular basis.
- Appendix A contains release notes.
- Appendix B contains information on the Small Computer System Interface (SCSI).

Preface

- Appendix C describes the VMS bad block support for SCSI disks.
- The Glossary lists and defines terms.

Associated Documents

The following documents might be useful:

- *VMS Upgrade and Installation Procedures*—Describes the installation and upgrade procedures for the current release of the VMS operating system. Use this guide in conjunction with *VMS Installation and Operations: VAXstation 3100, MicroVAX 3100 Series* when you are doing either an installation or an upgrade. This guide also contains information on the User Environment Test Package (UETP).
- *VMS Release Notes*—Provides notes on various aspects of the VMS operating system.
- The hardware manuals supplied with your VAX computer provide detailed hardware information on system hardware.

Conventions

The following conventions are used in this manual:

Ctrl/x	A sequence such as Ctrl/x indicates that you must hold down the key labeled Ctrl while you press another key or a pointing device button.
.	A vertical ellipsis indicates the omission of items from a code example or command format; the items are omitted because they are not important to the topic being discussed.
red ink	Red ink indicates information that you must enter from the keyboard or a screen object that you must choose or click on. For online versions, user input is shown in bold .
boldface text	Boldface text represents the introduction of a new term or the name of an argument, an attribute, or a reason.
UPPERCASE TEXT	Uppercase letters indicate the name of a routine, the name of a file, the name of a file protection code, or the abbreviation for a system privilege.
numbers	Unless otherwise noted, all numbers in the text are assumed to be decimal. Nondecimal radices—binary, octal, or hexadecimal—are explicitly indicated.

Part I

Part I describes what you need to know to install the VMS operating system.

1

The Installation, Upgrade, and Update Procedures

This chapter describes what happens during the installation, upgrade, and update procedures. It also tells when you should do an installation, upgrade, or update and refers you to the appropriate documentation.

Before you install, upgrade, or update the VMS operating system, read this chapter.

1.1 What Happens During an Installation

When you install the VMS operating system, the installation procedure does the following:

- Initializes the system disk, erasing its contents
- Creates a common system directory structure
- Transfers the VMS files from the distribution media to the system disk

Use the installation procedure under the following conditions:

- If your VAX computer is new (it has never had any version of the operating system running on it).
- If your VAX computer is running a version of the VMS operating system and you want to destroy the entire contents of the system disk (both VMS and user files).
- If you are running the VMS operating system but are not able to perform an upgrade. For example, if you do not have a standard version of the VMS operating system on your system disk, the upgrade procedure does not work correctly.

If you are going to install the VMS operating system, read Chapter 2, Chapter 3, and Chapter 4 of this guide and follow the installation procedure in the current version of *VMS Upgrade and Installation Procedures*.

CAUTION: The installation procedure initializes the system disk, erasing its contents. For this reason, use the installation procedure only on new VAX computers or if you want to destroy the contents of the system disk.

1.2 What Happens During an Upgrade

In most cases, if you are already running a standard version of the VMS operating system, you can use the upgrade procedure to obtain a higher version. The upgrade procedure does not initialize the system disk.

The Installation, Upgrade, and Update Procedures

1.2 What Happens During an Upgrade

When you upgrade the VMS operating system, the upgrade procedure does the following:

- Makes room for the upgrade by purging and deleting some VMS files, but leaves some of the VMS files and all the user files intact
- Transfers the VMS files from the distribution media to the system disk
- Merges the old VMS files and the new VMS files
- Cleans up files and structures used only during the upgrade

CAUTION: The upgrade procedure will not work correctly if you have changed the names of system directories on your system disk or if you have deleted VMS files from them. Restore your VMS system disk to a standard system before attempting an upgrade.

If you are going to perform an upgrade, see the current version of *VMS Upgrade and Installation Procedures* for a step-by-step description of the upgrade procedure.

1.3 What Happens During an Update

The update procedure is used to make minor fixes to the operating system. When you update the VMS operating system, the update procedure does the following:

- Applies patches to some VMS files
- Replaces some VMS files

After installing or upgrading the VMS operating system, you perform an update. This update is referred to as the *mandatory update*. The directions for an installation or an upgrade indicate when to perform the mandatory update. Some maintenance releases of the VMS operating system are also applied with the update procedure.

CAUTION: The update procedure will not work correctly if you have changed the names of system directories on your system disk. Restore your VMS system disk to a standard system before attempting an update.

2

Hardware

Before you install the VMS operating system, you need to be familiar with the following hardware components:

- Workstation display monitor
- On/Off switch
- Halt button
- Disk and tape drives

This chapter does not provide a detailed description of the hardware; it describes only the hardware components you need to perform system management operations. For a detailed description of hardware for your configuration, see the hardware manuals supplied with your VAX computer.

2.1 Turning On the Monitor

Turn on the power to the monitor before turning on the power to the system. To turn on the monitor, use the following procedure:

- 1 Make sure that the cable between the monitor and the system is connected properly.
- 2 Make sure that all power cords are plugged in securely.
- 3 Press the power switch on the monitor.

The monitor runs in two different modes: console mode and program mode.

- Console mode—When the workstation display monitor is in console mode, the VMS operating system is not running and the console-mode prompt (>>>) is displayed. You can control and monitor system operations by entering console-mode commands.
- Program mode—When the workstation display monitor is in program mode, the VMS operating system is running and the dollar-sign prompt (\$) is displayed. You can enter DCL commands, run programs, and receive system messages.

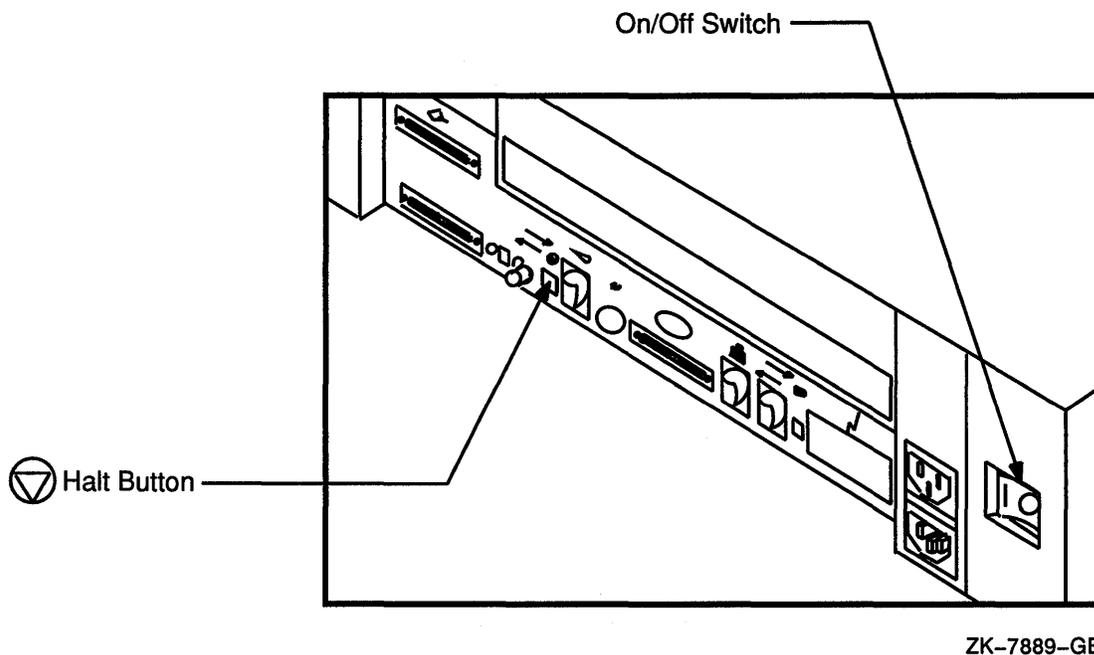
2.2 The On/Off Switch

The On/Off switch is on the back of the system unit. Setting the switch to 1 turns on the power. Setting the switch to 0 turns off the power. Figure 2-1 shows the location of the On/Off switch.

Hardware

2.3 The Halt Button

Figure 2-1 The On/Off Switch and the Halt Button



2.3 The Halt Button

The Halt button is on the back of the system unit. It is underneath the Halt icon, an inverted triangle within a circle. The Halt button is a small square that projects from the back panel of the system unit. Figure 2-1 shows its location.

Press the Halt button with your fingertip to stop the VMS operating system and put the system in console mode. The console-mode prompt (>>>) is displayed on the workstation monitor.

2.4 Alternate Console Terminal

Your VAX computer has a serial port to which you can attach a printer. A picture of a small printer appears above this serial port. You can also attach another terminal to this port to use as the console terminal when the workstation display monitor is not working. You can also do this when you want a printout of what happens during the installation procedure.

There are two ways to get a printout of the installation procedure. You can attach a hardcopy terminal to the serial port, or you can attach a video terminal to the serial port and then connect a printer to the video terminal.

2.4 Alternate Console Terminal

To attach any supported hardcopy or video terminal (but not a workstation display monitor) to the serial port and use it as an alternate console terminal, use the following procedure:

- 1 If the VMS operating system is not running, go to step 2.

If the VMS operating system is running, log into the SYSTEM account. Enter the following command and press RETURN:

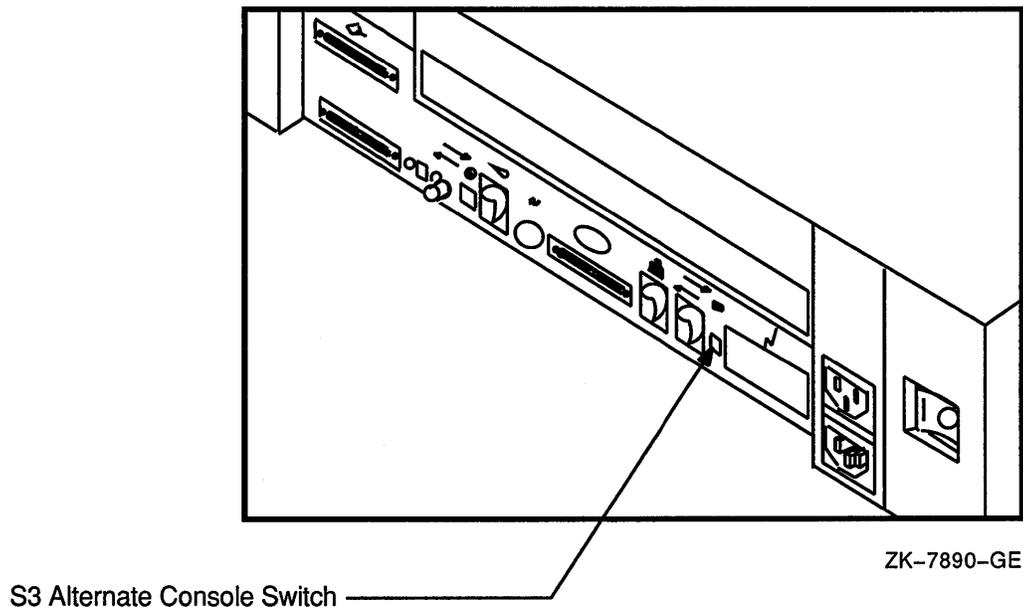
```
$ @SYS$SYSTEM:SHUTDOWN
```

Answer the questions. When the procedure asks if an automatic reboot should be performed, press RETURN for NO. When the procedure is finished, it displays the following message:

```
SYSTEM SHUTDOWN COMPLETE -- USE CONSOLE TO HALT SYSTEM
```

- 2 Turn the On/Off switch on the system unit and any expansion boxes to the 0 (off) position. Also turn off the power to the monitor.
- 3 Turn the alternate console switch to the 1 (on) position. Figure 2-2 shows the location of the alternate console switch. When this switch is turned to 1, the serial port becomes a terminal port.

Figure 2-2 Alternate Console Switch



- 4 Attach one end of an RS423 serial line to the serial port of the alternate console terminal. Attach the other end of the RS423 serial line to the serial port on the system unit. There is a picture of a small printer above the serial port.
- 5 Turn on the alternate console terminal.

Hardware

2.4 Alternate Console Terminal

- 6 Check the baud rate on the alternate console terminal. The baud rate should be set to 9600. (For information on checking or setting the baud rate, see the documentation that came with your terminal.)
- 7 Turn the On/Off switch on the system unit and any expansion boxes to the 1 (on) position.
- 8 If the console-mode prompt (>>>) does not appear on the alternate console terminal screen, press the BREAK key on the alternate console terminal.

You can now use the alternate console terminal.

CAUTION: Do not turn off the alternate console terminal while the VMS operating system is running, because you might halt the system. If you turn off the alternate console terminal accidentally and halt the system, you can resume your work by turning on the terminal, pressing RETURN to get the console-mode prompt (>>>), and entering the CONTINUE command.

If you do not have a hardcopy terminal, you can get a printout of the installation procedure by connecting a printer to an alternate console terminal. For example, if you use a VT220 terminal as the alternate console terminal, you can attach an LA50 printer to the VT220 terminal. Set up the terminal so that whatever is displayed on the screen is printed. To attach a printer to the alternate console terminal, use the following procedure:

- 1 Make sure the power to the system unit, the alternate console terminal, any expansion boxes, and the printer is turned off.
- 2 Attach one end of a printer cable to the printer port of the alternate console terminal. Attach the other end of the cable to the connector on the printer.
- 3 Turn on the printer.
- 4 Check the baud rate on the printer (see the documentation that came with your printer). The baud rate should meet the requirements of your terminal. (See the documentation that came with your terminal.)
- 5 Turn on the alternate console terminal.
- 6 Check the set-up on the alternate console terminal to make sure that characters displayed on the terminal screen are printed. For example, on the VT220 you need to enable AUTOPRINT MODE in the primary set up.
- 7 Turn on any expansion boxes and the system unit.

To disconnect the alternate console terminal, use the following procedure:

- 1 If the VMS operating system is not running, go to step 2.

If the VMS operating system is running, log into the SYSTEM account. Enter the following command and press RETURN:

```
$ @SYSS$SYSTEM:SHUTDOWN
```

2.4 Alternate Console Terminal

Answer the questions. When the procedure asks if an automatic reboot should be performed, press RETURN for NO. When the procedure is finished, it displays the following message:

```
SYSTEM SHUTDOWN COMPLETE -- USE CONSOLE TO HALT SYSTEM
```

- 2 Turn the On/Off switch on the system unit and any expansion boxes to the 0 (off) position.
- 3 Turn off the alternate console terminal and disconnect the RS423 serial line that attaches the alternate console terminal to the serial port of the VAXstation 3100.
- 4 Turn the alternate console switch to the 0 (off) position. When this switch is turned to 0, you can use the serial port to attach a printer to the system.
- 5 Turn on components in the following order:
 - a. Turn on the monitor.
 - b. Turn on the RZ55 drive, if you have one.
 - c. Turn on the RZ56 drive, if you have one.
 - d. Turn on any other optional drives that you have.
 - e. Turn on the system unit.

2.5 Disk and Tape Drives

Your VAX computer can contain one or more of the following drives within the system unit:

- TZ30 tape cartridge drive
- RZ22 fixed disk drive
- RZ23 fixed disk drive
- RX23 floppy diskette drive
- RRD40 compact disc drive

In addition to the disk and tape drives contained within the system unit, you also can equip your VAX computer with the following optional disk and tape drives:

- TK50 tape cartridge drive
- RRD40 compact disc drive
- RZ55 fixed disk drive
- RZ56 fixed disk drive

These drives are contained in separate units called expansion boxes. Table 2-1 lists the capacity of the disk and tape drives that can be part of a VAXstation 3100 or MicroVAX 3100 system.

Hardware

2.5 Disk and Tape Drives

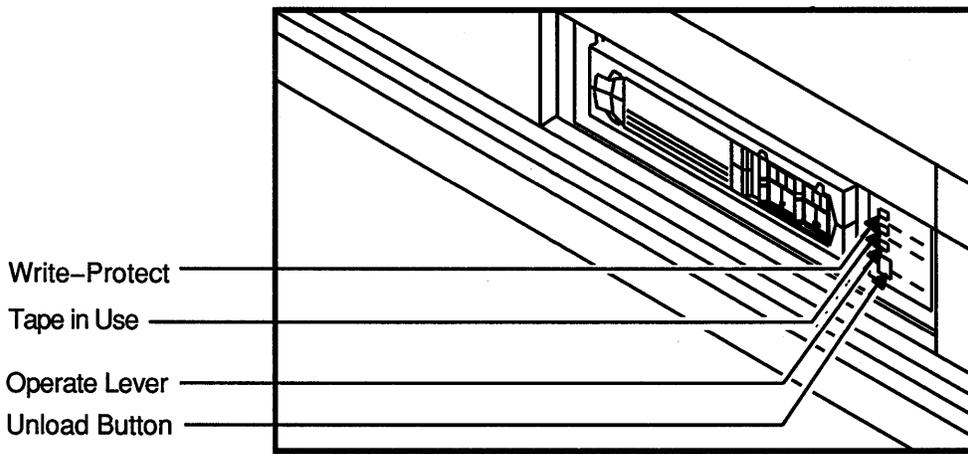
Table 2-1 Disk and Tape Drives

Drive	Storage Capacity
TZ30	95 Megabytes
RZ22	50 Megabytes
RZ23	104 Megabytes
RRD40	600 Megabytes
TK50	95 Megabytes
RX23	1.4 Megabytes
RZ55	332 Megabytes
RZ56	650 Megabytes

2.6 The TZ30 Tape Cartridge Drive

If you have a TZ30 tape cartridge drive, you can install the VMS operating system from a tape cartridge. Figure 2-3 shows a TZ30 tape cartridge drive.

Figure 2-3 TZ30 Tape Cartridge Drive



ZK-7891-GE

When using the TZ30 tape cartridge drive you should be aware of the following:

- The orange light glows when the tape cartridge is write-protected.
- The yellow light glows when the tape is loaded and blinks when the tape is in use.

2.6 The TZ30 Tape Cartridge Drive

- The green light glows when the tape is unloaded and blinks when the drive detects a tape cartridge error.

CAUTION: Never attempt to remove a tape cartridge under any of the following circumstances:

- The green light is off.
 - The yellow light is on or blinking.
- You press the Unload button to rewind and unload the tape. When the tape is unloaded, the green light goes on and the tape drive beeps.
 - The cartridge-release lever is located below the tape access slot. This lever controls the position of the tape drive spindle. Move the lever to the right to insert a tape cartridge and to the left to remove a tape cartridge.

CAUTION: Do not force the cartridge-release lever. Move it *only* when the green light glows steadily or blinks and the yellow light does not blink or glow. Otherwise, you might damage both the tape and the drive.

Table 2–2 summarizes the tape cartridge drive controls. Table 2–3 describes the tape cartridge drive lights.

Table 2–2 TZ30 Drive Controls

Control	Position	Function
Unload button	Pressed in	Rewinds and unloads the tape (15 seconds to 2 minutes).
Cartridge-release lever	Left	Lets you insert or remove a tape after rewind and unload operations are complete.
	Right	Locks tape in operating position.

Table 2–3 TZ30 Indicator Lights

Light	State	Condition
Orange—Write Protected	On	Tape is write-protected.
	Off	Tape is write-enabled.
Yellow—Tape in Use	On	Tape is loaded.
	Blinking	Tape is being used. Fast blinking (four times a second) indicates that a read or write operation is in progress. Medium blinking (two times a second) indicates that the tape is loading or unloading. Slow blinking (once a second) indicates that the tape is rewinding.

(continued on next page)

Hardware

2.6 The TZ30 Tape Cartridge Drive

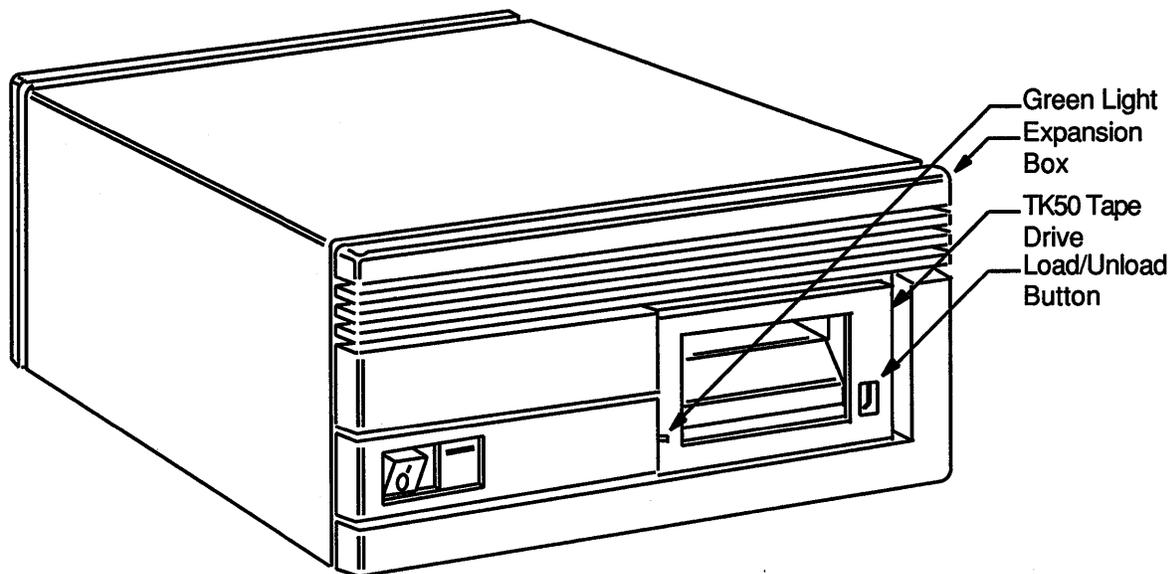
Table 2-3 (Cont.) TZ30 Indicator Lights

Light	State	Condition
Green—Operate Lever	On	You can operate the lever to load or unload a tape.
	Off	Do not operate the lever.
	Blinking	Cartridge error detected.
All	On	Power-up diagnostics are running. All three lights stay on for a few seconds to test themselves. If all three lights remain lit for a long time, the power-up diagnostics have failed.
	Blinking	Drive fault.

2.7 The TK50 Tape Cartridge Drive

If you have a TK50 tape cartridge drive, you can install the VMS operating system from a tape cartridge. Figure 2-4 shows the TK50 tape cartridge drive.

Figure 2-4 TK50 Tape Cartridge Drive



ZK-7874-GE

When using the TK50 tape cartridge drive shown in Figure 2-4, you should be aware of the following:

- The green light blinks when the tape in the drive is moving (being read from or written to). If a tape cartridge is in the drive and this

2.7 The TK50 Tape Cartridge Drive

light is off, the drive is inactive and the tape is not positioned at its beginning.

Note: *Never attempt to remove a tape when the green light is blinking or when it is off; this damages the tape and might damage the drive.*

The green light glows when the drive is empty. It also glows when the drive is inactive and positioned at the beginning of a tape. The only time you can remove a tape cartridge is when the green light is glowing steadily.

- The red Load/Unload button controls the loading of the tape.

When the button is pressed in, it is in the Load position. The red light on the button glows when the tape is loaded. It blinks *slowly* when the tape is rewinding. It blinks *rapidly* when there is a tape error (for some reason the tape could not be read). To clear a tape error, press the button four times.

Note: *Never attempt to remove a tape cartridge when the Load /Unload Button is in the Load (in) position (the red light is on); you might damage both the tape and the drive.*

When the Load/Unload button is released, it is in the Unload (out) position. The only time you can remove a tape is when this button is in the Unload (out) position (the red light is off).

- The cartridge-release handle is located next to the tape access slot. This handle controls the position of the tape drive spindle. Pull the handle open to insert or remove a tape cartridge.

CAUTION: Pull the cartridge-release handle open *only* when all three of the following are true:

- The green light glows steadily.
- The Load/Unload button is in the Unload (out) position.
- The red light on the Load/Unload button is off.

Otherwise, you might damage both the tape and the drive.

Table 2-4 summarizes the tape cartridge drive controls. Table 2-5 describes the tape cartridge drive lights.

Table 2-4 TK50 Drive Controls

Control	Position	Function
Load/Unload button	In	Loads the tape (15 seconds to 3 1/2 minutes).
	Out	Rewinds and unloads the tape.

(continued on next page)

Hardware

2.7 The TK50 Tape Cartridge Drive

Table 2-4 (Cont.) TK50 Drive Controls

Control	Position	Function
Cartridge release handle	Open	Lets you insert or remove a tape after rewind and unload operations are complete.
	Closed	Locks tape in operating position.

Table 2-5 TK50 Indicator Lights

Red Light	Green Light	Condition
Off	Off	No power to the tape drive.
Off	On	Safe to move cartridge release handle. Power is turned on.
On	Off	Do not move the cartridge release handle. One of the following conditions exists: <ul style="list-style-type: none">• Power-on self test is occurring.• Cartridge is inserted but handle is still in the up position.• Tape is loading or unloading.• Tape is stopped.
On	On	Tape loaded successfully.
On	Blinking	Tape is moving (except rewind). Read/write commands are being processed. Irregular rapid blinking means tape calibration is occurring.
Blinking	Blinking	Tape is rewinding.
Rapid Blinking	Off	A fault is occurring. Press and release the Load/Unload button four times. If the problem persists, do not attempt to remove the tape cartridge. Call Digital Field Service.

2.7.1 Tape Cartridges

Follow these guidelines when using tape cartridges:

- Tape cartridges come in clear, plastic, protective cases. You should keep tape cartridges in these cases when you are not using them.
- Store tape cartridges in a vertical position.

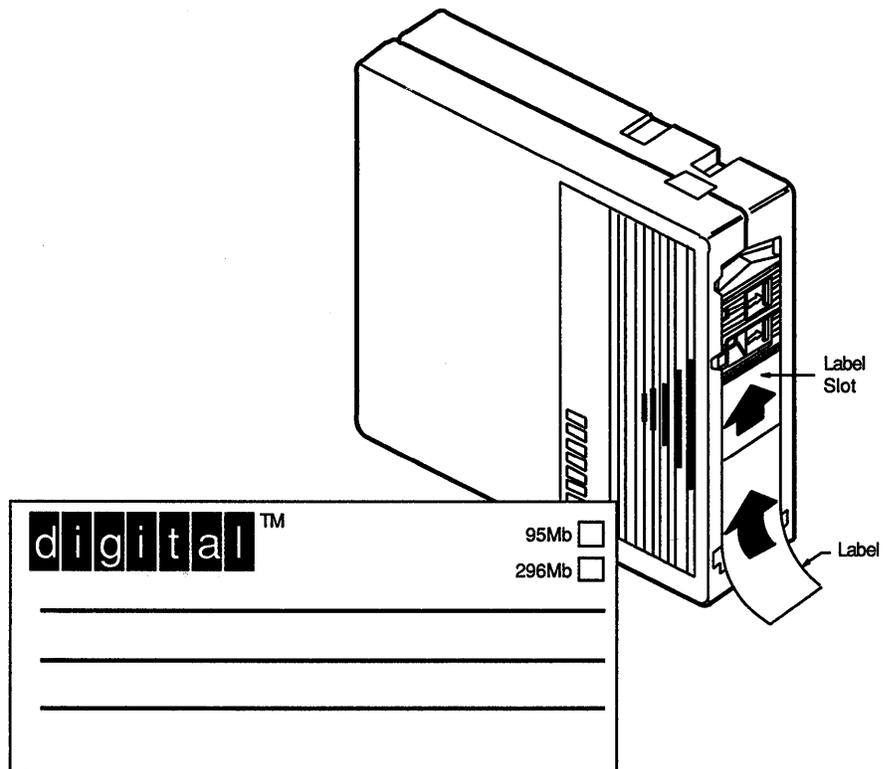
Hardware

2.7 The TK50 Tape Cartridge Drive

- The label slot holds the label that provides information about the contents of the tape cartridge. Label a tape cartridge if you are going to copy files to it (distribution tape cartridges are already labeled).

To label a tape cartridge, insert a slide-in label into the slot located on the front of the tape cartridge. Figure 2-5 shows how to insert the label on a tape cartridge.

Figure 2-5 Inserting a Label on a Tape Cartridge



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CAUTION: Use only the label slot to label a tape cartridge. Applying adhesive labels or writing on the tape cartridge can damage it or the drive.

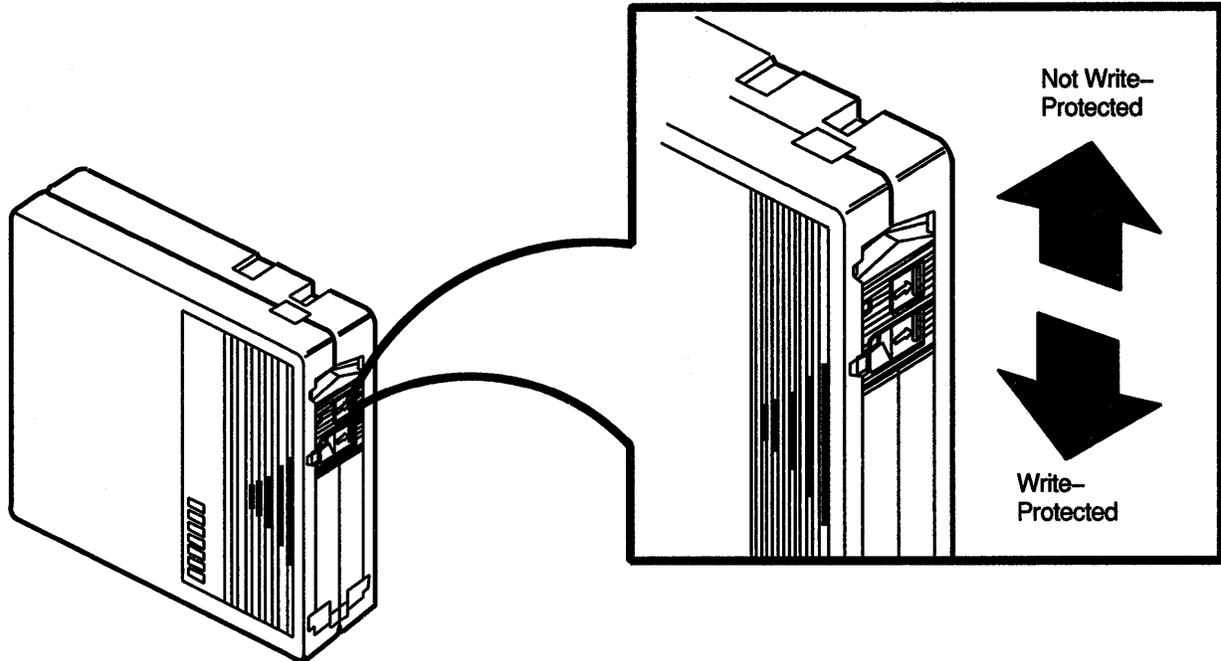
- The write-protect switch is a movable switch on the tape cartridge that controls whether you can write to the tape. To write-protect a tape cartridge, slide the write-protect switch toward the label slot. An orange rectangle is visible when the tape cartridge is write-protected.

Always write-protect the distribution tape cartridge before an installation. Figure 2-6 shows how to write-protect a tape cartridge.

Hardware

2.7 The TK50 Tape Cartridge Drive

Figure 2-6 Positioning the Write-Protect Switch



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2.7.2 Inserting a Tape Cartridge in a TZ30 Drive

To insert a tape cartridge in a TZ30 drive, do the following:

- 1 Make sure the tape drive is empty. If the VMS operating system is not running, go to step 2.

If the VMS operating system is running and a tape cartridge is already in the drive, enter the following command and press RETURN:

```
$ SHOW DEVICE MKA500
```

If the display indicates that the status of the tape cartridge is MOUNTED, you must dismount the tape before removing it from the drive. Follow the instructions in Section 2.7.6 to dismount the tape cartridge. Then follow the directions in Section 2.7.7 to remove the tape cartridge.

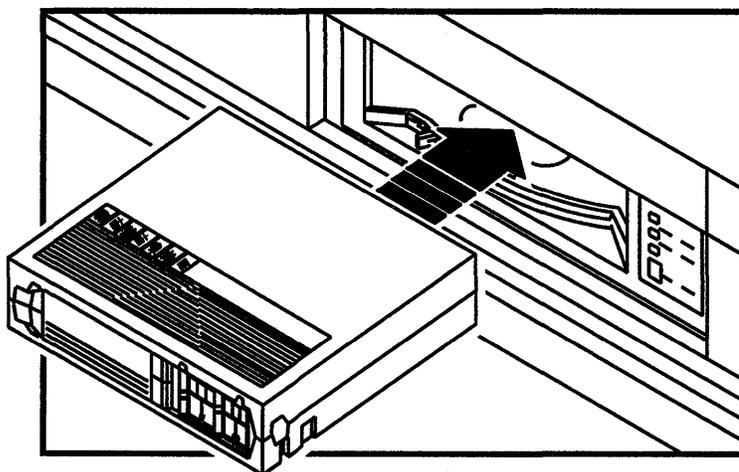
- 2 Remove the tape cartridge from its plastic case. You should write-protect a tape cartridge containing software that you are installing on your system. You should write-enable a tape cartridge if you are going to either copy or back up files to it.

CAUTION: Move the cartridge-release lever *only* when the green light glows steadily and the yellow and orange lights do not blink or glow. Otherwise, you might damage both the tape and the drive.

2.7 The TK50 Tape Cartridge Drive

- 3 Hold the tape cartridge with the label facing you and the large arrow on the top of the tape cartridge pointing into the drive. Insert the tape cartridge in the drive. Push the tape cartridge into the drive until it locks into place.
- 4 Move the cartridge-release lever to the right until it locks into place. The green light turns off. The yellow light blinks as the tape cartridge loads, and glows when the tape cartridge is successfully loaded. If the tape is write-protected, the orange light also glows. Figure 2-7 shows how to insert a TZ30 tape cartridge.

Figure 2-7 Inserting a TZ30 Tape Cartridge



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2.7.3 Inserting a Tape Cartridge in a TK50 Drive

To insert a tape cartridge in a TK50 drive, do the following:

- 1 Make sure the tape drive is empty. If the VMS operating system is not running, go to step 2.

If the VMS operating system is running, and a tape cartridge is already in the drive, enter the following command and press RETURN:

```
$ SHOW DEVICE MKA500
```

If the display indicates that the status of the tape cartridge is MOUNTED, you must first dismount the tape before removing it from the drive. Follow the instructions in Section 2.7.6 to dismount the tape cartridge. Then follow the directions for removing a tape cartridge in Section 2.7.8.

- 2 Press the Load/Unload button so that it is in the Unload (out) position. The green light glows steadily, and the red light is off.

Hardware

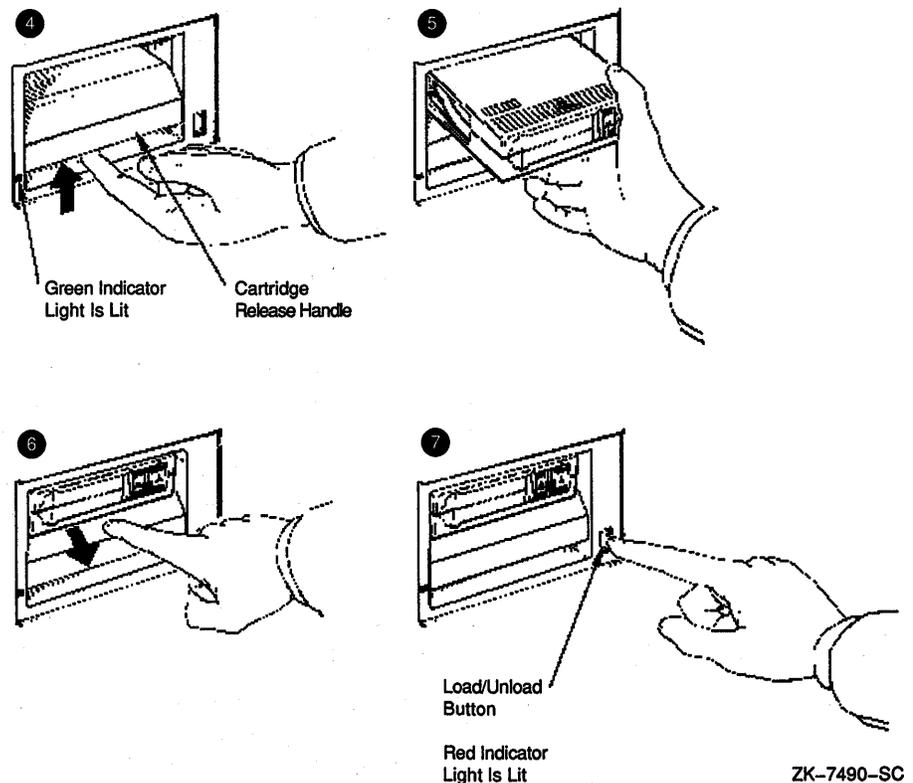
2.7 The TK50 Tape Cartridge Drive

- 3 Remove the tape cartridge from its plastic case. You should write-protect a tape cartridge containing software that you are installing on your system. You should write-enable a tape cartridge if you are going to either copy or back up files to it.

CAUTION: Never pull open the cartridge-release handle unless the green light glows, the red light is off, and the Load/Unload button is in the Unload (out) position; you might damage the drive.

- 4 Pull open the cartridge-release handle. Figure 2-8 shows how to insert a TK50 tape cartridge.

Figure 2-8 Inserting a TK50 Tape Cartridge



- 5 Hold the tape cartridge with the label facing you and the large arrow on the top of the tape cartridge pointing into the drive. Insert the tape cartridge in the drive. Push the tape cartridge into the drive until it locks into place. The green light turns off, and the red light glows.
- 6 Push the cartridge-release handle closed until it locks into place. The red light turns off, and the green light glows.
- 7 Press the Load/Unload button so that it is in the Load (in) position. The red light glows. The tape cartridge goes through a load process that takes approximately 30 seconds. During this time, the green light blinks. When the tape is ready, the green light glows.

2.7.4 Initializing a Tape Cartridge

Note: You do not need to initialize any tape cartridges when you install the VMS operating system.

Initializing a tape cartridge does the following:

- Erases any data stored on the tape cartridge
- Assigns a volume label to the tape cartridge
- Prepares the tape cartridge to store VMS files

You should initialize a new tape cartridge before you use it the first time. Initialize an old tape cartridge to erase it.

Before you initialize a tape cartridge, make sure that the account you are logged into has the volume protection (VOLPRO) privilege. Make sure the tape cartridge is write-enabled.

CAUTION: Do not initialize a tape cartridge that contains operating system software or files that you want to save. The INITIALIZE command erases the tape cartridge.

To initialize a tape cartridge, enter the INITIALIZE command in the following format and press RETURN:

```
$ INITIALIZE MKA500: volume-label
```

Substitute a 1- to 6-character name for *volume-label*. Write the volume label of the tape cartridge on the tape cartridge label. You need to know the volume label when you use the tape cartridge.

For example, the following command initializes the tape cartridge in the tape cartridge drive and gives it the label TEST:

```
$ INITIALIZE MKA500: TEST
```

2.7.5 Mounting a Tape Cartridge

Note: You do not need to mount any tape cartridges when you install the VMS operating system. The VMS installation procedure does this automatically.

After you insert a tape cartridge (and initialize it, if it is new) you must mount it, to make it available to the system. To mount a tape cartridge, enter the MOUNT command in the following format and press RETURN:

```
$ MOUNT MKA500: volume-label
```

The *volume-label* is the 1- to 6-character name you assigned to the tape cartridge with the INITIALIZE command.

If you do not specify the correct volume label when you mount the tape cartridge, the system displays the following message:

```
%MOUNT-F-INCROLLABEL, incorrect volume label
```

Hardware

2.7 The TK50 Tape Cartridge Drive

If you do not remember the volume label, enter the MOUNT command in the following format and press RETURN:

```
$ MOUNT/OVERRIDE=IDENTIFICATION MKA500:
```

The system displays a message containing the volume label. In the following example, the volume label is TAPER.

```
%MOUNT-I-MOUNTED, TAPER mounted on _MKA500:.
```

After you mount a tape cartridge, you can determine its volume label at any time by entering the following command:

```
$ SHOW DEVICE MKA500:
```

The system displays the volume label.

2.7.6 Dismounting a Tape Cartridge

Note: You do not need to dismount any tape cartridges when you install the VMS operating system. The VMS installation procedure does this automatically.

When you finish using a tape cartridge, you should dismount it. To dismount a tape cartridge, enter the DISMOUNT command in the following format and press RETURN:

```
$ DISMOUNT MKA500:
```

After you dismount a tape cartridge, you can remove it from the drive following the instructions in Section 2.7.7.

2.7.7 Removing a Tape Cartridge from a TZ30 Drive

To remove a tape cartridge from a TZ30 drive, do the following:

- 1 Press the Unload button. If the tape is not rewound, the yellow light blinks slowly as the tape rewinds. When the tape is completely unloaded, the green light glows, the yellow light turns off, and you hear a beep.

CAUTION: Move the cartridge-release lever *only* when the green light glows steadily and the yellow and orange lights do not blink or glow. Otherwise, you might damage both the tape and the drive.

- 2 Move the cartridge-release lever to the left. The tape cartridge partially ejects.
- 3 Remove the tape cartridge and put it in its plastic case.

2.7.8 Removing a Tape Cartridge from a TK50 Drive

To remove a tape cartridge from a TK50 drive, do the following:

- 1 Press the Load/Unload button so that it is in the Unload (out) position. If the tape is not rewound, the red and green lights blink slowly as the tape rewinds. When the tape is completely unloaded, the red light turns off and the green light glows.

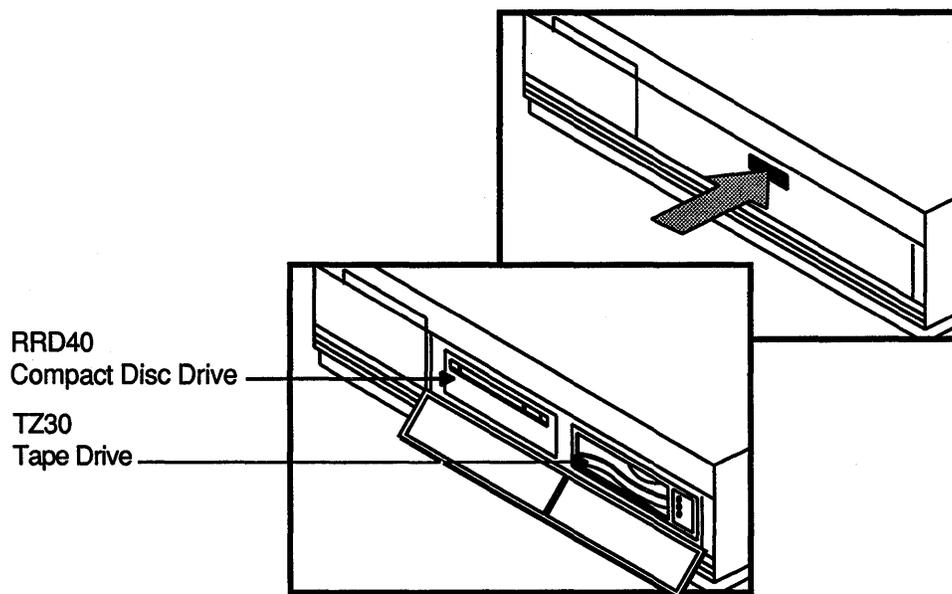
CAUTION: Never pull open the cartridge-release handle unless the green light glows, the red light is off, and the Load/Unload button is in the Unload (out) position; you might damage the tape drive.

- 2 Pull open the cartridge-release handle. The tape cartridge partially ejects.
- 3 Remove the tape cartridge and put it in its plastic case.
- 4 Push the cartridge-release handle closed until it locks firmly into place.

2.8 The Compact Disc Drive

Depending on the system you have, you can have either a compact disc drive in the system unit or a compact disc drive in an expansion box. The compact disc drive is a read-only drive that reads data stored on removable compact discs. A compact disc can store 600 Megabytes of data. Figure 2-9 and Figure 2-10 show the two types of compact disc drives.

Figure 2-9 Compact Disc Drive on the System Unit

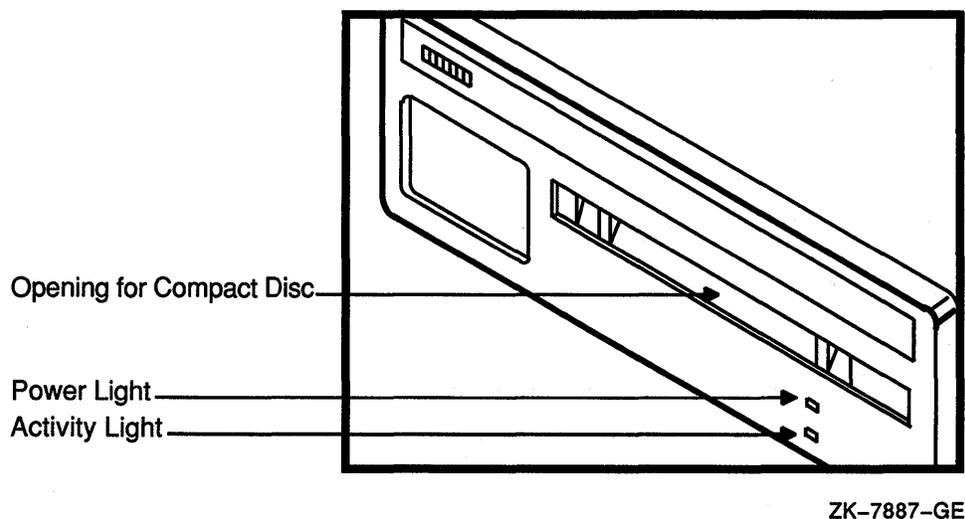


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Hardware

2.8 The Compact Disc Drive

Figure 2-10 Compact Disc Drive in an Expansion Box



2.8.1 Inserting a Compact Disc

A compact disc is contained within a clear plastic *caddy*. When you insert a compact disc in the drive, insert the entire caddy. **DO NOT** remove the disc from the caddy.

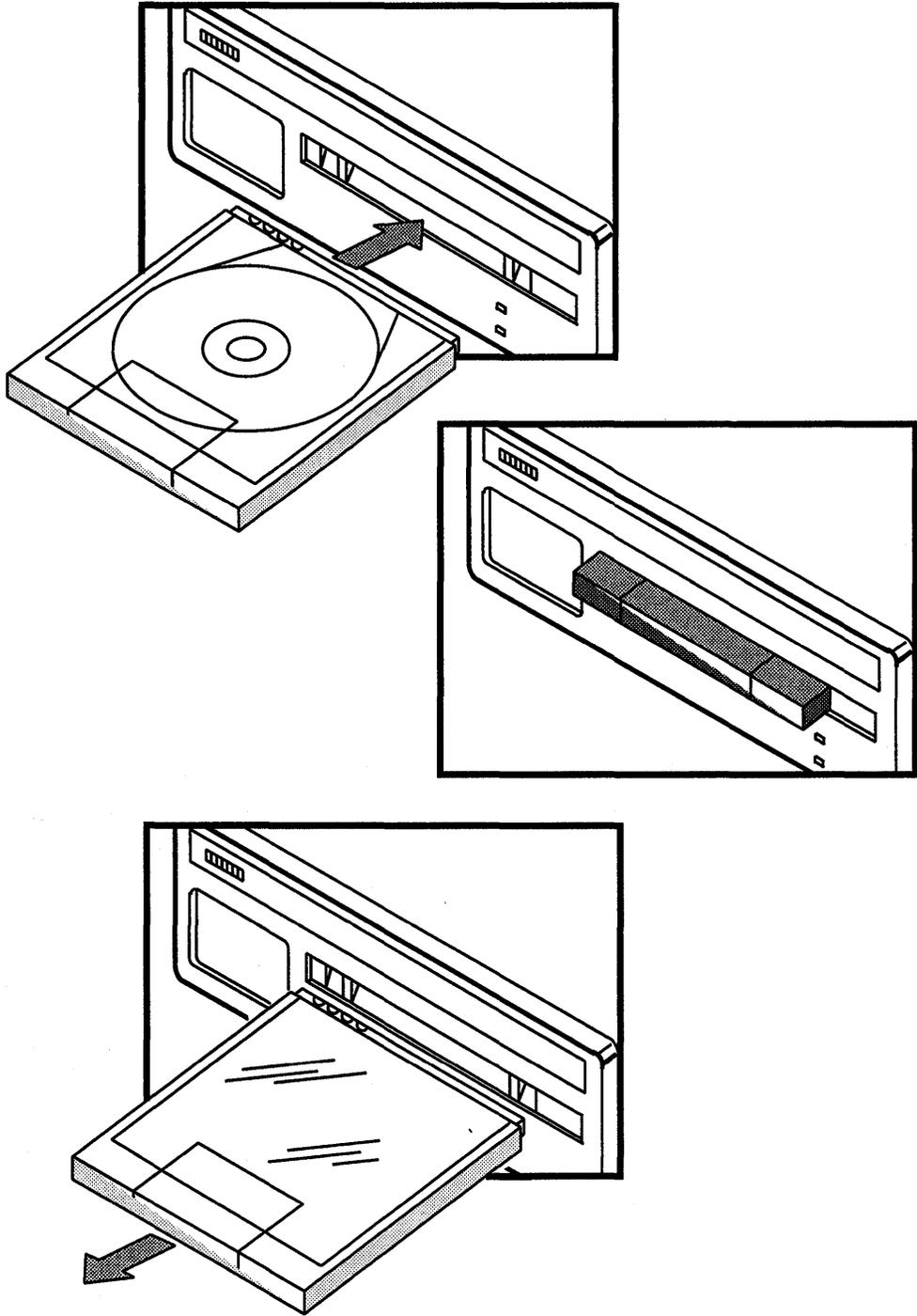
To insert a compact disc in the drive, do the following:

- 1 Make sure the power to the drive is on. The power light on the front of the drive should be lit.
- 2 Examine the caddy. Make sure it is not cracked or damaged in any way.
- 3 Examine the disc inside the caddy. One side of the disc is labeled. The label should always be facing up as you insert the disc in the drive. When the label is facing up, the four notches on the caddy are on the left as shown in Figure 2-11. These notches line up with four similar notches on the front of the drive.
- 4 Insert the caddy as shown in Figure 2-11. Make sure the notches on the left side of the disc caddy line up with the notches on the door of the drive. Slide the caddy in as far as it will go and then remove it. When you remove the caddy, notice that the disc remains in the drive. Only the clear plastic caddy comes out.
- 5 The front activity light should go on within five seconds.

If the drive accepted the disc and the activity light does not light, the disc might be sitting incorrectly in the caddy. Unload the disc and try again.

Hardware
2.8 The Compact Disc Drive

Figure 2-11 Inserting a Compact Disc



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For more information on using a compact disc drive, see the hardware manuals.

Hardware

2.8 The Compact Disc Drive

2.8.2 Removing a Compact Disc

Before removing a compact disc, make sure the activity light is not flashing. If it is flashing, wait for it to stop before you proceed.

To remove a compact disc from a drive, do the following:

- 1 Position the clear plastic caddy by matching the four notches on the disc to the four notches on the drive. Make sure the arrow is going into the drive first.
- 2 Insert the caddy into the drive door as far as it will go.
- 3 Remove the caddy. The disc will be back in the caddy. The activity light will go out.

2.9 Using RX23 Floppy Diskettes

You can use the following types of diskettes in the RX23 drive:

- Double Density (DD)—A double density diskette contains 9 sectors (512 bytes per sector), 80 cylinders, and 2 heads.
- High Density (HD)—A high density diskette contains 18 sectors (512 bytes per sector), 80 cylinders, and 2 heads.

You can only read double density diskettes that have been formatted and written on by another computer. You cannot write on a double density diskette.

You can read and write on a high density diskette. Before you can use a high density diskette you must format it. After you boot the VMS operating system, put the diskette you want to format in the drive. Enter a command in the following format:

```
$ INITIALIZE/DENSITY=DOUBLE device-name: volume-label
```

For example, if the device name of the RX23 drive is DUA2 and the volume label is ROHBA, enter the following command and press RETURN:

```
$ INITIALIZE/DENSITY=DOUBLE DUA2: ROHBA
```

For more information on the INITIALIZE command, see the *VMS DCL Dictionary*. Note that in some cases you might need VOLPRO privilege to format a diskette.

Do not build a standalone BACKUP kit on an RX23 diskette. You cannot boot the VMS operating system from an RX23 diskette. Digital recommends that you build one standalone BACKUP kit on the system disk and one on a tape cartridge.

3 Before Installing VMS

This chapter describes the following:

- Terms and procedures you need to know before you do an installation
- Information you need to install the VMS operating system in a VAXcluster environment

3.1 The Distribution Media and System Disk

When you install the VMS operating system, you work primarily with the distribution media and the system disk. The distribution media are the disks or tapes that the VMS operating system is supplied on. However, the distribution media has a format that the system cannot readily use.

The installation procedure transfers the VMS files from the distribution media to your system disk and puts them in a format that the system can use. A *system disk* is the disk that contains (or will contain) the VMS operating system in a usable format.

3.2 Device Names

At different times during the installation you need to tell the system which drive contains the distribution media and which drive contains the system disk. You do this by referring to the drive that holds the distribution media and to the fixed disk that you want to be your system disk. You refer to a drive with its *device name*. A device name has the following format:

ddciuu

where:

- *dd* is the device code. The device code tells what type of drive you are using. DK is the device code for disk drives and MK is the device code for tape drives.
- *c* is the controller designation. The controller designation on the standard system is A. The controller designation on the VAXserver 3100 can be A or B.
- *i* is the SCSI ID number. It can be a decimal number in the range of 0 to 7.
- *uu* is the SCSI logical unit number. It is usually zero.

For example, a fixed disk with a SCSI ID number of one has the device name DKA100. A fixed disk with a SCSI ID number of two has the device name DKA200. Note that, when the SCSI ID number is zero, the device name is DKA0.

Before Installing VMS

3.2 Device Names

Note: The device name for the RX23 floppy disk drive might not follow this convention. It might be referred to as DUA2.

Use the SHOW DEVICE command at the console-mode prompt (>>>) to find out the device names of the disk and tape drives on your system. For example:

```
>>> SHOW DEVICE
VMS/VMB  ULTRIX  ADDR      DEVTYP      NUMBYTES    RM/FX  WP  DEVNAM  REVISION
-----  -
ESAO     SEO       08-00-2B-07-A7-B6
DKAO     RZ0       A/0/0/00   RODISK
DKA400   RZ4       A/4/0/00   DISK       104MB    FX
MKA500   TZ5       A/5/0/00   TAPE      .....   RM
...HOST ID...  A/6       INTR
```

Each column gives the following information:

- **VMS/VMB**—the device name used by VMS and VMB
- **ULTRIX**—the ULTRIX device name
- **ADDR**—the address of the device, where the first letter indicates whether the device resides on Bus A or Bus B; the first number indicates the SCSI ID, and the last two numbers are always zero
- **DEVTYP**—the type of device (RO stands for read-only, INTR stands for SCSI initiator)
- **NUMBYTES**—capacity of the drive in bytes, when this information is available
- **RM/FX**—tells whether the drive is removable (RM) or fixed (FX)
- **WP**—indicates if the drive is write-protected, when this information is available
- **DEVNAM**—indicates the device name, when this information is available
- **REVISION**—indicates the version of the device on the system, when this information is available

3.3 Choosing a System Disk

If your system has more than one fixed disk, you can choose which one will be the system disk. When choosing a system disk, you need to be aware of the capacity of the disk as well as the size of the VMS operating system. Keep in mind that a system disk in a VAXcluster environment needs more space for the operating system than a system disk for a standalone system.

Before you begin the installation procedure, make sure you know the device names for both the drive that will hold the distribution media and the fixed disk that will be the system disk.

3.4 Information on VAXcluster Environments

If you are installing the VMS operating system in a VAXcluster environment, the installation procedure asks you for information about your VAXcluster environment. Before proceeding, you must read the *VMS VAXcluster Manual*. If you have a clear understanding of VAXclusters before you do an installation, you are less likely to enter incorrect information during the installation. Entering incorrect information during the installation might force you to repeat the entire procedure.

The following is a list of the VAXcluster information you need to obtain: (For a complete explanation of each item, see the *VMS VAXcluster Manual*.)

- 1 Determine what type of configuration you want: local area or mixed-interconnect. These configuration types are distinguished by the interconnect device that the VAX computers in the cluster use to communicate with one another (CI, Ethernet, or both).

Note: The VAXstation 3100 and MicroVAX 3100 series cannot be part of a CI-only VAXcluster environment.

- 2 You need to know the *DECnet node name* and *node address* for the VAX computer on which you are installing the VMS operating system. The network or system manager determines the DECnet node name and node address for each VAX computer on the network. See your system or network manager for this information.
- 3 You need to know the allocation class value for the VAX computer on which you are installing the VMS operating system. During the installation procedure you are asked for the ALLOCLASS value, as follows:

Enter a value for ALICE's ALLOCLASS parameter:

Enter the appropriate allocation class value for the VAX computer on which you are installing the VMS operating system. Refer to the *VMS VAXcluster Manual* for the rules on specifying allocation class values. Note that, in a mixed-interconnect VAXcluster environment, the allocation class value cannot be zero. It has to be a value between 1 and 255. This is also true for any VAX computer that is connected to a dual-pathed disk.

When you enter the allocation class value, the installation procedure uses it to automatically set the value of ALLOCLASS, a SYSGEN parameter.

- 4 If you are going to set up either a local area or a mixed-interconnect cluster, determine the *cluster group number* and the *cluster password*. Use the following rules to determine the cluster group number and password:
 - Cluster group number—A number in the range from 1 to 4095 or 61440 to 65535.
 - Cluster password—Must be from 1 to 31 alphanumeric characters in length and may include dollar signs (\$) and underscores (_).

4 Installing VMS

Make sure you know the difference between an installation and an upgrade by reading Chapter 1. If you are going to install the VMS operating system, follow the installation procedure in the most recent version of *VMS Upgrade and Installation Procedures*.

Refer to this chapter for installation information specific to the VAXstation 3100 and MicroVAX 3100 series. It includes the following information:

- Turning on the system
- Booting standalone BACKUP
- Booting the new system disk

Use this information along with the installation procedure in the most recent version of *VMS Upgrade and Installation Procedures*.

Before you begin the installation, read Chapter 3. If you are installing the VMS operating system on a VAX computer that is part of a VAXcluster environment, read the *VMS VAXcluster Manual*.

Note: The screen displays and examples in this manual depict the installation of VMS Version 5.3. Your screen displays reflect the version that you are installing.

4.1 Installing VMS on Large-Memory Systems

Large-memory systems require extra disk space for page and swap files. If you install VMS and all of the DECwindows options onto an RZ23 drive on a system with 16 Megabytes or more of memory, it might be necessary to move the page and swap files to a different disk.

4.2 Turning On the System

This procedure assumes that the system is not turned on when you start the installation. The following steps describe how to turn on the system:

- 1 Turn components on in the following order:
 - a. Turn on the monitor.
 - b. Turn on the RZ55 drive, if you have one.
 - c. Turn on the RZ56 drive, if you have one.
 - d. Turn on any other optional drives that you have. (Push the power switch on the front to the 1 (on) position.)
 - e. Push the power switch on the back of the system unit to the 1 (on) position.

Installing VMS

4.2 Turning On the System

- 2 The system should display self-test messages similar to the following:

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

If the console-mode prompt (>>>) does not appear on the screen, press the Halt button.

If the system does not power up properly (for example, if you receive the message ?84 FAIL), refer to the troubleshooting section of the hardware manual supplied with your system.

- 3 To prepare the system disk, go to Section 4.3.

4.3 Preparing the System Disk

To set up the fixed disk you use during the installation, do the following:

- 1 If your system has more than one fixed disk, decide which one you want to be the system disk.
- 2 Enter the SHOW DEVICE command at the console-mode prompt (>>>) to find out the device names for the system disk and the drive that will hold the distribution kit (either a tape cartridge drive or a compact disc drive). Write the device names on a piece of paper. You need this information throughout the installation.

4.4 Booting Standalone BACKUP

This section describes the steps for booting standalone BACKUP. Standalone BACKUP lets you transfer the VMS *required* save set from the distribution kit to your system disk. The method you use to boot standalone BACKUP depends on the type of distribution kit you have.

- Tape cartridge kit—follow the instructions in Section 4.4.1
- Compact disc kit—follow the instructions in Section 4.4.2

4.4.1 Tape Cartridge Kit

When you have a tape cartridge distribution kit, you boot standalone BACKUP from a tape cartridge labeled similar to the following:

Paper Label ¹	Volume Label ²
VAX/VMS V5.3 BIN TK50 S/A BKUP & DECWINDOWS	DECW53

¹A paper label is the label affixed to a tape cartridge.

²A volume label is the name the VMS operating system uses to refer to a tape cartridge. During the installation the procedure displays the volume label, not the paper label, in messages.

Booting standalone BACKUP takes approximately 20 minutes.

Installing VMS

4.4 Booting Standalone BACKUP

- 1 Insert the tape cartridge containing standalone BACKUP in the tape cartridge drive.
- 2 To boot standalone BACKUP, enter the following command and press RETURN:

```
>>> B MKA500
```

Note: The device name for a TK50 tape cartridge drive is usually either MKA500 or MKB500. The device name for the TZ30 drive is usually MKA500. Enter the SHOW DEVICE command at the console-mode prompt (>>>) to display the correct device name.

Ignore any error messages about missing drivers that resemble the following:

```
%SYSGEN-I-OPENIN, error opening SYS$SYSROOT:[SYSEXE]VEDRIVER.EXE; as input
%SYSGEN-E-FNF, file not found
```

These messages might be displayed during the installation.

- 3 Some time later, standalone BACKUP displays the following message:

```
VAX/VMS Version V5.3 Major version id = 1 Minor version id = 0
```

- 4 A few minutes later the procedure asks you for the date and time. Enter the date and time using the 24-hour clock format and press RETURN. For example:

```
PLEASE ENTER DATE AND TIME (DD-MMM-YYYY HH:MM) 19-APR-1990 15:00
```

- 5 The procedure displays a list of the local devices on your system. For example:

```
Available device MKA500:      device type TK50
Available device DKA100:      device type RRD40
.
.
.
```

Check the list of devices. If the list is incomplete, make sure that all the drives are properly connected to the system. See your hardware manuals for details.

- 6 When standalone BACKUP finishes booting, it displays an identification message followed by the dollar-sign prompt (\$):

```
%BACKUP-I-IDENT, Stand-alone BACKUP V5.3; the date is 19-APR-1990 15:00
$
```

Installing VMS

4.4 Booting Standalone BACKUP

4.4.2 Compact Disc

When you have a compact disc distribution kit, you boot standalone BACKUP from the compact disc. The compact disc is labeled similar to the following:

CD Label ¹	Volume Label ²
VAX/VMS V5.3	VMS053

¹The CD label is printed on the compact disc.

²A volume label is the name the VMS operating system uses to refer to a compact disc. During the installation, the procedure displays the volume label, not the CD label, in messages.

Booting standalone BACKUP takes approximately 3 minutes.

- 1 Insert the distribution compact disc in the compact disc drive.
- 2 To boot standalone BACKUP, enter a command in the following format:

```
>>> B source-drive
```

Substitute the device name of the compact disc drive for *source-drive*. If you do not know the device name, enter the SHOW DEVICE command at the console-mode prompt. Write the device name of the compact disc drive on a piece of paper. You need this information throughout the installation.

For example, if the compact disc drive has the device name DKA100, enter the following command and press RETURN:

```
>>> B DKA100
```

Ignore any error messages about missing drivers that resemble the following:

```
%SYSGEN-I-OPENIN, error opening SYS$SYSROOT:[SYSEXE]VEDRIVER.EXE; as input  
%SYSGEN-E-FNF, file not found
```

These messages might be displayed during the installation.

- 3 A few minutes later standalone BACKUP displays the following message:

```
VAX/VMS Version V5.3 Major version id = 1 Minor version id = 0
```

- 4 A few minutes later the procedure asks for the date and time. Enter the date and time using the 24-hour clock format and press RETURN. For example:

```
PLEASE ENTER DATE AND TIME (DD-MMM-YYYY HH:MM) 19-APR-1990 15:00
```

- 5 The procedure displays a list of the local devices on your system. For example:

```
Available device MKA500:    device type TK50  
Available device DKA100:    device type RRD40  
.  
.  
.
```

Check the list of devices. If the list is incomplete, make sure that all the drives are connected properly to the system. See your hardware manuals for details.

- 6 When standalone BACKUP finishes booting, the procedure displays an identification message followed by the dollar-sign prompt (\$):

```
%BACKUP-I-IDENT, Stand-alone BACKUP V5.3; the date is 19-APR-1990 15:00
$
```

4.5 Booting the New System Disk

As a result of the BACKUP command you type to start an installation, the *required* save set of the VMS operating system is transferred to the system disk. You know the *required* save set is on the new system disk when you see the following display:

```
%BACKUP-I-STARTVERIFY, starting verification pass
```

This message indicates that the *required* save set has been transferred to the system disk and the files are being checked for errors. Approximately 15 minutes later the procedure displays the following message:

```
%BACKUP-I-PROCDONE, Operation completed. Processing finished at 16-APR-1990 15:00
If you do not want to perform another standalone BACKUP operation,
use the console to halt the system.
```

If you do want to perform another standalone BACKUP operation, ensure the standalone application volume is online and ready. Enter "YES" to continue:

To continue the installation, stop the system and boot the system disk as follows:

- 1 Press the Halt button located on the back of the system unit.
- 2 Enter the SET BOOT command in the following format:

```
>>> SET BOOT target-drive
```

Substitute the device name of the system disk for *target-drive*. The SET BOOT command tells the procedure what disk to boot from. For example, if the system disk has the device name DKA400, enter the following command and press RETURN:

```
>>> SET BOOT DKA400
```

For more information about the default boot device, see Section 5.3.

- 3 To boot the system disk, enter the following command and press RETURN:

```
>>> B
```

- 4 When the boot is complete, the procedure displays some messages and asks for the date and time.

To complete the installation, see the recent version of *VMS Upgrade and Installation Procedures*.

Part II

Part II describes frequently performed system operations such as system startup, shutdown, and backup.

5

Startup and Shutdown Procedures

This chapter contains information on the following:

- Overview of booting the system
- Ways to boot the system
- Booting from [SYSF]
- Shutting down the system

5.1

Overview of Booting

Booting is the process of loading system software into the processor's main memory. The VAXstation 3100 and MicroVAX 3100 series use an internal memory device to boot the VMS operating system from the system disk into memory. The boot process consists of the following steps:

- 1 You enter the **BOOT** command. The boot procedure deposits information in the general purpose registers.
- 2 **VMB**, the primary boot program, is loaded from read-only memory (ROM) into main memory. **VMB** is a program that allows access to the system disk. **VMB** locates **SYS\$SYSTEM:SYSBOOT.EXE** on the system disk and loads it into memory.
- 3 **SYSBOOT.EXE** loads the **SYSGEN** parameters stored in **SYS\$SYSTEM:VAXVMSSYS.PAR** and checks the conversational boot flag. If the flag is set, the procedure stops and displays the **SYSBOOT>** prompt. If the flag is not set, **SYSBOOT** loads the VMS executive into memory and transfers control to the VMS executive.
- 4 When the VMS executive finishes, it executes the **SWAPPER** process.
- 5 The **SWAPPER** creates the **SYSINIT** process.
- 6 **SYSINIT** creates the **STARTUP** process.
- 7 **STARTUP** executes **SYS\$SYSTEM:STARTUP.COM** (unless you indicated another file at the **SYSBOOT>** prompt) and **SYSTARTUP_V5.COM**. The current values of **SYSGEN** parameters are written back to **VAXVMSSYS.PAR**.
- 8 The boot process finishes, and you can log into the VMS operating system.

Startup and Shutdown Procedures

5.2 Booting the System

5.2 Booting the System

To boot the VMS operating system from the system disk, use the following procedure:

- 1 If the VMS operating system is not running, go to step 2.

If the VMS operating system is running, log into the SYSTEM account. Enter the following command and press RETURN:

```
$ @SYSS$SYSTEM:SHUTDOWN
```

Answer the questions. When the procedure asks if an automatic reboot should be performed, press RETURN for NO. When the procedure is finished, it displays the following message:

```
SYSTEM SHUTDOWN COMPLETE -- USE CONSOLE TO HALT SYSTEM
```

- 2 Press the Halt button located on the back of the system unit.
- 3 Enter the BOOT command in the following format:

```
>>> B device-name
```

Substitute the device name of the system disk for *device-name*. For example, to boot from a drive with a device name of DKA400, enter the following command and press RETURN:

```
>>> B DKA400
```

To boot from the network, enter the following command and press RETURN:

```
>>> B ESA0
```

For more information on device names, see Section 3.2.

- 4 After the system boots, it displays the following message:

```
VAX/VMS Version V5.3 19-APR-1990 15:00
```

```
The VAX/VMS system is now executing the system startup procedure.
```

```
The VAX/VMS system is now executing the site-specific startup commands.
```

```
%SET-I-INTSET, login interactive limit=64, current interactive value = 0  
SYSTEM      job terminated at 19-APR-1990 15:00:00.00
```

5.3 The SET BOOT Command

There are two commands you can use at the console-mode prompt (>>>) to set, display, and cancel the drive from which you want the system to boot.

Use the SET BOOT command to tell the system what drive you want to boot from. Enter the SET BOOT command in the following format:

```
>>> SET BOOT device-name
```

Substitute the device name of the system disk for *device-name*. For example, to boot from a drive with a device name of DKA400, enter the following command and press RETURN:

```
>>> SET BOOT DKA400
```

Startup and Shutdown Procedures

5.3 The SET BOOT Command

The next time you boot the system you can enter the BOOT command without specifying a device name. For example:

```
>>> B
```

Use the SHOW BOOT command to find out what drive was specified in the last SET BOOT command. For example:

```
>>> SHOW BOOT
```

To cancel the drive specified in the last SET BOOT command, enter the following command and press RETURN:

```
>>> SET BOOT
```

If you have not used the SET BOOT command to set the drive to boot from and you enter the BOOT command without specifying a device name, the system will ask you for a device name. If you do not enter a device name within 30 seconds, the system boots from the network device, ESA0.

5.4 Automatic Boot

You can set the VAXstation 3100 and MicroVAX 3100 series to boot automatically or you can boot it manually. This section describes how to control whether the system boots automatically.

The VAXstation 3100 and MicroVAX 3100 series can boot automatically from the device designated in RAM. By default, the network device, ESA0, is the designated boot device. When you installed the VMS operating system, you designated the system disk as the default boot device. Section 5.3 describes how to change the default boot device.

These VAX computers can boot automatically from the default boot device under the following conditions:

- When you first turn on system power
- When system power comes on after a power failure
- After you shut down the system (if you entered Y at the auto reboot prompt)
- After a bugcheck
- If the system halts under program control

To control whether the system boots automatically in these situations, do the following:

- 1 If the VMS operating system is not running, go to step 2.

If the VMS operating system is running, log into the SYSTEM account. Enter the following command and press RETURN:

```
$ @SYSS$SYSTEM: SHUTDOWN
```

Answer the questions. When the procedure asks if an automatic reboot should be performed, press RETURN for NO. When the procedure is finished, it displays the following message:

```
SYSTEM SHUTDOWN COMPLETE -- USE CONSOLE TO HALT SYSTEM
```

Startup and Shutdown Procedures

5.4 Automatic Boot

- 2 Press the Halt button located on the back of the system unit.
- 3 Enter the following command to show whether the system has been set to boot automatically:

```
>>> SHOW HALT
```

The system displays a value of 2 or 3, which are defined as follows:

2—If the power comes on or the system halts under program control, the system attempts to reboot from the default boot device designated in RAM.

3—When power comes on to the system or the system halts under program control, it displays the console-mode prompt (>>>) and does not attempt to reboot. The system reboots automatically only if you enter Y at the auto reboot prompt when you shut down the system with the SHUTDOWN.COM command procedure.

- 4 Enter the SET HALT command if you want to change the automatic booting behavior. The following example changes the value to 3.

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

5.5 Booting from [SYSF] During an Upgrade

In the future you may want to upgrade to the most recent version of the VMS operating system. During the upgrade procedure you must boot from the [SYSF] root directory. To boot from [SYSF], enter the BOOT command in the following format and press RETURN:

```
>>> B/F0000000 [device-name]
```

Substitute the device name of the system disk for *device-name*. Chapter 3 contains a list of device names for the VAXstation 3100 and MicroVAX 3100 series.

For example, to boot from [SYSF] on a drive with a device name of DKA400, enter the following command and press RETURN:

```
>>> B/F0000000 DKA400
```

5.6 Conversational Boot

A conversational boot is most commonly used in research and development environments and during software upgrades. Perform a conversational boot to stop the boot process before it completes. The boot process stops after it loads SYS\$SYSTEM:SYSBOOT.EXE and displays the SYSBOOT> prompt. At the SYSBOOT> prompt, you can enter certain SYSGEN commands to do the following:

- Look at system parameter values
- Change system parameter values
- Specify another parameter file
- Specify another system startup command procedure

Startup and Shutdown Procedures

5.6 Conversational Boot

- Select the default system parameter file if you modified system parameters to values that render the system unbootable
- Specify a minimum startup

There are several ways to perform a conversational boot. The following procedure is the most direct:

- 1 If the VMS operating system is not running, go to step 2.

If the VMS operating system is running, log into the SYSTEM account. Enter the following command and press RETURN:

```
$ @SYS$SYSTEM:SHUTDOWN
```

Answer the questions. When the procedure asks if an automatic reboot should be performed, press RETURN for NO. When the procedure is finished, it displays the following message:

```
SYSTEM SHUTDOWN COMPLETE - USE CONSOLE TO HALT SYSTEM
```

- 2 Press the Halt button located on the back of the system box.
- 3 To begin the conversational boot, enter the BOOT command in the following format:

```
>>> B/1 [device-name]
```

Substitute the device name of the drive from which you want to boot for *device-name*. For example, if the system disk has a device name of DKA400, enter the following command and press RETURN:

```
>>> B/1 DKA400
```

If you do not specify a device name, the system boots from the boot device specified by the last SET BOOT command.

- 4 At the SYSBOOT> prompt, you can enter any of the SYSGEN commands listed in Table 5-1. For more information about these SYSGEN commands, see the *VMS System Generation Utility Manual*.
- 5 When you finish using the SYSGEN commands, enter the CONTINUE command to complete the boot process.

Table 5-1 SYSGEN Commands Used in SYSBOOT

Command	Description
CONTINUE	Resumes the boot procedure.
DISABLE CHECKS	Inhibits checking of parameter values specified with the SET command.
ENABLE CHECKS	Permits checking of parameter values specified with the SET command.
HELP	Displays a summary of the SYSBOOT commands on the terminal screen.
SET parameter-name	Establishes the value of a system parameter.

(continued on next page)

Startup and Shutdown Procedures

5.6 Conversational Boot

Table 5-1 (Cont.) SYSGEN Commands Used in SYSBOOT

Command	Description
SET/STARTUP	Sets the name of the system startup command procedure.
SHOW [parameter]	Displays active, current, default, maximum, and minimum values for specific parameters. Use qualifiers to display characteristics of parameters grouped by categories.
USE [file-spec]	Specifies a parameter file to be used as a source of values (you must enter the entire file specification, including device and directory; you cannot specify a logical name).

The following examples illustrate some operations you can perform during a conversational boot.

You can enter the following command to set a new value for the SYSGEN parameter WSMAX to 512. The CONTINUE command completes the boot process.

```
SYSBOOT> SET WSMAX 512
SYSBOOT> CONTINUE
```

When the VMS operating system displays the following message, the new SYSGEN parameter value becomes active:

```
SYSTEM  job terminated at 19-APR-1990 15:05:11.01
```

If you modified the system parameters to values that render the system unbootable, enter the following commands to boot using default system parameter values:

```
SYSBOOT> USE DEFAULT
SYSBOOT> CONTINUE
```

You can also use the conversational boot operation to specify a minimum startup. For example, if you want to boot the system and avoid autoconfiguring all the peripheral devices, enter the following command and press RETURN:

```
SYSBOOT> SET STARTUP_P1 "MIN"
```

This command initiates a minimum startup that performs the following sequence of operations:

- 1 Starts the processes that control error logging, the job controller, and the operator's log
- 2 Installs known images
- 3 Defines the number of interactive users as eight
- 4 Logs off

Because this procedure does not invoke SYSTARTUP_V5.COM, it does not autoconfigure the system's peripheral devices.

Startup and Shutdown Procedures

5.6 Conversational Boot

The value of `STARTUP_P1` is saved and affects future boot operations. After the operating system boots, you can log into the `SYSTEM` account and run `SYSGEN` to reset `STARTUP_P1`. For example, enter the following commands to reset `STARTUP_P1` to its default value (null):

```
$ RUN SYS$SYSTEM:SYSGEN
SYSGEN> USE CURRENT
SYSGEN> SET STARTUP_P1 ""
SYSGEN> WRITE CURRENT
SYSGEN> EXIT
```

5.7 Booting with XDELTA

`XDELTA` is a debugging tool that system programmers use. To use `XDELTA`, you need to boot the system in a special way. For information on booting with `XDELTA`, see the *VMS Delta/XDelta Utility Manual*.

5.8 If the System Does Not Boot

If the system does not boot because a hardware problem occurs, a question mark (?) usually precedes the error message displayed on the console terminal. An example of a hardware problem is a read error on a disk or tape cartridge drive. If you suspect a hardware problem, do the following:

- 1 Consult the hardware manual for your VAX computer.
- 2 Contact Digital Field Service.

When the operating system is loaded into memory, a message similar to the following appears on the terminal screen:

```
SYSTEM  job terminated at 19-APR-1990 15:05:03.17
```

If the system does not display this message, a software problem has probably occurred. Do the following:

- 1 Turn off the system box. Turn it back on and try to reboot.
- 2 Do a conversational boot using default `SYSGEN` parameters as described in Section 5.6. If the system boots, run `AUTOGEN`. For more information on `AUTOGEN`, see the *Guide to Setting Up a VMS System*.

5.9 Shutting Down the System

Before you shut down the operating system, decide if you want it to reboot automatically or if you want to enter console-mode commands after the shutdown completes.

If you want the system to reboot automatically after the shutdown, see Section 5.4.

Startup and Shutdown Procedures

5.9 Shutting Down the System

5.9.1 Types of Shutdowns

You can perform the following three types of shutdown operations:

- **An orderly shutdown with SYS\$SYSTEM:SHUTDOWN.COM.** This procedure shuts down the system while performing maintenance functions such as disabling future logins, stopping the batch and printer queues, dismounting volumes and stopping user processes. To use the SHUTDOWN command procedure, log into the SYSTEM account, enter the following command, and press RETURN:

```
$ @SYS$SYSTEM:SHUTDOWN
```

To halt the system after the procedure completes, press the Halt button located on the back of the system box.

For more information about the SHUTDOWN command procedure, see the *Guide to Setting Up a VMS System*.

- **An emergency shutdown with OPCCRASH.EXE.** If you cannot perform an orderly shutdown with SHUTDOWN.COM, run the OPCCRASH emergency shutdown program. To run the OPCCRASH program, log into the SYSTEM account, enter the following command, and press RETURN:

```
$ RUN SYS$SYSTEM:OPCCRASH
```

To halt the system after the procedure completes, press the Halt button located on the back of the system box.

For more information about the OPCCRASH program, see the *Guide to Setting Up a VMS System*.

- **An Emergency Shutdown with CRASH Commands.** Use this emergency shutdown procedure if OPCCRASH fails. Section 5.9.2 describes using CRASH commands.

5.9.2 Emergency Shutdown with CRASH Commands

Note: Use CRASH commands only if the system is hung and you cannot log into the SYSTEM account to use SHUTDOWN or OPCCRASH.

To force your processor to fail, do the following:

- 1 Press the Halt button located on the back of the system box.
- 2 To examine processor registers, enter the following commands and press RETURN:

```
>>> E/N:F R0  
>>> E PSL
```

The system displays the contents of the registers. Write these values down if you want to save information about the state of the system.

- 3 Enter the following commands and press RETURN:

```
>>> D PC FFFFFFFF  
>>> D PSL 041F0000
```

Startup and Shutdown Procedures

5.9 Shutting Down the System

By depositing these values, you cause the system to write a memory dump to the system dump file on disk.

- 4 Enter the following command and press RETURN:

```
>>> CONTINUE
```

This causes the system to perform a bugcheck.

- 5 After the system reboots, you can examine the dump file. Log into the SYSTEM account.

- 6 Enter the following commands and press RETURN after each one:

```
$ ANALYZE/CRASH SYS$SYSTEM:SYSDUMP.DMP  
SDA> SHOW CRASH
```

For more information about the System Dump Analyzer (SDA) see the *VMS System Dump Analyzer Utility Manual*.

5.10 If the System Fails

Your system can fail in the following ways:

- Bugcheck—The system displays a bugcheck message on the console terminal and shuts itself down. This happens because the system encountered a problem that made further operation impossible. Reboot the system.
- Hang—The system stops responding to your commands. The problem could be a failure in system software or a hardware component or a power failure.
- Erratic behavior—The system does not respond according to specifications. The problem could be a failure in system software or a hardware component.

To see if the failure is a system problem and not something you have done, try the following:

- Make sure that you did not press the F1 key (the Hold Screen key). The Hold Screen light goes on when you press either the Hold Screen Key (F1) or CTRL/S.
- Press CTRL/T to check the status of your process. A status line should appear, indicating the name of the program that is executing and other information. If the status line does not appear, the program you are executing might be hung. (If you have disabled CTRL/T by entering the command SET NOCONTROL=T or have set the terminal to nobroadcast mode by entering the command SET TERMINAL /NOBROADCAST, this procedure does not work.)
- Make sure the cable connecting the terminal or monitor to the system box is secure.

Usually you can force an exit from a hung program by pressing CTRL/Y. When you press CTRL/Y, any work performed by the program and not saved on disk is lost.

Startup and Shutdown Procedures

5.10 If the System Fails

If the system is hung, press the Halt button and reboot without a normal shutdown.

If you have a problem with the system that Digital has not warned you about, note in detail the sequence of events that caused the problem and notify Digital Field Service.

6

Backup Procedures

This chapter describes the following procedures:

- Installing and booting standalone BACKUP on the system disk
- Installing and booting standalone BACKUP on a tape cartridge
- Backing up and restoring the system disk

6.1 Overview of Standalone BACKUP

The Backup Utility lets you create and restore backup copies of files, directories, and user disks. Because the Backup Utility copies only what is on the disk and ignores sections of any open files contained in memory, you should use it to back up user disks, not the system disk. If you use the Backup Utility to back up the system disk, the portions of the files that were in memory and data about files not yet written back to the disk (cache) will not be recorded on the resulting backup copy.

Use standalone BACKUP to make a complete backup of the system disk. Standalone BACKUP is a version of the Backup Utility that runs without the support of the entire VMS operating system. Before you use standalone BACKUP, you must shut down the VMS operating system. The shutdown procedure sends the contents of the caches back to the disk and closes any open files. By shutting the system down and using standalone BACKUP, you can make an exact copy of the system disk.

You can keep standalone BACKUP on the system disk, a tape cartridge, or any other media that the system can boot from. Digital recommends that you keep standalone BACKUP on your system disk and on a tape cartridge. Usually you boot standalone BACKUP from the system disk because it saves time. However, you need to keep a copy of standalone BACKUP on a tape cartridge in case the system disk becomes damaged. As part of your distribution kit, you received standalone BACKUP on a tape cartridge.

6.1.1 Installing Standalone BACKUP on the System Disk

You can install standalone BACKUP in any available root directory on the system disk from [SYS1] to [SYSE]. However, Digital has established [SYSE] as the standard directory for standalone BACKUP.

To install standalone BACKUP in [SYSE] on the system disk, use the following procedure:

- 1 Log into the SYSTEM account.
- 2 Enter the following command and press RETURN:

```
$ @SYS$UPDATE:STABACKIT SYS$SYSDEVICE:
```

Backup Procedures

6.1 Overview of Standalone BACKUP

The procedure places the files in the directories [SYSE.SYSEXE] and [SYSE.SYS\$LDR] on the system disk. It lists the files as they are copied. When the procedure finishes, it displays the following message:

The kit is complete.

- 3 To boot standalone BACKUP from the system disk, go to Section 6.1.2.

6.1.2 Booting Standalone BACKUP from the System Disk

To boot standalone BACKUP from the system disk, use the following procedure:

- 1 If the VMS operating system is not running, go to step 2.

If the VMS operating system is running, log into the SYSTEM account. Enter the following command and press RETURN:

```
$ @SYSS$SYSTEM:SHUTDOWN
```

Answer the questions. When the procedure asks if an automatic system boot should be performed, press RETURN for NO. When the procedure is finished, it displays the following message:

```
SYSTEM SHUTDOWN COMPLETE -- USE CONSOLE TO HALT SYSTEM
```

- 2 Press the Halt button.
- 3 Enter the BOOT command in the following format:

```
>>> B/E0000000 device-name
```

Substitute the device name of the system disk for *device-name*. Note that these are zeros. For example, if the system disk has a device name of DKA400, enter the following command and press RETURN:

```
>>> B/E0000000 DKA400
```

For more information on device names, see Section 3.2.

- 4 Standalone BACKUP displays the following message:

```
VAX/VMS Version V5.3 Major version id = 01 Minor version id = 00
```

- 5 The procedure asks you for the date and time. Enter the date and time using the 24-hour clock format and press RETURN. For example:

```
PLEASE ENTER DATE AND TIME (DD-MMM-YYYY HH:MM) 19-APR-1990 15:00
```

- 6 The procedure displays a list of the local devices on your system. For example:

```
Available device MKA500:      device type TK50
Available device DKA100:      device type RRD40
.
.
.
```

Check the list of devices. If the list is incomplete, make sure that all the drives are properly connected to the system. See your hardware manuals for details.

Backup Procedures

6.1 Overview of Standalone BACKUP

- 7 When standalone BACKUP finishes booting, it displays an identification message followed by the dollar sign prompt (\$):

```
%BACKUP-I-IDENT, Standalone BACKUP V5.3; the date is 19-APR-1990 15:00
$
```

To make a backup copy of the system disk, go to Section 6.2. To restore the system disk, go to Section 6.2.2.

6.1.3 Installing Standalone BACKUP on a Tape Cartridge

If your system has a tape cartridge drive, Digital recommends that you keep standalone BACKUP on a tape cartridge in case the system disk becomes damaged. To install standalone BACKUP on a tape cartridge, use the following procedure:

Note: You should have standalone BACKUP on the tape cartridge that came with your distribution kit. Use the procedure in this section if your copy of standalone BACKUP becomes damaged, or if you need to make extra copies.

- 1 Obtain one blank tape cartridge. Write the name S/A BKUP Version X on the paper label. Insert the label in the label slot.
- 2 Write-enable the tape cartridge.
- 3 Insert the tape cartridge labeled S/A BKUP into the drive.
- 4 Log into the SYSTEM account.
- 5 Enter the following command and press RETURN:

```
$ @SYSSUPDATE:STABACKIT
```

- 6 The procedure asks you for the name of the target device. Type MKA500 and press RETURN. For example:

```
Enter the name of the device on which to build the kit: MKA500
```

```
.
.
```

```
Please place the scratch tape cartridge in drive _MKA500:
This volume will receive the volume label SYSTEM.
```

```
Enter "YES" when ready:
```

- 7 When you are ready to continue, type Y (for YES) and press RETURN.
- 8 The system displays verification messages informing you that files are being copied.
- 9 When standalone BACKUP is installed, the procedure displays a message similar to the following:

```
Ending time 19-APR-1990 16:44:29.90
Starting time 19-APR-1990 16:30:39.05
```

```
The Kit is complete.
```

```
$
```

Backup Procedures

6.1 Overview of Standalone BACKUP

- 10 Remove the tape cartridge labeled S/A BKUP V5.3 from the tape cartridge drive.
- 11 Write-protect the tape cartridge and store it in a safe place.

6.1.4 Booting Standalone BACKUP from a Tape Cartridge

If the system disk containing standalone BACKUP should become unusable, you can boot standalone BACKUP from a tape cartridge. Booting standalone BACKUP from a tape cartridge takes approximately 20 minutes. You need a tape cartridge that contains standalone BACKUP (either the distribution tape cartridge or one that you created). To boot standalone BACKUP from a tape cartridge, use the following procedure:

- 1 If the VMS operating system is not running, go to step 2.

If the VMS operating system is running, log into the SYSTEM account. Enter the following command and press RETURN:

```
$ @SYS$SYSTEM:SHUTDOWN
```

Answer the questions. When the procedure asks if an automatic system boot should be performed, press RETURN for NO. When the procedure is finished, it displays the following message:

```
SYSTEM SHUTDOWN COMPLETE -- USE CONSOLE TO HALT SYSTEM
```

- 2 Press the Halt button.
- 3 Insert the tape cartridge that contains standalone BACKUP into the tape cartridge drive.
- 4 To boot standalone BACKUP, enter the following command at the console-mode prompt (>>>) and press RETURN:

```
>>> B MKA500
```

- 5 Standalone BACKUP displays the following message:

```
VAX/VMS Version V5.3 Major version id = 01 Minor version id = 00
```

- 6 The procedure asks you for the date and time. Enter the date and time using the 24-hour clock format and press RETURN. For example:

```
PLEASE ENTER DATE AND TIME (DD-MMM-YYYY HH:MM) 19-APR-1990 15:00
```

- 7 The procedure displays a list of the local devices on your system. For example:

```
Available device MKA500:      device type TK50
Available device DKA100:      device type RRD40
.
.
```

- 8 When standalone BACKUP finishes booting, it displays an identification message followed by the dollar sign prompt (\$):

```
%BACKUP-I-IDENT, standalone BACKUP V5.3; the date is 19-APR-1990 15:50
$
```

- 9 Remove the tape cartridge containing standalone BACKUP from the tape cartridge drive.

To make a backup copy of the system disk, go to Section 6.2.

To restore the system disk, go to Section 6.2.2.

6.2 Using Standalone BACKUP

There are several reasons to back up a system disk:

- In case a problem occurs during a VMS upgrade or update or during the installation of other software products. *Before* you attempt any of these procedures you should back up the system disk. If a problem does occur, you can restore the backup copy to the system disk.
- To prevent loss of system files if they are accidentally deleted. *After* you install or upgrade the VMS operating system or any other software products, you should back up the system disk. If a system file is deleted and renders the system disk inoperable, you can restore the backup copy and continue to use the system.
- In case the system disk malfunctions. If you have a backup copy of the VMS operating system, you can restore it to a functioning disk and continue to use the system.
- To eliminate disk fragmentation. Fragmentation happens when files are not stored contiguously on the disk. Back up the system disk to a tape cartridge, diskettes, or another disk. Then restore the files to the original system disk. The BACKUP command creates a copy on which files are stored contiguously.

Digital recommends that you use standalone BACKUP, which uses a subset of Backup Utility qualifiers, to back up and restore your system disk. It is especially important that you understand the functions of the /IMAGE and /PHYSICAL qualifiers to the BACKUP command before using standalone BACKUP.

Qualifier	Function
/IMAGE	Lets you create a functionally equivalent copy of the entire system disk
/PHYSICAL	Copies, saves, restores, or compares the entire system disk in terms of logical blocks, ignoring any file structure

For a complete description of the Backup Utility and its qualifiers, see the *VMS Backup Utility Manual*.

Backup Procedures

6.2 Using Standalone BACKUP

6.2.1 Backing Up the System Disk

To back up the system disk, use the following procedure:

- 1 Decide whether you want to back up the system disk to another fixed disk or to a tape cartridge. If you are using a tape cartridge, obtain a scratch tape cartridge that you can use for the backup copy. A scratch tape cartridge is a tape cartridge that is either blank or contains files that you no longer need.
- 2 If you are using a tape cartridge, write-enable it. To write-enable a tape cartridge, slide the write-protect switch away from the tape cartridge label. Insert the tape cartridge in the tape cartridge drive.
- 3 Determine the device names of the drive holding the system disk and the drive holding the backup disk or tape cartridge. Enter the SHOW DEVICE command at the console-mode prompt (>>>).
- 4 Boot standalone BACKUP as described in either Section 6.1.2 or Section 6.1.4.
- 5 Enter the BACKUP command in one of the following formats. If you are backing up the system disk to a disk, use the first command. If you are backing up the system disk to a tape cartridge, use the second command.

```
$ BACKUP/IMAGE/VERIFY source-drive: target-drive:
```

```
$ BACKUP/IMAGE/VERIFY source-drive: MKA500:saveset.BCK/REWIND/LABEL=volume-label
```

where:

- *source-drive* is the location of the files you want to backup. Use the device name of the drive holding the system disk.
- *target-drive* is the destination. Use the device name of the drive holding the backup disk or tape cartridge.
- *saveset.BCK* is the name of the save set (the name should reflect the contents of the backup tape and can have up to 17 characters).
- *volume-label* is the volume label of the tape cartridge in the tape cartridge drive. If the tape cartridge has been initialized already, use the same volume label that was assigned by the INITIALIZE command. If the tape cartridge has not been initialized, you can assign a volume label at this time. The volume label can have up to six characters.

The following example uses the BACKUP command to make a backup disk. You can use a backup disk as a system disk.

```
$ BACKUP/IMAGE/VERIFY DKA400: DKA300:
```

The following example uses the BACKUP command to make a backup tape cartridge. The contents of a backup tape cartridge have to be restored to a disk before you can use them. For more information, see Section 6.2.2.

```
$ BACKUP/IMAGE/VERIFY DKA400: MKA500:DEC_31_1989.BCK/REWIND/LABEL=SYSDSK
```

Backup Procedures

6.2 Using Standalone BACKUP

- 6 The procedure displays the following message:

```
%BACKUP-I-STARTVERIFY, starting verification pass
```

- 7 If you are backing up the system disk to another disk, go to step 8.

If you are backing up the system disk to a tape cartridge and the contents of the system disk fit on one tape cartridge, remove the backup tape cartridge from the drive. Label the tape COMPLETE SYSTEM BACKUP and include the date. Then go to step 8.

If you are backing up the system disk to a tape cartridge and the system disk contains more data than one tape cartridge can store, the procedure displays the following messages:

```
%BACKUP-I-RESUME, Resuming operation on volume 2
%BACKUP-I-READYWRITE, Mount volume 2 on _MKA500: for writing
Enter "YES" when ready.
```

Do the following:

- a. Remove the backup tape cartridge from the drive.
- b. Label it COMPLETE SYSTEM BACKUP, number it, and include the date.
- c. Write-protect the tape cartridge.
- d. Write-enable another scratch tape cartridge and insert it in the drive.
- e. When you are ready to continue, type Y (for YES) and press RETURN. The procedure displays the following message:

```
%BACKUP-I-STARTVERIFY, starting verification pass
```

Each time the procedure displays a mount request, repeat steps a through e.

- 8 When the procedure is finished, it displays the following message:

```
%BACKUP-I-PROCDONE, Operation completed. Processing finished at 19-APR-1990 15:30
If you do not want to perform another standalone BACKUP operation,
use the console to halt the system.
```

```
If you do want to perform another standalone BACKUP operation,
ensure the standalone application volume is online and ready.
Enter "YES" to continue:
```

- 9 Press the Halt button.

- 10 Reboot the system.

Store backup tape cartridges in a safe place.

Note: The BACKUP command creates a system disk that includes a set of volume parameters provided by Digital, including a CLUSTER_SIZE (disk access scheme) of one. (The CLUSTER_SIZE refers to the way files are stored on the disk, *not* to VAXclusters.) You can change most volume parameters later with the SET VOLUME command. However, to change the CLUSTER_SIZE you must back up the system disk to a disk that has been previously initialized with the CLUSTER_SIZE that you want. To prevent

Backup Procedures

6.2 Using Standalone BACKUP

the **BACKUP** command from reinitializing the target disk, use the **/NOINITIALIZE** qualifier. For more information about initializing a disk, see the *Guide to Maintaining a VMS System*. For more information on the **BACKUP** command, see the *VMS Backup Utility Manual*.

6.2.2 Restoring the System Disk

To restore the system disk, use the following procedure:

- 1 Determine the device names of the drive holding the system disk and the drive holding the backup disk or tape cartridge. Enter the **SHOW DEVICE** command at the console-mode prompt (>>>).
- 2 Boot standalone **BACKUP** as described in Section 6.1.2 or Section 6.1.4.
- 3 If you have a backup tape cartridge, make sure it is write-protected. Insert it in the drive.
- 4 Enter the **BACKUP** command in one of the following formats. If you have a backup disk, use the first command. If you have a backup tape cartridge, use the second command.

```
$ BACKUP/IMAGE/VERIFY source-drive: target-drive:
```

```
$ BACKUP/IMAGE/VERIFY MKA500:saveset.BCK/REWIND target-drive:
```

where:

- *source-drive* is the location of the files you want to restore. Use the device name of the drive holding the backup disk or tape cartridge.
- *saveset.BCK* is the name of the save set, if you have a backup tape cartridge.
- *target-drive* is the destination. Use the device name of the drive holding the system disk.

The following example uses the **BACKUP** command to restore the system disk from a backup disk:

```
$ BACKUP/IMAGE/VERIFY DKA400: DKA300:
```

The following example uses the **BACKUP** command to restore the system disk from a backup tape cartridge:

```
$ BACKUP/IMAGE/VERIFY MKA500:DEC_31_1989.BCK/REWIND DKA400:
```

- 5 The procedure displays the following message:

```
%BACKUP-I-STARTVERIFY, starting verification pass
```

- 6 If you have a backup disk or only one backup tape cartridge, go to step 7.

If you have more than one backup tape cartridge, the procedure displays the following message:

```
%BACKUP-I-RESUME, Resuming operation on volume 2  
%BACKUP-I-READYREAD, Mount volume 2 on MKA500: for reading  
Enter "YES" when ready.
```

Backup Procedures

6.2 Using Standalone BACKUP

Remove the first backup tape cartridge from the drive. Insert the next backup tape cartridge in the drive, type Y (for YES), and press RETURN. Each time you receive a mount request, repeat this step.

7 When the procedure is finished, it displays the following message:

```
%BACKUP-I-PROCDONE, Operation completed. Processing finished at 19-APR-1990 15:30  
If you do not want to perform another standalone BACKUP operation,  
use the console to halt the system.
```

```
If you do want to perform another standalone BACKUP operation,  
ensure the standalone application volume is online and ready.  
Enter "YES" to continue:
```

8 Press the Halt button.

9 Reboot the system.

A

Release Notes

These release notes describe special features and restrictions for the VAXstation 3100 and MicroVAX 3100 computers.

A.1 Restrictions on the Use of the Tape Drive

When you perform a backup operation with either a TZK50 or TZ30 tape drive, always use the /VERIFY qualifier with the BACKUP command. If a SCSI bus reset occurs during a backup operation and you did not include /VERIFY, an undetected loss of data could occur.

A.2 Restriction on the Use of the Compact Disc Drive

When you enter the SHOW DEVICE command at the console-mode prompt (>>>), the display might not include information on the compact disc drive you have in an expansion box. If this happens, check the cable from the system box to the drive. Also make sure the power to the drive is turned on. If the problem still persists, turn the power to the drive off and then on again. Wait 10 seconds or more before trying the SHOW DEVICE command again. At this time the compact disc drive should be included in the display.

A.3 TZK50 Expansion Box from a VAXstation 2000

The TZK50 expansion box (tape drive) used on the VAXstation 2000 and the MicroVAX 2000 is not compatible with the VAXstation 3100 and MicroVAX 3100 SCSI bus. If you want to use that tape drive with your system, it must be modified by Digital Field Service. Otherwise, the unit will be left offline and an error will be logged for the drive. Note that the modifications required for operation on the VAXstation 3100 and MicroVAX 3100 series will make this tape drive inoperable on the VAXstation 2000 and MicroVAX 2000 systems.

A.4 Performance on the TZK50 and TZ30 Tape Drives

Good performance on the TZK50 and TZ30 tape drives requires that the tapes move continuously; this is called "streaming." If the tape drive shares a SCSI bus with a number of other drives, it could slow down to the extent that it can no longer stream. This causes poor tape drive performance. To correct the problem, perform backup operations that involve the tape drive during a less busy time of day.

B

SCSI Disk and Tape Drives

A *bus* is a channel (a set of wires) along which communication signals in a computer system travel. One type of bus is the Input/Output bus (I/O bus). The central processing unit (CPU) of a computer uses the I/O bus to communicate with the disk and tape drives on the system. The VAXstation 3100 has a special I/O bus that is based on the ANSI standard known as the Small Computer System Interface (SCSI). This bus is called the SCSI bus.

The CPU and each disk and tape drive on the SCSI bus are assigned a unique identification number in the range of 0 to 7. The device with the highest identification number (7) has the highest priority. The device with the lowest identification number (0) has the lowest priority. Digital ships pre-configured systems from the factory with the proper identification numbers set. You can use the SHOW DEVICE command at the console-mode prompt (>>>) to display the identification numbers assigned to the devices on your system.

Table B-1 lists the identification numbers that Digital usually assigns to the devices on a SCSI bus. These are subject to change.

Table B-1 SCSI ID Numbers

ID Number	
7	unused
6	CPU
5	tape drive
4	disk drive
3	disk drive
2	disk drive
1	unused
0	unused

These identification numbers give optimal performance on most systems. However, if you have special performance needs, you can set the identification number on each SCSI device manually. Each device has a switchpack or jumpers that you can set. For more information, see the hardware manuals.

When you set SCSI identification numbers, follow these rules:

- You can have as many as 7 drives on one bus as long as you reserve the number 6 for the CPU.
- Each device must have a *unique* identification number.

SCSI Disk and Tape Drives

If you fail to follow these rules, you might have the following problems with the system:

- Self-test errors when you turn the power on to the system
- Unexpected results from the SHOW DEVICE console command
- Inability to boot the system
- Unexplained system crashes

B.1 Changing the Identification Number of the CPU

Digital assigns the SCSI identification number 6 to the CPU. The CPU automatically uses this value whenever the battery backup is exhausted.

If you need to change the identification number of the CPU, use the SET SCSIA and SET SCSIB console commands. Note that the identification number is changed back automatically to 6 whenever the battery backup is exhausted. For more information on the SET SCSIA and SET SCSIB commands, see the hardware manuals.

B.2 SCSI Bus Termination

The SCSI bus on your system is sensitive to changes in configuration. The rules for configuring a SCSI system are listed below. Digital ensures that these requirements are met when it builds your system and when it services your equipment. If you must reconfigure your system, then you must follow these rules for the proper operation of the SCSI bus.

- There are no SCSI terminators on any drive in the system box or in expansion boxes.
- Cables supplied by Digital are used to connect expansion boxes.
- The terminating connector supplied by Digital is plugged into the last SCSI jack on the external bus.
- There is no duplication of any SCSI ID (target or initiator) on a bus. It is acceptable to have IDs on the "B" bus that duplicate on the "A" bus.

Violation of any of these rules may lead to serious consequences, including system crashes, loss of user data, and erratic system behavior.

C

Bad Block Support

This section describes the VMS bad block support for SCSI disks. The following components contain VMS bad block support:

- Console disk formatter
- Bad Block Locator (BAD) Utility
- INITIALIZE command and the file system
- SCSI disk class driver

C.1

SCSI Concepts

This section describes the following commands and concepts:

- FORMAT UNIT command
- REASSIGN BLOCKS command
- No forced error bit
- Non-last track

FORMAT UNIT Command

All SCSI disks can implement a FORMAT UNIT command. This command makes sure that every block on a disk is accessible. It also causes a drive to initialize control structures that manage media defects.

REASSIGN BLOCKS Command

Some SCSI disks can implement a REASSIGN BLOCKS command. Host software can use this command to relocate the data for a specific logical block to a different physical location on a fixed disk. It is used when a read or write operation to a disk block fails due to a media defect. The REASSIGN BLOCKS command is not guaranteed to move the data from the old to the new location on the disk.

No Forced Error Bit

A unique forced error bit is associated with each block on a Digital Storage Architecture (DSA) disk. When a read operation to a DSA disk block results in a nonrecoverable error, the block is reassigned to a different physical location on the disk and the forced error bit for this block is set. Once this bit is set, error status is displayed when an attempt is made to read this disk block.

SCSI disks have no forced error bit. This means that in the particular case of a nonrecoverable read error, reassignment operations are not performed. If a read operation to a SCSI disk block results in a nonrecoverable error and the block is reassigned to a different physical location on the disk, subsequent reads to this block result in success status.

Bad Block Support

C.1 SCSI Concepts

Non-last Track

Some types of disks reserve the last track for recording bad block information. SCSI disks, however, use the last good block to record bad block information. This is called “non-last track.”

C.2 Console Disk Formatter

The console disk formatter is a program that can be run before VMS is booted and before any user data is placed on the disk. It performs the `FORMAT UNIT` command, followed by a sequence of reads and writes to ensure that every disk block can store data reliably. Reassignment operations are performed for blocks that return errors during read or write operations.

C.3 BAD Utility

The BAD Utility runs under VMS. It ensures that every block on the disk can store data reliably. Like the console disk formatter, it performs reads and writes to every block on the disk. Information about any sequence of bad blocks found on the disk is saved in the Detected Bad Block File (DBBF). This table is stored on the last good block of the disk.

C.4 The INITIALIZE Command and the File System

The `INITIALIZE` command prepares disks to store files. It creates the file `BADBLK.SYS` (located at `[0,0]`). Blocks found to have nonrecoverable errors are allocated to this file so that they won't be allocated to user files.

Usually, all I/O operations to SCSI disks go through the SCSI disk class driver. If a nonrecoverable error is detected for a SCSI disk block, the driver returns an error status (`SS$_PARITY`) to the file system. The file system then sets a flag in the file header for the file that contains the bad block. When you delete a file that contains a bad block, a process is created that attempts to read and write every block within the file. This is called the “scrub” process. It allocates any bad blocks that are found to `BADBLK.SYS`.

Note the following about the reinitialization of a disk:

- The contents of `BADBLK.SYS` are *not* preserved.
- Any blocks entered in the DBBF by the BAD Utility are *not* allocated to `BADBLK.SYS`.

C.5 SCSI Disk Class Driver

Upon completion of a read or write operation, SCSI disks return one of the following status indications:

- Successful
- Recoverable (soft error)
- Nonrecoverable (hard error)

Recoverable errors fall into two categories:

- Recoverable with read retries—These errors are considered to be successful by the disk class driver.
- Recoverable with ECC correction—These errors can lead to class driver retries and possibly to the reassignment of blocks.

Nonrecoverable errors lead to retries and possibly to the reassignment of blocks.

C.6 Error Recovery Parameters

SCSI disks have a set of flags, called error recovery parameters. These flags control what happens when an error is detected. The settings of each of these flags are as follows:

- **AWRE, ARRE**—Control whether the disk automatically reassigns blocks when errors are detected during write and read operations. All SCSI disks supplied by Digital have these flags set to zero, preventing automatic block reassignment. Thus, all reassign operations are performed under host software control.
- **TB**—Controls whether the disk transfers the block for which an error occurs. This feature is enabled by the SCSI disk class driver (that is, the bad block is transferred).
- **PER**—Controls whether the disk informs the host when a recoverable error occurs. This flag is set by the SCSI disk class driver.
- **DTE**—Determines whether the disk stops a transfer when the first error is detected. If this flag is not set, the disk class driver is informed of only the last error in a transfer with errors on multiple blocks. The disk class driver sets this flag for all disks which support this feature.
- **DCR**—When set, prevents the disk from applying correction in the course of error recovery. The disk class driver clears this flag for all SCSI disks.

C.7 What the Disk Class Driver Does When it Detects an Error

When the disk class driver detects a read or write error, it tries the operation again several times. If appropriate, it reassigns blocks to prevent media defects from causing future errors. Following is a summary of the retry algorithms implemented by the SCSI disk class driver:

- 1 The driver detects an error during a read or write operation.
- 2 The driver retries the operation three times. If a retry is successful, it exits.
- 3 If the three retries fail and this is a nonrecoverable read, it returns a status of `SS$_PARITY`. (A reassignment would result in undetected user data corruption because there is no forced error bit in SCSI.)

In all other cases—a recoverable read, a recoverable write, a non-recoverable write—the driver attempts to reassign the block up to three times.

Bad Block Support

C.7 What the Disk Class Driver Does When it Detects an Error

- 4** If the reassignment succeeds, the driver writes the original data to the reassigned block. The REASSIGN BLOCKS command is not guaranteed to move the data from the old to the new location on the disk.

If the write operation after the reassign fails and fewer than three reassigns have been performed, return to the reassign loop.

Glossary

boot or bootstrap: The process of loading system software into a processor's main memory. This guide uses the term *boot* to refer to this process.

boot server: A computer that is part of a local area VAXcluster. The boot server in a local area VAXcluster has a system disk that contains files common to the cluster; other nodes in the cluster (satellite nodes) can access these files. See also *satellite node*.

CI-only VAXcluster: A computer system consisting of a number of VAX computers. It uses only the computer interconnect (CI) to communicate with other VAX computers in the cluster. A VAXstation 3100 cannot be part of a CI-only VAXcluster.

console mode: In console mode, you control the system by entering console-mode commands. In console mode, the VMS operating system is not running.

device name: The name you use to identify a device on the system. A device name indicates the device code, controller designation, and unit number.

local area VAXcluster: Consists of a VAX computer that acts as a boot server and a number of low-end VAX computers that act as satellite nodes. Ethernet connects all of the computers. These computers share a single file system. See also *boot server* and *satellite node*.

local drive: Any drive that is connected directly to a computer is referred to as a local drive.

media: A generic term that refers to any packaging agent capable of storing computer software. Examples of media are magnetic tapes, diskettes, disk packs, compact discs (CDROM), tape cartridges, etc.

mixed-interconnect VAXcluster: A computer system consisting of a number of VAX computers. It uses both the computer interconnect (CI) and the Ethernet to communicate with other VAX computers in the cluster.

program mode: In program mode, the CPU is running and the system is controlled by the VMS operating system. In program mode, you can enter DCL commands, run programs, and receive system messages. See also *console mode*.

satellite node: A computer that is part of a local area VAXcluster. A satellite node is booted remotely from the system disk of the boot server in the local area VAXcluster. See also *boot server*.

save set: The format that the BACKUP utility stores files in. The VMS operating system is shipped in this format.

Glossary

scratch media: Media that are blank or have files that you no longer need. For example, a scratch tape cartridge.

standalone BACKUP: A version of the BACKUP utility that is booted into memory. It runs without the control of the VMS operating system.

standalone system: A computer system with only one VAX computer.

system disk: The disk that contains (or will contain) the VMS operating system. A VMS system disk is set up so that most of the VMS files can be shared by several computers. In addition, each computer has its own directory on the system disk that contains its page, swap, and dump files.

VAXcluster environment: A computer system consisting of a number of highly integrated VAX computers. There are three types of VAXcluster environments: CI-only, local area, and mixed-interconnect.

VAXserver: A VAX computer that functions primarily as the boot server in a local area VAXcluster. It also can serve as the batch computer for the cluster. A VAXserver is licensed for only two users.

VMS User Environment Test Package (UETP): A software package that tests all the standard peripheral devices on your system, various commands and operating system functions, the system's multi-user capability, DECnet-VAX, and the VAXcluster environment.

VMSTAILOR: A software program that lets you remove files from or add files to your system disk.

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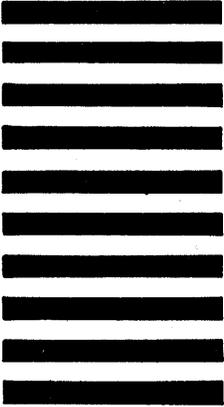
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