VMS Installation and Operations: VAX 8820,8830,8840

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April 1988

This guide describes the VMS installation procedure for the VAX 8820, 8830, and 8840. It also explains the startup, shutdown, and backup operations for these VAX computers.

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April 1988

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Preface

The VAX 8820, 8830, and 8840 are air-cooled systems with battery backup that can contain up to four processors. They use symmetric multiprocessing to deliver up to 22 times the performance of a VAX–11/780.

These systems are packaged in two cabinets. The memory and I/O cabinet supports 64M to 512M of shareable memory, up to six VAXBI buses, and both an NI and a CI port. The CPU cabinet can be configured with up to four processors in a tightly coupled multiprocessor configuration. An optional BI expander cabinet provides two BI channels with space for up to six channels. In addition to the above cabinets, there is a MicroVAX II console subsystem.

These systems offer full compatibility with software written and used on other VAX computers, including VMS software, optional software products, and applications software.

VMS Installation and Operations: VAX 8820,8830,8840 contains specific installation and operations information for the VAX 8820, 8830, and 8840. 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 the following products by their abbreviated names:

- The VAX 8820, VAX 8830, and VAX 8840 computers are referred to collectively as the VAX 8820, 8830, and 8840.
- The VAX 8820 computer is referred to as the VAX 8820.
- The VAX 8830 computer is referred to as the VAX 8830.
- The VAX 8840 computer is referred to as the VAX 8840.

Intended Audience

This guide is for system managers, operators, and users of the VAX 8820, 8830, and 8840.

Document Structure

VMS Installation and Operations: VAX 8820,8830,8840 is organized into two parts. Part I provides an overview of the system and covers installation and post-installation procedures. 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 installation, upgrade, and update procedures.
- Chapter 2 describes the console subsystem.
- Chapter 3 summarizes the basic information you need to know before installing the VMS operating system.
- Chapter 4 describes the tasks you need to complete before you can install the VMS operating system.

- Chapter 5 tells you how to install the VMS operating system from a local tape drive.
- Chapter 6 tells you how to install the VMS operating system from an HSC tape drive.
- Chapter 7 lists the tasks you should perform after you install the VMS operating system.
- Chapter 8 describes the VMS User Environment Test Program (UETP) and how you can use it to test the system.

Part II

- Chapter 9 contains instructions for starting up the system. It also describes system shutdown procedures.
- Chapter 10 describes backup procedures you should perform on a regular basis.
- Appendix A contains release notes for the VAX 8820, 8830, and 8840.
- The Glossary lists and defines terms.

Associated Documents

The following documents might be useful:

- *VMS Release Notes*—provides notes on various aspects of the VMS operating system. Most importantly, the release notes contain a description of the upgrade and update procedures. The release notes also contain the latest information regarding your VAX computer. You should read the current version of the *VMS Release Notes* before installing, upgrading, or updating the VMS operating system or using your VAX computer.
- *Console User's Guide*—has information about the system hardware, as well as instructions for using the console and the console command language.
- The hardware manuals supplied with your VAX computer provide detailed information on system hardware.

Conventions

Convention	Meaning
RET	In examples, a key name (usually abbreviated) shown within a box indicates that you press a key on the keyboard; in text, a key name is not enclosed in a box. In this example, the key is the RETURN key. (Note that the RETURN key is not usually shown in syntax statements or in all examples; however, assume that you must press the RETURN key after entering a command or responding to a prompt.)
CTRL/C	A key combination, shown in uppercase with a slash separating two key names, indicates that you hold down the first key while you press the second key. For example, the key combination CTRL/C indicates that you hold down the key labeled CTRL while you press the key labeled C. In examples, a key combination is enclosed in a box.
$ SHOW TIME 05-JUN-1988 11:55:22	In examples, system output (what the system displays) is shown in black. User input (what you enter) is shown in red.
$ TYPE MYFILE.DAT . . .	In examples, a vertical series of periods, or ellipsis, means either that not all the data that the system would display in response to a command is shown or that not all the data a user would enter is shown.
input-file, . . .	In examples, a horizontal ellipsis indicates that additional parameters, values, or other information can be entered, that preceding items can be repeated one or more times, or that optional arguments in a statement have been omitted.
[logical-name]	Brackets indicate that the enclosed item is optional. (Brackets are not, however, optional in the syntax of a directory name in a file specification or in the syntax of a substring specification in an assignment statement.)
quotation marks apostrophes	The term quotation marks is used to refer to double quotation marks ("). The term apostrophe (') is used to refer to a single quotation mark.

New and Changed Features

Before VMS Version 5.0 the *VAX/VMS System Manager's Reference Manual* included specific information on booting and installing standalone BACKUP on the different VAX computers. The *Guide to VAX/VMS Software Installation* provided information on console subsystems, disk and tape drives, and booting during installation. There were also 19 separate booklets with step-by-step instructions for installing the VMS operating system.

With VMS Version 5.0 DIGITAL is providing one guide for each family of VAX computers. Each guide provides a single source of information on the following:

- Disk and tape drives and the console subsystem
- Installing the VMS operating system on your particular VAX computer
- Testing the system with UETP
- Startup and shutdown operations
- Installing and booting standalone BACKUP
- Backing up and restoring the system disk

The guide for your VAX computer provides all the specific information you need to install the VMS operating system and perform daily startup, shutdown, and backup operations.

Note the following Version 5.0 restrictions for installing the VMS operating system:

- Dual system disks are no longer supported.
- The entire VMS operating system will not fit on an RC25, RD52, or RK07 system disk. DIGITAL suggests that you add more disk storage to your system.
- The VAX–11/782 is no longer supported.

Part I

Part I describes installation and post-installation procedures.

1 The Installation, Upgrade, and Update Procedures

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

Before you install or upgrade 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 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 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 will not work correctly.

If you are going to install the VMS operating system, read Chapters 1 through 4 of this guide and then follow the appropriate installation procedure.

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

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

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.

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 the *VMS Release Notes* 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. The directions for a maintenance update are in the *VMS Release Notes*.

CAUTION: **The update 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 update.**

2 The Console Subsystem

Before you install the VMS operating system, you need to be familiar with the console subsystem. In general, use the console subsystem to examine and deposit data in memory or processor registers, stop the processors, and boot the operating system. During installation, use it to boot the system and monitor the installation process. The console subsystem consists of the following:

- Console terminal and optional printer
- MicroVAX II microcomputer
- Console fixed disk drive
- Console tape cartridge drive
- Console command language

This chapter describes the parts of the console subsystem that you use to install the VMS operating system. For a complete description of the console subsystem, see the *Console User's Guide*.

2.1 The Console Terminal

The console terminal is the video terminal attached to the console microcomputer. It has the name OPA0. The console terminal is the only terminal on the system that can execute all the console commands. Use it to control and monitor system operations.

A DIGITAL diagnostics center uses a *remote console terminal* (located at the diagnositics center) to control system operations during diagnostic testing. A remote console terminal has the name OPA5. It can execute a subset of the console commands.

During the VMS installation procedure, DIGITAL recommends that you keep track of system operations. There are two ways to keep track of system operations:

- Save the information in a console log file
- Send the information to a printer

The console terminal can keep a record of system operations in a *console log file*. For example, information that has scrolled off the terminal screen is stored in a console log file. When you want a console log file, enter the following command and press RETURN:

```
PS-CIO-0> ENABLE LOG
```

When you no longer want a log file, enter the following command and press RETURN:

```
PS-CIO-0> DISABLE LOG
```

Another way to keep track of system operations is to attach a printer to the console subsystem. The printer can then record the terminal display. To send the terminal display to the printer, enter the following command and press RETURN:

```
PS-CIO-0> ENABLE PRINTER
```

To stop sending the terminal display to the printer, enter the following command and press RETURN:

```
PS-CIO-0> DISABLE PRINTER
```

2.2 The Console Fixed Disk Drive

The console fixed disk is the primary storage device for the console subsystem, and contains the console software. Console VMS, the operating system for the console subsystem, refers to the console fixed disk as DUA0. The VMS operating system refers to it as CSA3. Figure 2–1 shows the control panel for the console subsystem. The VMS operating system has only read access to the console fixed disk. Table 2–1 explains the functions of the buttons and lights on the control panel.

Figure 2–1 Control Panel on the Console Subsystem

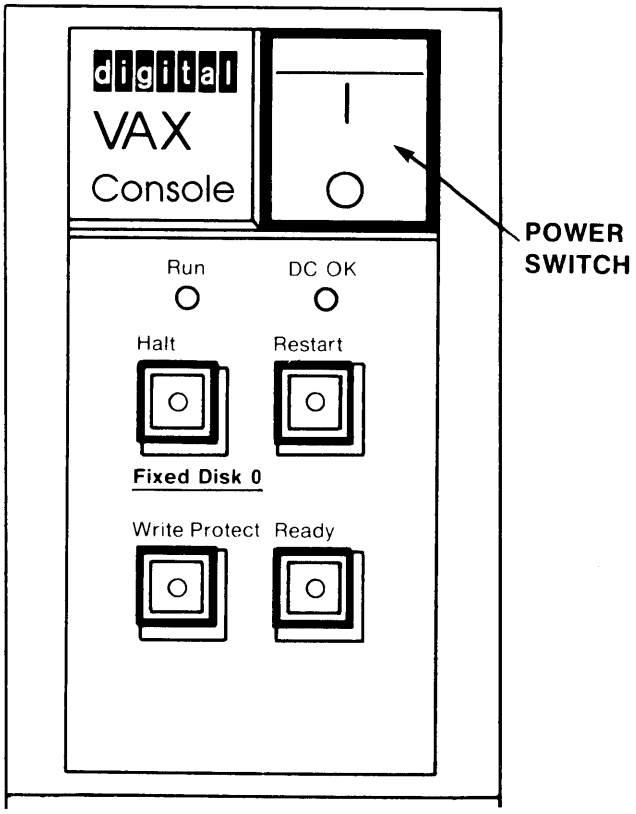


Table 2–1 Controls and Indicator Lights on the Control Panel

Control/Indicator Light	Description
Power switch	Turns the AC power on. This rocker switch is labeled 1/0 (on/off). The orange light glows when power is on.
Run light	Glows green when the console subsystem is running.
DC OK light	Glows green if all DC voltages are present and within proper tolerance levels.
Halt button	Stops the console subsystem. When you push the Halt button in, it glows red and stays in. Releasing the Halt button, by pressing it again, causes the console subsystem to display the > > > prompt.
Reset button	Stops the console subsystem and runs the ROM-based diagnostics for the console subsystem.
Write Protect button	Prevents writing to the console fixed disk. When pushed in, the button glows red and the disk is write-protected.
Ready button	Prevents writing to or reading from the console fixed disk. When pushed in, the disk is protected from reading or writing. When the button is released, the button glows green; the disk is available for reading and writing. The ready button blinks when data are read from or written to the fixed disk.

2.3 The Console Tape Cartridge Drive

The console subsystem includes a TK50 tape cartridge drive. Console VMS, the operating system for the console subsystem, refers to it as MUA0. The VMS operating system cannot access this drive. Use this drive to install standalone BACKUP and update the console software. Figure 2–2 shows the tape cartridge drive.

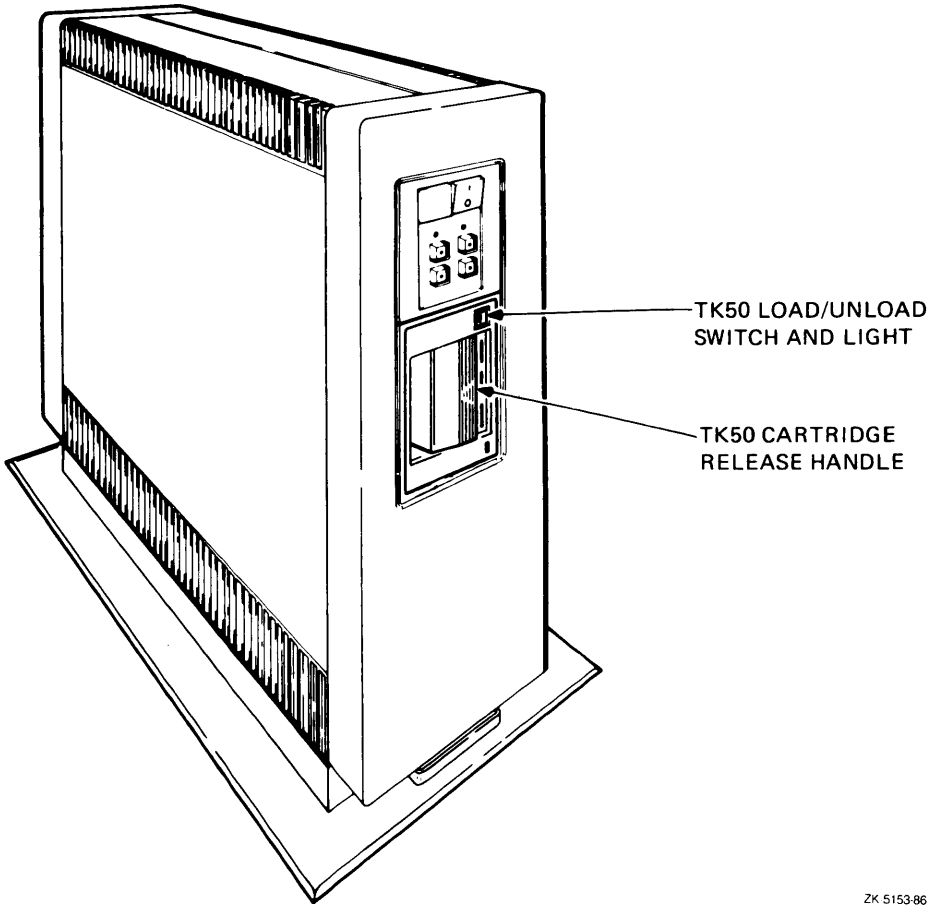
When using the tape cartridge drive shown in Figure 2–2, you should be aware of the following:

- The green light blinks when the tape in the drive is actually moving (being read from or written to). If a tape cartridge is in the drive and this light is off, the drive is inactive and the tape is not positioned at its beginning. *Never* attempt to remove a tape cartridge 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 is when the green light is glowing.

- The red LOAD/UNLOAD button controls the loading of the tape.

Figure 2–2 The Console Tape Cartridge Drive



When the button is pressed in, it is in the LOAD (in) position. The red light on the button glows red when the tape is loaded. It blinks *slowly* when the tape is rewinding. It blinks *quickly* 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.

CAUTION: ***Never* attempt to remove a tape cartridge while the LOAD/UNLOAD button is in the LOAD (in) position (the red light is on); this damages the tape and might damage 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 is glowing**

- **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 2–2 Summary of Tape Cartridge 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.
Cartridge release handle	Open	Lets you insert or remove a tape after rewind and unload operations are completed.
	Closed	Locks tape in operating position.

Table 2–3 Tape Cartridge Drive Indicator Lights

Red Light	Green Light	Condition
Off	Off	No power to the tape cartridge drive.
Off	On	Safe to move the handle. Power is present.
On	Off	Do not move the handle. One of the following is in effect: • Power-on self test is occurring. • Tape cartridge is inserted but handle is still in the open position. • Tape is loading or unloading. • Tape is stopped.
On	On	Tape loaded successfully.
On	Blinks	Tape is in motion (except rewind). Read/write commands are being processed. Irregular fast blinks mean tape calibration is occurring.
Blinks	Blinks	Tape is rewinding.
Rapid blinks	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.

2.3.1 Tape Cartridges

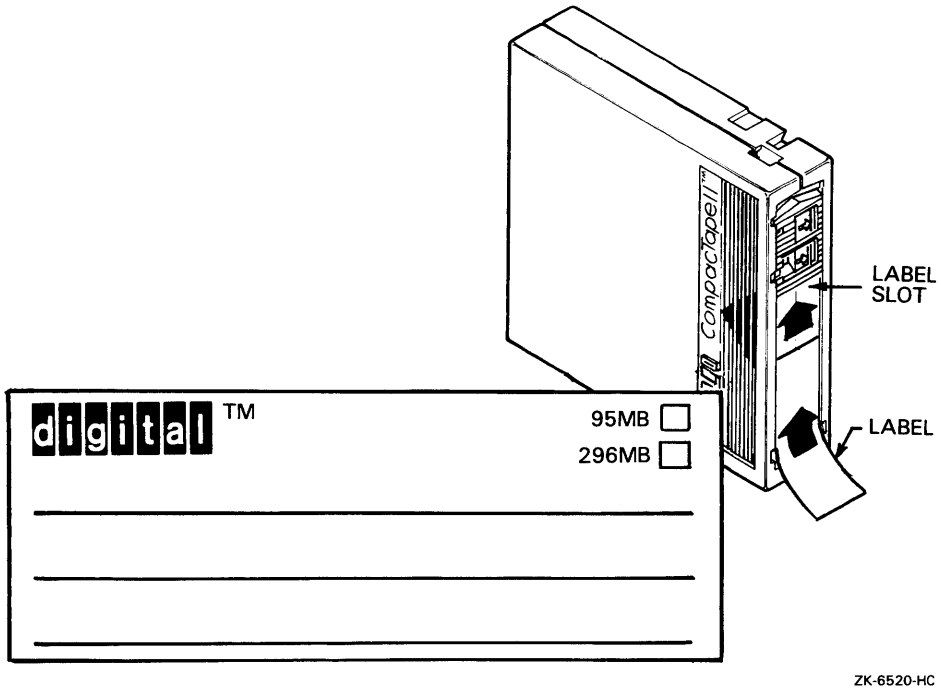
Follow these guidelines when using tape cartridges:

- Tape cartridges come in clear plastic protective cases. You should keep tape cartridges in these cases when you are not using them.
- The label slot holds the label that provides information about the contents of the tape cartridge. Label a tape cartridge if you will 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 2–3 shows how to insert a label on a tape cartridge.

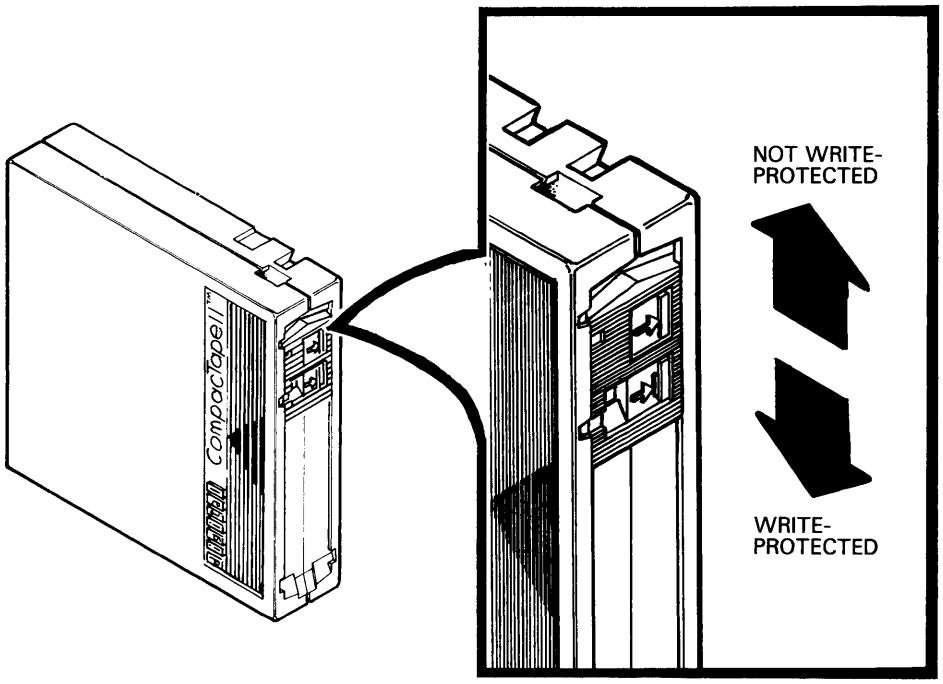
CAUTION: **Use only the label slot provided to label a tape cartridge. Applying adhesive labels or writing on the tape cartridge can damage it.**

Figure 2–3 Inserting a Label on a Tape Cartridge



- 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.

Figure 2–4 Positioning the Write-Protect Switch



Always write-protect the distribution tape cartridge before an installation. Figure 2–4 shows how to write-protect a tape cartridge.

2.3.2 Inserting a Tape Cartridge

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

1 Make sure the tape cartridge drive is empty. If a tape cartridge is already in the drive, enter the following command and press RETURN:

```
PS-HW-0> SHOW DEVICE MUA0
```

If the display indicates that the device status of the tape cartridge is MOUNTED, enter the following command and press RETURN:

```
PS-HW-0> DISMOUNT MUA0
```

Then follow the directions for removing a tape cartridge in Section 2.3.3.

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.

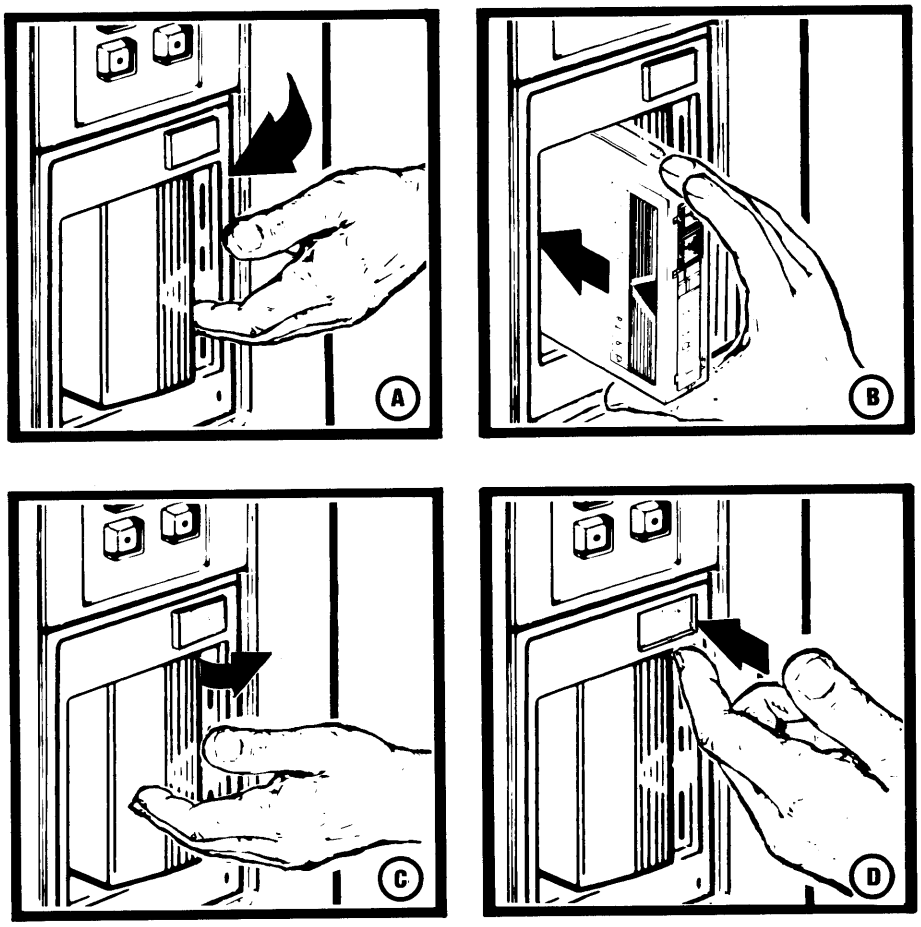
CAUTION: **Never pull open the cartridge-release handle unless the green light glows, the red light is off, and the LOAD/UNLOAD button is in the UNLOAD (out) position; you might damage the drive.**

3 Pull open the cartridge-release handle.

4. Remove the tape cartridge from its plastic case. You should write-protect a tape cartridge containing software that you will install on your system. You should write-enable a tape cartridge if you are going to either copy or backup files to it.
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 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 between 10 and 15 seconds. During this time the green light blinks. When the tape is ready, the green light glows.

   Figure 2–5 illustrates the procedure.

Figure 2–5 Inserting a Tape Cartridge



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2.3.3 Removing a Tape Cartridge

To remove a tape cartridge from the 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 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 handle closed until it locks firmly into place.

2.4 The Console Prompt

The prompt on the console terminal conveys information about the state of the system. Table 2–4 lists the prompts that might be displayed during the VMS installation procedure.

Table 2–4 The Console Prompt

Prompt	Meaning
PS-HW-0> [1]	Power to the system is turned on, but the microcode is not loaded, and the system is not initialized.
PS-CIO-0> [1]	Indicates that the power to the system is turned on, microcode is loaded, and the system is initialized.
PS-OS-0> [1]	The VMS operating system is running, but the console has control.
PCON-SPAWN>	Console VMS is interpreting DCL commands.
$	The VMS operating system is running.

[1]The zero in the prompt tells you that CPU 0 is the current CPU. If the prompt ends with a 1, CPU 1 is the current CPU. The prompts in the examples in this manual display CPU 0 as the current CPU.

You can enter some console commands only at certain prompts. For example, enter the HALT command only when PS-OS-0> is displayed.

Other commands are valid at several different prompts. For example, you can enter the COPY command at any of the following prompts:

```
PS-HW-0>
PS-CIO-0>
PCON-SPAWN>
$
```

The *Console User's Guide* contains complete information on console commands and when you can use them. This manual lists only the commands you might need to install the VMS operating system. The commands are shown with the prompt that will most likely be displayed during installation.

2.5 Console Command Language

Unlike the console subsystem of other VAX computers, this one does not have a control panel with lights and switches. Use the console command language to control all functions. The console command language lets you do the following tasks:

- Turn the system on
- Boot the system
- Provide information on the operational state of the CPUs and other system components
- Dictate how the system reacts to initial booting, shutdowns, and restarts

Table 2–5 describes some of the commonly used commands.

Table 2–5 Console Commands

Command	Meaning
BOOT	Boots the system. During the installation procedure use the abbreviation, B, for the BOOT command. The following example uses the boot command procedure DEFBOO.CMD to boot the system: `PS-CIO-0> B`
DEPOSIT	Puts a value in the specified register or memory location. For example, the following command puts a zero in register 2 (R2): `PS-CIO-0> DEPOSIT R2 0`

ENABLE/DISABLE AUTO BOOT	In combination with AUTO RESTART, determines how the system reacts after one of the following events:
	• The system is initialized
	• A power failure occurs
	• An error halt after a restart attempt fails
	For example, the following commands cause the system to reboot automatically after any of the events listed above:
	`PS-HW-0> DISABLE AUTO RESTART`
	`PS-HW-0> ENABLE AUTO BOOT`
	The following command prevents the system from automatically rebooting after any of the events listed above:
	`PS-HW-0> DISABLE AUTO BOOT`

ENABLE/DISABLE AUTO POWERON	Determines what happens when power is restored after a power failure. For example, the following command automatically applies power to the CPU when power is restored after a power failure.
	`PS-HW-0> ENABLE AUTO POWERON`
	The following command prevents the automatic application of power to the CPU when power is restored after a power failure:
	`PS-HW-0> DISABLE AUTO POWERON`

ENABLE/DISABLE AUTO REBOOT	Determines whether or not the console executes the boot command procedure DEFBOO.CMD after you execute SHUTDOWN.COM and ask for an automatic system reboot. It also causes a system reboot after a system crash.

Table 2–5 (Cont.) Console Commands

Command	Meaning

ENABLE/DISABLE AUTO RESTART	In combination with AUTO BOOT, determines what happens after a power failure or an error halt. For example, the following command causes automatic restart after a power failure or an error halt:
	`PS-HW-0> ENABLE AUTO RESTART`
	The following command prevents automatic restart after a power failure or an error halt:
	`PS-HW-0> DISABLE AUTO RESTART`
	AUTO RESTART takes precedence over AUTO BOOT. If AUTO RESTART and AUTO BOOT are both enabled, the system first tries to restart. If that fails, the system tries to reboot.

HALT	Halts the execution of macro instructions in the specified CPU. Use the HALT command to stop a CPU. For example, the following command stops CPU 0: `PS-OS-0> HALT` Do not use the HALT command for a system shutdown; use the procedures described in Chapter 9.

POWER	Changes the state of the power system. For example, the following command turns power on for the entire system (except for the Environmental Monitoring Module (EMM), which is already on):
	`PS-HW-0> POWER ON`
	The following command turns power off for all components of the system except the EMM and memory. The contents of memory are preserved.
	`PS-HW-0> POWER STANDBY`
	The following command turns power off for the entire system except the EMM (the only time power is off to the EMM is when a power disruption occurs or the circuit breaker that controls power to the system is tripped):
	`PS-HW-0> POWER OFF`

SHOW CPU	Displays information about the CPU's. For example, the following command displays information about all the CPU's: `PS-HW-0> SHOW CPU/ALL`

For more information on the console command language, see the *Console User's Guide*.

3 Before Installing VMS

This chapter describes the following:

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

3.1 The Distribution Media and the System Disk

When you install the VMS operating system, you work primarily with the distribution media and the system disk. The *distribution media* is the set of disks or tapes that the VMS operating system is supplied on. The VMS operating system is supplied on the distribution media in a format that the processor cannot readily use.

The installation procedure transfers the VMS operating system from the distribution media to your system disk and puts it 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 Local Drives

A drive that is connected directly to a VAX computer is referred to as a *local drive*. For example, a magnetic tape drive connected directly to a VAX computer is referred to as a *local tape drive*.

If you have a single VAX computer, it is likely all the drives connected to the system are local drives. If you have a VAXcluster environment, you can have local drives or HSC drives, depending on the type of VAXcluster configuration.

Check with the system manager if you are not sure what types of drives you are using for the installation.

3.3 HSC Drives

A drive that is connected to an HSC device is referred to as an *HSC drive*. For example, a magnetic tape drive connected to an HSC device is referred to as an *HSC tape drive*.

If you have a VAXcluster environment, you can have local drives or HSC drives, depending on the type of VAXcluster configuration. Check with the system manager if you are not sure what types of drives you are using for the installation.

3.4 Choosing the Correct Installation Procedure

The VMS installation procedure you should follow depends on whether you will put the distribution magnetic tape on a local drive or an HSC drive. For example, if you intend to put it on a local drive, read this chapter and Chapter 4 and follow the installation procedure in Chapter 5. If you intend to put it on an HSC drive, read this chapter and Chapter 4 and follow the installation procedure in Chapter 6.

3.5 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 refer to a drive with its *device name*. A device name has the following format:

ddcu

where:

- *dd* is the *device code*. The device code tells what type of drive you are using.
- *c* is the *controller designation*. A controller designation can be one of the alphabetic letters A through Z. The controller designation, along with the unit number, identifies the location of the drive.
- *u* is the *unit number*. A unit number can be a decimal number in the range of 0 to *n*.[1] The unit number, along with the controller designation, identifies the location of the drive.

Note: The only part of the name you can readily modify is the unit number. The device code is fixed and the controller designation is made when the hardware is installed.

For example, CSA3 is the device name for the console fixed disk drive. *CS* is the device code. *A* names the controller (the controller provides the interface between the processor and the drive). *3* is the unit number.

If a drive is connected to an HSC device, precede the device name with the name of the HSC and a dollar sign ($). For example:

```
TROUT$DJA0
```

TROUT is the name of the HSC device and DJA0 is the device name for an RA60 drive that is connected to it. Table 3–1 lists the device names for the different drives that can be part of a VAX 8820, 8830, and 8840 system.

[1] The first drive on a controller is usually assigned a unit number of zero, the next drive is assigned a unit number of one, and so on. The range is determined by the bus that supports the drive.

Table 3–1 Device Names for the VAX 8820, 8830, and 8840

Device	Device Name[1]
Console fixed disk	CSA3
RA60 disk drive	DJcu
RA70, RA80, RA81, and RA82 disk drives	DUcu
TU80 magnetic tape drive	MScu
TA78, TU81, and TU81-plus magnetic tape drives	MUcu

[1] *c* stands for the controller designation, and *u* stands for the unit number.

You can use any of the disk drives (except the console drive) to hold the system disk. When choosing a system disk, you must 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 drive that will hold the system disk.

3.6 Booting During the Installation

This section explains what you need to know to boot the system during the installation procedure. For complete information on booting the system for daily operations, see Chapter 9.

When you boot from the system disk, use the BOOT command followed by a boot name. Boot names have the following format:

dddn

where:

- *ddd* is the controller type (BCI or BDA)
- *n* is the unit number

The following example boots the system from a BDA-controlled drive with a unit number of one:

```
PS-CIO-O> B BDA1
```

The boot name (in this case BDA1) is the abbreviation for a boot command procedure. A boot command procedure is a file stored on the console fixed disk. It contains the list of instructions needed to load the VMS operating system from the system disk into memory. The instructions for booting the system are slightly different for each type of controller (BCI,[2] or BDA). Therefore, a boot command procedure exists for each type of controller that the processor supports. The following are some examples of boot command procedures:

[2] Use BCI for either the CIBCI or the CIBCA controller

BDABOO.CMD
BCIBOO.CMD

Before you can install the VMS operating system, you must edit the appropriate boot command procedures for your system as explained in Chapter 4. Before you begin the installation procedure, make sure you know the boot name for the drive that holds the system disk.

3.7 Information on VAXcluster Environments

If you are installing the VMS operating system in a VAXcluster environment, the installation procedure will ask 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.

Following is a list of the VAXcluster information you need to obtain. For a complete explanation of each item, see the *VMS VAXcluster Manual*.

Determine what type of configuration you want: CI-only, 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).

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.

During the installation procedure you will be asked for the ALLOCLASS value of the VAX computer you are installing VMS on. For example:

```
Enter a value for ALICE's ALLOCLASS parameter:
```

Enter the appropriate allocation class value for the VAX computer that you are installing the VMS operating system on. 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.

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 Preparing the System for an Installation

This chapter assumes that the hardware has been installed and tested and the console subsystem is running. It also assumes that you are familiar with the operation of the console as described in the *Console User's Guide*.

Before you can install the VMS operating system on a VAX 8820, 8830, or 8840, you must perform the following tasks:

- Install standalone BACKUP on the console fixed disk
- Edit the boot command procedures
- Edit DEFBOO.CMD

This chapter describes each of these tasks.

Note: The prompts in the examples display CPU 0 as the current CPU.

4.1 Installing Standalone BACKUP

You need to put standalone BACKUP on the console fixed disk before you can install the VMS operating system. Use the tape cartridge labeled VMS V5.0 CONSOL TK50 SABKP.BCK FOR 8820/30/40 that is included in the VMS distribution kit.

To install standalone BACKUP from the tape cartridge, use the following procedure:

Note: This procedure assumes that the console subsystem is running and the PS-HW-0> prompt is displayed (power to the system is turned on, but the microcode is not loaded and the system is not initialized). For more information, see the *Console User's Guide*.

1. Make sure that both the WRITE PROTECT and the READY buttons for the console fixed disk are released (in the OUT position).
2. Check the console tape cartridge drive. If it is empty, go to step 3.

   If there is another tape cartridge in the drive, enter the following command and press RETURN:

   ```
   PS-HW-0> SHOW DEVICE MUA0
   ```

   If the display indicates that the device status of the tape cartridge is MOUNTED, enter the following command and press RETURN:

   ```
   PS-HW-0> DISMOUNT MUA0
   ```

3. Make sure that the LOAD/UNLOAD button is in the UNLOAD (out) position. When the green light glows steadily and the red light is off, pull open the cartridge-release handle.

   If there is a another tape cartridge in the drive, remove it.

4 Take the tape cartridge labeled VMS V5.0 CONSOL TK50 SABKP.BCK FOR 8820/30/40 from its clear plastic case. Make sure it is write-protected (the write-protect switch is positioned to the left and the orange rectangle is visible).

5 Insert the tape cartridge in the drive. The green light turns off and the red light glows.

6 Push the handle closed. The green light glows and the red light turns off. Push the LOAD/UNLOAD button in. When the tape is ready, both the green and red lights glow.

7 Enter the following command and press RETURN:

```
PS-HW-0> SPAWN
```

8 At the PCON-SPAWN> prompt, enter the following command and press RETURN:

```
PCON-SPAWN> MOUNT/FOREIGN MUA0
```

9 To transfer the standalone BACKUP files to the console fixed disk, enter the following command and press RETURN:

```
PCON-SPAWN> BACKUP/VERIFY MUA0:SABKP.BCK/SAVE_SET/REWIND DUA0:[*...]/NEW_VERSION
```

The procedure transfers standalone BACKUP to the console fixed disk. This takes approximately five minutes. During the process the green light on the tape cartridge drive blinks. The procedure displays the following message:

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

This message indicates that standalone BACKUP has been transfered to the console fixed disk and the files are being checked for errors. Approximately five minutes later, the procedure finishes and the PCON-SPAWN> prompt is displayed, as follows:

```
PCON-SPAWN>
```

10 Enter the following command and press RETURN:

```
PCON-SPAWN> DISMOUNT/UNLOAD MUA0
```

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.

11 Release the LOAD/UNLOAD button so that it is in the UNLOAD (out) position. Pull the handle open and remove the tape cartridge. Push the handle closed.

12 Put the tape cartridge in its plastic case and store it in a safe place.

13 Enter the following command and press RETURN:

```
PCON-SPAWN> LOGOUT
```

14 Enter the following command and press RETURN:

```
PS-HW-0> @SYSINIT
```

Informational messages are displayed. When SYSINIT finishes, the PS-CIO-0> prompt is displayed, as follows:

```
PS-CIO-0>
```

15 To edit the boot command procedures, go to Section 4.2.

4.2 Editing Boot Command Procedures

During the installation procedure you are asked to boot the system. When you boot the system, a boot command procedure is used to deposit values in the processor registers, load the VMS operating system into memory, and start the CPUs.

All the boot command procedures that you might need are stored on the console fixed disk in the [PSTAR] directory. Table 4–1 lists the boot command procedures on the console fixed disk.

Table 4–1 Boot Command Procedures

BCIBOO.CMD	Used to boot from an HSC disk on a CIBCI or a CIBCA
BDABOO.CMD	Used to boot from a disk attached to a KDB50 disk controller
DEFBOO.CMD	Default boot command procedure

Before you can use these boot command procedures, you must edit certain lines. Some of the lines contain DEPOSIT commands that put the value zero in registers 1 through 5. You must edit these lines so that the DEPOSIT commands put the correct values for your system in the registers.

Edit the boot command procedure that corresponds to the controller type for your system disk. For example, if your system disk is attached to a CIBCI or CIBCA controller, edit BCIBOO.CMD. After you decide which boot command procedure you need to edit, check Table 4–2 or Table 4–3 to find the correct values for your system.

To edit a boot command procedure, follow these steps:

1 Before editing a boot command procedure, make a copy of it. Use the COPY command in the following format:

```
PS-CIO-0> COPY filename.CMD filename.SAV
```

where *filename* is the file name of the boot command procedure. For example, to make a copy of BCIBOO.CMD, enter the following command and press RETURN:

```
PS-CIO-0> COPY BCIBOO.CMD BCIBOO.SAV
```

2 After you have copied the boot command procedure, edit the original. Enter the EDIT command in the following format:

```
PS-CIO-0> EDIT filename.CMD
```

For example, to edit BCIBOO.CMD, enter the following command and press RETURN:

```
PS-CIO-0> EDIT BCIBOO.CMD
```

Note: The EDIT command starts the EDT editor. If you need more information on using the EDT editor, press the PF2 key for online HELP or see the *Guide to VMS Text Processing*.

3 Change the DEPOSIT commands for register 1 (R1) and register 2 (R2). Use the values shown in Table 4–2 or Table 4–3.

4 Delete the exclamation characters (!) that precede the DEPOSIT commands for R1 and R2.

5 You can change the DEPOSIT commands for register 3 (R3) and register 5 (R5) if you want to. However, values that are entered for R3 and R5 as part of the BOOT command will override the values in the boot command procedure.

6 When you have finished editing the boot command procedure, press CTRL/Z. At the asterisk (*) prompt, enter the EXIT command and press RETURN:

```
* EXIT
```

The modified version of the boot command procedure is saved, and the PS-CIO-0> prompt is displayed.

7 To edit DEFBOO.CMD, go to Section 4.3.

Note: If you change the system configuration in the future, use the previous procedure to modify the boot command procedures.

Table 4–2 Values to Deposit in R1-R5: BCIBOO.CMD

Register Number	Bit Position	Possible Values	Meaning
R1	<31:07>	Must be zero	No meaning.
	<06:04>	0-5 (hex)	The VAXBI that has the CIBCI or CIBCA that accesses the system disk. The VAX 8820, 8830, and 8840 support a maximum of six VAXBIs.
	<03:00>	0-F (hex)	The VAXBI node number of the CIBCI or CIBCA adapter.
R2	<31:16>	Must be zero	No meaning.
	<15:08>	0-F (hex)	Node number of the second HSC if the boot device is dual ported. If one of the HSCs is node 0, that node must be specified as the lowest byte. For example, 0100 means boot from either HSC 0 or 1, while 0001 means boot from HSC 1 only.
	<07:00>	0-F (hex)	Node number of the first HSC.
R3[1]	<31:00>		Unit number of the drive that holds the system disk (expressed in decimal).
R4	<31:00>		If Bit 3 is set in R5, deposit the hexadecimal value of the logical block number of the secondary boot block in R4.

[1]Note that if you install volume shadowing, you must deposit special values in R3. For information, see the *Console User's Guide* and the *VAX Volume Shadowing Manual.*

Table 4–2 (Cont.) Values to Deposit in R1-R5: BCIBOO.CMD

Register Number	Bit Position	Possible Values	Meaning
R5	<31:00>		See the *Console User's Guide* for information about the boot control flags that can be set in R5.

Table 4–3 Values to Deposit in R1-R5: BDABOO.CMD

Register Number	Bit Position	Possible Values	Meaning
R1	<31:07>	Must be zero	No meaning.
	<06:04>	0-5 (hex)	The VAXBI that has the CIBCI or CIBCA that accesses the system disk. The VAX 8820, 8830, and 8840 support a maximum of six VAXBIs.
	<03:00>	0-F (hex)	The VAXBI node number of the CIBCI or CIBCA adapter.
R2	<31:00>	Must be zero	No meaning.
R3[1]	<31:00>		Unit number of the drive that holds the system disk (expressed in decimal).
R4	<31:00>		If Bit 3 is set in R5, deposit the hexadecimal value of the logical block number of the secondary boot block in R4.
R5	<31:00>		See the *Console User's Guide* for information about the boot control flags that can be set in R5.

[1]Note that if you install volume shadowing, you must deposit special values in R3. For information, see the *Console User's Guide* and the *VAX Volume Shadowing Manual.*

4.3 Editing DEFBOO.CMD

The default boot command procedure, DEFBOO.CMD, consists of a single BOOT command. DEFBOO.CMD is executed under the following circumstances:

- When you enter the BOOT command without specifying a boot name
- When you enable AUTO BOOT, and the system reboots automatically after a power failure or error halt

Edit DEFBOO.CMD so that it refers to the boot command procedure you modified in Section 4.2. Follow these steps:

1 Before editing DEFBOO.CMD, make a copy of it. Enter the following command and press RETURN:

```
PS-CIO-0> COPY DEFBOO.CMD DEFBOO.SAV
```

2 After you have copied DEFBOO.CMD, edit the original. Enter the following command and press RETURN:

```
PS-CIO-0> EDIT DEFBOO.CMD
```

The contents of DEFBOO.CMD are displayed. For example:

```
!DEFBOO.CMD
      .
      .
BOOT DDDnnn/R5=##
```

Note: The EDIT command starts the EDT editor. If you need more information on using the EDT editor, press the PF2 key for online HELP or see the *Guide to VMS Text Processing*.

3 Edit the line that contains the BOOT command. Substitute BCI or BDA for *ddd*. Substitute the unit number of the drive that will hold the system disk for *nnn*.

For example, suppose the system disk is on a CIBCI controller and it has a unit number of two. Change the BOOT command in DEFBOO.CMD as follows:

```
BOOT BCI2
```

If you have a VAXcluster environment, specify the correct root directory to boot from. For example, if you want to boot from [SYS3], enter the following:

```
BOOT BCI2 /R5=30000000
```

4 When you have finished editing DEFBOO.CMD, press CTRL/Z. At the asterisk (*) prompt, enter the EXIT command and press RETURN:

```
* EXIT
```

The modified version of DEFBOO.CMD is saved, and the PS-CIO-0> prompt is displayed.

Note: If you change the system configuration in the future, use the previous procedure to modify DEFBOO.CMD.

After you have edited the boot command procedures and DEFBOO.CMD, install the VMS operating system. If you are installing the VMS operating system from a local tape drive, see Chapter 5. If you are installing the VMS operating system from an HSC tape drive, see Chapter 6.

5 Installing VMS from a Local Tape Drive

This chapter describes installing the VMS operating system on a VAX 8820, 8830, and 8840 from a *local tape drive*. To install the VMS operating system from an HSC tape drive, see Chapter 6.

CAUTION: **The software installation procedure overwrites the contents of the system disk. Use the VMS installation procedure only if your VAX computer is new, or if you want to destroy the contents of the system disk. If your system disk contains files that you want to save, you should upgrade to the new version of the VMS operating system. For a complete description of the upgrade procedure, see the current version of the *VMS Release Notes*.**

5.1 Before You Start

Before you install the VMS operating system, do the following:

- Make sure the hardware has been installed and checked for proper operation. For detailed information on the hardware, see the hardware manual for your VAX computer.
- Follow the directions in Chapter 4 to install standalone BACKUP on the console fixed disk and edit the boot command procedures.
- Make sure you have all the items listed on the bill of materials in the VMS distribution kit. The magnetic tape distribution kit should contain the following:
  - A magnetic tape that contains the VMS *required, library,* and *optional* save sets
  - A magnetic tape that contains the mandatory update
  - A TK50 tape cartridge that contains standalone BACKUP

  If your kit is incomplete, notify the DIGITAL Software Distribution Center. Request priority shipment of any missing items.
- If you are installing the VMS operating system on a VAX computer in a VAXcluster environment, determine whether you want a CI-only, local area, or mixed-interconnect configuration. For a complete description of configurations, see the *VMS VAXcluster Manual*. Depending on the type of configuration, you need to obtain the following information from either the network or VAXcluster manager:
  - CI-Only Configuration: Obtain the allocation class value, the DECnet node name, and node address for the computer.
  - Local Area and Mixed-Interconnect Configurations: You need the allocation class value, the DECnet node name, and node address for the computer. You also need the cluster group number and password.

Installing VMS from a Local Tape Drive

5.1 Before You Start

The installation procedure transfers the VMS files from the distribution magnetic tape to the system disk. The procedure consists of the following stages:

1. Preparing the disk and tape drives
2. Booting standalone BACKUP
3. Creating the system disk
4. Transferring the *library* and *optional* save sets
5. Installing the mandatory update and running AUTOGEN

The entire procedure takes approximately one hour.

Note: The screen displays and examples in this manual depict the installation of VMS Version 5.0. Your screen displays reflect the version that you are installing.

5.2 Preparing the Disk and Tape Drives

To set up the disk and tape drives you use during the installation, do the following:

1. Decide which drive will hold the distribution magnetic tape and which drive will hold the system disk.
2. Follow this step only if the system disk is on an HSC drive in a VAXcluster environment. Otherwise, go to step 3.

   Make sure that both the CI780 and the HSC50 or HSC70 are turned on and on line. Obtain the HSC name from the system manager or use the following procedure:

   a. Press CTRL/C at the HSC console terminal.

   b. Enter the following command at the HSC> prompt and press RETURN:

   ```
   HSC> SHOW SYSTEM
   ```

   The information displayed includes the name of the HSC. For example:

   ```
   31-Dec-1988 15:00:00.00  Boot:30-Dec-1988 11:31:11.41  Up: 51:00
   Version: V350              System ID: %X000000011        Name: TROUT
        .
        .
        .
   DISK allocation class =  1   TAPE allocation class =  0
   Start command file m Disabled

   SETSHO - Program Exit
   ```

   For more information, see the *HSC User Guide*.
3. Thread the tape on the tape drive and put the drive on line.
4. Place a scratch disk in the drive for the system disk (unless the system disk is fixed).
5. Spin up the system disk but *do not* write-protect it.
6. To boot standalone BACKUP, go to Section 5.3.

5.3 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 magnetic tape to your system disk.

1. Make sure that the console subsystem is running and the PS-CIO-0> prompt is displayed.
2. To enable automatic reboot, enter the following command and press RETURN:[1]

```
PS-CIO-0> ENABLE AUTO REBOOT
```

3. To boot standalone BACKUP, enter the following command and press RETURN:

```
PS-CIO-0> @CSABOO
```

Note: If your VAX computer has 512M of memory, you must do a conversational boot. Enter the following commands and press RETURN after each one.

```
PS-CIO-0> B CSA /R5=D0000001
SYSBOOT> DISABLE CHECKS
SYSBOOT> SET PHYSICALPAGES 1047552
SYSBOOT> CONTINUE
```

For more information, see Section A.4.

4. The procedure might ask 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) 31-DEC-1988 15:00

VAX/VMS Version V5.0 Major version = 01 Minor version id = 00
```

5. The procedure displays a list of the local devices on your system and, if you have them, HSC- and MSCP-served devices. For example:

```
Available device DJA3:    device type RA60
Available device DJA2:    device type RA60
      .
      .
      .
```

   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, standalone BACKUP V5.0; the date is 31-DEC-1988 15:00
$
```

7. To create a system disk on a local drive, go to Section 5.4.

   To create a system disk on an HSC drive, go to Section 5.5.

[1] For the system to reboot automatically you must enter the ENABLE AUTO REBOOT command and edit the boot command procedures as described in Section 4.2 and Section 4.3.

5.4 Creating a System Disk on a Local Drive

This section provides instructions for installing the VMS operating system on a system disk that is on a local drive. To create a system disk on an HSC drive, see Section 5.5.

The VMS files are stored on the distribution magnetic tape as three save sets: *required, library,* and *optional.* This section describes the steps for transferring the *required* save set from the distribution magnetic tape to your system disk.

The instructions refer to the *source-drive* and the *target-drive* where:

- The *source-drive* is the drive that holds the distribution magnetic tape
- The *target-drive* is the drive that holds the system disk

1 Determine the device names for the *source-drive* and the *target-drive* using Table 3–1. Write these names on a piece of paper. You will need this information throughout the installation.

2 To transfer the *required* save set to your system disk, enter the BACKUP command in the following format:

```
$ BACKUP/VERIFY source-drive:VMS050.B/SAVE_SET target-drive:
```

Substitute the appropriate device names for *source-drive* and *target-drive.* Make sure you put a colon (:) after each device name and that you use zeros in device names and in VMS050.

For example, if your system has the following configuration:

- A TU80 *source-drive* with a controller designation of A and a unit number of zero
- An RA80 *target-drive* with a controller designation of A and a unit number of six

Enter the following command and press RETURN:

```
$ BACKUP/VERIFY MSA0:VMS050.B/SAVE_SET DUA6:
```

The *required* save set is transferred from the distribution magnetic tape to the system disk.[2] This takes approximately five minutes. During the process the procedure displays the following message:

```
%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 five minutes later the procedure displays the following message:

```
%BACKUP-I-PROCDONE, Operation completed. Processing finished at 31-DEC-1988 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:
```

3 Press CTRL/P to return control to the console.

[2] The BACKUP command creates a system disk that includes a DIGITAL-provided set of volume parameters, including a CLUSTER_SIZE (disk access scheme) of 1. For more information, see the note at the end of Section 10.2.

4 Enter the following command and press RETURN:

```
PS-OS-0> HALT
```

5 To boot the system disk, use the BOOT command in the following format:

```
PS-CIO-0> B dddn
```

Substitute BCI or BDA for *ddd*. Substitute the unit number of the *target-drive* for *n*.

For example, suppose your system disk is on a BDA-controlled drive and the unit number is six. Enter the following command and press RETURN:

```
PS-CIO-0> B BDA6
```

Note: If your VAX computer has 512M of memory, you must do a conversational boot. Enter the following commands and press RETURN after each one.

```
PS-CIO-0> B dddn /R5=1
SYSBOOT> DISABLE CHECKS
SYSBOOT> SET PHYSICALPAGES 1047552
SYSBOOT> CONTINUE
```

For more information, see Section A.4.

6 When the boot is complete, the procedure displays a message and asks you for the date and time. Enter the date and time using the 24-hour clock format and press RETURN. For example:

Note: The procedure displays warning messages, similar to the following, that the VMS license is not registered. Continue with the installation procedure. Follow the instructions for registering the VMS license after you finish the installation.

```
  VAX/VMS Version BI5O Major version id = 01 Minor version id = 00

     VAX/VMS Version 5.0 Installation Procedure

%%%%%%%%%%  OPCOM 31-DEC-1988 15:00:00.00  %%%%%%%%%%
Logfile has been initialized by operator _OPA0:
Logfile is SYS$SYSROOT:[SYSMGR]OPERATOR.LOG;1

%LICENSE-F-EMTLDB, License database contains no license records
%LICENSE-E-NOAUTH, DEC VAX-VMS use is not authorized on this node
-%LICENSE-F-NOLICENSE, no license is active for this software product
-%LICENSE-I-SYSMGR, please see your system manager
%%%%%%%%%%  OPCOM 31-DEC-1988 15:00:00.00  %%%%%%%%%%
Message from user SYSTEM
%LICENSE-E-NOAUTH, DEC VAX-VMS use is not authorized on this node
-%LICENSE-F-NOLICENSE, no license is active for this software product
-%LICENSE-I-SYSMGR, please see your system manager

Startup processing continuing...

Please enter the date and time (DD-MMM-YYYY HH:MM): 31-DEC-1988 15:00
```

7 The procedure asks for the volume label of the system disk. A volume label is the name the VMS operating system uses to refer to the system disk. If you have a VAXcluster environment, each system disk must have a unique volume label.

You can press RETURN to accept the default volume label, VMSRL5, or you can enter a volume label of your choice. The volume label can be 1 to 12 characters long; spaces are not allowed. For example:

```
If this system disk is to be used in a cluster with multiple
system disks, then each system disk must have a unique volume label.
Any nodes having system disks with duplicate volume labels will fail
to boot into the cluster.

You may indicate a volume label of 1 to 12-characters in length. If you
wish to use the default name of VMSRL5 just press RETURN in response to
the next question.

Enter the volume label for this system disk (no spaces) [VMSRL5]: SYSDSK
```

8 The procedure asks which drive holds the distribution magnetic tape. Enter the device name of the *source-drive*. For example, suppose the *source-drive* is a TU80 tape drive with a controller designation of A and a unit number of zero. Enter the following and press RETURN:

```
Enter the name of the drive holding the distribution media (DDCU): MSA0:
```

9 Several minutes later the procedure displays the following messages:

```
%MOUNT-I-MOUNTED, VMS050 mounted on _$MSA0:

Restoring LIBRARY saveset.
```

To continue the installation procedure, go to Section 5.6.

5.5 Creating a System Disk on an HSC Drive

This section provides instructions for installing the VMS operating system on a system disk that is on an HSC drive in a VAXcluster environment.

The VMS files are stored on the distribution magnetic tape as three save sets: *required, library,* and *optional.* This section describes the steps for transferring the *required* save set from the distribution magnetic tape to your system disk.

The instructions refer to the *source-drive* and the *target-drive* where:

- The *source-drive* is the drive that holds the distribution magnetic tape
- The *target-drive* is the drive that holds the system disk

1 Determine the device names for the *source-drive* and the *target-drive* using Table 3–1. Write these names on a piece of paper. You will need this information throughout the installation.

2 To transfer the *required* save set to your system disk, enter the BACKUP command in the following format:

```
$ BACKUP/VERIFY source-drive:VMS050.B/SAVE_SET hsc-name$target-drive:
```

Substitute the appropriate device names for *source-drive* and *target-drive.* Make sure you put a colon (:) after each device name and that you use zeros in device names and in VMS050. Precede the *target-drive* with the HSC name and a dollar sign ($).

For example, if your system has the following configuration:

- A TU80 *source-drive* with a controller designation of A and a unit number of zero

- An HSC-based RA80 *target-drive* with an HSC name of YOURS, a controller designation of A, and a unit number of six

Enter the following command and press RETURN:

```
$ BACKUP/VERIFY MSA0:VMS050.B/SAVE_SET YOURS$DUA6:
```

The *required* save set is transferred from the distribution magnetic tape to the system disk.[2] This takes approximately five minutes. During the process the procedure displays the following message:

```
%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 five minutes later the procedure displays the following message:

```
%BACKUP-I-PROCDONE, Operation completed. Processing finished at 31-DEC-1988 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:
```

3 Press CTRL/P to return control to the console.

4 Enter the following command and press RETURN:

```
PS-OS-0> HALT
```

5 To boot the system disk, use the BOOT command in the following format:

```
PS-CIO-0> B dddn
```

Substitute BCI or BDA for *ddd*. Substitute the unit number of the *target-drive* for *n*.

For example, suppose your system disk is on a CIBCI-controlled drive and the unit number is six. Enter the following command and press RETURN:

```
PS-CIO-0> B BCI6
```

Note: If your VAX computer has 512M of memory, you must do a conversational boot. Enter the following commands and press RETURN after each one.

```
PS-CIO-0> B dddn /R5=1
SYSBOOT> DISABLE CHECKS
SYSBOOT> SET PHYSICALPAGES 1047552
SYSBOOT> CONTINUE
```

For more information, see Section A.4.

6 When the boot is complete, 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:

Note: The procedure displays warning messages, similar to the following, that the VMS license is not registered. Continue with the installation procedure. Follow the instructions for registering the VMS license after you finish the installation.

```
  VAX/VMS Version BI50 Major version id = 01 Minor version id = 00

     VAX/VMS Version 5.0 Installation Procedure

%%%%%%%%%%  OPCOM 31-DEC-1988 15:00:00.00  %%%%%%%%%%
Logfile has been initialized by operator _OPA0:
Logfile is SYS$SYSROOT:[SYSMGR]OPERATOR.LOG;1

%LICENSE-F-EMTLDB, License database contains no license records
%LICENSE-E-NOAUTH, DEC VAX-VMS use is not authorized on this node
-%LICENSE-F-NOLICENSE, no license is active for this software product
-%LICENSE-I-SYSMGR, please see your system manager
%%%%%%%%%%  OPCOM 31-DEC-1988 15:00:00.00  %%%%%%%%%%
Message from user SYSTEM
%LICENSE-E-NOAUTH, DEC VAX-VMS use is not authorized on this node
-%LICENSE-F-NOLICENSE, no license is active for this software product
-%LICENSE-I-SYSMGR, please see your system manager

Startup processing continuing...

Please enter the date and time (DD-MMM-YYYY HH:MM): 31-DEC-1988 15:00
```

7 The procedure asks for the volume label of the system disk. A volume label is the name the VMS operating system uses to refer to the system disk. If you have a VAXcluster environment, each system disk must have a unique volume label.

You can press RETURN to accept the default volume label, VMSRL5, or you can enter a volume label of your choice. The volume label can be 1 to 12 characters long; spaces are not allowed. For example:

```
If this system disk is to be used in a cluster with multiple
system disks, then each system disk must have a unique volume label.
Any nodes having system disks with duplicate volume labels will fail
to boot into the cluster.

You may indicate a volume label of 1 to 12-characters in length. If you
wish to use the default name of VMSRL5 just press RETURN in response to
the next question.

Enter the volume label for this system disk (no spaces) [VMSRL5]: SYSDSK
```

8 The procedure asks which drive holds the distribution magnetic tape. Enter the device name of the *source-drive*. For example, suppose the *source-drive* is a TU80 tape drive with a controller designation of A and a unit number of zero. Enter the following and press RETURN:

```
Enter the name of the drive holding the distribution media (DDCU): MSA0:
```

9 Several minutes later the procedure displays the following messages:

```
%MOUNT-I-MOUNTED, VMS050 mounted on _$MSA0:

Restoring LIBRARY saveset.
```

To continue the installation procedure, go to Section 5.6.

5.6 Transferring the Library and Optional Save Sets

This section describes the steps for transfering the *library* and *optional* save sets from the distribution magnetic tape to the system disk.

1 The installation procedure now transfers the *library* and *optional* save sets to your system disk. It takes approximately eight minutes. During this time the procedure displays the following messages:

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

Restoring OPTIONAL saveset.
%BACKUP-I-STARTVERIFY, starting verification pass

Creating [VMS$COMMON] directory tree.

In a cluster, you can run multiple systems sharing all files except
PAGEFILE.SYS, SWAPFILE.SYS, SYSDUMP.DMP and VAXVMSSYS.PAR.

Will this node be a cluster member? (Y/N)
```

If you are installing the VMS operating system on a standalone system, type N (for NO), press RETURN, and go to step 4.

If you are installing the VMS operating system in a VAXcluster environment, type Y (for YES), press RETURN, and go to step 2.

Note: If you answer YES to the VAXcluster question, you must have a VAXcluster license.

2 The procedure displays the following message:

```
Now configuring system to be a cluster member.
```

3 Determine the type of cluster configuration you want to create (configuration types are described in the *VMS VAXcluster Manual*). Table 5–1 lists the questions you are asked if you want a CI-only configuration. Table 5–2 lists the questions you are asked if you want either a local area or a mixed-interconnect configuration. Typical responses are explained in the tables.

Table 5–1 Installation Questions for CI-Only Configurations

Question	How to Respond
Will this node be a cluster member (Y/N)?	Enter Y.
What is the node's DECnet node name?	Enter the DECnet node name—for example, JUPITR. The DECnet node name may be from 1 to 6 alphanumeric characters in length and may not include dollar signs or underscores.
What is the node's DECnet node address?	Enter the DECnet node address—for example, 2.2.
Will the Ethernet be used for cluster communications (Y/N)?	Enter N. The Ethernet is not used for cluster (SCS internode) communications in CI-only configurations.
Will JUPITR be a disk server (Y/N)?	Enter Y or N, depending on your configuration requirements. Refer to the *VMS VAXcluster Manual* for information on served cluster disks.
Enter a value for JUPITR's ALLOCLASS parameter:	If the system is connected to a dual-ported disk, enter the appropriate allocation class value (it must be a value between 1 and 255). Otherwise, enter 0.
Does this cluster contain a quorum disk [N]?	Enter Y or N, depending on your configuration. If you enter Y, the procedure will prompt for the name of the quorum disk. Enter the device name of the quorum disk.

Table 5–2 Installation Questions for Local Area and Mixed-Interconnect Configurations

Question	How to Respond
Will this node be a cluster member (Y/N)?	Enter Y.
What is the node's DECnet node name?	Enter the DECnet node name—for example, JUPITR. The DECnet node name may be from 1 to 6 alphanumeric characters in length and may not include dollar signs or underscores.
What is the node's DECnet node address?	Enter the DECnet node address—for example, 2.2.
Will the Ethernet be used for cluster communications (Y/N)?	Enter Y. The Ethernet is required for cluster (SCS internode) communications in local area and mixed-interconnect configurations.
Enter this cluster's group number:	Enter a number in the range from 1 to 4095 or 61440 to 65535.
Enter this cluster's password:	Enter the cluster password. The password must be from 1 to 31 alphanumeric characters in length and may include dollar signs and underscores.

Table 5–2 (Cont.) Installation Questions for Local Area and Mixed-Interconnect Configurations

Question	How to Respond
Re-enter this cluster's password for verification:	Re-enter the password.
Will JUPITR be a disk server (Y/N)?	Enter Y. In local area and mixed-interconnect configurations, the system disk is always served to the cluster. Refer to the *VMS VAXcluster Manual* for information on served cluster disks.
Will JUPITR serve HSC disks (Y)?	Enter a response appropriate for your configuration.
Enter a value for JUPITR's ALLOCLASS parameter:	Enter the appropriate allocation class value. If you have a mixed-interconnect configuration, the value must be between 1 and 255, you cannot enter 0.
Does this cluster contain a quorum disk [N]?	Enter Y or N, depending on your configuration. If you enter Y, the procedure will prompt for the name of the quorum disk. Enter the device name of the quorum disk.

4 The procedure displays the following message:

```
You may now remove the distribution kit from _$MSA0:
```

Remove the distribution magnetic tape from the drive.

5 The procedure asks you for new passwords for the SYSTEM, SYSTEST, and FIELD accounts. Passwords must be at least eight characters in length; they do not appear on the display. Press RETURN after you enter each one. After you enter the passwords, the procedure checks each one to make sure it meets the requirements for a good password. For example:

```
Now we will ask you for new passwords for the following accounts:
            SYSTEM, SYSTEST, FIELD

Enter new password for account SYSTEM: PANCAKES
Re-enter the password for account SYSTEM for verification: PANCAKES

%UAF-I-MDFYMSG, user record(s) updated

Enter new password for account SYSTEST: BRATWURST
Re-enter the password for account SYSTEST for verification: BRATWURST

%UAF-I-MDFYMSG, user record(s) updated

Enter new password for account FIELD: ZIRHUMBA
Re-enter new password for account FIELD for verification: ZIRHUMBA

%UAF-I-MDFYMSG, user record(s) updated

The procedure will now check and verify passwords for the
following accounts:

      SYSTEM, SYSTEST, FIELD

Passwords that can be guessed easily will not be accepted.
```

If the procedure verifies the passwords, it displays the following messages:

```
%VMS-I-PWD_OKAY, account password for SYSTEM verified
%VMS-I-PWD_OKAY, account password for SYSTEST verified
%VMS-I-PWD_OKAY, account password for FIELD verified
```

If you enter a password incorrectly or if the password is too easy to guess, the procedure displays error messages similar to the following:

```
%VMS-W-PWD_INVALID, account password for SYSTEM is invalid
-VMS-I-PWD_WEAK, password is too easy to guess

Because of the preceding error, you must take action to secure this account.
You must either disable this account, change its password, or do both.
```

When the procedure asks if you want to disable the account, type N (for NO) and press RETURN. When the procedure asks if you want to enter a new password, type Y (for YES) and press RETURN. Then enter a new password. For example:

```
Do you want to disable the account (Y/N)? N
Do you want to change the account password (Y/N)? Y
You must now select a new primary password for the SYSTEM account. The
password you select must be at least 8 characters in length and may not
be the same as the name of the account.

New password: WILLIWAW
Verification: WILLIWAW

%UAF-I-MDFYMSG, user record(s) updated
%VMS-I-PWD_SET, primary password for account SYSTEM set
```

6 After you have entered the passwords, the procedure creates your RIGHTS database and displays the following message:

```
Creating RIGHTS database file. SYS$SYSTEM:RIGHTSLIST.DAT
Ignore any "%SYSTEM-F-DUPIDENT, duplicate identifier" errors
      .
      .
      .
%UAF-I-RDBDONEMSG, rights database modified
```

After the procedure creates your RIGHTS database, go to Section 5.7 to install the mandatory update.

5.7 Installing the Mandatory Update and Running AUTOGEN

Follow the directions in this section to install the mandatory update and run AUTOGEN. AUTOGEN evaluates your hardware configuration and estimates typical workloads. It then sets system parameters, the sizes of the page, swap, and dump files, and the contents of VMSIMAGES.DAT. When AUTOGEN finishes, the installation procedure is complete.

1 After the procedure creates the RIGHTS database, it displays the following messages:

```
After the installation finishes, you may want to do one or more of the
following tasks:

- DECOMPRESS THE SYSTEM LIBRARIES - For space considerations, many of the system
libraries are shipped in a data compressed format. If you have enough disk
space, you may decompress them for faster access. Use SYS$UPDATE:LIBDECOMP.COM
to data expand the libraries. If you choose not to decompress these libraries
there will be a negative impact on the performance of the HELP and LINK
commands.

- BUILD A STANDALONE BACKUP KIT - You can build a standalone backup kit
using the procedure described in your VMS installation and operations
guide which is supplied with your VAX processor.

Continuing with VAX/VMS V5.0 Installation Procedure.

Configuring all devices on the system.

You must now install the MANDATORY UPDATE, which can be found
on a separate distribution volume.

        VAX/VMS Software Product Installation Procedure V5.0

It is 31-DEC-1988 at 15:00
Enter a question mark (?) at any time for help.
```

2 The procedure asks you for the device name of the drive that contains the mandatory update. Enter the device name of the drive on which you want to put the tape containing the mandatory update and press RETURN. For example:

```
*Where will the distribution volumes be mounted: MSA0
```

The procedure displays the following messages:

```
Please mount the first volume of the set on MSA0:.
*Are you ready?
```

3 Put the magnetic tape labeled VMS V5.0 BIN 16MT9 MANDATORY UPDATE in the drive. When you are ready to continue, type Y and press RETURN. The procedure displays the following series of messages and asks if you want to purge files:

```
%MOUNT-I-MOUNTED, VMSMUP mounted on _MSA0:.

The following products will be processed:

   VMSMUP V5.0

        Beginning installation of VMSMUP V5.0 at 15:00

%VMSINSTAL-I-RESTORE, Restoring product saveset A...

       Installing VMS V5 mandatory update

Do you want to purge files replaced by this installation [YES]?
```

Press RETURN (for YES) and go to the next step.

4 Depending on the version of VMS that you are installing, the mandatory update procedure might ask for certain information. Read the screen displays for instructions. When the procedure is finished, it displays the following message:

```
    VMSINSTAL procedure done at 15:02
```

5 AUTOGEN runs and displays the following series of messages:

```
Running AUTOGEN to compute new SYSGEN parameters.

An attempt may be made to re-size the pagefile or swapfile. If
there is insufficient room on the disk, the recommended size is
displayed with a message that the file should be created or
extended manually by the system manager later on.

Running  AUTOGEN - Please wait.
      .
      .
      .
```

6 After AUTOGEN finishes, the procedure displays a series of shutdown messages that begins like this:

```
The system is shutting down to allow the system to boot with the
generated site-specific parameters and installed images.

The system will automatically reboot after the shutdown and the upgrade
will be complete.

     SHUTDOWN -- Perform an Orderly System Shutdown
```

7 If you edited the boot command procedures and entered the ENABLE AUTO REBOOT command, the system reboots automatically.

If the system does not reboot automatically, press CTRL/P and enter the HALT/CPU=ALL command at the PS-OS-0> prompt. Enter the BOOT command in the following format:

```
PS-CIO-0> B dddn
```

Substitute BCI or BDA for *ddd*. Substitute the unit number of the drive that holds the system disk for *n*. For example:

```
PS-CIO-0> B BCI6
```

Note: If your VAX computer has 512M of memory, you must do a conversational boot. Enter the following commands and press RETURN after each one:

```
PS-CIO-0> B dddn /R5=1
SYSBOOT> DISABLE CHECKS
SYSBOOT> SET PHYSICALPAGES 1047552
SYSBOOT> CONTINUE
```

For more information, see Section A.4.

8 After the system reboots, the procedure displays the following message:

Note: The procedure might display warning messages that the VMS and VAXcluster licenses must be registered. Be sure to register these licenses when the installation procedure finishes, as described in Chapter 7.

```
   VAX/VMS Version V5.0 Major version id = 01 Minor version id = 00

You have successfully installed the VMS operating system.
The system is now executing the STARTUP procedure.
Please await the completion of STARTUP before logging
into the system (approximately three minutes).

%%%%%%%%%%  OPCOM 31-DEC-1988 15:00.00.00  %%%%%%%%%%
Logfile has been initialized by operator _OPA0:
Logfile is SYS$SYSROOT:[SYSMGR]OPERATOR.LOG;1
```

Finally, the procedure displays informational messages as well as accounting information. For example:

```
Startup processing continuing...

%SET-I-INTSET, login interactive limit=64, current interactive value = 0
  31-DEC-1988 15:00:00.00
  SYSTEM       job terminated at 31-DEC-1988 15:00:00.00

Accounting information:
 Buffered I/O count:        859      Peak working set size:        565
 Direct I/O count:          478      Peak virtual size:           2570
 Page faults:              5003      Mounted volumes:                0
 Charged CPU time:  0 00:00:55.23    Elapsed time:       0 00:01:31.24
```

At this point the VMS operating system is running.

9 Press RETURN. The system asks you for the user name and password. Log into the SYSTEM account so that you can perform certain post-installation tasks. For example:

```
    Welcome to VAX/VMS V5.0

USERNAME: SYSTEM
PASSWORD: PANCAKES
    .
    .
    .
    Welcome to VAX/VMS V5.0
```

When you press RETURN, the VMS operating system prompt ($) is displayed.

If you forget the password, follow the instructions for breaking into the system in the *Guide to Setting Up a VMS System*.

10 There are several things you must do before you can use the system. For complete information, see Chapter 7.

6 Installing VMS from an HSC Tape Drive

This chapter describes installing the VMS operating system on a VAX 8820, 8830, and 8840 from an *HSC tape drive*. To install VMS from a local tape drive, see Chapter 5.

CAUTION: **The software installation procedure overwrites the contents of the system disk. Use the VMS installation procedure only if your VAX computer is new, or if you want to destroy the contents of the system disk. If your system disk contains files that you want to save, you should upgrade to the new version of VMS. For a complete description of the upgrade procedure, see the current version of the *VMS Release Notes*.**

6.1 Before You Start

Before you install the VMS operating system, do the following:

- Make sure the hardware has been installed and checked for proper operation. For detailed information on the hardware, see the hardware manual for your VAX computer.
- Follow the directions in Chapter 4 to install standalone BACKUP on the console fixed disk and edit the boot command procedures.
- Make sure you have all the items listed on the bill of materials in the VMS distribution kit. The magnetic tape distribution kit should contain the following:
  - A magnetic tape that contains the VMS *required, library,* and *optional* save sets
  - A magnetic tape that contains the mandatory update
  - A TK50 tape cartridge that contains standalone BACKUP

  If your kit is incomplete, notify the DIGITAL Software Distribution Center. Request priority shipment of any missing items.
- If you are installing the VMS operating system on a VAX computer in a VAXcluster environment, determine whether you want a CI-only, local area, or mixed-interconnect configuration. For a complete description of configurations, see the *VMS VAXcluster Manual*. Depending on the type of configuration, you need to obtain the following information from either the network or VAXcluster manager:
  - CI-Only Configuration: Obtain the allocation class value, the DECnet node name, and node address for the computer.
  - Local Area and Mixed-Interconnect Configurations: You need the allocation class value, the DECnet node name, and node address for the computer. You also need the cluster group number and password.

Installing VMS from an HSC Tape Drive

6.1 Before You Start

The installation procedure transfers the VMS files from the distribution magnetic tape to the system disk. The procedure consists of the following stages:

1. Preparing the disk and tape drives
2. Booting standalone BACKUP
3. Creating the system disk
4. Transferring the *library* and *optional* save sets
5. Installing the mandatory update and running AUTOGEN

The entire procedure takes approximately one hour.

Note: The screen displays and examples in this manual depict VMS Version 5.0. Your screen displays reflect the version that you are installing.

6.2 Preparing the Disk and Tape Drives

To set up the disk and tape drives you use during the installation, do the following:

1. Decide which drive will hold the distribution magnetic tape and which drive will hold the system disk.
2. Make sure that both the CIBCA (or CIBCI) and the HSC50 (or HSC70) are turned on and on line. Obtain the HSC name from the system manager or use the following procedure:
   a. Press CTRL/C at the HSC console terminal.
   b. Enter the following command at the HSC> prompt and press RETURN:

      ```
      HSC> SHOW SYSTEM
      ```

      The information displayed includes the name of the HSC. For example:

      ```
      31-Dec-1988 15:00:00.00  Boot:30-Dec-1988 11:31:11.41  Up: 51:00
      Version: V350               System ID: %X000000011        Name: TROUT
           .
           .
           .
      DISK allocation class =  1   TAPE allocation class =  0
      Start command file m Disabled

      SETSHO - Program Exit
      ```

      For more information, see the *HSC User Guide*.
3. Thread the tape on the tape drive and put the drive on line.
4. Place a scratch disk in the drive for the system disk (unless the system disk is fixed).
5. Spin up the system disk but *do not* write-protect it.
6. To boot standalone BACKUP, go to Section 6.3.

6.3 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 magnetic tape to your system disk.

1. Make sure that the console subsystem is running and the PS-CIO-0> prompt is displayed.
2. To enable automatic reboot, enter the following command and press RETURN:[1]

```
PS-CIO-0> ENABLE AUTO REBOOT
```

3. To boot standalone BACKUP, enter the following command and press RETURN:

```
PS-CIO-0> @CSABOO
```

Note: If your VAX computer has 512M of memory, you must do a conversational boot. Enter the following commands and press RETURN after each one.

```
PS-CIO-0> B CSA /R5=D0000001
SYSBOOT> DISABLE CHECKS
SYSBOOT> SET PHYSICALPAGES 1047552
SYSBOOT> CONTINUE
```

For more information, see Section A.4.

4. The procedure might ask 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) 31-DEC-1988 15:00

VAX/VMS Version V5.0 Major version id = 01 Minor version id = 00
```

5. The procedure displays a list of the local devices on your system and, if you have them, HSC and MSCP-served devices. For example:

```
Available device MINE$DJA2:     device type RA60
Available device MINE$DJA3:     device type RA60
      .
      .
      .
```

   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, standalone BACKUP V5.0; the date is 31-DEC-1988 15:00
$
```

7. To create a system disk on a local drive, go to Section 6.4.

   To create a system disk on an HSC drive, go to Section 6.5.

[1] For the system to reboot automatically you must enter the ENABLE AUTO REBOOT command and edit the boot command procedures as described in Section 4.2 and Section 4.3.

6.4 Creating a System Disk on a Local Drive

This section provides instructions for installing the VMS operating system on a system disk that is on a local drive in a VAXcluster environment. To create a system disk on an HSC drive, see Section 6.5.

The VMS files are stored on the distribution magnetic tape as three save sets: *required, library,* and *optional.* This section describes the steps for transferring the *required* save set from the distribution magnetic tape to your system disk.

The instructions refer to the *source-drive* and the *target-drive* where:

- The *source-drive* is the drive that holds the distribution magnetic tape
- The *target-drive* is the drive that holds the system disk

1 Determine the device names for the *source-drive* and the *target-drive* using Table 3–1. Write these names on a piece of paper. You will need this information throughout the installation.

2 To transfer the *required* save set to your system disk, enter the BACKUP command in the following format:

```
$ BACKUP/VERIFY hsc-name$source-drive:VMS050.B/SAVE_SET target-drive:
```

Substitute the appropriate device names for *source-drive* and *target-drive.* Make sure you put a colon (:) after each device name and that you use zeros in devices names and in VMS050. Precede the *source-drive* with the HSC name and a dollar sign ($).

For example, if your system has the following configuration:

- An HSC-based TA78 *source-drive* with an HSC name of MINE, a controller designation of A, and a unit number of zero
- An RA80 *target-drive* with a controller designation of A and a unit number of six

Enter the following command and press RETURN:

```
$ BACKUP/VERIFY MINE$MUA0:VMS050.B/SAVE_SET DUA6:
```

The *required* save set is transferred from the distribution magnetic tape to the system disk.[1] This takes approximately five minutes. During the process the procedure displays the following message:

```
%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 five minutes later the procedure displays the following message:

```
%BACKUP-I-PROCDONE, Operation completed. Processing finished at 31-DEC-1988 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:
```

3 Press CTRL/P to return control to the console.

[1] The BACKUP command creates a system disk that includes a DIGITAL-provided set of volume parameters, including a CLUSTER_SIZE (disk access scheme) of 1. For more information, see the note at the end of Section 10.2.

4 Enter the following command and press RETURN:

```
PS-OS-0> HALT
```

5 Boot the system disk. Use the BOOT command in the following format:

```
PS-CIO-0> B dddn
```

Substitute BCI or BDA for *ddd*. Substitute the unit number of the *target-drive* for *n*. For example, suppose the system disk is on a BDA-controlled drive and the unit number is six. Enter the following command and press RETURN:

```
PS-CIO-0> B BDA6
```

Note: If your VAX computer has 512M of memory, you must do a conversational boot. Enter the following commands and press RETURN after each one.

```
PS-CIO-0> B dddn /R5=1
SYSBOOT> DISABLE CHECKS
SYSBOOT> SET PHYSICALPAGES 1047552
SYSBOOT> CONTINUE
```

For more information, see Section A.4.

6 When the boot is complete, 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:

Note: The procedure displays warning messages, similar to the following, that the VMS license is not registered. Continue with the installation procedure. Follow the instructions for registering the VMS license after you finish the installation.

```
  VAX/VMS Version BI50 Major version id = 01 Minor version id = 00

     VAX/VMS Version 5.0 Installation Procedure

%%%%%%%%%%  OPCOM 31-DEC-1988 15:00:00.00  %%%%%%%%%%
Logfile has been initialized by operator _OPA0:
Logfile is SYS$SYSROOT:[SYSMGR]OPERATOR.LOG;1

%LICENSE-F-EMTLDB, License database contains no license records
%LICENSE-E-NOAUTH, DEC VAX-VMS use is not authorized on this node
-%LICENSE-F-NOLICENSE, no license is active for this software product
-%LICENSE-I-SYSMGR, please see your system manager
%%%%%%%%%%  OPCOM 31-DEC-1988 15:00:00.00  %%%%%%%%%%
Message from user SYSTEM
%LICENSE-E-NOAUTH, DEC VAX-VMS use is not authorized on this node
-%LICENSE-F-NOLICENSE, no license is active for this software product
-%LICENSE-I-SYSMGR, please see your system manager

Startup processing continuing...

Please enter the date and time (DD-MMM-YYYY HH:MM): 31-DEC-1988 15:00
```

7 The procedure asks for the volume label of the system disk. A volume label is the name the VMS operating system uses to refer to the system disk. If you have a VAXcluster environment, each system disk must have a unique volume label.

You can press RETURN to accept the default volume label, VMSRL5, or you can enter a volume label of your choice. The volume label can be 1 to 12 characters long; spaces are not allowed. For example:

```
If this system disk is to be used in a cluster with multiple
system disks, then each system disk must have a unique volume label.
Any nodes having system disks with duplicate volume labels will fail
to boot into the cluster.

You may indicate a volume label of 1 to 12-characters in length. If you
wish to use the default name of VMSRL5 just press RETURN in response to
the next question.

Enter the volume label for this system disk (no spaces) [VMSRL5]: SYSDSK
```

8 The procedure asks which drive holds the distribution magnetic tape. Enter the HSC name and the device name of the *source-drive* separated by a dollar sign ($). Use the following format:

```
Enter the name of the drive holding the distribution media (DDCU): hsc-name$source-drive:
```

For example, suppose the *source-drive* is an HSC-based TA78 tape drive with an HSC name of MINE, a controller designation of A, and a unit number of zero. Enter the following and press RETURN:

```
Enter the name of the drive holding the distribution media (DDCU): MINE$MUA0:
```

9 Several minutes later the procedure displays the following messages:

```
%MOUNT-I-MOUNTED, VMS050 mounted on _$MUA0:(MINE)

Restoring LIBRARY saveset.
```

To continue the installation procedure, go to Section 6.6.

6.5 Creating a System Disk on an HSC Drive

This section provides instructions for installing the VMS operating system on a system disk that is on an HSC drive in a VAXcluster environment.

The VMS files are stored on the distribution magnetic tape as three save sets: *required, library,* and *optional.* This section describes the steps for transferring the *required* save set from the distribution magnetic tape to your system disk.

The instructions refer to the *source-drive* and the *target-drive* where:

- The *source-drive* is the drive that holds the distribution magnetic tape
- The *target-drive* is the drive that holds the system disk

1 Determine the device names for the *source-drive* and the *target-drive* using Table 3–1. Write these names on a piece of paper. You will need this information throughout the installation.

2 To transfer the *required* save set to your system disk, enter the BACKUP command in the following format:

```
$ BACKUP/VERIFY hsc-name$source-drive:VMS050.B/SAVE_SET hsc-name$target-drive:
```

Substitute the appropriate device names for *source-drive* and *target-drive.* Make sure you put a colon (:) after each device name and that you use zeros in device names and in VMS050. Precede the *source-drive* and the *target-drive* with the HSC name and a dollar sign ($).

For example, if your system has the following configuration:

- An HSC-based TA78 *source-drive* with an HSC name of MINE, a controller designation of A, and a unit number of zero
- An HSC-based RA80 *target-drive* with an HSC name of YOURS, a controller designation of A, and a unit number of six

Enter the following command and press RETURN:

```
$ BACKUP/VERIFY MINE$MUA0:VMS050.B/SAVE_SET YOURS$DUA6:
```

The *required* save set is transferred from the distribution magnetic tape to the system disk.[1] This takes approximately five minutes. During the process the procedure displays the following message:

```
%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 five minutes later the procedure displays the following message:

```
%BACKUP-I-PROCDONE, Operation completed. Processing finished at 31-DEC-1988 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:
```

3 Press CTRL/P to return control to the console.

4 Enter the following command and press RETURN:

```
PS-OS-0> HALT
```

5 To boot the system disk, use the BOOT command in the following format:

```
PS-CIO-0> B dddn
```

Substitute BCI or BDA for *ddd*. Substitute the unit number of the *target-drive* for *n*.

For example, suppose the system disk is on a CIBCI-controlled drive and the unit number is six. Enter the following command and press RETURN:

```
PS-CIO-0> B BCI6
```

Note: If your VAX computer has 512M of memory, you must do a conversational boot. Enter the following commands and press RETURN after each one.

```
PS-CIO-0> B dddn /R5=1
SYSBOOT> DISABLE CHECKS
SYSBOOT> SET PHYSICALPAGES 1047552
SYSBOOT> CONTINUE
```

For more information, see Section A.4.

6 When the boot is complete, 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:

Note: The procedure displays warning messages, similar to the following, that the VMS license is not registered. Continue with the installation procedure. Follow the instructions for registering the VMS license after you finish the installation.

```
  VAX/VMS Version BI50 Major version id = 01 Minor version id = 00

     VAX/VMS Version 5.0 Installation Procedure

%%%%%%%%%%%  OPCOM 31-DEC-1988 15:00:00.00  %%%%%%%%%%%
Logfile has been initialized by operator _OPA0:
Logfile is SYS$SYSROOT:[SYSMGR]OPERATOR.LOG;1

%LICENSE-F-EMTLDB, License database contains no license records
%LICENSE-E-NOAUTH, DEC VAX-VMS use is not authorized on this node
-%LICENSE-F-NOLICENSE, no license is active for this software product
-%LICENSE-I-SYSMGR, please see your system manager
%%%%%%%%%%%  OPCOM 31-DEC-1988 15:00:00.00  %%%%%%%%%%%
Message from user SYSTEM
%LICENSE-E-NOAUTH, DEC VAX-VMS use is not authorized on this node
-%LICENSE-F-NOLICENSE, no license is active for this software product
-%LICENSE-I-SYSMGR, please see your system manager

Startup processing continuing...

Please enter the date and time (DD-MMM-YYYY HH:MM): 31-DEC-1988 15:00
```

7 The procedure asks for the volume label of the system disk. A volume label is the name the VMS operating system uses to refer to the system disk. If you have a VAXcluster environment, each system disk must have a unique volume label.

You can press RETURN to accept the default volume label, VMSRL5, or you can enter a volume label of your choice. The volume label can be 1 to 12 characters long; spaces are not allowed. For example:

```
If this system disk is to be used in a cluster with multiple
system disks, then each system disk must have a unique volume label.
Any nodes having system disks with duplicate volume labels will fail
to boot into the cluster.

You may indicate a volume label of 1 to 12-characters in length. If you
wish to use the default name of VMSRL5 just press RETURN in response to
the next question.

Enter the volume label for this system disk (no spaces) [VMSRL5]: SYSDSK
```

8 The procedure asks which drive holds the distribution magnetic tape. Enter the HSC name and the device name of the *source-drive* separated by a dollar sign ($). Use the following format:

```
Enter the name of the drive holding the distribution media (DDCU): hsc-name$source-drive:
```

For example, suppose the *source-drive* is an HSC-based TA78 tape drive with an HSC name of MINE, a controller designation of A, and a unit number of zero. Enter the following and press RETURN:

```
Enter the name of the drive holding the distribution media (DDCU): MINE$MUA0:
```

9 Several minutes later the procedure displays the following messages:

```
%MOUNT-I-MOUNTED, VMS050 mounted on _$MUA0:(MINE)

Restoring LIBRARY saveset.
```

To continue the installation procedure, go to Section 6.6.

6.6 Transferring the Library and Optional Save Sets

This section describes the steps for transfering the *library* and *optional* save sets from the distribution magnetic tape to the system disk.

1 The installation procedure now transfers the *library* and *optional* save sets to your system disk. It takes approximately eight minutes. During this time the procedure displays the following messages:

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

Restoring OPTIONAL saveset.
%BACKUP-I-STARTVERIFY, starting verification pass

Creating [VMS$COMMON] directory tree.

In a cluster, you can run multiple systems sharing all files except
PAGEFILE.SYS, SWAPFILE.SYS, SYSDUMP.DMP and VAXVMSSYS.PAR.

Will this node be a cluster member? (Y/N)
```

If you are installing the VMS operating system on a standalone system, type N (for NO), press RETURN, and go to step 4.

If you are installing the VMS operating system in a VAXcluster environment, type Y (for YES), press RETURN, and go to step 2.

Note: If you answer YES to the VAXcluster question, you must have a VAXcluster license.

2 The procedure displays the following message:

```
Now configuring system to be a cluster member.
```

3 Determine the type of cluster configuration you want to create (configuration types are described in the *VMS VAXcluster Manual*). Table 6–1 lists the questions you are asked if you want a CI-only configuration. Table 6–2 lists the questions you are asked if you want either a local area or a mixed-interconnect configuration. Typical responses are explained in the tables.

Table 6–1 Installation Questions for CI-Only Configurations

Question	How to Respond
Will this node be a cluster member (Y/N)?	Enter Y.
What is the node's DECnet node name?	Enter the DECnet node name—for example, JUPITR. The DECnet node name may be from 1 to 6 alphanumeric characters in length and may not include dollar signs or underscores.
What is the node's DECnet node address?	Enter the DECnet node address—for example, 2.2.
Will the Ethernet be used for cluster communications (Y/N)?	Enter N. The Ethernet is not used for cluster (SCS internode) communications in CI-only configurations.
Will JUPITR be a disk server (Y/N)?	Enter Y or N, depending on your configuration requirements. Refer to the *VMS VAXcluster Manual* for information on served cluster disks.
Enter a value for JUPITR's ALLOCLASS parameter:	If the system is connected to a dual-ported disk, enter the appropriate allocation class value (it must be a value between 1 and 255). Otherwise, enter 0.
Does this cluster contain a quorum disk [N]?	Enter Y or N, depending on your configuration. If you enter Y, the procedure will prompt for the name of the quorum disk. Enter the device name of the quorum disk.

Table 6–2 Installation Questions for Local Area and Mixed-Interconnect Configurations

Question	How to Respond
Will this node be a cluster member (Y/N)?	Enter Y.
What is the node's DECnet node name?	Enter the DECnet node name—for example, JUPITR. The DECnet node name may be from 1 to 6 alphanumeric characters in length and may not include dollar signs or underscores.
What is the node's DECnet node address?	Enter the DECnet node address—for example, 2.2.
Will the Ethernet be used for cluster communications (Y/N)?	Enter Y. The Ethernet is required for cluster (SCS internode) communications in local area and mixed-interconnect configurations.
Enter this cluster's group number:	Enter a number in the range from 1 to 4095 or 61440 to 65535.
Enter this cluster's password:	Enter the cluster password. The password must be from 1 to 31 alphanumeric characters in length and may include dollar signs and underscores.

Table 6–2 (Cont.) Installation Questions for Local Area and Mixed-Interconnect Configurations

Question	How to Respond
Re-enter this cluster's password for verification:	Re-enter the password.
Will JUPITR be a disk server (Y/N)?	Enter Y. In local area and mixed-interconnect configurations, the system disk is always served to the cluster. Refer to the *VMS VAXcluster Manual* for information on served cluster disks.
Will JUPITR serve HSC disks (Y)?	Enter a response appropriate for your configuration.
Enter a value for JUPITR's ALLOCLASS parameter:	Enter the appropriate allocation class value. If you have a mixed-interconnect configuration, the value must be between 1 and 255, you cannot enter 0.
Does this cluster contain a quorum disk [N]?	Enter Y or N, depending on your configuration. If you enter Y, the procedure will prompt for the name of the quorum disk. Enter the device name of the quorum disk.

4 The procedure displays the following message:

```
You may now remove the distribution kit from _$MUA0:(MINE)
```

Remove the distribution tape from the drive.

5 The procedure asks you for new passwords for the SYSTEM, SYSTEST, and FIELD accounts. Passwords must be at least eight characters in length; they do not appear on the display. Press RETURN after you enter each one. After you enter the passwords, the procedure checks each one to make sure it meets the requirements for a good password. For example:

```
Now we will ask you for new passwords for the following accounts:
            SYSTEM, SYSTEST, FIELD

Enter new password for account SYSTEM: PANCAKES
Re-enter the password for account SYSTEM for verification: PANCAKES

%UAF-I-MDFYMSG, user record(s) updated

Enter new password for account SYSTEST: BRATWURST
Re-enter the password for account SYSTEST for verification: BRATWURST

%UAF-I-MDFYMSG, user record(s) updated

Enter new password for account FIELD: ZIRHUMBA
Re-enter new password for account FIELD for verification: ZIRHUMBA

%UAF-I-MDFYMSG, user record(s) updated

The procedure will now check and verify passwords for the
following accounts:

      SYSTEM, SYSTEST, FIELD

Passwords that can be guessed easily will not be accepted.
```

If the procedure verifies the passwords, it displays the following messages:

```
%VMS-I-PWD_OKAY, account password for SYSTEM verified
%VMS-I-PWD_OKAY, account password for SYSTEST verified
%VMS-I-PWD_OKAY, account password for FIELD verified
```

If you enter a password incorrectly or if the password is too easy to guess, the procedure displays error messages similar to the following:

```
%VMS-W-PWD_INVALID, account password for SYSTEM is invalid
-VMS-I-PWD_WEAK, password is too easy to guess

Because of the preceding error, you must take action to secure this account.
You must either disable this account, change its password, or do both.
```

When the procedure asks if you want to disable the account, type N (for NO) and press RETURN. When the procedure asks if you want to enter a new password, type Y (for YES) and press RETURN. Then enter a new password. For example:

```
Do you want to disable the account (Y/N)? N
Do you want to change the account password (Y/N)? Y
You must now select a new primary password for the SYSTEM account. The
password you select must be at least 8 characters in length and may not
be the same as the name of the account.

New password: WILLIWAW
Verification: WILLIWAW

%UAF-I-MDFYMSG, user record(s) updated
%VMS-I-PWD_SET, primary password for account SYSTEM set
```

6 After you have entered the passwords, the procedure creates your RIGHTS database and displays the following message:

```
Creating RIGHTS database file. SYS$SYSTEM:RIGHTSLIST.DAT
Ignore any "%SYSTEM-F-DUPIDENT, duplicate identifier" errors
      .
      .
      .
%UAF-I-RDBDONEMSG, rights database modified
```

7 After the procedure creates your RIGHTS database, go to Section 6.7 to install the mandatory update.

6.7 Installing the Mandatory Update and Running AUTOGEN

Follow the directions in this section to install the mandatory update and run AUTOGEN. AUTOGEN evaluates your hardware configuration and estimates typical workloads. It then sets system parameters, the sizes of the page, swap, and dump files, and the contents of VMSIMAGES.DAT. When AUTOGEN finishes, the installation procedure is complete.

1 After the procedure creates the RIGHTS database, it displays the following messages:

```
After the installation finishes, you may want to do one or more of the
following tasks:

- DECOMPRESS THE SYSTEM LIBRARIES - For space considerations, many of the system
libraries are shipped in a data compressed format. If you have enough disk
space, you may decompress them for faster access. Use SYS$UPDATE:LIBDECOMP.COM
to data expand the libraries. If you choose not to decompress these libraries
there will be a negative impact on the performance of the HELP and LINK
commands.

- BUILD A STANDALONE BACKUP KIT - You can build a standalone backup kit
using the procedure described in your VMS installation and operations
guide which is supplied with your VAX processor.

Continuing with VAX/VMS V5.0 Installation Procedure.

Configuring all devices on the system.

You must now install the MANDATORY UPDATE, which can be found
on a separate distribution volume.

       VAX/VMS Software Product Installation Procedure V5.0

It is 31-DEC-1988 at 15:00
Enter a question mark (?) at any time for help.
```

2 The procedure asks you for the device name of the drive that contains the mandatory update. Enter the device name of the drive on which you want to put the tape containing the mandatory update and press RETURN. For example:

```
*Where will the distribution volumes be mounted: MINE$MUA0
```

The procedure displays the following messages:

```
Please mount the first volume of the set on MINE$MUA0:.
*Are you ready?
```

3 Put the magnetic tape labeled VMS V5.0 BIN 16MT9 MANDATORY UPDATE in the drive. When you are ready to continue, type Y and press RETURN. The procedure displays the following series of messages and asks if you want to purge files:

```
%MOUNT-I-MOUNTED, VMSMUP mounted on _$6$MUA0: (MINE)

The following products will be processed:

   VMSMUP V5.0

        Beginning installation of VMSMUP V5.0 at 15:00

%VMSINSTAL-I-RESTORE, Restoring product saveset A...

        Installing VMS V5 mandatory update

Do you want to purge files replaced by this installation [YES]?
```

Press RETURN (for YES) and go to the next step.

4 Depending on the version of VMS that you are installing, the mandatory update procedure might ask for certain information. Read the screen displays for instructions. When the procedure is finished, it displays the following message:

```
    VMSINSTAL procedure done at 15:02
```

5 AUTOGEN runs and displays the following series of messages:

```
Running AUTOGEN to compute new SYSGEN parameters.

An attempt may be made to re-size the pagefile or swapfile. If
there is insufficient room on the disk, the recommended size is
displayed with a message that the file should be created or
extended manually by the system manager later on.

Running  AUTOGEN - Please wait.
     .
     .
     .
```

6 After AUTOGEN finishes, the procedure displays a series of shutdown messages that begins like this:

```
The system is shutting down to allow the system to boot with the
generated site-specific parameters and installed images.

The system will automatically reboot after the shutdown and the upgrade
will be complete.

     SHUTDOWN -- Perform an Orderly System Shutdown
```

7 If you edited the boot command procedures and entered the ENABLE AUTO REBOOT command, the system reboots automatically.

If the system does not reboot automatically, press CTRL/P and enter the HALT/CPU=ALL command at the PS-OS-0> prompt. Enter the BOOT command in the following format:

```
PS-CIO-0> B dddn
```

Substitute BCI or BDA for *ddd*. Substitute the unit number of the drive that holds the system disk for *n*. For example:

```
PS-CIO-0> B BCI6
```

Note: If your VAX computer has 512M of memory, you must do a conversational boot. Enter the following commands and press RETURN after each one.

```
PS-CIO-0> B dddn /R5=1
SYSBOOT> DISABLE CHECKS
SYSBOOT> SET PHYSICALPAGES 1047552
SYSBOOT> CONTINUE
```

For more information, see Section A.4.

8 After the system reboots, the procedure displays the following message:

Note: The procedure might display warning messages that the VMS and VAXcluster licenses must be registered. Be sure to register these licenses when the installation procedure finishes, as described in Chapter 7.

```
   VAX/VMS Version V5.0 Major version id = 01 Minor version id = 00

You have successfully installed the VMS operating system.
The system is now executing the STARTUP procedure.
Please await the completion of STARTUP before logging
into the system (approximately three minutes).

%%%%%%%%%%  OPCOM 31-DEC-1988 15:00.00.00  %%%%%%%%%%
Logfile has been initialized by operator _OPA0:
Logfile is SYS$SYSROOT:[SYSMGR]OPERATOR.LOG;1)
```

Finally, the procedure displays informational messages as well as accounting information. For example:

```
Startup processing continuing...

%SET-I-INTSET, login interactive limit=64, current interactive value = 0
  31-DEC-1988 15:00:00.00
  SYSTEM       job terminated at 31-DEC-1988 15:00:00.00

Accounting information:
 Buffered I/O count:       859      Peak working set size:        565
 Direct I/O count:         478      Peak virtual size:           2570
 Page faults:             5003      Mounted volumes:                0
 Charged CPU time:  0 00:00:55.23   Elapsed time:       0 00:01:31.24
```

At this point the VMS operating system is running.

9 Press RETURN. The system asks you for the user name and password. Log into the SYSTEM account so that you can perform certain post-installation tasks. For example:

```
    Welcome to VAX/VMS V5.0

USERNAME: SYSTEM
PASSWORD: PANCAKES
     .
     .
     .
    Welcome to VAX/VMS V5.0
```

When you press RETURN, the VMS operating system prompt ($) is displayed.

If you forget the password, follow the instructions for breaking into the system in the *Guide to Setting Up a VMS System.*

10 There are several things you must do before you can use the system. For complete information, see Chapter 7.

7 After Installing VMS

After you have installed the VMS operating system, you need to perform several important tasks to prepare the system for operation. This chapter tells you what the tasks are, whether they are optional or required, and the order in which you perform them. The following list summarizes the tasks that are described in this chapter:

1. Registering your licenses—You must register the VMS license(s) that came with the software. You must also register the licenses you have for any system integrated products that you purchased.
2. Removing unwanted files from the system disk—You can free space on the system disk by removing the VMS files that you do not need.
3. Customizing the system—Depending on whether you have a standalone system or a system that is part of a VAXcluster environment, there are several things you must do.
4. Testing the system—Once you have customized the system, run the VMS User Environment Test Program (UETP) to test the system.
5. Decompressing the system libraries—After you test the system, you can decompress the system libraries.
6. Backing up the system disk—To protect all the work you have just done, make a backup copy of the system disk.

7.1 Registering Your Licenses

The VMS license lets you use the VMS operating system. You must register this license.

After you register the VMS license, you must register the licenses for any of the following system integrated products you have purchased:

- VAXclusters
- DECnet–VAX
- RMS Journaling
- Volume Shadowing

For step-by-step instructions on registering licenses, see the current version of the *VMS Release Notes*.

7.2 Removing Unwanted Files with VMSTAILOR

Read this section if you want to remove the VMS operating system files that you do not need from the system disk. For example, if you are not running DECnet–VAX, you do not need the network support files. You can remove unwanted files with the VMSTAILOR program. Log into the SYSTEM account, enter the following command and press RETURN:

```
$ RUN SYS$UPDATE:VMSTAILOR
```

The VMSTAILOR program asks you if you want to tailor files ON or OFF. Type OFF to remove unwanted files.

The VMSTAILOR program lists each group of files and its size in blocks. Files are grouped according to their function. For example, all the files required for cluster support are in one group. A file group is made up of many small subgroups. You can eliminate an entire group of files, or you can eliminate one or more of its subgroups.

Decide which file groups or subgroups you do not need to support your system. The VMSTAILOR program displays step-by-step instructions that are easy to follow.

VMSTAILOR displays the names of the files it deletes. After it finishes, AUTOGEN runs automatically to make the adjustments that are necessary after system files are deleted.

Note: You can use VMSTAILOR at any time to delete or add groups of VMS files to the system disk. After adding files to the system disk, you should apply any updates that affect them.

For example, suppose you do not need the VMS Version 5.0 MAIL utility and you run VMSTAILOR to remove those files. Later on, if you decide you want to use MAIL, you can run VMSTAILOR to return the MAIL files to the system disk. You then apply any VMS upgrade or update that has occurred since Version 5.0 that affected the MAIL utility.

7.3 Customizing the System

You must customize the system disk so that it automatically performs certain tasks when you boot. In addition, if your computer is part of a VAXcluster environment, you must prepare the cluster operating environment and build the cluster.

For instructions on customizing the system, read the following documentation (in the order given):

1. Read Chapter 9 in this book. This chapter explains the different ways to boot the system. It also tells you how to shut down the system.
2. If your computer is part of a VAXcluster environment, read the *VMS VAXcluster Manual* for further information on setting up a cluster.
   a. Start by reading Chapter 1, which contains general information on VAXclusters.
   b. Then follow the directions in Chapter 2 to configure the DECnet–VAX network. In addition, Chapter 2 tells you how to coordinate the cluster command procedures and system files.
   c. Follow the directions in Chapter 3 to build the cluster.

3 If you have a standalone system, read the *Guide to Setting Up a VMS System* for instructions on customizing and using your system. You will find information on the following tasks:

   a. Editing the template files SYCONFIG.COM, SYLOGICALS.COM, SYLOGIN.COM, and SYSTARTUP_V5.COM

   b. Setting up user accounts

   c. Adjusting system parameters

7.4 Testing the System with UETP

You must run the User Environment Test Package (UETP) to verify the installation. For complete information, see Chapter 8. Note that UETP needs at least 1200 free blocks on the system disk.

7.5 Decompressing the System Libraries

Decompressing the system libraries gives the system faster access to the libraries. The decompressed libraries require approximately 5000 additional blocks of disk space. To find out how much disk space you have, enter the following command and press RETURN:

```
$ SHOW DEVICE SYS$SYSDEVICE
```

If you have enough room on the disk, you can decompress the libraries. The decompression process takes approximately a half hour. Log into the SYSTEM account. Enter the following command and press RETURN:

```
$ @SYS$UPDATE:LIBDECOMP.COM
```

7.6 Backing Up the System Disk

Now that you have spent a lot of time and effort customizing and testing the system, protect your work by making a backup copy of the system disk. DIGITAL recommends that you perform the following operations:

- Make a standalone backup kit
- Back up the system disk

For complete information on these operations, see Chapter 10. Once you have backed up the system disk, install any software products that you have purchased. Follow the directions given in the software product manuals.

8 Running UETP

The User Environment Test Package (UETP) is a VMS software package designed to test whether the VMS operating system is installed correctly. UETP puts the system through a series of tests that simulate a typical user environment, making demands on the system that are similar to demands that might occur in everyday use.

UETP is not a diagnostic program; it does not attempt to test every feature exhaustively. When UETP runs to completion without encountering nonrecoverable errors, the system being tested is ready for use.

UETP exercises devices and functions that are common to all VMS systems, with the exception of optional features such as high-level language compilers. The system components tested include the following:

- Most standard peripheral devices
- The system's multiuser capability
- DECnet–VAX
- Clusterwide file access and locks

8.1 Summary of UETP Operating Instructions

This section summarizes the procedure for running all phases of UETP with default values. If you are familiar with the test package, refer to this section. If you need further information, refer to Section 8.2.

1 Log into the SYSTEST account as follows:

```
Username: SYSTEST
Password:
```

Note: Because the SYSTEST and SYSTEST_CLIG accounts have privileges, unauthorized use of these accounts might compromise the security of your system.

2 Make sure no user programs are running or user volumes are mounted. By design, UETP assumes and requests the exclusive use of system resources. Unpredictable results could occur if you ignore this restriction.

3 After you log in, check all devices to be sure that the following conditions exist:

- All devices you want to test are powered up and are on line to the system.
- Scratch disks are mounted and initialized.
- Disks contain a directory named [SYSTEST] with OWNER_UIC=[1,7]. (You can create this directory with the DCL command CREATE/DIRECTORY.)

- Magnetic tape drives that you want to test contain a magnetic tape reel with at least 600 feet of tape. The magnetic tape is initialized with the label UETP (using the DCL command INITIALIZE). You should also mount the magnetic tape to make it available to the system.
- Scratch tape cartridges have been inserted in each drive you want to test and are mounted and initialized with the label UETP.
- Line printers and hardcopy terminals have plenty of paper.
- Terminal characteristics and baud rate are set correctly (see the user's guide for your terminal).

Note that some communications devices need to be set up by DIGITAL Field Service (see Section 8.3).

If you encounter any problems in preparing to run UETP, read Section 8.3 before proceeding.

4 To start UETP, enter the following command and press RETURN:

```
$ @UETP
```

UETP responds with the following question:

```
Run "ALL" UETP phases or a "SUBSET" [ALL]?
```

Press RETURN to choose the default response enclosed in brackets. UETP responds with three more questions in the following sequence:

```
How many passes of UETP do you wish to run [1]?
How many simulated user loads do you want [n]?
Do you want Long or Short report format [Long]?
```

Press RETURN after each prompt. After you answer the last question, UETP initiates its entire sequence of tests, which run to completion without further input. The final message should look like the following:

```
**************************************************
*                                                *
   END OF UETP PASS 1 AT 31-DEC-1988 16:30:09.38
*                                                *
**************************************************
```

5 After UETP runs, check the log files for errors. If testing completes successfully, the VMS operating system is in proper working order.

Note: After a run of UETP, you should always run the Error Log Utility to check for hardware problems that can occur during a run of UETP. For information on running the Error Log Utility, refer to the *VMS Error Log Utility Manual.*

If UETP does not complete successfully, refer to Section 8.5.

If you want to run UETP without using the default responses, refer to Sections 8.4 through 8.4.4, which explain the options.

8.2 Logging In

Obtain the SYSTEST password from your system manager. Log into the SYSTEST account from the console terminal as follows:

```
Username: SYSTEST
Password:
```

Note: Because SYSTEST has privileges, unauthorized use of this account might compromise the security of your system.

UETP will fail if you do not run the test from the SYSTEST account. Also, if you try to run UETP from a terminal other than the console terminal, the device test phase displays an error message stating that the terminal you are using is unavailable for testing. You can ignore this message.

After you log into the SYSTEST account, enter the command SHOW USERS to make sure no user programs are running and no user volumes are mounted. UETP requires exclusive use of system resources. If you ignore this restriction, UETP may interfere with applications that depend on these resources.

8.2.1 SYSTEST Directories

If you logged in successfully, you should be in the root directory [SYSTEST] on the system disk. UETP uses directories named [SYSTEST] to hold all the files used by UETP command procedure (UETP.COM) and temporary files used by UETP during testing.

The DCL command SHOW LOGICAL displays the translation of the logical name SYS$TEST on a typical system:

```
$ SHOW LOGICAL SYS$TEST
   "SYS$TEST" = "SYS$SYSROOT:[SYSTEST]"  (LNM$SYSTEM_TABLE)
```

If you want UETP to test a particular disk, such as a scratch disk, create either a [SYSTEST] directory or a [SYS0.SYSTEST] directory on that disk. Section 8.3.2 discusses setting up scratch disks for testing.

8.3 Setting Up for UETP

After you log in, you need to set up the devices on the system for UETP testing.

Note: Your system may not have all the devices described in this section.

You should check all devices to be sure that the following conditions exist:

- All devices you want to test are turned on and are on line.
- Scratch disks are mounted and initialized.
- Disks contain a directory named [SYSTEST] with OWNER_UIC=[1,7]. Use the CREATE/DIRECTORY command if the [SYSTEST] directory does not exist on the disk.
- Scratch magnetic tape reels are *physically* mounted on each drive you want tested and are initialized with the label UETP (using the DCL command INITIALIZE). Make sure magnetic tape reels contain at least 600 feet of tape.

- Scratch tape cartridges have been inserted in each drive you want to test and are mounted and initialized with the label UETP.
- Line printers and hardcopy terminals have plenty of paper.
- Terminal characteristics and baud rate are set correctly (see the user's guide for your terminal).

Note that some communications devices discussed in this section need to be set up by DIGITAL Field Service.

8.3.1 Setting Up the System Disk

Before running UETP, make sure that the system disk has at least 1200 blocks available. Note that large systems, such as systems that run more than 20 load test processes, might require a minimum of 2000 available blocks. Running multiple passes of UETP causes log files to accumulate in the default directory, further reducing the amount of disk space available for subsequent passes.

If disk quotas are enabled on the system disk, you should disable them before you run UETP.

8.3.2 Setting Up Additional Disks

The disk test uses most of the available free space on each testable disk. UETP estimates the space that the disk test uses for normal testing as follows:

- On each testable disk, the device test phase tries to create two files. The size of these files depends on how much free space is available on the disk. Usually the test creates each file with 5% of the free space on the disk. However, if the disk is nearly full, the test creates files that are 5 blocks. If the test cannot create 5 block files, it fails. Only the initial file creation can cause the device test to fail because of lack of disk space.
- The test randomly reads and writes blocks of data to the files. After every multiple of 20 writes for each file, the test tries to extend the file. The size of this extension is either 5% of the free disk space, or 5 blocks if the file was created with 5 blocks. This process of extension continues until the combined space of the files reaches 75% of the free disk space.

By creating and extending fragmented files in this way, UETP exercises the disk. This allows the test to check for exceeded quotas or a full disk, and to adjust for the amount of available disk space.

To prepare each disk drive in the system for UETP testing, use the following procedure:

1. Place a scratch disk in the drive and spin up the drive. If a scratch disk is not available, use any disk with a substantial amount of free space; UETP does not overwrite existing files on any volume. If your scratch disk contains files that you want to keep, do not initialize the disk; go to step 3.
2. If the disk does not contain files you want to save, initialize it. For example:

```
$ INITIALIZE DUA1: TEST1
```

This command initializes DUA1, and assigns the volume label TEST1 to the disk. All volumes must have unique labels.

3 Mount the disk. For example:

```
$ MOUNT/SYSTEM DUA1: TEST1
```

This command mounts the volume labeled TEST1 on DUA1. The /SYSTEM qualifier indicates that you are making the volume available to all users on the system.

4 UETP uses the [SYSTEST] directory when testing the disk. If the volume does not contain the directory [SYSTEST], you must create it. For example:

```
$ CREATE/DIRECTORY/OWNER_UIC=[1,7] DUA1:[SYSTEST]
```

This command creates a [SYSTEST] directory on DUA1 and assigns a user identification code (UIC) of [1,7]. The directory must have a UIC of [1,7] to run UETP.

If the disk you have mounted contains a root directory structure, you can create the [SYSTEST] directory in the [SYS0.] tree.

8.3.3 Setting Up Magnetic Tape Drives

To set up each magnetic tape drive in the system, use the following procedure:

1 Place a scratch volume with at least 600 feet of magnetic tape in the tape drive. Make sure that the write-enable ring is in place.

2 Position the magnetic tape at the beginning-of-tape (BOT) and put the drive on line.

3 Initialize each scratch magnetic tape with the label UETP. For example, if you have mounted a scratch magnetic tape on MTA1, enter the following command and press RETURN:

```
$ INITIALIZE MTA1: UETP
```

Magnetic tapes must be labeled UETP to be tested.

If you encounter a problem initializing the magnetic tape, or if the test has a problem accessing the magnetic tape, refer to the description of the INITIALIZE command in the *VMS DCL Dictionary*.

8.3.4 Setting Up Terminals and Line Printers

Terminals and line printers must be turned on to be tested by UETP. They must also be on line. Check that line printers and hardcopy terminals have enough paper. The amount of paper required depends on the number of UETP passes that you plan to execute. Each pass requires two pages for each line printer and hardcopy terminal.

Check that all terminals are set to the correct baud rate and are assigned appropriate characteristics (see the user's guide for your terminal).

Spooled devices and devices allocated to queues fail the initialization phase of UETP and are not tested.

8.3.5 Preparing Ethernet Adapters for UETP Testing

Make sure that no other processes are sharing the device when you run UETP.

Note: If your system is part of a local area VAXcluster, you will not be able to test your Ethernet adapter because you need the Ethernet adapter to maintain your cluster connection.

UETP automatically shuts down DECnet and the LAT–11 server for the duration of the device tests and restarts them when the device tests are completed. You must shut down any local applications.

8.3.6 Preparing the DR11–W for UETP Testing

Note: Only DIGITAL Field Service personnel should set up the DR11-W for UETP testing.

The DR11–W uses an internal logical loopback mode that tests all functionality except that of module connectors, cables, and transceivers. Because random external patterns are generated during this operation, the user device or other processor might need to be isolated from the DR11–W being tested until the testing is complete.

To test the DR11–W properly, the E105 switchpack must be set as follows:

Switch 1	Switch 2	Switch 3	Switch 4	Switch 5
Off	On	Off	Off	On

When UETP testing is completed, restore the DR11–W to the proper operating configuration.

8.3.7 Preparing a Second LPA11–K for UETP Testing

If you have two LPA11–Ks, be sure that each is given a systemwide logical name in the SYS$MANAGER:LPA11STRT.COM file. The logical name for the first LPA11–K should be LPA11$0, and the logical name for the second LPA11–K should be LPA11$1.

8.3.8 Devices Not Tested

UETP does not test the following devices; their status has no effect on UETP execution:

- Devices that require operator interaction (such as card readers)
- Software devices (such as the null device and local memory mailboxes)

UETP does not have specific tests for UDA, HSC, or CI devices; they are tested implicitly by the disk, magnetic tape, and DECnet tests.

UETP also does not test the console terminal or console drives. If you boot the system, log in, and start UETP, you have shown that these devices can be used.

8.3.9 Preparing for VAXcluster Testing

Before you run UETP in a VAXcluster environment, you should check the SYSTEST_CLIG account. The SYSTEST_CLIG account parallels SYSTEST except that it is dedicated to running the cluster-integration test. The requirements for the SYSTEST_CLIG account are as follows:

1 The account should be present in the user authorization file, exactly as distributed by DIGITAL on each system in your VAXcluster.

Note: You may have disabled the SYSTEST_CLIG account as part of the VMS Version 5.0 upgrade procedure. If you did, you should reenable the SYSTEST_CLIG account before you run UETP.

To reenable the SYSTEST_CLIG account, enter the following commands and press RETURN after each one:

```
$ SET DEFAULT SYS$SYSTEM
$ RUN AUTHORIZE
UAF> MODIFY /FLAGS=NODISUSER SYSTEST_CLIG
UAF> EXIT
```

2 The account should have a null password.

Note: You may have supplied a password for the SYSTEST_CLIG account as part of the VMS Version 5.0 upgrade procedure. If you did, you should set the password to the null password before you run UETP.

To set the password of the SYSTEST_CLIG account to the null password, enter the following commands and press RETURN after each one:

```
$ SET DEFAULT SYS$SYSTEM
$ RUN AUTHORIZE
UAF> MODIFY /NOPASSWORD SYSTEST_CLIG
UAF> EXIT
$
```

Note: DIGITAL recommends that you disable the SYSTEST_CLIG account after testing has completed.

To disable the SYSTEST_CLIG account, enter the following commands and press RETURN after each one:

```
$ SET DEFAULT SYS$SYSTEM
$ RUN AUTHORIZE
UAF> MODIFY /FLAGS=DISUSER SYSTEST_CLIG
UAF> EXIT
```

3 The privileges and quotas of the SYSTEST_CLIG account should match those of the SYSTEST account.

UETP requires little additional preparation for the cluster-integration test phase beyond the requirements for other UETP test phases. The additional requirements for cluster integration testing are as follows:

1 Your system must be a member of a VAXcluster. If it is not, UETP displays a message and does not attempt to run the test.

2 Your system must use the same deadlock detection interval as the other systems in the VAXcluster.

3 The files UETCLIG00.COM and UETCLIG00.EXE, located in SYS$TEST, are necessary for each system included in the test.

4 DECnet must be set up between the VAXcluster nodes; UETP uses DECnet to create a process on those nodes. All checks that the test makes depend on its ability to create the SYSTEST_CLIG processes and to communicate with them using DECnet.

5 There must be a [SYSTEST] or [SYS0.SYSTEST] directory on some disk available to the VAXcluster for each node (both VMS and HSC) in the cluster. The test uses the same directory as the UETP disk test to create a file on each cluster node and to see if some other VMS node in the cluster can share access to that file. There must be one such directory per node; the test continues with the next cluster node once it has finished with a file.

8.3.10 Preparing DECnet

The DECnet phase of UETP uses more system resources than most other phases. Before you start UETP, you can choose which remote node you want the DECnet phase of the test to run from. By specifying the least busy node to run the DECnet test from, you can minimize disruption to remote system users.

By default, the file UETDNET00.COM chooses the node to run the DECnet test from. If you want to choose the node to run the DECnet test on, enter the following command before you invoke UETP:

```
$ DEFINE/GROUP UETP$NODE_ADDRESS node_address
```

This command equates the group logical name UETP$NODE_ADDRESS to the node address of the node in your area on which you want to run the DECnet phase of UETP.

For example:

```
$ DEFINE/GROUP UETP$NODE_ADDRESS 2.121
```

When you run UETP, a router node attempts to establish a connection between your node and the node defined by UETP$NODE_ADDRESS. Occasionally the connection between your node and the router node might be busy or non-existent. When this happens, the system displays the following error messages:

```
%NCP-F-CONNEC, Unable to connect to listener
-SYSTEM-F-REMRSRC, resources at the remote node were insufficient

%NCP-F-CONNEC, Unable to connect to listener
-SYSTEM-F-NOSUCHNODE, remote node is unknown
```

8.4 Starting UETP

When you have logged in and prepared the system and devices, you are ready to begin the test.

To start UETP, enter the following command and press RETURN:

```
$ @UETP
```

UETP displays the following prompt:

```
Run "ALL" UETP phases or a "SUBSET" [ALL]?
```

Throughout the startup dialog, brackets indicate the default value, which you can choose by pressing RETURN.

When running UETP for the first time, it is a good idea to choose the default value (ALL) and run all the phases. If you choose ALL, UETP displays three more questions, which are described in Sections 8.4.2 through 8.4.4. If you want to run all the test phases, skip the next section.

8.4.1 Running a Subset of Phases

You can run a single phase by entering SUBSET or S in response to the following prompt:

```
Run "ALL" UETP phases or a "SUBSET" [ALL]?
```

UETP prompts you for the phase you want to run as follows:

```
You can choose one or more of the following phases:

        DEVICE, LOAD, DECNET, CLUSTER

Phase(s):
```

There is no default; enter one or more phase names from the list. Separate two or more phases with spaces or commas.

If your choice includes the LOAD phase, UETP displays the three prompts described in the next sections. To run the LOAD phase, refer to the next section.

If you exclude the LOAD phase, UETP responds with only two prompts:

```
How many passes of UETP do you wish to run [1]?
Do you want Long or Short report format [Long]?
```

Sections 8.4.2 and 8.4.4 discuss these questions. After you answer both questions, the phase you have selected runs to completion.

8.4.2 Single Run Versus Multiple Passes

If you specified the default ALL or a subset of phases at the last prompt, UETP displays the following message:

```
How many passes of UETP do you wish to run [1]?
```

You can repeat the test run as many times as you want. If you enter 1 in response to the prompt (or press RETURN for the default), UETP stops after completing a single run. If you specify a number greater than 1, UETP restarts itself continuously until it completes the number of passes (runs) specified.

You can run UETP once to check that the system is working, or many times to evaluate the system's response to continuous use. For example, a field service technician who is interested only in verifying that a newly installed system works might run UETP once or twice. A manufacturing technician might let the system run for several hours as part of the system integration and test.

When you specify multiple UETP runs, you might want to request a short console log (see Section 8.4.4). Make certain that all line printers and hardcopy terminals have enough paper; each run requires two pages.

8.4.3 Defining User Load for Load Test

After you specify the number of passes, UETP prompts you as follows:

```
How many simulated user loads do you want [n]?
```

Note: UETP displays this prompt only if you choose to run the LOAD phase, either implicitly (by running all phases), or explicitly (by running a subset and specifying the LOAD phase).

The purpose of the load test is to simulate a situation in which a number of users (detached processes) are competing for system resources. In response to this prompt, enter the number of users you want to simulate for this test. The number in brackets is the default value that UETP computed for your system. The default value depends on the amount of memory and the paging and swapping space that your system has.

Although the given default value is the best choice, you can increase or decrease the user load by entering your own response to the prompt. However, be aware that an increase might cause the test to fail because of insufficient resources.

If you want to see UETP display the user load equation as it runs, see Section 8.5.2.

8.4.4 Long and Short Report Format

The following prompt allows you to choose one of two console report formats:

```
Do you want Long or Short report format [Long]?
```

If you choose the long report format (the default), UETP sends all error messages as well as information on the beginning and end of all phases and tests to the console terminal. UETP records all its output in the UETP.LOG file, regardless of your response to this question.

In many cases, it may not be convenient to have UETP write the bulk of its output to the terminal. For example, if you run UETP from a hardcopy terminal, the printing of all the output can slow the progress of the tests. This delay may not be a problem if you have requested only one run; however you may prefer to use the short format if you intend to run multiple passes of UETP from a hardcopy terminal.

If you request the short format, UETP displays status information at the console, such as error messages and notifications of the beginning and end of each phase. This information enables you to determine whether UETP is proceeding normally. If the short console log indicates a problem, you can look at UETP.LOG for further information. UETP.LOG contains all the output generated by the various phases, as well as the status information displayed at the console.

After you choose the report format, UETP initiates its sequence of tests and runs to completion. If UETP does not complete successfully, refer to Section 8.5 for troubleshooting information.

8.4.5 Termination of UETP

At the end of a UETP pass, the master command procedure UETP.COM displays the time at which the pass ended. In addition, UETP.COM determines whether UETP needs to be restarted. (You can request multiple passes when you start up the test package; see Section 8.4.2).

At the end of an entire UETP run, UETP.COM deletes temporary files and does other cleanup activities.

Pressing CTRL/Y or CTRL/C lets you terminate a UETP run before it completes normally. Normal completion of a UETP run, however, includes the deletion of miscellaneous files that have been created by UETP for the purpose of testing. The use of CTRL/Y or CTRL/C might interrupt or prevent these cleanup procedures.

The effect of these control characters depends on what part of UETP you are executing. For an explanation of the organization of UETP and its components, refer to Section 8.6.

8.4.5.1 Using CTRL/Y

Press CTRL/Y to abort a UETP run. Note, however, that cleanup of files and network processes in the [SYSTEST] directory may not be complete.

If you are running an individual test image, pressing CTRL/Y interrupts the current UETP test and temporarily returns control to the command interpreter. While the test is interrupted, you can enter a subset of DCL commands that are executed within the command interpreter and do not cause the current image to exit. The *VMS DCL Concepts Manual* contains a table of commands that you can use within the command interpreter. In addition, you can enter any of the following commands:

- The CONTINUE command continues the test from the point of interruption (except during execution of the cluster test).
- The STOP command terminates the test; the test aborts and control returns to the command interpreter.

Note: Using the STOP command may prevent cleanup procedures from executing normally. You should use the EXIT command if you want the image to do cleanup procedures before terminating.

- The EXIT command does cleanup procedures and terminates the test (except during execution of the cluster test); control returns to the command interpreter.

If you enter any DCL command other than CONTINUE, STOP and EXIT, the test does cleanup procedures and terminates, and the DCL command executes.

8.4.5.2 Using CTRL/C

Press CTRL/C to interrupt a UETP run. You cannot continue the same test phase after you press CTRL/C. UETP automatically goes to the next phase in the master command procedure.

Some UETP phases react to CTRL/C by cleaning up all activity and terminating immediately. Such tests display the following message:

```
%UETP-I-ABORTC, 'testname' to abort this test, type ^C
```

The phases that do not display the previous message terminate all processes they have started. These processes might not have a chance to complete normal cleanup procedures.

If you are running an individual test image, however, you can use CTRL/C to terminate the execution of the image and complete cleanup procedures.

Note that CTRL/C does not complete cleanup procedures for the cluster test.

8.5 Troubleshooting

This section explains the role of UETP in interpreting operational errors in a VMS operating system. Section 8.5.4 discusses common errors that can appear in a UETP run and describes how to correct them.

8.5.1 Relationship of UETP to Error Logging and Diagnostics

When UETP encounters an error, it reacts like a user program. Either it returns an error message and continues, or it reports a fatal error and terminates the image or phase. In either case, UETP assumes that the VMS hardware is correctly installed and operating and does not attempt to diagnose the error.

If the cause of an error is not readily apparent, use the following methods to diagnose the error:

- *VMS Error Log Utility*—Run the Error Log Utility to obtain a detailed report of hardware and system errors. Error log reports provide information about the state of the hardware device and I/O request at the time of each error. For information about running the Error Log Utility, refer to the *VMS Error Log Utility Manual*.
- *Diagnostic facilities*—Use the diagnostic facilities to test exhaustively a device or medium to isolate the source of the error.

8.5.2 Interpreting UETP Output

You can monitor the progress of UETP tests at the terminal from which they were started. This terminal always displays status information, such as messages that announce the beginning and end of each phase and messages that signal an error.

The tests send other types of output to various log files depending on how you started the tests. The log files contain output generated by the actual test procedures. Even if UETP completes successfully, with no errors displayed at the terminal, it is good practice to check these log files for errors. Furthermore, when errors are displayed at the terminal, check the log files for more information about their origin and nature.

Each test returns a final completion status to the test controller image, UETPHAS00, using a termination mailbox. This completion status is an unsigned longword integer denoting a condition value. As a troubleshooting aid, UETPHAS00 displays the test's final completion status using the $FAO and $GETMSG system services. Sometimes, however, the $FA0 service needs additional information which cannot be provided using the termination mailbox. When this happens, UETP displays an error message similar to the following:

```
UETP-E-ABORT, !AS aborted at !%D
```

When UETP displays these types of error messages, check the log files for more information. You can also run the individual test to attempt to diagnose the problem.

The error messages that appear at the terminal and within the log files have two basic sources:

- UETP tests
- System components that are tested

To interpret the messages, you might need to refer either to the *VMS System Messages and Recovery Procedures Reference Volume* or to the manual that describes the individual system component.

Several parts of UETP, such as some device tests, UETINIT00.EXE, UETCLIG00.EXE, and UETDNET00.COM, let you obtain additional information concerning the progress of the test run or the problems it encounters. Because this information is usually insignificant, it is not displayed on the screen. To view the information, enter the following command and run the program:

```
$ DEFINE MODE DUMP
```

The following example shows the output for UETINIT00.EXE on a VAX 11/750:

```
$ RUN UETINIT00

      Welcome to VAX/VMS UETP Version V5.0

%UETP-I-ABORTC, UETINIT00 to abort this test, type ^C

You are running on an 11/750 CPU with 8704 pages of memory.
The system was booted from _DRA0:[SYS0.].
```

```
Run "ALL" UETP phases or a "SUBSET" [ALL]?
How many passes of UETP do you wish to run [1]?

The default number of loads is the minimum result of

1) CPU_SCALE * ((MEM_FREE + MEM_MODIFY) / (WS_SIZE * PER_WS_INUSE))
       0.80 * ((    8704 +        323) / (    350 *         0.20))  = 103

2) Free process slots                                               = 56

3) Free page file pages / Typical use of page file pages per process
                 18040 /                                       1000 = 18

How many simulated user loads do you want [18]?
Do you want Long or Short report format [Long]?

UETP starting at  31-DEC-1988 09:08:26.71 with parameters:
DEVICE LOAD DECNET CLUSTER  phases, 1 pass, 18 loads, long report.
$
```

This program does not initiate any phase; it displays the equation used by UETP to determine user load and the specific factors that are employed in the current run.

You should respond to the questions by pressing RETURN. After you respond to the first prompt, the program displays the expressions that determine the default number of simultaneous processes. The following definitions apply:

- CPU_SCALE refers to the relative processing power of the CPU in relation to a VAX–11/780. For example, a VAX–11/785 has a CPU_SCALE of 1.5 because it has 1.5 times the processing power of a VAX–11/780 (1.0).
- MEM_FREE represents memory in pages available to users.
- MEM_MODIFY represents memory pages on the modified page list.
- WS_SIZE represents working set size.
- PER_WS_INUSE represents typical percentage of the working set in active use for each process.

UETINIT00 also displays the specific values represented by the expressions. In this example, UETP selects 18 as the default for simulated user loads, because 18 is the minimum result of the three expressions.

You should deassign the logical name MODE before running UETP, unless you prefer to see the previous breakdown every time you run UETP.

8.5.2.1 Defining a Remote Node for UETP Ethernet Testing

When the UETUNAS00 test of the UETP executes, it is sometimes difficult to determine whether the problems it reports concern the device under test or the remote device. The easiest way to ensure that the test properly reports errors on the device under test is to define a "good turnaround." A "good turnaround" is a remote node that you know turns around Ethernet packets correctly and is up and waiting in the ready state.

You can make the UETUNAS00 test use a known "good turnaround" by performing the following actions. In the commands that follow, assume that the "good" device is on node BETA, and that node BETA is already defined in the network database.

1 Find the address of the "good" Ethernet node by using the Network Control Program (NCP). In order to use NCP, the following conditions must apply:

- DECnet must be up and running on the system.
- The account you are using must have TMPMBX and NETMBX privileges.

Enter the following commands and press RETURN:

```
$ RUN SYS$SYSTEM:NCP
NCP> TELL BETA SHOW CHARACTERISTICS ACTIVE LINES
```

If node BETA has not been defined in your network database, NCP displays an error message. In this event, specify another "good" node and retry the command. Otherwise, see your system or network manager.

NCP displays information similar to the following:

```
Active Line Volatile Characteristics as of  15-OCT-1986 16:13:02
                Line = UNA-0
                Counter timer            = 28800
                Receive buffers          = 6
                Controller               = normal
                Protocol                 = Ethernet
                Service timer            = 4000
                Hardware address         = AA-00-04-00-46-D3
                UNA device buffer size   = 1498
```

2 Use the displayed *hardware address* (in this case, AA00040046D3) to define the logical name TESTNIADR to point to the "good turnaround." Note that you do *not* specify the hyphens (-).

First, log in to the SYSTEST account. Then enter the following command:

```
$ DEFINE/SYSTEM TESTNIADR AA00040046D3
```

3 Run UETP.

4 When UETP has completed, deassign the logical name TESTNIADR by entering the following command:

```
$ DEASSIGN/SYSTEM TESTNIADR
```

8.5.3 The Log Files

At the end of a UETP run, the directory SYS$TEST contains a log file named UETP.LOG. This file contains all information generated by all UETP tests and phases. If the run involves multiple passes, you will find a version of UETP.LOG for each pass.

Although UETP.LOG contains information from all the passes, only information from the latest run is stored in this file. Information from the previous run is stored in a file named OLDUETP.LOG, which also has a version for each pass. Using these two files, UETP provides the output from its tests and phases from the two most recent runs.

The cluster test creates a NETSERVER.LOG file in SYS$TEST for each pass on each system included in the run. If the test is unable to report errors (for example, if the connection to another node is lost), the NETSERVER.LOG file on that node contains the result of the test run on that node. UETP does not purge or delete NETSERVER.LOG files; therefore, you must delete them occasionally to recover disk space.

If a UETP run does not complete normally, SYS$TEST might contain other log files. Ordinarily these log files are concatenated and placed within UETP.LOG. You can use any log files that appear on the system disk for error checking, but you must delete these log files before you run any new tests. You may delete these log files yourself or rerun the entire UETP, which checks for old UETP.LOG files and deletes them.

8.5.4 Possible UETP Errors

This section is intended to help you identify and solve problems you might encounter running UETP. You should refer to this section if you need help understanding a system failure and isolating its cause. This section is not intended as a repair manual and is not expected to diagnose any flaws in your system. It should, however, help you to interpret and act upon the information in the error messages.

If you are unable to correct an error after following the steps in this section, you should contact your DIGITAL Field Service representative. Any information you can supply about the measures you have taken to isolate the problem will help your DIGITAL Field Service representative diagnose the problem.

The following are the most common failures encountered while running UETP:

1. Wrong quotas, privileges, or account
2. UETINIT01 failure
3. Insufficient disk space
4. Incorrect VAXcluster setup
5. Problems during the load test
6. DECnet error
7. Errors logged but not displayed
8. No PCB or swap slots
9. Hangs
10. Bugchecks and machine checks

The following sections describe these errors and offer the best course of action for dealing with each one.

8.5.4.1 Wrong Quotas, Privileges, or Account

If your assigned quotas or privileges do not match standard quotas and privileges for the SYSTEST account, UETP displays the following error message:

```
**********************
*  UETINIT00         *
*  Error count =  1  *
**********************
-UETP-W-TEXT,   The following:

        OPER privilege,
        BIOLM  quota,
        ENQLM  quota,
        FILLM  quota,

are nonstandard for the SYSTEST account and may result in UETP errors.
```

This message informs you that the OPER privilege and the BIOLM, ENQLM, and FILLM quotas either are not assigned correctly or are not assigned at all.

Note: UETP displays a similar message if you run the cluster integration test phase, and the privileges and quotas for the SYSTEST_CLIG account are incorrect. The SYSTEST and SYSTEST_CLIG accounts require the same privileges and quotas. Take the same action described in this section.

Solution

To correct the problem, use the following procedure:

1. Display all privileges and quotas in effect for the current account using the DCL commands SHOW PROCESS/PRIVILEGE and SHOW PROCESS/QUOTA as follows:

```
$ SHOW PROCESS/PRIVILEGES

31-DEC-1988 18:06:02.89   OPA0:   User : SYSTEST

Process privileges :

    CMKRNL      may change mode to kernel
    CMEXEC      may change mode to exec
    SYSNAM      may insert in system logical name table
    GRPNAM      may insert in group logical name table
    DETACH      may create detached processes
    DIAGNOSE    may diagnose devices
    LOG_IO      may do logical I/O
    GROUP       may affect other processes in same group
    PRMCEB      may create permanent common event clusters
    PRMMBX      may create permanent mailbox
    SETPRV      may set any privilege bit
    TMPMBX      may create temporary mailbox
    NETMBX      may create network device
    VOLPRO      may override volume protection
    PHY_IO      may do physical I/O
    SYSPRV      may access objects via system protection

$ SHOW PROCESS/QUOTAS

31-DEC-1988 18:06:03.36          OPA0:          User: SYSTEST
```

```
Process Quotas:

    Account name: SYSTEST
    CPU limit:                       Infinite    Direct I/O limit:      55
    Buffered I/O byte count quota:      32768    Buffered I/O limit:    18
    Timer queue entry quota:               20    Open file quota:      100
    Paging file quota:                  19543    Subprocess quota:       8
    Default page fault cluster:            64    AST limit:             98
    Enqueue quota:                        300    Shared file limit:      0
    Max detached processes:                 0    Max active jobs:        0
```

2 Check that the privileges and quotas assigned to the account match the following:

Privileges

CMKRNL	CMEXEC	NETMBX	DIAGNOSE
DETACH	PRMCEB	PRMMBX	PHY_IO
GRPNAM	TMPMBX	VOLPRO	LOG_IO
SYSNAM	SYSPRV	SETPRV	GROUP

Quotas

BIOLM: 18	PRCLM: 8
DIOLM: 55	ASTLM: 100
FILLM: 100	BYTLM: 32768
TQELM: 20	CPU: no limit
ENQLM: 300	PGFLQUOTA: 20480
WSDEFAULT: 256	WSQUOTA: 512
WSEXTENT: 2048	

3 If any privileges or quotas are incorrect, run the Authorize Utility (AUTHORIZE) to add them (AUTHORIZE is explained in the *VMS Authorize Utility Manual*). As an alternative, you can temporarily assign the correct privileges with the DCL command SET PROCESS /PRIVILEGES.

If you are logged in to the wrong account, the following error message asks you to log in to the SYSTEST account:

```
$ @UETP

**********************
*  UETINIT00         *
*  Error count =  1  *
**********************
-UETP-E-ABORT, UETINIT00 aborted at  31-DEC-1988 14:24:10.13
-UETP-E-TEXT, You are logged in to the wrong account.
              Please log in to the SYSTEST account.
$
```

You must run UETP from the SYSTEST account.

8.5.4.2 UETINIT01 Failure

UETINIT01 failures are related to peripheral devices; this type of error message might indicate any of the following:

- Device failure
- Device not supported or not mounted
- Device allocated to another user
- Device write-locked
- Lost vacuum on a magnetic tape drive
- Drive off line

In some cases, the course of action you should take is explicit in the error message. For example, you might receive a message from the Operator Communication Facility (OPCOM) process informing you of a problem and recommending a corrective measure:

```
%OPCOM,  31-DEC-1988 14:10:52.96, request 1, from user SYSTEST
Please mount volume UETP in device _MTA0:
%MOUNT-I-OPRQST, Please mount volume UETP in device _MTA0:
```

Other error messages might relate information in which the solution is implicit:

```
%UETP-S-BEGIN, UETDISK00 beginning at 31-DEC-1988 13:34:46.03

**********************
*  DISK_DRA          *
*  Error count =  1  *
**********************
-UETP-E-TEXT, RMS file error in file DRA0:DRA00.TST
-RMS-E-DNR, device not ready or not mounted
%UETP-S-ENDED, UETDISK00 ended at  31-DEC-1988 13:34:46.80
```

This message tells you that a disk drive is either not ready or not mounted. From this information, you know where to look for the cause of the failure—at the disk drive. If you cannot see the cause of the problem immediately, check the setup instructions in Section 8.3.

In other cases, the cause of a failure might not be obvious from the information in the message. The problem might be related to hardware rather than software. For example, the Ethernet adapter test may produce one of the following messages if UETP does not have exclusive access to the Ethernet adapter:

- Inter-module cable unplugged
- Self-test failure code 0000000

To run the self-test diagnostic on the Ethernet adapter successfully, UETP needs exclusive access to the adapter. Either DECnet or the LAT terminal server also might also want to use the Ethernet adapter, which is a shareable device. UETP shuts down DECnet and the LAT terminal server for the duration of the device tests and restarts them when the tests are completed.

Solution

To determine where or when the failure occurs in the execution of UETP, use the following procedure:

- Run the device test individually (see Section 8.4.1). By doing this, you can determine if the failure can be re-created. Also, you are isolating the cause of the problem by reproducing it using the least amount of software possible. For example, if the failure occurs only when you run the entire device phase, and not when you run the affected device test individually, you can conclude the problem is related to device-interaction. Conversely, if you can re-create the error by running the single device test, then you have proved that the error is not related to device interaction.
- Run the device test with different media. If your run of the single device test succeeded in reproducing the error, the magnetic tape or disk media could be defective. Running the same test with new media determines whether this is the problem.
- Call DIGITAL Field Service. If you have tried all the previous steps without solving the problem, you should contact your DIGITAL Field Service representative.

8.5.4.3 Insufficient Disk Space

When you run continuous passes of UETP, log files accumulate on the disk from which UETP was run. These files reduce the amount of free disk space available for each successive pass. If the amount of disk space available becomes too small for the current load, the following error message appears:

```
%UETP-S-BEGIN, UETDISK00 beginning at  31-DEC-1988 08:12:24.34
%UETP-I-ABORTC, DISK_DJA to abort this test, type ^C

**********************
*  DISK_DJA          *
*  Error count = 1   *
**********************
-UETP-F-TEXT, RMS file error in file DJA0:DJA00.TST
-RMS-F-FUL, device full (insufficient space for allocation)

**********************
*  DISK_DJA          *
*  Error count = 2   *
**********************
-UETP-F-TEXT, RMS file error in file DJA0:DJA01.TST
-RMS-F-FUL, device full (insufficient space for allocation)
%UETP-E-DESTP, DISK_DJA stopped testing DJA unit 0 at 08:12:36.91
%UETP-S-ENDED, UETDISK00 ended at  31-DEC-1988 08:12:37.98
```

Solution

Make more space available on the disk. You can do this by using one or more of the following techniques:

- Delete unnecessary files to create more space.
- Purge files, if multiple versions exist.
- Mount a volume with sufficient space.

- Check for disk quotas that may be enabled on the disk. If disk quotas are enabled, either disable or increase them (see the *VMS SYSMAN Utility Manual* for a description of the Disk Quota Utility).

See Sections 8.2.1 and 8.3.2 for a further discussion of disk space.

8.5.4.4 Incorrect Setup of a VAXcluster

Most problems that can occur during the cluster-integration test are related to improper setup of the VAXcluster or of UETP on the VAXcluster. These problems are most likely to occur at the following stages of the VAXcluster test:

- Near the beginning, when processes on VMS nodes are started
- Toward the end, when cluster file access is checked

The cluster test phase shows that various VMS nodes in your cluster can simultaneously access files on selected nodes in the cluster. First, UETP tries to create a file on a disk drive that is accessible to the other selected nodes in the cluster. The following are the requirements for creating a file in the cluster test phase:

- There must be a [SYSTEST] directory on the disk in either the master file directory (MFD) or in the root directory [SYS0.].
- The [SYSTEST] directory must be protected so that the SYSTEST account can create a file in it.

If UETP is unable to find a suitable device on a certain node, the test displays a warning message and proceeds to the next cluster node.

Nodes on which the operator's terminal (OPA0) is set to the "No Broadcast" terminal characteristic will generate the following error message during the cluster test:

```
**********************
*  UETCLIG00master   *
*  Error count =  1  *
**********************
-UETP-E-TEXT, 0 operator consoles timed out on the cluster test warning
       and 1 operator console rejected it.
-UETP-E-TEXT, Status returned was,
      "%SYSTEM-F-DEVOFFLINE, device is not in configuration or not
      available"
```

Disregard this message if OPA0 is set to "No broadcast".

Solution

Whenever you suspect a problem, you should try to recover the SYS$TEST:NETSERVER.LOG file that was created when the SYSTEST_CLIG process was created. This file may contain additional error information that could not be transmitted to the node running the test. If it was not possible to create the SYSTEST_CLIG process on some node, the system accounting file for that node may contain a final process status in a process termination record.

The following problems can occur during a cluster test:

- Logging in at other nodes—This problem is due to incorrect setup for the cluster test at the remote VMS node. For example, if you specified a password for the SYSTEST_CLIG account or if you disabled the SYSTEST_CLIG account, the test displays the following message:

  ```
  %SYSTEM-F-INVLOGIN, login information invalid at remote node
  ```

  Refer to Section 8.3.9 and Section 8.5.2.1 for information on preparing for VAXcluster testing.

- Communicating with other nodes—A message indicates a DECnet problem. Check the NETSERVER.LOG file on the affected node to determine the cause.

- Taking out locks or detecting deadlocks—The most likely cause of this problem is that you are not logged in to the SYSTEST account. Another possibility is that your cluster is not configured properly.

- Creating files on VAXcluster nodes—This problem is due to incorrect setup for the cluster test; refer to Section 8.3.9 for information on preparing for VAXcluster testing.

8.5.4.5 Problems During the Load Test

A variety of errors can occur during the load test, because the command procedures that are started during the tests run several utilities and do many functions. Tracking a problem can be difficult because UETP deletes the log files that are generated during the load test (see Section 8.6.3).

Solution

If a problem occurs during the load test and the cause is not obvious, you can modify UETP.COM to preserve the log files as follows:

1 Add the /NODELETE qualifier to the following line:

```
$ TCNTRL UETLOAD00.DAT/PARALLEL_COUNT='LOADS/REPORT_TYPE='REPORT
```

2 Delete the following line:

```
$ DELETE UETLO*.LOG;*
```

Rerun the load test with these changes to try to re-create the problem.

If you re-create the problem, look at the contents of the appropriate log file. To determine which log file to read, you need to understand the scheme by which the load test names its processes and log files. (The log file names are derived from the process names.)

The load test creates processes that are named in the following format:

UETLOADnn_nnnn

For example:

```
%UETP-I-BEGIN, UETLOAD00 beginning at 31-DEC-1988 15:45:08.97
%UETP-I-BEGIN, UETLOAD02_0000 beginning at 31-DEC-1988 15:45:09.42
%UETP-I-BEGIN, UETLOAD03_0001 beginning at 31-DEC-1988 15:45:09.63
%UETP-I-BEGIN, UETLOAD04_0002 beginning at 31-DEC-1988 15:45:10.76
%UETP-I-BEGIN, UETLOAD05_0003 beginning at 31-DEC-1988 15:45:11.28
%UETP-I-BEGIN, UETLOAD06_0004 beginning at 31-DEC-1988 15:45:12.56
%UETP-I-BEGIN, UETLOAD07_0005 beginning at 31-DEC-1988 15:45:13.81
%UETP-I-BEGIN, UETLOAD08_0006 beginning at 31-DEC-1988 15:45:14.94
%UETP-I-BEGIN, UETLOAD09_0007 beginning at 31-DEC-1988 15:45:16.99
%UETP-I-BEGIN, UETLOAD10_0008 beginning at 31-DEC-1988 15:45:19.32
%UETP-I-BEGIN, UETLOAD11_0009 beginning at 31-DEC-1988 15:45:19.94
%UETP-I-BEGIN, UETLOAD02_0010 beginning at 31-DEC-1988 15:45:20.20
%UETP-I-BEGIN, UETLOAD03_0011 beginning at 31-DEC-1988 15:45:21.94
%UETP-I-BEGIN, UETLOAD04_0012 beginning at 31-DEC-1988 15:45:22.99
```

Note that if more than ten processes are created, the numbering sequence for the UETLOADnn portion of the process name starts over at UETLOAD02; however, the four digits of the _nnnn portion continue to increase.

Each load test process creates two log files. The first log file is created by the test controller; the second log file is created by the process itself. The log file that you need to look at for error information on any given load test process is the one that was created by the test controller (the first log file).

The load test log file derives its file name from the process name, appending the last four digits of the process name (from the _nnnn portion) to UETLO. The test-controller log file and the process log file for each process use the same file name; however, the process log file has the higher version number of the two. For example, the log files created by the process UETLOAD05_0003 would be named as follows:

UETLO0003.LOG;1 (test-controller log file)

UETLO0003.LOG;2 (process log file)

Make sure that you look at the log file with the lower version number; that file contains the load test commands and error information.

After you have isolated the problem, restore UETP.COM to its original state and delete the log files from the load test (UETLO*.LOG;*); failure to delete these files might result in disk space problems.

8.5.4.6 DECnet Error

A DECnet error message might indicate that the network is unavailable.

Solution

- If DECnet is included in your system, register the authorization key (see the *VMS Release Notes*).
- If DECnet is not included in your system, ignore the message; it is normal and does not affect the UETP run.

If you encounter other DECnet-related errors, you should do the following:

- Run DECnet as a single phase (see Section 8.4.1) to determine whether the error can be re-created.
- Refer to the *VMS System Messages and Recovery Procedures Reference Volume*.

8.5.4.7 Errors Logged But Not Displayed

If no errors are displayed at the console terminal or reported in the UETP.LOG file, you should run the Error Log Utility to see if any errors were logged in the ERRLOG.SYS file. See the *VMS Error Log Utility Manual* for information about running the Error Log Utility.

8.5.4.8 No PCB or Swap Slots

The following error message indicates that no process control block (PCB) or swap slots are available:

```
%UETP-I-BEGIN, UETLOAD00 beginning at  31-DEC-1988 07:47:16.50
%UETP-I-BEGIN, UETLOAD02_0000 beginning at  31-DEC-1988 07:47:16.76
%UETP-I-BEGIN, UETLOAD03_0001 beginning at  31-DEC-1988 07:47:16.92
%UETP-I-BEGIN, UETLOAD04_0002 beginning at  31-DEC-1988 07:47:17.13
%UETP-I-BEGIN, UETLOAD05_0003 beginning at  31-DEC-1988 07:47:17.35
%UETP-I-BEGIN, UETLOAD06_0004 beginning at  31-DEC-1988 07:47:17.61
%UETP-W-TEXT, The process -UETLOAD07_0005- was unable to be created,
  the error message is
-SYSTEM-F-NOSLOT, no pcb or swap slot available
%UETP-W-TEXT, The process -UETLOAD08_0006- was unable to be created,
  the error message is
-SYSTEM-F-NOSLOT, no pcb or swap slot available
%UETP-W-TEXT, The process -UETLOAD09_0007- was unable to be created,
  the error message is
-SYSTEM-F-NOSLOT, no pcb or swap slot available
%UETP-W-TEXT, The process -UETLOAD10_0008- was unable to be created,
  the error message is
-SYSTEM-F-NOSLOT, no pcb or swap slot available
%UETP-W-TEXT, The process -UETLOAD11_0009- was unable to be created,
  the error message is
-SYSTEM-F-NOSLOT, no pcb or swap slot available
%UETP-W-ABORT, UETLOAD00 aborted at  31-DEC-1988 07:47:54.10
-UETP-W-TEXT, Aborted via a user CTRL/C.
 ***********************************************
 *                                             *
    END OF UETP PASS 1 AT  31-DEC-1988 07:48:03.17
 *                                             *
 ***********************************************
```

Solution

To solve this problem, use the following procedure:

1. Rerun individually the phase that caused the error message (the LOAD phase in the previous example) to see if the error can be reproduced.
2. Increase the size of the page file, using either the command procedure SYS$UPDATE:SWAPFILES.COM or the System Generation Utility (see the *VMS System Generation Utility Manual*).
3. Increase the SYSGEN parameter MAXPROCESSCNT, if necessary, and reboot the system.
4. Increase both the page file size and the MAXPROCESSCNT, if necessary.

8.5.4.9 Hangs

If there is no keyboard response or system disk activity, the system may be hung.

Solution

A system hang can be difficult to trace; you should always save the dump file for reference. To learn why the system hung, run the System Dump Analyzer as described in the *VMS System Dump Analyzer Utility Manual*. Reasons for a system hang include the following:

- Insufficient pool space—Reboot the system with a larger value for NPAGEVIR.
- Insufficient page file space—Increase the page file space using the System Generation Utility as described in the *VMS System Generation Utility Manual*.
- I/O device failure causing driver-permanent loop—Call DIGITAL Field Service.

8.5.4.10 Bugchecks and Machine Checks

When the system aborts its run, a bugcheck message appears at the console.

Solution

Call DIGITAL Field Service. Often a hardware problem causes bugchecks and machine checks; there is no easy way to solve bugchecks or machine checks. It is important, however, that you save the SYS$SYSTEM:SYSDUMP.DMP and ERRLOG.SYS files so that they are available for examination. It is also important to know whether the failure can be re-created; you can verify this by running UETP again.

8.6 UETP Tests and Phases

This section explains in detail the organization of UETP and the individual components within the test package.

You run UETP by starting a master command procedure, which contains commands that start each test phase. The procedure begins by prompting you for information needed by the various test phases. (See Section 8.4 for a detailed description of starting UETP.)

The master command procedure, UETP.COM, contains commands that initiate each test phase. UETP.COM also contains commands that do such tasks as defining logical names and manipulating files generated by the tests.

The UETP.COM procedure also issues commands to start the test controlling program, UETPHAS00.EXE, which in turn controls each test phase. The test controller starts up multiple detached processes. It also reports their completion status and other information the processes report to it.

The following sections describe the various UETP test phases.

8.6.1 Initialization Phase

The following occurs during the initialization phase:

- The image UETINIT00.EXE prompts you for information (see Section 8.4). Your information defines variables that affect the execution of UETP tests.
- The image UETINIT01.EXE gathers information on all the controllers in the system and on their associated devices. This image writes the information into a file called UETINIDEV.DAT.
- Using the information in UETSUPDEV.DAT, UETINIT01.EXE verifies which devices in the system are operable by running the appropriate device test. Each device test completes a simple read/write operation to each device. If a device fails this test, the device's entry in UETINIDEV.DAT specifies that the device cannot be tested. As a result, subsequent UETP tests ignore that device.
- For each testable controller, UETINIT01.EXE writes a line into a file called UETCONT00.DAT. The line associates a test file with the controller it tests.

A summary of UETINIDEV.DAT always exists in UETP.LOG, and UETINIT01.EXE sends that summary to the console if you have requested the long report format.

8.6.2 Device Test Phase

The device test phase includes separate tests for each type of device, such as disk, magnetic tape, line printer, and terminal. This section explains the device test phase and presents instructions for testing a single device. If you want to run the entire device test phase individually, refer to Section 8.4.1.

8.6.2.1 How the Device Phase Works

The UETP device test phase starts an executable image, the phase controller UETPHAS00, which creates a detached process for every device controller to be tested. For example, if a system includes three terminal controllers, one line printer controller, and two disk controllers, the image creates six detached processes. In parallel, the detached processes execute images that test the various types of devices.

The initialization phase of UETP creates a file called UETINIDEV.DAT and a file called UETCONT00.DAT. UETINIDEV.DAT contains data on the VMS-supported controllers in the system and their associated devices; UETCONT00.DAT associates a device test image with each testable controller.

UETPHAS00 uses the information in UETCONT00.DAT to find a device controller name to pass to each detached process that it creates. UETPHAS00 passes the controller name by writing it to a mailbox that is SYS$INPUT to individual tests. Each detached process uses that data to determine which controller to test. The test image then searches UETINIDEV.DAT for the device controller and for all testable units on that controller. The phase controller terminates when all devices on all controllers have completed testing.

Because UETCONT00.DAT is deleted automatically at the end of a UETP run, you cannot run the device phase unless you start UETP.COM; you can run only individual test images. UETINIDEV.DAT exists in SYS$TEST unless you explicitly delete it.

8.6.2.2 Running a Single Device Test

You must be logged in to the SYSTEST account to run the individual tests as described in this section. Also, a copy of UETINIDEV.DAT must exist. If a copy of the file is not present from a previous run (a run of the entire UETP or a run of the device test phase creates UETINIDEV.DAT), you can create it. Note that when you run a single test, no log file is created; the test sends all its output to your terminal.

If you do not want to test all the device types, you can test a specific controller by choosing a test image name from Table 8–1 and executing it as in the following example:

```
$ RUN UETTTYS00
Controller designation?: TTB
```

UETP prompts you for the controller designation and the device code. Unless you are testing your own terminal, you must explicitly designate a controller name. If you are running the terminal test, you can press RETURN to test your terminal only.

If you plan to repeat the run several times, you might find it more convenient to define the logical name CTRLNAME as follows:

```
$ DEFINE CTRLNAME TTB
$ RUN UETTTYS00
```

When you define the controller name in this way, the logical name CTRLNAME remains assigned after the test completes. To deassign this logical name, use the DCL command DEASSIGN as follows:

```
$ DEASSIGN CTRLNAME
```

Format of UETINIDEV.DAT

The UETINIDEV.DAT file is an ASCII sequential file that you can type or edit if necessary. The contents of this file are shown in the following command sequence:

```
$ TYPE UETINIDEV.DAT

DDB x ddd
UCB y uuuuu
END OF UETINIDEV.DAT
```

The symbols in this example are defined as follows:

Symbol	Value
x	T, if there are any testable units for this controller; N, if this controller is not to be tested
y	T, if this unit is testable; N, if this unit is not testable

Symbol	Value
ddd	device controller name, for example DUA
uuuuu	device unit number, for example 25

UETINIDEV.DAT contains a DDB (device data block) line for each controller connected or visible to your system. After the DDB line there is a UCB (unit control block) line for each unit connected to that controller. A device test can test a particular device only if both the DDB line and the UCB line indicate that the device is testable.

Running a Test in Loop Mode

If you want to put extra stress on a device, you can run the device test in loop mode, which causes the test to run indefinitely. For example:

```
$ DEFINE MODE LOOP
$ RUN UETDISK00
Controller designation?: DRA
%UETP-I-TEXT, End of pass 1 with 980 iterations at 31-DEC-1988 16:18:51:03

^C
```

You must use CTRL/C to terminate the test run. If you use CTRL/Y, UETP does not complete cleanup procedures.

Functions of Individual Device Tests

For each disk in the system, the disk test allocates two files into which it randomly writes blocks of data. The test then checks the data, reports any errors to SYS$OUTPUT, and deletes the disk files.

When you run the disk test phase in a cluster environment, the test accesses all disks that are mounted by the system being tested, and users of the disk being tested might encounter an insufficient disk space problem. You should warn users on remote nodes (who share disks with users on the local system) that UETP may be testing a disk they are using.

The magnetic tape test exercises all the magnetic tape drives in the system. The test creates a large file on each mounted magnetic tape, into which it writes multiple sequential records of varying sizes. After writing the records, the test rewinds the magnetic tape, validates the written records, and reinitializes the magnetic tape.

The terminal and line printer test generates several pages or screens of output, in which each page or screen contains a header line and a test pattern of ASCII characters. A header line contains the test name, the device name, the date, and the time.

For the laboratory peripheral accelerator (LPA11-K), the test image determines the configuration on the LPA11-K's I/O bus. The image loads all types of microcode to the LPA11-K and reads or writes data for each device on the LPA11-K I/O bus.

The communications device tests fill the transmit message buffer with random data; then, using loopback mode, they transmit and receive the message several times. To check that the looped-back data is correct, an AST routine is associated with a $QIO read to compare the received message against the transmitted message. The procedure is repeated using messages of different lengths.

The interface device tests put their respective devices in maintenance mode, write random data, and then verify the data.

The Ethernet adapter test does self-test diagnostics on the device. It also does read and write tasks with test data that uses various adapter modes (such as internal loopback and external loopback).

Table 8–1 lists the device test images and the devices to be tested.

Table 8–1 The Device Tests

Test Image Name	Devices Tested
UETDISK00.EXE	Disks
UETTAPE00.EXE	Magnetic tape drives and tape cartridge drives
UETTTYS00.EXE	Terminals and line printers
UETLPAK00.EXE	LPA11–K
UETCOMS00.EXE	DMC11, DMR11
UETDMPF00.EXE	DMF32, DMP11
UETDR1W00.EXE	DR11–W
UETUNAS00.EXE	Ethernet Adapters

8.6.3 System Load Test Phase

The purpose of the system load test is to simulate a number of terminal users who are demanding system resources simultaneously. The system load tests, directed by the file UETLOAD00.DAT, create a number of detached processes that execute various command procedures. Each process simulates a user logged in at a terminal; the commands within each procedure are the same types of commands that a user enters from a terminal. The load test creates the detached processes in quick succession, and generally the processes execute their command procedures simultaneously. The effect on the system is analogous to an equal number of users concurrently issuing commands from terminals. In this way, the load test creates an environment that is similar to normal system use.

The load test uses the logical name LOADS to determine the number of detached processes to create. When you initiate the UETP command procedure, it prompts for the number of users to be simulated (see Section 8.4.3) and consequently the number of detached processes to be created. Your response, which depends on the amount of memory and the swapping and paging space in your system, defines the group logical name LOADS.

The UETP master command procedure deassigns all group logical names assigned by its tests as part of the termination phase. The group logical name LOADS remains assigned only if the UETP package does not complete normally.

The command procedures executed by the load test can generate a large amount of output, depending on the number of detached processes created. For each detached process (or user), the test creates a version of an output file called UETLOnnnn.LOG ("nnnn" represents a string of numeric characters). The console displays only status information as the load test progresses.

Whether the load test runs as part of the entire UETP or as an individual phase, UETP combines the UETLOnnnn.LOG files, writes the output to the file UETP.LOG, and deletes the individual output files.

You can run the system load test as a single phase by selecting LOAD from the choices offered in the startup dialog (see Section 8.4.1).

8.6.4 DECnet Test Phase

If DECnet is included in your VMS system, a run of the entire UETP automatically tests DECnet hardware and software. Because communications devices are allocated to DECnet and the DECnet devices cannot be tested by the UETP device test, UETP shuts down DECnet for the duration of the initialization and device test phases. It turns DECnet on again after those phases are completed. The DECnet node and circuit counters are zeroed at the beginning of the DECnet test to allow for failure monitoring during the run.

As with other UETP phases, you can run the DECnet phase individually by following the procedure described in Section 8.4.1.

8.6.4.1 Environment

The DECnet test will work successfully on VMS systems connected to all DECnet-supported node types, including routing and nonrouting nodes and several different types of operating systems (such as RSTS, RSX, TOPS, and RT). There must be some sort of default access on remote systems to copy files between systems. The DECnet phase tests the following:

- The node UETP is running on
- All circuits in sequence
- All adjacent or first-hop nodes and all circuits in parallel

There is no limit on the number of communication lines supported by the tests. A test on one adjacent node should last no more than two minutes at normal communications transfer rates.

8.6.4.2 How the DECnet Phase Works

UETP (under the control of UETPHAS00.EXE) reads the file UETDNET00.DAT and completes the following steps during the DECnet phase:

1. Executes a set of Network Control Program (NCP) LOOP EXECUTOR commands to test the node on which UETP is running.
2. Uses NCP to execute the command SHOW ACTIVE CIRCUITS. The results are placed in UETININET.TMP, from which UETP creates the data file UETININET.DAT. The UETININET.TMP file contains the following information for any circuit in the ON state but not in transition:
   - Circuit name
   - Node address
   - Node name (if one exists)

   The UETININET.TMP file is used throughout the DECnet phase to determine which devices to test.

3 Uses the UETININET.TMP file to create an NCP command procedure for each testable circuit. Each command procedure contains a set of NCP commands to zero the circuit and node counters and to test the circuit and adjacent node by copying files back and forth.

Note: If you do not want the counters zeroed, do not test DECnet.

4 Executes the command procedures from step 3 in parallel to simulate a heavy user load. The simulated user load is the lesser of the following values:

- The number of testable circuits, multiplied by two
- The maximum number of user-detached processes that can be created on the system before it runs out of resources (determined by UETINIT00)

5 Executes a program, UETNETS00.EXE, that uses the UETININET.DAT file to check the circuit and node counters for each testable circuit. If a counter indicates possible degradation (by being nonzero), its name and value are reported to the console. All counters are reported in the log file, but only the counters that indicate degradation are reported to the console. Following is an example of UETNETS00 output:

```
%UETP-S-BEGIN, UETNETS00 beginning at  31-DEC-1988 13:45:33.18
%UETP-W-TEXT, Circuit DMC-0 to (NODENAME1) OK.
%UETP-I-TEXT, Node  (NODENAME2) over DMC-1 response timeouts = 1.
%UETP-I-TEXT, Circuit DMC-1 to (NODENAME2) local buffer errors = 34.
%UETP-I-TEXT, Node  (NODENAME3) over DMP-0 response timeouts = 3.
%UETP-S-ENDED, UETNETS00 ended at  31-DEC-1988 13:45:36.34
```

Because degradation is not necessarily an error, the test's success is determined by you, not the system. The following counters indicate possible degradation:

For Circuits

- Arriving congestion loss
- Corruption loss
- Transit congestion loss
- Line down
- Initialization failure
- Data errors inbound
- Data errors outbound
- Remote reply timeouts
- Local reply timeouts
- Remote buffer errors
- Local buffer errors
- Selection timeouts
- Remote process errors
- Local process errors
- Locally initiated resets

- Network initiated resets

For Nodes

- Response timeouts
- Received connect resource errors
- Aged packet loss
- Node unreachable packet loss
- Node out of range packet loss
- Oversized packet loss
- Packet format error
- Partial routing update loss
- Verification reject

8.6.5 Cluster-Integration Test Phase

The cluster-integration test phase, which consists of a single program and a command file, depends heavily on DECnet. This phase uses DECnet to create SYSTEST_CLIG processes on each VMS node in the cluster and to communicate with each node. SYSTEST_CLIG is an account that is parallel to SYSTEST, but limited so that it can only be used as part of the cluster-integration test. The following restrictions on the SYSTEST_CLIG account are necessary for a correct run of the cluster test phase:

- The account must be enabled and the password must be null. For more information, see Section 8.3.9.
- The UIC must be the same as that of the SYSTEST account.
- The account must have the same privileges and quotas as the SYSTEST account. For more information, see Section 8.5.4.1.
- The account can allow login only through DECnet.
- The account must be locked into running UETCLIG00.COM when it logs in.

These items are necessary to ensure the security and privacy of your system. If the test cannot create a SYSTEST_CLIG process on some VMS node, it gives the reason for the failure and ignores that node for the lock tests and for sharing access during the file test. The test makes no attempt to report information relating to a failure at the node where creation was attempted; that is, any possible log file is not copied to the node running the test. If there is a problem communicating with a SYSTEST_CLIG process after it has been created, the test excludes it from further lock and file sharing tests. At the end of the cluster-integration test, an attempt is made to report any errors seen by that node.

UETCLIG00.EXE has two threads of execution: the primary and the secondary. The first, or primary thread, checks the cluster configuration; that is, it checks the VMS and HSC nodes and the disks attached to each of them that can be seen from the node running the test. For selected VMS nodes, the primary thread attempts to start up a SYSTEST_CLIG process through DECnet. Those nodes on which the primary thread was able to start

a SYSTEST_CLIG process run the command file UETCLIG00.COM, which starts up UETCLIG00.EXE and runs the secondary execution thread.

The process running the primary thread checks to see that it can communicate with the processes running the secondary threads. It then instructs them to take out locks so that a deadlock situation is created.

The primary thread tries to create a file on some disk on selected VMS and HSC nodes in the cluster. The primary thread writes a block, reads it back, and verifies it. The primary thread selects one VMS node at random and asks that node to read the block and verify it. The primary extends the file by writing another block and has the secondary read and verify the second block. The file is deleted.

The secondary processes exit. They copy to the primary process the contents of their SYS$ERROR files, so that the UETP log file and console report show all problems in a central place. DECnet automatically creates a NETSERVER.LOG in SYS$TEST as the test is run, so that if necessary, you can read that file later from the node in question.

During the test run, the primary process uses cluster $BRKTHRU to announce the beginning and ending of the test to each VMS node's console terminal.

You can define the group logical name MODE to the equivalence string DUMP to trace most events as they occur. Note that the logical name definitions apply only to the node on which they were defined. You must define MODE on each system in the VAXcluster on which you want to trace events.

Part II

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

9 Startup and Shutdown Procedures

This chapter describes different ways of booting the system. It also describes using the SHUTDOWN, OPCCRASH, and CRASH command procedures to stop the system.

Before you can use the information in this chapter, you must edit the boot command procedures and DEFBOO.CMD as described in Chapter 4.

9.1 Overview of Booting

Booting is the process of loading system software into memory. The VAX 8820, 8830, and 8840 use boot command procedures to boot the VMS operating system from the system disk into memory. A boot command procedure does the following:

- Sets up the system environment
- Deposits values in registers
- Tells the system what type of controller the system disk is on and the unit number of the drive
- Loads the VMS operating system into memory
- Starts the CPU

The instructions for booting the system vary slightly for each type of controller. There is a boot command procedure for each type of controller that the system supports.

For example, the boot command procedure BCIBOO.CMD lets you boot from disk drives connected to a CIBCI or CIBCA controller. All boot command procedures are stored on the console fixed disk (CSA3).

The boot process consists of the following steps:

1. You enter the BOOT command. The specified boot command procedure deposits information in the general purpose registers.
2. VMB.EXE, the primary boot program, is loaded into memory. VMB.EXE is a program that allows access to the system disk. VMB.EXE 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.EXE 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.

By setting certain SYSGEN parameters, you can control how many CPUs are activated at boot time and the character of a multiprocessing system. In a multiprocessing system, the primary CPU is always booted. By default, all available CPUs are also booted. If you want to change this, you can set the SYSGEN parameter SMP_CPUS to tell the system which secondary CPUs to boot. For information on SYSGEN parameters that affect multiprocessing, see the *VMS System Generation Utility Manual.*

9.2 Booting with DEFBOO.CMD

The most direct way to boot the system is to type the BOOT command and press RETURN. By default, the console uses DEFBOO.CMD to boot the system. DEFBOO.CMD is the boot command procedure that you edited in Chapter 4.

To boot the system with DEFBOO.CMD, 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 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 CTRL/P. At the PS-OS-0> prompt, enter the following command and press RETURN:

```
PS-OS-0> HALT/CPU=ALL
```

3 At the PS-CIO-0> prompt, enter the following command and press RETURN:

```
PS-CIO-0> B
```

9.3 Booting from Another System Disk

To boot the system from a drive other than the one specified in DEFBOO.CMD, 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 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 CTRL/P. At the PS-OS-0> prompt, enter the following command and press RETURN:

```
PS-OS-0> HALT/CPU=ALL
```

3 At the PS-CIO-0> prompt, enter the BOOT command in the following format:

```
PS-CIO-0> B dddn
```

Substitute BCI or BDA for *ddd*. Substitute the unit number of the drive holding the system disk for *n*.

For example, suppose the system disk is on a CIBCI-controlled drive and the unit number is six. Enter the following command and press RETURN:

```
PS-CIO-0> B BCI6
```

9.4 Booting from a Different Directory on the System Disk

The VMS operating system is installed on the system disk in the root directory named [SYS0]. You can use VMSKITBLD, described in *Guide to Setting Up a VMS System*, to put a copy of the VMS operating system in another root directory on the system disk.

To boot the system from a directory other than [SYS0], 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 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 CTRL/P. At the PS-OS-0> prompt, enter the following command and press RETURN:

```
PS-OS-0> HALT/CPU=ALL
```

3 At the PS-CIO-0> prompt, enter the BOOT command in the following format:

```
PS-CIO-0> B dddn /R5=rnnnnnnn
```

Substitute BCI or BDA for *ddd*. Substitute the unit number of the drive holding the system disk for *n*. Use *r* to identify the root from which you want to boot.

For example, suppose the system disk is on a CIBCI-controlled drive, the unit number is six, and you want to boot from [SYS3]. Enter the following command and press RETURN:

```
PS-CIO-0> B BCI6 /R5=30000000
```

9.5 Conversational Boot

A conversational boot is most commonly used in research and development environments for experimentation and during software upgrades. Perform a conversational boot when you want 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
- 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 way:

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 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 CTRL/P. At the PS-OS-0> prompt, enter the following command and press RETURN:

   ```
   PS-OS-0> HALT/CPU=ALL
   ```

3. At the PS-CIO-0> prompt, enter the following command and press RETURN:

   ```
   PS-CIO-0> B/R5=1
   ```

   This command uses DEFBOO.CMD and deposits one in register 5 (R5). When R5 contains one, the boot process stops at the SYSBOOT> prompt.

   If you want to boot from a drive other than the one specified in DEFBOO.CMD, enter the BOOT command in the following format:

   ```
   PS-CIO-0> B dddn /R5=1
   ```

Substitute BCI or BDA for *ddd*. Substitute the unit number of the drive holding the system disk for *n*. The /R5=1 qualifier deposits one in register 5 (R5).

For example, suppose the system disk is on a CIBCI-controlled drive and the unit number is two. Enter the following command and press RETURN:

```
PS-CIO-0> B BCI2 /R5=1
```

This command tells the console to boot with BCIBOO.CMD, deposit two in register 3 (R3), and deposit one in register 5 (R5).

4 At the SYSBOOT> prompt, you can enter any of the SYSGEN commands listed in Table 9–1. 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 9–1 SYSGEN Commands Used in SYSBOOT

Command	Description
CONTINUE	Resumes the boot process.
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.
SET/STARTUP	Sets the name of the system startup command procedure.
SHOW [parameter-name]	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 commands to set the SYSGEN parameter WSMAX to 512 and complete 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 31-DEC-1988 15:00:00.00
```

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

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

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

```
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 call SYSTARTUP_V5.COM, it does not automatically configure the system's peripheral devices.

The value of STARTUP_P1 is saved and affects future boot operations. After the operating system boots, you can 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
$
```

9.6 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*. Follow the instructions for booting a VAX 8800.

9.7 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. Examples of hardware problems are a read error on a disk drive or a machine check error. If you suspect a hardware problem, do the following:

1. Consult the hardware manual for your VAX computer.
2. Contact the appropriate DIGITAL Field Service representative.

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

```
SYSTEM       job terminated at 31-DEC-1988 15:00:00.00
```

If the system does not display this message, a software problem has probably occcurred. To correct the situation, do the following:

1 Try to boot the system again.

2 Place a backup copy of the system disk in another drive and try to boot from it.

9.8 Shutting Down the System

Before you shut down the VMS operating system, decide if you want the VMS operating system to reboot automatically or if you want to enter conosle commands after the shutdown completes.

If you want the VMS operating system to reboot automatically, you must have entered the ENABLE AUTO REBOOT command when you last were in console mode. If you want to enter console commands, stop the system after the shutdown completes.

9.8.1 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 stop the system after the procedure completes, press CTRL/P and enter the HALT/CPU=ALL command at the PS-OS-0> prompt.

  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. Enter the following command and press RETURN:

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

  To stop the system after the procedure completes, press CTRL/P and enter the HALT/CPU=ALL command at the PS-OS-0> prompt.

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

- **An emergency shutdown with CRASH** . Use this emergency shutdown procedure if OPCCRASH fails. The CRASH command procedure is on the console fixed disk. Section 9.8.2 describes the CRASH command procedure.

9.8.2 Emergency Shutdown with CRASH

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

The CRASH command procedure causes the system to fail, resulting in immediate shutdown. To force your system to fail with CRASH, do the following:

1. Press CTRL/P to stop the system. At the PS-OS-0> prompt, enter the following command and press RETURN:

   ```
   PS-OS-0> HALT/CPU=ALL
   ```

2. At the PS-CIO-0> prompt, enter the following command and press RETURN:

   ```
   PS-CIO-0> @CRASH
   ```

   CRASH displays a fatal bugcheck message, as well as additional messages and information. The procedure examines the program counter (PC), the processor status longword (PSL), and the stack pointers. It then deposits values in the PC and PSL to cause an exception condition that sends the contents of memory to the dump file on the system disk. Later you can read the dump file to determine why the system did not respond.

3. CRASH stops the system, displays the contents of the program counter, and displays the console prompt.

   If AUTO REBOOT is enabled, the system reboots after CRASH runs. If the system does not automatically reboot, reboot it manually.

4. After the system reboots, you can examine the dump file. To examine the dump file, log into the SYSTEM account. 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.*

10 Backup Procedures

This chapter contains information on the following:

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

10.1 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.

Before installing the VMS operating system, you install standalone BACKUP on the console fixed disk. You can also install standalone BACKUP on the system disk or any other media that your system supports. Usually you boot standalone BACKUP from the system disk because it saves time. However, you need standalone BACKUP on the console fixed disk in case the system disk becomes damaged.

10.1.1 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:
```

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 Create a boot command procedure that lets you boot standalone BACKUP from [SYSE]. For more information, see Section 10.1.2.

10.1.2 Booting Standalone BACKUP from the System Disk

You need a special boot command procedure to boot standalone BACKUP from the system disk. DIGITAL recommends that you modify an existing boot command procedure. Ideally, this should be the default boot command procedure, DEFBOO.CMD.

You can choose any unique name in the form xxxBOO.CMD for the command procedure you create. However, DIGITAL suggests you use an existing file name and change the first letter to an X. For example, if you use a copy of DEFBOO.CMD, name the new file XEFBOO.CMD.

To create a boot command procedure that boots standalone BACKUP from [SYSE], use the following procedure. The procedure assumes you are making a copy of DEFBOO.CMD and renaming it XEFBOO.CMD.

1 To make a copy of DEFBOO.CMD, enter the following command and press RETURN:

```
PS-CIO-0> COPY DEFBOO.CMD XEFBOO.CMD
```

2 Enter the following command and press RETURN:

```
PS-CIO-0> EDIT XEFBOO.CMD
```

3 Edit the line that contains the BOOT command so that it specifies the [SYSE] directory. For example:

```
BOOT BCI12 /R5:E0000000
```

4 Exit from the editor to save the modified version of the file.

To boot standalone BACKUP from [SYSE] on 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:

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

Answer the questions. When the procedure asks if an automatic system 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 CTRL/P. At the PS-OS-0> prompt, enter the following command and press RETURN:

```
PS-OS-0> HALT/CPU=ALL
```

3 At the PS-CIO-0> prompt, enter the following command and press RETURN:

```
PS-CIO-0> @XEFBOO
```

4 The procedure might ask 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) 31-DEC-1988 15:00

VAX/VMS Version V5.0 Major version id = 01 Minor version id = 00
```

5 The procedure displays a list of the local devices on your system and, if you have them, HSC and MSCP-served devices. For example:

```
Available device MINE$DJA2:     device type RA60
Available device MINE$DJA3:     device type RA60
      .
      .
      .
```

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, standalone BACKUP V5.0; the date is 31-DEC-1988 15:00
$
```

To make a backup copy of the system disk, go to Section 10.2.

To restore a backup copy of the system disk, go to Section 10.3.

10.1.3 Booting Standalone BACKUP from the Console Fixed Disk

If the system disk containing standalone BACKUP should become unusable, you can boot standalone BACKUP from the console fixed disk (assuming that you installed it as described in Section 4.1).

To boot standalone BACKUP from the console fixed 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:

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

Answer the questions. When the procedure asks if an automatic system 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 CTRL/P. At the PS-OS-0> prompt, enter the following command and press RETURN:

```
PS-OS-0> HALT/CPU=ALL
```

3 At the PS-CIO-0> prompt, enter the following command and press RETURN:

```
PS-CIO-0> @CSBOO
```

4 The procedure might ask 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) 31-DEC-1988 15:00

VAX/VMS Version V5.0 Major version id = 01 Minor version id = 00
```

5 The procedure displays a list of the local devices on your system and, if you have them, HSC and MSCP-served devices. For example:

```
Available device MINE$DJA2:     device type RA60
Available device MINE$DJA3:     device type RA60
      .
      .
      .
```

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, standalone BACKUP V5.0; the date is 31-DEC-1988 15:00
$
```

To make a backup copy of the system disk, go to Section 10.2.

To restore a backup copy of the system disk, go to Section 10.3.

10.2 Backing Up the System Disk

You should back up the system disk for the following reasons:

- 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 occurs, you can restore the backup copy of 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 or renders the system disk inoperable, you can restore the backup copy and continue to use the system.
- In case the drive that holds 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 stored noncontiguously on the disk. The BACKUP command creates a copy on which files are stored contiguously.
  - If the system disk is removable, eliminating disk fragmentation is a one-step process. Use the backup copy as the new system disk. Store the old system disk in a safe place.
  - If the system disk is fixed, back it up to a disk or magnetic tape. Then restore the files to the original system disk.

10.2 Backing Up the System Disk

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 following 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.*

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

1. Obtain a scratch disk or tape that you can use for the backup copy. Place it in the appropriate drive. If you are using a tape drive, put it on line. If you are using a disk drive, spin it up.
2. Write-protect the system disk by pressing the WRITE PROTECT button on the disk drive.
3. Boot standalone BACKUP as described in either Section 10.1.2 or Section 10.1.3.
4. Determine the device names of the drive holding the system disk and the drive holding the backup disk or tape. For the list of device names for the VAX 8820, 8830, and 8840, see Table 3–1.
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 magnetic tape, use the second command.

```
$ BACKUP/IMAGE/VERIFY source-drive: target-drive:
$ BACKUP/IMAGE/VERIFY/BUFFER=5 source-drive: target-drive:saveset.BCK/REWIND/LABEL=volume-label
```

   where:

   - *source-drive* is the location of the files you want to back up. 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.
   - *saveset.BCK* is the name of the saveset (the name should reflect the contents of the backup tape and cannot exceed 17 characters in length).
   - *volume-label* is the volume label of the tape in the target-drive. If the tape has already been initialized, use the same volume label that was assigned by the INITIALIZE command. If the tape 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 DUA0: DUA1:
```

The following example uses the BACKUP command to make a backup tape. You must restore the contents of a backup tape to a disk before you can use them. For more information, see Section 10.3.

```
$ BACKUP/IMAGE/VERIFY/BUFFER=5 DUA0: MSA0:DEC_31_1988.BCK/REWIND/LABEL=SYSDSK
```

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

```
%BACKUP-I-PROCDONE, Operation completed. Processing finished at 31-DEC-1988 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:
```

7 Press CTRL/P. At the PS-OS-0> prompt, enter the HALT command and press RETURN.

8 Reboot the system.

Store the backup copy of the system disk in a safe place.

Note: The BACKUP command creates a system disk that includes a DIGITAL-provided set of volume parameters, 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.) Most volume parameters can be changed 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 the BACKUP command from reinitializing the target disk, use the /NOINITIALIZE qualifier. For more information, read about initializing public volumes in the *Guide to Maintaining a VMS System.* For more information on the BACKUP command, see the *VMS Backup Utility Manual.*

10.3 Restoring the System Disk

To restore the system disk, use the following procedure:

1 Write-protect the backup disk or tape.

2 Place the backup disk or tape in an appropriate drive. If you are using a tape drive, put it on line. If you are using a disk drive, spin it up.

3 Boot standalone BACKUP as described in Section 10.1.2 or Section 10.1.3.

4 Place a scratch disk in the drive you intend to use for the new system disk. Spin it up but do not write-protect it.

5 Determine the device names of the drive holding the system disk and the drive holding the backup disk or tape. For the list of device names for VAX 8820, 8830, and 8840, see Table 3–1.

6 Enter the BACKUP command in one of the following formats. If you have a backup disk, use the first command. If you have backup tape, use the second command.

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

$ BACKUP/IMAGE/VERIFY/BUFFER=5 source-drive: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.
- *saveset* is the name of the saveset, if you have a backup tape.
- *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 DUA1: DUA0:
```

The following example uses the BACKUP command to restore the system disk from a backup tape.

```
$ BACKUP/IMAGE/VERIFY/BUFFER=5 MSA0:DEC_31_1988.BCK/REWIND DUA1:
```

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

```
%BACKUP-I-PROCDONE, Operation completed. Processing finished at 31-DEC-1988 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:
```

8 Press CTRL/P. At the PS-OS-0> prompt, enter the HALT command and press RETURN.

9 Reboot the system.

10.4 Restoring the Console Fixed Disk

If the console fixed disk should become damaged or unusable, restore it using the distribution TK50 tape cartridges that contain the console software and standalone BACKUP. Directions for installing the console software are given in the *Console User's Guide*. Directions for installing standalone BACKUP on the console fixed disk are given in Section 4.1 of this guide.

A Release Notes

The following restrictions apply to the VAX 8820, 8830, and 8840.

A.1 Restriction on a VAXBI 5

The VAX 8820, 8830, and 8840 support up to six VAXBIs (VAXBI 0 through VAXBI 5). Never configure the last VAXBI, VAXBI 5, to have a node 15. The system cannot recognize devices connected to node 15 on VAXBI 5.

A.2 Using the SET TIME Command

When you enter the SET TIME command, the date and time are stored internally. On a VAX 8530, 8550, 8700, 8800, 8820, 8830, and 8840 the date and time are sometimes stored incorrectly due to a protocol error in the console interface. If this happens, the system asks you for the date and time the next time you boot.

A.3 Using the SET TIME/CLUSTER Command

If you have a VAXcluster environment that includes a VAX 8530, 8550, 8700, 8800, 8820, 8830, or 8840, be careful when you enter the SET TIME/CLUSTER command. Make sure the consoles for these systems are connected and running the console program before you enter the SET TIME /CLUSTER command. If they are not running when you enter the command, the system crashes.

A.4 Restriction for Systems that Support 512M Memory

If your VAX computer has 512M of memory, you must reserve the upper .5M of memory whenever you boot the system. To do this, do a conversational boot, as described in the installation and operations guide for your VAX computer, and set the value of PHYSICALPAGES to 1047552.

For example, if you have a VAX 8830, the format for a conversational boot command is as follows:

```
PS-CIO-O> B dddn/R5=1
```

Substitute BCI or BDA for *ddd*. Substitute the unit number of the drive holding the system disk for *n*. /R5=1 deposits one in the right-most bit of register 5 (R5). This causes the boot process to stop after it loads SYS$SYSTEM:SYSBOOT.EXE and display the SYSBOOT> prompt.

At the SYSBOOT> prompt, enter the following commands:

```
SYSBOOT> DISABLE CHECKS
SYSBOOT> SET PHYSICALPAGES 1047552
SYSBOOT> CONTINUE
```

This reserves the upper .5M of memory. If this space is not reserved, the system could fail.

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 command procedure: A program stored on the console fixed disk that is used to boot the VMS operating system from a specified controller. DIGITAL provides a boot command procedure for each controller that the processor supports.

boot name: The abbreviated name of the boot command procedure you use to boot the system.

boot server: A VAX computer that is part of a local area VAXcluster. The boot server in a local area VAXcluster has a system disk that contains cluster common files; 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.

CIBCA: A computer interconnect (CI) port on a VAX Backplane Interconnect (VAXBI) that does not require a cabinet.

CIBCI: A computer interconnect (CI) port on a VAX Backplane Interconnect (VAXBI) that requires a cabinet.

computer interconnect: A computer interconnect (CI) is a type of I/O subsystem. It links VAX computers to each other and to HSC devices.

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.

Hierarchical Storage Controller (HSC) device: A self-contained, intelligent, mass storage subsystem that lets VAX computers in a VAXcluster environment share disks. Examples of HSC devices are the HSC50 and the HSC70.

HSC drive: Any drive that is connected to an HSC device is referred to as an HSC drive. A system disk on an HSC drive can be shared by several VAX computers in a VAXcluster environment.

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.

local drive: Any drive that is connected directly to a VAX 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, floppy diskettes, disk packs, tape cartridges, etc.

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

satellite node: A VAX 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.

scratch disk: A blank disk or a disk with files that you no longer need.

spin up/spin down: To spin up means to bring a disk drive up to operating speed. To spin down means to bring it to a gradual stop.

standalone BACKUP: A version of the Backup Utility that runs from memory 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 VAX computers. In addition, each computer has its own directory on the system disk that contains its page, swap, and dump files.

VAX Backplane Interconnect (VAXBI): A system bus that connects the CPU and memory to the I/O busses.

VAXBI node: A device on the VAXBI. I/O adaptors are one type of node on the VAXBI.

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

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 customize your system disk.

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