VMS Upgrade and Installation Supplement: VAX–11/780, 785

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This document supplements the current version of *VMS Upgrade and Installation Manual* with information specific to the VAX–11/780 and VAX–11/785 computers. This information includes startup, shutdown, and backup procedures.

digital equipment corporation
maynard, massachusetts

Production Note

This book was produced with the VAX DOCUMENT electronic publishing system, a software tool developed and sold by Digital. In this system, writers use an ASCII text editor to create source files containing text and English-like code; this code labels the structural elements of the document, such as chapters, paragraphs, and tables. The VAX DOCUMENT software, which runs on the VMS operating system, interprets the code to format the text, generate a table of contents and index, and paginate the entire document. Writers can print the document on the terminal or line printer, or they can use Digital-supported devices, such as the LN03 laser printer and PostScript printers (PrintServer 40 or LN03R ScriptPrinter), to produce a typeset-quality copy containing integrated graphics.

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Preface

VMS Upgrade and Installation Supplement: VAX–11/780, 785 contains installation and upgrade information specific to the VAX–11/780 and VAX–11/785 computers. Use it in conjunction with the *VMS Upgrade and Installation Manual.*

IMPORTANT: **When you are ready to upgrade, install, or update the VMS operating system, use the supplied documentation as follows:**

1. **Read all release-specific cover letters (if any) included with your distribution kit.**

2. **Read the most current version of the *VMS Release Notes*.**

3. **Consult the *VMS Upgrade and Installation Manual* for the VMS version that you are installing or upgrading to. It is your *primary* source of step-by-step upgrade and installation procedures.**

4. **Refer to this supplement for computer-specific information when the *VMS Upgrade and Installation Manual* directs you to do so.**

5. **Store this supplement and the *VMS Upgrade and Installation Manual* in the binder that contains the *VMS Release Notes*.**

Intended Audience

VMS Upgrade and Installation Supplement: VAX–11/780, 785 is intended for anyone responsible for installing or upgrading the VMS operating system on a VAX–11/780 or VAX–11/785 computer.

Document Structure

This manual is organized as follows:

- Chapter 1 describes the console subsystem.

- Chapter 2 describes some of the tasks you need to perform when you install the VMS operating system.

- Chapter 3 contains instructions for starting up the system. It also describes system shutdown procedures.

- Chapter 4 describes backup procedures you should perform on a regular basis.

Appendix A provides instructions for initializing multiport memory units. The Glossary defines key terms used in this manual.

Associated Documents

You should have access to the following documents:

- *VMS Upgrade and Installation Manual*, which is your primary source of upgrade and installation information. Use the *VMS Upgrade and Installation Manual* in conjunction with *VMS Upgrade and Installation Supplement: VAX–11/780, 785* when you are performing an installation or upgrade.

- *VMS Release Notes*, which provides important information on various aspects of the VMS operating system. You should read the *VMS Release Notes* before installing, upgrading, or updating the VMS operating system.

- Hardware manuals supplied with your VAX computer. These manuals contain detailed information about your system hardware.

Conventions

The following conventions are used in this manual:

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

1 Console Subsystem

Before you install the VMS operating system, you need to be familiar with the console subsystem. The console subsystem consists of the following:

- Console terminal
- LSI-11 microcomputer
- Control panel
- Console diskette drive
- Console command language
- Remote diagnostic port

In general, use the console subsystem to examine and deposit data in memory or computer registers, stop the computer, and boot the operating system. During installation, use the console susbsystem to boot the computer and monitor the installation process.

Figure 1–1   VAX–11/780 and VAX–11/785 Console Subsystem
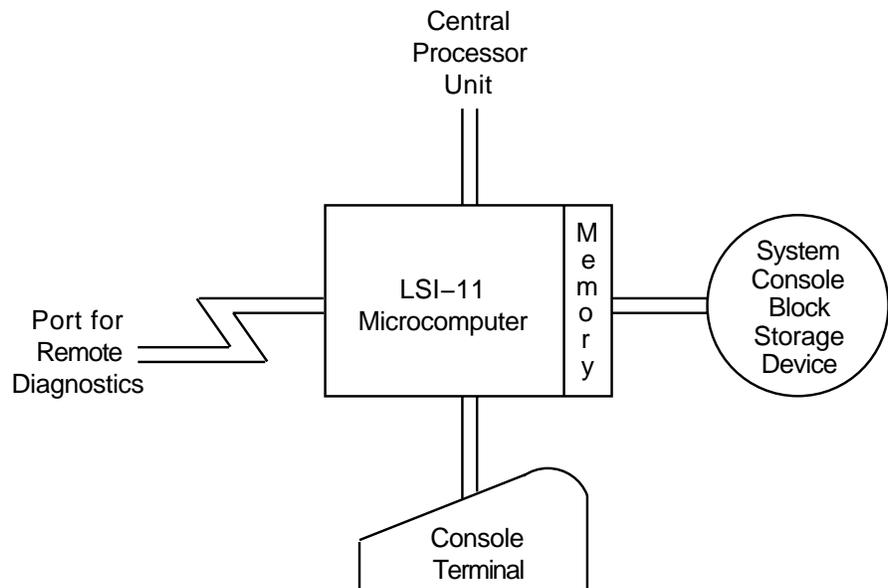
ZK–0999–GE

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 hardware manual for the VAX–11/780 and VAX–11/785.

1.1   Console Terminal

There are two types of console terminals:

- The Local console terminal is a hardcopy terminal attached to the system that prints a log of computer activities. Use it to control and monitor system operations.

- The remote console terminal is optional. If you purchase one, Digital diagnostics centers use a remote console terminal (located at the diagnostics center) to control system operations during diagnostic testing.

1.2   Control Panel

The VAX–11/780 and VAX–11/785 control panels are identical. The panel is located on the front of the computer and consists of four indicator lights and three switches. Figure 1–2 shows the control panel.

Figure 1–2   VAX–11/780 and VAX–11/785 Control Panel

ZK–0776–GE
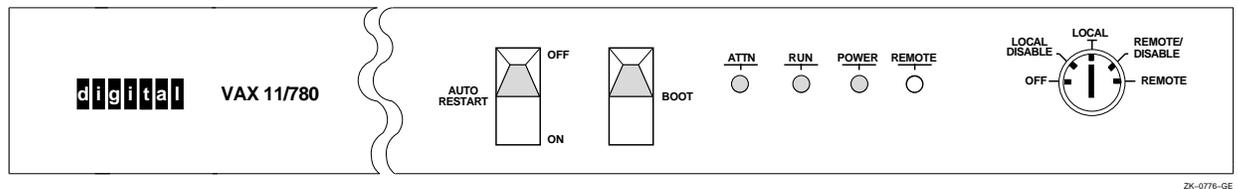
1.2.1   Indicator Lights

Table 1–1 describes the indicator lights on the VAX–11/780 and VAX–11/785 control panels.

Table 1–1   VAX–11/780 and VAX–11/785 Indicator Lights on the Control Panel

Label	Function
Attn	Glows red when the computer is stopped and the console subsystem is in console mode.
Run	Glows green when the computer is running and the console subsystem is in program mode.
Power	Glows green when power is supplied to the computer.
Remote	Glows red when the computer is stopped and the remote diagnostic port is enabled.

1.2.2 Switches

The control panel has the following switches:

- Auto Restart switch
- Boot switch
- Five-position keylock switch

1.2.2.1 Auto Restart Switch

The Auto Restart switch has the following settings:

On	The system reboots automatically when one of the events listed below occurs.
Off	The console-mode prompt (>>>) appears on the console terminal when one of the events listed below occurs.

The setting of the Auto Restart switch determines what happens after any of the following events:

- The power is turned on.
- A power failure occurs (if the battery backup unit did not save the contents of memory).
- A shutdown occurs (if you entered Y at the auto reboot prompt).
- The microprogram detects an error halt condition (for example, a HALT instruction executed in kernel mode).

Set the Auto Restart switch to On during normal system operations.

1.2.2.2 Boot Switch

Push the Boot switch to the On position to boot the system with the default boot command procedure. This spring-loaded switch Returns to Off when you release it.

1.2.2.3 Keylock Switch

The five-position keylock switch controls system power and determines how the system responds to commands from local and remote console terminals. Table 1–2 describes each keylock switch setting. Note that the power supply to the system is turned off only when the keylock switch is set to Off.

Table 1–2   Keylock Switch Settings

Setting	Meaning
Off	Power is supplied to the battery backup unit and to the time-of-year clock, but not to the computer.

Table 1–2 (Cont.)   Keylock Switch Settings

Setting	Meaning
Local Disable[1]	You cannot use the local console terminal in console mode to control the system. You can use it in program mode as a user terminal. A Digital diagnostics center cannot use the remote console terminal when the switch is set to Local Disable.
Local	You can use the local console terminal in console mode to control the system. You can use it in program mode as a user terminal. A Digital diagnostics center cannot use the remote console terminal when the switch is set to Local.
Remote Disable	A Digital diagnostics center can use the remote console terminal in program mode, but not in console mode. You cannot use the local console terminal.
Remote	A Digital diagnostics center is in control of the system. You cannot use the local console terminal. However, the Digital diagnostics center can enter commands to restore control to the local console terminal.

[1]Pressing the Boot switch to On has no effect because BOOT is a console mode command.

1.3   Console Diskette Drive

The console subsystem has a single floppy diskette drive, referred to as the *console diskette drive*. The floppy diskette drive holds RX01 floppy diskettes and is assigned the device name CSA1. The **console RX01** floppy diskette contains the command procedures used to *boot* (load) the operating system from the system disk into computer memory. It also is used to do the following tasks:

- Install updates

- Install optional software products

- Boot standalone BACKUP

1.3.1   Inserting and Removing a Floppy Diskette

To insert a floppy diskette in the console diskette drive, do the following:

1 Unlatch and open the CPU cabinet doors.

2 The diskette drive assembly is a rectangular, unpainted steel box in the lower right-hand corner of the cabinet. There is a black handle on the right of the drive assembly. Figure 1–3 shows the location of the console diskette drive. Pull the handle to swing out the drive until it is perpendicular to the cabinet. If you do not swing it out far enough, or if you swing it out too far, you will not be able to insert the floppy diskette.

Figure 1–3 Console Diskette Drive

Drive   Disk Drive Assembly   Handle
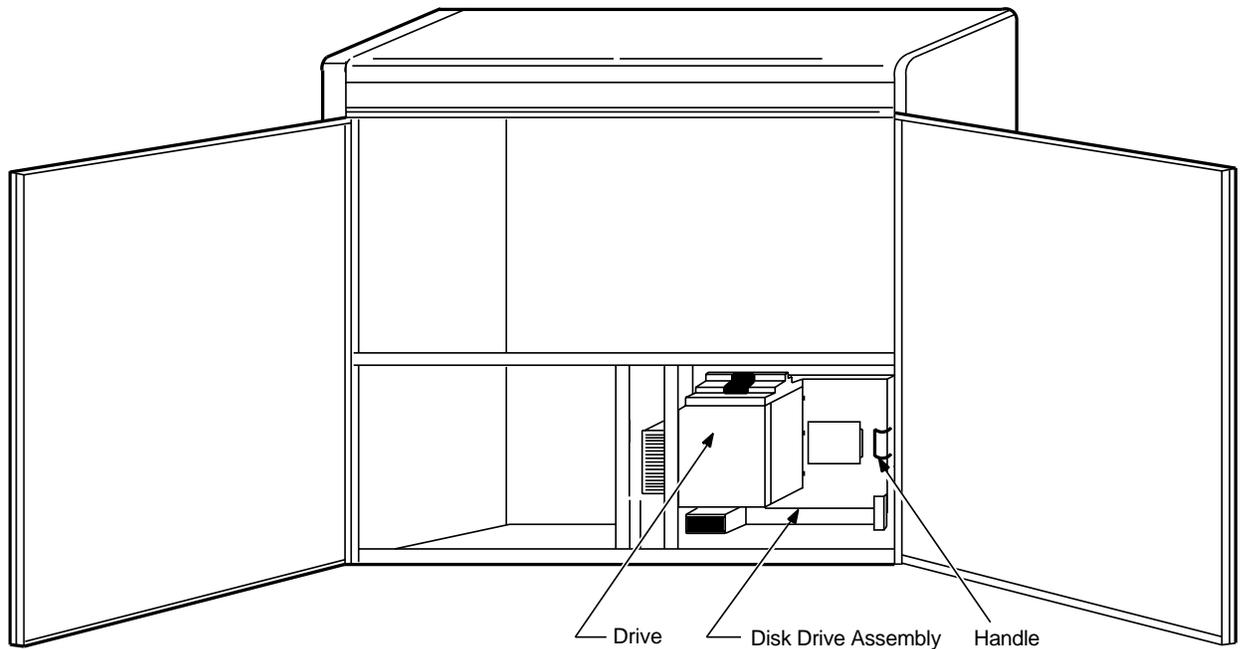
ZK–7437–GE

3 Press the black door latch on the top of the diskette drive to unlock the diskette slot cover. The cover will spring open.

4 Check the drive to be sure that it is empty. (If a floppy diskette is already in the drive, remove it and place it in a protective paper envelope.) Hold the floppy diskette so that the label is at the top and faces towards the right. The oval slot on the floppy diskette should be at the bottom. Figure 1–4 shows how to insert the floppy diskette in the drive.

Figure 1–4   Inserting a Floppy Diskette
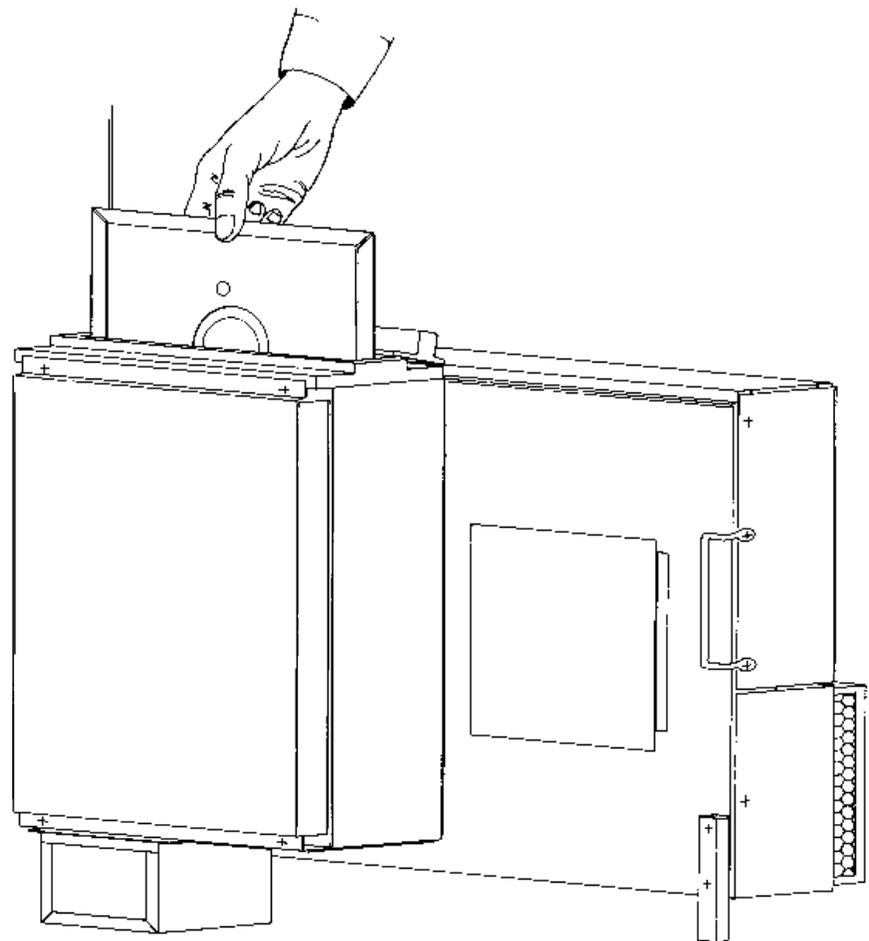
ZK–7438–SC

5   Close the diskette slot cover.

6   Swing the drive assembly back into the cabinet.

7   Close and latch the cabinet doors.

To remove a floppy diskette from the drive, open the diskette slot cover. Lift the floppy diskette firmly but gently out of the drive, taking care not to touch any exposed platter surfaces. Place the floppy diskette in a protective paper envelope.

1.4   Console Command Language

The console subsystem Runs in two different modes, console mode and program mode.

- Console mode — When the console subsystem is in console mode, the VMS operating system is not running and the console-mode prompt (>>>) is displayed. The CPU can be running or it can be stopped. When the CPU is running, it responds to a limited number of commands. When the CPU is stopped, it responds to all console mode commands. To stop the CPU, enter the HALT command at the console-mode prompt (>>>).

  To go from console mode to program mode, boot the VMS operating system as described in Chapter 3.

- Program mode — When the console subsystem is in program mode, the VMS operating system is running and the dollar-sign prompt ($) is displayed. You can enter DCL commands, Run programs, and receive system messages.

  If the VMS operating system is running and you want to go to console mode, follow the shutdown procedure described in Chapter 3. You can also press Ctrl/P to suspend program mode temporarily and go to console mode. To get back to program mode, enter the CONTINUE command at the console-mode prompt (>>>).

Table 1–3 describes the console mode commands you use during the installation procedure.

Table 1–3   Commonly Used Console Mode Commands

Command	Definition
BOOT	Executes a boot command procedure that loads a VAX software program into memory. The boot command procedure transfers control to the program in memory and puts the console subsystem in program mode. During the installation procedure use the abbreviation, B, for the BOOT command.
DEPOSIT	Puts a value in the specified register or memory location. During the installation procedure use the abbreviation, D, for the DEPOSIT command.
HALT	Completes the execution of the instruction in process and stops the CPU.

For more information on the console subsystem and command language, see the hardware manuals supplied with your VAX computer.

2 Installing the VMS Operating System

The *VMS Upgrade and Installation Manual* is your primary source for step-by-step upgrade and installation procedures. Start any VMS installation or upgrade by following the instructions in the *VMS Upgrade and Installation Manual*.

Refer to this chapter for installation information specific to the VAX–11 /780 and VAX–11/785 computers. For example, before installing VMS you need to know how to determine device names for the drives that you will use for the distribution media and the the system disk. In addition to helping you determine device names, this chapter also provides instruction for the following functions:

- Turning on the system

- Booting standalone BACKUP

- Booting the new system disk

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

If you are installing the VMS operating system on a VAX computer that is part of a VAXcluster environment, see also the *VMS VAXcluster Manual*.

2.1 Before Installing VMS

At different times during the installation, the installation procedure prompts you to identify which drive contains the distribution media and which drive contains the system disk. You refer to a drive by its *device name* which 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.

---

[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 device. For example, UDA disks can have unit numbers in the range of 0 to 254.

Installing the VMS Operating System

2.1 Before Installing VMS

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, CSA1 is the device name for the console diskette drive. *CS* is the device code. *A* names the controller (the controller provides the interface between the computer and the drive). *1* 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
```

In the preceding example, TROUT is the name of the HSC device and DJA0 is the device name for an RA60 drive connected to it.

Table 2–1 lists the device codes for the different drives that can be part of a VAX–11/780 or a VAX–11/785 system.

Table 2–1   Device Names for the VAX–11/780 and VAX–11/785 Devices

Device	Used in a Device Name	Used in a Boot Name
Console diskette drive	CSA1	CS1[1]
RA60 disk drive	DJ	DU
RA70, RA80, RA81, and RA82 disk drives	DU	DU
RK07 disk drive	DM	DM
RM03, RM05, RM80, and RP07 disk drives	DR	DB
TS11 and TU80 magnetic tape drives	MS	–
TA78, TA81, TU81, and TU81-plus magnetic tape drives	MU	–
TE16, TU45, and TU77 magnetic tape drives	MT	–
TU78 magnetic tape drive	MF	–

[1]Standalone BACKUP is the only thing you can boot from the console diskette drive.

You may select any disk drive to hold the system disk but be sure the capacity of the disk can accommodate 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.

Due to space limitations, the RK07 might not be a good choice for a system disk. Depending on the size of the computer's memory, all the VMS files might not fit on one RK07 disk and you cannot upgrade an RK07 system disk.

Return to the *VMS Upgrade and Installation Manual* to continue.

2.2 Turning On the System

These instructions assume that the system is not turned on when you start the installation. The following steps describe turning on the system and setting the switches on the processor control panel.

1 Turn on the console terminal.

2 Check the console diskette drive in the console subsystem. Make sure the console RX01 is in the drive.

3 Set the Auto Restart switch to Off.

4 From the Off position, set the keylock switch to Local.

5 As power is applied to the system, the Attn and Power lights go on. The console program boots into memory. The program displays a message similar to the following:

```
LOAD DONE, 2000 MICROWORDS LOADED
VER: PCS=04-04 WCS=01-C CON=V06-00-C
```

6 Return to the *VMS Upgrade and Installation Manual* to continue.

2.3 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. You need the five floppy diskettes from the VMS distribution kit. They are labeled as follows:

Paper Label[1]	Volume Label[2]
S/A BKUP RX01 1/5	SYSTEM_1
S/A BKUP RX01 2/5	SYSTEM_2
S/A BKUP RX01 3/5	SYSTEM_3
S/A BKUP RX01 4/5	SYSTEM_4
S/A BKUP RX01 5/5	BACKUP

[1]A paper label is a label affixed to a floppy diskette.

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

The procedure asks you to place the five floppy diskettes containing standalone BACKUP, successively, in the console drive.

1 Make sure the console RX01 is in the console diskette drive. To boot standalone BACKUP from the console drive, enter the following command and press Return:

```
>>> B CS1
```

The procedure displays the following messages:

```
CPU HALTED
INIT SEQ DONE
LOAD DONE, 0000A400 BYTES LOADED
```

Notice that the red Attn light goes off and the green Run light goes on. The procedure displays the following message:

```
Please remove the volume "78x console" from the console device.
Insert the first standalone system volume and enter "YES" when ready:
```

2 Remove the console RX01 and insert the floppy diskette labeled S/A BKUP RX01 1/5 in the drive. When you are ready to continue, type Y and press Return. The procedure displays the following message:

```
Resuming load operation on volume "SYSTEM_1", please stand by...
```

The console drive makes clicking noises while it is working. Approximately five minutes later, the procedure displays the following message:

```
Please remove the volume "SYSTEM_1" from the console device.
Insert the next standalone system volume and enter "YES" when ready:
```

3 Remove the S/A BKUP RX01 1/5 floppy diskette and insert the floppy diskette labeled S/A BKUP RX01 2/5 in the drive. When you are ready to continue, type Y and press Return. The procedure displays the following message:

```
Resuming load operation on volume "SYSTEM_2", please stand by...
```

Approximately one minute later the procedure displays the following messages:

```
   VAX/VMS Version V5.4 Major version id = 1 Minor version id = 0

Please remove the volume "SYSTEM_2" from the console device.
Insert the next standalone system volume and enter "YES" when ready:)
```

4 Remove the S/A BKUP RX01 2/5 floppy diskette and insert the floppy diskette labeled S/A BKUP RX01 3/5 in the drive. When you are ready to continue, type Y and press Return. The procedure displays the following message:

```
Resuming load operation on volume "SYSTEM_3", please stand by...
```

Approximately three minutes later the procedure displays the following message:

```
Please remove the volume "SYSTEM_3" from the console device.
Insert the next standalone system volume and enter "YES" when ready:
```

5 Remove the S/A BKUP RX01 3/5 floppy diskette and insert the floppy diskette labeled S/A BKUP RX01 4/5 in the drive. When you are ready to continue, type Y and press Return. The procedure displays the following message:

```
Resuming load operation on volume "SYSTEM_4", please stand by...
```

6 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)  19-Jun-1990 15:00
```

7 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 DJA2:    device type RA60
Available device 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.

8 The procedure displays the following messages:

```
Please remove the volume "SYSTEM_4" from the console device.
Insert the standalone application volume and enter "YES" when ready:
```

Remove the S/A BKUP RX01 4/5 floppy diskette and insert the floppy diskette labeled S/A BKUP RX01 5/5 in the drive. When you are ready to continue, type Y and press Return. The procedure displays the following message:

```
Resuming load operation on volume "BACKUP", please stand by...
```

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

```
%BACKUP-I-IDENT, standalone BACKUP V5.4; the date is 19-JUN-1990 15:00
$
```

Note: Do not remove the S/A BKUP RX01 5/5 floppy diskette from the drive until you are asked to do so.

2.4   Booting the new System Disk

The *required* save set on the distribution kit is restored to the system disk when you type the BACKUP command to start the installation. 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 restored 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 19-JUN-1990 15:00
If you do not want to perform another standalone BACKUP operation,
use the console to halt the system.

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

To continue the installation, halt the system and boot the system disk using the appropriate procedure described in the following sections.

When the boot is complete, the procedure displays some messages including warning messages that the VMS license is not registerd. You can ignore these warnings and continue with the installation. After you finish the installation, follow the instructions for registering the VMS license.

When the installation procedure prompts for it, enter the date and time using the 24-hour clock format. After you enter the date and time, Return to the *VMS Upgrade and Installation Manual* to continue with the installation. If the system does not boot, a hardware or software problem might exist. Refer to Section 3.5 for the symptoms of hardware and software problems and the actions you can take to correct these problems.

2.4.1 Booting from a Local System Disk

To boot the new system from a Local system disk, use the following procedure:

1 If the system is not in console mode, press Ctrl/P.

2 At the console mode prompt (>>>), enter the following command:

```
>>> HALT
```

3 Remove the S/A BKUP RX01 5/5 floppy diskette and insert the console RX01 in the console floppy diskette drive.

4 Boot the Local system disk. For example, if the system disk is on an RP06 disk drive designated as unit one, enter the following command:

```
>>> B DBA1
```

Booting the operating system into memory from the disk takes several minutes. During the boot process, the installation procedure displays the following messages:

```
CPU HALTED
INIT SEQ DONE
    .
    .
    .
LOAD DONE, 000A400 BYTES LOADED
```

5 When the boot is complete, the procedure displays some messages including warning messages that the VMS license is not registerd. You can ignore these warnings and continue with the installation. After you finish the installation, follow the instructions for registering the VMS license.

6 Return to the *VMS Upgrade and Installation Manual* to continue.

2.4.2 Booting from an HSC Drive

To boot from an HSC system disk, use the following procedure. The procedure assumes the VMS operating system is not Running.

1 Make sure the console RX01 is in the console diskette drive (CSA1) and the keylock switch is set to Local.

2 Press Ctrl/P and enter the HALT command at the console prompt:

```
>>> HALT
```

3 Deposit the HSC controller's node number (in hexadecimal notation) into register 2 (R2). For example, if the HSC controller is node number 12 (hexadecimal C), enter the following console command:

```
>>> DEPOSIT R2 C
```

Note: **If the drive holding the HSC system disk is attached to two HSC controllers, deposit both node numbers in register 2 (R2). Put the greater number in hexadecimal digits 3 and 2. Put the smaller number in digits 1 and 0. For example, if one HSC is node number 18 (hexadecimal 12) and the other is node number 10 (hexadecimal A), add the following command:**

```
DEPOSIT R2 120A
```

4 Deposit the HSC drive's unit number (in hexadecimal notation) into register 3 (R3). For example, if the HSC system disk is on the drive assigned unit number 3, add the following line to the file:

```
>>> DEPOSIT R3 3
```

5 Enter the following command to boot the HSC system disk:

```
>>> @CIBOO.CMD
```

Note: **You can also create default boot command procedures so that the system automatically boots from a particular drive. To create default boot command procedures, see Section 3.1.3.**

6 Return to the *VMS Upgrade and Installation Manual* to continue.

3 Startup and Shutdown Procedures

During a VMS installation or upgrade, your system will shut down and automatically restart (boot) the system several times. Although the installation and upgrade procedures usually perform these tasks automatically, you may have to manually shut down or boot the system. Furthermore, you may have to occasionally boot the system during normal operation.

This chapter describes the various methods for booting the system and for shutting the system down. The method you use to boot the system depends in part on where you have the system disk. If the system disk is on a local drive, you boot the system by identifying the drive on the command line. If the system disk is on an HSC drive(s), you must use the console to establish the identity of the HSC drive(s) and then use the CIBOO command procedures as described in Section 3.1.2.

3.1 Booting the System

Booting is the process of loading system software into memory. The VAX–11/780 and VAX–11/785 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 drive the system disk is on as well as the controller designation 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 different types of drives. Therefore, there is a boot command procedure for each type of drive that the computer supports.

For example, you can boot an RP06 drive that has a unit number of zero with the boot command procedure DB0BOO.CMD (assuming the controller designation is A). If the drive has a unit number of one, use the boot command procedure DB1BOO.CMD. Use CIBOO.CMD to boot from a system disk on an HSC drive.

All boot command procedures are located on the console RX01. The console RX01 must be in the console diskette drive (CSA1) whenever you boot the system.

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.

Startup and Shutdown Procedures

3.1 Booting the System

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 in to the VMS operating system.

There are some restrictions for booting a VAX–11/780 and VAX–11/785.

If you plan to boot from a UDA50-supported disk drive, you must keep in mind the following restrictions when you configure the system:

- Each UNIBUS up to (but not including) the one that supports the system disk must have exactly one UDA50. Each UNIBUS from the system disk upwards can have up to the legally allowable number of UDA50s.

- You can boot only from the first UDA50 on a UNIBUS (that is, the one with the fixed CSR and vector).

Do *not* enter the following SYSGEN command on a VAX–11/780 computer or a VAX–11/785 computer:

```
SYSGEN>  CONNECT OPA1
```

Specifying CONNECT OPA1 on a VAX–11/780 or VAX–11/785 corrupts the console software in such a way that you will not be able to do the following:

- Access the console RX01—Any attempt to access the console RX01 results in an I/O timeout.

- Reboot the system from a system disk on an HSC drive—The system cannot use the access path to the console interface board and displays the following error message:

```
CANNOT FIND CI MICROCODE FILE
```

If you enter the CONNECT OPA1 command by mistake, turn off the power to the console subsystem and reload the software on the console RX01.

The following sections describe how to boot from a local or an HSC drive.

3.1.1   Booting from a Local Drive

To boot from a system disk on a local drive, use the following procedure:

1 Make sure the console RX01 is in the console diskette drive (CSA1) and the keylock switch is set to Local.

2 If the VMS operating system is not running, go to step 3.

If the VMS operating system is running, log in to 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
```

3 Press Ctrl/P. At the prompt, enter the HALT command and press Return:

```
>>>  HALT
```

4 Enter the BOOT command followed by the *boot name* for the drive that holds the system disk. The format for a boot name is as follows:

ddu

where:

- *dd* is the device code (with some drives the device code is different when it is part of a boot name, Table 3–1 lists the device codes to use in boot names)

- *u* is the unit number

Table 3–1   Device Codes for VAX–11/780 and VAX–11/785 Disks

Device	Used in a Boot Name
RA60, RA80, RA81, and RA82 disk drives	DU
RK07 disk drive	DM
RM03, RM05, RM80, RP05, RP06, and RP07 disk drives	DB

For example, suppose the system disk is on an RA80 disk drive (DU is the device code for the RA80 drive) with a unit number of zero. Enter the following command and press Return:

```
>>>  B DU0
```

If you have a VAX–11/785, you can also specify a boot name in one of the following formats:

- *ddc* (*c* is the controller designation)

- *dd*

Depending on the format, there are several rules to follow for a VAX–11/785. These rules are given in Section 3.1.

You can also create default boot command procedures so that the system automatically boots from a particular drive. To create default boot command procedures, see Section 3.1.3.

3.1.2 Booting from an HSC Drive

To boot from a system disk on an HSC drive, use the following procedure. Note that all numeric entries are made in hexadecimal notation.

1 Make sure the console RX01 is in the console diskette drive (CSA1) and the keylock switch is set to Local.

2 If the VMS operating system is not running, go to step 3.

If the VMS operating system is running, log in to 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
```

3 Press Ctrl/P. At the prompt, enter the HALT command and press Return:

```
>>>  HALT
```

4 Determine the unit number of the system disk and the node number of the HSC controlling it. If the drive holding the system disk has two HSC controllers, determine both node numbers.

5 Deposit the HSC node number in register 2 (R2) using the following format:

```
>>>  D R2 node-number
```

For example, if the HSC is node number 12 (hexadecimal C), enter the following command and press Return:

```
>>>  D R2 C
```

Note: **If the drive holding the system disk is accessible to two HSCs, deposit both node numbers. Put the greater number in hexadecimal digits 3 and 2. Put the lesser number in digits 1 and 0. For example, if one HSC is node number 18 (hexadecimal 12) and the other is node number 10 (hexadecimal A), enter the following command and press Return:**

```
>>>  D R2 120A
```

6 Deposit the unit number of the drive holding the system disk in register 3 (R3). Use the following format:

```
>>>  D R3 unit-number
```

For example, if the drive holding the system disk has a unit number of 21 (hexadecimal 15), enter the following command and press Return:

```
>>> D R3 15
```

7 To boot the system disk, enter the following command and press Return:

```
>>> @CIBOO.CMD
```

You can also create default boot command procedures so that the system automatically boots from a particular drive. To create default boot command procedures, see Section 3.1.3.

3.1.3 Creating Default Boot Command Procedures

To boot the system, you can enter the BOOT command and specify the boot name for a particular drive. You can also create default boot command procedures that boot the system automatically. There are two default boot command procedures: DEFBOO.CMD and DEFGEN.CMD.

DEFBOO.CMD is the nonstop boot procedure. When you boot with DEFBOO.CMD, you have no control over the system until the boot process has finished. Use DEFGEN.CMD, the conversational boot procedure, when you want to interrupt the boot process and change system parameters.

DEFGEN.CMD and DEFBOO.CMD do not exist on the console RX01. However, Digital provides boot command procedures that you can edit and rename using the following procedure.

Note: **This procedure assumes that you have installed and booted the VMS operating system and are logged into the SYSTEM account.**

1 Make sure the console RX01 is in the console diskette drive (CSA1).

2 To connect the console drive to the system, enter the following commands and press Return after each one:

```
$ RUN SYS$SYSTEM:SYSGEN
SYSGEN> CONNECT CONSOLE
SYSGEN> EXIT
```

3 Use the Exchange Utility to display a list of the files on the console RX01. Boot command procedures are files that start with either CI or D and end with either BOO or GEN. The file type is CMD. Enter the following command and press Return:

```
$ EXCHANGE DIRECTORY CSA1:C*,D*
```

The Exchange Utility displays a list of boot command procedures. For example:

```
DUABOO.CMD       CSABOO.CMD
CIBOO.CMD        CIGEN.CMD
DU1BOO.CMD       DUAGEN.CMD
   .
   .
   .
```

4 If the system disk is on an HSC drive, copy and edit CIBOO.CMD and CIGEN.CMD.

If the system disk is on a local drive, copy and edit the files whose first two letters match the device code of the drive holding the system disk. For example, if the system disk is on an RP07 drive, find the file names that begin with DB (DB is the device code for an RP07 disk drive).

If the third character in the file name is a number, it stands for the unit number of a drive with a controller designation of A. For example, DB1BOO.CMD boots an RP07 disk drive with a controller designation of A and a unit number of one.

If the third character in the file name is a letter, it stands for the controller designation. There is no corresponding unit number. For example, DBCBOO.CMD boots an RP07 disk drive with a controller designation of C.

5   Use the Exchange Utility to copy the appropriate files from the console RX01 to your current directory on the system disk. Enter the COPY command in the following format:

```
$  EXCHANGE COPY CSA1:filename.CMD *
```

Substitute the file name of the boot command procedure for *filename*. For example, to make a copy of CIBOO.CMD and CIGEN.CMD, enter the following commands and press Return after each one:

```
$  EXCHANGE COPY CSA1:CIBOO.CMD *
$  EXCHANGE COPY CSA1:CIGEN.CMD *
```

6   If the third character of the file name is a number, go to step 7.

If the file name starts with CI or if the third character of the file name is a letter, edit the file as follows:

a.   Add a command to deposit the unit number of the drive holding the system disk in register 3 (R3). Use hexadecimal notation.

For example, suppose the system disk is on an RP07 disk drive with a controller designation of C and a unit number of three. After you copy DBCBOO.CMD and DBCGEN.CMD, add the following line to both files:

```
DEPOSIT R3 3    !DISK DRIVE UNIT NUMBER
```

Suppose the system disk is on an HSC-based RA60 disk drive with a unit number of two. After you copy CIBOO.CMD and CIGEN.CMD, add the following line to both files:

```
DEPOSIT R3 2    !DISK DRIVE UNIT NUMBER
```

b.   If you copied CIBOO.CMD and CIGEN.CMD, add a command to both files to deposit the HSC node number in register 2 (R2). Use the following format:

```
DEPOSIT R2 node-number
```

Substitute a hexadecimal value between 0 and F for *node-number*. For example, if the HSC is node number 12 (hexadecimal C), add the following command:

```
DEPOSIT R2 C
```

Note: **If the drive holding the system disk is attached to two HSC controllers, deposit both node numbers in register 2 (R2). Put the greater number in hexadecimal digits 3 and 2. Put the smaller number in digits 1 and 0. For example, if one HSC is node number 18 (hexadecimal 12) and the other is node number 10 (hexadecimal A), add the following command:**

```
DEPOSIT R2 120A
```

7 Rename the files. Enter the RENAME command in the following format:

```
$  RENAME filename.CMD DEFBOO.CMD
$  RENAME filename.CMD DEFGEN.CMD
```

Substitute the file name of the boot command procedure for *filename*. For example, to rename CIBOO.CMD and CIGEN.CMD, enter the following commands and press Return after each one:

```
$  RENAME CIBOO.CMD DEFBOO.CMD
$  RENAME CIGEN.CMD DEFGEN.CMD
```

8 Use the Exchange Utility to copy DEFBOO.CMD and DEFGEN.CMD to the console RXO1. Enter the following commands and press Return after each one:

```
$  EXCHANGE COPY DEFBOO.CMD CSA1:DEFBOO.CMD
$  EXCHANGE COPY DEFGEN.CMD CSA1:DEFGEN.CMD
```

9 When you are finished, enter the following command and press Return:

```
$  DISMOUNT CSA1
```

10 To secure the console RX01 from unauthorized access, you must enter the following command and press Return:

```
$  MOUNT/FOREIGN/SYSTEM/NOWRITE/NOASSIST CSA1
```

Now you can use DEFBOO.CMD and DEFGEN.CMD to boot the VMS operating system, as described in the following sections. If you change the system configuration in the future, use the previous procedure to modify DEFBOO.CMD and DEFGEN.CMD.

3.1.3.1 Booting with DEFBOO.CMD

You can cause the system to boot using DEFBOO.CMD when you do any of the following:

- Set the Auto Restart switch to ON. Turn on the power. The system uses DEFBOO.CMD to boot automatically.

- Set the keylock switch to Local. At the console-mode prompt (>>>), enter the following command to execute DEFBOO.CMD:

```
>>>  B
```

- Set the keylock switch to Local. When you see the console-mode prompt (>>>) displayed on the console terminal, push the Boot switch. The system executes DEFBOO.CMD.

- Set the Auto Restart switch to ON. Execute SHUTDOWN.COM and specify the auto reboot option. The system uses DEFBOO.CMD to reboot automatically.

- If the Auto Restart switch is set to On when the system shuts down due to a bugcheck, the system uses DEFBOO.CMD to reboot automatically.

The system sometimes uses DEFBOO.CMD when a power failure occurs. If the Auto Restart switch is set to On when a power failure occurs and the contents of memory are lost, the system executes DEFBOO.CMD when power is restored.

If a power failure occurs and the battery backup unit saves the contents of memory, the system restarts execution where it was interruped by the power failure.

3.1.4 Booting with DEFGEN.CMD—Conversational Boot

A conversational boot is most commonly used in research and development environments 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:

1 Make sure the console RX01 is in the console diskette drive (CSA1) and the keylock switch is set to Local.

2 If the VMS operating system is not running, go to step 3.

If the VMS operating system is running, log in to 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
```

3 Press Ctrl/P. At the console-mode prompt (>>>), enter the HALT command and press Return:

```
>>> HALT
```

4 To begin the conversational boot, enter the following command and press Return:

```
>>> @DEFGEN
```

5 At the SYSBOOT> prompt, you can enter any of the SYSGEN commands listed in Table 3–2. For more information about these SYSGEN commands, see the *VMS System Generation Utility Manual*.

6 When you finish using the SYSGEN commands, enter the CONTINUE command to complete the boot process.

Table 3–2   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 19-JUN-1990 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
```

Startup and Shutdown Procedures
3.1 Booting the System

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 autoconfigure 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
$
```

3.2 Booting From SYSF During an Upgrade

When you perform a VMS upgrade, you must boot the system from the SYSF directory on the system disk. To boot from [SYSF], create a command procedure named SYSFBOO.CMD.

To create SYSFBOO.CMD, use the following procedure:

Note: **This procedure assumes that you have installed and booted the VMS operating system and are logged in to the SYSTEM account.**

1 Make sure that the console RX01 is in the console diskette drive (CSA1).

2 Log in to the SYSTEM account.

3 To connect the console drive, enter the following commands and press Return after each one:

```
$  RUN SYS$SYSTEM:SYSGEN
SYSGEN>  CONNECT CONSOLE
SYSGEN>  EXIT
```

4 Use the Exchange Utility to copy DEFBOO.CMD from the console RX01 to your current directory on the system disk. Enter the following command and press Return:

```
$  EXCHANGE COPY CSA1:DEFBOO.CMD *
```

5 Edit the line in DEFBOO.CMD line that deposits a value in register 5 (R5) as shown in the following code example:

```
DEPOSIT R5 F0000000
```

6 Rename DEFBOO.CMD to SYSFBOO.CMD as shown in the following code example:

```
$   RENAME DEFBOO.CMD SYSFBOO.CMD
```

7 Use the Exchange Utility to copy SYSFBOO.CMD to the console RX01 as shown in the following code example:

```
$   EXCHANGE COPY SYSFBOO.CMD CSA1:SYnBOO.CMD
```

8 When you are finished, enter the following command and press Return:

```
$   DISMOUNT CSA1
```

9 To secure the console RX01 from unauthorized access, you must enter the following command and press Return:

```
$   MOUNT/FOREIGN/SYSTEM/NOWRITE/NOASSIST CSA1
```

To boot from the SYSF root, use the following procedure:

1 Make sure the console RX01 is in the console diskette drive (CSA1) and the keylock switch is set to Local.

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

If the VMS operating system is running, log in to 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
```

3 Press Ctrl/P. At the console-mode prompt (>>>), enter the HALT command and press Return:

```
>>>   HALT
```

4 Use the following command to boot from SYSF:

```
>>>   B SYSF
```

3.3   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 the *Guide to Setting Up a VMS System*, to add a copy of the VMS operating system to another root directory on the system disk.

To boot from a directory other than [SYSO], create a command procedure named SYnBOO.CMD, where *n* stands for the name of the other root directory on the system disk. To create SYnBOO.CMD, use the following procedure:

1 Make sure that the console RX01 is in the console diskette drive (CSA1).

2 Log in to the SYSTEM account.

3 To connect the console drive, enter the following commands and press Return after each one:

```
$  RUN SYS$SYSTEM:SYSGEN
SYSGEN>  CONNECT CONSOLE
SYSGEN>  EXIT
```

4 Use the Exchange Utility to copy DEFBOO.CMD from the console RX01 to your current directory on the system disk. Enter the following command and press Return:

```
$  EXCHANGE COPY CSA1:DEFBOO.CMD *
```

5 Edit DEFBOO.CMD. Change the line that deposits a value in register 5 (R5). This line contains the comment *!software boot flags*. The value is a hexadecimal number with eight bits. For example:

```
DEPOSIT R5 10000000     !software boot flags
```

Change the left-most digit of the value to reflect the name of the root directory from which you want to boot. For example, if you want to boot from the directory named [SYSC], change the line as follows:

```
DEPOSIT R5 C0000000     !software boot flags
```

6 Rename DEFBOO.CMD to SYnBOO.CMD, where *n* stands for the name of the other root directory. Use the following format:

```
$  RENAME DEFBOO.CMD SYnBOO.CMD
```

For example, if the directory is named [SYSC], enter the following command and press Return:

```
$  RENAME DEFBOO.CMD SYCBOO.CMD
```

7 Use the Exchange Utility to copy SYnBOO.CMD to the console RX01. Use the following format:

```
$  EXCHANGE COPY SYnBOO.CMD CSA1:SYnBOO.CMD
```

For example, if the file name is SYCBOO.CMD, enter the following command and press Return:

```
$  EXCHANGE COPY SYCBOO.CMD CSA1:SYCBOO.CMD
```

8 When you are finished, enter the following command and press Return:

```
$  DISMOUNT CSA1
```

9 To secure the console RX01 from unauthorized access, you must enter the following command and press Return:

```
$  MOUNT/FOREIGN/SYSTEM/NOWRITE/NOASSIST CSA1
```

To boot from a different directory on the system disk, use the following procedure:

1 Make sure the console RX01 is in the console diskette drive (CSA1) and the keylock switch is set to Local.

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

If the VMS operating system is running, log in to 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
```

3 Press Ctrl/P. At the console-mode prompt (>>>), enter the HALT command and press Return:

```
>>>  HALT
```

4 Use SYnBOO.CMD to boot from a different directory. For example, to boot from [SYSC], enter the following command and press Return:

```
>>>  B SYC
```

3.4 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*.

3.5 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 console diskette, 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 Customer 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 19-JUN-1990 15:00:00.00
```

If the system does not display this message, a software problem has probably occcurred. 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.

3.6 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 console-mode commands after the shutdown completes.

If you want the VMS operating system to reboot automatically, set the Auto Restart switch to ON. If you want to enter console-mode commands, stop the system after the shutdown completes.

You can perform the following three types of shutdown operations:

1   **An orderly shutdown with SYS$SYSTEM:SHUTDOWN.COM**–See Section 3.6.1.

2   **An emergency shutdown with OPCCRASH.EXE**–See Section 3.6.2.

3   **An emergency shutdown with CRASH** –See Section 3.6.3.

3.6.1 Orderly Shutdown with SHUTDOWN.COM

SHUTDOWN.COM shuts down the system while performing maintenance functions such as disabling future logins, stopping the batch and printer queues, dismounting mounted volumes, and stopping user processes. To use the SHUTDOWN command procedure, log in to the SYSTEM account, enter the following command, and press Return:

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

To halt the system after the procedure completes, press Ctrl/P and enter the HALT command at the console-mode prompt (>>>).

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

3.6.2 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 halt the system after the procedure completes, press Ctrl/P and enter the HALT command at the console-mode prompt (>>>).

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

If OPCCRASH fails, use the emergency crash procedure described in Section 3.6.3

3.6.3 Emergency Shutdown with CRASH

Note: Use CRASH only if the system is hung and you cannot log in to the SYSTEM account to use SHUTDOWN 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 Make sure the console RX01 is in the console diskette drive (CSA1) and the keylock switch is set to Local.

2 Press Ctrl/P to stop the system. At the console-mode prompt (>>>), enter the HALT command and press Return. For example:

```
>>>  HALT
```

3 Enter the following command and press Return:

```
>>>  @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.

4 CRASH halts the system, displays the contents of the program counter, and displays the console-mode prompt (>>>).

If the Auto Restart switch is set to ON, the system reboots after CRASH runs. If the system does not reboot automatically, reboot it manually.

5 After the system reboots you can examine the dump file. To examine the dump file, log in to 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.*

4 Backup Procedures

Use Standalone BACKUP to make a complete backup of the system disk. Standalone BACKUP is a a version of the Backup Utility that Runs without the support of the entire VMS system.

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 the loss of system files if they are accidentally deleted. (*After* you install or upgrade the VMS operating system, or any other software products, you should back up the system disk.) If a system file is deleted and renders the system disk inoperable, you can restore the backup copy and continue to use the system.

- In case the 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.

- 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, which happens when files are stored noncontiguously on the disk. The BACKUP command creates a copy of the system 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 you use a fixed (nonremovable) system disk, back it up to a disk or magnetic tape. Then restore the files to the original system disk.

This chapter contains information on the following:

- Installing and booting standalone BACKUP on the system disk
- Installing and booting standalone BACKUP on RX01 floppy diskettes
- Backing up and restoring the system disk

You should also make a copy of the console RX01 in case the original becomes damaged. Section 4.4 describes using CONSCOPY.COM to do this.

4.1 Using Standalone BACKUP

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.

The VMS Backup Utility lets you create and restore backup copies of files, directories, and user disks. However, 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 create a copy of the system disk, the copy will not contain portions of the files that were in memory and data about files not yet written back to the disk (cache).

Before you use standalone BACKUP, you must shut down the VMS operating system. The shutdown procedure sends the contents of the caches back to the disk and closes any open files. By shutting the system down and using standalone BACKUP, you can make an exact copy of the system disk.

You can keep standalone BACKUP on the system disk, RX01 floppy diskettes, or any other media that your system supports. Digital recommends that you keep standalone BACKUP on the system disk and on floppy diskettes. Usually you boot standalone BACKUP from the system disk because it saves time. However, you need a copy of standalone BACKUP on floppy diskettes in case the system disk becomes damaged. If you have a magnetic tape distribution kit, you received standalone BACKUP on floppy diskettes.

4.1.1 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 in to 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 4.1.2.

4.1.2   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   Make sure the console RX01 is in the console diskette drive (CSA1).

2   Log in to the SYSTEM account.

3   To connect the console drive to the system, enter the following commands and press Return after each one:

```
$  Run SYS$SYSTEM:SYSGEN
SYSGEN>  CONNECT CONSOLE
SYSGEN>  EXIT
```

4   Use the Exchange Utility to copy DEFBOO.CMD to the current directory on the system disk. Enter the following command and press Return:

```
$  EXCHANGE COPY CSA1:DEFBOO.CMD XEFBOO.CMD
```

5   Edit XEFBOO.CMD. Change the line that deposits a value in register 5 (R5). Change the left-most digit so that it specifies the [SYSE] directory. For example:

```
DEPOSIT R5 E0000000  !DESIGNATED ROOT IS SYSE
```

6   Exit from the editor to save the modified version of the file.

7   To copy XEFBOO.CMD to the console RX01, enter the following command and press Return:

```
$  EXCHANGE COPY XEFBOO.CMD CSA1:XEFBOO.CMD
```

8   When you are finished, enter the following command and press Return:

```
$  DISMOUNT CSA1
```

9   To secure the console RX01 from unauthorized access, you must enter the following command and press Return:

```
$  MOUNT/FOREIGN/SYSTEM/NOWRITE/NOASSIST CSA1
```

After you copy XEFBOO.CMD to the console RX01, you can use it to boot standalone BACKUP from the system disk.

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

1   Make sure the console RX01 is in the console diskette drive (CSA1) and the keylock switch is set to Local.

2 If the VMS operating system is not running, go to step 3.

   If the VMS operating system is running, log in to 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
   ```

3 Press Ctrl/P. At the console-mode prompt (>>>), enter the HALT
   command and press Return. For example:

   ```
   >>>  HALT
   ```

4 Enter the following command and press Return:

   ```
   >>>  @XEFBOO
   ```

5 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)  19-JUN-1990 15:00
   ```

6 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$DJA3:    device type RA60
   Available device MINE$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.

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

   ```
   %BACKUP-I-IDENT, standalone BACKUP V5.4; the date is 19-JUN-1990 15:00
   $
   ```

To make a backup copy of the system disk, go to Section 4.2.

To restore a backup copy of the system disk, go to Section 4.3.

4.1.3 Installing Standalone BACKUP on Floppy Diskettes

Digital recommends that you keep standalone BACKUP on floppy
diskettes in case the system disk becomes damaged. To install standalone
BACKUP on floppy diskettes, use the following procedure. The procedure
takes approximately 12 minutes.

Note: **If you have the VMS magnetic tape distribution kit, you already
have standalone BACKUP on floppy diskettes. If the original
floppy diskettes become damaged or you want to make extra
copies, use this procedure.**

1 Obtain five RX01 floppy diskettes. Affix a paper label to each one. Use a felt-tip pen to write a name on each one. Use the following names:

> S/A BKUP RX01 V5.4 1/5
> S/A BKUP RX01 V5.4 2/5
> S/A BKUP RX01 V5.4 3/5
> S/A BKUP RX01 V5.4 4/5
> S/A BKUP RX01 V5.4 5/5

A paper label is the label affixed to a diskette. The procedure displays a volume label, not the paper label, in messages. A volume label is the name the VMS operating system uses to refer to a floppy diskette.

2 Log in to the SYSTEM account.

3 Enter the following command and press Return:

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

4 The procedure asks you for the name of the target device. Type CSA1 and press Return. For example:

```
%STABACKIT-I-SYMDEL, all global symbols deleted
Enter the name of the device on which to build the kit:  CSA1
```

5 The procedure displays the following messages. Press Return (for YES) after each question.

```
The standalone kit requires five floppy diskettes. The first four
floppy diskettes contain the standalone VMS system files, the last
floppy diskette contains the BACKUP application image.

The system kit and the application kit can be built separately.

Do you want to build the system kit?  [Yes/No, default Yes]:

Do you want to build the application kit?  [Yes/No, default Yes]:
```

6 The procedure gives you two options that you can use to verify the reliability of the standalone BACKUP kit. It asks if you want to use the ANALYZE/MEDIA Utility to check for bad blocks on the target floppy diskette. Using ANALYZE/MEDIA adds five minutes to the time it takes the procedure to Run.

It also asks if you want to verify each file that it copies. This adds another five minutes to the time it takes the procedure to Run.

Digital suggests that you type Y and press Return when the procedure asks the following question:

```
Do you want to scan for bad blocks? [Yes/No, default No]:
```

The procedure displays the following message:

```
Do you want to verify copies? [Yes/No, default No]:
```

Press Return (for NO). Copy verification is only relevant for tape media.

7 The procedure displays the following messages:

```
Sysgen parameters for standalone VMS have been placed in file
                SYS$SYSROOT:<SYSUPD>VAXVMSSYS.PAR-TEMP-46E00121;1

Please place the first system floppy diskette in drive _CSA1:.
This volume will receive the volume label SYSTEM_1.

Enter "YES" when ready:
```

Backup Procedures
4.1 Using Standalone BACKUP

8   Insert the floppy diskette labeled S/A BKUP RX01 V5.4 1/5 in the console diskette drive. When you are ready to continue, type Y and press Return.

The procedure displays the following message:

```
Analyzing floppy diskette in _CSA1: for bad blocks . . .
```

If there are not any bad blocks, the procedure displays the following message:

```
%BAD-I-LST00BK, Device _CSA1: contains a total of 494 blocks; 0
defective blocks detected
```

If there are bad blocks, the procedure displays the following message:

```
Please replace the defective floppy diskette cartridge in _CSA1: with
another blank floppy diskette.
```

Discard the floppy diskette with bad blocks. Obtain and label a new floppy diskette and insert it into the console diskette drive.

9   After running ANALYZE/MEDIA, the procedure mounts the floppy diskette, copies a set of system files, and displays a number of informational messages. For example:

```
%MOUNT-I_MOUNTED, SYSTEM_1   mounted on _CSA1:
%CREATE-I-CREATED, _CSA1:<SYS0.SYSEXE> created
%CREATE-I-CREATED, _CSA1:<SYS0.SYS$LDR> created
      .
      .
      .
```

10   When the last file is copied, the procedure asks you to insert the next floppy diskette. Remove the floppy diskette labeled S/A BKUP RX01 V5.4 1/5. Insert the floppy diskette labeled S/A BKUP RX01 V5.4 2/5. When you are ready to continue, type Y and press Return. For example:

```
Please place the second system floppy diskette in drive _CSA1:.
This volume will receive the volume label SYSTEM_2.

Enter "YES" when ready:  Y
```

The ANALYZE/MEDIA Utility Runs as described in the previous step.

11   Repeat steps 8 through 10 for each floppy diskette.

12   After files are copied to the last floppy diskette, the procedure displays the following message:

```
The console volume will be mounted /NOWRITE for protection
Please make sure that the original console floppy diskette is
in the drive CSA1:.

Enter "YES" when ready:
```

13   Remove the floppy diskette labeled S/A BKUP RX01 V5.4 5/5. Insert the console RX01. When you are ready to continue, type Y and press Return. When the procedure finishes, it displays the following message:

```
The kit is complete.
```

4.1.4 Booting Standalone BACKUP from Floppy Diskettes

If the system disk containing standalone BACKUP becomes unusable, you can boot standalone BACKUP from RX01 floppy diskettes. You need the five floppy diskettes that contain standalone BACKUP. They are labeled as follows:

Paper Label[1]	Volume Label[2]
S/A BKUP RX01 V5.4 1/5	SYSTEM_1
S/A BKUP RX01 V5.4 2/5	SYSTEM_2
S/A BKUP RX01 V5.4 3/5	SYSTEM_3
S/A BKUP RX01 V5.4 4/5	SYSTEM_4
S/A BKUP RX01 V5.4 5/5	BACKUP

[1]A paper label is a label affixed to a floppy diskette.

[2]A volume label is the name the VMS operating system uses to refer to a floppy diskette. The procedure displays the volume label, not the paper label, in messages.

The procedure asks you to place the five floppy diskettes containing standalone BACKUP, successively, in the console drive.

1 Make sure the console RX01 is in the console diskette drive and the keylock switch is set to Local.

2 If the VMS operating system is not running, go to step 3.

If the VMS operating system is running, log in to 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
```

3 Press Ctrl/P. At the console-mode prompt (>>>), enter the HALT command and press Return. For example:

```
>>>  HALT
```

4 Enter the following command and press Return:

```
>>> B CS1
```

The procedure displays the following messages:

```
CPU HALTED
INIT SEQ DONE
LOAD DONE, 0000A400 BYTES LOADED
```

Notice that the red Attn light goes off, and the green Run light goes on. The procedure displays the following message:

```
Please remove the volume "78X console" from the console device.
Insert the first standalone system volume and enter "YES" when ready:
```

5 Remove the console RX01 and insert the floppy diskette labeled S/A
BKUP RX01 V5.4 1/5 in the drive. When you are ready to continue,
type Y and press Return. The procedure displays the following
message:

```
Resuming load operation on volume "SYSTEM_1", please stand by...
```

Approximately five minutes later the procedure displays the following
message:

```
Please remove the volume "SYSTEM_1" from the console device.
Insert the next standalone system volume and enter "YES" when ready:
```

6 Remove the S/A BKUP RX01 V5.4 1/5 floppy diskette and insert the
floppy diskette labeled S/A BKUP RX01 V5.4 2/5 in the drive. When
you are ready to continue, type Y and press Return. The procedure
displays the following message:

```
Resuming load operation on volume "SYSTEM_2", please stand by...
```

Approximately one minute later the procedure displays the following
message:

```
      VAX/VMS Version V5.4 Major version id = 1 Minor version id = 0
```

```
Please remove the volume "SYSTEM_2" from the console device.
Insert the next standalone system volume and enter "YES" when ready:
```

7 Remove the S/A BKUP RX01 V5.4 2/5 floppy diskette and insert the
floppy diskette labeled S/A BKUP RX01 V5.4 3/5 in the drive. When
you are ready to continue, type Y and press Return. The procedure
displays the following message:

```
Resuming load operation on volume "SYSTEM_3", please stand by...
```

Approximately one minute later the procedure displays the following
message:

```
Please remove the volume "SYSTEM_3" from the console device.
Insert the next standalone system volume and enter "YES" when ready:
```

8 Remove the S/A BKUP RX01 V5.4 3/5 floppy diskette and insert the
floppy diskette labeled S/A BKUP RX01 V5.4 4/5 in the drive. When
you are ready to continue, type Y and press Return. The procedure
displays the following message:

```
Resuming load operation on volume "SYSTEM_4", please stand by...
```

9 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)  19-JUN-1990 15:00
```

10 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.

11 The procedure displays the following messages:

```
Please remove the volume "SYSTEM_4" from the console device.
Insert the standalone application volume and enter "YES" when ready:
```

Remove the S/A BKUP RX01 V5.4 4/5 floppy diskette and insert the floppy diskette labeled S/A BKUP RX01 V5.4 5/5 in the drive. When you are ready to continue, type Y and press Return. The procedure displays the following message:

```
Resuming load operation on volume "BACKUP", please stand by...
```

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

```
%BACKUP-I-IDENT, standalone BACKUP V5.4; the date is 19-JUN-1990 15:00
$
```

To backup the system disk, go to Section 4.2.

To restore the system disk, go to Section 4.3.

4.2 Backing Up the System Disk

Standalone BACKUP uses a subset of Backup Utility qualifiers to back up and restore your system disk. It is especially important that you understand the BACKUP command qualifiers /IMAGE and /PHYSICAL 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 Section 4.1.2 or Section 4.1.4.

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 a VAX–11/780 and VAX–11/785, see Table 2–1.

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 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 4.3.

```
$  BACKUP/IMAGE/VERIFY DUA0: MSA0:JUN_19_1990.BCK/REWIND/LABEL=SYSDSK
```

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

```
%BACKUP-I-PROCDONE, Operation completed. Processing finished at 19-JUN-1990 15:00
If you do not want to perform another standalone BACKUP operation,
use the console to halt the system.

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

7   Press Ctrl/P. At the console-mode 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.) You can change most volume parameters later with the SET VOLUME command.**

However, to change the CLUSTER_SIZE you must back up the system disk to a disk that has been previously initialized with the CLUSTER_SIZE that you want. To prevent the BACKUP command from reinitializing the target disk, use the /NOINITIALIZE qualifier. For more information about initializing a disk, see the *Guide to Maintaining a VMS System*. For more information on the BACKUP command, see the *VMS Backup Utility Manual*.

4.3   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 4.1.2 or Section 4.1.4.

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 a VAX–11/780 and VAX–11/785, see Table 2–1.

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 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 MSA0:JUN_19_1990.BCK/REWIND DUA1:
```

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

```
%BACKUP-I-PROCDONE, Operation completed. Processing finished at 19-JUN-1990 15:00
If you do not want to perform another standalone BACKUP operation,
use the console to halt the system.

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

8   Press Ctrl/P. At the console-mode prompt (>>>), enter the HALT command and press Return.

9   Reboot the system.

4.4   Backing Up the Console RX01

Make a backup copy of the console RX01 to protect against corruption or loss of the original. First, use CONSCOPY.COM to transfer the files on the console RX01 to a directory on the system disk. Then use CONSCOPY.COM to *restore* the files to a new floppy diskette.

To transfer the console files to the system disk, use the following procedure:

1   Make sure the console RX01 is in the console diskette drive (CSA1).

2   Log in to the SYSTEM account.

3   Enter the following command and press Return:

```
$  @SYS$UPDATE:CONSCOPY
```

The procedure displays the following messages:

```
 S Y S $ U P D A T E : C O N S C O P Y . C O M

     Save or restore a VMS console medium.

Which CPU kit do you want to build?

   78X includes 11/780 and 11/785
   8600 includes 8650
   8200 includes 8250, 8300 and 8350

[8600, 8200, 78X, 750 or 730, default 78X]:
```

4   Press Return to accept the default, 78X. The procedure displays the following messages:

```
     A SAVE operation involves copying the console medium to
     an RT-11  virtual volume, which is a Files-11 file that
     is an image of the RT-11 console volume.

     A RESTORE operation involves copying the entire contents
     of a virtual volume to a console medium.
```

5   When the procedure asks which operation you want, type SAVE and press Return. For example:

```
Do you want to SAVE or RESTORE your console floppy?:  SAVE
```

6   The procedure asks you for the name of the *virtual disk* that you want the files to be saved on. Press Return to select the default (SYS$DISK:CONSOLE.DSK). For example:

```
Enter file name of virtual disk [default SYS$DISK:CONSOLE.DSK]:)
```

7   To verify the operation, press Return (for YES) in response to the following question:

```
Do you want log messages as files are copied? [Y/N, default YES]
```

8   The procedure asks for the name of the console drive. Type CSA1: and press Return. For example:

```
Enter console device drive (DDCU:):  CSA1:
```

9   When the procedure displays the following message, press Return (the console RX01 is already in the drive):

```
Put your console floppy into drive _CSA1:,
and type Return when ready:
```

After you press Return, the procedure mounts the console RX01 and uses the Exchange Utility to begin the *save* operation. The procedure displays several EXCHANGE messages, file header information, and a list of the files that are being saved. When the procedure is complete, it displays the following message:

```
The SAVE of your console floppy is complete.
```

To transfer the files that are on the system disk to a new floppy diskette, use the following procedure:

1 Enter the following command and press Return:

```
$  @SYS$UPDATE:CONSCOPY
```

The procedure displays the following messages:

```
 S Y S $ U P D A T E : C O N S C O P Y . C O M

     Save or restore a VMS console medium.

Which CPU kit do you want to build?

   78X includes 11/780 and 11/785
   8600 includes 8650
   8200 includes 8250, 8300 and 8350

[8600, 8200, 78X, 750 or 730, default 78X]:
```

2 Press Return to accept the default, 78X. The procedure displays the following messages:

```
       A SAVE operation involves copying the console medium to
       an RT-11  virtual volume, which is a Files-11 file that
       is an image of the RT-11 console volume.

       A RESTORE operation involves copying the entire contents
       of a virtual volume to a console medium.
```

3 When the procedure asks which operation you want, type RESTORE and press Return. For example:

```
Do you want to SAVE or RESTORE your console floppy?:  RESTORE
```

4 The procedure asks for the name of the *virtual disk* from which the files are to be restored. Press Return to select the default (SYS$DISK:CONSOLE.DSK). For example:

```
Enter file name of virtual disk [default SYS$DISK:CONSOLE.DSK]:
```

5 To verify the operation, press Return in response to the following question:

```
Do you want log messages as files are copied? [Y/N, default YES]
```

6 The procedure asks for the name of the console drive. Type CSA1: and press Return. For example:

```
Enter console device drive (DDCU:):  CSA1:
```

7 The procedure displays the following message:

```
Put your console floppy into drive _CSA1:,
and type Return when ready:
```

Remove the console RX01 from the console diskette drive. Insert the new floppy diskette in the drive. Press Return when you are ready to continue.

8 The procedure mounts the floppy diskette and uses the Exchange Utility to begin the *restore* operation. The procedure displays several EXCHANGE messages, file header information, and a list of the files that are being restored. When the procedure is complete, it displays the following message:

```
The RESTORE of your console floppy is complete.
```

Use the console RX01 that you just created to make sure it works. Treat the original as the backup copy.

A   Initializing Multiport (Shared) Memory Units

Multiport memory units vary in size from 256K to 2M (the size of a unit is displayed on its front panel). You can connect up to two multiport memory units to a single processor. Up to four processors can share one multiport memory unit.

To initialize a multiport memory unit, Run SYSGEN and enter the SHARE command with the /INITIALIZE qualifier. The VMS operating system does the following:

- Looks at the specified multiport memory unit. Checks to see if any processor with a port on the unit is using it.

- If no other processor is using the unit, initializes the unit.

- If another processor is using the unit, connects the unit.

If you omit the /INITIALIZE qualifier and the multiport memory unit has not been initialized, you get an error condition.

A multiport memory unit managed by the VMS operating system contains the following preallocated structures:

- Common data page—Description of VMS data structure and quotas for the shared memory

- Global section description (GSD) table—Total global sections, as specified in the SHARE command, times 100 bytes, rounded up to the next full page

- Mailbox table—Total mailboxes, as specified in the SHARE command, times 48 bytes, rounded up to the next full page

- CEF table—Total common event flag clusters, as specified in the SHARE command, times 80 bytes, rounded up to the next full page

- PRQ pool—Total interprocess or request messages, as specified in the SHARE command, times 64 bytes, rounded up to the next full page

- Dynamic pool—Number of blocks allocated to the pool, as specified in the SHARE command, times the size of each block, as specified in the SHARE command

- Global section bit map—One page

- Global sections—Size of multiport memory unit minus the sum of the above preallocated structures (that is, the remaining space)

For example, the following SHARE command specifies the values for a 256K multiport memory unit with four active ports. The results are shown in Table A–1.

Initializing Multiport (Shared) Memory Units

```
SYSGEN>   SHARE MPM0 SHR_MEM_1/INITIALIZE-
SYSGEN>   /GBLSECTIONS=32/MAILBOXES=32-
SYSGEN>   /CEFCLUSTERS=32/POOLBCOUNT=128-
SYSGEN>   /POOLBSIZE=128/PRQCOUNT=64
```

Table A–1   Values for Multiport Memory Structures

Structure	Value	Pages
CEF TABLE	32 x 80	= 5 pages
COMMON DATA PAGE	1	= 1 page
DYNAMIC POOL	128 x 128	= 32 pages
GLOBAL SECTIONS	512 - 57	= 455 pages
GLOBAL SECTION BIT MAP		= 1 page
GSD TABLE	32 x 100	= 7 pages
MAILBOX TABLE	32 x 48	= 3 pages
PRQ POOL	64 x 64	= 8 pages

Digital suggests the following guidelines in selecting values for the SHARE command:

- /CEFCLUSTERS, /GBLSECTIONS, and /MAILBOXES— Specify the maximum number of each type of structure required by all processors at any one time. The same structure being used by many processes on one or more processors counts as just one structure.

- /POOLBCOUNT and /POOLBSIZE—The primary use of the dynamic pool is to buffer mailbox messages. The size of a message is 28 bytes plus the data in the message. Since space from the pool is always allocated in whole blocks, the recommended block size is the median message size plus 28.

  A block size that is too small for a message requires extra system overhead to concatenate the message blocks into the user buffer and segment them out of the user buffer. The number of blocks should be sufficient to satisfy all messages that might be outstanding at once.

  If a mailbox request cannot be satisfied due to insufficient pool space, the requesting process enters a resource wait state or the request fails (if resource wait mode is not enabled), just as if the nonpaged dynamic pool were depleted. For this reason, you should overestimate space requirements in the dynamic pool.

- /PRQCOUNT—The system uses interprocessor request blocks to transfer requests among the VMS executive routines and mailbox drivers on the different processors. PRQs are allocated and deallocated rapidly, so a large number should not be needed. The default value normally suffices. If an executive or driver request cannot be satisfied because PRQs are depleted, the requesting routine waits for an available PRQ.

Calculate the space remaining for the global sections and determine whether it is sufficient. If the space is insufficient, you might reduce the size of the dynamic pool. However, insufficient space really suggests the need for a larger or additional multiport memory unit.

If a multiport memory unit is usually a part of the system configuration, include the SYSGEN commands in SYSTARTUP_V5.COM.to initialize and connect it.

Glossary

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

boot command procedure: A program stored on the console RX01 that is used to boot the VMS operating system from a specified drive. Digital provides a boot command procedure for each device that the system 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.

CI750: An interface between the memory interconnect (CMI) of the CPU on a VAX–11/750 and the computer interconnect (CI).

CI780: An interface between the synchronous backplane interface (SBI) of the CPU on the VAX–11/780 and VAX 8600 families and the computer interconnect (CI).

computer interconnect: A computer interconnect (CI) is a type of I/O subsystem. It links VAX computers to each other and to HSC devices.

console mode: In console mode you control the system through the console subsystem.

console RX01: The RX01 diskette that contains the console program. It is not shipped as part of the VMS distribution kit. The console RX01 is used in the console diskette drive (CSA1).

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.

Glossary

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.

Mass Storage Control Protocol (MSCP): The protocol used to communicate between a VAX computer and a disk or tape controller. An MSCP server makes Local MASSBUS, UNIBUS, and UDA50 disks accessible to all the nodes in a VAXcluster environment.

MASSBUS: A high-speed I/O subsystem. Some of the devices that can be connected to the MASSBUS are RM05 disk drives, RP07 disk drives, and TA78 magnetic tape drives.

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.

program mode: In program mode you control the system through the VMS operating system.

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

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

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 computers. In addition, each computer has its own directory on the system disk that contains its page, swap, and dump files.

UDA50: An intelligent disk drive controller that supports up to four disk drives on the UNIBUS.

UNIBUS: A medium-speed I/O subsystem. Some of the devices that can be connected to the UNIBUS are UDA50's, RL02 disk drives, and TU81 magnetic tape drives.

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.

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