OpenVMS Upgrade/Installation: VAX 4000 Series, MicroVAX, VAXstation, and VAXserver 32/33/34/35/36/38/3900 Series

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This document supplements the current version of the *Upgrade and Installation Manual* with information specific to VAX 4000 and MicroVAX, VAXstation, and VAXserver 3200, 3300/3400, 3500/3600, and 3800/3900 series computers. This information includes startup, shutdown, and backup procedures.

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Preface

This supplement contains installation and upgrade information specific to VAX
4000 and MicroVAX, VAXstation, and VAXserver 3200, 3300/3400, 3500/3600,
and 3800/3900 series computers. Use it in conjunction with the *Upgrade and
Installation Manual*.

_____ **Important** _____

If you received factory installed software (VMS FIS) with your computer,
refer to that user documentation first for information about starting up
your system. If you subsequently need to upgrade or install the VMS
operating system, use the supplied VMS 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 *Upgrade and Installation Manual* for the version of
    the VMS operating system that you are installing or upgrading to.
    It is your primary source for step-by-step upgrade and installation
    procedures.

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

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

Intended Audience

This manual is intended for anyone responsible for installing or upgrading the
VMS operating system on a VAX 4000 or MicroVAX, VAXstation, or VAXserver
3200, 3300/3400, 3500/3600, or 3800/3900 series computer.

Document Structure

This manual is organized as follows:

*   Chapter 1 describes some of the tasks you need to perform when you install
    the VMS operating system from a tape cartridge, magnetic tape, or compact
    disc. These tasks include specifying device names, preparing for a VAXcluster
    (including dual-host) environment, booting standalone BACKUP, and booting
    the new system disk.

*   Chapter 2 contains instructions for starting up the system. It also describes
    system shutdown procedures.

*   Chapter 3 describes backup procedures you should perform on a regular basis.

- The Glossary defines key terms used in this manual.

- The Index helps you locate topics of interest.

Associated Documents

You should have the following documents:

- The current version of the *Upgrade and Installation Manual*, which is your primary source of upgrade and installation information. Use the *Upgrade and Installation Manual* in conjunction with this supplement when you are performing an installation or an upgrade.

- The current version of the *VMS Release Notes*, which provides important information about the VMS operating system. Read the *VMS Release Notes* before installing, upgrading, or updating the VMS operating system or using your VAX computer.

- The *VAXcluster Systems for OpenVMS*, which provides information you will need to configure your system in a cluster environment.

- The *OpenVMS System Management Utilities Reference Manual*, which provides information about setting or modifying specific system parameters.

- The *OpenVMS Delta/XDelta Debugger Manual*, which provides information about booting the system with XDELTA.

- The *VMS System Dump Analyzer Utility Manual*, which provides information about using the System Dump Analyzer (SDA) to examine a dump file if you have used CRASH commands to shut down the system.

- The hardware manuals that are supplied with your VAX, MicroVAX, VAXstation, or VAXserver computer, including the documents supplied with your monitor, compact disc drive, and InfoServer system. These manuals provide detailed information about your system hardware.

  If you received a VMS distribution compact disc (CD), read the documents supplied with it.

Conventions

In this manual, every use of VAX VMS means the OpenVMS VAX operating system.

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.
PF1 *x*	A sequence such as PF1 *x* indicates that you must first press and release the key labeled PF1, then press and release another key or a pointing device button.
Return	In examples, a key name enclosed in a box indicates that you press a key on the keyboard. (In text, a key name is not enclosed in a box.)

. . .	A horizontal ellipsis in examples indicates one of the following possibilities: • Additional optional arguments in a statement have been omitted. • The preceding item or items can be repeated one or more times. • Additional parameters, values, or other information can be entered.
. . .	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.
( )	In format descriptions, parentheses indicate that, if you choose more than one option, you must enclose the choices in parentheses.
[ ]	In format descriptions, brackets indicate optional elements. You can choose one, none, or all of the options. (Brackets are not optional, however, in the syntax of a directory name in a VMS file specification, or in the syntax of a substring specification in an assignment statement.)
{ }	In format descriptions, braces surround a required choice of options; you must choose one of the options listed.
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 manual.
italic text	Italic text emphasizes important information, indicates variables, and indicates complete titles of manuals. Italic text also represents information that can vary in system messages (for example, Internal error *number*), command lines (for example, /PRODUCER=*name*), and command parameters in text.
UPPERCASE TEXT	Uppercase text indicates a command, the name of a routine, the name of a file, or the abbreviation for a system privilege.
-	A hyphen in code examples indicates that additional arguments to the request are provided on the line that follows.
numbers	All numbers in text are assumed to be decimal, unless otherwise noted. Nondecimal radixes—binary, octal, or hexadecimal—are explicitly indicated.
mouse	The term *mouse* refers to any pointing device, such as a mouse, a puck, or a stylus.
MB1, MB2, MB3	MB1 indicates the left mouse button, MB2 indicates the middle mouse button, and MB3 indicates the right mouse button. (The buttons can be redefined by the user.)
PB1, PB2, PB3, PB4	PB1, PB2, PB3, and PB4 indicate buttons on the puck.
SB, SB	SB and SB indicate buttons on the stylus.

1

Installing the VMS Operating System

If you received factory installed software (VMS FIS) with your computer, refer to that user documentation first for information about starting up your system. Otherwise, start any VMS installation or upgrade by following the instructions in the current version of the *Upgrade and Installation Manual*, your primary source for step-by-step upgrade and installation procedures. The *Upgrade and Installation Manual* will direct you to this chapter for installation information that is specific to VAX 4000 and MicroVAX, VAXstation, and VAXserver 3200, 3300/3400, 3500/3600, and 3800/3900 series computers. This information includes the following:

- Turning the system on (Section 1.1.1)

- Determining device names (Section 1.1.2)

- Preparing for a VAXcluster environment (including dual-host configurations) (Section 1.2)

- Booting standalone BACKUP (Section 1.3)

- Booting the new system disk (Section 1.4)

_____ **Note** _____

The screen displays and examples in this manual depict the installation of VMS Version 5.5. Your screen displays reflect the version that you are installing.

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1.1 Before Installing VMS

The following sections describe operations with which you must be familiar before you install the VMS operating system. These include turning on the system and determining device names.

_____ **Note** _____

Before proceeding further, make sure you are familiar with the location and operation of the hardware components that comprise your system (for example, the tape, disk, or compact disc drive, and the monitor) and the corresponding switches and buttons for those devices, as described in the hardware-specific manual you received with each component of your system.

_____

1.1.1 Turning the System On

To turn the system on, follow these steps:

1. Make sure that the console terminal is online. See the owner's manual for your terminal if you do not know how to determine if the terminal is on line.

   During the software installation, enter all commands from the console terminal.

2. Make sure that the baud rate (transmit and receive speed) of the console terminal and the system is 9600 and that the console terminal is set to 8 bits, no parity transmit, and no parity receive (the default setting for all terminals except the LA120). See the owner's manual you received with your terminal to set these characteristics.

3. Make sure that the system is plugged in properly, and that all power cable, terminal cable, and peripheral device cable connections are secure.

4. For all systems (except the MicroVAX 3600 Model 650QF and 650QS systems, which do not have the buttons described here) make sure the Halt, Restart, Write Protect, and Ready buttons on the system control panel are in the out position. (If a button is currently pressed in, press it in again to return it to the out position.)

5. Set the Break Enable/Disable switch to Enable by moving the switch toward the circle with the dot inside it or by moving it to the up position (1), depending on your computer model.

6. Turn the computer on by moving the power switch to the 1 (On) position. The switch on most models glows orange. The fan inside the system box will come on.

   The first time a VAX 4000 or MicroVAX, VAXstation, or VAXserver 3200, 3300/3400, 3500/3600, or 3800/3900 series computer computer is turned on, the system should display the language-mode selection menu. If you have selected a language already, the processor proceeds directly to the diagnostic tests.

   If you are prompted to select a language from the list of languages that appears on your terminal screen, select the language you want to use by entering the number associated with that language and pressing the Return key. To save the language that you have selected, turn the Power-up Mode switch on the CPU panel to the left to the → (arrow) position.

   After you select the language and set the Power-up Mode switch, the system performs diagnostic tests. During these self-tests, the system begins a countdown sequence. The numbers in the sequence depend on the hardware installed in the system and the devices attached to the system. When the sequence completes, the console-mode prompt (>>>) should appear on the terminal screen.

   If the console-mode prompt (>>>) does not appear on the terminal screen, stop the system, as follows:

   • If your system has a Halt button, press it twice. Make sure the light on the Halt button goes off.

   • If your system does not have a Halt button, press the F5 (Break) key on the console terminal.

1.1.2 Determining and Specifying Device Names

Several times during the installation, you need to tell the system which drive holds the distribution media and which drive holds the system disk. Refer to a drive by its *device name*. A device name has the following format:

ddcu

where:

- *dd* is the *device code*. The device code indicates what type of device you are using. Section 1.1.2.3 lists device codes for the drives that can be part of a VAX 4000 or MicroVAX, VAXstation, or VAXserver 3200, 3300/3400, 3500 /3600, or 3800/3900 series computer.

- *c* is the *controller designation*. The controller provides the interface between the processor and the drive. A controller designation, which can be one of the alphabetic letters, A through Z, combines with the unit number to identify the location of the device.

- *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 device.

_____ **Note** _____

- The only part of the device 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.

- If your system contains an RA60, RA81, or RA82 disk, the unit number matches the number on the unit plug on the front of the drive.

- If your system contains an RA70 or RA90 disk, Digital Services will set the unit number to the value you request. If you intend to install the VMS operating system on an RA70 disk, write down the unit number and keep it with you during the installation. You will need the unit number to complete the installation.

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Sections 1.1.2.1 and 1.1.2.2 describe two methods of displaying the devices available to your system.

1.1.2.1 Displaying Devices in Console Mode

You can use the SHOW DEVICE command to display information about the devices attached to your system. For each device, the console displays the Digital Storage Systems Interconnect (DSSI) bus number (on specific VAX 4000 systems only), DSSI node number and name on the first line, and the device name and option on the second line. On systems that use the KFQSA adapter, the SHOW DEVICE command identifies the separate disk and tape controllers assigned to each device. A sample SHOW DEVICE display follows:

_____

[1] The first drive on a controller is usually assigned a unit number of 0, the next drive is assigned a unit number of 1, and so on. The range is determined by the bus that supports the device. For example, KDA50 disks can have unit numbers in the range of 0 to 254.

```
>>> SHOW DEVICE
DSSI Bus 0 Node 0 (SYSDSK)
-DIA0 (RF31)
DSSI Bus 0 Node 1 (R7EFGH)
-DIA1 (RF31)
DSSI Bus 0 Node 2 (TFABCD)
-MIA2 (TF85)
DSSI Bus 1 Node 0 (R7IJKL)
-DIB0 (RF31)
DSSI Bus 1 Node 1 (R7MNOP)
-DIB1 (RF31)
UQSSP Disk Controller 0 (123456)
-DUA0 (RF31)
UQSSP Tape Controller 0 (456789)
-MUA0 (TK70)
>>>
```

1.1.2.2 Displaying Devices in Program Mode (DCL)

If the VMS operating system is running (that is, if your system is in program mode), the SHOW DEVICES command displays status in formation on the specified device or, if no device is specified, on all devices. For example:

```
$ SHOW DEVICES
Device    Device    Error   Volume   Free    Trans   Mnt
 Name     Status    Count    Label   Blocks  Count   Cnt
DUA0:     Mounted     0       VMS     84242    32     1
DUA1:     Online      0
DUA2:     Online      0

Device    Device    Error   Volume   Free    Trans   Mnt
 Name     Status    Count    Label   Blocks  Count   Cnt
MUA0:     Online      0

Device    Device    Error
 Name     Status    Count
OPA0:     Online      0
RTA0:     Online      0
RTB0:     Online      0

Device    Device    Error
 Name     Status    Count
PUA0:     Online      0
XQA0:     Online      0
XQA1:     Online      0
```

Your system might not contain all of the devices shown, or it may contain additional devices.

1.1.2.3 Device Names

Tables 1–1 and 1–2 list names of devices supported by VAX 4000 and MicroVAX, VAXstation, and VAXserver 3200, 3300/3400, 3500/3600, 3800/3900 series computers. Your system might not contain all of the devices shown. See the hardware documentation that came with your computer for more information about specific devices and device names.

Table 1–1   Device Names (Excluding VAXstation 3200 Systems)

Device	Device Code[1]	Boot Name[1]
RA60 disk	DJAu	DJAu
RA70, RA81, RA82, or RA90 disk	DUAu	DUAu
RD54 fixed disk	DUAu	DUAu
RRD40 or RRD50 compact disc drive	DUcu	DUcu
RRD40 compact disc drive on a KZQSA controller	DKAu	DKAu
Magnetic tape	MUA0	MUA0
Q–bus Ethernet controller	XQA0, XQB0	XQA0, XQB0
InfoServer system	DAD	ES0, EZ0, XQ0
Integral Ethernet controller	ESA0, EZA0	ESA0, EZA0
DMV11 synchronous communication device	XDcu	-
DRV11-WA synchronous communication device	XAA0	-
MSCP controller	PUA0	-
TMSCP controller	PTA0	-
TK50 tape cartridge drive	MUcu	MUcu
TK70 tape cartridge drive	MUcu	MUcu
TF85 tape cartridge drive	MIcu	MIcu
RF-series disk drive	DUcu, DIcu	DUcu, DIcu
TLZ04 tape drive	MKA0	MKA0
PROM (programmable read-only memory)	PRAu	PRAu

[1]For all device names in the table, c represents the the *adapter or controller designation*; u represents the *unit number*.

_____ **Note** _____

The unit number can be between 0 and 255. For MicroVAX 3600 systems with console firmware less than Version 5.x, the system disk must have a unit number between 0 and 15 (inclusive) to work in the sniffer boot sequence. For more information about the sniffer boot, see Section 2.1.1.

_____

For more information about the device names for DSSI drives (RF-series and TF-series), see Section 1.1.2.4.

Table 1–2 lists names of devices attached to VAXstation 3200 systems.

Table 1–2   Device Names for VAXstation 3200 Systems

Device on System with One Disk	Device Name[1]
RD54 fixed disk	DUA0
RRD40 compact disc drive	DUBu[2]
Magnetic tape cartridge	MUA0

Device on System with Two Disks	Device Name[1]
First RD54 fixed disk	DUA0
Second RD54 fixed disk	DUA1
RRD40 compact disc drive	DUBu[2]
Magnetic tape cartridge	MUA0

[1]The device name of a disk drive depends on the number of fixed disks.

[2]Note that *u* represents the *unit number*.

1.1.2.4   DSSI Disk and Tape Drives

Systems that use RF-series disk drives and TF-series tape drives access the DSSI bus in different ways, as follows.

MicroVAX and VAXserver 3400 Series Systems

MicroVAX and VAXserver 3400 series systems use an integral DSSI adapter on the CPU module to access RF-series disk drives and TF-series tape drives. Each drive is treated as a separate, remote disk or tape with its own allocation class, node name, and address on the DSSI bus. The following table shows the device names for RF-series and TF-series drives on MicroVAX and VAXserver 3400 series systems:

Device	Device Name for Booting	VMS Device Name	Examples
RF disk	DIcu, x$DIcu	nDIcu, x$DIcu	DIA1, 1DIA1, BETTY$DIA0
TF tape	MIcu, x$MIcu	nMIcu, x$MIcu	MIA0, FRED$MIA0, 1MIA0

n = allocation class value (1 through 255)
c = controller designation (always A)
u = unit number
x = DSSI node name

MicroVAX and VAXserver 3600 and 3900 Series Systems

MicroVAX and VAXserver 3600, 3900 series systems use the KFQSA adapter, an interface between the DSSI bus and the Q–bus, to access RF-series disk drives and TF-series tape drives. This configuration enhances data transfer performance on these systems. Although each drive is treated as a local disk or tape, you must set the allocation class for each RF-series or TF-series drive connected to a KFQSA adapter (as described in Section 1.2.2).

The following table shows the device names for RF-series disk drives and TF-series tape drives on MicroVAX and VAXserver 3600, 3900 series systems:

Device	Device Name for Booting	VMS Device Name	Examples
RF disk	DUcu[1]	DIcu, nDIcu	DUA0, BETTY$DIA0, 1DIB0
TF tape	MIcu, x$MIcu	nMIcu, x$MIcu	MIA0, FRED$MIA0, 1MIA0

[1]Note that, in console mode, MicroVAX and VAXserver 3600 and 3900 series computers display the device names for RF-series disks as DUcu. This allows the console subsystem to recognize the drive as either a standard RQDX or a KDA device. After you boot the VMS operating system, the device name is changed to DIcu.

    c = controller designation (each disk a separate controller)
    u = unit number
    n = allocation class value (1 through 255)

VAX 4000 Systems, Models 100 and 200

The following table shows the device-name formats for the RF-series disk drives and TF-series tape drives on the VAX 4000 series systems, models 100 and 200:

Device	Device Name Formats for Booting	VMS Device Name Formats	Examples
RF disk	DIcu, x$DIcu	nDIAu, x$DIAu	DIA0, BETTY$DIA0, 1DIA1
TF tape	MIcu, x$MIcu	nMIcu, x$MIcu	MIA0, FRED$MIA0, 1MIA0

    where:
    c = controller designation

      A = the controller designation for the DSSI bus

    u = unit number
    x = DSSI node name
    n = allocation class value (1 to 255)

VAX 4000 Systems, Models 300, 400, 500 and 600

The device names for RF-series disk drives and TF-series tape drives are determined by the configuration of the two integral DSSI adapters on the CPU module. The following table shows the device name formats for the RF-series disk drives and TF-series tape drives on VAX 4000 series system, models 300, 400, 500 and 600:

Device	Device Name Formats for Booting	VMS Device Name Formats	Examples
RF disk	DIcu, x$DIcu	nDIAu, x$DIAu	DIA0, BETTY$DIA0, 1DIB1
TF tape	MIcu, x$MIcu	nMIcu, x$MIcu	MIA0, FRED$MIA0, 1MIA0

where:
c = controller designation

    A is the controller designation for the first DSSI bus
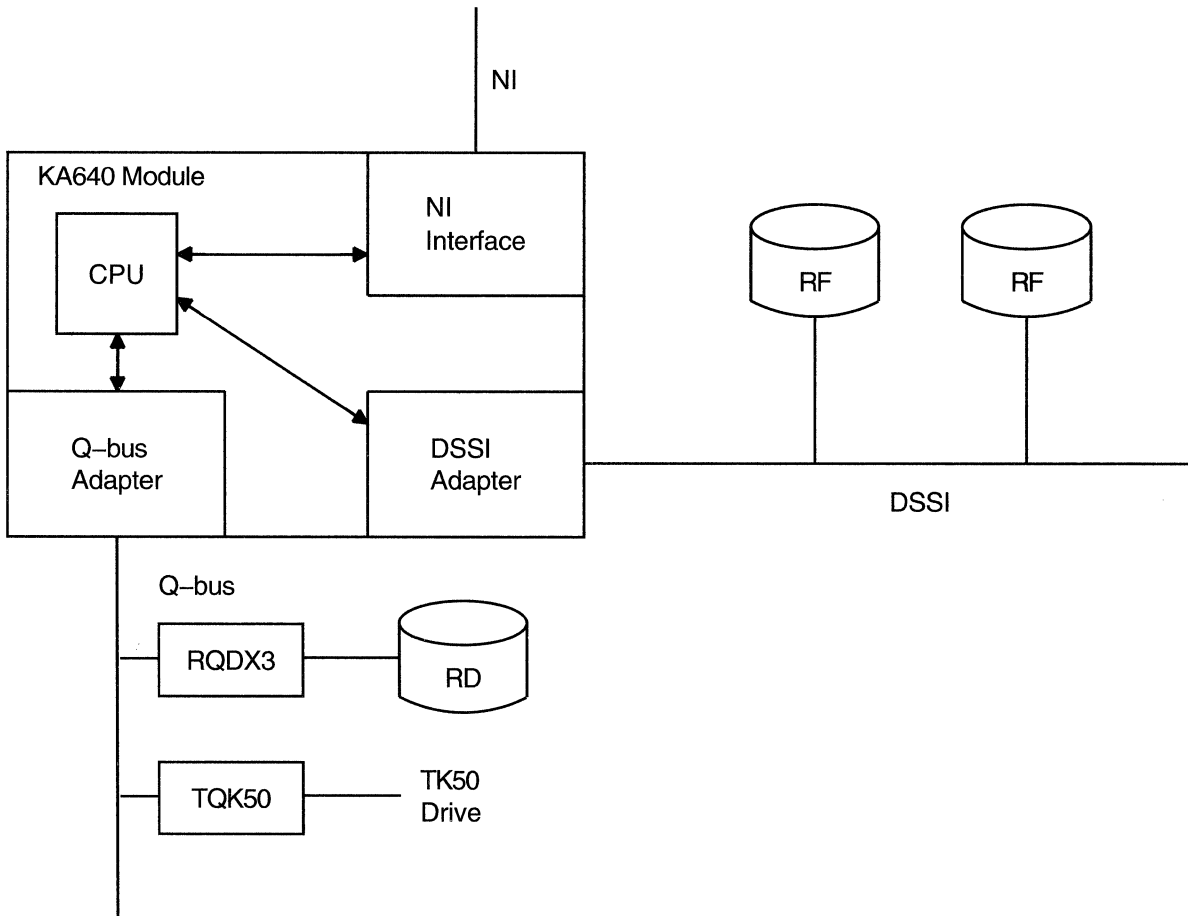   B is the controller designation for the second DSSI bus

u = unit number
x = DSSI node name
n = allocation class value (1 to 255)

Figures 1–1, 1–2, and 1–3 show examples of system-specific DSSI configurations.
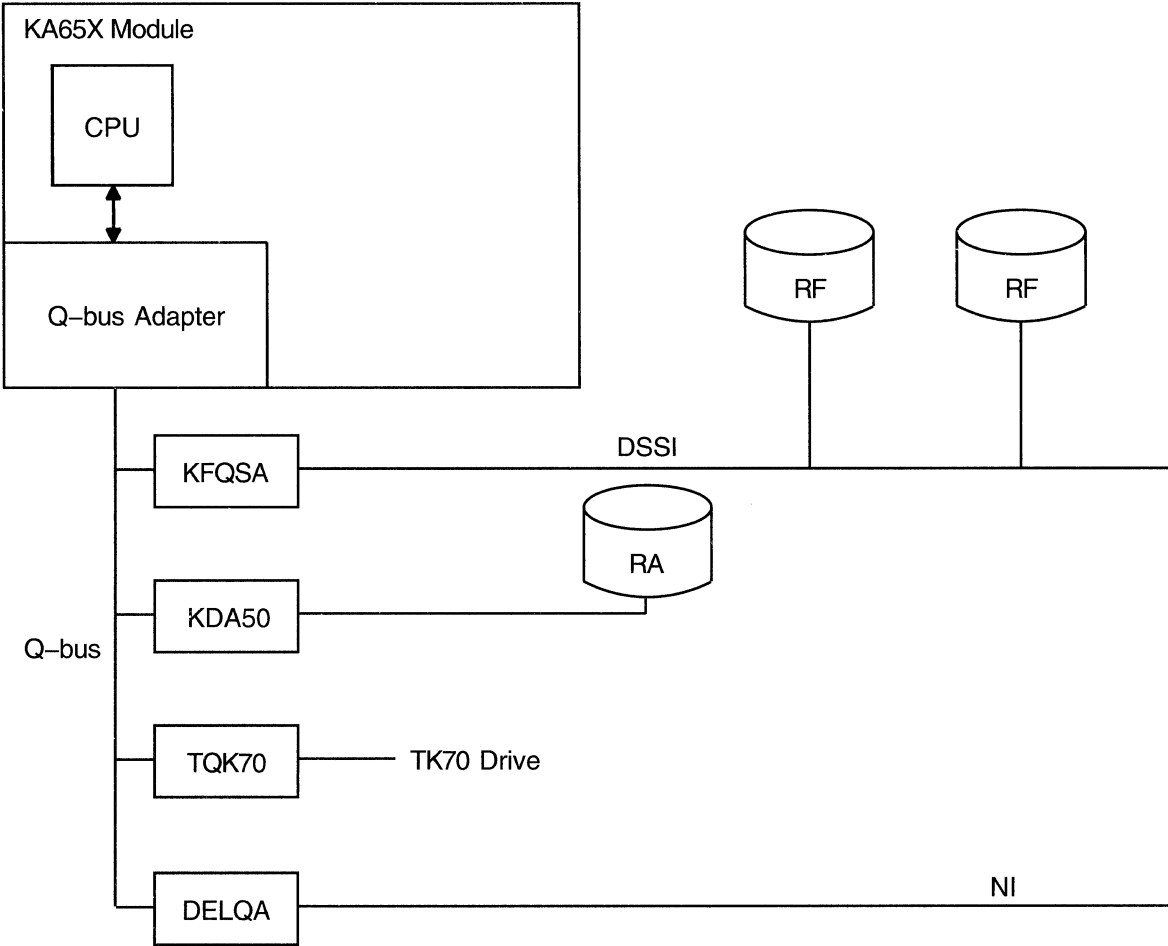
Figure 1–1 Sample MicroVAX and VAXserver 3400 Series Configuration

ZK–1018A–GE

Figure 1–2 Sample MicroVAX and VAXserver 3600, 3900 Series Configuration

ZK–1019A–GE

Figure 1–3 Sample VAX 4000 Series Configuration
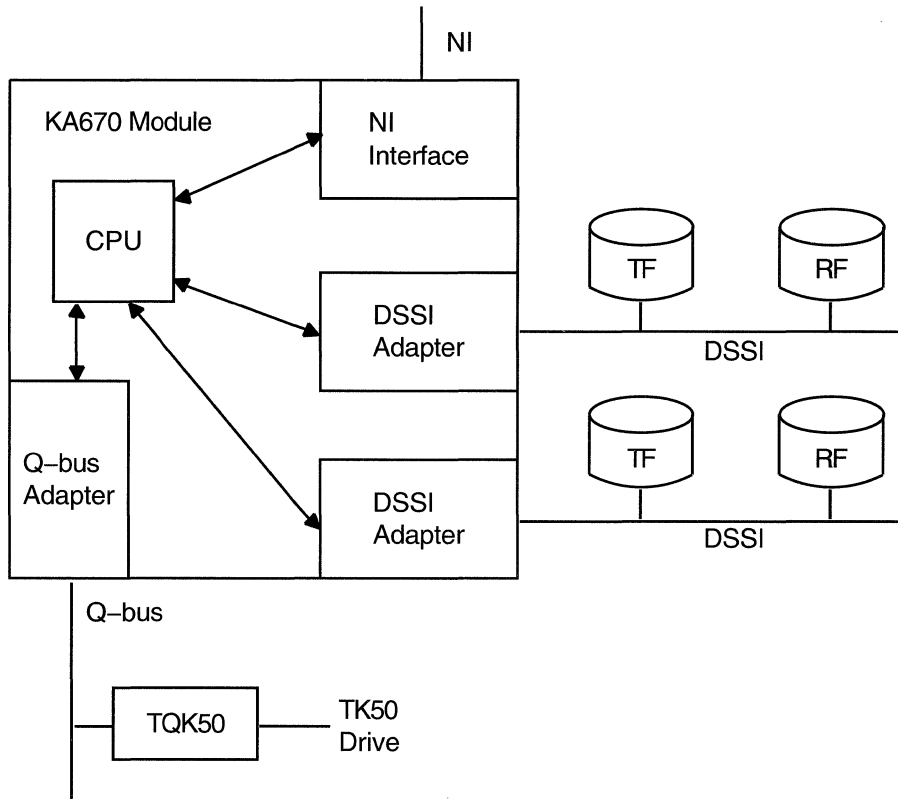
ZK–4053A–GE

You can connect as many as two VAX computers to one DSSI bus (in what is
called a **dual-host** configuration). In a dual-host configuration, both systems can
share the RF-series or TF-series drive on the common DSSI bus, provided that
the two systems are configured in a local area VAXcluster so that each shared
RF-series or TF-series drive has the *same device name* on both systems. Failure
to specify the same device name on both systems might result in disk or tape
corruption because the cluster-wide locking mechanisms will not work correctly.
Section 1.2.2 has more information about dual-host systems.

1.2 Preparing for a VAXcluster Environment

If you are installing the VMS operating system in a VAXcluster environment, the
installation procedure will ask you for specific information. Before proceeding,
therefore, you should read the *VAXcluster Systems for OpenVMS*. If you have
a clear understanding of VAXcluster configurations before you perform an
installation, you are less likely to enter incorrect information during the
installation. If you enter incorrect information, you might need to repeat the
entire installation procedure.

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

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

_____ Note _____

The VAX 4000 series, MicroVAX, VAXstation, and VAXserver 3600 series, and MicroVAX and VAXserver 3400 and 3900 series systems cannot be part of a CI only VAXcluster configuration.

_____

- Obtain, from your network or system manager, the _DECnet node name_ and _node address_ for the VAX computer on which you are installing the VMS operating system.

- Determine an appropriate allocation class (ALLOCLASS) value for the VAX computer on which you are installing the VMS operating system so you can respond to the following prompt during the installation (where n is the DECnet node name):

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

  Refer to the _VAXcluster Systems for OpenVMS_ for the rules on specifying allocation class values. Note that, in a mixed-interconnect VAXcluster environment, the allocation class value cannot be zero. It must be a value from 1 through 255. This range is also true for any VAX computer that is connected to a dual-pathed disk.

  The installation procedure uses the allocation class value to automatically set the value of ALLOCLASS, a SYSGEN parameter.

- If you plan to set up either a local area or a mixed-interconnect cluster, determine the _cluster group number_ and the _cluster password_. Use the following rules to determine the cluster group number and password:

  - Cluster group number: A number in the range from 1 through 4095 or 61440 through 65535.

  - Cluster password: Must be from 1 to 31 alphanumeric characters in length and may include dollar signs ($) and underscores (_).

Adding a VAXserver 3602 System to a VAXcluster Environment

A VAXserver 3602 system consists of two computers with shared disk and tape drives. If you have a VAXserver 3602 system, install the VMS operating system on one computer, set up that system as the boot node in a local area VAXcluster configuration, and then add the second computer as a satellite node.

1.2.1 Configuring a Dual-Host System for Cluster Operation

A dual-host system is a type of VAXcluster configuration that includes two computers and as many as six RF-series and TF-series drives. Because an RF-series disk or TF-series tape is simultaneously accessible to both computers, the system performs as well as a pair of high-availability boot servers in local area VAXcluster environments. For example, if an RF-series disk is configured as the system disk (you cannot use a TF-series tape for this purpose) for both the boot servers and the satellites, the cluster can tolerate the failure of either boot server.

An additional benefit of a dual-host system is that it is a cost-effective two-node cluster that can be easily expanded.

You can configure the system for cluster operation in several ways:

- As a pair of boot servers for a new local area cluster to which you add satellites

- As a two-node cluster to which you do not currently intend to add satellites

- As a pair of boot servers that you want to add to an existing cluster

Setup procedures for these options are described in Sections 1.2.1.1, 1.2.1.2, and 1.2.1.3.

1.2.1.1 Configuring the Dual-Host System as a Pair of Boot Servers for a New Local Area Cluster

To set up a dual-host system as a pair of boot servers for a new local area cluster, follow these steps:

1. Install the VMS operating system as described in the *Upgrade and Installation Manual* and this supplement.

   a. Answer the configuration questions as shown in the *Upgrade and Installation Manual*. (Note that because the system includes RF-series disks, the installation procedure asks if those disks will be served. Answer Y.)

   b. Answer Y when asked if the cluster contains a quorum disk, and then specify the device name for the quorum disk. (Note that you can use the system disk as the quorum disk to simplify system management operations.)

2. Follow the instructions in the *VAXcluster Systems for OpenVMS* to customize the system.

3. Enable the computer as a boot server using the command procedure SYS$MANAGER:CLUSTER_CONFIG.COM. Follow the instructions in the *VAXcluster Systems for OpenVMS*.

4. Add the second computer as a boot server using CLUSTER_CONFIG.COM. Be sure to answer Y when asked whether the cluster contains a quorum disk.

5. When you are ready to boot the second computer, enter the following sequence of commands at the console-mode prompt (>>>):

```
SET BOOT ddcu    ! for example, DIA0

SET BFLAG x0000000 ! x is the hexadecimal value of the computer's
                              ! system root

BOOT
```

6. Register your VAXcluster licenses for the computers.

1.2.1.2 Configuring the Dual-Host System as a New Two-Node Cluster

To set up a dual-host system as a new two-node cluster to which you do not want to add satellites, do the following:

1. Perform steps 1 and 2 as described in Section 1.2.1.1, *but answer N when asked if the computer will be a disk server.*

2. Add the second computer using CLUSTER_CONFIG.COM. *Answer N to the questions asking if the computer will be a satellite, a boot server, or a disk server.*

3. Perform steps 5 and 6 as described in Section 1.2.1.1.

If you later decide to add satellites, follow the instructions in the *VAXcluster Systems for OpenVMS*.

1.2.1.3 Adding the Dual-Host System to an Existing Cluster

To add a dual-host system to an existing cluster, follow the steps in
Section 1.2.1.1. However, because each computer will receive a vote, you may
determine that you do not need a quorum disk. In that case, answer N to the
quorum disk question (step 1B).

If the existing cluster currently uses a quorum disk, you might want to disable
the quorum disk on the active cluster members after adding the new computers
to the cluster. Use the CLUSTER_CONFIG.COM CHANGE function to do so.

1.2.2 Configuring RF-Series and TF-Series Devices in a VAXcluster Environment

When configuring a MicroVAX or VAXserver 3400 series for use in a VAXcluster
environment, you must treat RF-series and TF-series drives as if each one is a
separate HSC device serving only one disk. Because the VMS operating system
recognizes HSC served disks as remote rather than local devices, you must set
the SYSGEN parameter ALLOCLASS for the system and the allocation class for
each RF-series and TF-series drive to a value between 1 and 255. You can also
change the DSSI node name (and set other parameters) for each device, although
this is optional.

On VAX 4000 series and MicroVAX and VAXserver 3600 or 3900 series systems,
RF-series and TF-series drives are also treated as remote devices for the purposes
of configuring in a VAXcluster environment. Therefore, you must set the SYSGEN
parameter ALLOCLASS for the system and the allocation class for each drive
attached to the system to a value between 1 and 255. For MicroVAX and
VAXserver 3600 or 3900 series systems, RF-series and TF-series drives are
connected to a KFQSA adapter. For VAX 4000 series systems, RF-series and
TF-series drives can be connected directly to the embedded (integral) DSSI bus as
well as to a KFQSA adapter.

The *VAXcluster Systems for OpenVMS* provides guidelines you should read before
entering the allocation class value (ALLOCLASS) for your system (when the
VAXcluster portion of the installation procedure prompts you for that value).

To set the allocation class values (or change the DSSI node name) for each RF-
series and TF-series drive attached to your system, enter the SHOW DEVICE
command at the console prompt (>>>), as described in Section 1.1.2.1, and then
use the DUP Driver Utility to set the parameters you want. Use the following
procedure for each device, depending your system model and configuration:

1. For VAX 4000, MicroVAX and VAXserver 3400, 3600 and 3900 series systems,
    invoke the DUP Driver Utility by entering a command using one of the
    following formats:

    •   For VAX 4000 series systems with embedded (integral) DSSI buses:

        SET HOST/DUP/DSSI/BUS: b n PARAMS

        where b is the DSSI bus number (0 or 1) and n is the bus
        node ID (0 through 6) for the device on the bus. For example:

        >>> SET HOST/DUP/DSSI/BUS: 1 0 PARAMS

    •   For VAX 4000 and MicroVAX and VAXserver 3600 and 3900 systems
        equipped with a KFQSA adapter:

        SET HOST/DUP/UQSSP/DISK n PARAMS

where *n* is the UQSSP controller number for the device on the bus. For example:

```
>>> SET HOST/DUP/UQSSP 0 PARAMS
```

- For MicroVAX and VAXserver 3400 series systems:

  SET HOST/DUP/DSSI n PARAMS

  where *n* is the DSSI node number. For example:

  ```
  >>> SET HOST/DUP/DSSI 3 PARAMS
  ```

After you enter a command to invoke the DUP Driver Utility, the procedure displays a message similar to the following:

```
Starting DUP server...
Copyright (c) 1991 Digital Equipment Corporation

PARAMS>
```

2. At the PARAMS> prompt, enter a command in the following format to set the allocation class for the RF-series or TF-series device:

   SET ALLCLASS n

   where *n* is the allocation class number. For example:

   ```
   PARAMS>SET ALLCLASS 1
   ```

3. At the PARAMS> prompt, enter a command in the following format to change the DSSI node name:

   SET NODE NAME name

   where *name* must be from one to eight alphanumeric characters in length. The *name* must begin with an alphabetic character. For example:

   ```
   PARAMS> SET NODE NAME BARNEY
   ```

4. At the PARAMS> prompt, enter the WRITE command to write the parameters to nonvolatile storage in the RF-series or TF-series device. For example:

   ```
   PARAMS> WRITE
   ```

   The procedure displays the following message:

   ```
   Changes require controller initialization, ok? [Y/N]
   ```

   Type Y (for YES) and press the Return key. The procedure displays the following message and the console-mode prompt:

   ```
   Stopping DUP server...
   >>>
   ```

For more information about using the DUP Driver Utility to set other DSSI parameters, see the hardware documentation you received with your computer.

For more information about local and remote devices, see the *VAXcluster Systems for OpenVMS*.

1.2.3 Setting Allocation Class Values for Two or More Systems in a VAXcluster Environment

When you set a nonzero allocation class parameter for two or more systems in a VAXcluster environment, all cluster-accessible devices on nodes with a nonzero allocation class value must have unique names. For example, if two VAX nodes have the same allocation class value, both nodes cannot have a tape drive named MUA0.

To avoid identical names for disk or tape drives in a VAXcluster environment, set different allocation class values for each system. For example, you might set an allocation class value of 1 for one system and a value of 2 for the other system. In this case, the tape drives would be named 1MUA0 and 2MUA0.

If you must use identical nonzero allocation class values for two systems in a VAXcluster environment, as, for example, with a multihost configuration, make sure that all disk and tape drives on these systems have different unit numbers. Digital Services will set the unit numbers to the values that you request. For example, you might set 1 as the allocation class value for both systems, and 0 and 1 as the unit numbers for the tape drives. In this case, the tape drives would be named 1MUA0 and 1MUA1.

1.3 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 kit to your system disk. The method you use to boot standalone BACKUP depends on the type of distribution kit you have.

- Magnetic tape kit: Follow the instructions in Section 1.3.1.

- Tape cartridge kit: Follow the instructions in Section 1.3.1.

- Compact disc kit: Follow the instructions in Section 1.3.2.

1.3.1 Magnetic Tape and Tape Cartridge Kits

If you have either a magnetic tape or tape cartridge distribution kit, you boot standalone BACKUP from a tape cartridge. The tape cartridge that contains standalone BACKUP is labeled similar to the following:

Kit	Paper Label[1]	Volume Label[2]
Tape cartridge	VMS BIN TK50 2/2 S/A BKUP $ DECWINDOWS	DECW55

[1]A paper label is a label affixed to a tape cartridge or magnetic tape.

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

To boot standalone BACKUP, use the following procedure:

1. Insert the tape cartridge containing standalone BACKUP in the tape cartridge drive.

2. Enter the following command and press the Return key. Remember to type a zero, not the letter O, in the device name.

```
>>> BOOT MUA0
```

_____ **Note** _____

If you are installing the VMS operating system on a VAXstation 3200 or VAXstation 3500 system, ignore any error messages similar to the following:

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

Such messages about missing drivers might be displayed during the installation.

_____

3. The procedure asks for the date and time. Enter the date and time using the 24-hour clock format and press the Return key. For example:

   ```
   VAX/VMS Version V5.5 Major version id = 1 Minor version id = 0
   ```

   ```
   *Please enter the date and time (DD-MMM-YYYY HH:MM) 20-DEC-1991 13:00
   ```

4. 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 MUA0:    device type TK50
   Available device $1$DIA1: device type RF30
         .
         .
         .
   ```

   If you have set the allocation class value for each RF-series and TF-series drive to a value between 1 and 255 as described in Section 1.2.2, the procedure displays the device names for the RF-series and TF-series devices in the format nDIcu (RF disk) or nMIcu (TF tape), where n is the allocation class value. For example, if your configuration has an RF30 drive with an allocation class value of 1, a controller designation of A, and a unit number of 1, the procedure displays the device name 1DIA1.

   If you have not set the allocation class value for each RF-series and TF-series drive to a value between 1 and 255, the allocation class value is zero by default. For the 3400 series systems, the procedure displays the device names for the RF-series and TF-series drives in the format x$DIcu (RF disk) or nMIcu (TF tape), where x is the DSSI node name. A DSSI node name must be from one to eight alphanumeric characters in length. The name must begin with an alphabetic letter. For example, if your MicroVAX 3400 configuration has an RF30 drive with an allocation class value of zero, the DSSI node name MARY, a controller designation of A, and a unit number of 1, the procedure displays the device name MARY$DIA1. For KFQSA-connected RF-series and TF-series devices, the device name will not include the node name.

   Write down the names of the RF-series and TF-series drives. If you will be using an RF-series drive to hold the system disk (you cannot use a TF-series tape drive for that purpose), you will need the device name that the standalone BACKUP procedure displayed.

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

5. When standalone BACKUP finishes booting, the procedure displays an identification message followed by the dollar sign prompt ($).

```
%BACKUP-I-IDENT, Stand-alone BACKUP V5.5; the date is 20-DEC-1991 13:00:00.00
$
```

6. To create the system disk using the BACKUP command, return to the *Upgrade and Installation Manual*.

1.3.2 Compact Disc Kit

If you have the compact disc distribution kit, you boot standalone BACKUP from the compact disc.

Booting standalone BACKUP from a compact disc takes approximately 3 minutes. Use the following procedure:

1. Insert the distribution compact disc in the compact disc drive.

2. Enter a command in the following format:

BOOT device-name

Substitute the device name of the compact disc drive for *device-name*. For example, if the compact disc drive has a device name of DUB0, enter the following command and press the Return key:

```
>>> BOOT DUB0
```

Remember to type a zero, not the letter O, in the device name.

3. The procedure asks for the date and time. Enter the date and time using the 24-hour clock format and press the Return key. For example:

```
   VAX/VMS Version V5.5 Major version id = 1 Minor version id = 0

*Please enter the date and time (DD-MMM-YYYY HH:MM) 20-DEC-1991 13:00
```

4. The procedure displays a list of the local devices on your system and, if you have them, available HSC and MSCP devices as well. For example:

```
Available device MUA0:    device type TK50
Available device $1$DIA1: device type RF30
   .
   .
   .
```

If you have set the allocation class value for each RF-series and TF-series drive to a value between 1 and 255 as described in Section 1.2.2, the procedure displays the device names for the RF-series and TF-series drives in the format nDIcu (RF disk) or nMIcu (TF tape), where n is the allocation class value, c is the controller, and u is the unit number. For example, if your configuration has an RF30 drive with an allocation class value of 1, a controller designation of A, and a unit number of 1, the procedure displays the device name 1DIA1.

If you have not set the allocation class value for each RF-series and TF-series drive to a value between 1 and 255, the allocation class value is 0 by default.

For 3400 series systems, the procedure displays the device names for the RF-series or TF-series drive in the format xDIcu (RF disk) or nMIcu (TF tape), where x is the DSSI node name, c is the controller, and u is the unit number. A DSSI node name must be from one to eight alphanumeric characters in length. The name must begin with an alphabetic letter. For example, if your MicroVAX 3400 configuration has an RF30 drive with an allocation class

value of zero, the DSSI node name MARY, a controller designation of A, and a unit number of 1, the procedure displays the device name MARY$DIA1. For KFQSA-connected RF-series and TF-series devices, the device name will not include the node name.

Write down the names of the RF-series and TF-series drives. If you will be using an RF-series disk as the system disk (you cannot use a TF-series tape for that purpose), you will need the device name that the standalone BACKUP procedure displayed.

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

5. When standalone BACKUP finishes booting, the procedure displays an identification message followed by the dollar sign prompt ($).

```
%BACKUP-I-IDENT, Stand-alone BACKUP V5.5; the date is 20-DEC-1991 13:00:00.00
$
```

6. To create the system disk using the BACKUP command, return to the *Upgrade and Installation Manual*.

1.4 Booting the New System Disk

When you enter the BACKUP command to start an installation, as described in the *Upgrade and Installation Manual*, the *required* save set from the distribution tape cartridge or compact disc is transferred to your system disk. You know the required save set is on the new system disk when you see the following message:

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

This message indicates that the required save set has been transferred from the distribution media to the system disk and that the files are being checked for errors. Several minutes later, the procedure displays the following message:

```
%BACKUP-I-PROCDONE, Operation completed. Processing finished at 20-DEC-1991 16:00
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 as follows:

1. If your system has a Halt button, press it twice. Make sure the light on the Halt button goes off. If your system does not have a Halt button, press the F5 (Break) key on the console terminal.

2. At the console prompt (>>>) enter the SET BOOT command in the following format:

SET BOOT ddcu

The SET BOOT command sets the default boot device for booting when no device is specified, as described in Section 2.1.2. Substitute the device name of the system disk for *ddcu* by choosing from the device names listed in Section 1.1.2.3 or Table 1–2 (VAXstation 3200 systems only).

3. To boot the system disk, enter the BOOT command as follows:

```
>>> BOOT
```

Note that you do not need to specify the device name because you previously established the default device with the SET BOOT command.

4. When the boot is complete, the procedure displays some messages and asks you for the date and time. Enter the date and time using the 24-hour clock format and press the Return key. For example:

```
VAX/VMS Version V5.5 Major version id = 1 Minor version id = 0

*Please enter the date and time (DD-MMM-YYYY HH:MM) 20-DEC-1991 16:20
```

_____ **Note** _____

If the system does not boot, a hardware or software problem might exist. Refer to Section 2.1.8 for symptoms of hardware and software problems and the actions you can take to correct them.

_____

5. After you have successfully booted the new system disk, return to the _Upgrade and Installation Manual_ to continue the installation.

2

Startup and Shutdown Procedures

During a VMS installation or upgrade, your system will shut down and reboot several times. Although the installation and upgrade procedures usually can perform these tasks automatically, you might need to manually shut down or reboot your system. Also, you will occasionally need to reboot the system during normal operation. This chapter describes different ways of booting and shutting down the system.

2.1 Booting the System

Booting is the process of loading system software into the processor's memory. These systems use an internal memory device to boot the VMS operating system from the system disk into memory.

The boot process consists of the following steps:

1. You enter the BOOT command. The boot procedure deposits information in the general-purpose registers.

2. VMB, the primary boot program that allows access to the system disk, is loaded from the system ROMs. VMB locates SYS$SYSTEM:SYSBOOT.EXE on the system disk and loads it into memory.

3. SYSBOOT.EXE loads the SYSGEN parameters stored in a file called 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.

You can boot from a variety of devices, including an MSCP disk drive, a TMSCP tape drive, a PROM, the DELQA, an integral Ethernet device, or an InfoServer system. See Section 1.1.2.3 for a list of boot devices.

The following sections describe different methods of booting the system.

2.1.1 Sniffer Boot

If you do not set a default boot device, MicroVAX, VAXstation, and VAXserver 3600 series systems (with console firmware less than Version 5.x) and VAX 4000 series systems perform a sniffer boot on automatic boots and reboots. A sniffer boot lets you boot without specifying a device name. To perform a sniffer boot, do the following:

1. 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 the Return key:

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

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

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

2. Stop the system. If your system has a Halt button, press it twice. Make sure the light on the Halt button goes off. If your system does not have a Halt button, press the F5 (Break) key.

3. Enter the following command and press the Return key:

    ```
    >>> BOOT
    ```

    The system searches in the following order for a device from which it can boot:

    *   Fixed disks

    *   TK50, TK70, or TF85 tape cartridges

    *   The network

    The system searches *only* for disks with unit numbers ranging from 0 to 15 (decimal). If the system does not find any devices from which to boot, it continues to alternate indefinitely between trying to boot from a tape cartridge and from the network.

2.1.2 Automatic Boot

The VAX 4000 series, MicroVAX, VAXstation, and VAXserver 3600 series, MicroVAX and VAXserver 3400 series, and the MicroVAX and VAXserver 3900 series systems boot automatically under the following conditions:

*   If you selected the auto reboot option during normal system shutdown

*   After a system crash

*   If the Break Enable/Disable switch is set to Disable when power to the processor is turned on

During an automatic boot, the system boots from the boot device defined in the last SET BOOT console-mode command.

To display the default boot device, enter the following command:

```
>>> SHOW BOOT
```

To set the default boot device, enter a command in the following format:

```
SET BOOT ddcu
```

For example, to boot from DUA2 on subsequent automatic boots, enter the following command:

```
>>> SET BOOT DUA2
```

You might be asked to enter the date and time during the automatic boot.

―――――――――――――――――――――――――― **Note** ――――――――――――――――――――――――――

Note the following system-specific information:

- VAX 4000 and MicroVAX and VAXserver 3400 and 3900 series systems (as well as 3600 series computers with Version 5.x firmware) do not perform the sniffer boot on automatic boots. If you have not specified a default boot device or if the default has been cleared by a loss of backup power, the console program prompts you for a boot device. If you do not enter a boot device within 30 seconds, the system attempts to boot from the primary Ethernet device (ESA0 or XQA0).

- MicroVAX, VAXstation, and VAXserver 3600 series systems (with console firmware less than Version 5.x) perform a sniffer boot during an automatic boot under the following conditions:

    - If you have not specified a default boot device with the console-mode command SET BOOT

    - If you have cleared the default boot device by entering the following command:

        ```
        >>> SET BOOT
        ```

For more information about the sniffer boot, see Section 2.1.1.

――

2.1.3 Manual Boot

To boot the VMS operating system manually, use the following procedure:

1. Make sure that your computer is set up properly and turned on.

2. Make sure that your console terminal is set up properly and turned on.

3. If the VMS operating system is not running, go to step 4.

    If the VMS operating system is running, log in to the SYSTEM account. Enter the following command and press the Return key:

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

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

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

4. Stop the system. If your system has a Halt button, press it twice. Make sure the light on the Halt button goes off. If your system does not have a Halt button, press the F5 (Break) key.

5. Enter the BOOT command in the following format and press the Return key:

    ```
    BOOT ddcu
    ```

Substitute the device name of the system disk for *ddcu*. The unit number of the drive may have a value between 0 and 255. Section 1.1.2.3 contains a list of device names for these systems. For example, to boot from a drive with a device name of DUA2, enter the following command:

```
>>> BOOT DUA2
```

If you do not specify a device name, MicroVAX, VAXstation, and VAXserver 3600 series computers (with console firmware less than Version 5.x) perform a sniffer boot.

If you do not specify a device name, VAX 4000 series and MicroVAX and VAXserver 3400 or 3900 series computers (and 3600 series computers with Version 5.x console firmware) boot from the default boot device. If you have not specified a default device or the default device has been cleared by a loss of backup power, the console program prompts you for a device. If you do not enter a default device within 30 seconds, the system boots from the primary Ethernet device (ESA0 or XQA0).

6. The procedure might ask for the date and time. Enter the date and time using the 24-hour clock format and press the Return key. For example:

```
    VAX/VMS Version V5.5 Major version id = 01 Minor version id = 00
PLEASE ENTER DATE AND TIME (DD-MMM-YYYY HH:MM) 20-DEC-1991 13:00
```

7. After the system boots, it displays the following message:

```
    VAX/VMS Version V5.5 20-DEC-1991 13:00

%SET-I-INTSET, login interactive limit=64, current interactive value = 0
   SYSTEM      job terminated at 20-DEC-1991 13:00:00.00
```

2.1.4 Booting from [SYSF] During an Upgrade

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

B/R5:F0000000 ddcu

Substitute the device name of the system disk for *ddcu*. Section 1.1.2.3 contains a list of device names.

For example, to boot from an RD54 fixed disk, enter the following command and press the Return key:

```
>>> B/R5:F0000000 DUA0
```

2.1.5 Booting from a Different Directory

By default, the VMS operating system is installed in the system root directory named [SYS0]. However, you can use the VMSKITBLD procedure to add a copy of the VMS operating system to another system root directory (as long as it is *not* on your system disk) and then boot the system from that directory. For example, to boot from root [SYS3] on an RD54 fixed disk that is not your system disk, enter the following command and press the Return key:

```
>>> B/R5:30000000 DUA1
```

Section 1.1.2.3 contains a list of device names.

2.1.6 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 is the most direct:

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

   If the VMS operating system is running, log in to the SYSTEM account. Enter the following command and press the Return key:

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

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

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

2. If your system has a Halt button, press it twice. Make sure the light on the Halt button goes off. If your system does not have a Halt button, press the F5 (Break) key.

3. At the console prompt (>>>), enter the BOOT command in the following format and press the Return key:

   ```
   B/R5:00000001 [ddcu]
   ```

   If you do not specify a device name, the MicroVAX, VAXstation, and VAXserver 3600 series system (with console firmware less than Version 5.x) performs a sniffer boot when you finish using the SYSGEN commands. The VAX 4000 series and MicroVAX and VAXserver 3400 and 3900 series systems (and 3600 series with Version 5.x console firmware) boot from the default boot device when you finish using the SYSGEN commands.

4. At the SYSBOOT> prompt, you can enter any of the SYSGEN commands listed in Table 2–1. For more information about these SYSGEN commands, see the *OpenVMS System Management Utilities Reference Manual*.

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

Table 2–1   SYSGEN Commands Used in SYSBOOT

Command	Description
CONTINUE	Resumes the boot process.
DISABLE CHECKS	Inhibits checking of parameter values specified with the SET command.
ENABLE CHECKS	Permits checking of parameter values specified with the SET command.
HELP	Displays a summary of the SYSBOOT commands on the terminal screen.
SET *parameter-name*	Establishes the name 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 a new value for the SYSGEN parameter WSMAX to 512 and then complete the boot process:

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

The new SYSGEN parameter value goes into effect at the completion of the boot process.

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

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

- You can also use a conversational boot to specify a minimum startup. For example, if you want to boot the system and avoid configuring all your peripheral devices automatically, enter the following command and press the Return key:

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

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

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

2.1.7 Booting with XDELTA

XDELTA is a debugging tool that system programmers use. To use XDELTA, you need to boot the system in a specific manner. For information on booting with XDELTA, see the *OpenVMS Delta/XDelta Debugger Manual* and the current version of the *VMS Release Notes*.

2.1.8 If the System Does Not Boot

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

- Consult the hardware manual for your VAX computer.

- Contact your Digital Services representative.

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

```
%SET-I-INTSET, login interactive limit=64, current interactive value = 0
20-DEC-1991 15:00:00.00
   SYSTEM      job terminated at 20-DEC-1991 15:00:00.00

Accounting information:
 Buffered I/O count:        133    Peak working set size:       401
 Direct I/O count:           12    Peak pagefile size:         2379
 Page faults:               325    Mounted volumes:               0
 Charged CPU time: 0 00:00:55.23   Elapsed time:       0 00:01:31.24
```

If the system does not display this message, a software problem might have occurred. If you suspect a software problem, do the following:

- Try booting the system again.

- Do a conversational boot using the default SYSGEN parameters described in Section 2.1.6. If the system boots, run AUTOGEN. For more information on AUTOGEN, see the *OpenVMS System Manager's Manual*.

- Place a backup copy of the system disk into another drive and try to boot from it.

2.2 Shutting Down the System

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

If you want the operating system to reboot automatically, set the Break Enable/Disable switch to Disable. If you want to enter console-mode commands after the shutdown, set the Break Enable/Disable switch to Enable.

You can perform the following three types of shutdown operations:

- An orderly shutdown with SYS$SYSTEM:SHUTDOWN.COM (Section 2.2.1)

- An emergency shutdown with OPCCRASH.EXE (Section 2.2.2)

- An emergency shutdown with CRASH commands (Section 2.2.3)

2.2.1 Orderly Shutdown with SYS$SYSTEM:SHUTDOWN.COM

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

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

To halt the system after the procedure completes, press the Halt button twice. Make sure the light on the Halt button goes off. If your system does not have a Halt button, press the F5 (Break) key.

For more information about the SHUTDOWN command procedure, see the *OpenVMS System Manager's Manual*.

2.2.2 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 the Return key:

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

To halt the system after the procedure completes, press the Halt button twice. Make sure the light on the Halt button goes off. If your system does not have a Halt button, press the F5 (Break) key.

For more information about the OPCCRASH program, see the *OpenVMS System Manager's Manual*.

2.2.3 Emergency Shutdown with CRASH Commands

_____ **Note** _____

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

_____

CRASH commands cause the system to fail, resulting in immediate shutdown. To force your VAX 4000 or MicroVAX, VAXstation, or VAXserver 3200, 3300/3400, 3500/3600, or 3800/3900 series computer to fail, use the following procedure:

1. Set the Break Enable/Disable switch to the Enable position.

2. Stop the system. If your system has a Halt button, press it twice. Make sure the light on the Halt button goes off. If your system does not have a Halt button, press the F5 (Break) key.

3. Enter the following commands and press the Return key after each one:

```
>>> E PSL
>>> E/I 0
>>> E +
>>> E +
>>> E +
>>> E +
>>> D PC FFFFFFFF
>>> D PSL 1F0000
>>> C
```

CRASH commands display 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 commands stop the system, display the contents of the program counter, and display the console-mode prompt (>>>).

   After the CRASH commands execute, the system reboots from the boot device defined in the last SET BOOT console-mode command. If you have not specified a default boot device with the SET BOOT command, MicroVAX, VAXstation, and VAXserver 3600 series computers (with console firmware less than Version 5.x) perform a sniffer boot. The VAX 4000 series and MicroVAX and VAXserver 3400 and 3900 series (and 3600 series systems with Version 5.x console firmware) will prompt you to enter a boot device name. 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 the Return key 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*.

2.3 Troubleshooting

If your system exhibits unexpected behavior, note the following:

- If the system displays a bugcheck message on the console terminal and shuts itself down, it indicates that the system has encountered a problem that made further operation impossible or dangerous. Boot the system manually as explained in Section 2.1.3 or let it reboot automatically as explained in Section 2.1.2.

- If the system stops responding to your commands (that is, if the system "hangs"), there is a possible failure in a system software or hardware component or a possible power failure.

- If the system exhibits erratic behavior (it does not respond according to specifications), it indicates a possible failure in a system software or hardware component.

To determine if the failure is a system problem, do the following:

- Make sure that you did not press the F1 key (identified on your keyboard as either the No Scroll or the Hold Screen key).

- Press Ctrl/T to check the status of your process. A status line should be displayed, indicating the name of the program that is executing and other information. If the status line is not displayed, the system is probably hung. If the status line is displayed, the program you are executing may be hung. (If you have disabled Ctrl/T by entering the command SET NOCONTROL=T or have set the terminal to nobroadcast mode by entering the command SET TERMINAL/NOBROADCAST, this troubleshooting procedure will not work.)

- Make sure that the cable connecting the console terminal to the system is secure.

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

If the system itself is hung, you must reboot without a normal shutdown. If your system has a Halt button, press it twice. Make sure the light on the Halt button goes off. If your system does not have a Halt button, press the F5 (Break) key. Enter the CRASH commands as described in Section 2.2.3.

The console-mode prompt (>>>) is displayed on the console terminal. Boot the system as described in Section 2.1.3.

If you determine that you have a problem with the system, note in detail the sequence of events that caused the problem and notify Digital Services.

3

Backup Procedures

Use standalone BACKUP to make a complete backup of the system disk. Standalone BACKUP is a subset of the VMS Backup Utility that runs without the support of the entire VMS operating 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 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.

- To eliminate disk fragmentation, which happens when files are stored noncontiguously on the disk. The BACKUP/IMAGE command creates a copy on which files are stored contiguously.

  - If the system disk is removable and you have more than one disk drive, 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 your system disk is fixed, back it up to a disk or magnetic tape. Then restore the files to the original system disk.

This chapter describes the following:

- Using standalone BACKUP
- Installing and booting standalone BACKUP using the system disk
- Installing and booting standalone BACKUP using a tape cartridge
- Booting standalone BACKUP from a compact disc
- Backing up and restoring the system disk

3.1 Using Standalone BACKUP

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 resulting backup copy will not contain portions of the files that were in memory or data not yet written back to the disk (cache data).

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 down the system and using standalone BACKUP, you can make an exact copy of the system disk.

On VAX 4000 and MicroVAX, VAXstation, and VAXserver 3200, 3300/3400, 3500/3600, and 3800/3900 series computers, standalone BACKUP exists on either a tape cartridge or compact disc, depending on the distribution media you received. (You should make a copy of standalone BACKUP on another tape cartridge, in case the system disk becomes damaged.) The following sections describe standalone BACKUP installation and booting procedures for the system disk, tape cartridge, and compact disc.

3.1.1 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 the Return key:

   ```
   $ @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 is finished, it displays the following message:

   ```
   The kit is complete.
   ```

3. To boot standalone BACKUP from the system disk, go to Section 3.1.2.

3.1.2 Booting Standalone BACKUP from the System Disk

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

1. Set the Break Enable/Disable switch to Enable.

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 the Return key:

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

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

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

3. Stop the system. If your system has a Halt button, press it twice. Make sure the light on the Halt button goes off. If your system does not have a Halt button, press the F5 (Break) key.

4. At the console prompt (>>>), enter the BOOT command in the following format and press the Return key:

```
B/R5:E0000000 ddcu
```

Substitute the device name of the system disk for *ddcu*. Section 1.1.2.3 contains a list of device names for all MicroVAX 4000 and MicroVAX, VAXstation, and VAXserver 3600 series and MicroVAX and VAXserver 3400 series devices. For example:

```
>>> B/R5:E0000000 DUA1
```

5. A few minutes later the procedure will ask for the date and time. Enter the date and time using the 24-hour clock format and press the Return key. For example:

```
PLEASE ENTER DATE AND TIME (DD-MMM-YYYY HH:MM) 20-DEC-1991 13:00
```

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 MUA0:    device type TK50
                 .
                 .
                 .
```

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

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

```
%BACKUP-I-IDENT, Standalone BACKUP V5.5; the date is 20-DEC-1991 13:00
$
```

To back up the system disk, go to Section 3.2.

To restore the system disk, go to Section 3.3.

3.1.3 Installing Standalone BACKUP on a Tape Cartridge

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

_____ **Note** _____

If you have the VMS tape cartridge distribution kit, you have standalone BACKUP on tape cartridge. If the original tape cartridge becomes damaged, or if you want to make extra copies, use this procedure.

_____

1. Obtain a blank tape cartridge. Write the name on the paper label. Insert the label in to the label slot.

2. Write-enable the tape cartridge.

3. Insert the tape cartridge that contains standalone backup in the tape cartridge drive.

4. Log in to the SYSTEM account.

5. Enter the following command and press the Return key:

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

6. The procedure asks for the name of the target device. Type MUA0 and press the Return key. For example:

    ```
    Enter the name of the device on which to build the kit: MUA0
    ```

7. The procedure displays the following message:

    ```
        .
        .
        .
    Please place the scratch tape cartridge in drive _MUA0:.
    This volume will receive the volume label SYSTEM.

    Enter "YES" when ready:
    ```

8. When you are ready to continue, type Y (for YES) and press the Return key.

9. The procedure displays verification messages informing you that files are being copied.

10. When the procedure finishes, it displays a message similar to the following:

    ```
    Ending time   20-DEC-1991 13:45:29.90
    Starting time 20-DEC-1991 13:22:39.05

    The kit is complete.
    ```

11. Remove the tape cartridge labeled S/A BKUP V5.5 from the tape cartridge drive.

    Write-protect the tape cartridge and store it in a safe place.

3.1.4 Booting Standalone BACKUP from a Tape Cartridge

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

1. Set the Break Enable/Disable switch to Enable.

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 the Return key:

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

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

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

3. If your system has a Halt button, press it twice. Make sure the light on the Halt button goes off. If your system does not have a Halt button, press the F5 (Break) key.

4. Insert the tape cartridge containing standalone BACKUP in the tape cartridge drive.

5. Enter the following command and press the Return key:

```
>>> BOOT MUA0
```

6. The procedure will ask you for the date and time. Enter the date and time using the 24-hour clock format and press the Return key. For example:

```
VAX/VMS Version V5.5 20-DEC-1991 12:59
PLEASE ENTER DATE AND TIME (DD-MMM-YYY HH:MM) 20-DEC-1991 13:00
```

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 MUA0:    device type TK50
       .
       .
       .
```

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

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

```
%BACKUP-I-IDENT, stand-alone BACKUP V5.5; the date is 20-DEC-1991 13:00
$
```

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

To back up the system disk, go to Section 3.2.

To restore the system disk, go to Section 3.3.

3.1.5 Booting Standalone BACKUP from a Compact Disc

If the system disk containing standalone BACKUP should become unusable, you can boot standalone BACKUP from the original compact disc you received as the VMS operating system distribution media.

Booting standalone BACKUP from a compact disc takes approximately 3 minutes. Use the following procedure:

1. Set the Break Enable/Disable switch to Enable.

2. If the VMS operating system is not running, go to step 4.

If the VMS operating system is running, log in to the SYSTEM account.

3. Enter the following command and press the Return key:

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

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

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

4. If your system has a Halt button, press it twice. Make sure the light on the Halt button goes off. If your system does not have a Halt button, press the F5 (Break) key.

5. Insert the VMS operating system distribution compact disc in to the drive.

6. At the console prompt (>>>), enter a command in the following format:

   BOOT device-name

   Substitute the device name of the compact disc drive for *device-name*. For example, if the compact disc drive has a device name of DUB0, enter the following command and press the Return key:

   >>> BOOT DUB0

   Remember to type a zero, not the letter O, in the device name.

7. The procedure asks for the date and time. Enter the date and time using the 24-hour clock format and press the Return key. For example:

   ```
   VAX/VMS Version V5.5 Major version id = 1 Minor version id = 0
   ```

   ```
   *Please enter the date and time (DD-MMM-YYYY HH:MM) 20-DEC-1991 13:00
   ```

8. 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 MUA0:    device type TK50
   Available device $1$DIA1: device type RF30
            .
            .
            .
   ```

   If you have set the allocation class value for each RF-series drive to a value between 1 and 255 as described in Section 1.2.2, the procedure displays the device names for the RF devices in the format nDI*cu*, where n is the allocation class value. For example, if your configuration has an RF-series drive with an allocation class value of 1, a controller designation of A, and a unit number of 1, the procedure displays the device name 1DIA1.

   If you have not set the allocation class value for each RF30 or RF71 drive to a value between 1 and 255, the allocation class value is zero by default.

   For the 3400 Series systems, the procedure displays the device names for the RF-series drives in the format xDI*cu*, where x is the DSSI node name. A DSSI node name must be from one to eight alphanumeric characters in length. The name must begin with an alphabetic letter. For example, if your MicroVAX 3400 configuration has an RF30 drive with an allocation class value of zero, the DSSI node name MARY, a controller designation of A, and a unit number of 1, the procedure displays the device name MARY$DIA1. For KFQSA-connected RF30 or RF71 disks, the device name will not include the node name.

   Copy the names of the RF drives on a piece of paper. If you will be using an RF drive to hold the system disk, you will need the device name that the standalone BACKUP procedure displayed.

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

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

```
%BACKUP-I-IDENT, Stand-alone BACKUP V5.5; the date is 20-DEC-1991 13:00:00.00
$
```

To back up the system disk, go to Section 3.2.

To restore the system disk, go to Section 3.3.

3.2 Backing Up the System Disk

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

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

For a complete description of the Backup Utility and its qualifiers, see the *OpenVMS System Management Utilities Reference 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 3.1.2, Section 3.1.4, or Section 3.1.5.

4. Determine the device names of the drive holding the system disk and the drive holding the backup disk or tape. For a list of device names, see Section 1.1.2.3.

5. At the dollar sign prompt ($), 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 save set (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 been initialized already, 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. The contents of a backup tape must be restored to a disk before you can use them. For more information, see Section 3.3.

```
$ BACKUP/IMAGE/VERIFY DUA0: MUA0:SYSDSK_122091.BCK.BCK/REWIND/LABEL=SYSDSK
```

6. The procedure displays the following message:

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

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

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

```
%BACKUP-I-RESUME, Resuming operation on volume 2
%BACKUP-I-READYWRITE, Mount volume 2 on _MUA0: for writing
Enter "YES" when ready:
```

If the procedure does not display these messages, go to step 8.

a. Remove the backup tape from the drive.

b. Label the tape COMPLETE SYSTEM BACKUP SYSDSK_122091.BCK, number it, and include the date.

c. Write-protect the tape.

d. Write-enable another scratch tape and insert it in the drive.

e. When you are ready to continue, type Y (for YES) and press the Return key.

f. The procedure displays the following message:

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

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

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

```
%BACKUP-I-PROCDONE, operation completed. Processing finished at 20-DEC-1991 13:00
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:
```

9. Remove the backup tape from the drive. Label the tape COMPLETE SYSTEM BACKUP SYSDSK_122091.BCK, and include the date. If you used more than one tape, indicate the number of the tape in the backup sequence.

10. Write-protect the tape.

11. Stop the system. If your system has a Halt button, press it twice. Make sure the light on the Halt button goes off. If your system does not have a Halt button, press the F5 (Break) key.

12. 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 3. (The CLUSTER_SIZE refers to the way files are stored on the disk, _not_ to VAXcluster configurations.) 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 you want. For more information about initializing a disk, see the _OpenVMS System Manager's Manual_. For more information on the BACKUP command, see the _OpenVMS System Management Utilities Reference Manual_.

_____

3.3 Restoring the System Disk

To restore the system disk, use the following procedure:

1. Write-protect the backup disk or tape.

2. Insert 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 Sections 3.1.2, 3.1.4, or 3.1.5.

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 a list of device names for all MicroVAX 4000 and MicroVAX, VAXstation, and VAXserver 3600 series and MicroVAX and VAXserver 3400 and 3900 series devices, see Section 1.1.2.3.

6. At the dollar sign prompt ($), enter the BACKUP command in one of the following formats:

    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.

    • _target-drive_ is the destination. Use the device name of the drive holding the system disk.

    • _saveset.BCK_ is the name of the saveset, if you have a backup tape.

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 MUA0:SYSDISK_122091.BCK/REWIND DUA0:
```

If the save set contains more than one volume, the procedure displays the following message:

```
%BACKUP-I-RESUME, Resuming operation on volume 2
%BACKUP-I-READYREAD, Mount volume 2 on MUA0: for reading
Enter "YES" when ready.
```

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

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

```
%BACKUP-I-PROCDONE, operation completed. Processing finished at 20-DEC-1991 13:00
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:
```

9. Stop the system. If your system has a Halt button, press it twice. Make sure the light on the Halt button goes off. If your system does not have a Halt button, press the F5 (Break) key.

10. Reboot the system.

3.4 Copying an Existing System Disk

If you copy an existing system disk to an RF-series disk (rather than perform an installation on that RF-series disk), modify the following SYSGEN parameters by editing SYS$SYSTEM:MODPARAMS.DAT as follows:

• Set ALLOCLASS to match the allocation class of the RF-series device.

• Set MSCP_SERVE_ALL to 1.

Make sure you run AUTOGEN after booting your computers.

Glossary

boot or bootstrap

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

boot server

A VAX computer that is part of a local area VAXcluster or mixed-interconnect VAXcluster. The boot server in a local area VAXcluster or mixed-interconnect 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.

console mode

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

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.

dual-host system

A type of VAXcluster configuration that includes two systems, several RF series storage devices, and a Digital Storage Systems Interconnect (DSSI) cable. The two MicroVAX systems serve as boot nodes, with each system having direct access to all devices on the DSSI bus.

local area VAXcluster

A system of computers, with 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 computer is referred to as a local drive.

media

A generic term that refers to any packaging agent capable of storing computer software. Examples of media are magnetic tapes, floppy diskettes, disk packs, tape cartridges, etc.

mixed-interconnect VAXcluster

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

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 or mixed-interconnect VAXcluster. A satellite node is booted remotely from the system disk of the boot server in the VAXcluster. See also boot server.

save set

The format in which the Backup Utility stores files. 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.

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.

VAXserver

A VAX computer that functions primarily as the boot server in a local area or mixed-interconnect VAXcluster. It also can serve as the batch computer for the cluster. A VAXserver is restricted to only two users (for system management purposes).

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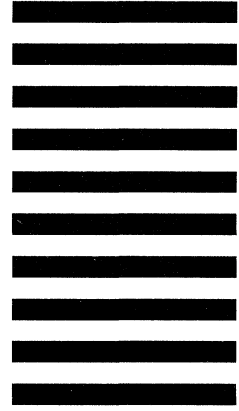Company _____ Date _____

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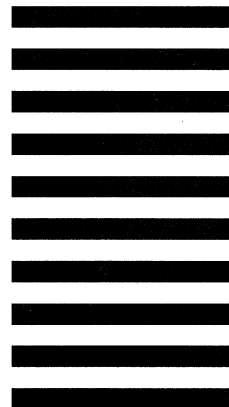
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