



OpenVMS Systems Operations Guide:
VAX 8600 Systems

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About This Guide

This document is a quick reference guide to basic VAX 8600 systems operations. It summarizes basic information concerning such system tasks as booting and console operation as they relate to VAX 8600 systems.

Intended Audience

This guide is designed primarily for the following:

- System software support personnel
- Digital Services personnel
- System managers
- Instructors and participants in certain OpenVMS operating system courses:
 - Systems Troubleshooting
 - System and Network Management I, II, and III

Document Scope

This guide describes various aspects of VAX 8600 systems operations including:

- Console subsystem overview
- Operators control panel
- Console commands
- System boot procedures
- System backup procedures

1

Console Subsystem Overview

1.1 Introduction

The console subsystem provides the means to examine and deposit data in memory or registers, to halt the system, and to boot the system. During an upgrade or installation, use the console subsystem to boot the system and monitor the upgrade installation process.

The console subsystem consists of the following:

- T-11 microcomputer
- Console terminal
- Control panel
- Console disk drive
- Optional remote diagnostic port

1.2 Console Terminal

There are two types of console terminals: the local console and the remote console.

Local console terminal

The local console is a hardcopy terminal which is attached to the console microprocessor. The local console provides the means to control and monitor system operations and to keep a printed log of system activities.

Remote console terminal

The remote console is an optional terminal which allows a customer services engineer at a Digital diagnostic center to control and monitor the system during diagnostic testing.

1.3 Operator's Control Panel

The VAX 8600 control panel is located on the front of the system cabinet. The panel includes four indicator lights and two keylock switches.

Figure 1-1 shows the control panel. Table 1-1 describes the indicator lights. Tables 1-2 and 1-3 describe the switches.

Figure 1-1 VAX 8600 Control Panel

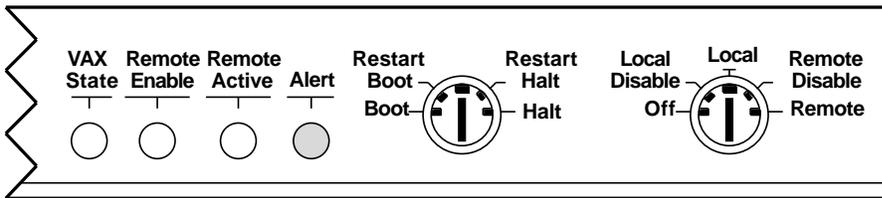


Table 1-1 Control Panel Indicators

| Indicator | Color | Meaning |
|------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VAX State | Green | Blinks when the CPU is executing instructions. |
| Remote Enable | Green | Illuminated when the remote diagnostic port access is enabled. |
| Remote Active | Green | Illuminated when the remote console terminal is connected and the remote diagnostic line is active. |
| Alert | Red | Illuminated when the CPU cabinet temperature is too high. When the alert light is on, the computer sends a warning message to the console terminal. The light blinks when temperature or air flow conditions exceed threshold limits. When the light blinks, the system shuts down automatically within one minute unless the problem is corrected. |

Table 1-2 Terminal Control Switch Settings

| Setting | Meaning |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OFF | Power is turned off. |
| LOCAL | Enables the local console to run in either console mode or program mode; the remote console is disabled. In program mode, pressing Ctrl/P puts the console subsystem in console mode. |
| LOCAL DISABLE | Enables the local console to run in console mode; the remote console is disabled. In program mode, pressing Ctrl/P has no effect. The system ignores the setting of the RESTART switch and attempts a RESTART/BOOT after a shutdown, power failure, or error halt. |
| REMOTE | Enables both the local and the remote console to run in console or program mode. Pressing Ctrl/P at either terminal puts the console subsystem in console mode. In program mode, command lines typed at the local or the remote terminal and the resulting output are echoed on both terminals. |
| REMOTE DISABLE | Enables the local console to run in console or program mode; the remote console can be used as a user terminal. Pressing Ctrl/P at the local console while in program mode puts the console subsystem in console mode. Pressing Ctrl/P at the remote console has no effect. |

Table 1-3 Restart Switch Settings

| Setting | System Action |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BOOT | Attempts to boot the system using the default boot command procedure. |
| RESTART/BOOT | Attempts to restart the system by checking the restart parameter block for valid data. If the restart parameter block is invalid, attempts to boot the system using the default boot command procedure. |
| HALT | Halts the system and displays the console-mode prompt (>>>) at the console terminal. |
| RESTART/HALT | Attempts to restart the system by checking the restart parameter block for valid data. If the restart parameter block is invalid, halts the system and displays the console-mode prompt (>>>) at the console terminal. |

NOTE

If the TERMINAL CONTROL switch is in the LOCAL DISABLE position, the system ignores the RESTART switch setting and assumes that it is in the RESTART/BOOT position.

1.4 Console Modes

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

Console mode

When the console subsystem is in console mode, the prompt >>> is displayed on the console terminal. In console mode, you can control and monitor system operations using console mode commands.

Program mode

When the console subsystem is in program mode, the OpenVMS operating system is running. In program mode, you can enter DCL commands, run programs, and receive system messages.

1.5 Commonly Used Console Commands

Table 1-4 describes the most commonly used console mode commands.

Table 1-4 Commonly Used Console Mode Commands

| Command | Definition |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BOOT | Executes a command procedure that loads a VAX software program into memory. The command procedure transfers control to the program and puts the console subsystem in the program mode. During the installation procedure, use the abbreviation, B, for the BOOT command. |
| BOOT/NOSTART | Stops the boot operation after the boot command procedure executes. This command lets you deposit values in registers before transferring control to the primary boot program with the START command. |
| DEPOSIT | Puts a value in the specified register or memory location. During the installation procedure, use the abbreviation, D, for the DEPOSIT command. |
| HALT | Stops the CPU. |
| START nnnn | Continues execution of the boot command procedure at the specified address. Use this command in conjunction with the BOOT/NOSTART command. |

For more information on the console subsystem and command language, refer to the documents supplied with the system.

2

System Shutdown Procedures

2.1 Orderly Shutdown with SHUTDOWN.COM

To use the SHUTDOWN command procedure, log in to the SYSTEM account, enter the following command, and press Return:

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

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

2.2 Emergency Shutdown with CRASH

NOTE

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

The CRASH command procedure is on the console RL02. CRASH causes the system to fail, resulting in immediate shutdown. To force your computer to fail with CRASH, do the following:

1. Make sure the console RL02 is in the console drive (CSA1) and the TERMINAL CONTROL switch is set to LOCAL.
2. Press Ctrl/P to obtain the console-mode prompt (>>>). Enter the HALT command and press Return.

```
>>> HALT
```

3. Enter the following command and press Return:

```
>>> @CRASH
```

2-2 System Shutdown Procedures

4. CRASH displays a fatal bugcheck message as well as additional messages and information. The procedure examines the program counter (PC), the processor status longword (PSL), and the stack pointers. It then deposits values in the PC and PSL that cause an exception condition that sends the contents of memory to a dump file on the system disk. Later you can read the dump file to determine why the system did not respond.
5. After the CRASH executes, the system attempts to reboot if the RESTART switch is set to the RESTART/BOOT position and the SYSGEN parameter BUGREBOOT is set to 1. Otherwise, reboot the system manually by entering the BOOT command at the console-mode prompt (>>>). If you do not specify a boot name, the system uses DEFBOO.COM.
6. After the system reboots you can examine the dump file. To examine the dump file, log into the SYSTEM account. Enter the following commands and press Return after each one:

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

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

3

System Boot Procedures

3.1 Introduction

VAX 8600 systems use command procedures to boot the operating system. Boot command procedures:

- Set up the system environment
- Deposit values in registers
- Tell the system what type of drive the system disk is on as well as the controller designation and the unit number of the drive
- Load the operating system into memory
- Start the CPU

3.2 Boot Devices and Command Procedures

The instructions for booting the system vary slightly for different types of drives. Therefore, there is a boot command procedure for each type of drive that the computer supports.

For example, you can boot an RA81 drive that has a unit number of 0 with the boot command procedure DU0BOO.COM (assuming the controller designation is A). If the drive has a unit number of 1, use the boot command procedure DU1BOO.COM. Use CIBOO.COM to boot from a system disk on an HSC drive.

All boot command procedures are located on the console RL02. The console RL02 must be in the console disk drive (CSA1) whenever you boot the system.

NOTE

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

- **Each UNIBUS up to (but not including) the one that supports the system disk must have exactly one UDA50. Each UNIBUS from the system disk upwards can have up to the legally allowable number of UDA50s.**
- **You can boot only from the first UDA50 on a UNIBUS (that is, the one with the fixed CSR and vector).**

3.3 Booting from a Local Drive

Follow these steps to boot the system from a local drive:

1. Make sure the console RL02 is in the console disk drive (CSA1) and the TERMINAL CONTROL switch is set to LOCAL.
2. If the OpenVMS operating system is not running, go to step 3.

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

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

The system displays a series of questions, which you should answer to complete the shutdown. When the procedure asks if an automatic system reboot should be performed, press Return for NO. When the procedure is finished, it displays the following message:

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

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

```
>>> HALT
```

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

```
ddu
```

where:

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

For example, to boot from an RA80 disk drive (device code DU) which has a unit number of 0, enter the following command:

```
>>> B DU0
```

Table 3-1 Disk Device Codes

| Code | Drive Type(s) |
|------|----------------------------------------|
| DB | RM03, RM05, RM80, RP05, RP06, and RP07 |
| DM | RK07 |
| DU | RA60, RA80, RA81, and RA82 |

You also can set up default boot command procedures so that the system automatically boots from a particular drive. To create default boot command procedures, see Section 3.5.

3.4 Booting from an HSC Drive

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

1. Make sure the console RL02 is in the console drive (CSA1) and the TERMINAL CONTROL switch is set to LOCAL.
2. If the OpenVMS operating system is not running, go to step 3.

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

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

The system displays a series of questions, which you should answer to complete the shutdown. When the procedure asks if an automatic system reboot should be performed, press Return for NO. When the procedure is finished, it displays the following message:

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

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

```
>>> HALT
```

4. Enter the following command and press Return:

```
>>> SET QUIET OFF
```

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This command lets you see the lines of the boot command procedure as they execute.

5. Enter the following command and press Return:

```
>>> BOOT/NOSTART CIBOO.COM
```

CIBOO executes and deposits values in the computer registers.

6. After CIBOO finishes, look at the DEPOSIT commands that it executed. You might need to change the values in some of the registers to fit your configuration.

If the HSC node number of your computer is not the value that CIBOO deposited, you need to change the value in register 2 (R2) using the following format:

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

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

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

NOTE

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

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

7. If the unit number of the drive holding the system disk is not the value that CIBOO deposited, you need to change the value in register 3 (R3) using the following format:

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

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

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

8. After you deposit the proper values, look for the value displayed by the EXAMINE SP command when CIBOO executed. The console display should look similar to the following:

```
>>> FIND/MEMORY
>>> EXAMINE SP
      G 0E 00000200
>>> LOAD/START:@ VMB
>>> START @
```

9. Enter the START command in the following format:

```
>>> START xxx
```

where *xxx* is the value displayed in response to the EXAMINE SP command when CIBOO executed.

For example, suppose your console display was the same as the one in step e. Enter the following command and press Return:

```
>>> START 200
```

You also can set up default boot command procedures so that the system automatically boots from a particular drive. By creating default boot command procedures, you avoid correcting information that CIBOO deposits each time you boot. For more information, see Section 3.5.

3.5 Creating Default Boot Command Procedures

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

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

`DEFGEN.COM` and `DEFBOO.COM` do not exist on the console `RL02`. However, Digital provides boot command procedures that you can edit and rename using the following procedure.

NOTE

This procedure assumes that the OpenVMS operating system is running and you are logged into the `SYSTEM` account.

1. Make sure the console `RL02` is in the console disk drive (`CSA1`) and the `TERMINAL CONTROL` switch is set to `LOCAL`.
2. To connect the console drive to the system, enter the following commands and press Return after each one:

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

3. Use the Exchange Utility to display a list of boot command procedures on the console `RL02`. Boot command procedures are the files that start with either `CI` or `D` and have a file type of `COM`. Enter the following command and press Return:

```
$ EXCHANGE DIRECTORY CSA1:CI*.COM,D*.COM
```

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

```
DUABOO.COM
DUAGEN.COM
CIBOO.COM
CIGEN.COM
.
.
.
```

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

If the system disk is on a local drive, look for the files whose first two letters match the device code of the drive holding the system disk. For example, if the system disk is on an RA82 drive, find the file names that begin with DU (DU is the device code for an RA82 disk drive).

If the third character in the file name is a number, it stands for the unit number of a drive with a controller designation of A. For example, DU1BOO.COM boots an RA82 disk drive with a controller designation of A and a unit number of 1.

If the third character in the file name is a letter, it stands for the controller designation. There is no corresponding unit number. For example, DUCBOO.COM boots an RA82 disk drive with a controller designation of C.

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5. Use the Exchange Utility to copy the appropriate files from the console RL02 to your current directory on the system disk. Enter the COPY command in the following format:

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

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

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

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

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

- a. Make sure the file contains a command that deposits the unit number of the drive holding the system disk in register 3 (R3). Use hexadecimal notation and make sure the command line is not commented out. For example, suppose the system disk is on an RP07 disk drive with a controller designation of C and a unit number of 3. After you copy DBCBOO.COM and DBCGEN.COM, make sure both files contain the following line:

```
DEPOSIT R3 00000003      !DISK DRIVE UNIT NUMBER
```

Suppose the system disk is on an HSC-based RA60 disk drive with a unit number of 2. After you copy CIBOO.COM and CIGEN.COM, make sure both files contain the following line:

```
DEPOSIT R3 00000002      !DISK DRIVE UNIT NUMBER
```

- b. If you copied CIBOO.COM and CIGEN.COM, make sure both files contain a command that deposits the HSC node number in register 2 (R2). Make sure the command line is not commented out. Use the following format:

```
DEPOSIT R2 node-number
```

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

```
DEPOSIT R2 C
```

NOTE

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

```
DEPOSIT R2 120A
```

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

```
$ RENAME filename.COM DEFBOO.COM
$ RENAME filename.COM DEFGEN.COM
```

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

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

8. Use the Exchange Utility to copy DEFBOO.COM and DEFGEN.COM to the console RL02. Enter the following commands and press Return after each one:

```
$ EXCHANGE COPY DEFBOO.COM CSA1:*
$ EXCHANGE COPY DEFGEN.COM CSA1:*
```

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

```
$ DISMOUNT CSA1
```

10. To secure the console RL02 from unauthorized access, you must enter the following command and press Return:

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

Now you can use DEFBOO.COM and DEFGEN.COM to boot the OpenVMS operating system, as described in the following sections.

3.6 Booting with DEFBOO.COM

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

- Set the RESTART switch to RESTART/BOOT or BOOT. Use the TERMINAL CONTROL switch to turn on system power. The system uses DEFBOO.COM to boot automatically.
- Set the RESTART switch to RESTART/BOOT or BOOT. Execute the SHUTDOWN command procedure and specify the auto reboot option. The system uses DEFBOO.COM to reboot automatically.
- Set the RESTART switch to RESTART/BOOT or BOOT. If the system shuts down because of a bugcheck, the system uses DEFBOO.COM to reboot automatically.
- Enter the following command and press Return:

```
>>> B
```

The system boots using DEFBOO.COM.

The system sometimes uses DEFBOO.COM when a power failure occurs. If a power failure occurs when the RESTART switch is set to RESTART/BOOT or BOOT and the contents of memory are lost, the system executes DEFBOO.COM when it regains power.

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

3.7 Conversational Boot (DEFGEN.COM)

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

- Look at system parameter values
- Change system parameter values
- Specify another parameter file
- Specify another system startup command procedure
- Select the default system parameter file if you modified system parameters to values that render the system unbootable
- Specify a minimum startup

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

1. Make sure the console RL02 is in the console disk drive and the TERMINAL CONTROL switch is set to LOCAL.
2. If the OpenVMS operating system is not running, go to step 3.

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

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

The system displays a series of questions, which you should answer to complete the shutdown. When the procedure asks if an automatic system reboot should be performed, press Return for NO. When the procedure is finished, it displays the following message:

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

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

```
>>> HALT
```

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

```
>>> @DEFGEN.COM
```

5. At the SYSBOOT> prompt, you can enter any of the SYSGEN commands listed in Table 3-2. For more information about these SYSGEN commands, see the *VMS System Generation Utility Manual*.
6. When you finish using the SYSGEN commands, enter the CONTINUE command to complete the boot process.

Table 3-2 SYSGEN Commands Used in SYSBOOT

| Command | Description |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CONTINUE | Resumes the boot procedure. |
| DISABLE CHECKS | Inhibits checking of parameter values specified with the SET command. |
| ENABLE CHECKS | Permits checking of parameter values specified with the SET command. |
| HELP | Displays a summary of the SYSBOOT commands on the terminal screen. |
| SET parameter-name | Establishes the value of a system parameter. |
| SET/STARTUP | Sets the name of the system startup command procedure. |
| SHOW [parameter] | Displays active, current, default, maximum, and minimum values for specific parameters. Use qualifiers to display characteristics of parameters grouped by categories. |
| USE [file-spec] | Specifies a parameter file to be used as a source of values (you must enter the entire file specification, including device and directory; you cannot specify a logical name). |

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

You can enter the following commands to set the SYSGEN parameter WSMAX to 512 and complete the boot process:

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

When the OpenVMS operating system displays the following message, the new SYSGEN parameter value becomes active.

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

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

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

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

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

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

1. Starts the processes that control error logging, the job controller, and the operator's log
2. Installs known images
3. Defines the number of interactive users as 8
4. Logs off

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

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

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

3.8 Booting from a Different Directory on the System Disk

The OpenVMS operating system is installed on the system disk in the system root directory named [SYS0]. You can use VMSKITBLD, described in the *Guide to Setting Up a VMS System*, to add a copy of the OpenVMS operating system to another system root directory on the system disk.

To boot the system from a directory other than [SYS0], create a command procedure named SYnBOO.COM, where *n* stands for the name of the other root directory on the system disk. Follow these steps to create a SYnBOO.COM:

1. Make sure that the console RL02 is in the console drive (CSA1) and the TERMINAL CONTROL switch is set to LOCAL.
2. To connect the console drive, enter the following commands and press Return after each one:

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

3. Use the Exchange Utility to copy the DEFBOO.COM command procedure from the console RL02 to your current directory on the system disk. Enter the following command and press Return:

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

4. Edit DEFBOO.COM. Change the command line that deposits a value into register 5 (R5). This line contains the comment *! Use R5 for optional boot control flags [SYSB.]*. The value is a hexadecimal number with 8 bits. For example:

```
DEPOSIT R5 B0000000      ! Use R5 for optional boot control flags
                        ! [SYSB.]
```

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

```
DEPOSIT R5 C0000000      ! Designated root is SYSC
```

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

```
$ RENAME DEFBOO.COM SYnBOO.COM
```

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

```
$ RENAME DEFBOO.COM SYCBOO.COM
```

6. Use the Exchange Utility to copy the SYnBOO.COM to the console RL02. Use the following format:

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

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

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

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

```
$ DISMOUNT CSA1
```

8. To secure the console RL02 from unauthorized access, you must enter the following command and press Return:

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

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

1. Make sure the console RL02 is in the console drive (CSA1) and the TERMINAL CONTROL switch is set to LOCAL.
2. If the OpenVMS operating system is not running, go to step 3.

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

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

The system displays a series of questions, which you should answer to complete the shutdown. When the procedure asks if an automatic system reboot should be performed, press Return for NO. When the procedure is finished, it displays the following message:

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

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

```
>>> HALT
```

4. Boot from the other root directory using the command procedure you created. For example, to boot from [SYSC], enter the following command and press Return:

```
>>> B SYC
```

3.9 Booting from [SYSF] During an Upgrade

To boot from [SYSF], create a command procedure named SYFBOO.COM.

To create SYFBOO.COM, use the following procedure:

1. Make sure that the console RL02 is in the console drive. Make sure the TERMINAL CONTROL switch is set to LOCAL.
2. Log in to the SYSTEM account.
3. To connect the console drive, enter the following commands and press Return after each one:

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

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4. Use the Exchange Utility to copy DEFBOO.COM from the console media to your current directory on the system disk as follows:

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

5. Edit DEFBOO.COM. Change the line that deposits a value in register 5 (R5). This line contains the comment *!Use R5 for optional boot control flags [SYSB.]*. The value is a hexadecimal number with eight digits. For example:

```
DEPOSIT R5 10000000 !Use R5 for optional boot control flags [SYSB.]
```

Change the leftmost digit of the value to reflect the name of the root directory from which you want to boot. For example, to boot from [SYSF], change the line as follows:

```
DEPOSIT R5 F0000000 !Use R5 for optional boot control flags [SYSB.]
```

6. Rename DEFBOO.COM to SYFBOO.COM, as follows:

```
$ RENAME DEFBOO.COM SYFBOO.COM
```

7. Use the Exchange Utility to copy SYFBOO.COM to the console media. Enter a command similar to the following:

```
$ EXCHANGE COPY SYFBOO.COM CSA1:SYFBOO.COM
```

8. When you are finished, enter a command similar to the following and press Return:

```
$ DISMOUNT CSA1
```

9. To secure the console media from unauthorized access, you must enter a command similar to the following and press Return:

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

To boot from [SYSF] during an upgrade, use the following procedure:

1. Make sure the console RL02 is in the console drive. Make sure the TERMINAL CONTROL switch is set to LOCAL.
2. Press Ctrl/P and enter the HALT command at the console-mode prompt (>>>):

```
>>> HALT
```

3. Use SYFBOO.COM to boot from [SYSF]. Enter the following command and press Return:

```
>>> B SYF
```


4

Backup Procedures

4.1 Introduction

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

You should back up the system disk for the following reasons:

- In case a problem occurs during a OpenVMS upgrade or update, or during the installation of other software products. (*Before* you attempt any of these procedures, 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 OpenVMS operating system, or any other software products, 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 OpenVMS operating system, you can restore it to a functioning disk and continue to use the system.
- To eliminate disk fragmentation, which happens when files are stored noncontiguously on the disk. The BACKUP command creates a copy on which files are stored contiguously.
 - If the system disk is removable, eliminating disk fragmentation is a one-step process. Use the backup copy as the new system disk. Store the old system disk in a safe place.

4-2 Backup Procedures

- If your system disk is fixed, back it up to a disk or magnetic tape. Then restore the files to the original system disk.

Digital recommends that you use standalone BACKUP to back up your system disk.

You should also back up the console RL02 in case the original becomes damaged.

4.2 Using Standalone BACKUP

You can keep standalone BACKUP on the system disk, an RL02 disk, or any other media that your system supports. Digital recommends that you keep standalone BACKUP on your system disk and on an RL02 disk. Usually, you boot standalone BACKUP from the system disk because it saves time. However, you need to keep a copy of standalone BACKUP on an RL02 disk in case the system disk becomes damaged. You received standalone BACKUP on an RL02 disk as part of the distribution kit.

4.3 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], use the following procedure:

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

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

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

```
The kit is complete.
```

3. Create a boot command procedure that lets you boot standalone BACKUP from [SYSE]. For more information, see Section 4.4.

4.4 Booting Standalone BACKUP from the System Disk

You need a special boot command procedure to boot standalone BACKUP from the system disk. Digital recommends that you modify an existing boot command procedure. Ideally, this should be the default boot command procedure, DEFBOO.COM.

You can choose any unique name in the form xxxBOO.COM for the command procedure you create. However, Digital suggests you use an existing file name, and change the first letter to an X. For example, if you use a copy of DEFBOO.COM, name the new file XEFBOO.COM.

To create a boot command procedure that boots standalone BACKUP from the [SYSE] root, use the following procedure. The procedure assumes you are using a copy of DEFBOO.COM and renaming it XEFBOO.COM.

1. Make sure the console RL02 is in the console drive (CSA1).
2. Log in to the SYSTEM account.
3. To connect the console drive to the system, enter the following commands and press Return after each one:

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

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

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

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

```
DEPOSIT R5 E0000000      ! Designated root is SYSE
```

6. Exit from the text editor to save the modified version of the file.
7. To copy XEFBOO.COM back to the console RL02, enter the following command and press Return:

```
$ EXCHANGE COPY XEFBOO.COM CSA1:*.*
```

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

```
$ DISMOUNT CSA1
```

9. To secure the console RL02 from unauthorized access, you must enter the following command and press Return:

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

After you copy XEFBOO.COM to the console RL02, you can use it to boot standalone BACKUP from the system disk.

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

1. Make sure the console RL02 is in the console drive (CSA1) and the TERMINAL CONTROL switch is set to LOCAL.
2. If the OpenVMS operating system is not running, go to step 3.

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

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

The system displays a series of questions, which you should answer to complete the shutdown. When the procedure asks if an automatic reboot should be performed, press Return for NO. When the procedure is finished, it displays the following message:

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

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

```
>>> HALT
```

4. Enter the following command and press Return:

```
>>> @XEFBOO
```

5. Standalone BACKUP displays the following message:

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

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

```
PLEASE ENTER DATE AND TIME (DD-MMM-YYYY HH:MM) 19-JUN-1990 15:30
```

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

```
Available device  MINE$DUA0:          device type RA81
Available device  MINE$DJA3:          device type RA60
.
.
```

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

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

```
%BACKUP-I-IDENT, Standalone BACKUP V5.4; the date is
19-JUN-1990 15:05
$
```

4.5 Installing Standalone BACKUP on an RL02 Disk

Digital recommends that you keep standalone BACKUP on an RL02 disk in case the system disk becomes damaged. To install standalone BACKUP on an RL02 disk, use the following procedure. The procedure takes approximately 15 minutes.

NOTE

You should have standalone BACKUP on the RL02 disk that came with your distribution kit. Use the procedure in this section if your copy of standalone BACKUP becomes damaged, or if you need to make extra copies.

- Obtain one blank RL02 disk. Write STANDALONE BACKUP V5.4 on the paper label on the disk.
- Log into the SYSTEM account.
- Remove the console RL02 from the console disk drive. Insert the RL02 labeled STANDALONE BACKUP V5.4.
- Enter the following command and press Return:

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

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

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

4-6 Backup Procedures

6. The procedure displays the following message:

Do you want to initialize CSA1:? Note that this will erase all files currently on the volume.

It is not necessary to initialize the disk and you would not want to initialize if you want to add a kit to an existing Files-11 disk. The disk must be a valid Files-11 disk if you wish to skip initializing, however.

Do you want to initialize? [Yes/No, default No]:

To accept the default, press Return. To initialize the disk, type Y (for YES).

7. The procedure displays the following message:

Enter the new volume label [default STANDBACKUP]:

Enter a new volume label or press Return to accept the default.

8. The procedure mounts the RL02 disk and displays a number of informational messages. For example:

```
%MOUNT-I-MOUNTED, STANDBACKUP mounted on _CSA1:
%CREATE-I-CREATED, _CSA1:<SYS0.SYSEXEXE> created
%CREATE-I-CREATED, _CSA1:<SYS0.SYS$LDR> created
.
.
.
```

9. After all the files are copied to the RL02 disk, the procedure displays the following message:

The console volume will be mounted /NOWRITE for protection. Please make sure the original console RL02 is in the drive CSA1:.

Enter "YES" when ready:

10. Remove the RL02 disk labeled STANDALONE BACKUP V5.4 from the console disk drive and insert the console RL02. When you are ready, type Y (for YES) and press Return.

11. The procedure may display several mount messages. When the procedure finishes, it displays a message similar to the following:

```
Ending time      19-JUN-1990 14:31
Starting time    19-JUN-1990 14:16

The kit is complete.
```

4.6 Booting Standalone BACKUP from an RL02 Disk

If the system disk containing standalone BACKUP should become unusable, you can boot standalone BACKUP from an RL02 disk. You need an RL02 disk that contains standalone BACKUP (either the one that came with the distribution kit or one that you created). To boot standalone BACKUP from an RL02 disk, use the following procedure:

1. Make sure the console RL02 disk is in the console drive (CSA1).
2. If the OpenVMS operating system is not running, go to step 3.

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

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

The system displays a series of questions, which you should answer to complete the shutdown. When the procedure asks if an automatic reboot should be performed, press Return for NO. When the procedure is finished, it displays the following message:

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

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

```
>>> HALT
```

4. To boot standalone BACKUP, enter the following command and press Return:

```
>>> B CS1
```

5. The procedure displays the following message:

```
G 0E 00000200
```

```
Please remove the volume "8600/8650 Console" from the console device.
```

```
Insert the first standalone system volume and enter "YES" when ready:
```

6. Remove the console RL02 and insert the RL02 disk that contains standalone BACKUP. When you are ready to continue, type Y and press Return. The procedure displays the following message:

```
Resuming load operation on volume 'STANDBACKUP', please stand by...
```

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

4-8 Backup Procedures

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

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

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  MINE$DUA0:          device type RA81
Available device  MINE$DJA3:          device type RA60
.
.
.
```

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

9. When standalone BACKUP is finished booting, it displays an identification message followed by the dollar sign prompt (\$):

```
%BACKUP-I-IDENT, standalone BACKUP V5.4; the date is 19-JUN-1990 15:35
$
```

4.7 Backing Up the Console RL02

Make a backup copy of the console RL02 to protect against corruption or loss of the original. First, use CONSCOPY.COM to transfer the files on the console RL02 to a directory on the system disk. Then use it to *restore* the files on the system disk to a new RL02 disk.

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

1. Log in to the SYSTEM account.
2. Insert the console RL02 disk in the console drive (CSA1).
3. Enter the following command and press Return:

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

The procedure displays the following message:

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

```
Save or restore a OpenVMS console medium.
```

```
Which CPU kit do you want to build?
```

```
78X, includes 11/780 and 11/785
```

```
8600 includes 8650
```

```
8200 includes 8250, 8300 and 8350
```

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

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

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

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

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

```
Do you want to SAVE or RESTORE your console RL02?: SAVE
```

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

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

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

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

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

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

9. When the procedure displays the following message, press Return (the console RL02 is already in the drive):

```
Put your console RL02 into drive _CSA1:,  
and press Return when ready:
```

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After you press Return, the procedure mounts the console RL02 and uses the Exchange Utility to begin the *save* operation. The procedure may display several Exchange Utility messages, file header information, and a list of the files being saved. When the procedure is complete, it displays the following message:

```
The SAVE of your console RL02 is complete.
```

To transfer the files that are on the system disk to a new RL02 disk, use the following procedure:

1. Enter the following command and press Return:

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

The procedure displays the following messages:

```
S Y S $ U P D A T E : C O N S C O P Y . C O M
      Save or restore a OpenVMS console medium.
```

Which CPU kit do you want to build?

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

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

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

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

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

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

```
Do you want to SAVE or RESTORE your console RL02?: RESTORE
```

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

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

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

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

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

Enter console device drive (DDCU:): CSA1:

7. The procedure displays the following message:

Put your console RL02 into drive _CSA1:,
and press Return when ready:

Remove the console RL02 disk from the console drive. Insert the new RL02 disk in the drive. Press Return when you are ready to continue.

8. The procedure mounts the RL02 disk and uses the Exchange Utility to begin the *restore* operation. The procedure displays several Exchange Utility messages, file header information, and a list of the files that are being restored. When the procedure is complete, it displays the following message:

The RESTORE of your console RL02 is complete.

Use the console RL02 that you just created to make sure it works. Treat the original as the backup copy.

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