DIRECTORIO DE PROFESORES DE LOS CURSOS: "INTRODUCCION AL SISTEMA VAX-11/780" Y "OPERACION Y ADMINISTRACION DEL SISTEMA VAX/VMS" DEL 29 DE ABRIL AL 13 DE MAYO.
MEXICO, D.F.

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EVALUACION DEL PERSONAL DOCENTE

CURSO: "INTRODUCCION AL SISTEMA VAX-11/780" Y "OPERACION Y ADMINISTRACION DEL SISTEMA VAX/VMS"

FECHA: DEL 29 DE ABRIL AL 13 DE MAYO/1985

	CONFERENCISTA	DOMINIO DEL TEMA	EFICIENCIA EN EL USO DE AYUDAS AUDIOVISUALES	MANTENIMIENTO DEL INTERES. (COMUNICACION CON LOS ASISTENTES, AMENIDAD, FACILIDAD DE EXPRESION).	PUNTUALIDAD	
1.	ING. EDUARDO S. JALLATH CORIA					
2.	ING. SOCRATES A. MUÑIZ ZAFRA					
3.	ING. HUMBERTO SANCHEZ SANDOVAL					
4.	ING. ALEJANDRO JIMENEZ GARCIA					
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ESCALA DE EVALUACION: 1 a 10

EVALUACION DE LA ENSEÑANZA

SU EVALUACION SINCERA NOS AYUDARA A MEJORAR LOS PROGRAMAS POSTERIORES QUE DISEÑAREMOS PARA USTED.

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TEMA	ORGANIZACION Y DESARROLLO DEL TEMA	GRADO DE PROFUNDIDAD LOGRADO EN EL TEMA	GRADO DE ACTUALIZACION LOGRADO EN EL TEMA	UTILIDAD PRACTICA DEL TEMA	
INTRODUCTION TO VAX/VMS					
COMPUTER BASICS					
VAX - 11 HARDWARE					
VAX / VMS SOFTWARE					
DCL RULES AND SYNTAX					
FILE, DIRECTORIES, AND FILE SPECIFICATIONS					
DCL COMMANDS					
MODIFYNG THE DCL ENVIRONMENT					
SYSTEM MANAGEMENT FUNCTIONS					
MONITORING AND BALANCING THE SYSTEM					
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ESCALA DE EVALUACION: 1 a 10

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OPERATOR-USER COMUNICATION					
HANDLING PERIPHERALS					
DISKS, TAPES, AND FLOPPIES					
QUEUES					
SHUTDOWN					
STARTUP					
BACKUP AND OTHER PERIODIC DUTIES					
HANDLING ERRORS					

ESCALA DE EVALUACION: 1 a 10

EVALUACION DEL CURSO

	CONCEPTO	EVALUACION
1.	APLICACION INMEDIATA DE LOS CONCEPTOS EXPUESTOS	
2.	CLARIDAD CON QUE SE EXPUSIERON LOS TEMAS	
3.	GRADO DE ACTUALIZACION LOGRADO CON EL CURSO	
4.	CUMPLIMIENTO DE LOS OBJETIVOS DEL CURSO	
5.	CONTINUIDAD EN LOS TEMAS DEL CURSO	
6.	CALIDAD DE LAS NOTAS DEL CURSO	
7.	GRADO DE MOTIVACION LOGRADO CON EL CURSO	

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MUY AGRADABLE	AGRADABLE	DESAGRADABLE

2. Medio de comunicación por el que se enteró del curso:

PERIODICO EXCELSIOR ANUNCIO TITULADO DIVISION DE EDUCACION CONTINUA	PERIODICO NOVEDADES ANUNCIO TITULADO DIVISION DE EDUCACION CONTINUA	FOLLETO DEL CURSO

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4. ¿Qué cambios haría usted en el programa para tratar de perfeccionar el curso? ____________________

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5. ¿Recomendaría el curso a otras personas?

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EY-1167E-SG-0301

M. en C. Miguel Durán Manjarrez

VAX/VMS OPERATOR

Student Guide

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DEC	DECSYSTEM-20	OMNIBUS
PDP	DIBOL	OS/8
DECUS	EDUSYSTEM	RSTS
UNIBUS	VAX	RSX
	VMS	IAS

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FACULTAD DE INGENIERIA U.N.A.M.

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DEL 29 DE ABRIL AL 13 DE MAYO.
MEXICO, D.F.

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ING. ALEJANDRO JIMENEZ GARCIA.
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ING. HUMBERTO SANCHEZ SANDOVAL.

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INTRODUCTION

The VAX/VMS OPERATOR course is designed for students who wish to understand and perform operational functions on a VAX computer system. Students wishing to understand but who may not be required to perform operational functions, also will find this a very instructive course. Sample operator functions include:

1. Physically mounting magnetic tapes and disks at the request of the users who own them
2. Initializing and mounting system volumes
3. Carrying out user requests
4. Sending messages to specific users
5. Broadcasting messages to all users
6. Controlling print and batch queues
7. Tending line printers
8. Tending card readers
9. Monitoring the system, noting and responding to emergencies
10. Printing copies of the operator's log file and the error log file
11. Shutting down and restarting the system

COURSE DESCRIPTION

The course topics include a basic discussion of the VAX/VMS operating system, the Digital Command Language (DCL) syntax and the use of DCL in operational control of the computer. The course contains hands-on exercises for the student. Additional topics discussed include:

- the user-operator-system manager interfaces.
- monitoring the system via DCL and reacting to the physical needs of the VAX and the VAX/VMS operating system (such as changing disks and tapes, and maintaining peripheral equipment).

- noting and responding to planned and unplanned changes in the system (for example, running system crash analysis procedures and system startup/shutdown procedures).
- daily, weekly, and otherwise periodic operational responsibilities such as routine backup and restore procedures.

PREREQUISITES

There are no prerequisites for this course.

The VAX/VMS Operator's course is written for people with no computer experience.

COURSE OBJECTIVES

Upon completion of this course the student will be able to:

1. Respond to user requests for information and/or operational assistance (such as mounting/dismounting disks and tapes).
2. Use the proper DCL commands (or supplied command procedures) to alter and/or change the system's environment according to the rules established by the system manager (for example, starting and stopping batch queues, print queues and processes).
3. Perform periodic functions as decided by the system manager, and system needs, to keep the VAX working smoothly. This includes backing up and restoring files and disks plus smoothly starting up and shutting down the system. VAX-11/780, VAX-11/750, and VAX-11/730 information is discussed.
4. Identify and refer problems to the system manager and/or system programmer. This relates to running crash analysis and diagnosis programs such as SDA, BAD, and VFY2.
5. Extract information (specific or general) about the system and its environment with the proper DCL commands.
6. Discuss VAX/VMS concepts related to system operation.
7. Prepare the system for Remote Diagnosis.

OPERATOR COURSE READING ASSIGNMENTS

Ø. INTRODUCTION TO VAX/VMS

This module is actually a summary of the following seven modules. It is organized in sections -- one for each of the summarized modules. The purpose of this module is to introduce the material contained in each module. As such, this module does not have any reading assignments of its own. Instead, you should do the reading assignments of the summarized modules.

1. COMPUTER BASICS

This module has no reading assignments. If more information is desired on computer basics, consult your instructor for additional material.

2. VAX-11 HARDWARE

2-1 VAX Hardware Handbook, Chapter 1.

VAX/VMS Summary Description, Chapter 1.

VAX-11/78Ø Hardware User's Guide, Chapter 1, Section 1.1 through 1.4.

When reading this material, pay close attention to the hardware information discussed. Do not ignore any software information. However, if you do not understand the software parts, wait until you finish Module 3.

3. VAX-11 SOFTWARE

3-1 VAX-11/78Ø Hardware User's Guide, Chapter 1, Section 1.5.

VAX Software Handbook, Chapter 1.

As you read this material, think back to the hardware information provided in the previous module. Also, concentrate on the basics of an operating system and the function it provides. If after reading this material, you are still not clear on an operating system and especially the parts and functions of the VAX/VMS operating system, review the module and, if needed, ask your instructor for assistance.

3-2 VAX Software Handbook, Chapter 2.

VAX/VMS Summary Description, Chapter 2.

OPERATOR COURSE READING ASSIGNMENTS

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3-2 VAX Software Handbook, Chapter 2.

VAX/VMS Summary Description, Chapter 2.

Because a process is one of the basic pieces of the VAX/VMS system, it is necessary to understand:

- What a process is
- What the parts of a process are
- What the different kinds of processes are

When you are reading the VAX/VMS Summary Description, read the entire chapter but pay close attention to the parts on "Process" and "Image".

OPTIONAL READINGS

VAX/VMS Summary Description, Chapter 3.

This optional reading gives more detail about the management of a process. Be sure you read and understand the material in the preceding reading assignments before attempting this material. If you are at all unsure whether you are ready for this material, it might be a good idea to delay reading it. After you have had some lab experience with the VAX/VMS system, return to this optional reading section.

4. DCL RULES AND SYNTAX

OPTIONAL READING

4-1 VAX/VMS Command Language User's Guide, Chapter 5.

If you have successfully completed the written exercises in the module and are short on time, return to this section after completing all the modules. This chapter details the Digital Command Language. If you have not had experience with other command languages, this chapter may prove slightly more involved than anticipated. Take your time and read this chapter carefully. It can be used for reference later.

5. FILES, DIRECTORIES AND FILE SPECIFICATIONS

5-1 VAX/VMS Command Language User's Guide, Chapter 2, File specifications.

5-2 VAX/VMS Command Language User's Guide, Chapter 2, Logical names.

5-3 VAX/VMS Command Language User's Guide, Chapter 3, File protection.

After reading the command descriptions of the SET command and all the parameters, compare the SET command with the SHOW command. You will find many SHOW commands that have a corresponding SET command.

6-5 VAX/VMS Command Language User's Guide, Part II, The command descriptions of:

- STOP
- SUBMIT
- RUN

VAX Software Handbook, Chapter 3.

Be sure you understand the use of the terminal control keys before continuing on. They will save you much time and grief.

7. MODIFYING YOUR DCL ENVIRONMENT

7-1 VAX/VMS Command Language User's Guide, Part II, The command description of "@".

VAX/VMS Guide to Using Command Procedures, Chapter 1.

Concentrate on the definition and use of command procedures. Be sure that you can properly activate (start up) a command procedure. Command procedures are used extensively on most VAX/VMS systems. Knowing what they are and how to use them will make your job easier.

7-2 VAX/VMS Command Language User's Guide, Chapter 2, Logical names.

VAX/VMS Command Language User's Guide, Part II, The command descriptions of ASSIGN and DEASSIGN.

This is a review of logical names. The use of logical names is covered in the module on file specifications. This section deals with how to create and remove logical names. After reading the module and the reading assignment, you might wish to go back and review the section on logical names in the Files, Directories, and File Specifications module.

When reading this material, concentrate on the three types of logical names (process, group, and system) and what processes can be affected by each. Using the SHOW LOGICAL command, review the logical names you have access to. If you need help on this or other logical name topics, discuss it with your instructor.

7-3 VAX/VMS Primmer, Chapter 6.

VAX/VMS Command Language User's Guide, Chapter 5, Symbols.

VAX/VMS Guide to Using Command Procedures, Chapter 3, Using symbols, and Chapter 4, Symbol substitution.

This section discusses setting up simple symbols to shorten DCL command lines. Do not spend time on any of the other sections in the chapters that deal with advanced symbol information. If this advanced symbol information interests you, return to it after the course is over.

7-4 VAX/VMS Primer, Chapter 2.

VAX/VMS Command Language User's Guide, Part II, The command description for EDIT/EDT.

VAX/VMS EDT Editor Manual, Chapter 1, Overview only, and Chapter 7, The command descriptions of:

- TYPE
- INSERT
- MOVE
- SUBSTITUTE
- EXIT
- QUIT

The main purpose in discussing an editor is so you can create and modify text and command procedure files. The commands covered in the module are sufficient to do this. If you successfully complete the lab assignments, do not worry about the other EDT editor commands.

7-5 VAX/VMS EDT Editor Manual, Chapter 7, The command descriptions of:

- COPY
- MOVE
- SUBSTITUTE
- RESEQUENCE
- INCLUDE

8. SYSTEM MANAGEMENT FUNCTIONS

8-1 VAX/VMS System Management and Operations Guide, Chapter 1 and Chapter 2.

VAX-11 Utilities Reference Manual, Chapter 2, the

AUTHORIZE utility, and Chapter 6, the DISKQUOTA utility.

VAX/VMS Commnad Language User's Guide, Part II, The command description of CREATE/DIRECTORY.

These readings look at system manager functions. Do not spend too much time reading the sections on AUTHORIZE and DISKQUOTA unless otherwise directed to by your instructor.

9. MONITORING AND BALANCING THE SYSTEM

9-1 VAX/VMS Command Language User's Guide, Part II, The command descriptions of:

- SHOW SYSTEM
- SHOW DEVICES
- SHOW MEMORY
- SHOW QUEUE

Once these commands have been discussed, you should constantly issue them. These commands are also covered in later modules. Take the time to carefully read the command descriptions for these commands. Be sure you understand the information output as a result of the commands. If you need assistance in understanding what is important about this information, discuss it with your instructor.

9-2 VAX/VMS Utilities Reference Manual, Chapter 12, the MONITOR utility.

9-3 VAX/VMS Command Language User's Guide, Part II, The command descriptions of:

- SHOW PROCESS/CONTINUOUS
- SHOW USERS
- STOP/ID
- SET LOGINS

When reading this chapter, unless you have the time to spend, concentrate on the TOP USERS discussion. Leave the reading of the other DISPLAY outputs for another time.

10. OPERATOR-USER COMMUNICATION

10-1 VAX/VMS Utilities Reference Manual, Chapter 14, The PHONE utility.

10-2 VAX/VMS Utilities Reference Manual, Chapter 13, The MAIL utility.

This reading assignment expands what is hoped to be an already well-founded understanding of MAIL. If you are not clear on the main uses of MAIL, go back and read the module section on MAIL again. Once fairly clear in your mind, proceed to the reading assignment.

10-3 VAX/VMS Command Language User's Guide, Part II, The command description of REQUEST and REPLY.

The REPLY command and the Operator's log file are of fair importance to an operator. Spend some time on this material and the corresponding module. It will be to your benefit to have a good understanding of this subject before continuing on.

11. HANDLING PERIPHERALS

11-1 VAX-11/780 Hardware User's Guide, Chapter 5,

- Pages 5-31 through 5-34
- Pages 5-39 through 5-41

Locate and read the user's guides for all types of disk drives on your system. Pay attention to the procedures up, power down, loading and unloading.

Pay attention to the diagrams as well as to the cautions and warnings listed. This information should be reviewed often until you follow all the suggestions automatically.

The RP06 and RM03 are discussed in this assignment, but the general warnings and cautions can be applied to any disk drive or pack.

11-2 VAX-11/780 Hardware User's Guide, Chapter 5, Pages 5-61 through 5-63.

11-3 VAX-11/780 Hardware User's Guide, Pages 5-53 through 5-59.

Locate and read the User's Guide for all tape drives supported on your system. Pay attention to the procedures for power up, power down, loading, unloading, and cleaning.

Pay attention to the diagrams and warnings. You will probably be handling many tapes during your career, so it is best to begin to handle them correctly now.

Pay particular attention to the handling and care section (5-59).

11-4 TU58 User's Guide, Chapter 2.

11-5 VAX-11/780 Hardware User's Guide, Pages 5-17 through 5-23. Consult the appropriate User's Guide for other types of terminals such as the VT100.

11-6 VAX-11/780 Hardware User's Guide,

- Pages 5-1 through 5-15
- Pages 5-67 through 5-75
- Pages 5-77 through 5-80

To learn more about any other printer, consult the appropriate User's Guide for the specific printer.

11-7 VAX-11/780 Hardware User's Guide, Pages 5-81 through 5-85.

12. DISKS, TAPES, and FLOPPIES

12-1 VAX/VMS Command Language User's Guide, Part II, The command descriptions of ALLOCATE and MOUNT/FOREIGN.

VAX/VMS Utilities Reference Manual, Chapter 4, The BAD utility.

12-2 VAX/VMS Command Language User's Guide, Part II, The command descriptions of:

- INITIALIZE
- MOUNT
- DISMOUNT

VAX/VMS Command Language User's Guide, Chapter 3, Section 3.1 through 3.4.2, disks.

VAX/VMS Utilities Reference Manual, Chapter 6, The Verify Utility (ANALYZE/DISK_STRUCTURE).

12-3 VAX/VMS Command Language User's Guide, Chapter 3, Sections 3.4.3 through the end, tapes.

VAX/VMS System Management and Operations Guide, Chapter 5.

13. QUEUES

13-1 VAX/VMS System Management and Operations Guide, Chapter 8, Batch queues.

VAX/VMS Command Language User's Guide, Part II, The command description of:

- SUBMIT
- SHOW QUEUE/BATCH
- INITIALIZE/QUEUE/BATCH
- START/QUEUE
- STOP/QUEUE
- STOP/ENTRY
- STOP/NEXT
- DELETE/QUEUE
- DELETE/ENTRY
- ASSIGN/MERGE

This section on batch queues and their control may best be used with the lab exercises. Read through the material before doing the lab exercises and have the information available when performing the lab to better your understanding of the subject.

13-2 VAX/VMS System Management and Operations Guide, Chapter 8, Device queues.

VAX/VMS Command Language User's Guide, Part II, The command descriptions of:

- PRINT
- INITIALIZE/QUEUE
- START/QUEUE
- STOP/QUEUE
- STOP/ABORT
- STOP/REQUEUE
- STOP/NEXT
- DELETE/QUEUE
- DELETE/ENTRY
- ASSIGN/QUEUE
- ASSIGN/MERGE
- SET QUEUE/ENTRY

This section on print queues and their control may best be used along with the lab exercises. Read through the material before doing the lab exercises and have the information available when performing the lab to better your understanding of the subject.

After Installation.

16. BACKUP and OTHER PERIODIC DUTIES

16-1 VAX/VMS Utilities Reference Manual, Chapter 3, The BACKUP Utility.

VAX/VMS Utilities Reference Manual, Chapter 7, The Disk Save and Compress Utility.

When reading the information on BACKUP, at first concentrate on what the utility can do rather than what the qualifiers are. Once you have a good feeling for what BACKUP can do, go back over the chapter and study the sequences of parameters and qualifiers.

If your operations group uses DSC, read the DSC material in detail. Otherwise, just familarize yourself with it.

16-2 VAX/VMS Command Language User's Guide, Part II, The command description of REPLY/LOG.

VAX/VMS Utilities Reference Manual, Chapter 17, The SYE utility.

Concentrate on what events (for example, a time stamp, a device error) are recorded and in what file they are recorded. Examine the operator's log and error log-file, not only during the lab, but after you have had some operating experience.

16-3 VAX/VMS Command Language User's Guide, Part II, The command description of SET ACCOUNTING/NEW_FILE and ACCOUNTING.

VAX/VMS Utilities Reference Manual, Chapter 1, The ACCOUNTING utility, and Chapter 6, The DISKQUOTA utility.

Discuss with your system manager the various items that must be periodically attended to at your site. If any of those items are not covered in the reading list, add them.

Pay close attention to what is being done, what information is being extracted, not just the command and its form.

17. HANDLING ERRORS

17-1 System Messages and Recovery Manual, Chapter 1.

The reading assignment assists you in deciphering errors on the VAX/VMS system. Pay close attention to the parts of an error message and what information it is giving.

You may wish to discuss the types of errors that occur on your system with your system manager or another operator.

OPTIONAL READING

17-2 System Dump Analyzer Reference Manual:

- Chapter 1
- Chapter 2
- SHOW SUMMARY command

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INTRODUCTION TO VAX / VMS.

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ING. SOCRATES A. MUÑIZ ZAFRA.
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MAYO DE 1985.

INTRODUCTION TO VAX/VMS

INTRODUCTION

As an operator, you will have to have a basic understanding of what a computer is, how it operates, and how to use it. In other words, before you can become a computer operator, you must first become a computer user.

As a student, you may have no experience with computers, a little experience with VAX/VMS or some other type of computer system, or extensive experience with another computer system and are becoming familiar with VAX/VMS.

The next seven modules are designed to teach you some fundamental VAX/VMS concepts that you will need to learn the skills of a VAX/VMS operator. Since some students may not have any computer experience, this course introduces general computer concepts and progresses to more advanced VAX/VMS concepts. On the other hand, some students may already be familiar with the concepts and may want to skip over material that they have already mastered.

This module is organized into sections that provide you with an overview of each of the following seven modules. This module will serve to alert you to material that you have had, and to prepare you for material that you have not had.

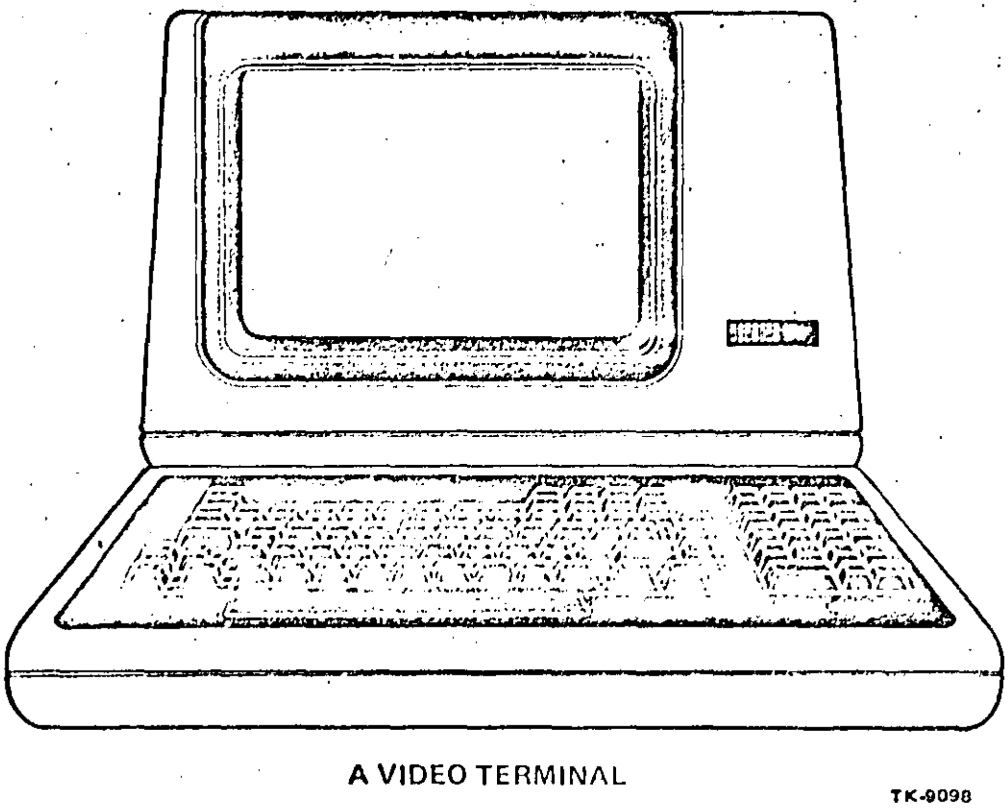
OBJECTIVES

1. To introduce basic computer concepts.
2. To list the hardware parts of a VAX/VMS computer.
3. To illustrate how to communicate with the VAX/VMS operating system.
4. To list and define the parts of a DCL command line.
5. To describe the functions of the VAX/VMS operating system.
6. To describe a process and its parts.
7. To describe the function of a file and the form of a file specification.
8. To list functional types of DCL commands.

RESOURCES

1. VMS Software Handbook
2. VMS Hardware Handbook
3. VAX/VMS Summary Description and Glossary

BEGINNING COMMUNICATION



A VIDEO TERMINAL

Figure Ø-1 A DIGITAL Terminal

To begin interacting with the system, you must log in and tell the system who you are. To log in, execute the following steps:

1. Turn on the terminal.

   You should know:

   - Where the ON-OFF switch is
   - Where the terminal is plugged in
   - Where the terminal-computer line is connected

2. Get the attention of the system.

   To signal the system that you want to log in, press one or two of the following keys on the terminal:

   - The RETURN key
   - The CTRL key and "Y" (at the same time)
   - The CTRL key and "C" (at the same time)

COMPUTER BASICS

A computer system is a functional organization of electrical and mechanical devices (called hardware) and a large group of instructions that tells the devices what to do (called software).

General purpose computer hardware devices are divided into four groups or parts of the overall system (see Figure Ø-2). The parts are:

- Central Processing Unit (CPU)
- Main Memory
- Auxiliary Storage
- User Input/Output

VAX-11 HARDWARE

The VAX-11 computer is divided into four functional subsystems (see Figure Ø-3). The four subsystems are:

- Central Processing Unit (CPU)
- Console
- Main Memory
- Input/Output (including the auxiliary storage devices)

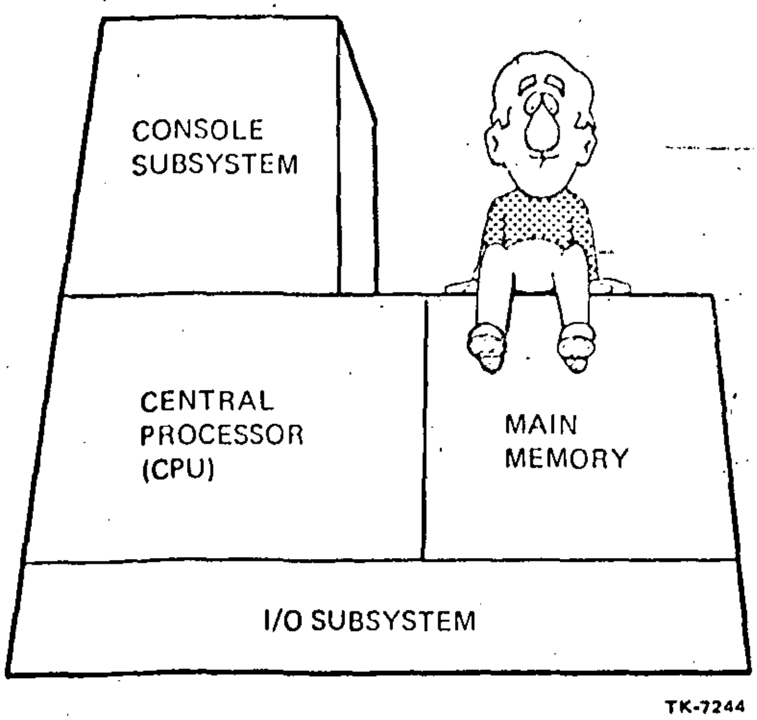


Figure Ø-3 VAX-11 Hardware Subsystems

The DIGITAL COMMAND LANGUAGE (DCL) is a way to tell the operating system what to do.

DCL RULES AND SYNTAX

The information conveyed by a DCL command is:

- What you want done (Verb)
- How you want it done (Qualifier)
- What you want it done to (Parameter)

The general form of a DCL command line is:

verb/qualifier parameter

- The verb or action word comes first.
- Any qualifiers generally come immediately after the word to which they apply. The qualifier must be preceded by a slash (/).
- The parameter or what to do the action to, comes last. It must be separated from other words with one or more spaces.

VAX/VMS SOFTWARE

The largest and most complicated software on a VAX is the VAX/VMS operating system.

Table Ø-1 Functions of the VMS Operating System

Function	Performed By	Comment
Monitor and supervise the system	Executive	Not discussed in this course
Ensure promptness and order	Scheduler	Gives all uses a fair share of processing time
Handle and control hardware devices	Device Drivers	Interfaces the CPU and I/O devices
Control the system when interrupts occur	Interrupt Handlers	Interrupts occur when a part of the system needs to get the CPUs attention quickly
Manage physical memory and disk space	Memory and Storage Allocator	Gives all users a fair share of memory and disk space
Assist user in communicating and controlling the system	Various System Programs	Perform various functions ranging from validating username/password to cleaning up when you log out

When a user issues a command to execute a program, the system must consider the following:

- Who is running the program?
- Should this user be allowed to run this program?
- How much of the system's resources should this user be given?
- How important is this user (what priority should the user be given)?

- What should the system permit the user to do (what privileges does the user have)?

VMS takes this information, combines it with a user's program and any other relevant data, and treats it as a unit called a process. (Think of a process as the program plus the environment in which it runs.)

A process is made up of four parts (see Figure Ø-4):

- The Hardware Context
- The Software Context
- The Virtual Address Space
- The Program (also called an Image)

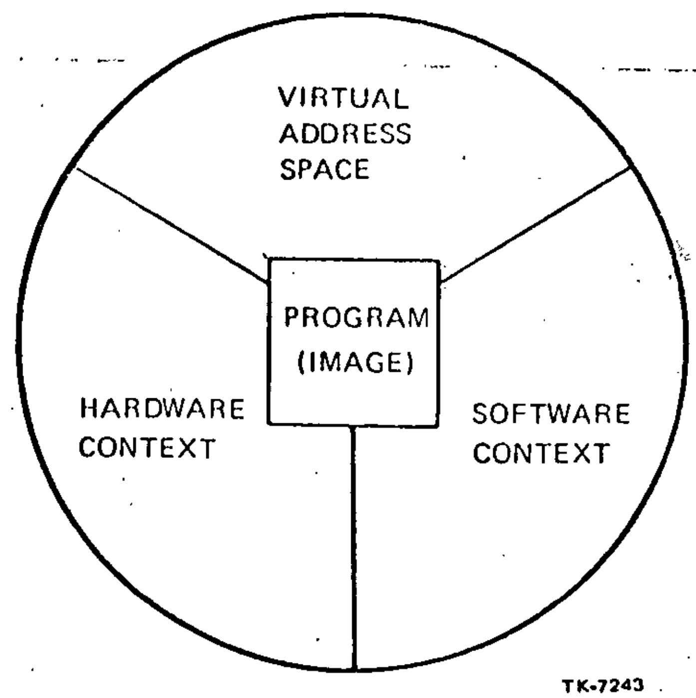


Figure Ø-4 The Four Parts of a Process

INTRODUCTION

Before learning about the VAX-11, it is important that you have a basic understanding of computers. This module discusses computers in very general terms, including:

- The computer and what it does
- The difference between hardware and software
- The standard hardware sections of a computer
- Instructions and programs used by a computer
- The operating system and what it does
- Multiprogramming
- Scheduling and time sharing

These topics are detailed in later modules, which center discussions on the VAX-11 computer system. Therefore, it is to your advantage to study this material carefully. Later, when it comes up again, you can concentrate on the VAX-specific material.

The two appendices at the end of this module are optional readings. Both subjects, flow charts and addresses, should be reviewed as often as you feel necessary.

OBJECTIVES

1. To identify the standard parts of computer hardware.
2. To list the functions of an operating system.
3. To define scheduling, time sharing, priorities, and multiprogramming.
4. To explain the difference between programs and instructions.

RESOURCES

1. <u>The VAX-11 Computer Programming and Architecture</u>
2. <u>VAX/VMS Summary Description and Glossary</u>

WHAT IS A COMPUTER

- A computer is a machine, an electrical and mechanical device.

- The Merriam-Webster dictionary defines a computer as "an automatic electronic machine for calculating."

COMPUTER FUNCTIONS

INPUT Gathering raw materials.

STORAGE Holding raw materials until they are needed.

PROCESS Working with the raw materials to form the final product.

OUTPUT Delivering the finished product for use.

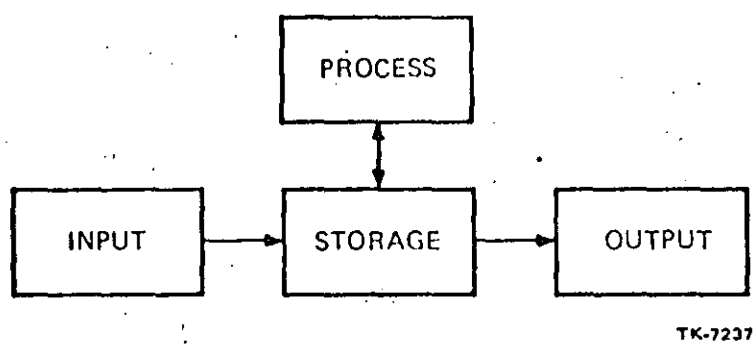


Figure 1-1 Basic Divisions of a Computer

HARDWARE VS. SOFTWARE

- A computer is a combination of hardware and software
- Hardware is the physical machine itself
- Software is the set of instructions that tells the hardware what to do

Hardware

- Central Processing Unit (CPU)
- Input
  - Punched cards,
  - Paper tape,
  - Magnetic tape, and
  - Computer terminals
- Output

  Same as above, plus:

  - TV display screens, and
  - Paper printers (computer-driven typewriters).
- Main Memory
- Auxiliary Storage

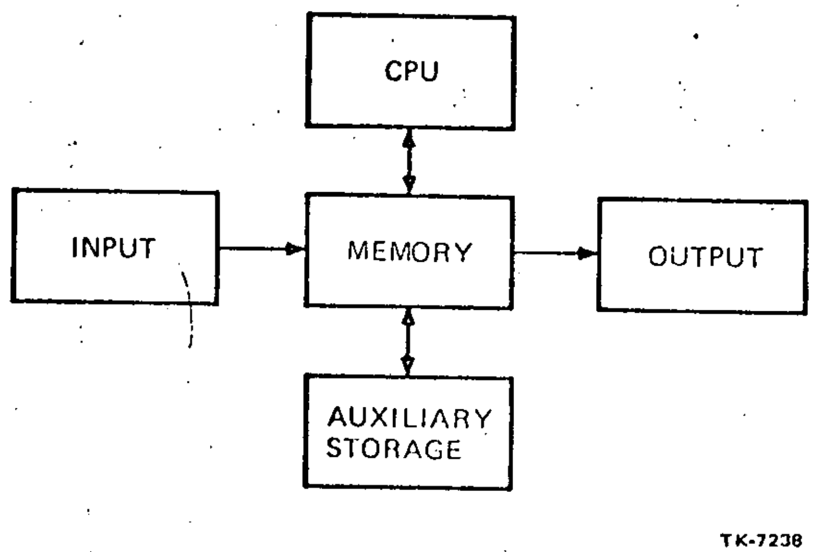


Figure 1-2 Computer Hardware

Software

- The Operating System
- Orders/Instructions
- Tasks
- Data Structures

APPENDIX B
INFORMATION, STORAGE

In a computer, numbers, words, and instructions are all put into a code using 1s and Øs. Instructions are separated from data. The computer is told where the first instruction is. It reads in sequence knowing that as long as it keeps going, the computer keeps seeing instructions. The data is referenced by addresses.

An address is a number that identifies a location in the computer. This is like the address of a house. The house is at a particular location. The easiest way to describe the location is by an address. When you get to the house, you are probably interested in the contents (the people) of the address rather than the address itself. The same is true for the computer. The computer use the address to find the contents. The address is just an easy way to put information someplace and know where to find it later.

For example:

Ø Ø Ø Ø Ø Ø Ø 1	:33

address= 33
contents= 1

Each 1 or Ø is called a bit. In this example, address 33 contains seven Øs and one 1. The 1s and Øs are, in this case, coded to represent the number one (1). Each bit does not have an address; an address refers to a group of bits. The size of the group of bits depends on the computer system.

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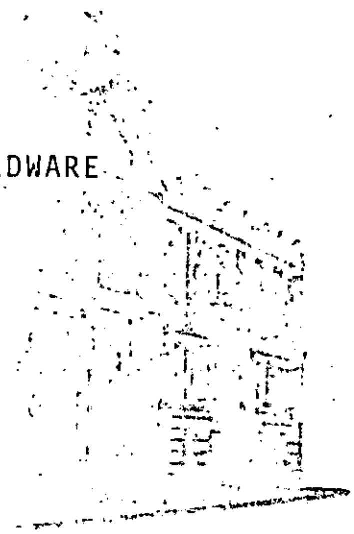

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MAYO DE 1985.

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VAX-11 HARDWARE

2

INTRODUCTION

As an operator, you are expected to interact with the computer, sometimes by handling the VAX hardware. Therefore, you must understand what the hardware parts are, what they do, and where they are located.

The VAX-11 is made up of four hardware sections called subsystems. Each subsystem has a specific purpose, a set of functions. The VAX-11 hardware is not physically split into four sections; the division of subsystems by function only makes the VAX-11 hardware easier to understand.

- The CPU subsystem
- The Console subsystem
- The Memory subsystem
- The Input/Output subsystem

Except for the console subsystem, the subsystems are similar to the basic computer functions mentioned in the Computer Basics module. The console subsystem is used in starting, stopping, and controlling the computer.

OBJECTIVES

1. To list and define the four main subsystems of the VAX-11 hardware.

2. To describe how the four VAX-11 subsystems relate to each other.

RESOURCES

1. <u>VAX Hardware Handbook</u>

2. <u>VAX/VMS Summary Description and Glossary</u>

3. <u>VAX-11/780 Hardware User's Guide</u>

4. <u>The VAX-11 Computer Programming and Architecture</u>

HARDWARE OVERVIEW

The four subsystems of a VAX-11 are:

- The Central Processing Unit (CPU)
- The Console
- The Main Memory
- The Input/Output (including the auxiliary storage devices)

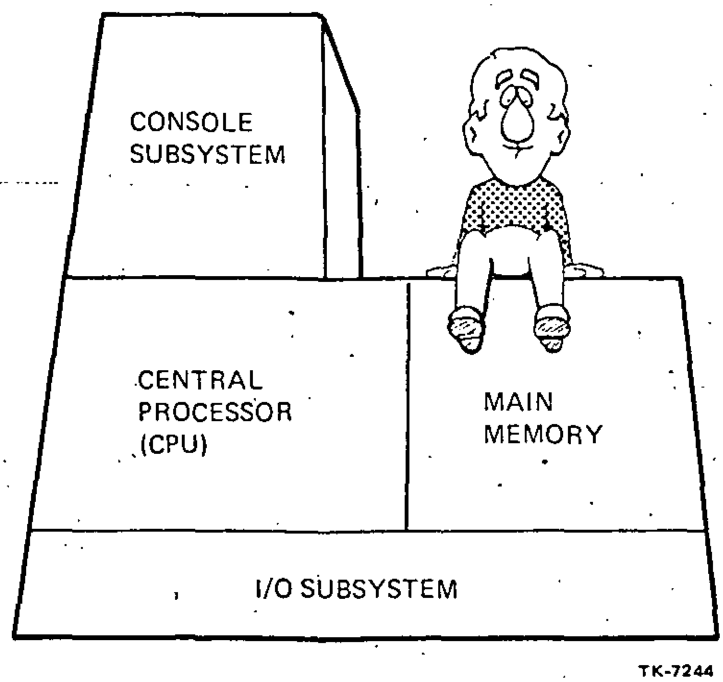

Figure 2-1 VAX-11 Hardware Subsystems

The CPU

The CPU contains:

- Registers - Locations used for fast but temporary storage of data (not instructions)
- Logic - The "know how" to perform the operations requested by the machine instructions.
- Cache memory - A small amount of memory in the CPU information from main memory
- A clock - Maintains the time

The Console Subsystem

The Console subsystem is made of:

- The Operator's Console Terminal
- Console Storage Device
- Console Processor (11/780 and 11/730)
- Remote Diagnosis Port

Main Memory

- There are two kinds of memory in a VAX: READ/WRITE and READ ONLY.
- READ/WRITE memory is used to store data/instructions
- The type of READ/WRITE memory used on the VAX-11 is called MOS memory
- If the VAX-11 has a power loss, the information in MOS memory is also lost
- A battery can be purchased that provides the power to keep information in memory for approximately 10 minutes after the main power goes off
- READ ONLY memory (ROM) contains information that cannot be changed by ordinary means.
- If power is lost, the information in the ROM is retained
- ROM is used in the startup sequence

Input/Output

All devices in the input/output subsystem are referred to as peripheral devices. There are three types of peripherals:

- Devices that communicate directly with people for input and output (terminals).
- Devices that communicate with people, but are used for input and output (card readers, line printers).
- Devices that communicate directly with the computer for input and output (disk, tape, cartridge, floppy disk).

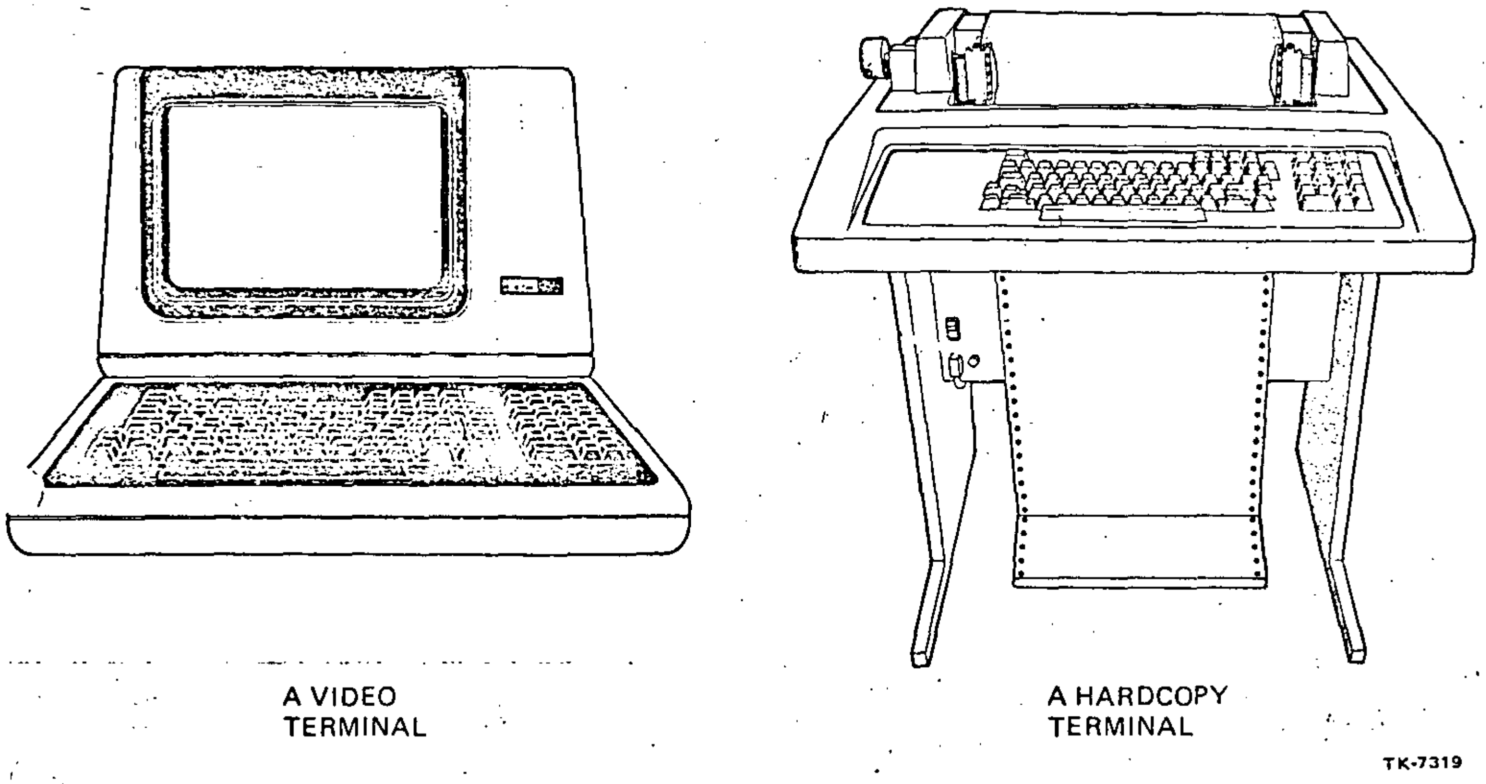

Figure 2-2 Input/Output Devices

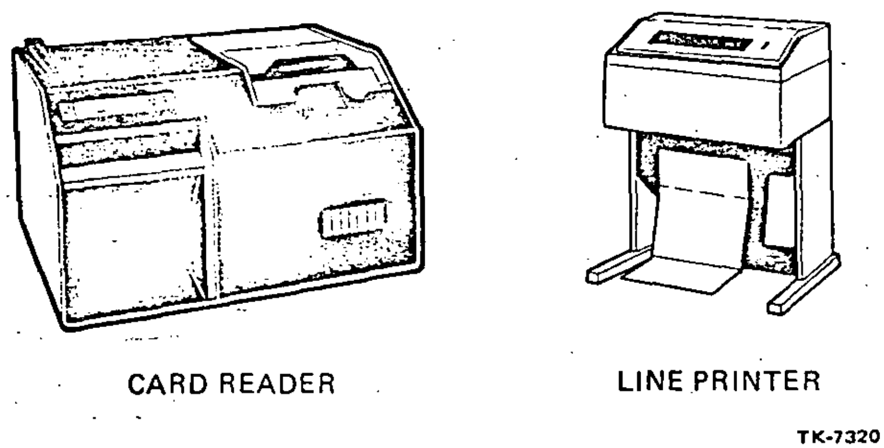

Figure 2-3 Input or Output Devices

VAX/VMS SOFTWARE

3

THE OPERATING SYSTEM

The operating system used on the VAX-11 is called the Virtual Memory System (VMS). The VMS operating system contains the following:

- An Executive - The monitor or supervisor of the computer
- A Scheduler - Software that ensures promptness and order
- Device Drivers - Software that handles and controls hardware devices
- Interrupt Handlers - Software that controls the computer when the current program is interrupted
- A Memory and Storage Allocator - Manages memory and disk space
- A Library of system programs - Assists the user in communicating and controlling the computer

Scheduling (CPU and Peripheral Management)

The VMS scheduler:

- Gives each user a certain amount of time in the CPU.
- Classifies users by importance, using a number from Ø to 31.

Device Drivers (Input/Output Programs)

Two types of programs are responsible for assisting input and output:

- ACP - ACPs understand how information should be stored on disks and tapes
- Device Drivers - Device drivers coordinate the passing of information to and from peripheral devices

User Memory Management

- The VMS operating system monitors all the users
- VMS limits the amount of physical memory each person can use
- VMS keeps track of how much and where each user's memory portion is
- VMS can shift a user's program in physical memory through a concept called Virtual Addressing.

System Memory Management

- There may not be enough physical memory to satisfy all users
- If that is the case, users must take turns using physical memory
- The users are swapped out to disk

System Informational Data Structures

The system must record information about each of its many users, including:

1. User name
2. What the user is doing
3. What the user is allowed to do
4. How much physical memory the user can have

Memory and Storage Allocation

Physical address space (physical memory) is divided into sections. The smallest amount of memory is called a byte. Each byte on the VAX has eight bits.

The system allocates equal portions of memory and disk space:

- For Memory: a page (512 bytes)
- For Disks: a block (512 bytes)

SYSTEM UTILITIES AND PROGRAMS

To assist the operator and all users, the operating system has a series of utilities and programs which make the use of the VAX computer easier. A few of them are:

- Digital Command Language (DCL)
- MAIL
- BACKUP
- MONITOR
- Text Editors
- Program Development Utilities

PROCESSES

VMS users are different, so the system must consider the following:

- Who is running the program?
- Should this user be allowed to run this program?
- How much of the system's resources should this user be given?
- How important is this user (what priority should the user be given)?
- What can the system permit the user to do (what privileges does the user have)?

VMS takes this information, combines it with a user's program and any other pertinent data, and creates an entirely new, larger unit, called a process.

A process is made up of four parts:

1. The Hardware Context
2. The Software Context
3. The Virtual Address Space
4. The Program (also called an Image)

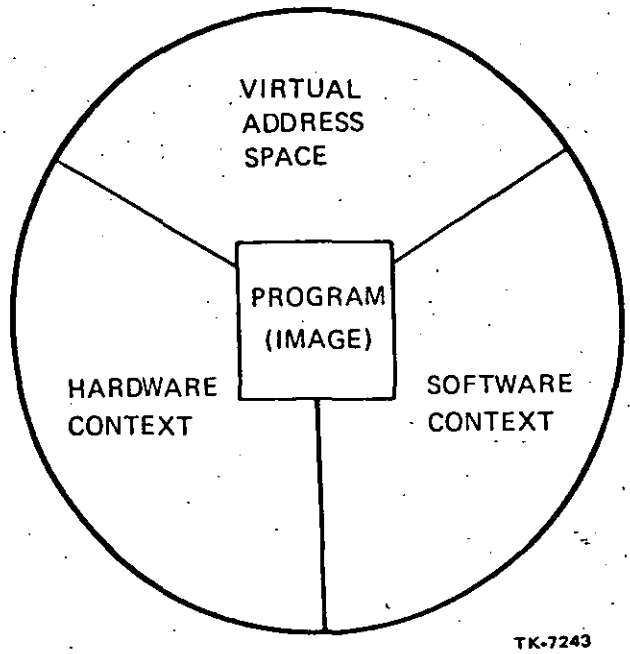

Figure 3-1 The Parts of a Process

Process Types

There are four types of processes on VMS:

- Interactive
- Detached
- Subprocess
- Batch

All have the process characteristics defined in previous sections, with the following differences:

- The source of commands/instructions
- The length of the process's life
- The presence of DCL programs

Table 3-1 Characteristics of Process Types

Type	Commands/Instructions	Process Life	DCL
INTERACTIVE	Command entered to DCL from a terminal; DCL activates its program.	Exists until told to delete itself.	Present.
DETACHED	Process runs an image; image enters commands via program instructions.	Exists until image is finished.	Not present.
SUBPROCESS	Process runs an image; image enters commands via program instructions.	Exists until image is finished or creator process is finished, whichever comes first	Not present.
BATCH	Enters commands to DCL from disk; DCL activates the program.	Exists until no more DCL commands are found.	Present.

Table 3-2 Process Creation

Created By	Type	Reason
System	Interactive	User requested
	Detached	System work
	Subprocess	System work
	Batch	User requested
User	Interactive	Not Possible
	Detached	Work divorced from creator
	Subprocess	Needed soon but DETACHED is not wanted or possible
	Batch	Work divorced from creator need for results is NOT immediate

Table 3-3 Process Restrictions and Capabilities

	Interactive	Detached	Subprocess	Batch
Privileges	Copied from UAF	Given by creator	Given by creator	Copied from UAF
Quotas and Limits	Copied from UAF	Given by and not shared with creator	Shared with creator	Copied from UAF
UAF	Used for everything	Used for information not given by creator	Used for information not given by creator	Used for information not given by creator
UIC Created Process	UIC from UAF	Any UIC is accepted	UIC of the creator	UIC of the creator
Special Restrictions	None	None	Exists only as long as creator exists	Process must wait until released

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DCL RULES AND SYNTAX

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MAYO DE 1985.

SUMMARY

In summary, to construct a command string:

- Wait for a prompt from the system. When the system is ready to receive a DCL command, it displays the dollar sign ($) at your terminal.
- Enter a command verb.
- If required or wanted, enter command qualifiers. Precede each command qualifier with a slash (/).
- If required or wanted, enter parameters. Separate the parameters from the verb and other parameters with one or more spaces.
- If required or wanted, enter parameter qualifiers. Again, precede each qualifier with a slash (/).
- Send the command to the system using the final delimiter (RETURN key).

Defaults are used for portions of the command line you do not choose to enter

If you forget what parameters to enter, hit the RETURN key after the verb and its qualifiers. The system will prompt you for the parameters it needs. If the verb has default parameters, no prompt will occur.

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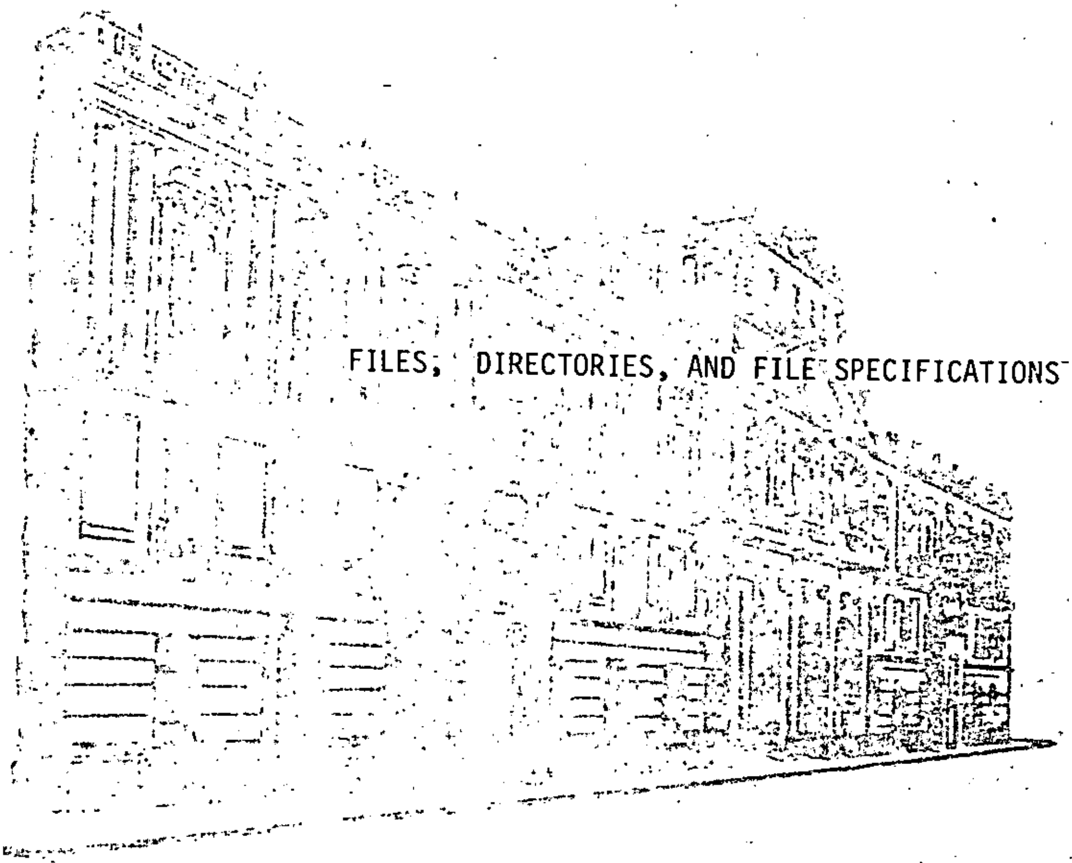

FILES, DIRECTORIES, AND FILE SPECIFICATIONS

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FILES, DIRECTORIES, AND FILE SPECIFICATIONS

5

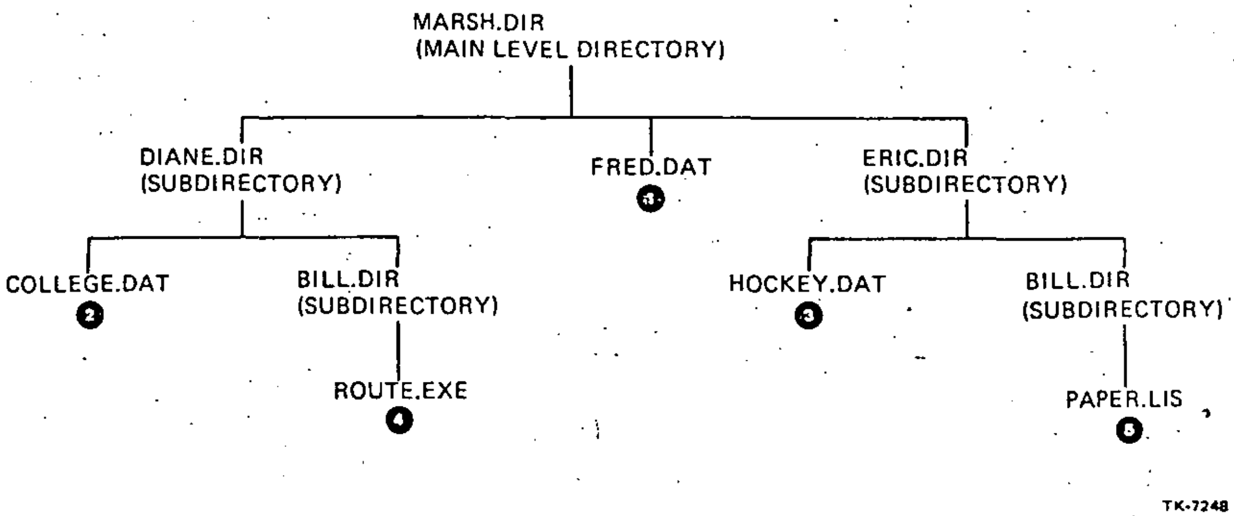


Figure 5-2 Directories (Pathways to Files)

File Specifications for Figure 5-2:

1. [MARSH]FRED.DAT
2. [MARSH.DIANE]COLLEGE.DAT
3. [MARSH.ERIC]HOCKEY.DAT
4. [MARSH.DIANE.BILL]ROUTE.EXE
5. [MARSH.ERIC.BILL]PAPER.LIS

FILE SPECIFICATIONS

- The name of a file is referred to as a file specification
- The file specification describes the pathway to a file
- The file specification is broken into six parts

Table 5-1 Parts of a File Specification

Part	Purpose	Rules for Naming	Example
Node	Computer name	1 to 6 characters	HARPO::
Device	Recording device name	4-16 characters	DBA2:
Directory & Subdirectory	List of file names and file numbers	1-9 characters each	[MARSH.SUB]
Name	Specific label file	Ø-9 characters	PHONE
Type	File contents	Ø-3 characters	.LIS
Version	Unique number for files with the same name and type	1-32767	;16

Table 5-2 Device Types and Model Names

Device Catagory	Device Type	Model Names
Terminals	TT	VT52 VT100 LA36 LA120
Tape Drives	MT	TE16 TU45 TU77 TU78
	MS	TU11
Tape Cartridges	DD	TU58
Disk Drives	DL	RL02
	DR	RM03 RM05
	DB	RP05 RP06 RP07
	DM	RK07
	DY	RX01 RX02
	CS	RX01 and TU58 (when used as console device)

Table 5-3 File Types and Contents

File Contents	File Type
Data	.DAT
Listing (print file)	.LIS
Directory	.DIR
Command procedure	.COM
Executable program	.EXE
BASIC source code	.BAS
COBOL source code	.COB
FORTRAN source code	.FOR
VAX-11 MACRO source code	.MAR
PASCAL source code	.PAS

Wildcards

A wildcard can be used in place of or as part of the	A wildcard CANNOT be used in place of or as part of the
Directory	Node name
File name	Device
File type	
Version number	

Legal File Specifications

```
DBAØ:[MARSH]*.DAT

DBAØ:[MARSH]*.DAT;*

DBAØ:[MARSH]FILE.DAT

DBAØ:[*]FILE.DAT

DBAØ:[*.*]FILE.DAT

DBAØ:[*]*.*;*

DBAØ:[MARSH]%%%%.DAT

DBAØ:[MARSH]FILE%.DAT
```

Illegal File Specifications

```
FUZZY::*:[MARSH]FILE.DAT
(wildcards cannot be used for device names.)

*::DBAØ:[MARSH]*.DAT;1
(wildcards cannot be used for node names.)
```

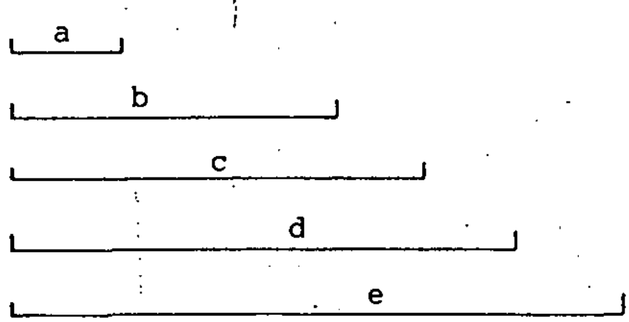
Table 5-4 Wildcards and File Specification Examples

Desired Files	File Specification
All versions of all files in the directory DBAØ:[MARSH] that begin with the letter B with a file type of DAT.	DBAØ:[MARSH]B*.DAT;*
All versions of all files in main level directories on DBAØ with the letter B in the file name.	DBAØ:[*]*B*.*;*
All directories on DBAØ that begin with the letters SYS.	DBAØ:[SYS*]
All files in the default device and directory that begin with FILE and have only one additional character in the file name.	FILE%.*

LOGICAL NAMES

- Logical names are used by VMS to refer to devices and directories in constant use
- Any DCL command that accepts a file specification accepts a logical name

```
DBAØ:[SQUIRREL]ROCKY.DAT;23
```



a. If you substitute a logical name (DISK) for the device name (DBAØ), the resulting file spec is:

```
DISK:[SQUIRREL]ROCKY.DAT;23
```

b. If you substitute a logical name (HOME) for the disk and directory (DBAØ:[SQUIRREL]), the result is:

```
HOME:ROCKY.DAT;23
```

c. If you substitute a logical name (ALMOST) for the disk, directory, and file name (DBAØ:[SQUIRREL]ROCKY), the result is:

```
ALMOST:.DAT;23
```

d. If you substitute a logical name (FULL) for the disk,directory,file name, and file type (DBAØ:[SQUIRREL]ROCKY.DAT), the result is:

```
FULL:;23
```

e. If you substitute a logical name (COMPLETE) for the entire file spec (DBAØ:[SQUIRREL]ROCKY.DAT;23), the result is:

```
COMPLETE:
```

NOTE

Logical names should always be delimited with a colon (:).

Figure 5-5 Default System Directories and Logical Names

Type of files	Directory	Logical Name
Files that record system errors.	[SYSERR]	SYS$ERRORLOG
Files used to operate the system.	[SYSEXE]	SYS$SYSTEM
Files containing helpful information.	[SYSHLP]	SYS$HELP
Files containing prepared programs and program parts. Referred to by users writing their own programs.	[SYSLIB]	SYS$LIBRARY
Files used by DEC maintenance. Normally the directory is empty.	[SYSMAINT]	SYS$MAINTENANCE
Files used for system management duties.	[SYSMGR]	SYS$MANAGER
System message files.	[SYSMSG]	SYS$MESSAGE
Files used to test the VMS system. The program set to perform this function is called the User Environmental Test Program (UETP).	[SYSTEST]	SYS$TEST
Files used by operators and system managers to maintain the software status of the system.	[SYSUPD]	SYS$UPDATE

Table 5-6 Logical Names for VAX/VMS

Logical Name	Real Name (Equivalent to)	Use/Reason
SYS$DISK	DBA2:	Tells each user their default disk.
SYS$LOGIN	DBA2:[MARSH]	Tells each user their default and disk directory when they login.
SYS$SYSDEVICE	DBAØ:	Tells the system the name of the disk where all system directories reside.
SYS$SYSROOT	DBAØ:[SYSØ.]	Tells the system the name of device and directory where all system directories reside.
SYS$NODE	HARPO::	Logical name for the node name of the VAX itself (available only when DECnet is running).

PROTECTING INFORMATION

VMS can protect a user's information (files) from other users who may want to do one or more of the following:

- Read the file (look at contents, make no changes).
- Modify the file (look at contents, make changes).
- Execute the file (run the file, as with a program).
- Delete the file (remove the file from the disk).

The protection facility of the VAX is based on a User Identification Code, or UIC. A UIC consists of two 3-digit octal numbers (Ø through 7). (Leading zeros are usually not printed; for example Ø1Ø = 1Ø.) The first number is the group number; it specifies which group the user belongs to. The second number is the member number; it uniquely identifies individuals within a group.

The format of a UIC is:

    [group number,member number]

For example:

User	UIC
Jim	[1Ø,5]
Tom	[1ØØ,5]
Dick	[1ØØ,1Ø]
Harry	[1ØØ,15]
Charlie	[3ØØ,1Ø]

Each user's UIC is stored in the User Authorization File. When a user creates a file, it is assigned the user's UIC. In addition, the file is assigned a protection code. This code tells VMS who may access the file and what kind of access is allowed (Read, Write, Execute, and/or Delete). For example, a typical protection code looks like this:

    S:RWE,O:RWED,G:RE,W:R

Table 5-7 User Categories
Based on Comparing File UIC to User UIC

Category	Group number	Member number
SYSTEM	Ø - 1Ø (octal)	Any number
OWNER	Matches	Matches
GROUP	Matches	Does not match
WORLD	Does not match	Does not match

For example, suppose that a file has:

UIC	[1ØØ,1Ø]
Protection Code	S:RWE,O:RWED,G:RE,W:R

then this is the categories of various users for that file and the types of access that they are allowed:

User	UIC	Category for [1ØØ,1Ø]	Access Permitted by S:RWE,O:RWED,G:RE,W:R
Jim	[1Ø,5]	System	Read,Write,Execute
Tom	[1ØØ,5]	Group	Read,Execute
Dick	[1ØØ,1Ø]	Owner	Read,Write,Execute,Delete
Harry	[1ØØ,15]	Group	Read,Execute
Charlie	[3ØØ,1Ø]	World	Read

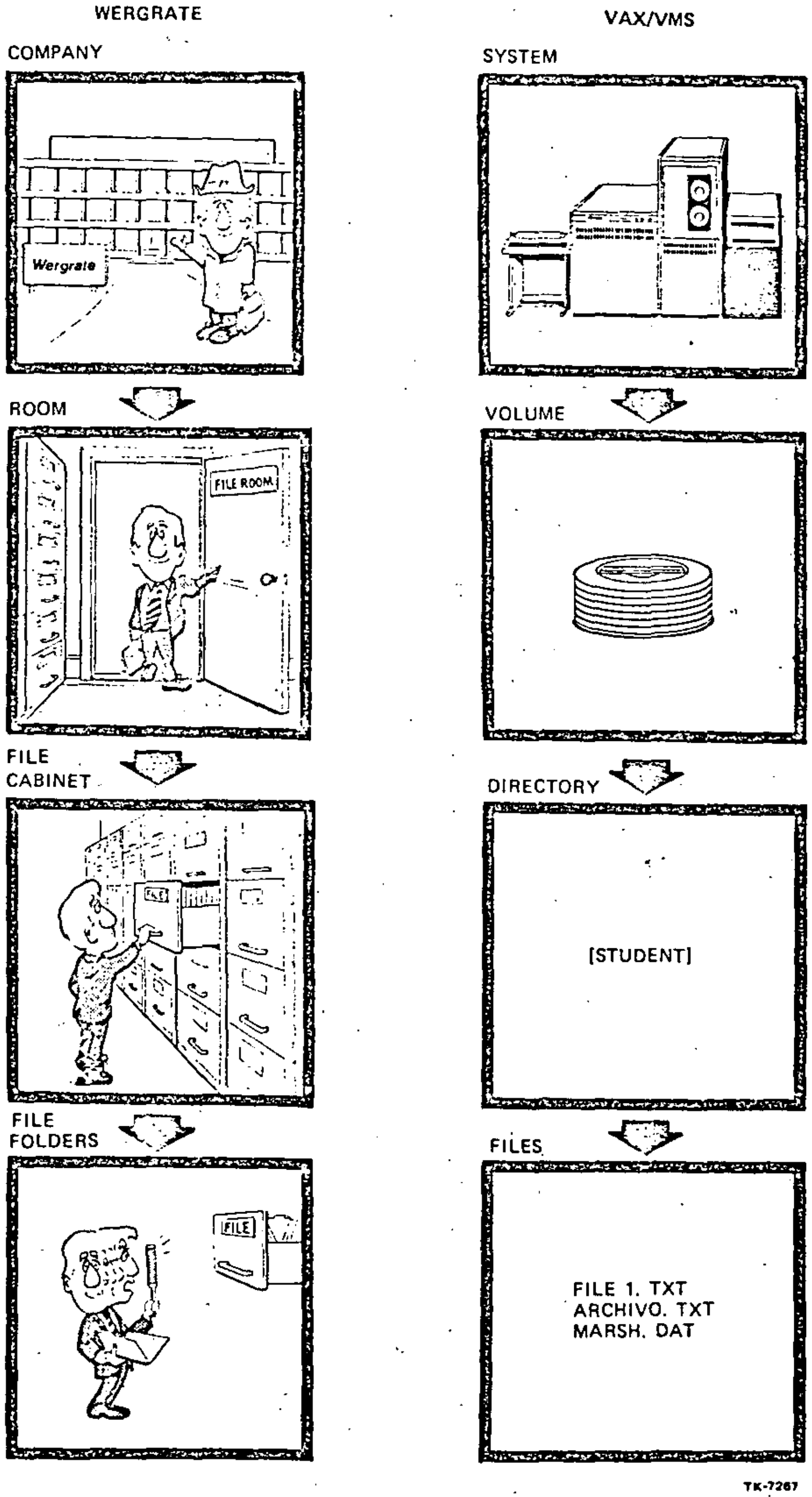


Figure 5-4 Required Order of Access to Information for a Company and VAX/VMS

Table 5-8 Summary of Effects of Access Rights to Files

	(R)read	(W)write	(E)execute	(D)delete
Disk Volume	Can read files on the volume.	Can modify files on the volume.	Can create files on the volume.	Can delete files from volume.
Disk Directory	Can read list of files in directory.	Can modify the list (add files).	Does not apply.	Can delete the directory.
Disk File	Can read contents of file.	Can modify the contents of a file.	Can execute executable files.	Can delete the file.
Tape File	Can read list of files on tape.	Can add files to the volume.	Does not apply.	Does not apply.

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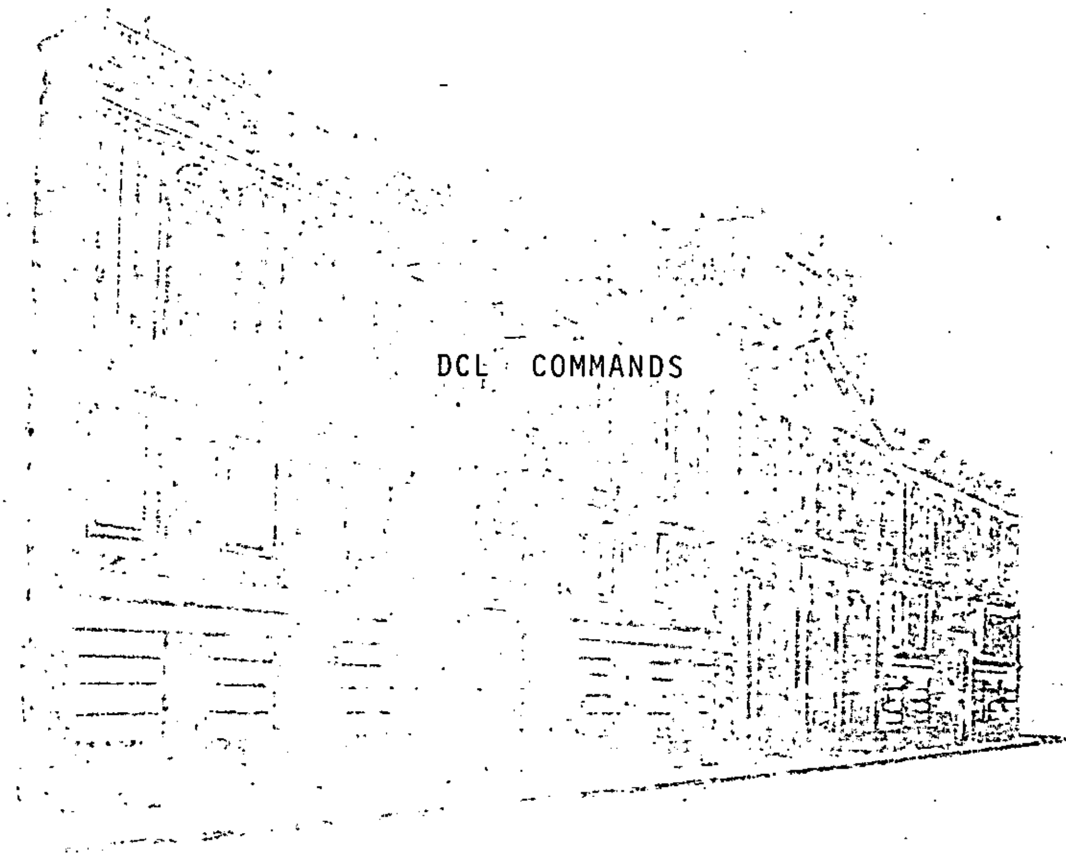

DCL COMMANDS

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MAYO DE 1985.

DCL COMMANDS

6

INTRODUCTION

For operators as well as users to manipulate and interact with the computer, it is necessary to use the correct language. This module explains the commands of DCL which perform specific operator-related duties.

Because DCL is flexible, several DCL commands accomplish the same thing. This module discusses the easiest and most direct DCL commands for the following categories:

- Information
- File control and manipulation
- Image and Process Control

OBJECTIVES

To select and invoke the proper DCL commands that:

- Return specific information
- Control and manipulate files
- Control images and processes

RESOURCES

1. VAX/VMS Command Language User's Guide

2. VAX Software Handbook

INTERACTION AND MANIPULATION

As an operator, it is necessary to communicate with VAX/VMS to perform the following functions:

- Retrieve information
- Provide new or updated information to VMS
- Create and remove files on the system
- Alter information within selected files

These functions are performed using DCL commands. Table 6-1 lists the DCL commands by group and their functions.

Table 6-1 DCL Commands

DCL Command and Group	Function
Informational	
HELP	Finds information about DCL commands.
SHOW	Obtains process or system information.
File Control/Manipulation	
DIRECTORY	Obtains a list of one or more files.
TYPE	Displays the contents of a file on the terminal.
PRINT	Prints the contents of the file on the lineprinter.
COPY	Creates a new file copy.
DELETE	Removes files from the system.
PURGE	Removes almost all copies of files.
Image and Process Control	
SET	Alters process, system or device information.
STOP	Stops a process or an image.
RUN	Activates a process or an image.

Informational Commands The following DCL commands provide information and assistance:

HELP - provides information about DCL commands and other topics.

SHOW - allows users to find information on their process or the operating system.

The HELP Command

Information in the form of help messages is available for most of the DCL commands and a few other selected topics. These help messages give:

- A brief description of the command
- The format of the command
- Parameters and qualifiers for which there is additional information.

To access these help messages and display them on your terminal, use the HELP command:

```
$ HELP
or
$ HELP topic
```

The help messages are organized by topic and subtopic; each help message may have subordinate help messages explaining various parameters and qualifiers. As you access help messages, you will be prompted for additional topics or subtopics. At each prompt, you may enter:

- The name of a topic or subtopic for more information and go to down a level to a subordinate help message
- ? to re-display current topic's help message
- <CR> to go up a level (exit at the top level)
- CTRL/Z to exit immediately

The SHOW Command

SHOW displays current information about your process or the system or the terminal. The command form is:

```
$ SHOW parameter
```

Table 6-2 SHOW Command Parameters

Information	Command
List of active processes	SHOW SYSTEM
Date and Time	SHOW DAYTIME
Default device and directory	SHOW DEFAULT
Active logical names	SHOW LOGICAL
Process disk use	SHOW QUOTA
Process information	SHOW PROCESS
Process statistics	SHOW STATUS
Terminal characteristics	SHOW TERMINAL
Default file protection	SHOW PROTECTION

File Control/Manipulation Commands

An operator must be able to manipulate the files that exist on disk and tape volumes to:

- Obtain a list of file names.
- Examine the information in files.
- Obtain a printout of a file's contents.
- Remove files from system volumes.

Table 6-3 File Control/Manipulation Commands

Function	Command	Command Form
List file names in one or more directories.	DIRECTORY	$ DIRECTORY parameter $ DIRECTORY SYS$SYSTEM
Display contents of one or more files on the terminal	TYPE	$ TYPE parameter $ TYPE SYS$SYSTEM:STARTUP.COM
Print contents of one or more files on a line printer.	PRINT	$ PRINT parameter $ PRINT SYS$SYSTEM:STARTUP.COM
Copy old file to make a new file.	COPY	$ COPY old_name new_name $ COPY OLDFILE.DAT NEWFILE.DAT
Remove one or more files from a disk.	DELETE	$ DELETE parameter $ DELETE OLDFILE.DAT;*
Removes all but highest version(s) of selected file(s).	PURGE	$ PURGE parameter $ PURGE OLDFILE.DAT

The DIRECTORY Command

To display a list of file names that are on disk, use the DIRECTORY command. The form of the command is:

```
$ DIRECTORY parameter/qualifier
```

Table 6-4 DIRECTORY Command Parameters

Parameter	Example	Output
NONE		Lists file names on default device in the default directory.
Directory name	[STUDENT]	Lists file names in directory [STUDENT].
Name of file in default directory	FRED.DAT	Lists all files named FRED.DAT in default directory.
Name of file NOT in default directory	PHONEY.EXE	Lists error message stating "File not found".
Name of directory NOT on device	[FAKE]	Lists error message stating "Directory not found".
File name with wildcard	DEB.*	Lists any file in the default directory named DEB with any file type.
Ellipsis alone	[...]	Lists all file names in all subdirectories at all levels below default directory.
Ellipsis with directory name	[STUDENT...]	Lists all file names in all subdirectories at all levels below "STUDENT".
Wildcarded main directory	[*]	Lists all file names in all main level directories on default device.
Wildcarded main directory with file name	[*]FRED.DAT	Lists all files named FRED.DAT in all main level directories.
Wildcarded subdirectory	[STUDENT.*]	Lists all file names in all subdirectories below "STUDENT".

Table 6-5 Selected Qualifiers for the DIRECTORY Command

Qualifier	Result
None	Lists file names.
/PROTECTION	Lists file names and protection codes.
/SIZE	Lists file names and sizes in blocks.
/FULL	Lists file names and a full set of statistics for each file.

There are other qualifiers to the DIRECTORY command which provide selected portions from the /FULL qualifier display.

Listed below are selected parts from the output of a DIRECTORY/FULL command:

- Size:X/Y

  The amount of disk blocks used is X. The number of disk blocks allocated to the file is Y.

- Owner: [group_number,member_number]

  The owner number is the UIC number assigned to each user. The UIC is the only way to tell which files actually belong to which user.

- Created: Day-Month-Year

  The date the file is created.

- Revised: Day-Month-Year

  The revised date is when the file was last changed.

- File Protection

  The protection information indicates which UICs are allowed to read, write, execute, and delete the file.

The TYPE Command

To display the contents of a file on a terminal, use the TYPE command:

```
$ TYPE parameter
```

The parameter is made up of one or more file specifications. Like the DIRECTORY command, if the file specification is incomplete, VMS has a set of defaults to use.

Table 6-6 Defaults for the TYPE Command File Specification

Portion of File Specification	Default
Device	Present default device
Directory	Present default directory
Filename	No Default
File type	.LIS
Version	Highest version number

The PRINT Command

The PRINT command causes files to be printed on a line printer. The form of the command is:

```
$ PRINT parameter
```

The parameter is a list of one or more file specifications (separated by commas) to be printed.

The PRINT command has the same file specification defaults as the TYPE command (see Table 6-7).

The COPY Command

To copy an existing file to a new file, use the COPY command. The COPY command form is:

```
$ COPY old_file_name new_file_name
```

For example:

```
$ COPY [MARSH]NAMES.DAT [MARSH]NEW.DAT
```

The COPY command is used to:

1. Obtain a copy of a file from another directory or subdirectory.

2. Create a copy of a file for other users to access without endangering the original file.

3. Create a copy of a file in a different directory.

4. Create a copy of a file whose information constantly changes.

The DELETE Command

The DELETE command allows you to get rid of files that are no longer needed. The DELETE command form is:

```
$ DELETE parameter
```

The parameter is a list of one or more file specifications. The file specifications must contain the version number of the file to be deleted. The only defaults for the DELETE command are the device and directory defaults.

If the verb qualifier /CONFIRM is added to the DELETE command, DCL asks the user permission to delete the file. If the response by the user is yes (Y), the file is deleted. If the response is no (N), the file is not deleted (see Example 6-6).

```
$ DELETE/CONFIRM FILE.DAT;2
USERDISK:[STUDENT]FILE.DAT;2, delete? (Y or N) :Y
$
```

The PURGE Command

The PURGE command removes all but the highest version number of each file specification given. The highest version numbered file is usually the most recent file. The PURGE command removes the older files, buts keeps the newest file for future use. The PURGE command form is:

```
$ PURGE parameter
```

The parameter is a list of one or more file specifications. If the parameter is not given (no file specifications), the PURGE command acts on all files in the default directory.

The /KEEP qualifier allows a user to specify how many versions of each file are kept. The default for the /KEEP qualifier is 1. If a user wants the two highest version numbered files kept, the qualifier /KEEP=2 is added to the PURGE command.

Image and Process Control Commands

Many duties performed by an operator cannot be accomplished with one DCL command. Some duties need a program written specifically for that duty. Users and operators have several types of processes that can be used to work for them, including:

- Interactive
- Batch
- Detached
- Subprocess

Table 6-7 Image and Process Control Commands

Purpose	DCL Command
Alter process information	SET
Stop a process	STOP
Submit a batch process	SUBMIT
Activate an image	RUN
Create a subprocess	RUN/qualifier
Create a detached process	RUN/UIC=[uic]

The SET Command

The SET command is used to change a characteristic (or value) of a process on VMS or the part of the system itself. SET requires a parameter (like the SHOW command). There is no default parameter value for the SET command.

Table 6-8 SET Command Parameters

Operation	DCL Command	Comment
Alter default device and/or directory	SET DEFAULT	The change is temporary; logging off or another SET DEFAULT resets it.
Alter protection of one or more files	SET PROTECTION	Must be owner of file or have SYSTEM UIC.
Alter your password	SET PASSWORD	Must be logged in and know old password.
Alter the terminal's characteristics	SET TERMINAL	Privilege required to use /PERMANENT.

The RUN Command

- Activates an image.
- Creates a subprocess.
- Creates a detached process.

Table 6-9 Using the RUN Command

	Necessary Qualifiers	Needed for Success
Image	NONE	READ or EXECUTE access to file
Subprocess	Any other than /DEBUG or /UIC	Same as image, plus sufficient quotas and limits.
Detached	/UIC	Same as image, plus DETACH privilege.

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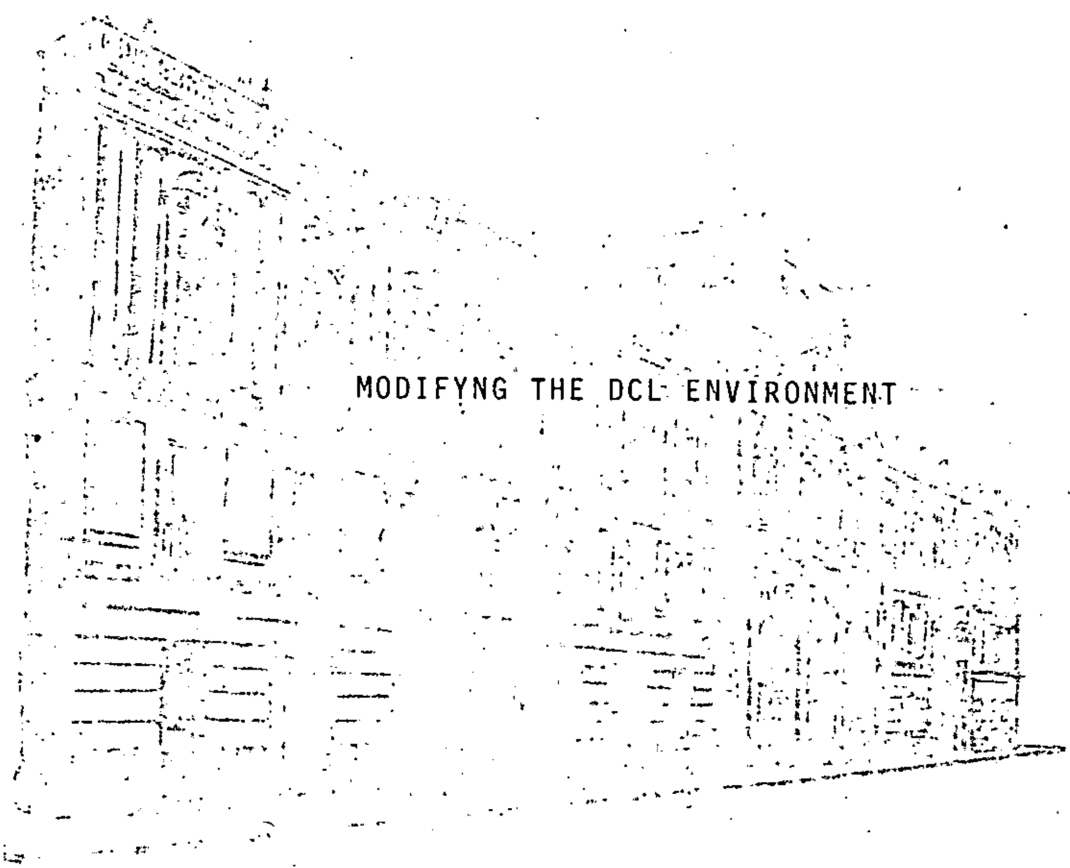

MODIFYNG THE DCL ENVIRONMENT

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MAYO DE 1985.

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MODIFYING THE DCL ENVIRONMENT

7

INTRODUCTION

As an operator, you must become proficient with the DCL commands that control and interact with images, processes, and VMS itself. There are DCL commands that can be used to modify your DCL environment. These commands make DCL easier to use and you, as an operator, more efficient.

One method of changing your DCL environment is through what are known as Command Procedure files. Command procedure files contain a series of DCL commands. VMS can read the DCL commands from the files instead of from your terminal. By placing commonly-used DCL command sequences in these files, a user can more easily interact with VMS.

In the Files, Directories, and File Specifications module, logical names were substituted for portions of file specifications. This module discusses the DCL commands (ASSIGN and DEASSIGN) used to set up and get rid of logical names. By adding qualifiers to the ASSIGN command, logical names can be created for use by other processes. Logical names, as discussed in later modules, are a good way for an operator to assist and control VMS and user processes.

DCL symbols are also used to modify your DCL environment. DCL symbols are a series of characters that represent part or all of a DCL command. The DCL symbol selected is up to the user. This freedom of selection gives the user the ability to tailor the DCL command language to suit personal needs.

To accomplish some of the above tasks, it is necessary to create and modify certain kinds of files. To do this, you need to learn a system utility called the EDT editor. The EDT editor assists you in creating and modifying files that contain text. Text files, when created properly, can be used for command procedures, messages to other users, lists of tasks to accomplish, etc.

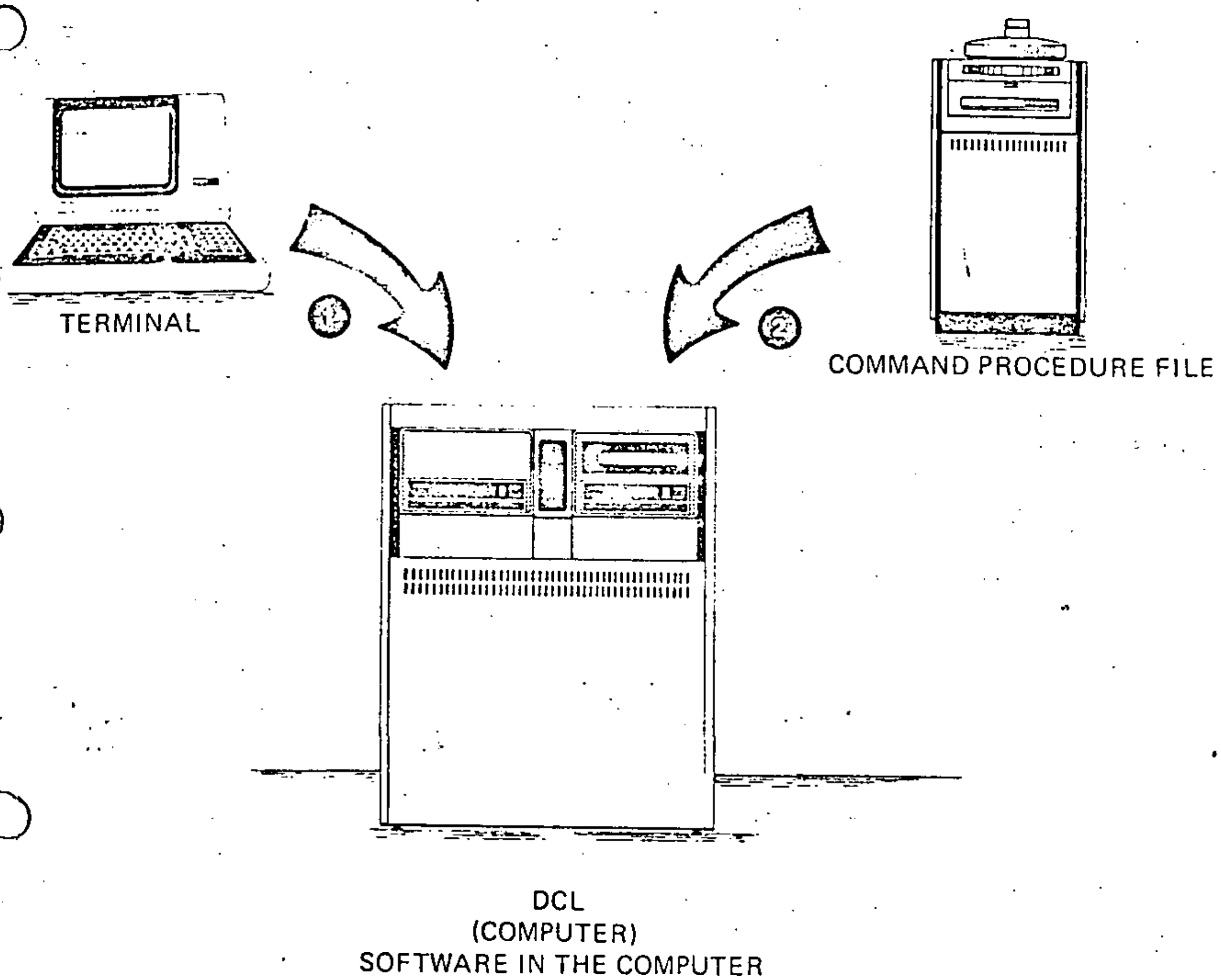
More importantly, the EDT editor helps you set up files necessary to operate the VAX/VMS system. The types of files used in system operation are presented throughout the course. The EDT editor enables you to examine, and if necessary, tailor the files for your job as a system operator.

MODIFYING YOUR DCL ENVIRONMENT

Table 7-1 Modifying DCL and Its Environment

Function	Method
Enter commands from a file instead of a terminal	Command Procedures
Create logical names	DCL command ASSIGN
Delete logical names	DCL command DEASSIGN
Shorten DCL commands or change DCL command verbs	DCL Symbols

COMMAND PROCEDURES



1 DCL COMMANDS CAN BE ENTERED FROM THE TERMINAL

2 BY ENTERING "@FILE SPECIFICATION", THE DCL COMMANDS CAN BE ENTERED FROM A COMMAND PROCEDURE FILE

TK-7255

Figure 7-1 Entering DCL Commands

- A command procedure is a file of DCL commands
- The file type defaults to .COM
- The DCL commands in a command procedure appear as they would be entered at a terminal
- A command procedure is activated by entering "@" and the file specification

LOGICAL NAMES

Logical names can be used to remove any references to a specific device in DCL commands. They are set up by using the following DCL command:

```
$ ASSIGN   real_name   logical_name
```

where

real_name   is the device or file specification desired.

logical_name is the name to be used in all DCL commands.

For example,

```
$ ASSIGN DBA1:  FRED

        <-----------
```

To remove logical names after they have served their purpose, use:

```
$ DEASSIGN logical_name
```

For example,

```
$ DEASSIGN FRED
```

VMS uses a series of data structures called logical name tables to keep track of logical names. VMS uses three types of tables to hold all the logical names on the system:

- Process - Each process has its own logical name table. No process can read another process's logical name table.
- Group - Each group UIC has its own logical name table. Group tables are accessible only by users in each group and VMS.
- System - There is one system logical name table in VMS. It is accessible to all users as well as VMS.

To change entries in a group or system table requires a privilege for each type of logical name table. To change each table type (Process, Group, and System) requires the addition of qualifiers to the ASSIGN command.

Table 7-2 Logical Names

	Process	Group	System
DCL Command Qualifier	/PROCESS	/GROUP	/SYSTEM
Privilege needed to create or remove	NONE	GRPNAM	SYSNAM
Create Logical Name	ASSIGN/PROCESS	ASSIGN/GROUP	ASSIGN/SYSTEM
Find Logical Name	SHOW LOGICAL/PROCESS	SHOW LOGICAL/GROUP	SHOW LOGICAL/SYSTEM
Remove Logical Name	DEASSIGN/PROCESS	DEASSIGN/GROUP	DEASSIGN/SYSTEM

NOTE

When a user logs off the system, the Process logical names set up for that specific process are destroyed. However, the entries in the Group logical name tables and in the System logical name table are kept until specifically DEASSIGNed, or the computer is shut down.

SYMBOLS

Symbols can be thought of as command synonyms:

```
$ SYS=="SHOW SYSTEM"
```

where

SYS	is the symbol being created.
==	indicates that "SYS" is to mean the same as "SHOW SYSTEM".
"	indicates the beginning of the string to be replaced.
SHOW SYSTEM	is the actual DCL command string.
"	indicates the end of the command string to be replaced.

Once the command SYS=="SHOW SYSTEM" is issued, the commands SYS and SHOW SYSTEM perform the same function.

Table 7-3 Local and Global Symbols

Function	Local Symbol	Global Symbol
Create a symbol	=	==
	$ SYS="SHOW SYSTEM	$ SYS=="SHOW SYSTEM"
Find a Symbol	SHOW SYMBOL/LOCAL	SHOW SYMBOL/GLOBAL
	$ SHOW SYMBOL/LOCAL SYS	$ SHOW SYMBOL/GLOBAL SYS
Remove a Symbol	DELETE/SYMBOL/LOCAL	DELETE/SYMBOL/GLOBAL
	$ DELETE/SYMBOL/LOCAL SYS	$ DELETE/SYMBOL/GLOBAL SYS
List all symbols	SHOW/SYMBOL/LOCAL/ALL	SHOW SYMBOL/GLOBAL/ALL
	$ SHOW SYMBOL/LOCAL/ALL	$ SHOW SYMBOL/LOCAL/ALL

Table 7-4 Symbols

Function	Symbol Creation	Example
Replace a DCL Verb	SCROLL=="TYPE"	$ SCROLL FRED.DAT
Replace a DCL Parameter	MINE==DBA2:[STUDENT]	$ DIRECTORY 'MINE' $ TYPE 'MINE'FRED.DAT
Replace a DCL Command Line	SYS=="SHOW SYSTEM"	$ SYS
Activate an Image	DO=="RUN file.exe"	$ DO
Activate a Command Procedure	LOOK=="@INFO.COM"	$ LOOK

How logical names and symbols are used is sometimes confusing. They both relate how DCL commands are specified; but, they differ in how they are applied. Table 7-5 compares logical names and symbols.

Table 7-5 Logical Names and Symbols

	Logical Names	Symbols
Function	Represents device, directory, and file specifications.	Represents commands or portions of command strings.
Use	Replaces part or all of a file specification.	Replaces part or all of a command. The symbol must be the first (left-most) part of the command line.
Created	$ ASSIGN command	Assignment statement (==)
Displayed	$ SHOW LOGICAL command	$ SHOW SYMBOL/GLOBAL command
Deleted	$ DEASSIGN command	$ DELETE/SYMBOL/GLOBAL command

CREATING AND MODIFYING FILES

Files are created and manipulated on VMS with system utilities called editors. VMS has several editors; one of the most commonly used is the EDT editor.

The EDT editor is run (activated) with the DCL command

```
$ EDIT file_spec
```

or

```
$ EDIT/EDT file_spec
```

The /EDT qualifier invokes the EDT editor. Other qualifiers invoke different editors.

NOTE

> EDT looks for whatever file name is given. If the file you wish to edit exists, but you misspell the file name, EDT searches for the file by the misspelled name. The editor does not know that the file name requested is a misspelled existing file.

For example, to create a new file:

```
$ EDIT/EDT    PERSONAL.DAT
Input file does not exist
[EOB]
*
```

To edit an old file:

```
$ EDIT/EDT DBA2:[MARSH.OPER.STUDENT]FRED.DAT
1    first line of file
*
```

The EDT command form is:

```
*EDT-command parameter
```

where

*	is the EDT prompt
EDT-command	is a verb that tells the EDT editor what to do
parameter	for most commands is a line number or a range of lines numbers

The line numbers are assigned by EDT and can be changed when necessary. EDT assigns a number to each line in a file beginning at 1.

```
    INFO.COM

1   $ SHOW PROCESS   !First Comment
2   $! Second Comment
3   $ SHOW LOGICAL
4   $ SHOW TIME
5   $      SHOW SYSTEM
6   $
```

- A single line number is specified by simply giving the number (for example, 3 or 42)
- A range of line numbers is specified by giving the first and the last line numbers in the range, separated by a colon (for example, 1:5 or 24:36)
- The first line of a file may be specified by BEGIN
- The last line of a file may be specified by END

Table 7-6 EDT Editor Commands

Action	Command	One Line	Range of Lines
Display one or more lines of text	TYPE	*TYPE 1	*TYPE 1:4
Add text to a file at a specific line number	INSERT	*INSERT 3 new information <CTRL/Z>	
Delete one or more lines of text	DELETE	*DELETE 2	*DELETE 2:5
Exit from the editor saving all editing changes	EXIT	*EXIT	*EXIT
Exit from the editor NOT saving any editing changes	QUIT	*QUIT	*QUIT

Table 7-7 Additional EDT Commands

Action	Command and Parameter(s)	Examples
Copy one or more lines from one location to another in the same file	COPY range TO line__number	*COPY 1:2 TO 5 *COPY 4 TO 6
Move one or more lines from one location to another in the same file	MOVE range TO line__number	*MOVE 1:3 TO 6 *MOVE 4 TO 6
Substitute a set of one or more characters for a different set of one or more characters	SUB/set-1/set-2/range	*SUB/show/set/1:6 *SUB/show/set/3
Renumber the lines in the file (1,2,3,4, etc.)	RESEQUENCE	*RESEQUENCE
Copy of the entire contents of one file into the present edited file	INCLUDE file__name line#	*INCLUDE FRED.DAT 6

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CURSOS: "INTRODUCCION AL SISTEMA VAX - 11/780" Y
"OPERACION Y ADMINISTRACION DEL SISTEMA VAX / VMS"
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SYSTEM MANAGEMENT FUNCTIONS

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SYSTEM MANAGEMENT FUNCTIONS

8

The system operations staff must know how to utilize the VAX/VMS system in the most effective way to provide the maximum benefit to the users. Many of the jobs done by the operations staff affect the utilization of the system. These jobs fall into one of the following four categories:

- Setting up user accounts
- Starting the system
- Controlling the operation of the system
- Configuring the system for good performance

Different system programs are used to perform each of these jobs. Often, these programs need certain types of information (for example, username, password, and so on). Someone on the operations staff must collect this information; this may be delegated to the operator. If this is the case, it is helpful for you to understand what kind of data is necessary. Some types of data, and methods of collecting data, are discussed in this module. The Backup and Other Periodic Duties module discusses other kinds of data that may be needed, as well as some other methods of collection.

OBJECTIVES

1. To describe the basic functions of system management.

2. To describe the purpose of utilities that are system management related.

RESOURCES

1. <u>VAX/VMS System Management and Operations Guide</u>

2. <u>VAX Software Handbook</u>

BASIC FUNCTIONS OF SYSTEM MANAGEMENT

Some typical system management questions are listed below:

- How many users are there?
- What kinds of jobs do the users do? (for example, large programs, editing, numerical analysis, monitoring equipment, design, report generation)
- Who should be allowed to use the system?
- Do the users need to be coordinated in any way?
- How and why should different users be restricted in their use of the system?
- Considering the work done by the system users, when can the system be powered down or up? How much of an affect will this have on the work? When is it really important to turn the system off/on?
- Should more hardware be acquired? If so, what kind? (for example, more memory, another disk drive, a printer)
- How can the best use be made of the current configuration?
- Can hardware run forever without any problems?
- What kinds of things need to be done regularly?
- What kinds of things are done once only?
- What kinds of problems can occur and how can they be solved?

Table 8-1 System Management Functions

System Management Functions	Operation(s) Performed
Generate the system	\$ RUN SYS\$SYSTEM:SYSGEN SYS\$SYSTEM:SYSBOOT.EXE
Start (boot) the system	SYS\$SYSTEM:STARTUP.COM SYS\$MANAGER:SYSTARTUP.COM and others...
Shut down the system	\$ @ SYS\$SYSTEM:SHUTDOWN.COM SYS\$MANAGER:SYSHUTDWN.COM and others...
Add user accounts	\$ RUN SYS\$SYSTEM:AUTHORIZE
Control use of disk space	\$ RUN SYS\$SYSTEM:DISKQUOTA
Create user directories	\$ CREATE/DIRECTORY
Improve system performance	\$ MONITOR \$ RUN SYS\$SYSTEM:SYSGEN.EXE \$ BACKUP and others...
Schedule work on the system	\$ SUBMIT
Use printers effectively	\$ INITIALIZE/QUEUE \$ START/QUEUE and others...
Control information storage on public volumes	\$ INITIALIZE \$ MOUNT and others...
Save information stored on public volumes	\$ BACKUP
Create logical names in the SYSTEM logical name table for general use	\$ ASSIGN/SYSTEM
Monitor system activity to note possible problems	\$ MONITOR \$ SHOW SYSTEM and others...

Table 8-1 System Management Functions (cont.)

System Management Functions	Operation(s) Performed
Analyze machine problems	$ RUN SYS$SYSTEM:SYE $ MONITOR $ ANALYZE/DISK_STRUCTURE
Analyze system problems	$ SHOW MEMORY $ SHOW SYSTEM $ MONITOR Interprete error messages Remote Diagnosis
Maintain Equipment	Clean daily

RESOURCE MANAGEMENT

Someone on the operations staff must decide who is allowed to use the system. This is an important job in terms of two resources: space and time.

VAX/VMS provides two utilities and a DCL command to assist with the management of resources:

1. The AUTHORIZE utility

2. The DISKQUOTA utility

3. The CREATE/DIRECTORY command

- AUTHORIZE enables the operations staff to

  - Specify who may use the system.

  - Limit the amount of space in memory for each user.

  - Restrict interaction between users by establishing groups.

  - Run a command procedure for any user at log in time.

  - Limit the number of files a user may have open at any one time.

  - Limit other resources not mentioned here.

- DISKQUOTA enables the operations staff to

  - Limit the space allowed per UIC on any volume.

  - Keep track of the space used.

  - Look at the space used and modify limits for any user.

- CREATE/DIRECTORY enables the operations staff to

  - Create the user's disk directory.

  - Separate one user's files from other users' files.

  - Limit the number of file versions kept.

For more information, see the <u>VAX/VMS System Management and Operations Guide</u>.

Setting Up User Accounts

The information about a user is recorded in a file called the User Authorization File (UAF).

```
(1) Username:    SMITH       (2) Owner:  Joe Smith
 (3)Account:     Prgmmer      (4)UIC:    [100,4]
(5) CLI:         DCL         (6) LGICMD:
 (7)Default Directory: USERDISK:[SMITH]
(8) Login Flags:
    Primary days:   Mon Tue Wed Thu Fri
    Secondary days:
    No hourly restrictions
    PRIO:       4  BYTLM:          4096  BIOLM:            6
    PRCLM:      2  PBYTLM:            0  DIOLM:            6
(9) ASTLM:     10  WSDEFAULT:       150  FILLM:           20
    ENQLM:      0  WSQUOTA:         200  SHRFILLM:         0
    TQELM:     10  WSEXTENT         200  CPU:       no limit
    MAXJOBS:    0  MAXACCTJOBS:       0  PGFLQUOTA:    10000
(10) Privileges:
    TMPMBX NETMBX GROUP WORLD OPER CMKRNL
```

Example 8-1 Sample UAF Record

Notes on Example 8-1

1. Username - typed in response to the USERNAME prompt at login time; also used as process name.

2. Owner - usually the first and last name of the user.

3. Account - for accounting or general information; can be the name of project or department.

4. UIC - group and member number of user.

5. CLI - default command language for communication with the operating system.

6. LGICMD - login command file; a command procedure activated automatically at login time (LOGIN.COM is activated if this is blank).

7. Default Directory - the device and directory where the user is positioned at login time.

8. Login Flag - any of several flags which affect the process during its existence.

9. Limits and quotas - values assigned which affect system resources.

10 Privileges - allow users to affect system resources or other users.

NOTE

Passwords are NEVER displayed. To maintain security, passwords are encoded before they are stored; they cannot be decoded.

For more information, see the <u>VAX/VMS System Management and Operations Guide</u>.

A skeleton UAF file containing four records is part of the initial distribution kit:

- SYSTEM
- FIELD
- SYSTEST
- DEFAULT

Use the AUTHORIZE utility to add new records or change old records in the UAF. To run AUTHORIZE, enter the following commands:

```
$ SET DEFAULT SYS$SYSTEM
$ RUN AUTHORIZE
UAF>
```

Table 8-2 Summary of AUTHORIZE Commands

Function	Command	Example
Add a user	ADD	ADD JOE/PASSWORD=TIE/UIC=[100,4]
Create a file of usernames that can be printed	LIST	LIST JOE/FULL
Display users	SHOW	SHOW JOE
Modify a user's record	MODIFY	MODIFY JOE/PASSWORD=LOUIS
Modify DEFAULT record	DEFAULT	DEFAULT/LGICMD=SYS$SYSDISK:[R2]D2
Rename a user's record	RENAME	RENAME JOE JIM/PASSWORD=KIRK
Copy one user's record to another	COPY	COPY JOE JOHN/PASSWORD=ADAMS
Remove users	REMOVE	REMOVE JOE
List commands	HELP	HELP
Return to DCL	EXIT	EXIT

Allocating Disk Space to Users

- Users can be limited to a certain number of blocks on a disk called a permanent quota.
- The system generates an error message if the quota is exceeded.
- An overdraft quota specifies a limited number of blocks beyond the permanent quota which can be used to add to an existing file.
- Quotas are set up by using the DISKQUOTA utility.

To run the DISKQUOTA utility, enter the following DCL command:

```
$ RUN SYS$SYSTEM:DISKQUOTA
DISKQ>
```

Table 8-3 lists the various activities of the DISKQUOTA utility and shows an example of each. Keep in mind the following points on the DISQUOTA utility:

- Quotas are maintained on a volume-by-volume basis.
- A quota file must be created on a volume before the utility can be activated.
- When running the DISKQUOTA program, the volume is specified by the USE command. The other commands work with that volume until another is specified. The USE command is the first DISKQUOTA command you issue.
- DISKQUOTA commands must fit on one line. Use several MODIFY commands to alter a record, if necessary.
- Quotas are assigned to UICs, not usernames. Usually, each user has a unique UIC, so quotas are given to each user separately. However, if more than one user shares the same UIC, they share the quota of disk space assigned to that UIC.
- If the system crashes, the blocks used on each disk by each UIC (where the utility was activated) are recounted. The totals are then entered into the corresponding quota file during the startup procedure.
- The VAX/VMS System Management and Operations Guide has more information.

Table 8-3 Summary of DISKQUOTA Commands

Function	Example
Specify which disk to use DISKQUOTA on	USE DBA1:
Create a quota file for a specified disk	CREATE
Enable DISKQUOTA activity for a specified disk, so blocks used are recorded for each UIC	ENABLE
Disable DISKQUOTA activity for a specified disk	DISABLE
Count all blocks allocated to each UIC (when first enabling) and record in quota file	REBUILD
Display users	SHOW [*,*]
Add a new UIC to a quota file so blocks used by that UIC are also counted	ADD [20,2]/PERMQUOTA=10000
Modify the permanent quota or overdraft for a specified UIC	MODIFY [20,2]/OVERDRAFT=2000
Remove a UIC from the quota file for a specified disk	REMOVE [20,2]
List all DISKQUOTA commands	HELP
Return to DCL level	EXIT

Creating User Directories

Use the CREATE/DIRECTORY DCL command as shown in Example 8-2 to create a main level user directory. It is important that you remember to include the /OWNER_UIC qualifier so that the directory will belong to the user, not to you.

```
$ CREATE/DIRECTORY USERDISK:[SMITH]/OWNERUIC=[100,4]
```

Example 8-2 The CREATE/DIRECTORY Command

Note that in the above CREATE/DIRECTORY command, the default disk, the directory, and the owner UIC match the corresponding fields in the UAF shown in Example 8-1. If for some reason they do not match, you would have to go back and modify the UAF or the main level directory.

SUMMARY

The following must be done to add a new user:

1. Create a UAF record using AUTHORIZE, attempting to assign a unique UIC with an appropriate group number.

2. If the DISKQUOTA utility is enabled on the volume where the user will be working, add the new UIC to the quota file for that volume.

3. Create a directory on the volume where the user will be working. The name of this directory is usually the same as the username.

4. Modify the UAF record so the default device and directory matches the volume where the user will be working and the directory just created.

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MONITORING AND BALANCING THE SYSTEM

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MAYO DE 1985.

9

MONITORING AND BALANCING THE SYSTEM

INTRODUCTION

One of the operator's main duties is to monitor what is being done on the system. If set up properly, the operating system needs little attention. The system needs help when users:

- Request a change in system storage configuration (see the Disks, Tapes, and Floppies module).
- Make unplanned demands on system resources.
- Put themselves in a problem situation.

An operator must have an overview of the system. By monitoring the system, and anticipating needs and problems, the operator helps to keep the system functioning. It may also be necessary for an operator to obtain detailed information on a process or device. For example, if an overview examination of the system revealed that a process or device is causing a problem, the operator should examine that process or device in detail.

OBJECTIVES

1. To invoke the proper DCL commands that provide specific information about the operating system.
2. To identify the sections of the hardware/software that are not functioning according to system management policies and rules.

RESOURCES

1. VAX/VMS Command Language User's Guide
2. VAX/VMS Utilities Reference Manual

MONITORING THE SYSTEM

Table 9-1 System, Process, and Device Monitoring

Function	Command or Utility
General System Information	
Overview of the processes on the system	$ SHOW SYSTEM
Overview of print queues	$ SHOW QUEUE/DEVICES/ALL
Overview of batch queues	$ SHOW QUEUE/BATCH/ALL
Overview of the disks and tapes available (mounted)	$ SHOW DEVICES/MOUNTED
Overview of System Memory Resources	$ SHOW MEMORY
Display of System Resources and Use	$ MONITOR
Specific Information (Process or Device)	
Interactive processes and Terminal device codes	$ SHOW USERS
Specific information on what a process is currently doing	$ SHOW PROCESS/CONTINUOUS/ID=
Specific information on what a process is allowed to do	$ RUN SYS$SYSTEM:AUTHORIZE (see module on "SYSTEM MANAGEMENT FUNCTIONS")
Specific information on how much disk space a user is allowed	$ RUN SYS$SYSTEM:DISKQUOTA $ SHOW QUOTA/USER (see module on "SYSTEM MANAGEMENT FUNCTIONS")
Specifics of a Device (owner, volume label)	$ SHOW DEVICE device

OBTAINING INFORMATION VIA DCL

Information may be gathered on:

- Active processes
- System processes
- Devices
- System memory resources
- Print and batch queues

Active Processes

To list all processes presently on the system:

```
$ SHOW SYSTEM
```

VAX/VMS Processes on 9-MAR-1981 17:40:50.05 Uptime 4 03:34:43

Pid	Process Name		UIC	State	Pri	Dir. I/O	CPU	Page flts	Ph.Mem	
00[illegible]0000	NULL	1	000,000	COM	0	0	11:08:14.89	0	0	
00010001	SWAPPER		000,000	HIB	16	0	00:02:45.65	0	0	
000F001E	FRIEDMAN		363,002	LEF	9	297	00:01:12.90	7384	44	
002A0023	MARSH	2	363,010	CUR	7	2180	00:03:27.68	29011	104	
001B0029	TOWLE		363,020	LEF	4	144	00:00:18.17	2256	47	
[illegible]340036	MASORS	3	363,005	LEF	9	29	00:00:02.37	618	128	
[illegible]020038	REMACP		001,003	HIB	10	1	00:07:12.45	36	30	
[illegible]10039	NETACP		001,004	HIB	10	11874	00:11:33.65	193528	120	
[illegible]03C	NATASHA	4	366,010	CEF	4	1	00:00:00.07	23	52	
[illegible]3D	PRTSYMB2		001,004	HIB	8	1891	00:03:57.92	27	46	S
[illegible]3F	ERRFMT		001,006	HIB	8	1340	00:00:16.15	30	32	
[illegible]	OPCOM		001,004	LEF	7	458	00:00:05.32	34	42	
[illegible]	JOB_CONTROL	5	001,004	HIB	9	4543	00:01:08.37	347	130	
[illegible]	DBA0BACP		001,003	HIB	8	179208	01:25:50.87	130922	225	
[illegible]	PRTSYMB1		001,004	HIB	8	3453	00:07:36.01	45	44	S

Example 9-1 Output from the SHOW SYSTEM command

Table 9-2 Process State Categories

Category	Definition
WAIT STATE	The process is waiting for an event to happen before it can do more computing.
PREFERRED	For overall system "health", a process should be in this state. In the preferred state, the process is likely to become computable quite quickly.
OK	A process in this state does not interfere with the system or the running of other processes. A process that is outswapped generally does not hurt the efficiency of VMS. It is only when it takes a long time for an outswapped process to become computable again that being outswapped becomes a problem.
OTHER	If one or more processes are in these states, they should be watched. While in these states, there is a potential for trouble with one process.

NOTE

The numbers in Table 9-3 correspond to the numbered lines in Example 9-1.

Table 9-3 System States and Definitions

	Name of State & Abbreviation	Wait State	OK	Preferred	Other	Definition of State
11	Computable COM/COMO		X	X		Ready to go to the CPU
[illegible]	Common Event Flag CEF/CEFO	X	X	X		Waiting for something to happen.
*	Collided Page COLP	X			X	Waiting for the system.
12	Current CUR		X	X		Executing in the CPU.
*	Free Page Wait FPG	X			X	Waiting for some physical memory.
[illegible]	Local Event Flag LEF/LEFO	X	X	X		Waiting for something to happen.
[illegible]	Hibernate HIB/HIBO	X	X			Sleeping; can wake self up.**
*	Mutex/Misc Resource MWAIT	X			X	Waiting for a resource.
*	Suspended SUSP/SUSPO	X	X			Sleeping.***
*	Page Fault Wait PFW	X			X	Waiting for the system.

* No example of this state is in Example 9-1.

** This state is normally used by system processes when they want to get out of the way. This means that they are still available, but not blocking other COMPUTABLE processes.

*** This state should be used for short times only. Processes that spend too much time in this state without permission from the system manager should be carefully examined.

System Processes

The operating system has several processes of its own on the system.

Table 9-4 System Processes

System Process	Normal State(s)	Purpose
NULL	COM	Keeps the CPU busy when no other processes are ready to execute.
SWAPPER	HIB,COM	Transfers processes between physical memory and disk.
ERRFMT	HIB,COM	Transfers reported errors to a file on the system disk.
xxxACP	HIB,COM	Part of transfer software to and from disks, tapes, and other computers.
PRTSYMBn	HIB,COM	Part of the software that prints jobs on line printers.
OPCOM	HIB,COM	User-Operator communications (see the Operator-User Communications module).
JOB_CONTROL	HIB,COM	Responsible for managing print queue, managing batch queues, and logging users in.

Table 9-5 Results of System Process Deletion

System Process	Result of Process Deletion
SWAPPER	System crashes **
ERRFMT	Process deletion logged on console *
xxxACP	System slows down, then completety stops, possibly crashes
OPCOM	System continues to function
JOB_CONTROL	Users cannot log on and queues do not function
PRTSYMBn	The associated printer stops printing
NULL	System continues to function **

* To restart the ERRFMT process, invoke a command procedure as follows (privileges are needed for the command procedure to function successfully):

```
$ @SYS$SYSTEM:STARTUP.COM ERRFMT
```

** The operating system will not allow you to delete these processes.

Except for the ERRFMT process, the final and sometimes only action that can be taken is to shutdown and restart the system. Consult the system manager before restarting the system.

Devices

To display information about the devices on your system, use:

```
$ SHOW DEVICES
```

Table 9-6 SHOW DEVICES Command

Information Needed	Command
Overview of the devices on the system	$ SHOW DEVICES
Amount of disk space on one or more mounted disks	$ SHOW DEVICES/MOUNTED
Characteristics or error count on a specific device	$ SHOW DEVICES device_name
Owner of an allocated device (for example, a tape drive)	$ SHOW DEVICES/FULL device_name
Names of all files open on a device	$ SHOW DEVICES/FILES device_name

System Memory Resources

To display information about physical memory, use:

```
$ SHOW MEMORY

              System Memory Resources on 23-MAR-1982 15:53:10.83

Physical Memory Usage (pages):     Total         Free     In Use   Modified
Main Memory (4.00Mb)                8192         4524       3631         37

Slot Usage (slots):                Total         Free   Resident    Swapped
  Process Entry Slots                 75    ①      53         22          0
  Balance Set Slots                   70           50         20          0

Fixed-size Pool Areas (packets):   Total    ②    Free     In Use       Size
  Small Packet (SRP) List            272           66        206         96
  I/O Request Packet (IRP) List      300         2184        116        160
  Large Packet (LRP) List             13            7          6        640

Dynamic Memory Usage (bytes):      Total    ③     Free     In Use    Largest
  Nonpaged Dynamic Memory         179712        97504      82208      96960
  Paged Dynamic Memory             65536        45312      20224      45232

Paging File Usage (pages):                       Free     In Use      Total
DBA0:[SYS0.SYSEXE]SWAPFILE.SYS              ④   11352       3648      15000
DBA0:[SYS0.SYSEXE]PAGEFILE.SYS                  28870       1130      30000

Of the physical pages in use, 1303 pages are permanently allocated to VMS.
```

Example 9-2 SHOW MEMORY Output

• Notes on Example 9-2

1. Free Process Entry Slots - Indicates the maximum number of additional processes VMS has room for in memory.

   Problem: Users cannot log in, new processes cannot be created.

   Action: To make room for new processes, old processes must be deleted. Tell user to try again later.

2. Fixed-sized Pool Area (Packets) - Mainly used to Input/Output information.

   Problem: The number of SRPs, IRPs, or LRPs goes to zero.

   Action: The system will still function. Notify the system manager that the number of packets used has exceeded estimates.

3. Free Paged Dynamic Memory and Free Nonpaged Dynamic Memory - Indicates the amount of dynamic memory left for processes' use.

   Problem: If the number becomes small, the system slows down.

   Action: To free up memory:

   - Send a message to current users to cut down on heavy I/O if possible.
   - Stop some processes.
   - Reboot the system with more memory set aside.

4. Free Swap File Pages - Indicates the number of pages VMS has on disk to swap users into.

   Problem: Users cannot log in. New processes cannot be created.

   Action: To make room for new processes, old processes must be deleted. Tell user to try again later.

Print and Batch Queues

To examine the queues on the system, enter the following commands:

```
$ SHOW QUEUE/DEVICES/ALL

$ SHOW QUEUE/BATCH/ALL
```

More information on these commands and queues in general is available in the Queues module.

OBTAINING INFORMATION VIA THE MONITOR UTILITY

The MONITOR utility displays information about the system. Some of this information overlaps with the SHOW MEMORY and SHOW SYSTEM commands.

To execute the MONITOR utility, type:

```
$ MONITOR class-name(s)
```

Table 9-7 MONITOR Class Names

Class Description	Class Name
DECnet-VAX statistics	DECNET
File system ACP statistics	FCP
System I/O statistics	IO
Lock management statistics	LOCK
Time spent in each of the processor modes	MODES
Page management statistics	PAGE
Statistics on space allocation in the nonpaged dynamic pool	POOL
Statistics on all processes	PROCESSES
Number of processes in each of the scheduler states	STATES

Interactive Processes and Terminal Codes

To list the interactive processes and their respecitve terminal codes, use:

```
$ SHOW USERS
```

```
        VAX/VMS Interactive Users - Total = 5
            26-MAY-1981 16:13:26.29

    (1) TTA1:  (2) MARSH         (3) 002A0023
        TTA5:      FRIEDMAN          000F001E
        TTA7:      TOWLE             001B0029
        TTB3:      MASORS            00340036
        TTB4:      NATASHA           00BF003C
```

Example 9-6 Output from SHOW USERS

Notes on Example 9-6

(1) TTA1: is the terminal device code

(2) MARSH is the user name

(3) 002A0023 is the PID for the process

ADJUSTING THE SYSTEM AND ITS WORKLOAD

1. Cut down the number of batch processes.

   Use the STOP command as it is discussed in the Queues module.

2. Cut down the number of interactive processes.

   Use the SET LOGINS command.

Table 9-9 SET LOGINS Command

Function	Command
Display the allowed limit of interactive users	$ SET LOGINS/INTERACTIVE
Alter the number of allowed interactive users	$ SET LOGINS/INTERACTIVE=n

3. Request that some people log off.

   Use the REPLY command as it is discussed in the Operator-User Communications module.

4. Stop processes.

   As a last resort, use the STOP command to stop processes.

INTRODUCTION

As an operator, it is your job to interact and communicate with users, the system manager, and the operating system. VAX/VMS provides many ways to communicate, from direct (via terminals) conversation with a user, to leaving messages for one or more users. The VAX/VMS DCL commands and utilities allow operators to:

- Communicate terminal-to-terminal.
- Send messages to one or more users whether they are logged on or not.
- Respond to a list of requests by users and the operating system. The operator selects which request to handle first. The operating system keeps track of sending requests.

Communication with the system manager is very important for smooth running of the machine. It is necessary to inform the system manager, verbally or through documentation, of any problems

OBJECTIVES

1. To use the VMS communication utilities (MAIL and PHONE) to send messages to users.
2. To invoke the REPLY command in an operations environment to respond to user communication.

RESOURCES

1. VAX/VMS Utilities Reference Manual
2. VAX/VMS System Management and Operations Guide
3. Site Management Guide

WRITTEN EXERCISE

Table of error information

	Facility generating the error	Severity of error	Code word used to look up the error
1			
2			
3			
4			
5			
6			
7			

The PHONE Utility

- Allows you to talk directly with other users.
- Users may be on your system or any other VAX-11 computer that can be reached by means of DECnet-VAX.
- Closely simulates the features of a real telephone, including:
  - Hold button
  - Telephone directories
  - Conference calls

NOTE

You can only use PHONE on a video terminal such as the DIGITAL VT52 and the VT100. Do not try to run PHONE on a hardcopy terminal.

The PHONE utility is executed using the DCL command:

```
$ PHONE
```

YOUR TERMINAL

```
+-----------------------------------------+
|          VAX/VMS Phone Facility         |
| % your phone commands                   |
|-----------------------------------------|
|             ROWAN::BUFORD               |
|                                         |
| your message                            |
|                                         |
|-----------------------------------------|
|             MARTIN::MARSH               |
|                                         |
| their message                           |
|                                         |
+-----------------------------------------+
```

Figure 10-1 A Video Screen using PHONE

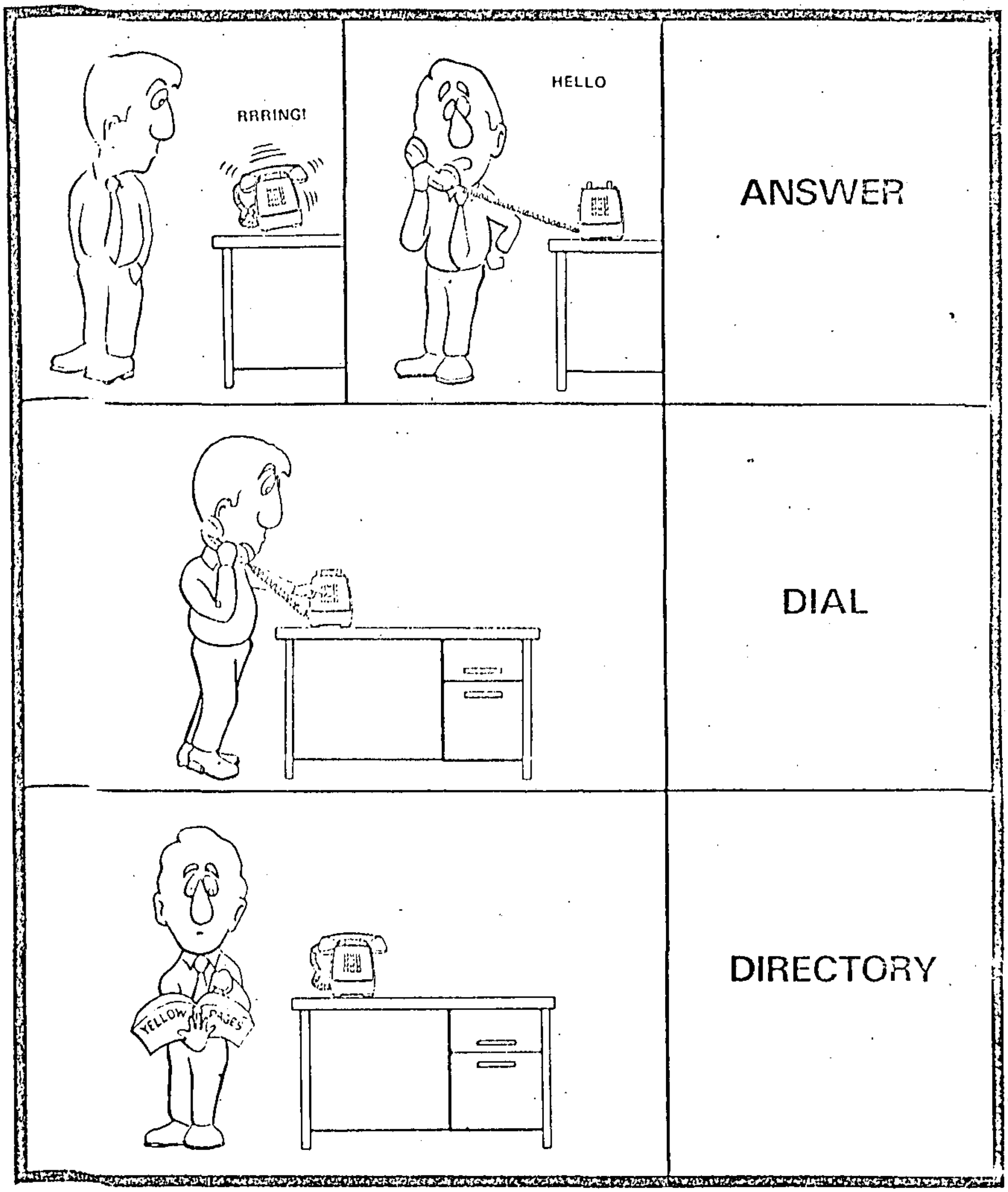

Figure 10-2 Comparing PHONE Commands to a Telephone
(Sheet 1 of 2)

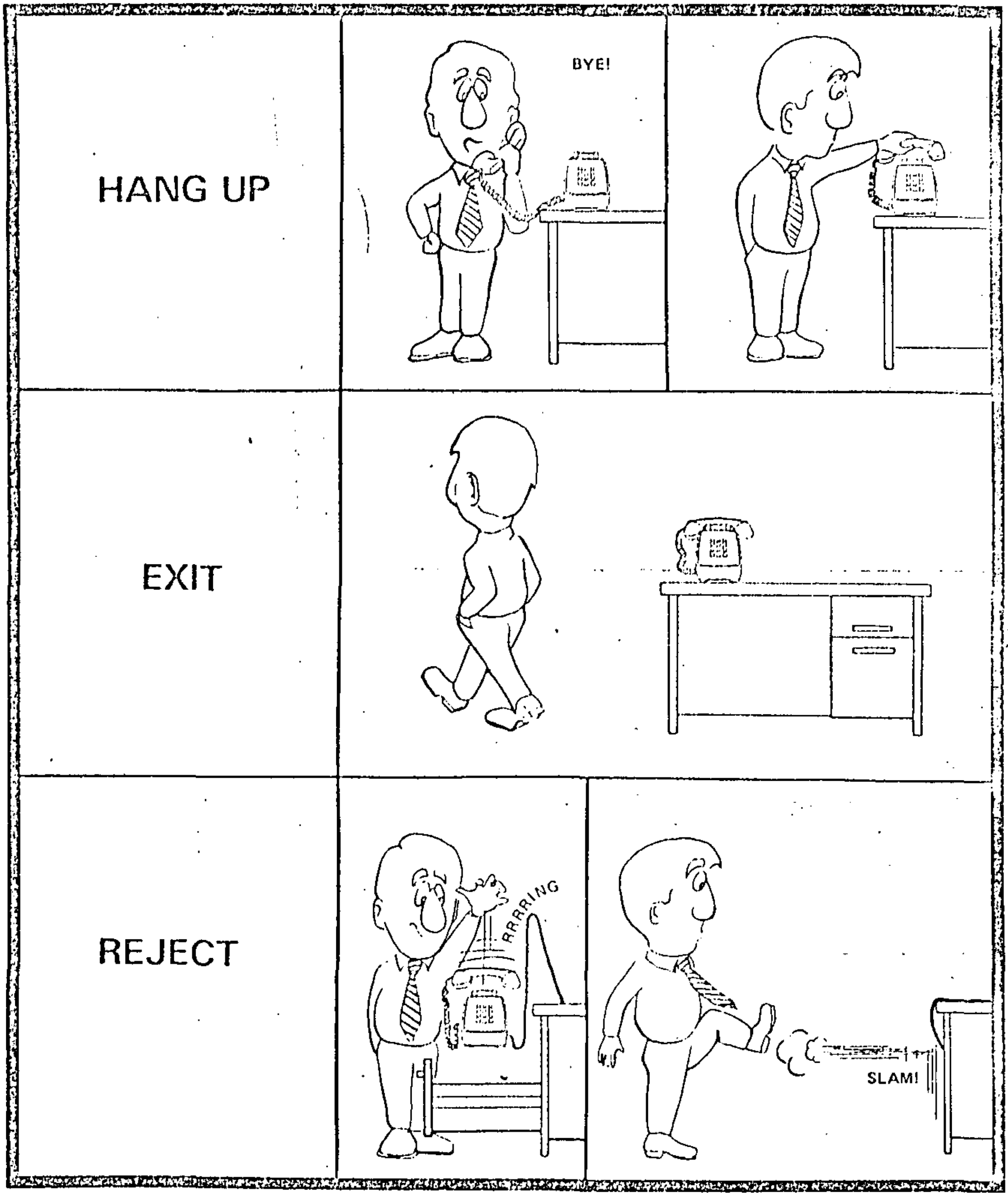

Figure 10-2 Comparing PHONE Commands to a Telephone
(Sheet 2 of 2)

Table 10-3 MAIL Commands

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Function	Command
Reading and Manipulating Messages	
List the available messages	DIRECTORY
Display the contents of a message	READ
Remove a message from the mail file	DELETE
Add a copy of a message to another message file	FILE
Send a copy of a message to the line printer	PRINT
Send a copy of an existing message to other users	FORWARD
Sending and Replying to Messages	
Send a new message to one or more users	SEND
Send an answer to a message already received	REPLY

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```
MAIL> DIRECTORY

        # From          Date           Subject

        1 FRIEDMAN      20-MAY-1981    VMS
        2 CORMAN        19-MAY-1981    Clowning
        3 MUIZNIEKS     20-MAY-1981    Pizza
```

Example 10-1 List of MAIL Messages

where;

#	is a message number. The number for each message allows a user to manipulate the messages one by one. The number changes if lower numbered messages are removed from the mail file.
From	is the process name of the sender.
Date	is the date the message is sent.
Subject	indicates what the message is about.

A distribution list is used to:

- Store usernames
- Send mail to users on the list without having to enter each name.

Example 10-2 is an example of a distribution list file named NAMES.DIS.

```
NAMES.DIS

!System Programmers
FRIEDMAN
MASORS
MUIZNIEKS
TOWLE
```

Example 10-2 Distribution List File, NAMES.DIS

Enter the distribution list file specification when the MAIL utility prompts for the receiver's user name. To indicate that this is a distribution list, not a user name, put the "@" character in front of the file specification.

```
MAIL> SEND [MARSH]gather.dat
To:   @NAMES.DIS
Subj: Gathering
```

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Example 10-3 Using a Distribution List

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User and Operating System Requests

Another method of handling user-operator and system-operator communication is through the OPCOM process which:

1. Forwards messages and requests from the users and the system itself to the operator console. ($ REQUEST and $ MOUNT)

2. Keeps track of current requests and the users that made them.

3. Enables the operator to respond to requests. ($ REPLY)

4. Logs all requests and replies into the operator log file (SYS$MANAGER:OPERATOR.LOG).

Informative Messages

- Are meant to inform you
- Do not require an answer from you
- Appear only once
- Are not logged in the operator log (SYS$MANAGER:OPERATOR.LOG).
- Get generated when:
  - A user issues the DCL command REQUEST
  - The system wants to inform you of an important operation (such as a MOUNT or DISMOUNT)

For example, a user enters:

```
$ REQUEST "Please check to see if LPAØ:  is online"
```

and the following OPCOM message appears on the console:

```
%OPCOM, 15-MAR-1982 10:12:23.37, message from user BUFORD
__TTCØ:, Please check to see if LPAØ:  is online
```

Requests for Operator Action

- Request that you perform an action
- Require you to reply to them
- Reappear periodically as a reminder
- Are logged in the operator log file (SYS$MANAGER:OPERATOR.LOG).
- Get generated when:
  A user issues the DCL command REQUEST/REPLY
  1. The system needs you to do something for it (like change a tape)
- The user (or the system) cannot proceed until you reply

For example, a user enters:

```
$ REQUEST/REPLY "Please mount a scratch tape on MTA1:"
```

and the following OPCOM message appears on the console:

```
%OPCOM, 15-MAR-1982 10:02:13.27, request 1, from user BUFORD
__TTC0:, Please mount a scratch tape on MTA1:
```

If you do not reply:

- OPCOM will repeat the message every few minutes
- That user will not get another DCL prompt and cannot do any work until you send a reply (either that you did or that you cannot mount the tape)

Request Cancelations

- Cancel previous requests for operator action
- Release you from replying to the request
- Appear only once
- Are logged in the operator log file (SYS$MANAGER:OPERATOR.LOG).
- Get generated when a user that initiated a request for operator action could not or would not wait, so he entered a CTRL Y

If the user cancels a request, the following OPCOM message appears on the console:

%OPCOM, [illegible] [illegible]:35:41.53, request 1 was cancelled

Replying to Requests

The DCL command used to communicate with OPCOM is REPLY:

```
$ REPLY/qualifier   "message text"
```

where:

/qualifier — indicates what is to be done.

message text — is passed on. Not all qualifiers have messages associated with them.

For those requests that require a reply, there are several types of replies an operator can make.

Table 10-4 Operator Replies and Appropriate Qualifiers

Function	Qualifier
List the requests that have not been sent a final response	/STATUS
Reply that request has been fulfilled	/TO=request-id
Reply that request has been aborted	/ABORT=request-id
Acknowledge request but put off a final reply for a short time	/PENDING=request-id
Send the label of an initialize tape as the final response	/INITIALIZE=request-id
Send the label of an blank tape as the final response	/BLANK_TAPE=request-id

Using REPLY to Send Messages to Users

- Reply-ids are not needed
- Messages should be short
- Messages can be sent to all users or terminals

Table 10-5 Operator Messages and Appropriate Qualifiers

Function	Qualifier
Send a message to a specific terminal	/TERMINAL=device_code
Send a message to all users presently logged onto the system	/USER
Send a message to all terminals whether a user is logged on or not	/ALL
Causes the terminal receiving the message to buzz or ring (add to any of the above qualifiers)	/BELL

Table 10-7 Summary of Qualifiers to the REPLY Command

Function	Qualifier
Responding to Requests	
Lists the requests that have not been sent a final message	/STATUS
Sends a final response to a request	/TO=request-id
Sends a response to a request, but not the final response	/PENDING=request-id
Cancels the request	/ABORT=request-id
Sends the label of an initialize tape as the final response	/INITIALIZE=request-id
Sends the label of an blank tape as the final response	/BLANK_TAPE=request-id
Sending Messages and Information	
Sends a message to a specific terminal	/TERMINAL=device_code
Sends a message to all users presently logged on the system	/USER
Sends a message to all terminals whether a user is logged on or not	/ALL
Causes the terminal receiving the message to buzz or ring (add to any of the above qualifiers)	/BELL
Controlling Operator Terminals and the Log File	
Sets up a non-console terminal as an operator's terminal	/ENABLE
Stops a terminal from being an operator's terminal	/DISABLE
Closes the current OPERATOR.LOG file and opens a new file with a higher version	/LOG

DIVISION DE EDUCACION CONTINUA
FACULTAD DE INGENIERIA U.N.A.M.

CURSOS: "INTRODUCCION AL SISTEMA VAX - 11/780" Y
"OPERACION Y ADMINISTRACION DEL SISTEMA VAX / VMS"
DEL 29 DE ABRIL AL 13 DE MAYO.
MEXICO, D.F.

HANDLING PERIPHERALS

PROFESORES:

ING. EDUARDO S. JALLATH CORIA.
ING. ALEJANDRO JIMENEZ GARCIA.
ING. SOCRATES A. MUÑIZ ZAFRA.
ING. HUMBERTO SANCHEZ SANDOVAL.

MAYO DE 1985.

The methods of record keeping can vary, but the information kept usually includes:

1. Failures
2. Adjustments
3. Cleaning schedules
4. Configuration and hardware changes
5. Software changes
6. Breakage and replacements

This information is often kept in a system log, which can be nothing more than a three-ring binder kept near the system.

NOTE

Be sure to inform your course administrator that you have reached this point in the course, as the labs in this module require supervision.

OBJECTIVES

1. To clean and adjust all peripherals on your system using recommended procedures.
2. To handle, load, unload, and store the various types of media associated with your system.
3. To power on/off all peripheral devices on your system.

RESOURCES

1. User's Guide for each device on the system.
2. Hardware User's Guide
3. Site Management Guide

7. If the device generates a fault, or does not seem to work properly, look at all parts of the device that are normally handled. Be sure all wires are plugged in, and all doors are closed tightly, etc. If you have checked everything, and the device is stopped, the last procedure which sometimes works is to power the device down and back up. This clears up some problems, but not all. If there is still a problem, report it to the system manager or field engineer.

DISKS AND DISK DRIVES

(If you do not use disks, you may skip this section and go to the next section dealing with diskettes.)

Disk Drives

A disk drive is one of the most important peripherals on the system because it can be used to access data stored on disks. Disk drives are very sensitive pieces of equipment, so most of their maintenance is performed by field service personnel. When a drive containing a disk is started, the disk begins to spin. Disk heads access information while the disk is spinning.

Disks

Some disks, referred to as **disk packs**, such as the RM05 or RP06, are kept in transparent containers. From the side, the disk pack looks like a stack of phonograph records attached in the middle to a cylinder. These record-like surfaces are called platters. The plastic cover is removed when the pack is loaded in the drive.

Other disks, called **cartridge disks**, come in cartridge form, such as the RL02 or RK07. A cartridge is a plastic container which contains the same kind of record-like surfaces. The entire cartridge disk is loaded in the drive (although a protective cover is removed).

A third kind of disk, **nonremovable disks**, are shipped as part of the disk drive, and stay in the drive all of the time. They cannot be seen or handled by the user. These packs are also made up of platters. An example would be the RP07 or RM80 packs.

NOTE

Disk packs for different drives, such as the RMØ5 or RPØ6, look similar. Cartridge packs also look similar. However, if a disk designed for one drive is loaded into another, it could cause damage. Be sure to read the label on a disk before loading it into a drive to avoid this problem.

Disk Heads

The information on a disk is stored magnetically, so the disk heads do not touch the platters. If a head does touch the surface, both the head and the surface are usually damaged. Because the pack is spinning very fast, the damage can be extensive. When this happens, it is called a head crash.

Head crashes usually result from dirt on a platter or head, or because the head is too close to the pack surface. Figure 12-1 show the relationship of the size of a piece of dirt to the space between a disk surface and the disk head. As can be seen, the space is very small and the dirt - even something as small as a smoke particle - is very large in comparison.

Head Alignment -- When the heads are reading the disk, they expect the information to be in a certain area. If the heads are poorly adjusted, they look in the wrong place for the information. When the same heads are used to write a disk, they write information in the wrong area. Usually, these disks can only be read by the drive where they were written. If they can be read by other drives without noticeable errors, the information is not always transferred correctly.

The real problem occurs after many disks have been produced by a poorly-aligned drive. After a while, the bad drive is the only drive that can read the disks correctly. Then, someone makes a decision to align the drives, and no drive is left that can read the disks. Therefore, it is important to keep the drives aligned so all disks can be read by more than one device.

To prevent alignment problems and head crashes, the field service representative can perform a procedure called head alignment. Head alignment should be done on a regular basis to all disk drives. The procedure checks the distance between the disk heads and platters, and corrects any errors before they cause damage.

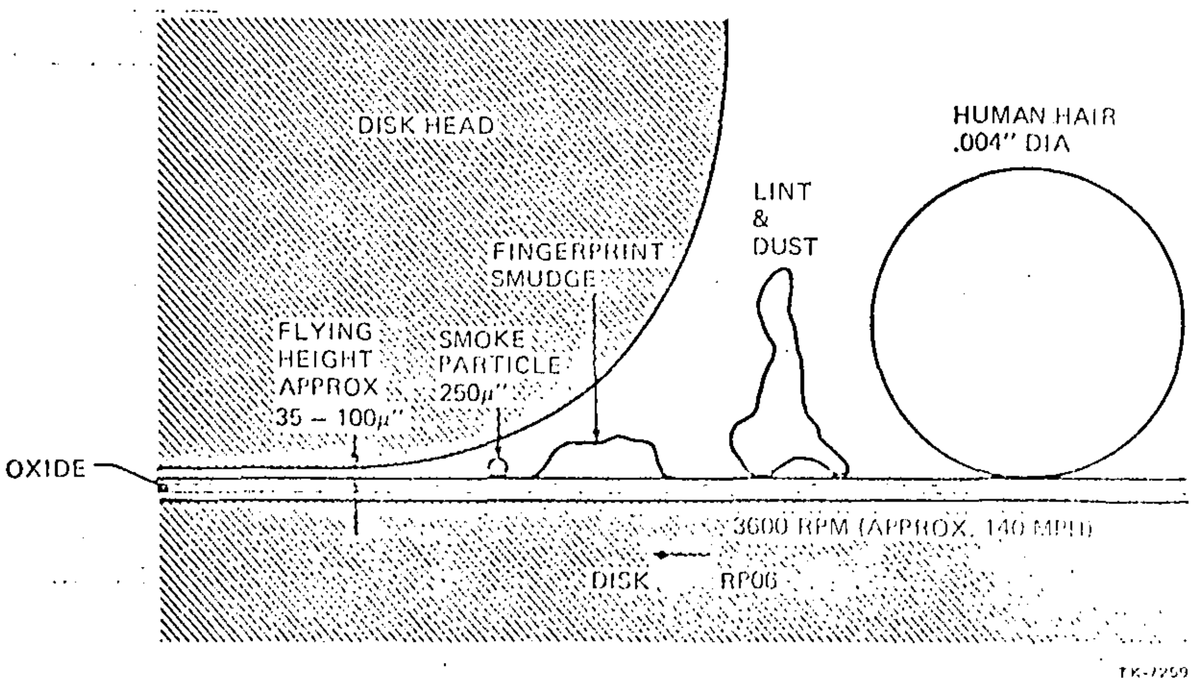


Figure 11-1 Relationship of the Size of Dirt to a Disk

Disk Pack Handling

In general, handle disk packs carefully. Always hold a disk pack with two hands to avoid dropping it or striking it against a table. Cleanliness is very important. Smoking, eating, or drinking should not be allowed near the drives, or even in the computer room. Operator should store packs in a clean area, and keep the covers of the drives closed whenever possible.

Cleaning

You are responsible for cleaning the outside of the drive only. The drive should be cleaned on a weekly basis, or more often if the computer room is not a clean environment. Some reasons for more frequent cleaning would be:

- When new equipment is installed (increases overall dirt in the room).

- When any maintenance work is done near or above the drive (dirt can fall in and around the drive).
- If there is a line printer near the drive (the paper in line printers produces a lot of dust).

To clean a drive, perform the following on a weekly basis:

1. Using a cloth moistened with all-purpose cleaner, clean the front panel and exterior of the device. (DO NOT CLEAN INSIDE THE DEVICE.)
2. Using a lint-free wipe or cloth moistened with glass cleaner, clean the glass on the outside of the front cover.

LEARNING ACTIVITY

1. Do Reading Assignment 11-1.
2. Perform Written Exercise 1.
3. Perform Lab Exercise 1.

WRITTEN EXERCISE 1

This exercise emphasizes the major points of the reading assignment. If you cannot answer these questions easily, review the material in the reading assignment. You should know this material BEFORE you handle a disk pack or disk drive.

1. Fill in T or F for true or false in the blanks preceding the following statements:

   a. ___ After turning the disk drive power on, allow the blower to run for at least one minute before installing the disk pack.

   b. ___ It does not matter whether you set the pack in the drive straight or at an angle.

   c. ___ Never stack the packs on top of each other.

   d. ___ Never store a pack in direct sunlight or in a dirty area.

   e. ___ Write the labels for the pack with pencil, pen, or felt tip pen.

   f. ___ DO NOT TOUCH disk surfaces.

2. Trained service personnel should be called in to handle various problems with disk packs or drives. List four types of problems which should be handled by your field service representative.

   a.

   b.

   c.

   d.

3. The cover over a disk pack protects it from many damaging things. Name two.

   a.

   b.

4. If you drop a disk pack, or it has caused damage to one disk drive, would it be safe to place the pack in another drive? Why or why not?

5. Is it ok to store a disk pack on its side, or to bang it against walls and tables? Why or why not?

6. You hear loud noises and notice a burning odor coming from one disk drive. What should you do?

SOLUTION

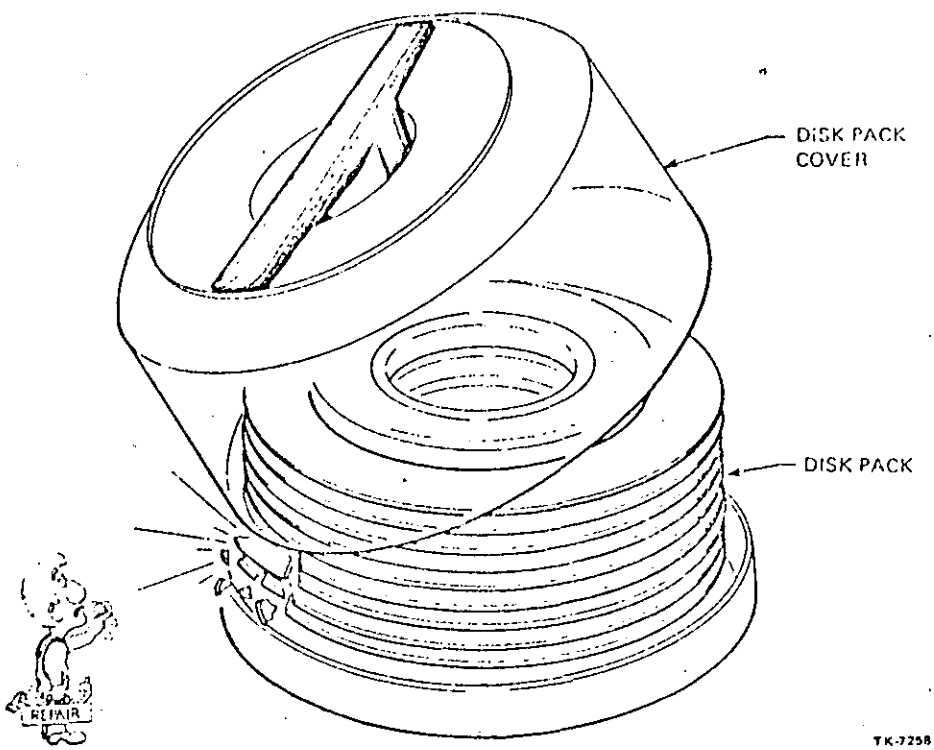
1. Fill in T or F for true or false in the blanks preceding the following statements:

   a. After turning the disk drive power on, allow the blower to run for at least one minute before installing the disk pack.

      False. The blower should run for at least 2 minutes.

   b. It does not matter whether you set the pack in the drive straight or at an angle.

      False. Never set the pack in the drive at an angle; the cover can damage the drive.



   c. Never stack the packs on top of each other.

      True. Never stack the packs on top of each other.

d. Never store a pack in direct sunlight or in a dirty area.

True. Never store a pack in direct sunlight or in a dirty area.

e. Write the labels for the pack with pencil, pen, or felt tip pen.

False. Never write the labels for the pack with pencil.

f. DO NOT TOUCH disk surfaces.

True. DO NOT TOUCH disk surfaces.

2. Trained service personnel should be called on to handle various problems with disk packs or drives. List four types of problems which should be handled by your field service representative.

a. Dirt has accumulated on the heads.

b. There is a burning odor coming from the drive.

c. The drive makes unusual noises, such as screeching or clanging.

d. There is a sudden increase in error rate on a specific drive or pack.

If your problem was listed in the reading assignment, it is a correct answer.

3. The cover over a disk pack protects it from many damaging things. Name two.

   The cover over a disk pack protects it from many things including dust, moisture, dirt, damage,etc.

4. If you drop a disk pack, or it has caused damage to one disk drive, would it be safe to place the pack in another drive? Why or why not?

   Never place a damaged pack in another drive because you may cause a head crash on the new drive. (Remember, head crashes are very expensive and time-consuming to fix). Never place a good pack in a damaged drive for the same reason.

5. Is it ok to store a disk pack on its side, or to bang it against walls and tables? Why or why not?

   Do not store a disk pack on its side, as the platters can be bent. Do not allow the pack to be struck in any way because the resulting damage can be great, and a head crash may result if you load the pack into a drive.

6. You hear loud noises and notice a burning odor coming from one disk drive. What should you do?

   Unusually loud noises and a burning odor may indicate a head crash. The disk and the drive are probably damaged. Push the STOP button so the pack stops spinning. Call field service. DO NOT DO ANYTHING to the drive or the pack ! (Do not even attempt to remove the pack). Put a sign CRASHED DRIVE on the drive. NEVER mount the crashed pack in another drive.

LAB EXERCISE 1

If you need help with the following activities, review the reading assignment. If you cannot find the answer there, get help from the course administrator or the observer assigned to you. Do not begin the exercise until the course administrator is present.

1. Stand next to a disk drive and listen to the sounds it makes so you know what is normal. The chugging and clicking sounds are the heads going out to read/write, and coming back to where they normally reside. Listen to these sounds for a while. You should develop an ear for your system so you can hear abnormal sounds even if you are on the other side of the room. This is very important as quick reactions can save equipment from severe damage when there is a problem.

2. Remove a pack from a different drive and look in the drive cavity for dirt or particles. (Do not let any hair or dirt fall inside the drive while you are looking.) Be sure to check inside a drive whenever you load or remove a pack.

3. Turn the disk drive off (POWER DOWN). When complete, turn the disk drive on (POWER UP).

4. Wait at least two minutes, then load a disk pack (provided).

5. Close the cover and start the drive.

6. When the pack is spinning at the correct speed, an indication that it is ready for use should appear on the drive. (Consult the appropriate User's Guide for specifics.)

7. Stop the disk spinning.

8. Try to open the cover before the pack stops spinning.

9. The cover should be locked. Wait for the pack to stop spinning and open the cover.

10. Remove the pack and close the cover.

11. Store the pack in the location provided by the course administrator.

12. Turn the drive off (POWER DOWN).

13. Clean the drive.

NOTE

Disk drives (and other equipment) perform better when left on continuously.

DISKETTES AND DISKETTE DRIVES

(If you do not use diskettes you may skip this section and go on to the next section dealing with tapes.)

Diskette Drives

Two types of diskette drives are supported on the VAX. These drives look like small boxes with a slot in one end protected by a sliding door.

NOTE

> The latch on the door is not strong, and should be treated gently. Open and close the cover by squeezing the latch without pushing it roughly. The cover should be kept closed as much as possible to decrease accumulation of dust inside the drive.

The drive contains a small disk, called a diskette. A VAX 11/780 uses a diskette drive to hold the console diskette which contains information needed to start the system.

Diskettes

A separate folder surrounds each diskette. The folder is usually square and sealed. The diskette is round. Diskettes are small and flexible, so they are often called floppies. You can store the same kind of information on a floppy as can be stored on a regular disk. The diskette drive reads the information from the diskette through the oblong hole in the folder. Labels can be attached to the front of the diskette folder. The diskette can not store as much information as a regular disk, but it can store directory structures and many files.

Drive Head and Alignment

The heads used to read the diskette are contained within the drive box. The field service representative is responsible for cleaning and checking these heads on a regular basis.

Diskette Handling

Because diskettes are flexible, they can be easily bent or scratched. They should be kept in paper folders, to decrease the amount of contact with dust or dirt. Always

- handle a diskette carefully, and store them in hard containers when not in use. Do not write on a label while it is attached to the folder containing a diskette.

Cleaning

Wiping off the outside of the drive periodically is the only cleaning required. Use a damp cloth (not wet).

LEARNING ACTIVITY

1. Do Reading Assignment 11-2.
2. Perform Written Exercise 2.
3. Perform Lab Exercise 2.

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WRITTEN EXERCISE 2

1. Should you write on the label of a diskette while it is attached to the diskette?

2. Does bending a diskette cause damage?

3. Should you ever touch the actual diskette through the oval hole in the cover?

4. Should diskettes be stored horizontally?

5. When the cover of the diskette drive is opened, the cover is moved to one side of the drive, revealing an open slot for the diskette. Should the label face the side of the drive where the cover is?

6. Name three things you should never do to a diskette.

   a.

   b.

   c.

221

SOLUTION

1. Should you write on the label of a diskette while it is attached to the diskette?

   No. Never write on the label while it is attached to the diskette. Attach the label after it is written. However, you can write on an attached label very lightly with a pencil or felt pen. Be aware that pressure can damage the diskette through the folder.

2. Does bending a diskette cause damage?

   Yes. Bending, folding, scratching, or in any way changing the shape of the diskette is damaging.

3. Should you ever touch the actual diskette through the oval hole in the cover?

   No. DO NOT TOUCH the diskette through the oval hole in the folder. The grease left by your fingers makes the diskette difficult to read.

4. Should diskettes be stored horizontally?

   Yes. Store diskettes in piles of ten or less.

5. When the cover of the diskette drive is opened, the cover is moved to one side of the drive, revealing an open slot for the diskette. Should the label face the side of the drive where the cover is?

   No. The label on the diskette should not face the side of the drive where the cover is when the cover is open. (i.e., for the console drive, the label should face to the right when the diskette is loaded.)

6. Name three things you should never do to a diskette.

   Handling diskettes is discussed in the reading assignment. Review the assignment, and if your answer is listed there, it is correct.

LAB EXERCISE 2

If you need help with the following activities, review the reading assignment. If you cannot find the answer there, get help from the course administrator or the observer assigned to you.

The console subsystem on the VAX 11/780 includes a floppy drive. Load a diskette according to the following instructions. (If you do not have a VAX 11/780, but you do have a diskette drive, read these instructions and load a diskette following the same basic principles.) Your course administrator should provide you with a scratch floppy.

1. Unlock and open the cabinet doors of the central processor.

2. Swing out the drive assembly until it is at a right angle to the cabinet.

   The drive assembly is a rectangular, unpainted steel box in the lower right-hand corner of the central processor cabinet. There is a black handle on the right of the drive assembly. The diskette cannot be inserted unless the drive has been swung out completely.

3. Insert the diskette into the drive.

   Squeeze the black pushbutton to unlock the slot cover; the cover will spring open. As you insert the diskette, the label should be at the top and should face the right cabinet door (should face up on horizontal drives). The end of the diskette with the oval slot should be placed in the drive first.

4. Close the diskette slot cover.

5. Swing the drive assembly back into the cabinet.

6. Clean the outside of the drive.

7. Your course administrator will write some information to the floppy. Listen to the noise made by the drive to learn what is normal. Never open the cover of a floppy drive when you hear the noise, as information may be lost. Check the floppies in your lab area to be sure they are properly labeled and stored. If not, obtain some labels and storage containers and correct the situation.

TAPES AND TAPE DRIVES

(If you do not use tapes, you may skip this section and go on to the next section dealing with cartridges.)

Tape Drives

Although a system can function without a tape drive, most systems have at least one of these devices. Tape drives are important because they can be used to transfer information from a storage device to a magnetic tape, called backing up. Once the information has been saved, the copy on the storage device could be damaged or destroyed. Since the information is safely stored on the tape, it can be transferred later to another storage device, called restoring. Tapes are often used for backup or for transporting information between systems.

Tapes

A magnetic tape consists of several parts. The tape itself is wider than tape used to record music on a cassette, but it is the same kind of tape. The tape is wound around a center piece (hub) and enclosed on two sides by flat, round pieces of plastic (flanges). Labels can be placed on the front flange. The back flange faces the drive, and contains a groove around the hub. This groove can be empty, or it can contain a plastic write ring. When the write ring is in the groove, information can be transferred to the tape. When the write ring is removed, the information on the tape is protected because the tape can only be read.

Tape Drive Head

The tape drive head is used to read the tape. Most drives have a diagram inside the door that shows you where the head is located on the drive. Tapes can get very dirty, and this dirt is transferred to the head. If the head is dirty enough, it will not read or write the tape properly.

Head Alignment

Tape drives are often used to produce large numbers of tapes. If the head on a production drive is not aligned, other drives are not able to read the tapes produced. Also, if this same drive is aligned later, no drive will be able to read the tapes. Therefore, the drives should be aligned on a regular basis, or this production time and effort will be wasted.

Tape Handling

Handle tapes carefully. Bent or cracked reels can damage the drive. Cleanliness is important because clean heads and tapes increase the reliability of the data saved. There is grease on the cleanest of hands, as well as dust in the air, and dirt on the floor and tables. Therefore, never handle the tape any more than necessary with your hands, and do not unroll the tape onto the floor or table. Use a firm grip when carrying tapes so they cannot be dropped or struck against sharp objects. Do not use force when loading or unloading a tape. Find out the correct method to use for your type of drive and follow that method.

Cleaning

You will probably be cleaning the tape drives more often than any other peripheral, because increased cleanliness leads to decreased chance of error. Clean your drive according to the following chart (refer to Figure 11-2):

NOTE

Be sure to remove any magnetic tape first. Look for damage to the glass or any other parts of the drive while cleaning.

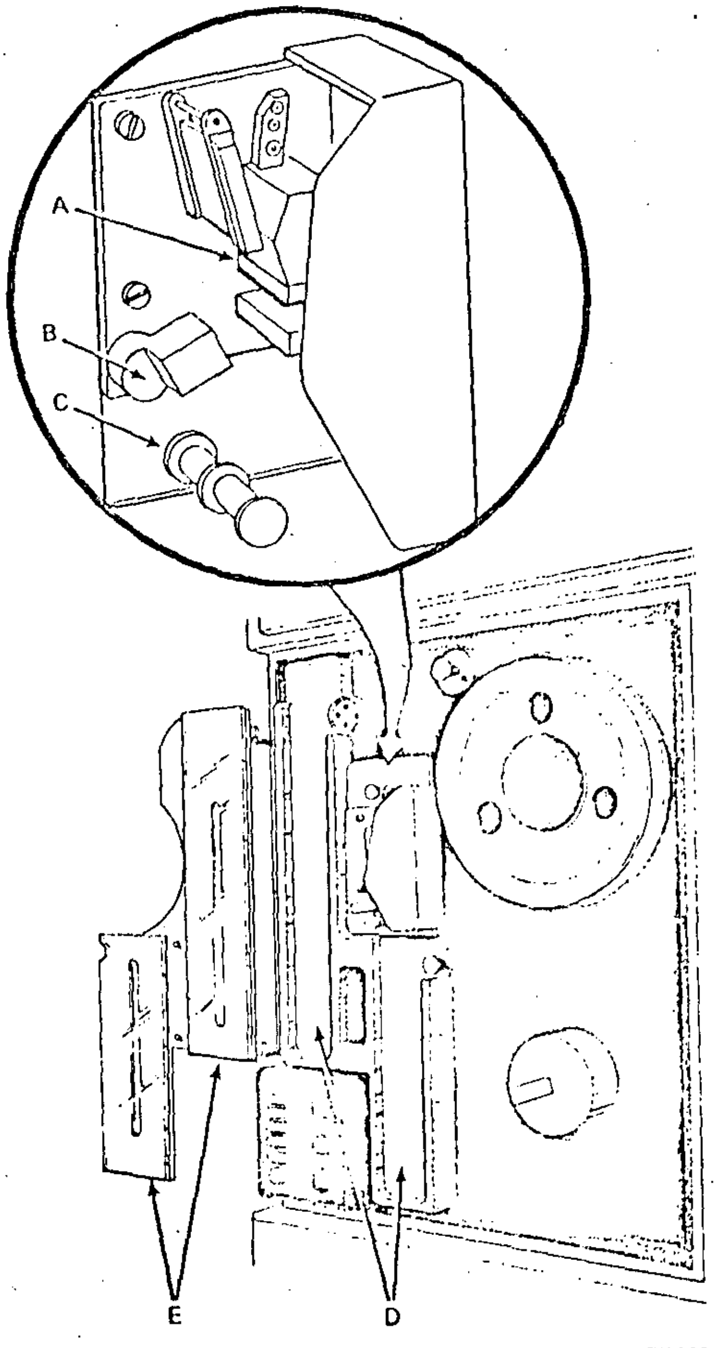

Figure 11-2 TU16 Magnetic Tape Drive

Table 11-1. Tape Drive Cleaning Frequency

Frequency	Operation
Weekly, or every 8 hours of operation, whichever occurs first	Clean the following GENTLY, using a cotton swab and DEC magtape cleaning fluid (refer to Figure 11-2): Read/write head (item A) Upper roller guide (item B) Lower roller guide (item C) Clean the following GENTLY, using DIGITAL magnetic tape cleaning fluid with a cotton swab. Wipe completely using wipes or lint-free cloths. Vacuum pockets (item D) Vacuum door glass (item E)
Weekly	Using a lint-free cloth or wipe moistened with mild detergent, remove all built up material on the reel hub surfaces, especially around the rubber ring and the capstan (if present). Remove any residue with a clean, dry cloth. CAUTION DO NOT CLEAN rubber surfaces with any solvent or alcohol. This destroys the gripping surface.
Monthly	Dust and vacuum the exterior of the outer door and top of the cabinet.
Monthly, or as needed	Vacuum the inside of the door and drive especially near the bottom edges.

LEARNING ACTIVITY

1. Do Reading Assignment 11-3.
2. Perform Written Exercise 3.
3. Perform Lab Exercise 3.

WRITTEN EXERCISE 3

This exercise emphasizes the major points of the reading assignment. If you cannot answer these questions easily, review the material in the reading assignment. You should know this material BEFORE you handle a tape or tape drive.

Fill in T or F for true or false in the blanks preceding the following statements.

1. ___ It is ok to put the tape on the drive in any manner as long as it looks good.

2. ___ Never twist the tape. It should always lie flat.

3. ___ Stretching the tape allows you to store more information.

4. ___ Tapes that are greasy move faster and leave less dirt on the drive.

5. ___ Magnetic tapes can be stored on top of terminals and tape drives or near electric motors.

For the following multiple choice questions, choose the correct answer.

6. The metallic marker at the beginning of the tape is called:

   a. the BOT marker

   b. the EOT marker

   c. the silver marker

7. Before pressing the button to load the tape, the tape should be manually turned:

   a. 1 time

   b. 2 times

   c. 4 times

   d. 7 times

8. Before you can place the tape on the drive, the lock on the:

   a. flange must be undone

   b. wheel must be undone

   c. vacuum must be undone

   d. hub must be undone

9. Name the part of the tape drive used to read/write the tape.

   a. the hub

   b. the vacuum

   c. the head

   d. all of the above

10. If a write ring is placed in the groove in the back of the tape, the tape:

    a. can be read only

    b. can be read and written

    c. can be written only

    d. cannot be accessed at all

SOLUTION

Fill in T or F for true or false in the blanks preceding the following statements.

1. It is ok to put the tape on the drive in any manner as long as it looks good.

   False. The tape should be threaded in the correct manner for the specific tape drive. Follow the User's Guide for each drive.

2. Never twist the tape. It should always lie flat.

   True. Never twist the tape. It should always lie flat.

3. Stretching the tape allows you to store more information.

   False. Stretching the tape damages the tape.

4. Tapes that are greasy move faster and leave less dirt on the drive.

   False. Tapes that are greasy leave more dirt on the drive.

5. Magnetic tapes can be stored on top of terminals and tape drives or near electric motors.

   False. Magnetic tapes should not be stored on top of terminals and tape drives or near electric motors.

For the following multiple choice questions, choose the correct answer.

6. The metallic marker at the beginning of the tape is called:

   a. the BOT marker

   b. the EOT marker

   c. the silver marker

7. Before pressing the button to load the tape, the tape should be manually turned:

   a. 1 time

   b. 2 times

   c. 4 times

   d. 7 times

8. Before you can place the tape on the drive, the lock on the:

   a. flange must be undone

   b. wheel must be undone

   c. vacuum must be undone

   d. hub must be undone

9. Name the part of the tape drive used to read/write the tape.

   a. the hub

   b. the vacuum

   c. the head

   d. all of the above

10. If a write ring is placed in the groove in the back of the tape, the tape:

   a. can be read only

   b. can be read and written

   c. can be written only

   d. cannot be accessed at all

LAB EXERCISE 3

If you need help with the following activities, review the reading assignment. If you cannot find the answer there, get help from the course administrator or the observer assigned to you.

1. Turn a tape drive on (POWER UP).

2. Remove the cover from the tape (get help from the observer).

3. Load the tape on the drive. Listen to the noises as it is loaded and observe the movements of the drive.

4. After it is loaded, observe the drive in action as your course administrator copies some files to the tape. Pay attention to where the tape moves in the drive. These are the areas that get dirty quickly.

5. Remove the tape from the drive and put the cover back on.

6. Store the tape in the location provided by the course administrator.

7. Turn the drive off (POWER DOWN).

   Repeat the activities for each type of tape drive on your system. You should become familiar with tape handling and loading procedures, so practice these activities several times on each drive. When you can do all the activities without help from the observer, continue the module.

8. Clean the tape drive.

CARTRIDGES AND CARTRIDGE DRIVE

(If you do not use cartridges you may skip this section and go on to the next section dealing with terminals.)

Cartridge Drive

The TU58 is the cartridge drive supported on the VAX. The drive is used to access data stored on TU58 tape cartridges.

Cartridges

The cartridge tape is smaller than a regular cassette tape. It has a few extra features, such as a write-lock switch. These tapes often contain information which the VAX 11/750 uses to start running. Other information can be stored on these cartridges, but they are slower and can hold less information than a normal tape.

Head Alignment

The cartridge head can be seen at the center of the slot where the cartridge is placed. This head should not be touched, as it is sensitive, but it does need to be cleaned for the same reasons stated for the heads in the other tape drives. The head should be checked for proper alignment periodically by field service personnel.

Cartridge Handling

Handle the cartridges carefully. Do not drop them, touch the exposed tape, or store them in a dirty area.

Cleaning

An operator is responsible for cleaning the head on the drive which reads the tape. The head should be cleaned weekly using a cotton swab and DEC magtape cleaning fluid. Clean the head, turning it with the swab to clean all sides.

LEARNING ACTIVITY

1. Do Reading Assignment 11-4.

2. Perform Written Assignment 4.

3. Perform Lab Exercise 4.

WRITTEN EXERCISE 4

Your course administrator will provide you with a cartridge. Notice that it looks like a cassette tape. Move the write protect tab back and forth to see how it works. Choose the correct answer for the following question:

1. The information on the tape is protected when the write protect tab is moved to the

   a. right

   b. left

SOLUTION

1. The information on the tape is protected when the write protect tab is moved to the

   a. right

   b. left

LAB EXERCISE 4

If you need help with the following activities, review the reading assignment. If you cannot find the answer there, get help from the course administrator or the observer assigned to you.

1. Load a cartridge tape in the drive.

2. Remove the tape.

3. Store the tape in the location provided by the course administrator.

4. Clean the head on the drive.

VIDEO TERMINALS

A terminal can be used to input data to a computer system. If you have been using a terminal to do the lab exercises in this course, you have probably noticed that when you type something in, the system often outputs something in response. Because you can interact in this manner, terminals are called interactive devices.

Terminal Handling

Terminals are a very important part of the input/output of a computer system. Dirt, dust, and foreign matter such as coffee or water can damage the insides. This kind of contamination can enter through the spaces between the keys on the keyboard. Therefore, drinks and food should not be allowed near terminals.

Adjustments

Some adjustments which can be made on a terminal include:

- Brightness (for video terminals). If the print is too bright, the screen wears out faster.

- Speed (baud rate). The hardware setting on the terminal must match the software setting (seen with the $SHOW TERMINAL command).

For other terminal adjustments, consult the user's manual for each type of terminal.

Cleaning

Terminals should be vacuumed and wiped off periodically, but their performance is not seriously impaired by dust. You should be careful about excessive dirt, such as ashes, debris from maintenance work in the room, or food particles. Clean the terminal weekly as follows:

1. Using a soft cloth (so as not to scratch the screen) moistened with glass cleaner, clean the display screen.

2. Using a cloth moistened with all-purpose cleaner, clean the outside of the terminal.

3. Vacuum the keyboard area.

LEARNING ACTIVITY

1. Do Reading Assignment 11-5.
2. Perform Written Exercise 5.
3. Perform Lab Exercise 5.

WRITTEN EXERCISE 5

List the commands used to look at the characteristics of:

1. Your terminal.

2. Another terminal (TTA1).

List the commands used to suppress LOWERCASE capability on:

3. Your terminal.

4. Another terminal (TTA1).

SOLUTION

List the commands used to look at the characteristics of:

1. Your terminal.

   $ SHOW TERMINAL

2. Another terminal (TTA1).

   $ SHOW TERMINAL TTA1:

List the commands used to suppress LOWERCASE capability on:

3. Your terminal.

   $ SET TERMINAL/NOLOWER

4. Another terminal (TTA1).

LAB EXERCISE 5

1. If you need help with the following activities, review the reading assignment. If you cannot find the answer there, get help from the course administrator or the observer assigned to you (refer to Appendix A).

   A. Change the speed on the terminal.
   B. Change the speed back to the original speed.
   C. Increase the brightness of the output to the screen.
   D. Decrease the brightness.

2. The most common situations and their solutions are described below. If your course administrator did not set up all of these, be sure to read the solutions anyway, because you will probably need to know the answer eventually.

NOTE

Since the VT52 and VT100 terminals are the most common, the solutions are given for these terminals. Check the User's Guide for solutions for other types of terminals.

Situation	Solution
The terminal is dark. There is no response when you type RETURN or CTRL-C.	Turn the terminal on.
The ON/OFF switch is set to ON but the terminal is still dark.	Try one or more of the following: a. Make sure the wires connecting the terminal to the computer are plugged in. b. Make sure the main power supply to the terminals is ON. c. Make sure the system is up and running. d. Check the brightness level of the terminal. If too dark, you will not be able to see if you are logged in. To fix this, refer to Appendix A.

Situation	Solution
The print on the terminal screen is very bright.	Dim the print using the correct method for the terminal. Refer to Appendix A for details on the VT52 and VT100.
When the Return key is pressed, random characters are output to the terminal instead of the USERNAME: prompt.	Check the baud rate or speed setting on the terminal. A different hardware/software setting causes this problem. Refer to Appendix A for further discussion of the solution.

3. Your course administrator will change the adjustments on one or more terminals on your system. Look at the first terminal and change the adjustments to match the suggested settings in the reading assignment. After you have logged in successfully, check the software settings for that terminal with the SHOW TERMINAL command. If the settings match, repeat this procedure with the next terminal. If the settings do not match, use the SET TERMINAL command to fix the settings.

NOTE

You will not be able to log in on some of the terminals. In these cases, log in on another terminal and check the software settings of the inaccessible terminal. (Remember that the software settings and the hardware settings must match in most cases.) Change the software settings or the hardware settings and attempt to log in. You should be successful.

You should develop the habit of checking all of the terminals on your system daily to be sure they are working correctly.

4. Clean the terminal.

SOLUTION

1.	VT100	VT52
A.	Press SETUP key. (You are in SETUP A) Press the "5" key. (You are in SETUP B) Change the Transmit and Receive speeds by pressing keys "7" and "8" (note the speeds in the lower right hand corner of the screen). Press SETUP again. (You are out of SETUP mode.) *	Change the position of the S1 and/or S2 switches (located under the terminal) with a screwdriver. *
B.	Same as in A. *	Same as in A. *
C.	Enter SETUP A by pressing the SETUP key. Press the up-arrow key to increase brightness. Press the SETUP key again.	Move the side arm located in back of the terminal.
D.	Same as C, but press the down-arrow to decrease brightness.	Same as C, but move the side arm the other way.

* Both transmit and receive speeds must be the same for the terminal to work.

2. Use the procedures listed in the question.

3. $ SHOW TERMINAL

   $ SHOW TERMINAL TTA1

   Notice that the speed is not listed.
   To list the speed, enter:

   $ SHOW TERMINAL/PERMANENT TTA1

   $ SET TERMINAL/NOLOWER

   $ SET TERMINAL/NOLOWER TTA1

PRINTERS

(If you do not use printers you may skip this section and go to the section that deals with card readers.)

A user can create a file on disk, change it, save it on tape, and transfer it to other systems. However, information on paper is more useful in many cases than information stored on disk or tape. For example:

- When a programmer must debug a program. Often, mistakes can be seen when the program is on paper that were not noticed on the terminal screen.
- When a memo must be sent out to many people. If the memo is on paper, it can be photocopied, distributed, and filed.

In these cases, the user can output the information to a line printer. The output is often referred to as a hardcopy or printout. Printers can also be used in the process of saving, storing, and transferring information. For example:

- When a disk is getting full, files must be deleted to make room. Often, old files are printed and saved on magnetic tape, then deleted. If the tape becomes unreadable after a period of time, the file can be reconstructed from the printout.
- When a memo is printed, a hardcopy is filed and the original file is often deleted to save space on the disk.

Printer Handling

Printers should be adjusted according to the type of paper used. The paper could be several sheets thick, or wider or narrower than normal. Other adjustments can be made as well.

Static can build up on a printer. The negative results of the static includes: erratic printing, jobs stopping in mid-cycle paper faults, etc.. The problem is solved on many printers by attaching one end of a wire to the printer, and the other end to the paper basket. This wire can become unattached, so check it if the above problems occur.

The level of paper should be checked on a regular basis, so the printer is not out of paper for long periods of time. The ribbon should also be checked regularly, so it does not wear thin.

Adjustments

Most printers can be adjusted to handle varying sizes and thicknesses of forms. These adjustments include:

- distance of print head from paper
- lining up the paper vertically
- setting the size of the paper (length and width)

Cleaning

General cleanliness is important. If a file is printed on a printer with an old and dirty ribbon, the output can be faded, smeared, or smudged. Dust from the paper tends to accumulate inside the printer depending on how heavily it is used. Frequent vacuuming helps to decrease this accumulation. Ribbons should be reversed (LPØ5) or changed when they are worn.

Clean the printer according to Table 11-2.

Table 11-2. Line Printer Cleaning Frequency

Frequency	Operation
Daily	Check the paper feed adjustments and tension adjustments. Check the print head adjustment.
	Check the ribbon. Reverse it or replace it when needed.
	Using a lint-free cloth, wipe off the outside of the device.
Weekly	Vacuum the inside of the printer, including the keyboard if it is a terminal printer

LEARNING ACTIVITY

1. Do Reading Assignment 11-6.
2. Do Lab Exercise 6.

LAB EXERCISE 6

To do the following activities correctly, refer to the reading assignment or the appropriate User's Guide for the printer you are using. Do this lab on all types of printers available on the system so you become familiar with each one.

1. Remove the print ribbon and replace it with a new ribbon if it is worn. If it is not worn, put it back in the printer. For drum printers like the LP05, reverse the ribbon and put it back in the printer.

   NOTE

   Look at the printer carefully before removing the ribbon so you will be sure to put it back correctly.

2. Find the grounding wire between the printer and the paper basket if it exists. Ensure that it is attached securely.

3. Vacuum the insides of the printer. For terminal printers, vacuum the keyboard also.

4. Pick up stray paper, boxes, etc. Put them in the proper trash or recycle containers.

   One of an operator's jobs is usually to pick up the stray rubbish in the lab area. This gives the operator an opportunity to observe all of the equipment and the general cleanliness of the lab. Many problems are noticed and solved before they cause damage during these routine checks.

5. Move the box of paper which feeds paper into the printer far to the right so the paper is not fed evenly. Observe the results as a file is printed by the course administrator. Straighten the box.

   When the box of paper is moved to the right or to the left, the paper will not feed through the printer evenly. This will usually cause the paper to jam after a while. Every box should be placed directly under the printer to avoid paper jams. Also, the paper which is output after being printed should not be allowed to interfere with the input box.

6. Press the appropriate buttons to move the paper up one full page. Also, press the buttons to move the paper up one line. Find the manual handle to move the paper, and move the paper up a few inches.

7. Adjust the paper so printing begins at the top of a page. (Actually, printing should begin a few lines down from the top.)

   After the top of form has been changed, test it by printing a file before you allow users to access the printer. The adjustment will often look correct, but is too high or too low.

8. Remove the paper from the printer. Observe the operator console when this is done to the system printer. What message appears on the console?

9. Load the paper. Adjust the tension (side to side) so the paper is loose. Observe the action of the printer as a file is printed by your course administrator. Now adjust the paper so it is very tight. Again, observe the action of the printer as a file is printed.

   When the paper is very loose, the print head tends to drag across the paper and leaves smudges or rips the paper. When the paper is very tight, the holes in the sides get ripped as the printer attempts to advance the paper. After some holes are ripped, the printer cannot advance the paper, and the print head keeps printing. The result is a very dark line of black ink, which is the accumulation of several lines of printing. The paper is usually ripped, and must be removed and reloaded.

10. Observe the action of the printer, especially the ribbon and print head, as the course administrator prints a file. Adjust the print head so it is closer to the paper and observe the change when a file is printed. Now adjust the print head so it is further away from the paper. Again, observe the action as a file is printed.

   If the print head is set away from the paper, it must travel farther and faster to print a character, and it hits the paper with more force. This setting is good for multipart forms, where the force is needed to imprint the last part of the form. However, if the setting for a multipart paper is used for single part paper, the printer will wear out faster.

11. Load some multipart forms (provided) in the printer. Notice that they are several thicknesses of paper. Adjust the print head to print clearly through all thicknesses without ripping the forms.

    If the print head is set too close for multipart forms, the head will smudge or tear the forms. If the setting is to far away, the print on the last part of the form will not be readable.

12. Load some forms (provided) in the printer. Adjust the printer to adapt to the different length of the paper. Your course administrator will print a file. Be sure the printing begins slightly below the top of each page.

    Again, if you make any adjustment, test it first before loading expensive forms or starting a large print job.

CARD READERS

(If you do not use card readers, you may skip this section and continue working on the next module.)

A card reader is used to input data to a computer system. Data is stored on cards which are punched with holes. There are many combinations of holes, each of which stands for a letter or number, etc. Cards are another method used to store data. The cards are placed as a group called a card deck (where the cards are set up in a certain order) into the part of the card reader called the input hopper. As each card is read, the data represented by the holes is transferred to disk. The card is then placed in the output hopper by the device.

Handling

If the cards get dirty, it is hard for the card reader to read them. Also, dirty cards make the card reader dirty. Therefore, never drop the cards on the floor or handle the area with the holes. Cards should be handled along the edges only. Wet, bent or mutilated cards will not be read correctly.

Cleaning

Dust or particles in the input hopper can collect in the holes of the cards, making them difficult to read. Therefore, the hoppers and surrounding area should be vacuumed weekly or more often depending on the frequency of use.

Clean the card reader weekly by vacuuming the hoppers and other areas of the device.

LEARNING ACTIVITY

1. Do Reading Assignment 11-7.

2. Do Lab Exercise 7.

LAB EXERCISE 7

1. Load the card deck (provided by the course administrator) into the input hopper. Observe the action of the card reader as the cards are read. Unload the cards from the output hopper.

2. Clean the card reader.

APPENDIX A

TERMINAL ADJUSTMENTS

A.1 BAUD RATE

The hardware settings must match the software settings before users can log in and work on a terminal. The software setting for the terminal TTA1 can be displayed by entering the command:

```
$ SHOW TERMINAL TTA1
```

on another terminal. Other characteristics of the terminal are also listed. The baud rate and characteristics of any terminal can be found by using the same command with the name of the terminal. If it is not possible to log in on any other terminal, change the baud rate setting one speed at a time and press the Return key after each change. When the USERNAME prompt appears, the terminal matches the software setting.

After the terminal has been set to the correct speed, place a label on the front of it indicating the correct speed.

A.1.1 Changing the Baud Rate

On a VT52, two rotary switches on the bottom of the terminal are used to control the baud rate (see Figure A-1). S1 should normally be set to full-duplex. S2 controls the speed. Turn the switch using a screwdriver or dime until the switch setting matches the software setting.

On a VT100, press the SETUP key to change the characteristics of the terminal. However, you must be in SETUP B to change the baud rate. Press the number 5 key. You should see SETUP B in the upper left corner of the screen. The baud rates are printed in the lower right corner of the screen. Both numbers must be the same and both must match the software setting of the terminal before the user can log in.

The number 7 key changes the transmit speed, and the number 8 key changes the receive speed. Each time one of these keys is pressed, the numbers on the screen change. The baud rate can only be increased with these keys, but when the highest number is reached, it starts counting again at the lowest number. Change both speeds until they match the software setting.

To make the change permanent, type SHIFT-S while in SETUP B. (Normally, the change remains until the terminal is powered down.)

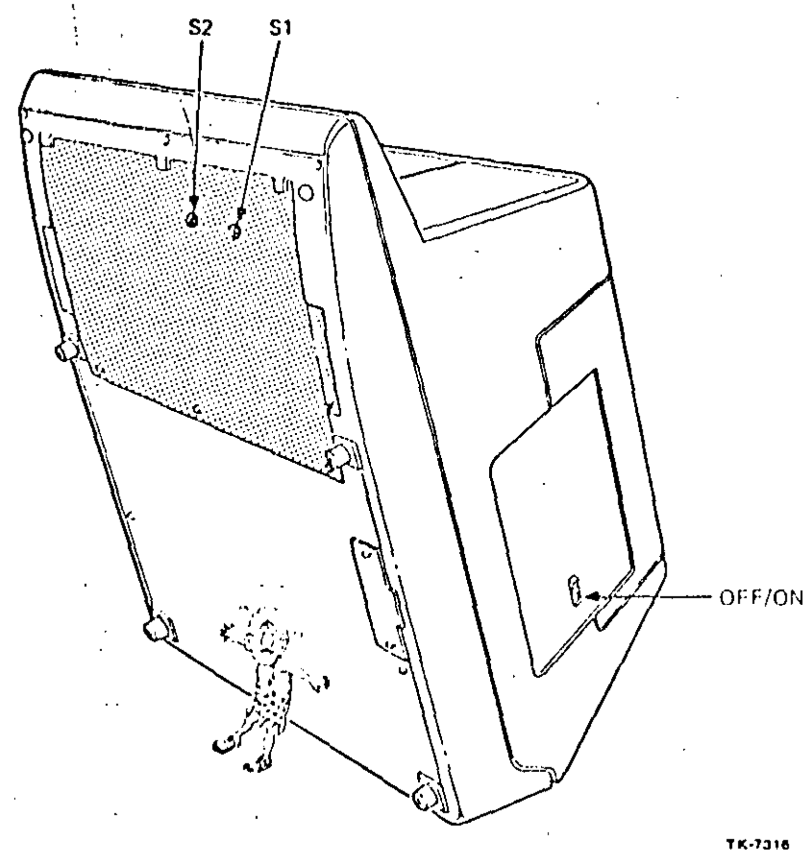

Figure A-1 VT52, Underneath, Showing S1 and S2 Rotary Switches

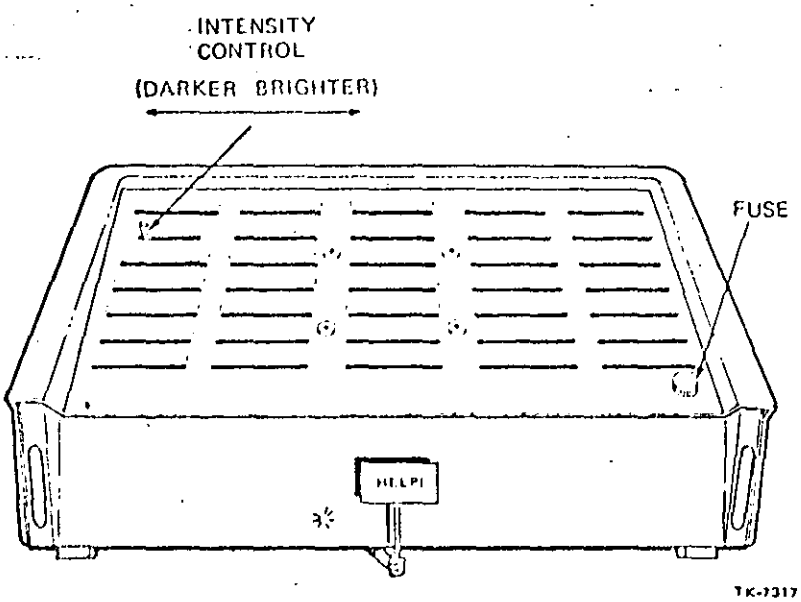

Figure A-2 VT52, Rear View

A.2 ADJUSTING THE BRIGHTNESS OF A VT52 OR VT100

To change the brightness setting:

On a VT52, move the brightness control lever (see Figure A-2) horizontally. From the front of the terminal, moving the lever to the right increases the brightness, and moving it to the left decreases the brightness.

On a VT100, press the SETUP key. Now you can change the characteristics of the terminal. Two keys are used to control the brightness, the key with the arrow pointing up and the key with the arrow pointing down. If the up arrow key is pressed while the terminal is in SETUP mode, the brightness increases. If the down arrow key is pressed, the brightness decreases.

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MEXICO, D.F.

DISKS, TAPES, AND FLOPPIES

PROFESORES:

ING. EDUARDO S. JALLATH CORIA.
ING. ALEJANDRO JIMENEZ GARCIA.
ING. SOCRATES A. MUÑIZ ZAFRA.
ING. HUMBERTO SANCHEZ SANDOVAL.

MAYO DE 1985.

DISKS, TAPES, AND FLOPPIES

12

INTRODUCTION

Secondary storage, although slower than main memory, has much more space. The types of storage available are disks, floppies, cartridges and tapes.

To use and maintain these storage mediums, a user or operator should:

- Prepare a volume for use.
- Have the operating system recognize the volume.
- Have the system release the volume from use.
- Recover the use of the volume due to corrupt data or bad areas on the volume.

OBJECTIVES

1. To recognize how storage devices are identified and structured on VAX.
2. To prepare a storage device and the storage medium (tape, disk or floppy) used with the device.
3. To issue the DCL commands necessary to effect storage devices and the mediums within them.
4. To invoke utilities necessary to prepare a new or corrupted medium for use.

RESOURCES

1. VAX/VMS Command Language User's Guide
2. VAX/VMS System Management and Operations Guide
3. VAX/VMS Utilities Reference Manual

AUXILIARY STORAGE

VAX/VMS supports four types of storage mediums:

- Disk
- Tape
- Floppy
- Tape Cartridge

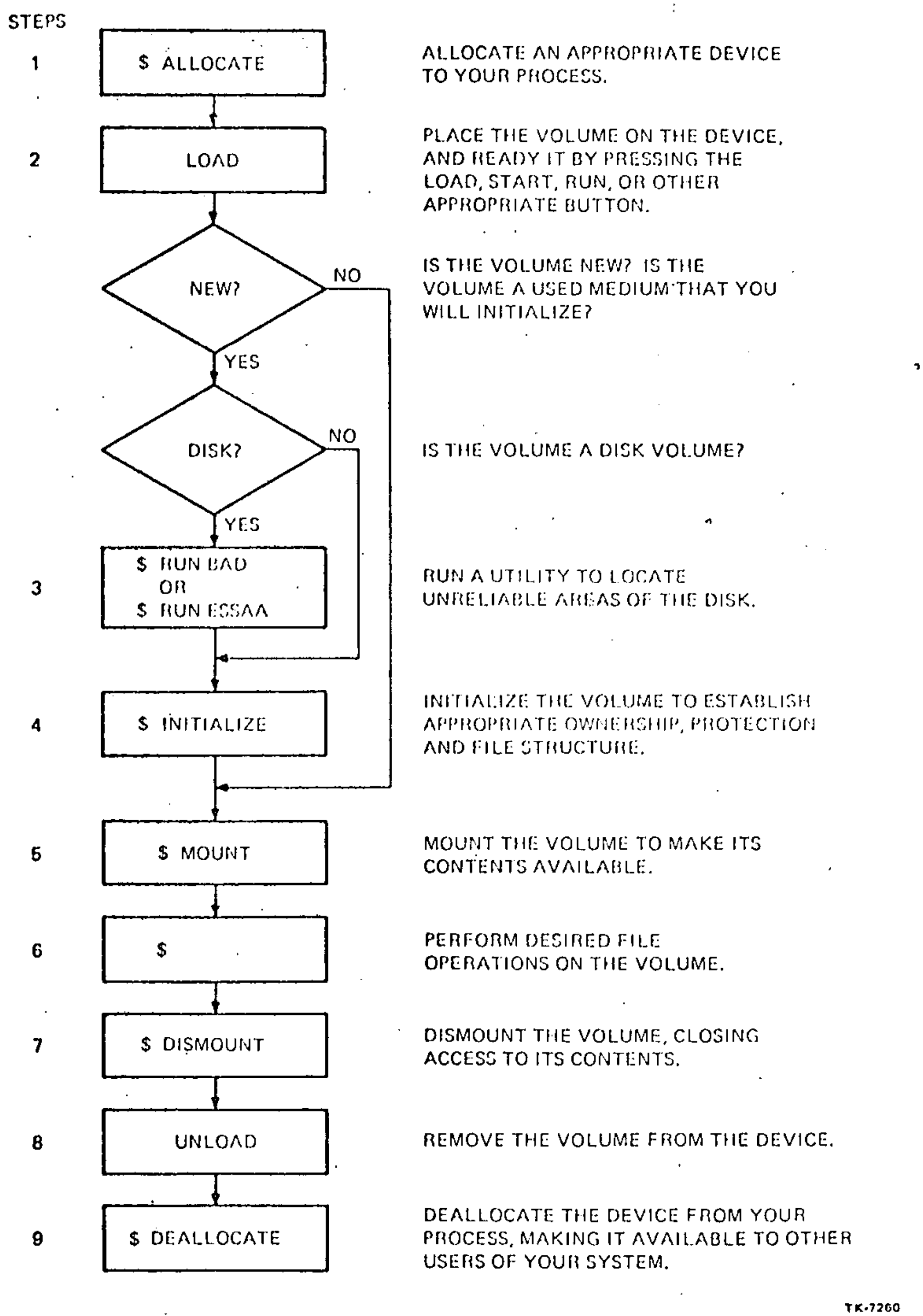

Figure 12-1 Preparing and Using a Volume

Notes on Figure 12-1:

1. Reserve the device.

2. Physically load volume.

3. Find unreliable areas on disks or cartridges and, if necessary, prepare the volume for use by the hardware device.

4. Invalidate previous information (if appropriate), and prepare the volume for use by VMS software.

5. Request system recognition of volume.

6. Use the volume.

7. Request system release of volume.

8. Physically remove the volume.

9. Give up the device.

Table 12-1 Volume Accessibility and Operator Involvement

Category	Accessibility	Operator Involvement (Refer to Figure 12-1)
User Private	Available only to one user process.	Steps 2 and 8 only
Public	Available to everyone on the system.	Steps 1 through 8
Group	Available to a select UIC group.*	Steps 2 and 8 or Steps 1 through 8
System Private	Available to operator to perform system functions (see the Backup and other Periodic Duties module).	Steps 1 through 8

* If the volume is totally controlled by the UIC group, operator involvement is minimal. If the group volume is controlled by the operator, involvement is maximum.

Table 12-2 DCL Commands and Utilities for Disks, Tapes, and Floppies

Purpose	Method	Example/Reference
Reserve a device for use	ALLOCATE	$ ALLOCATE MTAØ:
Prepare a disk for device use	Formatter Utility	$ RUN SYS$MAINTENANCE:ESSAA.EXE
Check disk for readability	BAD	$ RUN SYS$SYSTEM:BAD.EXE
Prepare a disk or tape for use by VMS	INITIALIZE	$ INITIALIZE MTAØ: label
System recognition of volume	MOUNT	$ MOUNT MTAØ: label
System release of volume	DISMOUNT	$ DISMOUNT MTAØ:
Release device	DEALLOCATE	$ DEALLOCATE MTAØ:
Correct a corrupt disk	VERIFY	$ ANALYZE/DISK_STRUCTURE DRAØ:/REPAIR

VOLUME SETS

- VAX/VMS allows users to spread information over one or more volumes
  - Multiple tape volumes
  - Multiple disk volumes
- The volumes become part of a volume set
- Volume sets for disks must be tight volume sets
- The operating system does not request an additional disk unless it has been previously bound into a volume set
- Volume sets for tapes must be loose volume sets
- Loose volume sets are created as needed, not bound prior to use.

DISKS AND FLOPPIES

Preparing a Volume for Use

Table 12-3 Using BAD and EVRAC

Condition	Utility
New and unformatted	EVRAC
Old, containing invalid information	BAD
Old, containing invalid information and causing read errors on drive.	EVRAC

Running the BAD Utility

- The BAD utility is run before initialization
- BAD records the location of any unreadable areas on the disk
- BAD destroys any data stored on the disk
- The disk must be allocated and then mounted with the /FOREIGN qualifier
- Once the disk has been properly mounted, run the BAD utility with the following command:

```
$ RUN SYS$SYSTEM:BAD.EXE
```

- BAD prompts you with BAD>.
- Enter the code of the device to be examined. The code uses unit numbers:

```
BAD>ddu
```

  where dd is the device code and u is the unit number.
- Once the BAD utility is finished, use a CTRL/Z to return to DCL

```
$ ALLOCATE DBA1:
$ MOUNT/FOREIGN DBA1:
$ RUN SYS$SYSTEM:BAD.EXE
BAD> DB1:
BAD -- TOTAL NO.  OF BAD BLOCKS = 2.
BAD> <CTRL/Z>
```

Example 12-1 Running the BAD Utility

To obtain a listing of the bad blocks on the volume, an additional qualifier is needed.

```
$ ALLOCATE DBA1:
$ MOUNT/FORIEGN DBA1:
$ RUN SYS$SYSTEM:BAD.EXE
BAD> DB1:/LI
BAD -- DB1:  BAD BLOCK FOUND - LBN= 20663
BAD> <CRTL/Z>
$
```

Example 12-2 The BAD Utility with List Qualifier

Formatting a Pack

- ESSAA.EXE - Called the "Diagnostic Supervisor", this program is run first to prepare for and oversee the running of other programs.

NOTE

If you are running a VAX-11/750, run ECSAA.EXE in place of ESSAA.EXE. If you are running a VAX-11/730, run ENSAA.EXE instead.

- EVRAC.EXE - Does the actual formatting. It asks several questions before formatting the pack.

```
$ SET DEFAULT SYS$MAINTENANCE
$ RUN ESSAA.EXE

DS> @CONFIG
DS> SELECT  DMA0
DS> RUN EVRAC/SEC:PACKINIT

PACK IS NOT LABELED 'SCRATCH' DO YOU WISH TO CONTINUE?
[(NO), YES] YES

DO YOU WISH TO CONTINUE? YES

ENTER PACK SERIAL NUMBER [(1),1-2147483647(D)] <RETURN>

DS> <CTRL/Z>
```

Example 12-3 Sample of Input for EVRAC.EXE

Notes on Examples 12-3 and 12-4

- Changes your default device and directory to the proper directory. It is important that all files referenced and used be in the maintenance directory.
- Activates the Diagnostic Supervisor.
- Enters a series of commands (like a command procedure) that defines the hardware structure of the computer.
- The device code for the disk to be formatted.
- The program EVRAC is activated; the section PACKINIT actually does the work.
- If the pack is not new, or not labeled 'scratch', the program gives this warning and asks if it should continue the formatting. The program is careful because the formatting destroys the information presently on the disk.
- Again, for safety, the program is giving you one more chance to abort the program. It is making sure that you want this pack formatted.
- The program requires an identification number for the pack. Ask the system manager for the number to be entered.
- To exit the Diagnostic Supervisor, enter a CTRL/Z.

```
  SET DEFAULT SYS$MAINTENANCE
  RUN ESSAA
DIAGNOSTIC SUPERVISOR. ZZ-ESSAA-5.Ø-130 7-JUN-1981 12:04:10.66
DS>  @CONFIG
DS> SELECT DMAØ
DS> RUN EVRAC/SEC:PACKINIT
 .. PROGRAM: EVRAC VAX DISK FORMATTER, REV 5.4, 11 TESTS, AT 12:24:28.44.
TESTING: _DMAØ

DISK TYPE=RKØ7  FOR PHYSICAL DEVICE _DMAØ
PACK STRUCTURE= ODS2   PACK LABEL= 'VMSXØJ8
PACK IS NOT LABELED 'SCRATCH' DO YOU WISH TO CONTINUE
[(NO), YES] YES

  ***********  WARNING  **********
  BAD SECTOR FILE WILL BE REFORMATTED

DO YOU WISH TO CONTINUE? [(NO), YES] YES

FOR PHYSICAL DEVICE _DMAØ
ENTER PACK SERIAL NUMBER [(1), 1-2147483647(D)] <RETURN>

CONTENTS OF BAD SECTOR FILE
PACK SERIAL NUMBER=            1(D) FOR DEVICE _DMAØ
NO BAD SECTORS IN FILE
FORMAT STARTED      AT 12:25:25.76 FOR DEVICE _DMAØ
FORMAT COMPLETED    AT 12:27:31.78 FOR DEVICE _DMAØ
VERIFY STARTED      AT 12:27:33.5Ø FOR DEVICE _DMAØ
BAD SECTOR FILE UPDATED BY      1(D) ENTRIES

CONTENTS OF BAD SECTOR FILE
PACK SERIAL NUMBER=              1(D) FOR DEVICE _DMAØ
LOGICAL BLOCK       CYLINDER      TRACK    SECTOR
-----------------------------------------------------
    2288Ø(D)        346(D)        2(D)      Ø(D)
VERIFY COMPLETED    AT 12:45:23.Ø2 FOR DEVICE _DMAØ
FOR PHYSICAL DEVICE _DMAØ DISK TYPE=RKØ7
PACK WAS LABELED 'VMSXØJ8
PACK SERIAL NUMBER=              1(D)
NUMBER OF BAD SECTORS ADDED TO BAD SECTOR FILE=       1(D)
 .. End of run.  Ø errors detected.  Pass count: 1.
Time:  7-JUN-1981 12:45:30.44
DS> <CTRL/Z>
$
```

Example 12-4 Formatting a Disk Pack

Initializing a Volume

To initialize a volume, use the following DCL command:

```
$ INITIALIZE/qualifiers  device  label
```

where

/qualifiers	describes how the disk is to be set up.
device	is the code for the device that contains the volume.
label	is the name to be given to the volume. This name is permanent until the volume is reinitialized.

Table 12-4 Qualifiers to the INITIALIZE Command

Purpose	Qualifiers
Assign ownership to the volume	/OWNER_UIC=
Assign protection to volume	/GROUP /SYSTEM /SHARE /PROTECTION=(code)
Allocate disk space for file headers	/HEADERS=
Set up the minimum unit of allocation	/CLUSTER_SIZE=

System Recognition of the Volume

To use the volume spinning on the disk drive, VMS must:

- Be told the volume is in the drive.
- Verify that the user attempting to bring the volume into the system has the authorization or privilege.
- Extract information from the volume.

The DCL command MOUNT initiates the system recognition of a volume.

```
$ MOUNT/qualifier(s) device label logical_name
```

where

/qualifiers	are used to declare information or temporarily modify information used to set up the disk pack.
device	is the code for the device where the volume is loaded.
label	is the label assigned by the INITIALIZE command.
logical_name	is a logical name assigned to the device name. The logical name exists until the device is removed from the system.

Table 12-5 Qualifiers to the MOUNT Command

Purpose	Qualifier
Define to whom the volume will be available	/GROUP /SYSTEM /SHARE
Activate quota checking, if QUOTA.SYS exists	/QUOTA
Turn off any default disk caching	/NOCACHING
Mount a non-VMS disk or a disk not to be used as a VAX/VMS disk	/FOREIGN
Mount a disk with an unknown label	/OVERRIDE=ID

System Release of a Volume

Use the DISMOUNT command:

```
$ DISMOUNT device_name
```

Upon receiving the DISMOUNT command, VMS:

- Finishes what it is doing to the volume.
- Does not allow new Input/Output.
- Releases the volume from the system.

CAUTION

Use the SHOW DEVICES command to verify that the volume is dismounted before unloading it.

The VERIFY Utility

To execute VERIFY, use the following DCL command:

```
$ ANALYZE/DISK_STRUCTURE device:/qualifier(s)
```

You should not run the VERIFY utility on a disk that has active users. If you do, VERIFY will probably return spurious and incorrect messages that may indicate a non-existant error.

The VERIFY utility operates in three modes:

- Error reporting with no repairs
- Error reporting with repairs
- User-controlled selective repairs

VERIFY's operating mode is determined by the qualifier(s) that you add to the ANALYZE/DISK_STRUCTURE command.

Table 12-6 Qualifiers to the ANALYZE/DISK_STRUCTURE Command

Function	Qualifier
Repair errors detected in the file structure.	/REPAIR
Prompt to confirm whether each repair should be performed.	/CONFIRM
Produce a listing of the index file in file number order including file id, file name, and owner UIC.	/LIST
Perform a read check of all allocated blocks on the file structure.	/READ_CHECK
Produce a disk usage accounting file.	/USAGE

TAPES AND CARTRIDGES

The procedures for tapes and cartridges are similar to the procedures for disks. In Figure 12-1, step 3 is eliminated for tapes. All steps, including running BAD, are done for cartridges.

Initializing a Volume

The form of the command is:

```
$ INITIALIZE  device  label
```

When initializing tapes, the default density is 1600 bpi. To obtain a different density, use the /DENSITY qualifier.

Mounting a Volume

The form of the command is:

```
$ MOUNT/qualifiers  device  label  logical_name
```

Table 12-7 MOUNT Qualifiers

Purpose	Qualifier
Mounting a non-VMS tape volume	/FOREIGN
Specifying the density for FOREIGN tapes	/DENSITY

Dismounting a Volume

Removing a tape from a device is similar to removing a disk. The command used is DISMOUNT:

```
$ DISMOUNT  device
```

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QUEUES.

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QUEUES

13

INTRODUCTION

Some computer systems have many batch users and/or produce a great deal of printed material. In these cases, an operator must coordinate the needs of both batch users and printers. VAX/VMS assists with these tasks through the use of queues. Queues are lists maintained by the system.

By associating queues with printing devices, processes need not wait until a device is available before requesting to print information. If a process wants to print, it can be placed on the list and the process can handle another job. Large print jobs can be delayed until off-hours, freeing devices for smaller jobs during normal work hours.

Batch queues help to even out the CPU load. Requests made during peak hours are processed during less active times. Here too, large jobs can be delayed until off-hours.

OBJECTIVES

1. To define the purpose and usage of queues on VMS.
2. To create, define and control queues that regulate print and batch processing.

RESOURCES

1. VAX/VMS System Management and Operations Guide

DEFINITION OF QUEUES

- A queue is a list

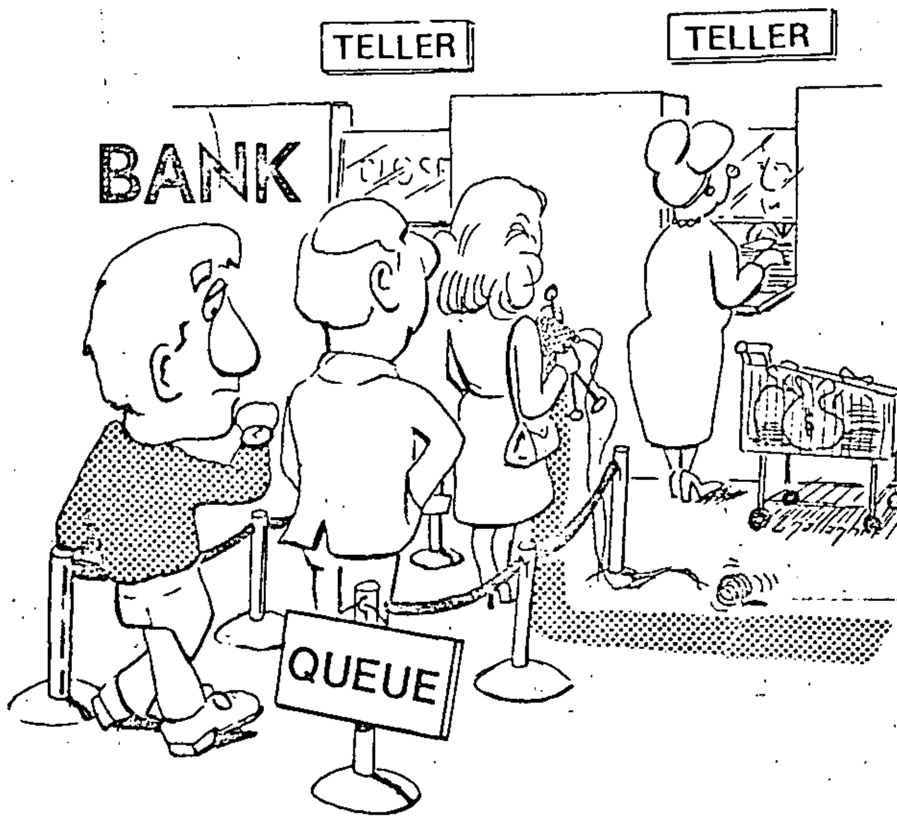

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Figure 13-1 Example of a Queue

- Computer queues are ordered in specific ways.
  - First in, first out (FIFO)
  - By importance (priority-ordered)

- The batch and print queues are a combination of FIFO and priority-ordered.

- The units that are waiting in the batch and print queues are called jobs.

- The jobs in batch and print queues all have a priority

- VMS first orders the jobs by priority. If there are other jobs with the same priority, they are ordered first in, first out within that priority.

The Job Controller

- Is responsible for the print and batch queues
- Remains in hibernation until needed
- Stores the names of jobs to be processed in a file on the system disk
- Assigns a job number to the job
- The job number is used in other DCL commands to refer to the job
- Controls print and batch queues according to rules set up by the operator and system manager

Table 13-1 Job States in Queues

Job State	Definition
Current	Presently being processed
Pending	Waiting to be processed
Holding	Waiting for something to happen before converting to pending

BATCH QUEUES

A batch job is a command procedure that is executed by the system as a process without users interaction.

A batch queues on VAX/VMS is a list of command procedure file specifications to be executed. A file specification is added to the list (queue) as a result of one of the following events:

1. A user issues the DCL command SUBMIT preceding a command procedure file specification.

   $ SUBMIT file_specification

2. A command procedure (preceded by the proper USERNAME and PASSWORD information cards) is read from a card reader.

The Job Controller is responsible for the batch queues and for running the batch jobs on the system. However, the batch queues on the system have characteristics (attributes) that set certain limits for the Job Controller. The batch queue attributes are:

- JOBLIM - the maximum number of current batch jobs in the queue.
- PRIORITY - the priority of all processes created from this queue.
- WSLIMIT - the maximum number of physical pages assigned to each process.
- CPUTIME - the maximum number of seconds allowed using the CPU.
- SWAP - allows the processes from the queue to be swapped out to the disk.

... 13-1 represents a batch queue. There are eight jobs ... queue; three are current (JOBLIM=3), five are ..., and none are holding. Job 106 is the next batch ... run.

```
                SYS$BATCH

Pending                        Current

JOB106, PRIORITY=5             JOB101
JOB107, PRIORITY=4             JOB102
JOB109, PRIORITY=4             JOB105
JOB87,  PRIORITY=2
JOB42,  PRIORITY=1

        QUEUE CHARACTERISTICS
        JOBLIM=3, PRIORITY=2, WSLIMIT=150
        CPUTIME=INFINITE, SWAP
```

Example 13-1 Default Batch Queue

Obtaining Batch Queue Information

To get information about batch queues and the jobs in them, use:

```
$ SHOW QUEUE/BATCH/qualifier(s) batch_queue
```

where batch_queue defaults to SYS$BATCH.

Table 13-2 SHOW QUEUE/BATCH Command Qualifiers

Function	Command
List your batch jobs	$ SHOW QUEUE/BATCH
List your batch job command procedure file specifications	$ SHOW QUEUE/BATCH/FULL
List all batch jobs	$ SHOW QUEUE/BATCH/ALL
List all batch job command procedure file specifications	$ SHOW QUEUE/BATCH/ALL/FULL

Initializing and Starting a Batch Queue

Two steps must be performed to establish a batch queue that will execute jobs: you have to initialize it and start it.

To create a batch queue, use:

```
$ INITIALIZE/QUEUE/BATCH/qualifier(s)  queue_name
```

Table 13-3 Batch Queue Initialization Qualifiers

Attribute	Additional Qualifier
Number of current batch jobs in the queue	/JOBLIM
Amount of physical memory allowed each current batch job	/WSDEFAULT /WSQUOTA
Amount of CPU time allowed each current batch job	/CPUDEFAULT /CPUMAXIMUM
Determine if current batch jobs will be swapped out to disk	/DISABLE_SWAPPING /NODISABLE_SWAPPING

The users can submit jobs to a batch queue that has been initialized, but the jobs will not get executed unless the batch queue is started. To start a batch queue, use:

```
$ START/QUEUE/BATCH/qualifier(s)  queue_name
```

The qualifiers listed in Table 13-3 may be used in the START/QUEUE/BATCH command.

Stopping and Deleting a Batch Queue

Stopping a batch queue is the opposite of starting it: the batch queue is still there (and users can continue to submit jobs to it) but it will not execute any more jobs. Similarly, deleting a batch queue is the opposite of initializing it: the batch queue is gone.

To stop a batch queue, use:

```
$ STOP/QUEUE/BATCH  queue_name
```

To delete a batch queue, use:

```
$ DELETE/QUEUE/BATCH  queue_name
```

Manipulating Batch Queues

It may become necessary to transfer the jobs from one queue to another. To do this, use:

```
$ ASSIGN/MERGE  to_queue  from_queue
```

For example:

```
$ ASSIGN/MERGE  SYS$BATCH  FAST$BATCH
```

Now, SYS$BATCH has all the jobs that used to belong to FAST$BATCH.

Altering Jobs in a Batch Queue

The attributes of a batch queue job (for example, CPU time) are assigned by the user that issues the SUBMIT command. Changes can be made to jobs in the PENDING or HOLDING states. Common changes include:

1. Releasing a job placed on HOLD.
2. Holding a job that cannot be processed at present.
3. Changing the priority of a queue entry.

The basic command form for changing a job queue entry is:

```
$ SET QUEUE/ENTRY=job_number/qualifier  queue_name
```

Table 13-4 Changing the Attributes of a Batch Queue Entry

Function	Qualifier
Hold a job entry	/HOLD
Release a job entry	/RELEASE
Delay a job entry until a particular date and/or time	/AFTER=day-time
Alter the queue priority of a job entry	/PRIORITY=n
Change the name of a job entry	/NAME=name
Alter the CPU time request for a job entry	/CPUTIME=
Alter the physical memory allocation for an entry	/WSDEFAULT or /WSQUOTA

To delete a job entry that is in the PENDING or HOLD state, use:

```
$ DELETE/ENTRY=####   queue_name
```

where #### is the job number.

If you need to stop a current batch job, you would stop it as if it were any other process:

```
$ STOP  process_name
```

or

```
$ STOP/ID=process_id
```

PRINT QUEUES

Print queues contain lists of file specifications of ASCII text files that are to be printed.

VMS supports three different print queue types:

- Physical
- Logical
- Generic

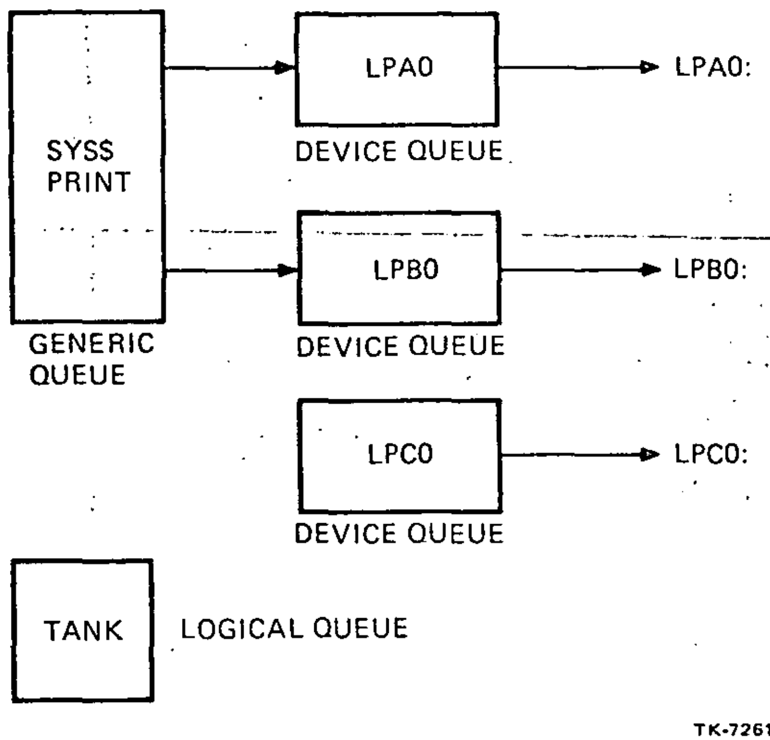

Figure 13-2 Print Queues

In Figure 13-2, legal print commands include:

```
$ PRINT/QUEUE=SYS$PRINT      FILE_SPECIFICATION
$ PRINT/QUEUE=LPAØ:          FILE_SPECIFICATION
$ PRINT/QUEUE=LPBØ:          FILE_SPECIFICATION
$ PRINT/QUEUE=LPCØ:          FILE_SPECIFICATION
$ PRINT/QUEUE=TANK           FILE_SPECIFICATION
```

Only Physical Print Queues can "feed" jobs to an output device.

Logical Print Queues can be used to set aside print jobs that:

- Are excessively long
- Are private or confidential
- Require special forms
- Require special characteristics (for example, red ink)

A Generic Print Queue is one that feeds to any physical print queue.

Obtaining Print Queue Information

To get information about print queues and the jobs in them, use:

```
$ SHOW QUEUE/qualifier(s)  print_queue
```

where print_queue must be specified or it will be prompted for. The exception to this is when the /DEVICE qualifier is used (see Table 13-5).

Table 13-5 SHOW QUEUE Command Qualifiers

Function	Command
List your print jobs	$ SHOW QUEUE queue_name
List your print job file specifications	$ SHOW QUEUE/FULL queue_name
List all print jobs	$ SHOW QUEUE/ALL queue_name
List all print queues	$ SHOW QUEUE/DEVICE
List all print job file specifications for all print queues	$ SHOW QUEUE/ALL/FULL/DEVICE

Initializing and Starting a Print Queue

To create a print queue, use:

```
$ INITIALIZE/QUEUE/qualifier(s)  queue_name
```

Table 13-6 DCL Commands to Create Print Queues

Function	Command
Create a physical queue	$ INITIALIZE/QUEUE device_name
Create a logical queue	$ INITIALIZE/QUEUE queue_name
Create a generic queue	$ INITIALIZE/QUEUE/GENERIC queue_name
Create a physical queue that will not receive jobs from a generic queue	$ INITIALIZE/QUEUE/NOENABLE queue_name

Table 13-7 Additional INITIALIZE/QUEUE Qualifiers

Other Print Queue Features	Additional Qualifiers
Add a flag page to each print job	/FLAG
Add a burst line in-between each print job	/BURST
Set up queue to a special form	/FORM_TYPE=number
Set up queue with special characteristics	/CHARACTERISTICS=

Once a print queue is created:

- A physical print queue needs to be started.
- A generic print queue is already connected to physical print queues, but it has to be started, too.
- A logical print queue needs to be assigned to a physical print queue before it is started.

Table 13-8 DCL Commands to Start Print Queues

Function	Command
Start print queue with no changes	$ START/QUEUE queue_name
Start print queue with changes	$ START/QUEUE/qualifier queue_name
Restart print queue using next job	$ START/QUEUE/NEXT queue_name
Restart print queue at beginning of current file	$ START/QUEUE/TOP_OF_FILE queue_name
Restart print queue one page back	$ START/QUEUE/BACKSPACE queue_name

Stopping and Deleting a Print Queue

There are several reasons why it may be necessary to stop a print queue:

- Paper ran out
- Paper jammed
- Need to change paper to special forms
- Need to assign a logical print queue to a physical one
- Need to remove (delete) the print queue

To stop a print queue, use:

```
$ STOP/QUEUE/qualifier(s)  queue_name
```

Table 13-9 DCL Commands to Stop Print Queues

Function	Command
Halt the print queue immediately	$ STOP/QUEUE queue_name
Halt the print queue after the current job is finished	$ STOP/QUEUE/NEXT queue_name
Halt the print queue and abort the current job on the printer	$ STOP/QUEUE/ABORT queue_name
Halt the print queue and place the current job at end of the queue	$ STOP/QUEUE/REQUEUE queue_name

To delete a print queue, use:

```
$ DELETE/QUEUE  queue_name
```

Manipulating Print Queues

The DCL command that connects a logical and physical print queue is:

```
$ ASSIGN/QUEUE  physical_queue  logical_queue
```

To disconnect a logical print queue from a physical print queue, use:

```
$ DEASSIGN/QUEUE  logical_queue
```

To take all the jobs in a print queue and place them into another print queue, another form of the ASSIGN DCL command is used:

```
$ ASSIGN/MERGE  to_queue  from_queue
```

Altering Jobs in a Print Queue

Changes can be made only in the PENDING or HOLDING states. Entries marked CURRENT are already being processed and cannot be changed without being requeued. Common changes include:

1. Releasing a job placed on HOLD.

2. Holding a job that cannot be processed at present.

3. Changing the priority of a queue entry.

To alter the specific print job attributes on a print queue:

```
$ SET QUEUE/ENTRY=job_number/qualifier queue_name
```

Table 13-10 Changing the Attributes of a Print Queue Entry

Function	Qualifier
Hold a job entry	/HOLD
Release a job entry	/RELEASE
Delay a job entry until a particular date and/or time	/AFTER=day-time
Alter the queue priority of a job entry	/PRIORITY=n
Change the name of a job entry	/NAME=name
Alter the form for the job entry	/FORMS=n
Alter the number of copies of the entry to be printed	/JOB_COUNT=n
Alter the characteristics of a job entry	/CHARACTERISTICS=

To delete a job entry (whether the job has started printing or not), use:

```
$ DELETE/ENTRY=####   queue_name
```

where #### is the job number. If the job has already started when this command is issued, the print job will stop.

Table 13-11 Common Print Queue Command Sequences

Function	Command Sequence
Change paper in line printer LPAØ	$ STOP/QUEUE LPAØ Replace paper $ START/QUEUE LPAØ
Change forms for line printer LPAØ	$ STOP/QUEUE LPAØ Put in new forms $ START/QUEUE/FORMS=code LPAØ
Change characteristics of line printer LPAØ	$ STOP/QUEUE LPAØ Alter printer characteristics (for example, special color ribbon) $ START/QUEUE/CHARACTERISTICS=code LPAO
Fix printer LPAØ that mangled one page of a print job	$ STOP/QUEUE LPAØ Reset paper in printer $ START/QUEUE/BACKSPACE LPAØ
Fix printer LPAØ that mangled many pages of a print job	$ STOP/QUEUE LPAØ Reset paper in printer $ START/QUEUE/TOP_OF_FILE LPAØ
Set up device and new queue LPAØ for use as a line printer	$ SET DEVICE/SPOOLED LPAØ $ INITIALIZE/QUEUE LPAØ $ START/QUEUE LPAØ
Set up device and existing queue LPAØ for use as a line printer	$ SET DEVICE/SPOOLED LPAØ $ START/QUEUE LPAØ
Stop a physical queue, assign a logical to the physical queue, and start them	$ STOP/QUEUE/NEXT LPAØ $ ASSIGN/QUEUE LPAØ FORM3 $ START/QUEUE LPAØ $ START/QUEUE FORM3
Take jobs from broken printer LPAØ, and give to working printer LPBØ	$ STOP/QUEUE LPAØ $ STOP/QUEUE/REQUEUE LPAØ $ ASSIGN/MERGE LPBØ LPAØ $ DELETE/QUEUE LPAØ

Table 13-12 Summary of DCL Commands for Print and Batch Queues

Function	Command
Place a job in a batch queue	$ SUBMIT/QUEUE=queue_name file_spec
Place a job in a print queue	$ PRINT/QUEUE=queue_name parameter
Examine a batch * or print queue	$ SHOW QUEUE queue_name
Create a batch * or print queue	$ INITIALIZE/QUEUE queue_name
Start a batch * or print queue	$ START/QUEUE queue_name
Prepare a device for use as a printer	$ SET DEVICE/SPOOLED device_name
Alter printer characteristics	$ SET PRINTER/qualifier(s) device_name
Halt a batch or print queue	$ STOP/QUEUE queue_name
Remove a batch or print queue	$ DELETE/QUEUE queue_name
Move all jobs from queue_2 to queue_1	$ ASSIGN/MERGE queue_1 queue_2
Connect two print queues	$ ASSIGN/QUEUE queue_1 queue_2
Disconnect two print queues	$ DEASSIGN/QUEUE logical_queue
Change an entry in a batch or a print queue	$ SET QUEUE/ENTRY=job_number queue_name
Remove an entry from a batch or print queue	$ DELETE/ENTRY=job_number queue_name

* These commands need a /BATCH qualifier to work for batch queues.

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DEL 29 DE ABRIL AL 13 DE MAYO.
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SHUTDOWN

PROFESORES:

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ING. HUMBERTO SANCHEZ SANDOVAL.

MAYO DE 1985.

SHUTDOWN

14

INTRODUCTION

The fact that your system is up and running now has little bearing on the future. Generally, the system does not stay up forever. Sometimes, the system halts by itself because of software or hardware problems. Occasionally, an operator must shut down the system. Common reasons for shutdown include:

- The need to back up the system disk (see the Backup and Other Periodic Duties module)
- The need to move the system to another location
- Hardware problems or maintenance
- Software problems or maintenance
- The system will not be used for a length of time
- Excessive heat in the room
- Power failure

This module discusses several methods for shutting down the system. These methods vary with the situation.

This module also discusses turning the system power off. However, systems generally run better if left on continuously. There is a difference between "shutting down" and "powering down" a system.

OBJECTIVES

1. Shut down the system, using the correct procedure for a regular or emergency shutdown.

2. Power off the system.

RESOURCES

1. VAX/VMS System Management and Operations Guide

2. VAX/VMS Hardware User's Guide

OVERVIEW OF SHUTTING DOWN A VAX

A computer system is part software and part hardware. To turn a system off correctly, it is necessary to turn off the software (called a shutdown) and then turn off the hardware (called a power down).

NOTE

The hardware will last longer and be more reliable if it is left powered up. Many of the reasons for shutting down the system do not require that the hardware be turned off, so leave it turned on as much as possible.

Table 14-1 Shutdown Methods

Situation	Method
Orderly Shutdown (Routine)	$ @SYS$SYSTEM:SHUTDOWN.COM
Immediate Shutdown (Emergency)	$ RUN SYS$SYSTEM:OPCCRASH.EXE
Manual Crash (System is hung)	Enter commands at the console to crash the system.

Thus, as an operator, you need to know how to:

- Use the console subsystem.
- Do an orderly shutdown
- Do an emergency shutdown
- Manually crash the system
- Power down the hardware

THE CONSOLE SUBSYSTEM

The console subsystem consists of the following parts:

- Console processor (except 11/75Ø)
- Console command language (CCL)
- Console terminal
- Console device
- Front panel switches and lights
- Remote diagnosis port (optional)

The console subsystem may be used in one of three modes:

1. Console I/O mode
2. Program I/O mode
3. Remote diagnosis mode

Table 14-2 Selected Console Commands

Function	11/75Ø	11/73Ø	11/78Ø
Puts the console terminal in console I/O mode *	CTRL/P	CTRL/P	CTRL/P
Halts execution of CPU work *	CTRL/P	CTRL/P	>>>HALT
Used to examine memory contents	>>>E	>>>E	>>>EXAMINE
Returns console terminal to program I/O mode *	>>>C	>>>C	>>>SET TERMINAL PROGRAMMABLE **
Allows CPU work to continue *	>>>C	>>>C	>>>CONTINUE

* On the 11/73Ø and 11/75Ø, a single command (CTRL/P in one case, C in the other) does both functions listed.
** On the 11/78Ø, the full command is SET TERMINAL PROGRAMMABLE, all of which goes on one line.

ORDERLY SYSTEM SHUTDOWN

The VAX/VMS operating system needs to do some housekeeping fuctions so that no data is lost. The SYS$SYSTEM:SHUTDOWN.COM command procedure automatically does these functions. Some of the housekeeping functions it performs are:

- Disables future logins
- Stops batch and device queues
- Dismounts mounted volumes
- Stops user processes
- Invokes a site-specific command procedure (SYS$MANAGER:SYSHUTDWN.COM)

The site-specific shutdown command procedure (SYS$MANAGER:SYSHUTDWN.COM) may be modified at the discretion of the operations staff to perform any additional functions during the shutdown process. DO NOT modify SYS$SYSTEM:SHUTDOWN.COM.

NOTE

To successfully execute SHUTDOWN.COM, You must either have SETPRV privilege or CMKRNL, SYSNAM, OPER, WORLD, SYSPRV, and EXQUOTA privileges.

```
$ @SYS$SYSTEM:SHUTDOWN    1
How many minutes until shutdown [0]? 5    2
Reason?  Weekly backup    3
Do you want to spin down the disks [No]?  <CR>    4
Expected uptime (<RET> if not known)? in two hours    5
```

Example 14-1 Typical System Shutdown

Notes on Example 14-1

1 You may invoke the command procedure from any account as long as you have the privileges listed above.

2 This is to give users a chance to finish up and logout on their own.

3 The reason you enter will be displayed on the users' terminals to tell them what is ging on.

4 If you answre "Yes", all the disks will be spun down. Simply entering a carriage return accepts the default of "No".

5 The answer you enter will be displayed on the users' terminals to tell them when the system will the back up.

The command procedure proceeds until this message is displayed on the console terminal:

SYSTEM SHUTDOWN COMPLETE - USE THE CONSOLE TO HALT SYSTEM

At this point, put the console terminal in console I/O mode and halt the CPU (see Table 14-2).

EMERGENCY SYSTEM SHUTDOWN

The SYS$SYSTEM:OPCCRASH.EXE program does an immediate shutdown with a minimum of houskeeping functions and no warning to the users. SYS$MANAGER:SYSHUTDWN.COM is not executed. As a result data may be lost.

This method is used when SYS$SYSTEM:SHUTDOWN.COM does not work. To activate the program, use the command:

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

Soon you will see the message:

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

At this point, put the console terminal in console I/O mode and halt the CPU (see Table 14-2).

CRASH THE SYSTEM

To correct a hung system, you must manually crash the system and then restart it. The sequence of commands that you enter at the console terminal depend on the computer model.

Crashing an 11/780 or 11/730

```
<CTRL/P>
>>>HALT        (HALT is not needed on an 11/730)
>>>@CRASH
!
! Command file to crash VMS abnormally
!

        .
        .
        .

HALT_INST_EXECUTED
HALTED AT 80007183

>>>
```

Example 14-2 Crashing an 11/780 or 11/730

NOTE

The Console Command Language (CCL) is different from DCL; it has different defaults. The extension of the CRASH command file is .CMD, NOT .COM.

Crashing an 11/750

```
<CTRL/P>
>>>E/G F
>>>E P
>>>E/I Ø
>>>E/I 1
>>>E/I 2
>>>E/I 3
>>>E/I 4
>>>D/G F FFFFFFFF
>>>D P 1FØØØØ
>>>C
```

The system will crash and dump the contents of its registers.

POWER DOWN THE SYSTEM

You should only power down the system when it is not going to be used for an extended length of time or in a disaster situation (such as a flood).

1. Shutdown the software

2. Turn off the CPU

3. Turn off the cabinet's main power switch

4. Turn off the individual peripherals

The following sections describe the controls used to turn off the CPU and the main cabinet.

The Key Switch

- The key switch in the front panel of the CPU can be used to control the power.
- Program I/O is possible with the key in any position except OFF.
- When the key is in a position marked SECURE or DISABLE, console I/O mode cannot be entered.
- The BOOT (or INITIALIZE) switch is also disabled when the key is in the SECURE or DISABLE position.

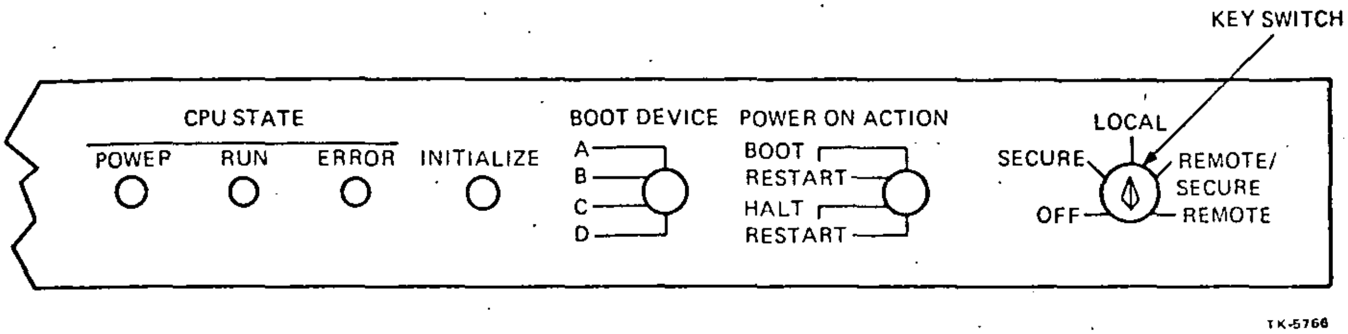

Figure 14-1 VAX 11/750 Front Panel

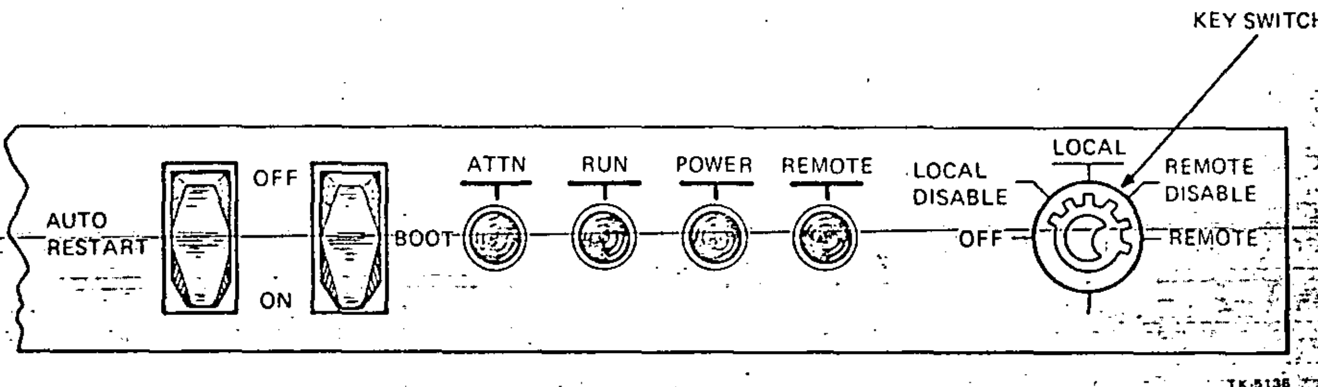

Figure 14-2 VAX-11/780 Front Panel

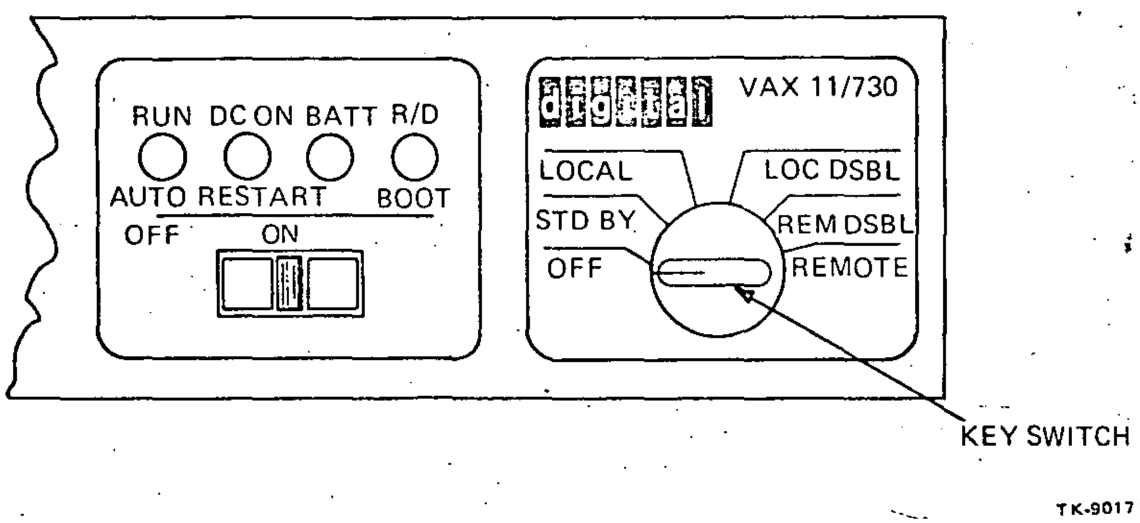

Figure 14-3 VAX-11/730 Front Panel

Table 14-3 Front Panel Key Switch Positions

11/750	11/780 and 11/730	Effects on Console Terminal (and System)
OFF	OFF	Power is off to the CPU. (Power is still on to other parts of the system.)
SECURE	LOCAL/DISABLE	Only program I/O mode possible.
LOCAL	LOCAL	Either program I/O mode or console I/O mode possible.
REMOTE	REMOTE	Program I/O mode possible Console I/O mode possible if allowed by the Remote Diagnosis Center. (See the Handling Errors module)
REMOTE/SECURE	REMOTE/SECURE	Only program I/O mode possible

By turning the key switch to the OFF position, you are in fact crashing the system. This is actually a fourth method of shutting down the software and can be used as such in an extreme emergency.

The Key Control Switch

The key control switch, located on the rear panel of the system cabinet (near the floor), enables or disables the key switch on the front panel.

Table 14-4 Effects of the Key Control Switch

Key Control Switch	Condition of System	Effect on Front Panel Key Switch
OFF	Not Running	Disabled
LOCAL ON	System remains in the condition indicated by the position of front panel key BEFORE rear switch was set	Disabled
REMOTE ON	System is in the condition indicated by current position of front panel key	Enabled

Normally, the key control switch is left alone.

The Main Power Switch

When the key switch is off, the CPU is powered down, but components such as power supplies and fans contiue to run. The main power switch located in the rear panel of the system cabinet must be pressed down to power off the system completely.

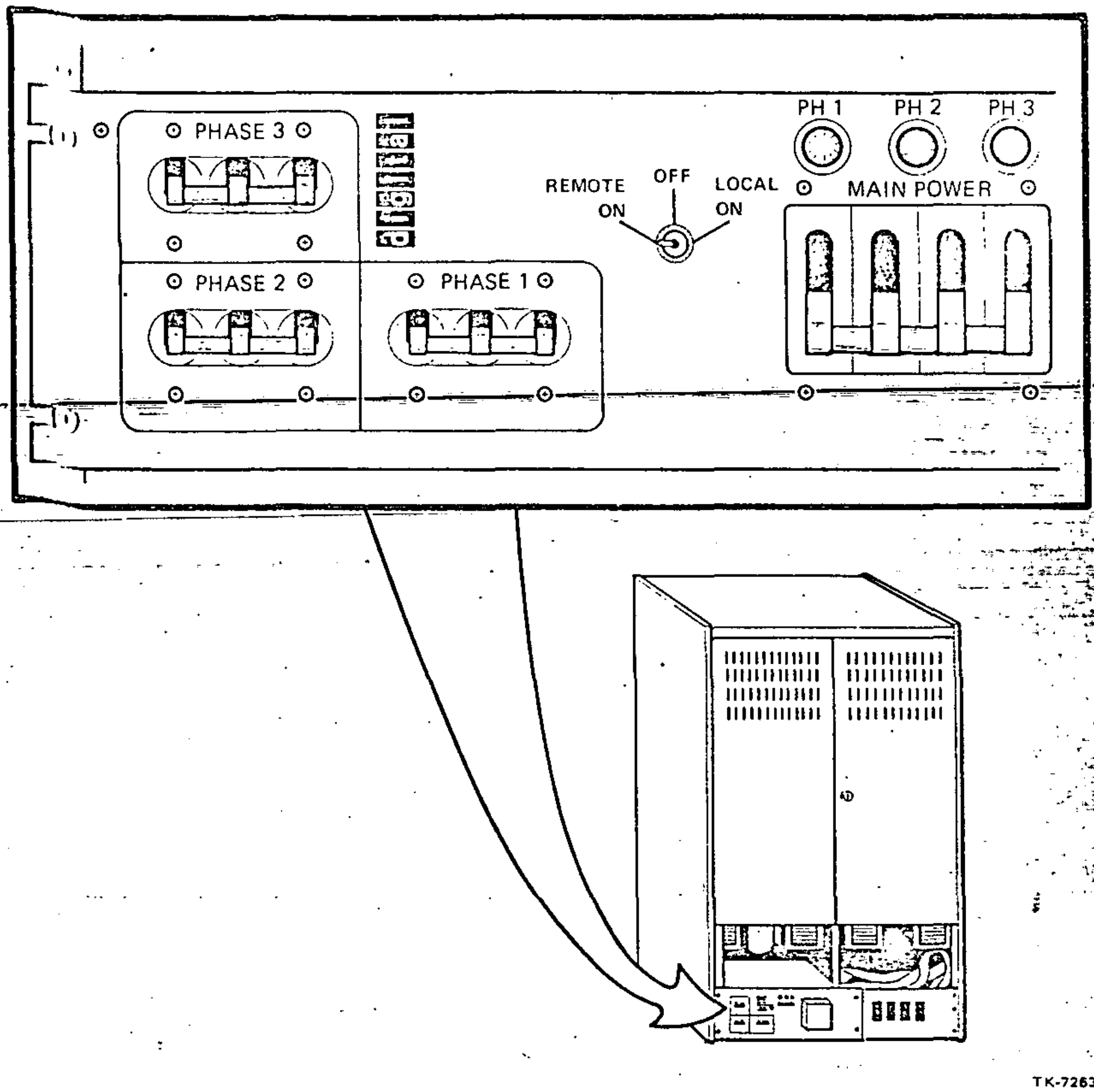

Figure 14-4 VAX-11/780 Rear Panel

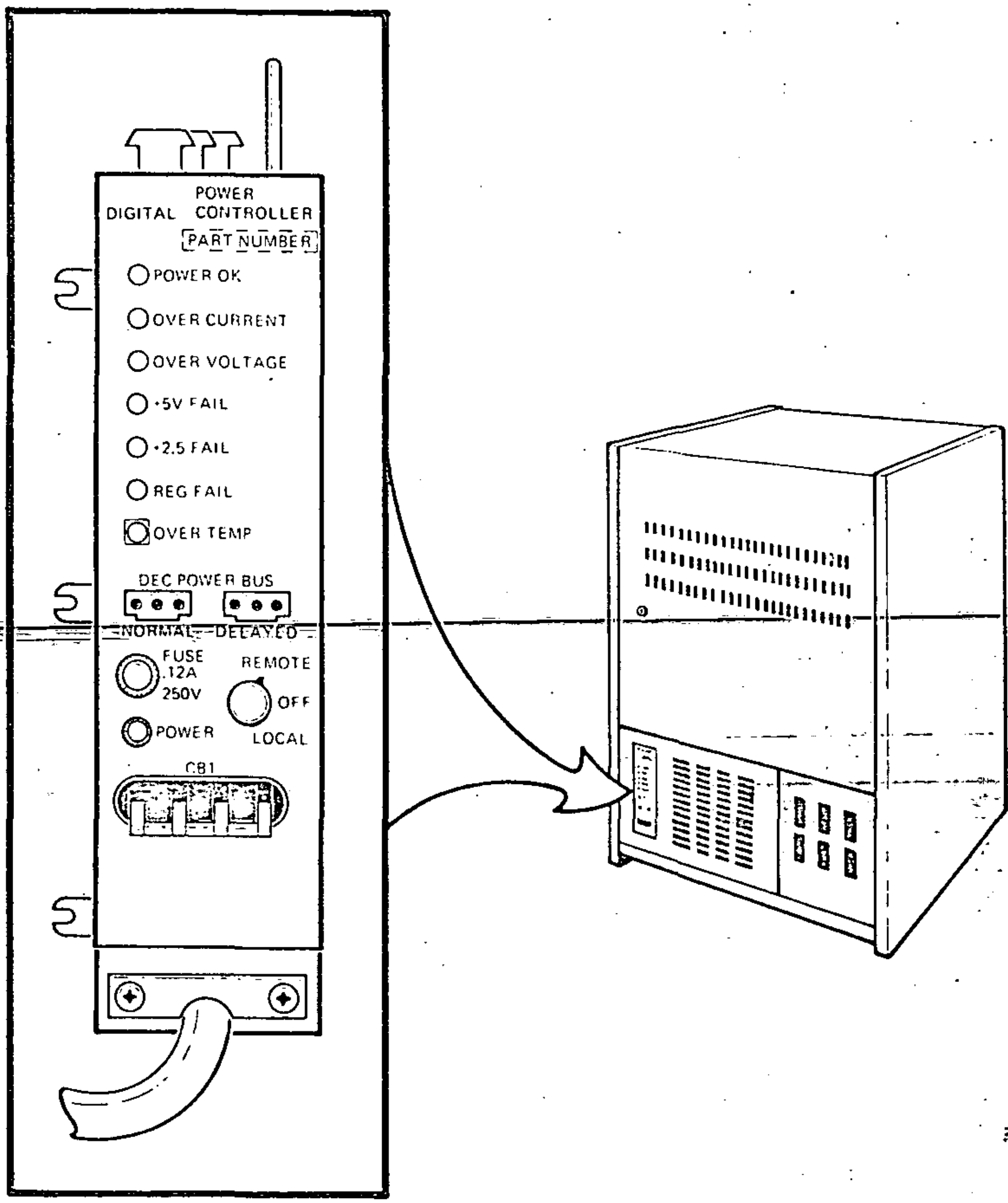

Figure 14-5 VAX-11/750 Rear Panel

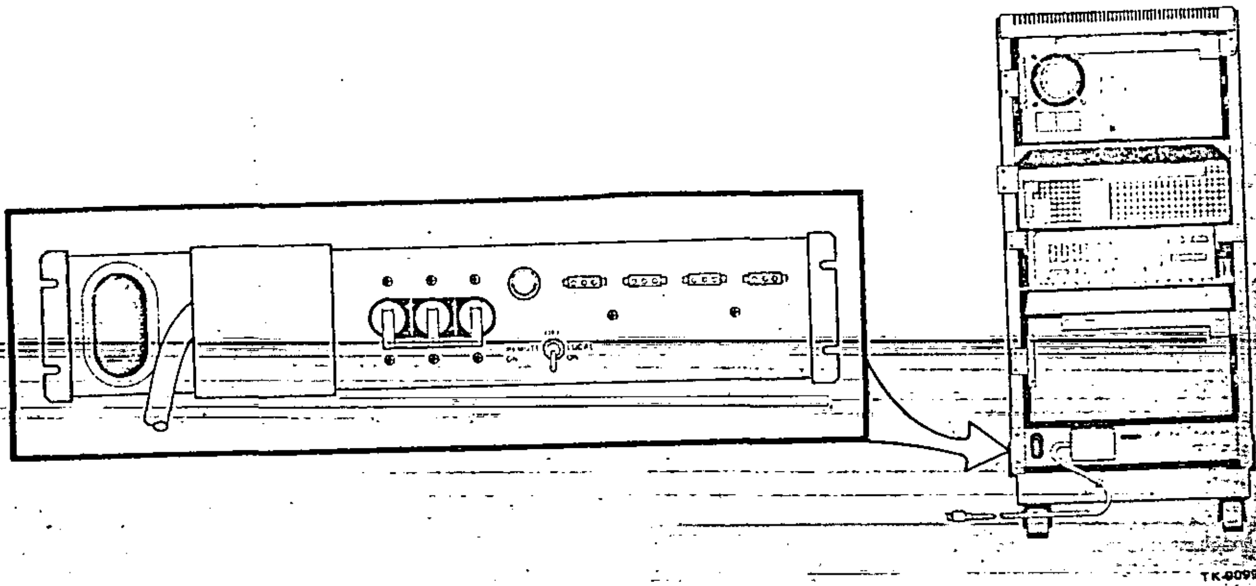

Figure 14-6 VAX-11/730 Rear Panel

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MEXICO, D.F.

STARTUP

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MAYO DE 1985.

STARTUP

15

INTRODUCTION

To work on a system, a user must be logged in. To log in, the system must be up, running, and available to users. In other words, the system must be powered up and initialized. The initialization process is also known as startup.

There are many ways to start a system. Some methods are simple, others are more complicated. In certain circumstances, VAX systems are capable of restarting themselves.

During the start up procedure, various files are accessed by the system. Each file contains some information used to make the system available to users. If any of these files are missing or corrupted, the system will not start properly.

This module discusses power up, startup, and restart procedures. Common problems (power failures, invalid system disk), problems corrected by the operator (invalid console floppy), and problems referred to the system manager (unable to start the computer) are also discussed. In addition, this module discusses the files that are used to start the system, what they contain, and what to do if certain files are missing or damaged.

OBJECTIVES

1. To power up an 11/780, 11/750, and 11/730 system using the correct switches and controls.

2. To start the software on the system using switches on the system cabinet.

3. To start the software on the system using switches on the system cabinet and the console command language.

4. To define and correct common errors which occur during the startup procedure.

RESOURCES

1. VAX Hardware Handbook

2. VAX-11/780 Software Installation Guide

3. VAX-11/750 Software Installation Guide

4. VAX-11/730 Software Installation Guide

5. VAX/VMS System Management and Operations Guide

OVERVIEW OF STARTING UP A VAX-11

Table 15-1 Startup Methods.

Situation	Method
Power failure with Battery Backup and Auto Restart enabled	No action is needed. The system will restart itself and continue as if nothing happened.
Power failure with Auto Restart enabled; Battery Backup expired or not enabled	No action is needed. The system will restart and initialize itself.
System crashes with Auto Restart enabled	No action is needed. The system will restart and initialize itself.
CPU has been halted and a simple (default) startup is needed	>>>BOOT or push the BOOT switch (INITIALIZE on the 11/750).
CPU has been halted and an alternate device is to be used as the system disk	>>>BOOT ddu * (slightly different on the 11/750).
CPU has been halted and changes need to be made as the system is starting up (conversational bootstrap)	>>>@ dduGEN ** (slightly different on the 11/750).

* ddu is a code that specifies the disk type and unit number which is to be used. The code will the covered later in this module.

** dduGEN is the name of a command procedure whose first three characters is a code that specifies the disk type and unit number of the system disk device.

POWERING UP THE SYSTEM

1. Power up individual peripherals and physically mount the disks

2. Power up the main cabinet

3. Set the Auto Restart (Power On Action) switch
   11/780 - Load the console volume into the console drive
   11/750 - Set the Boot Device switch to the system disk

   (Let the system warm up for a few minutes)

4. Turn the key switch to Local

NOTE

If the power has been off for some time, the hardware should warm up for a while.

AUTO RESTART

The following need to be set to enable Auto Restart:

Auto Restart of an 11/780

- The console volume is loaded in the console floppy drive
- The system disk is physically mounted on the correct drive
- The Auto Restart switch is set to ON
- The key switch is set to Local or Local/Disable

Auto Restart of an 11/750

- The Boot Device switch is set to indicate the system disk
- The system disk is physically mounted on the correct drive
- The Power On Action switch is set to Restart/Boot
- The key switch is set to Local or Secure

Auto Restart of an 11/730

- The system disk is physically mounted on the correct drive
- The Auto Restart switch is set to ON
- The key switch is set to Local or Local/Disable

SIMPLE (DEFAULT) STARTUP

You have a choice between two actions:

- Use the BOOT command at the console terminal
- Use the Boot (Initialize on an 11/750) switch

Note that in both cases, the CPU has already been halted.

Default Startup of an 11/780

Conditions similar to those that applied to the Auto Restart apply to the Default Startup:

- The CPU has been halted
- The console volume is loaded in the console floppy drive
- The system disk is physically mounted on the correct drive
- The key switch is set to Local or Local/Disable

Either push and release the Boot switch on the front panel, or enter the BOOT command at the console terminal in response to the CCL prompt:

```
>>>BOOT
```

STARTUP USING AN ALTERNATIVE DEVICE

To start the system using an alternate device, use the boot command as it was presented in the previous section under the same conditions, with an additional parameter:

```
11/780 - >>>BOOT ddu

11/750 - >>>B ddcu

11/730 - >>>B ddu
```

where:

- **dd** is a code describing the device type
- **c** is the channel letter (usually A) - 11/750 only
- **u** is the unit number of the alternate disk

THE SYSTEM INITIALIZATION SEQUENCE

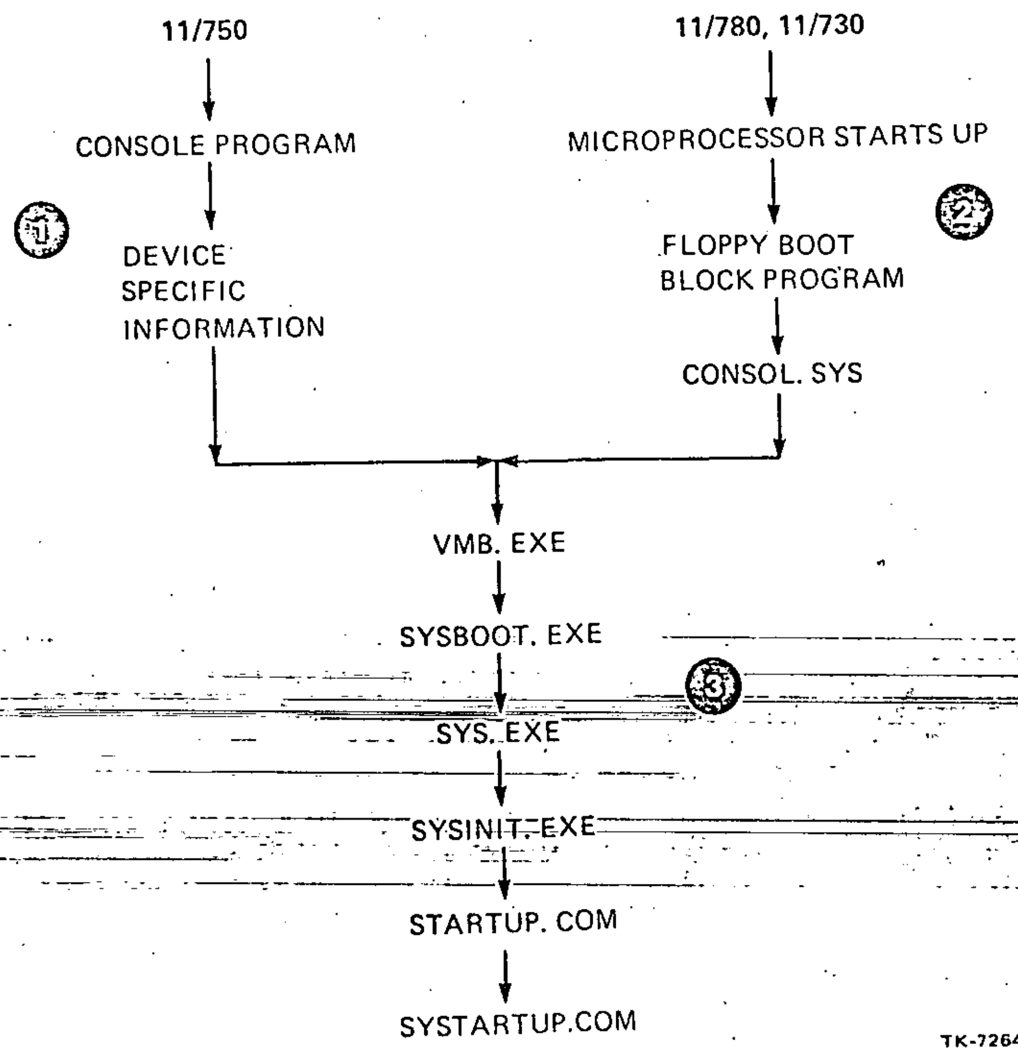

Figure 15-1 Sequence of Events for Startup

NOTE

The numbers in Figure 15-1 correspond to the three sections of Table 15-3.

STARTUP

You need to be concerned with the last two command procedures. The first is SYS$SYSTEM:STARTUP.COM, which is used to:

- Assign logical names
- Install images (programs) in memory so several users can access the same copy (saving space)
- Connect different devices to the system
- Activate SYSTARTUP.COM

DO NOT modify STARTUP.COM.

The other command procedure is SYS$MANAGER:SYSTARTUP.COM, which is a site-specific command procedure that is used to:

- Set up terminals (speeds, page size, etc.)
- Print notices about the system
- Connect other systems for communication via DECnet
- Mount user data disks
- Assign additional logical names
- Install more images
- Connect extra devices

SYSTARTUP.COM is empty when the system is received. The system manager must enter commands into the file. Therefore, the contents are usually unique to each system.

ERRORS DURING THE STARTUP SEQUENCE

When attempting to solve any startup error, ask yourself the following questions:

- Are all of the switches set correctly?
- Is the system disk loaded in the system device?
- Is the system disk 'READY'?
- If required, is the console diskette loaded correctly (for example, not backwards)?
- Did you do all of the steps in the correct order?
- Did you spell all commands properly, including punctuation (if you are using console commands)?

NOTE

If you ever hear loud, unusual noises from the disk during the startup procedure, stop what you are doing and contact the system manager immediately.

Table 15-4 Common Startup Errors

Errors	Action
?NO BOOT ON FLOPPY ?FLOPPY ERROR ON BOOT	Replace floppy (possibly broken diskette drive).
%any number (11/75Ø only)	Code numbers are listed in the VAX/VMS Hardware Handbook. Usually hardware problem; contact system manager.
?FATAL - WCS & PCS VER MISMATCH ?FILE NOT FOUND ?FLOPPY ERR, CODE=X (X is a number from 1-4) ?FLOPPY NOT READY	Check console device. If empty,load console floppy; if not empty, replace console floppy.
%BOOT-F-Bootfile not contiguous %BOOT-F-I/O error reading boot file %BOOT-F-Unable to locate boot file [illegible]OOT-F-Unexpected exception [illegible]OOT-F-Nonexistent drive %BOOT-F-Unexpected machine check %SYSBOOT-E-File not contiguous %SYSBOOT-E-I/O error reading file %SYSBOOT-F-Unable to locate or read CPU-dependent file %SYSBOOT-F-Unable to locate or read terminal service code %SYSBOOT-F-Unable to locate SYS.EXE	Replace system disk and try again.
?'<text-string>' is incomplete ?'<text-string>' is incorrect ?FILE NAME ERR.	Retype command correctly.

Many errors are caused by CPU problems or other hardware problems. The best solution is to try again. If the error is repeated, power down the system completly. Power up the system and try again. If the error repeats, call the system manager.

NOTE

If you had to power down/up a system to clear an error, give the printout from the console terminal session to the system manager.

Table 15-5 Common Problems which Occur During Startup

Problem	Action
Information on system disk is invalid or damaged	Replace System Disk
Console terminal is broken	Use BOOT or INITIALIZE switch
Power failure	Restart

INTRODUCTION

Among the many duties of an operator are maintaining system software, system data, and user files. This maintenance includes:

1. Making and keeping copies of system and user disk files.

2. Controlling system data files which records:

   - what users are allowed to do.

   - what users have been doing on the system.

   - what device errors have occurred.

   - what volumes have been mounted and dismounted.

   - how much disk space is being used on each disk.

   - messages sent between users, the system and operators.

3. Creating new system disks.

4. Updating the system software or adding new software.

5. Creating new console floppies.

These duties are done periodically. They can be regularly scheduled (for example, making copies of system and user disks), or the result of an event outside of your control (for example, VAX/VMS software updates from DIGITAL). Whatever the reason, it is an operator's duty to perform these maintenance functions to keep the system running.

OBJECTIVES

1. To backup (partial and full) selected system and data disks using the appropriate method and utility.

2. To select and invoke procedures that update and maintain the system.

RESOURCES

1. <u>VAX/VMS Utilities Reference Manual</u>

2. <u>VAX/VMS System Management and Operations Guide</u>

PERIODIC DUTIES

Table 16-1 Operator Scheduled Functions

Function	Command/Utility	Suggested Schedule
Copying User and System Disks		
Copy of all files on disks	$ BACKUP	Weekly
Copy of all files modified since last BACKUP	$ BACKUP	Daily
Manipulating System Information Files		
Create new OPERATOR.LOG file	$ REPLY/LOG	Daily
Process ERRLOG.SYS file	$ RUN SYE	Daily
Create new ACCOUNTNG.DAT file	$ SET ACCOUNTING/NEW	Daily
Documenting User Information		
Obtain user information	$ RUN AUTHORIZE	Weekly
Current disk usage listed by UIC	$ RUN DISKQUOTA	Weekly

COPYING SYSTEM AND USER DISKS

How often file copies are made depends on the priority of the information. Table 16-1 suggests that:

1. A copy of all files be made each week.

2. Daily backups be done, but only on files modified during that same day.

Table 16-2 Utilities/Commands to Backup and Restore Files

Function	Command/Utility	Comment
Specifically selected files	$ COPY	Good for only a small file number.
	$ BACKUP	May be done on-line or stand alone.
On-line full volume files	On-line BACKUP On-line DSC	For nonsystem disks only. No one uses disk at backup time.
Stand-alone full volume files	Stand-alone BACKUP Stand-alone DSC	System disk is always backed up standalone.

The BACKUP Utility (On-Line)

The BACKUP utility is used to save and restore a selected set of disk files, or all files on a disk while others are using the system (but not using the set of disk files being backed up). BACKUP can select files to backup on the basis of:

- Part or all of a file specification.
- Whether the file has been created since the last running of BACKUP.
- Whether the file has been changed since last running BACKUP.

The form of the command is:

```
$ BACKUP/qualifier  input-specifier  output-specifier
```

Table 16-3 Definitions of BACKUP Terms

Term	Definition
SAVE-SET	A file in BACKUP format, created by BACKUP
SAVE-SET-NAME	Any legal VMS filename, file type and version number
SAVE-SET-SPECIFIER	A device and a SAVE-SET-NAME. The form is: device:save-set-name

NOTE

> Usually, the file type for a save-set is BCK. However, there is no default; the BCK file type is only a convention. BCK is used in all examples for this module.

Table 16-4 BACKUP Functions and Commands

Function	Definition
Compare	Examine two input and output specifications for differences in file specifications.
	$ BACKUP/COMPARE SAVE-SET-SPECIFIER FILE_SPECIFICATION(S)
	$ BACKUP/COMPARE MTAØ:FEB1Ø.BCK [MARSH...]*.*
Copy	Create one or more new files from one or more old files.
	$ BACKUP FILE_SPECIFICATION(S) FILE_SPECIFICATION(S)
	$ BACKUP DBA1:[MARSH...] DBA2:[MARSH...]
Duplicate	Create a duplicate of a disk including location of information.
	$ BACKUP/PHYSICAL INPUT_DEVICE OUTPUT_DEVICE
	$ BACKUP/PHYSICAL DBA1: DBA2:
List	Display the file specifications for files inside the save-set.
	$ BACKUP/LIST SAVE-SET-SPECIFIER
	$ BACKUP/LIST MTAØ:FEB1Ø.BCK
Save	Copy one or more files into a save-set. The directory structure is recorded with file information.
	$ BACKUP FILE_SPECIFICATION(S) SAVE-SET-SPECIFIER
	$ BACKUP DBA1:[MARSH...]*.* MTAØ:FEB16.BCK
Restore	Copy one or more files from a save-set to a disk or floppy. Directories are created if not found.
	$ BACKUP SAVE-SET-SPECIFIER FILE_SPECIFICATION(S)
	$ BACKUP MTAØ:FEB16.BCK DBA2:[MARSH]

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CURSOS: "INTRODUCCION AL SISTEMA VAX - 11/780" Y
"OPERACION Y ADMINISTRACION DEL SISTEMA VAX / VMS"
DEL 29 DE ABRIL AL 13 DE MAYO.
MEXICO, D.F.

BACKUP AND OTHER PERIODIC DUTIES

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MAYO DE 1985.

BACKUP AND OTHER PERIODIC DUTIES

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```
  $ BACKUP/LIST=LISTING.LIS   JUN8.BCK
  $ TYPE LISTING.LIS
  Listing of save set

  Save set:                JUN8.BCK
① Written by:              MARSH
  UIC:                     [363,010]
② Date:                     8-JUN-1981 16:58:58.26
③ Command:                 BACKUP *.FJM;* JUN8.BCK/SAVE_SET/COMMENT=
  these files are not to be restored unless given permission
  by system manager
④ Comment:                 these files are not to be restored
  unless given permission by system manager
  Operating system:        VAX/VMS
  BACKUP version:          V2.3-3
  Node name:               _GALAXY::
⑤ Written on:              _DBA2:
  Block size:              32256
  Group size:              10
  Buffer count:            3
                                                          ⑦
⑥ [MARSH]ONE.FJM;1                               1   8-JUN-1981 16:20
  [MARSH]TWO.FJM;1                               1   8-JUN-1981 16:21

  Total of 2 files, 2 blocks
  End of save set
```

Example 16-1 Output from BACKUP/LIST

Notes on Example 16-1

① Process name that created the SAVE-SET

② Date on which SAVE-SET created

③ Form of BACKUP command used to create SAVE-SET

④ Comment entered into SAVE-SET

⑤ Device on which SAVE-SET placed

⑥ Full file specification for saved files

⑦ Creation date of each file

```
$ BACKUP/RECORD  DBAØ:[*...]*.*  TAPE:FEB1Ø.BCK
```

Partial backup as part of a once-a-day schedule

```
$ BACKUP/RECORD
From: DBAØ:[*...]*.*/SINCE=BACKUP
To:   TAPE:FEB11.BCK
```

Example 16-2 "Weekly Schedule" Commands for Full and Partial Backups

If you follow the full BACKUP once-a-week and partial BACKUP once-a-day schedule, restoring a disk follows the command sequence illustrated in Example 16-3 and 16-4.

Table 16-5 Sample BACKUP Log for February

Type of Backup	Date in February
Full	3, 1Ø, 17, 24
Partial	all other days

```
$ MOUNT/FOREIGN MTAØ:  tape label
$ BACKUP  TAPE:FEB1Ø.BCK  DBA1:[*...]*.*/OWNER=ORIGINAL
```

Example 16-3 Simple Disk Restoration Using BACKUP

```
$ MOUNT/FOREIGN  MTAØ:   FEB1Ø     TAPE
$ BACKUP  TAPE:FEB1Ø.BCK  DBA1:[*...]*.*/OWNER=ORIGINAL
$ DISMOUNT MTAØ:
$ MOUNT/FOREIGN  MTAØ:   FEB11     TAPE
$ BACKUP  TAPE:FEB11.BCK   DBA1:[*...]*.*/OWNER=ORIGINAL
$ DISMOUNT MTAØ:
$ MOUNT/FOREIGN  MTAØ:   FEB12     TAPE
$ BACKUP TAPE:FEB12.BCK DBA1:[*...]*.*/OWNER=ORIGINAL
$ DISMOUNT  MTAØ:
```

Example 16-4 Restoring a Disk Using BACKUP

To restore a specific file from a SAVE-SET, the following information is needed from the user making the request:

1. A full file specification

2. The user's UIC

3. If possible, the most recent date on which the file was known to exist.

```
$ MOUNT/FOREIGN  MTAØ:    FEB12       TAPE
$ BACKUP/LIST=FILES.LIS    TAPE:FEB12.BCK
$ TYPE FILES.LIS
```

If the required file is not in the SAVE-SET FEB12.BCK, get the tape from the day before and repeat the above steps until the file is found.

If the required file is in the SAVE-SET, continue:

```
$ BACKUP
From:  TAPE:FEB12.BCK/SELECT=[SHERMAN]GETME.COM
To:    DBA2:[SHERMAN]GETME.COM/OWNER_UIC=ORIGINAL
```

Example 16-5 Restoring DBA2:[PEABODY]SHERMAN.COM

NOTE

If you do not know the name of a save-set, mount the volume normally and list the directory. Then, dismount the volume, remount it with the /FOREIGN qualifier, and proceed normally.

The BACKUP Utility (Stand-alone)

The stand-alone BACKUP software will either be:

1. On 2 floppies or cartridges (RX01 or TU58)
2. On a disk

To start stand-alone BACKUP from a disk:

- Physically mount the disk
- Startup the system using that disk as an alternate system device
- After a few moments, the "$" prompt will appear
- This is NOT DCL; the ONLY command that will be accepted is the BACKUP command
- The BACKUP command is given as if VAX/VMS were running

Starting up stand-alone BACKUP from the floppies or cartridges are more dependent on the type of VAX. For example, let's assume that:

- The system has been shutdown (see the Shutdown module),
- The CPU has been halted,
- The console volume is in the console drive (VAX-11/780 only), and
- The console terminal is in console I/O mode.

Example 16-6 shows how to startup stand-alone BACKUP on a VAX-11/730 with TU58s. Example 16-7 shows how to startup stand-alone BACKUP on a VAX-11/750 with TU58s. Finally, example 16-8 shows how to startup stand-alone BACKUP on a VAX-11/780 with floppies.

```
                ①

>>>B CS1        ②
Please mount the first standalone system diskette or     ③
cartridge and press return
<CR>            ④
VAX/VMS Version 3.0 21-MAY-1982 13:41                    ⑤

Please mount second standalone system diskette or
cartridge and press return
<CR>            ⑥

$               ⑦
```

Example 16-6 Starting Stand-alone BACKUP on a VAX-11/730 from TU58s

Notes on Example 16-6:

1. CSA1 (the console device on the front panel) is empty at this point.
2. Perform a startup using CS1 (no controller identifier) as the alternate device.
3. After about 3 minutes, this message appears on the console terminal.
4. Put the cartridge labeled VAX/VMS 3.0 S/A BKUP T58 1/2 (or one that has been built by the operations staff) in CSA1, then press RETURN.
5. After another 15 to 20 minutes, this second message appears on the console terminal.
6. Remove the first cartridge from CSA1 and put the cartridge labeled VAX/VMS 3.0 S/A BKUP T58 2/2 (or one that has been built by the operations staff) in CSA1, then press RETURN.
7. After about 3 more minutes, the "$" prompt appears and you may enter BACKUP commands. DO NOT remove the second cartridge until you have finished using BACKUP.

```
                  (1)

>>>B DDAØ         (2)
VAX/VMS Version 3.Ø 21-MAY-1982 13:41                  (3)

Please mount second standalone system diskette or
cartridge and press return
<CR>              (4)

$                 (5)
```

Example 16-7 Starting Stand-alone BACKUP on a VAX-11/750 from TU58s

Notes on Example 16-7:

(1) The cartridge on the front panel of an 11/750 is reffered to as DDAØ or CSA1, depending on the operation. In this operation, it is called DDAØ. Put the cartridge labeled VAX11 S/A BACKUP TU58 1/2 (or one that has been built by the operations staff) in DDAØ.

(2) Perform a startup using DDAØ as the alternate device.

(3) After another 15 to 20 minutes, this message appears on the console terminal.

(4) Remove the first cartridge from DDAØ and put the cartridge labeled VAX11 S/A BACKUP TU58 2/2 (or one that has been built by the operations staff) in DDAØ, then press RETURN.

(5) After about 3 more minutes, the "$" prompt appears and you may enter BACKUP commands. DO NOT remove the second cartridge until you have finished using BACKUP.

```
                (1)

>>>BOOT CS1     (2)
Please mount the first standalone system diskette or     (3)
cartridge and press return
<CR>            (4)
VAX/VMS Version 3.0 21-MAY-1982 13:41                    (5)

Please mount second standalone system diskette or
cartridge and press return
<CR>            (6)

$               (7)
```

Example 16-8 Starting Stand-alone BACKUP on a VAX-11/780 from Floppy Diskettes

Notes on Example 16-8:

1. CSA1 (the console floppy diskette drive) has the console volume in it at this point.

2. Perform a startup using CS1 (no controller identifier) as the alternate device. Note: if you get a "file not found" error message, try the command BOOT DSC.

3. After typing the BBOT command, this message appears on the console terminal.

4. Put the floppy labeled VAX/VMS 3.0 S/A BKUP RX1 1/2 (or one that has been built by the operations staff) in CSA1, then press RETURN.

5. When the first floppy has finished loading, this second message appears on the console terminal.

6. Remove the first floppy from CSA1 and put the floppy labeled VAX/VMS 3.0 S/A BKUP RX1 2/2 (or one that has been built by the operations staff) in CSA1, then press RETURN.

7. When the second floppy has finished loading, the "$" prompt appears and you may enter BACKUP commands. DO NOT remove the second floppy until you have finished using BACKUP.

To get out of stand-alone BACKUP, enter CTRL/P to get back to the console I/O mode prompt (>>>).

The Disk Save and Compress (DSC) Utility

The DSC utility is used for the same purpose as BACKUP. Like BACKUP, there are two versions of DSC: on-line and stand-alone. However, DSC has been replaced functionally by BACKUP.

NOTE

DSC cannot read BACKUP files (and vice versa).

CLOSING AND EXAMINING THE OPERATOR LOG FILE

The operator log file (SYS$MANAGER:OPERATOR.LOG) contains:

- All REQUEST and REPLY communication between users and operators
- All communication between the operating system and operator
- A message indicating the device name and time when any terminals are enabled and disabled as operator terminals
- The time of day, stamped every 30 minutes in the file
- Off-line messages when a device has been taken off-line (for example, the line printer runs out of paper and goes off-line).

```
$ SET DEFAULT SYS$MANAGER:
$ REPLY/LOG
$ DIRECTORY OPERATOR.LOG

Directory DBA0:[SYSMGR]

OPERATOR.LOG;38 OPERATOR.LOG;37 OPERATOR.LOG;36

Total of 3 files.

$ TYPE OPERATOR.LOG;36
```

Example 16-9 Opening New OPERATOR.LOG File

CLOSING AND EXAMINING THE ERROR LOG FILE

Another system data file to be closed periodically is the error log file (SYS$ERRORLOG:ERRLOG.SYS). The file is closed simply by using the RENAME command (ERRORLOG.OLD is the suggested new filename). The file contains:

- Errors found and recorded by the operating system
- Mounts and dismounts of devices

The program SYS$SYSTEM:SYE.EXE is used to format the error log.

```
$ SET DEFAULT SYS$ERRORLOG:
$ RENAME ERRLOG.SYS   ERRLOG.OLD
$ RUN SYS$SYSTEM:SYS.EXE

SYE VERSION 3.3

_INPUT FILE    [SYS$ERRORLOG:ERRLOG.OLD]   ?
_OUTPUT FILE   [SYS$OUTPUT]                ?
_OPTIONS       [ROLL-UP]                   ?
_DEVICE NAME   [<CR>]                      ?
_AFTER DATE    [FIRST ENTRY]               ?
_BEFORE DATE   [LAST ENTRY]                ?
```

Example 16-10 Closing and Processing the Error Log File

_INPUT FILE	The name of the file that SYE.EXE is to process. If no file specification is given (just hit the RETURN key) the highest version of SYS$ERRORLOG:ERRLOG.OLD is used.
_OUTPUT FILE	The name of the file or device to receive the output. The default is SYS$OUTPUT.
_OPTIONS	The type of report to be generated by SYE.EXE. The default is a ROLL-UP, or brief overview of the recorded information.
_DEVICE NAME	The name of the device(s) to be listed in the output from SYE.EXE. The default is all devices.
_AFTER DATE	All entries after this date are to be part of the SYE report.
_BEFORE DATE	All entries before this date are to be part of the SYE report.

Table 16-6 Sample Input Values for SYE.EXE

SYE Prompts	Daily Report	Brief Errors	Mounts and Dismounts	Specific Device
Input	<Return>	<Return>	<Return>	<Return>
Output	VIEW.DAT	BRIEF.DAT	CONFIG.DAT	DEVICE.DAT
Options	<Return>	BRIEF	BRIEF	BRIEF
Device Name	<Return>	<Return>	/CONFIG	Device_name
After	DD-MMM-YYYY	<Return>	<Return>	<Return>
Before	DD-MMM-YYYY	<Return>	<Return>	<Return>

Daily Report

```
VAX/VMS SYSTEM ERROR REPORT COMPILED 14-JUN-1981

SUMMARY OF ALL ENTRIES LOGGED BY SID 01100137

        DEVICE ERROR BIT(S) SET          37.
        MACHINE CHECK                    14.
        SBI FAULT                         1.
        CORRECTED READ DATA             134.
        UBA INTERRUPT                   158.
        SYSTEM START-UP                  16.
        SYSTEM POWER-FAIL RESTART         1.
        FATAL BUGCHECK                   15.
        PERIODIC TIME-STAMP             149.
        SYSTEM BUGCHECK                   1.
        NETWORK MESSAGE                  17.
        VOLUME MOUNT                    162.
        VOLUME DISMOUNT                  84.
        DEVICE I/O TIMEOUT                5.

        DATE OF EARLIEST ENTRY      10-MAY-1981 23:59:13.66
        DATE OF LATEST ENTRY        13-MAY-1981 12:52:57.10
```

Example 16-11 Partial SYE.EXE Output (Daily Report)

Mounts and Dismounts

```
V A X / V M S SYSTEM ERROR REPORT COMPILED 14-JUN-1981 13:51

******************ENTRY      1. ******************************
MOUNT VOLUME                 LOGGED 11-MAY-1981 00:02:16.88
ERROR SEQUENCE 10.           SYSTEM ID REGISTER      1100137

      UNIT DBA1., VOLUME LABEL SYSPACK1

      42. QIO OPERATIONS THIS UNIT, 0. ERRORS THIS UNIT
******************ENTRY      2. ******************************
DISMOUNT VOLUME              LOGGED 11-MAY-1981 00:28:46.46
ERROR SEQUENCE 15.           SYSTEM ID REGISTER      1100137

      UNIT DBA1., VOLUME LABEL SYSPACK1

      517. QIO OPERATIONS THIS UNIT, 0. ERRORS THIS UNIT
      475. QIO OPERATIONS THIS VOLUME, 0. ERRORS THIS VOLUME
```

Example 16-12 SYE.EXE Mount/Dismount Information

KEEPING TRACK OF COMPUTER USAGE

- The operating system gathers information on system usage
- The information is recorded in SYS$MANAGER:ACCOUNTNG.DAT
- The ACCOUNTING utility is designed to:
  - Read the accounting data file
  - Select information as requested by the user
  - generate reports
- These reports can be used to keep track of and/or bill for computer usage
- The accounting data file needs to be closed and a new one opened periodically.

Table 16-7 Accounting Data File Record Types

System Event (record type)	/TYPE Keyword	Information Recorded (partial list)	Comments
Process termination	IMAGE	Username, UIC, PID, elapse time, processor time, terminal name, priority, page faults	Useful for tracking how long each user is logged in and using the processor.
Print job termination	PRINT	Username, UIC, PID, elapse time, processor time, priority, queue name, job name, pages printed	Useful for tracking printer usage.
Login failure	LOGFAIL	Terminal name, elapse time, processor time	Can be used to determine if someone is trying to break into the system.
System initialization	SYSINIT	Status code, start time, username (JOB_CONTROL, DECNET, SYSTEM)	Useful for tracking the frequency of system crashes.

ACCOUNTNG.DAT is closed and a newer version opened up with a DCL command whose form is:

```
$ SET ACCOUNTING/NEW_FILE
```

The ACCOUNTING Utility

The ACCOUNTING utility reads the accounting data file (or a copy), selects records, and generates one of the following forms of output:

- A brief listing of selected records
- A full listing of selected records
- A summary listing of selected records
- A binary copy of selected records

To invoke the ACCOUNTING utility, use the DCL command:

```
$ ACCOUNTING/qualifier(s)
```

To use a file other than ACCOUNTNG.DAT as input, use the following DCL command:

```
$ ACCOUNTING/qualifier(s) filename
```

Table 16-8 ACCOUNTING Command Qualifiers

Function Group	Function	Qualifier
Record Selection	Selects records of the type specified (see Table 16-7).	/TYPE
	Selects records of the process type specified (INTERACTIVE, BATCH, etc.).	/PROCESS
	Selects records within the time range specified.	/BEFORE /SINCE
	Selects records which contain a value specified in the field referred to by the qualifier. For example, if you wanted to select records with the username of "ROCKY", you would use /USER=ROCKY as a qualifier. If you wanted to select records with a priority of 4 or 5, you would use /PRIORITY=(4,5) as a qualifier. You can also select records that do NOT contain the value specified by using a minus in quotes ("-") first. For example, /TERMINAL=("-"TTA0) will select all records EXCEPT those that contain TTA0 as the terminal.	/ACCOUNT /ADDRESS /ENTRY /IDENTIFICATION /IMAGE /JOB /NODE /OWNER /PRIORITY /PROCESS /QUEUE /REMOTE_ID /STATUS /TERMINAL /UIC /USER
Output Selection	Specifies the type of output (you may only use one). The default is default. /SUMMARY specifies which fields to sort and summarize by.	/FULL /SUMMARY /BINARY
Listing Format	Specifies the title for summary type listings.	/TITLE
	Specifies the sequence of records in brief or full type listings.	/SORT
	Specifies the fields to be included in summary type listings.	/REPORT
Misc.	Specifies where to put the output.	/OUTPUT
	Specifies where to log messages.	/LOG
	Specifies where to put records that were NOT selected. This is a binary file.	/REJECTED

OBTAINING SYSTEM INFORMATION FOR DOCUMENTATION

User Authorization Information

```
$ SET DEFAULT  SYS$SYSTEM
$ RUN AUTHORIZE.EXE
UAF> LIST [*,*]/BRIEF
UAF> EXIT
$ PRINT SYSUAF.LIS
```

Example 16-13 Using the AUTHORIZE Utility to Obtain User Authorization Information

NOTE

Usually, the file type of a list file is LST. Notice that the SYSUAF list file type is different: it is LIS.

Disk-Usage Information

```
$ SET DEFAULT SYS$SYSTEM
$ ASSIGN/USER  QUOTA.LST  SYS$OUTPUT
$ RUN DISKQUOTA
DISKQ> USE device1
DISKQ> SHOW [*,*]
DISKQ> USE device2
DISKQ> SHOW [*,*]          (repeat USE and SHOW [*,*] commands
     .                      for as many devices as necessary)
     .
     .
DISKQ> EXIT
$ PRINT QUOTA.LST
```

Example 16-14 Using the Disk Quota Utility

SYSTEM DISK AND CONSOLE STORAGE MAINTENANCE

To maintain the system disk and the console storage medium:

- Create new system disks
- Update the information on the system disk
- Create extra console floppies or cartridges

Table 16-9 System Maintenance Command Procedures

Function	Command Procedure	Comment
Create a new system disk (on-line)	SYSKITBLD.COM	No optional software transferred to new disk
Add software to present system	VMSINSTAL.COM	Read all instructions carefully before starting
Transfer a file to/from console medium	DXCOPY.COM	Cannot use DCL COPY command on console medium
Save information on console medium	CONSCOPY.COM	Saved information is stored on disk
Build new console medium	CONSCOPY.COM	Information transferred to console medium from disk

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HANDLING ERRORS

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MAYO DE 1985.

HANDLING ERRORS

INTRODUCTION

When a computer does not act properly, it is up to an operator to remedy the situation. An operator should approach problems in a well-defined manner by:

- Positively identifying the problem.
- Gathering data important to the problem.
- Taking action to possibly cure the problem.
- Attempting more drastic action (if appropriate).
- Turning the problem over to the system manager, or other appropriate person, if all operator action fails.

The system problems discussed here are fairly common. After completing this module, discuss any site-specific problems and action procedures with your system manager.

OBJECTIVES

1. To issue DCL commands [illegible] utilities that [illegible] information necessary [illegible] error analysis.

2. To select and record [illegible] needed to document [illegible] problems.

3. To select VAX docu[illegible] that are useful [illegible] clarifying and so[illegible] specific problems [illegible] extracting the proper [illegible]rmation.

4. To prepare the system [illegible] Remote Diagnosis.

5. To choose the proper [illegible]nique for recovering [illegible] system locked up f[illegible] [illegible]ftware reasons [illegible] system").

RESOURCES

1. VAX/VMS System Mess[illegible] and Recovery Proce[illegible] Manual

2. VAX/VMS System Manage[illegible] and Operations Guide

OPERATOR ACTIONS TO PROBLEMS

The action taken by an operator may be to fix a problem or just accumulate information for others to use.

Table 17-1 Basic Problems and Operator Actions

Problem	Operator Action
Error message received from system software or a utility	Look in the VAX/VMS System Messages and Recovery Procedures Manual.
Error occurs in command procedure	From a hardcopy terminal: 1. enter $SET VERIFY 2. rerun command procedure
Hardware device problem	Turn in problem report. Execute SYE utility.
System crashed, but has been rebooted	Gather information on cause of crash by activating SDA utility.
Computer unable to function	1. Site-Specific 2. Contact system manager 3. Call for Remote Diagnosis from DIGITAL Diagnosis Center
System problem, but computer still able to function	Gather information on problem, and give to system manager.

DECIPHERING ERROR MESSAGES

The form of an error message is:

    %FACILITY-L-IDENT, text of message

where

FACILITY	The name of the system program or utility that generated the error.
L	The level of the error (such as success, warning, severe error).
IDENT	A code word that is an abbreviation of the message text.

The VAX/VMS System Messages and Recovery Procedures Manual is a collection of all the messages produced by the system. It also suggests a method for correcting or recovering from each error.

HANDLING ERRORS IN COMMAND PROCEDURES

- It is not up to an operator to debug and correct command procedures written by others
- Most command procedures do not display the commands as they execute, so it may not be obvious where the error is
- When a command procedure problem occurs, it is important to gather as much information as possible.
- If an error message is displayed, use the error message to define the problem.
- If the error is not easily fixed, consult the system manager or writer of the command procedure.
- If the command procedure creating the error cannot be reactivated without harm (consult the writer of the command procedure), perform the following steps:
  - List the steps you took to prepare for the command procedure (for example, tapes obtained, system changes, users forced off the system, disk mounted/dismounted).
  - Record on paper, in proper order, any questions asked by the command procedure, and your replies.
  - Record the exact form of the error message received.
  - Add any comments or information you feel the writer should have to solve the problem (such as the name of the manual and page number where the error message is described).
- If the command procedure can be reactivated without harm, perform the following steps:
  - Log on to a hardcopy terminal.
  - Perform any necessary command procedure preparation (such as obtaining tapes, allocating devices, assigning logical names).
  - Issue the DCL command, SET VERIFY which causes the command procedure contents to print on the terminal while each line is read and used by the system.

```
$ @ERROR.COM
What is the name of the file? : SAMPLE.DAT
%SYSTEM-W-NOSUCHDEV no such device on available
Name of the disk? : <CTRL/Y>
```

Example 17-1 Sample Output Before DCL SET VERIFY Command

```
$ SET VERIFY
$ @ERROR.COM
$ set noon
$ loopl:
$ Inquire name "What is the name of the file? "
What is the name of the file? : SAMPLE.DAT
$ if name .eqs. "" then $goto loopl
$ Allocate DZA1:
%SYSTEM-W-NOSUCHDEV no such device on available
$ Inquire disk_name  "Name of the disk? "
Name of the disk? : <CTRL/Y>
$
```

Example 17-2 Sample Output with DCL SET VERIFY Command

- Activate the command procedure and answer any questions.

- Circle the error message after it appears on the terminal. Because SET VERIFY has been given, the error message should appear immediately after the faulty command line.

- Examine the error message and command line it follows. If the problem is easily fixed, do so. If it is not, or you are not supposed to make changes, consult the system manager or appropriate person.

- Add any information the command procedure writer can use to solve the problem (such as the manual name and page number where the error message is described).

Preparation on VAX-11/780 and VAX-11/750 Computers

The DDC assumes that the system disk pack (or an assigned diagnostic pack) is already on-line. The pack has a diagnostic area ([SYSMAINT]) that the DDC uses to load and run diagnostics.

If the computer is to be tested without VMS (stand-alone), be sure to write-protect the system/diagnostic disk pack. If the computer is to be tested with VMS running, the DDC may want to run on-line diagnostics or error logger, depending on the severity of the problem. The system disk pack or assigned diagnostic pack need not be write-protected in this case. No other normally used disks or tapes should be on the computer at this time.

Stand-Alone Remote Diagnosis on a VAX-11/780

1. Turn the AUTO RESTART switch (on the front console) to OFF.

2. Place the remote console floppy labeled "RX4/ REMOTE CONSOLE FLOPPY" in the floppy drive.

3. Turn the LSI power switch OFF, then back ON.

4. Write-protect the system disk pack (keeping on-line and ready) if this pack has the diagnostic (SYSMAINT) area on it, or mount the assigned disk pack with (SYSMAINT) on it in a drive, and write-protect it.

5. Rotate the key switch (on the front panel) to REMOTE. The REMOTE indicator will light.

   If "remote access not supported" is displayed on the console as a result of rotating the key switch to REMOTE or REMOTE/DISABLE, go back to step 1 and repeat the sequence. The warning "?remote access not supported" indicates that the computer is not properly prepared for DDC to dial into the machine. If, after starting over at step one, the message appears a second time, check the floppy to be sure it is the correct one. If the floppy has the correct label, contact the system manager.

6. The VAX-11/780 is ready for remote diagnosis.

On-Line Remote Diagnosis on a VAX-11/780

NOTE

To use this method, the remote floppy must contain an up-to-date copy of DEFBOO.CMD and WCSxxx.PAT from the console floppy. When you finish these steps, the computer will run normally, except that DDC will be able to dial into the system.

1. Place the remote console floppy labeled "RX4/ REMOTE CONSOLE FLOPPY" in the floppy drive.

2. Turn the AUTO RESTART switch (on the front console) to ON.

3. Turn the LSI powerswitch OFF, then back ON.

4. Rotate the access key switch (on front console) to the REMOTE DISABLE POSITION. The REMOTE indicator will light.

5. The VAX-11/780 is now ready for remote diagnosis.

Remote Diagnosis on a VAX-11/750

Enabling remote diagnosis on a VAX-11/750 is the same whether it is to be standalone or on-line. The information loaded into a VAX-11/780 is part of the optional remote diagnosis hardware on a VAX-11/750. To enable remote diagnosis, perform the following steps.

1. Load the diagnostic cartridge into the console storage device.

2. Turn the POWER ON ACTION switch to HALT.

3. Turn the keyswitch to REMOTE; this transfers system control to the DDC.

NOTE

You may be contacted over the console terminal and asked to insert some floppies/cartridges in the console storage device (CSA1:).