PERSONAL PRODUCTIVITY USING DOS® VERSION 5.0

KENNETH D. GORHAM

B&E TECH
Business and Educational Technologies
A Division of Wm. C. Brown Communications, Inc.

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LOS ANGELES MISSION COLLEGE

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PREFACE

This text *Personal Productivity Using DOS 5* is the third edition of a DOS book that was originally published in 1987. These DOS books have been very successful (selling over 35,000 copies) because they combine a solid discussion of the DOS principles followed by a series of hands-on activities. The text covers DOS 5 at both the DOS prompt and using the DOS shell. The text discusses many of the new features of DOS 5 including the new improved shell, using a mouse with the shell, **doskey**, **mirror**, **unformat**, **undelete**, and the **edit** program.

Error Messages

The text discussion includes numerous examples of command sequences and screen displays. A unique feature of the text is a discussion of error messages generated by DOS and the probable cause of each error. Included in the end of chapter review section are questions and error message solving exercises.

Hands-on Activities

The hands-on activities are broken down into discrete sections so that they can be repeated as many times as necessary. These activities have been extensively tested by the students at Los Angeles Mission College. The activities use a series of files that are provided on the instructor's diskette. The files are designed to be loaded onto a hard disk and downloaded to the student's diskette when needed.

Comprehensive Problems

At the end of each chapter's activities is a comprehensive problem. These problems make the student utilize many of the techniques discussed in the chapter to solve a particular problem. The student solves the comprehensive problem and produces a printout which is given to the instructor.

Notation System

When new terms are introduced in the text, they are printed in *italics*. When DOS commands such as **dir** are used, they are printed in **boldfaced** type. When files such as BUDGET.94 are mentioned in the text, they are printed in CAPS. When keys such as <ESC> are used in the text, they are printed in CAPS and enclosed in angle brackets. Key sequences such as <CTRL-C>, are shown with a dash separating the two keys. To use the key sequence, press and hold the first key and then tap the second key.

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CHAPTER 1

THE DOS ENVIRONMENT

LEARNING OBJECTIVES

After completing chapter 1 you will be able to:

- Define hardware and software.
- Define the components of the systems unit.
- Define the difference between ROM and RAM.
- Differentiate between temporary and permanent memory.
- Define the different types of disk drives.
- Define the function of adapter cards.
- Define the different types of video display cards.
- Define the different parts of the keyboard.
- Define the different types of printers.
- Define the use of tape backup, mouse, and modem devices.

DOS Defined

This text assumes that you are using an operating systems program called PC-DOS Version 5.0 or MS-DOS Version 5.0. Since PC-DOS and MS-DOS are virtually identical, in this text the program will be called *DOS* (an acronym for **D**isk **O**perating **S**ystem). DOS is the most widely used operating system program found on microcomputers. Over 100 million copies of DOS have been sold. A *computer program* is a set of commands that instructs a computer to perform a task. The *operating system program* is a program that manages the computer system. DOS is the operating system program discussed in this text.

DOS gets your computer running and controls the operation of your computer's activities. Programs that are used to accomplish a particular task such as word processing are called *applications programs*. Examples of applications programs include WordPerfect (a word- processing program) and Lotus 1-2-3 (a spreadsheet program). Before you can start an applications program, you must first start DOS. The applications programs use DOS to accomplish basic processing tasks. If the computer did not have an operating system, each applications program would have to include the ability to accomplish these basic processing tasks.

Files and Directories

Computer information is stored on storage media called a *disk*. DOS creates a storage facility on the disk, called a *file*, to store groups of related information. The instructions used to run a program are stored in *program files*, and the information you create by using an applications program is stored in *data files*. For example, these data files can be word-processing documents or spreadsheets. An important function of DOS is to control the storage of files on disk. As you work with an application program, DOS processes the information stored in program files and passes it along to your system when it is needed. When you are finished using the application program, your data files are stored on disk.

You assign each file a name so that you can identify its contents. For example, you may use a word-processing program to create a budget document for your business. You might assign the name BUDGET to the data file that contains this information. Just as paper documents are stored in file folders in the drawers of a file cabinet, electronic files are stored in electronic file folders called directories and subdirectories.

Organizing Files into Directories

A disk can hold several hundred or even thousands of files, depending on its size. The more files you have, the more difficult it is to keep track of them. To help you keep track of your files, you can use DOS to group your files into *directories*. Just as file folders in a file cabinet contain groups of related files, directories are used to store groups of related files on disk. You assign each directory a unique name so that you can identify it.

When your directories become too large, you can use DOS to create additional directories to further organize your files. A directory within another directory is called a *subdirectory*. For example, within the BUDGET directory, you could have a subdirectory for the each year such as BUDGET93 and BUDGET94. In chapter 6 you'll learn how to create and manipulate directories and subdirectories.

The Importance of DOS

You may wonder why DOS is so important to understand, especially if you plan on only using application programs. It is important because many applications programs, such as Lotus 1-2-3, must be accessed through DOS. You will also be more efficient in your interaction with applications programs when you are familiar with DOS. You can use DOS to configure your system so that

applications programs will operate at maximum efficiency. DOS can automate procedures so that you can efficiently manage your disk files and move smoothly from one applications program to another.

Microcomputer Systems

A *system* is a group of elements that, when properly combined, produces a result. A *microcomputer system* is a collection of hardware components that work together. An operating system is a group of programs that work with the microcomputer system to produce results. Before DOS can be explored, an understanding of what constitutes a typical microcomputer system must be achieved. This knowledge will also assist you if you purchase your own computer.

A microcomputer system consists of two major items: hardware and software. *Hardware* is the tangible, physical machinery. *Software* is the set of programs, procedures, and related documentation associated with a computer system. The DOS program is an example of software. Software primarily consists of the programs that tell the machinery what to do.

Software

Software that a microcomputer user will encounter can be divided into three basic categories: operating system programs, applications programs, and utility programs. Operating system programs are used to start the computer, work with applications software, and store data. DOS is an example of an operating system program.

Applications programs are programs that are used to accomplish a particular function. The most popular types of applications software are word-processing programs such as WordPerfect, used to create letters and other documents; spreadsheet programs such as Lotus 1-2-3, used for budgeting and financial analysis; and database management programs such as dBase IV, used to create electronic filing systems.

Utility programs, provide additional flexibility and ease of use when added to operating systems or applications software. Some utility programs are provided with DOS and you can buy utility programs from other software companies that make DOS easier to use. Utility programs can also be added to applications software. For example, you may buy additional utilities for your spreadsheet software that will enhance graphics and printing, and make the spreadsheet program easier to use.

Hardware

A *microcomputer* is an electronic device controlled by instructions stored within its memory. It allows data to be entered, processed, output, and stored. *Data* is the words or numbers processed by the microcomputer to create useful information. Microcomputers perform four basic functions: input, processing, storage, and output. All pieces of hardware perform at least one of these functions, and some hardware devices perform two of these functions. Processing involves changing or manipulating data to produce usable information. The *microprocessor chip* is the hardware device that does the processing.

Data must be input to the computer so that it can be processed. Data is typically input from the *keyboard* or a *disk drive*. A *mouse* device may be used in place of or in addition to a keyboard to enter commands. Information can be output on a device called a *monitor* that looks like a TV screen. The monitor displays information, such as the instructions you send to your computer and the information and results your computer sends back after interpreting your instructions. The monitor may display information in one color or several colors. Output to the monitor is called *soft copy output* while *hard copy output* is information that is printed by a device called a *printer*. Information is stored by writing it to a disk so that it can be recalled in the future.

The hardware units that are typically part of a microcomputer system are the *systems unit* which contains the microprocessor chip, RAM and ROM memory chips, disk drives, and a video display card. A *video display card* controls the display of information on the monitor. Storage devices include the disk drive, which is used to store data and programs and *tape backup units*, which are used to back up information stored on disk. Output devices include the monitor, which displays output from the microcomputer and also displays data and commands as they are entered by the user; and the printer, which provides hard copy output.

Microprocessor Chips

The type of microprocessor chip installed in the systems unit determines the type of systems unit. The microprocessor chip drives the rest of the computer system. There are currently a number of different types of microprocessors. Each generation of microprocessor is faster than the one that preceded it. The following chart summarizes the types of microcomputers.

Type	Word Size	MHz	Comments
8088	16-bit word/8-bit data path	4.77	Used in old "PC/XT-style" machines. Not used in currently sold machines.
8086	16-bit word/16-bit data path	12	Not used in currently sold machines.
80286	32-bit word/16-bit data path	33	Used in "AT-style" machines. Not used in currently sold machines.
80386SX	32-bit word/16-bit data path	20	Processes 32 bits of data at a time but communicates with the rest of the machine in 16-bit chunks.
80386DX	32-bit word/32-bit data path	33	A full 32-bit processor.
80486SX	32-bit word/32-bit data path	25	Like the 486DX except that it does not have a built-in math co-processor.
80486DX	32-bit word/32-bit data path	50	Comes with built-in math co-processor that can provide enhanced speed with software that performs math-intensive calculations.
Pentium	32-bit word/32-bit data path	100	Released in last quarter of 1993.

Microprocessor Types

The Intel Corporation dominates the market for most of the microprocessor chips and it manufactures all the microprocessors discussed above. The 486 chip is the most commonly used chip sold in today's computers. If you plan on using Microsoft Windows (a very popular program that enhances DOS), you should purchase a computer with a 386DX or better microprocessor chip. The Pentium chip is expected to be considerably faster and more expensive than the 486 family.

Computer chips, including microprocessor chips, store information by assigning a value of either 0 or 1 to the smallest unit of storage, a binary digit or a *bit*. Eight of these bits grouped together forms a *byte*. It takes one byte to store each character in a computer chip. A *character* is a number (0-9), a letter (A-Z), or a special character such as a question mark, a dollar sign, and so on.

When bytes are grouped together (always in multiples of 2), the groups are called *words*. A 16-bit word represents two characters and a 32-bit word represents four characters. The *word size* of a microprocessor determines how much data can be processed at one time. As the word size increases more data can be processed with each pass and the computer operates faster.

The word size used within the microprocessor and the word size for input/output can differ as in the case of the 80386SX chip (32-bit within the microprocessor, 16-bit input/output path). The word size used for input/output determines how fast information can be input to the microprocessor and

output from the microprocessor. A *clock* is used in each microprocessor to control how fast it operates. A *megahertz (MHz)* is a unit used to measure how fast the clock runs. A megahertz is one million cycles per second. The faster the clock is driven, the faster the microcomputer. For example, you can purchase 80486 computers that run at 25 megahertz or 66 megahertz.

Memory Chips

The systems unit contains two types of memory chips, *ROM* (Read Only Memory) and *RAM* (Random-Access Memory). Microcomputers typically have a small amount of ROM and a large amount of RAM. Both types of memory are stored on a physical unit called a *memory chip*.

ROM is called Read Only Memory because you cannot write into this memory; you can only read from this memory. ROM contains programs that have been permanently encoded into ROM chips and are used when the computer is turned on. For example, one ROM program allows the computer to start itself, the equivalent of a starter on a car. Another ROM program monitors the keyboard for activity and sends the keystrokes to DOS for analysis. ROM memory is permanent because it is not erased when you turn off the computer.

RAM is called random access memory because you both read from and write to this memory. The instructions that your computer gets and the information that your computer processes are kept in RAM during your work session. RAM is known as temporary memory because it is erased when the computer is turned off. When the microcomputer is powered on, programs (including DOS) are loaded into RAM and data is manipulated within RAM. When you create a letter with your word processing program or create a budget with your spreadsheet program this information is manipulated in RAM. Since RAM will be erased when the microcomputer is turned off, you must, at some point, save your letter or spreadsheet to disk memory.

The amount of RAM is usually at least 640,000 characters, but many users add more RAM to their computers. The amount of RAM needed in a microcomputer is determined by the requirements of the software used. For example, Lotus 1-2-3 Version 2.2 requires 256,000 characters of RAM whereas WordPerfect Version 5.1 requires 512,000 characters of RAM. The size of RAM is measured in *kilobytes* or *megabytes*. One kilobyte (*KB*) of RAM equals 1,024 bytes. One megabyte (*MB*) of RAM equals 1,048,576 bytes. Since one byte can store one character, a microcomputer with 640KB of RAM can store 655,360 characters in RAM.

Disk Drives

A disk, like a cassette tape, is a reusable storage device that holds information such as software and data in files. The disk drives are the microcomputer's permanent memory device. Unlike information stored in RAM, however, information stored on disk is not erased when you turn off your computer. Your computer's disk drives move information stored on the disks into and out of RAM. For example, your computer can read software instructions from disk into RAM, and it can write your data to a disk for safekeeping. There are two types of disk drives, *floppy disk drives* and *hard disk drives*.

The hard drive is inside the systems unit and contains a non-removable disk drive. A hard disk drive allows you to store large amounts of information in one convenient place, instead of storing it on many floppy disks. The hard disk drive can also write and read information to and from your system much faster than a floppy disk can read and write information to and from a disk. When your system writes or reads information to or from a disk, the indicator light on the drive goes on.

A floppy disk drive holds a removable floppy disk, which has less storage capacity than a hard disk. The user has to insert a disk (also called a diskette) into the floppy disk drive. There are two types of floppy drives, a drive that uses a 5.25-inch-diameter disk and a drive that uses a 3.5-inch-diameter disk. The 5.25-inch drive is the original type of drive. The 3.5-inch drive has become the more popular type of drive because the diskette used is more durable than a 5.25-inch diskette. The 3.5-inch diskette is stored within a rigid case; the 5.25-inch diskette is stored within a flexible case.

The terms byte, kilobyte, and megabyte are also used to define the amount of disk storage. Both types of diskettes can have data stored on them using different densities. *Density* is a measure of the number of magnetic spots recorded in a one-inch area on the diskette. The original 5.25-inch double-density diskette could store about 360KB bytes of data. A high-density (also called a quad-density) diskette can store more than one megabyte of data.

Both the 3.5-inch and 5.25-inch diskettes can be purchased in either double-density or high-density formats. Floppy diskettes can store from 360KB to 1.44MB depending upon the type of disk drive and the density used. Hard drives can usually store at least 40MB of data and larger hard drives can store as much as 600MB of data.

Each disk drive has a letter assigned to it so that you can tell your system where to find instructions and information. If you have one floppy drive it is known as the A drive. If you have two floppy drives they are known as the A and B drives. The hard drive is named the C drive, and if you have multiple hard drives you may also have a D or E drive and so on. A system that has a hard drive must have at least one floppy drive because software programs that are purchased must be initially loaded onto the hard disk from a floppy drive. The floppy drive can also be used to back up the hard drive and to transfer data to other microcomputers.

Adapter Cards

Adapter cards installed inside the systems unit customize the microcomputer to your individual specifications. Just as some cars may have air conditioning and power windows and other cars have no air conditioning and manual windows, microcomputers can be configured with a variety of options. These options require that an adapter card be installed to connect the option to the systems unit.

The adapter card is installed in an *expansion slot* that is mounted on a printed circuit board called the *motherboard* that forms the bottom of the systems unit. The microprocessor, RAM, and ROM are also plugged into the motherboard. The expansion slots are all connected to a common communications channel called a *bus*. Earlier systems had an 8-bit bus, but modern systems have either a 16-bit or 32-bit bus. The wider the bus the faster data can be transferred.

Microcomputers have from three to ten expansion slots depending on the type of system. The number of expansion slots determines how many options can be added to a microcomputer. Most microcomputers have two adapter cards as standard equipment. There must be a disk-drive controller card to connect your diskette or hard disk to the systems unit. You must also have a video card to connect your monitor to the systems unit. Another common type of adaptor card is a printer interface card to connect a printer to the systems unit.

Located on the back or the front of the systems unit are sockets called *ports*. You use two of the ports to plug in your keyboard and monitor. Any additional ports are used to connect hardware devices such as the printer to the systems unit. Since hardware devices are either parallel or serial devices, ports (except for the ports used to connect the keyboard and the monitor) are also either parallel or serial.

A *serial port* transfers data one bit at a time whereas a *parallel port* transfers data eight bits at a time. You must connect a parallel device with a parallel port and a serial device with a serial port. For example, the video display card usually comes with a parallel printer port. A parallel cable would be used to connect a parallel printer with the parallel printer port. Serial devices include the mouse and the modem. Virtually all other devices are parallel devices.

Peripherals

Every piece of hardware that is connected to the systems unit with an adapter card or a cable is known as a *peripheral*. Common peripherals include the keyboard, monitor, printer, and disk drive.

Monitor

A monitor is a display screen that allows the user to see what is being keyed into RAM or displayed from RAM. Monitors typically display eighty characters horizontally and twenty-five lines vertically on the screen. A flashing dash called a *cursor* marks your current position on the screen. If you move the cursor to the top or the bottom of the screen, data must be scrolled on and off the screen because only twenty-five lines by eighty characters can be displayed at one time. There are two types of monitors: monochrome (single color) and color. A monochrome monitor displays green, amber, or white characters on a black background. Color monitors can display multiple colors.

The quality of the monitor and the type of video display card connected to the monitor determines the resolution or clarity of the display. Some video display cards enable your monitor to display graphical information in addition to text and numbers. The resolution of video display cards is primarily determined by the amount of picture elements or *pixels* displayed by the card. A pixel is an individual point on the screen used to create each character. The pixel rate is measured horizontally and vertically. For example, a 320 x 200 pixel monitor displays 320 horizontal pixels by 200 vertical pixels.

Next to resolution, *dot pitch* is the most important factor in determining the apparent sharpness of a screen. Dot pitch is the distance between the pixels. All other things being equal, the smaller the dot pitch (expressed in millimeters), the sharper the image. The following table summarizes the different types of video display cards:

Type	Pixels	Graphics/Color Palette
MDA	750 x 350	Monochrome without graphics.
Hercules	740 x 348	Monochrome with graphics.
CGA	320 x 200	Color (4 colors with a palette of 16).
EGA	640 x 350	Color (16 colors with a palette of 64).
VGA	640 x 480	Color (16 colors with a palette of 256).
Super VGA	800 x 600	Color (16 colors with a palette of 256).

Video Display Cards

The original Monochrome Display Adapter (MDA) card had a high resolution of 750 x 350 but did not support color. The original Color Graphics Adapter (CGA) card displayed color graphics (4 colors out of a palette of 16), but the card had a low resolution of 320 x 200. The Enhanced Graphics Adapter (EGA) card, introduced in 1984, displayed color (16 colors out of a palette of 64) with high resolution (640 x 350). The Video Graphics Array (VGA) card, currently the most popular type of video display card, is used for both high resolution monochrome and color monitors and has a resolution of 640 x 480. The super VGA display card, offering a resolution of 800 x 600, can display 16 colors out of a palette of 256. Some super VGA cards have a resolution of 1024 x 768 and can display 256 colors.

Keyboard

You use the keyboard to type instructions to your computer and to type information you want your computer to process. When a key is pressed, a signal flows from the keyboard, through a cable, into memory, where a code representing the character keyed in is stored. The keys are typematic, which means that if you hold them down for a fraction of a second the keyboard will continue to type the same character until you release the key. You will use this feature when you wish to repetitively enter