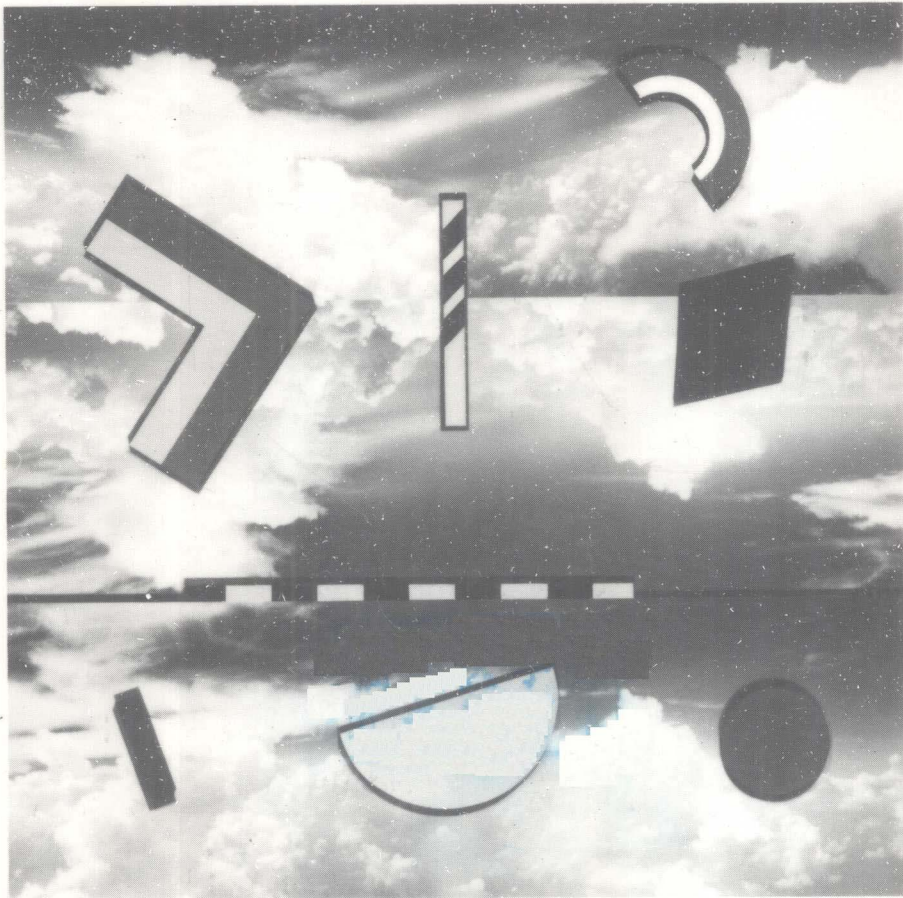


Second Edition

INTRODUCTION TO THE MICROCOMPUTER AND ITS APPLICATIONS

PC-DOS™



CHAO C. CHIEN

PS/2® Version

INTRODUCTION TO THE MICROCOMPUTER AND ITS APPLICATIONS: PC-DOSTM

Second Edition

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INTRODUCTION TO THE
MICROCOMPUTER AND
ITS APPLICATIONS: PC-DOS™

To
Mother
With love from us all

INTRODUCTION

Every computer has an operating system. The operating system is the set of software procedures that govern the computer's basic operations. In addition to controlling the computer's internal affairs, the operating system allows the user to perform application-independent, system-oriented activities, such as configuring the system's equipment and duplicating files. With mainframe and minicomputers, these activities are performed not by computer users who are more interested in the applications than in the mundane chores of preparing the computer system but by special computer center personnel known as *computer operators*. There are good reasons for this separation of responsibilities. First, system-level operations are much more technical than applications. Second, when hundreds of thousands or even millions of dollars are spent on a computer system capable of serving many users, the cost associated with the maintenance of a crew dedicated to operating the computer system is well justified. This would not be the case for microcomputers, which may cost as little as a few hundred dollars each and generally serve single users. But the microcomputer uses operating systems too, and somebody has to perform the system-level tasks. That person is the user.

This book is intended for a course devoted to the subject of PC-DOS, the operating system for the IBM PC. It is expanded from Chapters 1, 3, and 4 of *Introduction to the Microcomputer and Its Applications* and contains the topics generally considered mandatory for professional IBM PC applications users who will be managing their own computers as well as working in a communal environment. The computer used in the discussion is the IBM PC or a compatible with at least one diskette drive, although a hard disk is preferable. The operating system used is PC-DOS version 2.xx and up.

The same data diskette used with *Introduction to the Microcomputer and Its Applications* accompanies this book. Therefore, you will find that there are many more files on the data diskette than you need with this booklet. But this should not hinder you from using the data diskette to try out the sample illustrations and perform the suggested exercises.

ABOUT THE DATA DISKETTE

The data diskette has the following directory structure:

\BATCH	(For use with PC-DOS and batch files.)
\WP-FILES	(For use with WordPerfect.)
\WP-LTD	(For use with WordPerfect limited edition.)
\WSAFILES	(For use with WordStar.)
\123FILES	(For use with 1-2-3.)
\DB3FILES	(For use with dBASE III Plus/IV.)
\ADDRESS	(For use with dBASE III Plus/IV.)
\WORKFILE	(Extra work files for exercise or exam use.)
\WORDPERF	(For use with WordPerfect.)
\WP-LTD	(For use with WordPerfect limited edition.)
\WORDSTAR	(For use with WordStar.)
\LOTUS123	(For use with 1-2-3.)
\DBASE	(For use with dBASE III Plus/IV.)
\DBASE-ED	(For use with dBASE III Plus educational version.)

The 5 $\frac{1}{4}$ -inch-diameter diskette is entirely occupied by the files in these directories. In order to use the diskette, you should first create a working diskette by disk copying the data diskette onto a blank diskette (using the PC-DOS command DISKCOPY A:A:) and then making room on it by removing the unnecessary files and directories. For this booklet, the only directories required are \BATCH, \WP-FILES, \WP-LTD, and \WS-FILES.

To remove a directory, you must first erase its files. For example, to remove directory \DB3FILES, use the following PC-DOS commands:

```
ERASE A:\DB3FILES\*.*
RD A:\DB3FILES
```

To remove the \WORKFILE directory, first remove all of its children directories, such as using the following commands to remove the \WORKFILE\WORDPERF directory:

```
ERASE A:\WORKFILE\WORDPERF\*.*
RD A:\WORKFILE\WORDPERF
```

When all the children directories have been removed, then remove the \WORKFILE directory with:

```
RD A:\WORKFILE
```

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Chapter 1

Understanding PC-DOS

After studying this chapter, you should be able to:

- Identify the computer's fundamental hardware components
- Describe the differences between ROM and RAM
- Identify the different kinds of peripheral equipment
- Explain the terms *hardware* and *software*
- Describe the role of the operating system
- Explain default values
- Discuss the functions of the system prompt and cursor

PC-DOS is the operating system for use with the IBM PC family of computers. An *operating system* is a set of programs (defined later) designed to manage the computer's resources. If you have no experience working with computers, it is essential that you have some idea about how the computer works before you begin studying the operating system, which is a rather technical subject. Thus, we will begin our study of PC-DOS by examining the structure of the computer and the basic computer operations.

COMPUTER FUNDAMENTALS

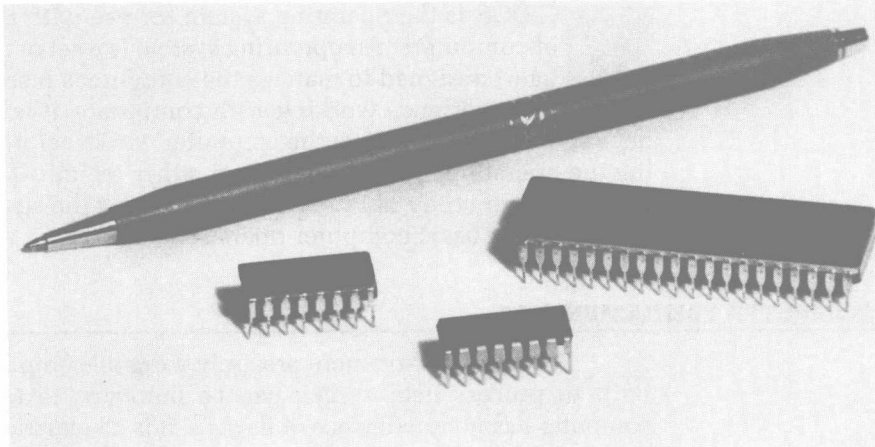
A computer—or, more precisely, a *digital computer*¹—is a machine built to process data, which can be numbers, text, or graphics. The computer has no intelligence of its own; it is an electrical device designed to recognize a given set of instructions and follow them. By retaining the *instructions* and *data* in the form of electrical images, it decodes the instructions, carries them out, and works on (processes) the data to produce results, which are often called **output** or **information**.

Physically, the computer consists of a number of components called the **hardware**. In simplified terms, a computer has two main components: a central processing unit and a memory unit. The **central processing unit**, also called the **CPU** or the **processor**, may be likened to the computer's brain, although in reality the computer cannot think—it can only follow instructions. The CPU's function is to control and perform computer operations by following instructions. The **memory** holds the directives of the computer's operations, called *instructions* or *programs*, and the data to be worked on. For example, you can instruct the computer to solve the equation $2 + 3 + 4$. The numbers 2, 3, and 4 are the **data**. You give the computer appropriate instructions on how to add these numbers. Then the CPU and the pertinent components apply the instructions to the data and produce the result—in this case, 9. The instructions and the data—in fact, any abstract, intangible part of the computer—is called **software**.

¹There are two types of computers: the analog computer and the digital computer. An *analog* computer responds to continuous electrical wave signals and produces continuous electrical wave outputs. A *digital* computer works on discrete electrical states, such as on and off, and outputs discrete electrical signals. The discrete electrical signals are then interpreted by people as intelligence. All the computers discussed in this book are digital computers.

FIGURE 1 ■ 1

A CPU



The CPU

The CPU (See Figure 1.1) consists of specially designed electronic circuitry. It basically performs only a few operations, which include:

1. Simple **arithmetic operations**, such as addition, subtraction, multiplication, and division.
2. Simple **logical operations**, such as comparing two numbers so that the result of the comparison can be used to determine what action to take next.
3. Moving data from one place in the computer's memory to another.
4. Transforming data from one form into another.
5. Simple input and output operations. **Input** means to get data or instructions into the computer; **output** means to pass the results to the outside.

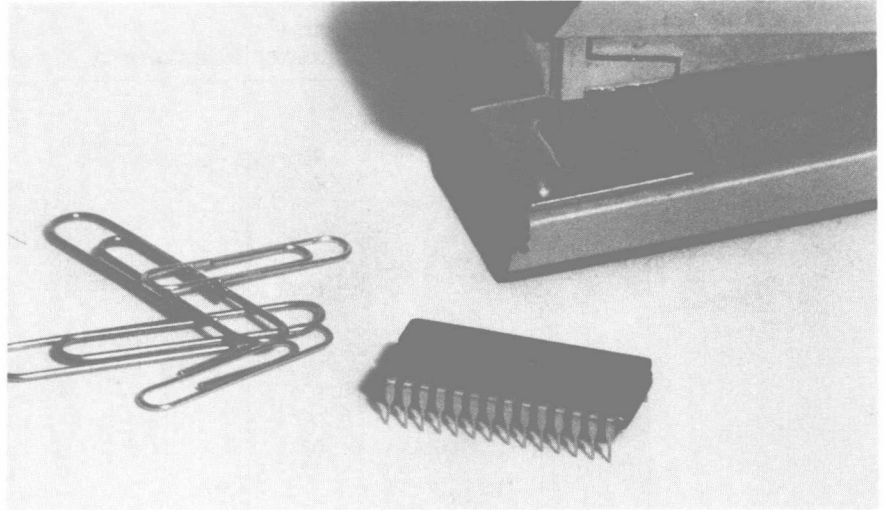
For **microcomputers**, the entire CPU circuitry is etched onto a small piece of semiconductor material called an **integrated circuit** or **chip**. Such a CPU is called a **microprocessor**, from which the term **microcomputer** is derived.

The Memory

The memory (see Figure 1.2) holds the data and instructions the CPU needs. Because the computer is an electrical device, it understands only *electricity on* and *electricity off* (or *magnetic north* and *south*, or *with* and *without voltage*). Thus, all intelligence is expressed using two symbols—0 and 1—which are called *binary digits* or **bits**. (Binary means “of two.”) Numeric values are expressed using the *binary numbering*

FIGURE 1 ■ 2

A memory chip



system, and text characters are represented as codes made up of combinations of 0s and 1s. The character codes used by the IBM PC are called ASCII, the *American Standard Code for Information Interchange* (see Figure 1.3). In ASCII, eight bits—any combination of 0s and 1s—form one character or symbol. For example, the letter *A* is denoted by the code 01000001 (which also can be interpreted as the value 65).

The basic working unit of the computer's memory is therefore a group of eight bits, which is called a **byte**. The computer's memory consists of thousands of bytes. For convenience, the unit **K** can be used to express memory capacity. One K equals 1,024. Thus 64K bytes of memory is the same as 65,536 ($1,024 \times 64 = 65,536$) bytes. For larger memory capacities, the unit **mega** can be used. One megabyte equals 1,048,576 bytes.

The CPU obtains instructions and data from the computer's memory. Because the same computer performs a great variety of tasks depending on the instructions, or programs, it receives, the memory is erasable just as audiocassette tapes must be erasable to record different musical selections at different times. But there are some programs and instructions the computer needs no matter what function you are performing. These programs often are permanently recorded in the memory so that they cannot be destroyed. As a result, the computer's memory usually consists of two parts:

1. **Read-only memory**, or **ROM**, whose contents (instructions and data) are permanently fixed, can be read and used by the CPU but cannot be altered by the computer user.

FIGURE 1 ■ 3

The ASCII table

ASCII VALUE	CHARACTER	ASCII VALUE	CHARACTER	ASCII VALUE	CHARACTER
032	(space)	064	@	096	
033	!	065	A	097	a
034	"	066	B	098	b
035	#	067	C	099	c
036	\$	068	D	100	d
037	%	069	E	101	e
038	&	070	F	102	f
039	'	071	G	103	g
040	(	072	H	104	h
041	)	073	I	105	i
042	*	074	J	106	j
043	+	075	K	107	k
044	,	076	L	108	l
045	—	077	M	109	m
046	.	078	N	110	n
047	/	079	O	111	o
048	0	080	P	112	p
049	1	081	Q	113	q
050	2	082	R	114	r
051	3	083	S	115	s
052	4	084	T	116	t
053	5	085	U	117	u
054	6	086	V	118	v
055	7	087	W	119	w
056	8	088	X	120	x
057	9	089	Y	121	y
058	:	090	Z	122	z
059	;	091	[	123	{
060	<	092	\	124	|
061	=	093	]	125	}
062	>	094	^	126	~
063	?	095	_	127	␣

2. **Random-access memory, or RAM,** or *volatile memory*, whose contents are erasable and therefore can be defined by the computer user.

How the Computer Works

When executing (carrying out the instructions of) a program, the **control unit**, or **CU**, component of the CPU retrieves a program instruction from the computer's memory and decodes it so that it can understand the operation being requested. It then passes the decoded instruction to the appropriate components of the computer to carry out the instructions. Often the instruction is given to a component called the