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Your IBM[®] PC

A Guide to the IBM Personal Computer



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YOUR IBM® PC: A Guide to the IBM® Personal Computer

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**YOUR IBM® PC:
A Guide to the IBM® Personal Computer**

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LJG

INTRODUCTION

Whether you are a novice or an experienced computer user, this book will show you how to use the IBM Personal Computer. With it you will learn about three aspects of using the IBM PC. First, you will be introduced to the parts that can make up an IBM PC system, including components from both IBM and other manufacturers. Second, you will see the wide variety of ways in which the PC can be used, either with applications programs that you buy or with programs that you write yourself. Last and most important, you will see how to control the PC by entering various commands from the keyboard and learn how to write your own programs.

Chapters 1 and 2 are addressed to everyone who uses the PC. Chapter 1, *The IBM PC*, describes the parts common to all PC systems and some typical additions that give your computer specific capabilities. A range of applications for the PC is also presented so that you will have an idea of the flexibility of the PC. Chapter 2, *Getting the PC Up and Running*, provides an overview of how to use the PC. This chapter assumes no prior experience with the PC. When you have finished Chapter 2, you will be able to run the three versions of the IBM BASIC language, DOS, and CP/M-86, as appropriate for your system.

Chapters 3 through 6 are for readers who wish to program the PC in BASIC. As with Chapters 1 and 2, you do not need any experience with BASIC to use these chapters. However, some introductory programming background will be helpful.

Chapter 3, Starting BASIC, Chapter 4, The Elements of BASIC, and Chapter 5, Extending the Power of BASIC, work together to enable you to compose your own solutions to problems by writing programs in BASIC. These chapters explain the programming process and how programs are entered, changed, saved, and retrieved. They also explain how to write programs that take advantage of the PC's features.

Chapter 6, BASIC Files, shows you how to store and retrieve data from various storage and input/output devices. For example, you will learn how to organize information from BASIC programs, put it onto floppy disks, and then access that information efficiently.

Chapter 7, The PC Memory, is useful after you get some experience programming in BASIC or if you are using other languages with the PC. This chapter discusses how the memory of the PC is organized and how it is accessed. This chapter also illustrates how BASIC programs interact with memory and how you can control this process.

Chapters 8, 9, and 10 can be used by anyone who is programming in BASIC.

Chapter 8, Graphics, demonstrates how to generate figures and charts on the PC from BASIC. Graphics is an important part of many programs, since using appropriate graphics can greatly enhance the communication between a user and a program.

Chapter 9, Sound and the PC, provides a guide to generating sound with the PC through BASIC. Using BASIC you can create sounds from scratch, specifying frequencies and durations of the sound, or you can transfer music to the PC, specifying notes, tempos, note lengths, and so on.

Chapter 10, Communications, explains how to use the PC to communicate with other devices, including other computers, other PCs, and various input and output devices. This chapter explains both how to use communications hardware with already written programs and how to write your own communications programs in BASIC.

The next two chapters, Chapters 11 and 12, are for readers who wish to run programs from PC DOS or CP/M-86. Chapter 11, Operating Systems, Disks, and DOS, and Chapter 12, CP/M-86 for the PC, will enable you to use the most popular operating systems for the PC. Here you will

see how to work with floppy disks outside of BASIC and how to use some of the programs that come with the DOS and CP/M-86 operating systems.

The last chapter, Chapter 13, Keeping the PC Up and Running, offers advice about getting a space ready for your system and about coping with problems that may occur while you are operating the PC. This chapter also outlines some sound installation and operating procedures, and explains how to troubleshoot problems yourself as well as where you can go for more help.

CONTENTS

	Introduction	ix
1	The IBM PC	1
2	Getting the PC Up and Running	19
3	Starting BASIC	39
4	The Elements of BASIC	69
5	Extending the Power of BASIC	113
6	BASIC Files	157
7	The PC Memory	193
8	Graphics	203
9	Sound and the PC	237
10	Communications	267
11	Operating Systems, Disks, and PC-DOS	291
12	CP/M-86 for the PC	327
13	Keeping the PC Up and Running	369
A	BASIC Statements, Commands, Functions, and Variables	381
B	ASCII Characters and Secondary Codes	509
C	BASIC Error Messages	521
D	DOS Command Summary	529
E	DOS Error Messages	537
F	CP/M-86 Command Summary	557
	Index	575

1

THE IBM PC

The IBM Personal Computer, which we will call the IBM PC or simply the PC, is a complete computer system. All PCs are made up of a few basic parts and typically of a few optional parts that tailor the PC for a particular application.

In this chapter, you will learn what the basic parts of the PC are and what they do. You will also learn about some of the more common optional parts that can be added to a system to customize it and the applications in which those parts might be used. When we refer to parts, we mean both physical units—that is, the hardware—and the instructions or programs that control the hardware—that is, the software.

THE IBM PC SYSTEM HARDWARE

The basic hardware of a PC system consists of

- The System Unit with memory
- The keyboard
- A display.

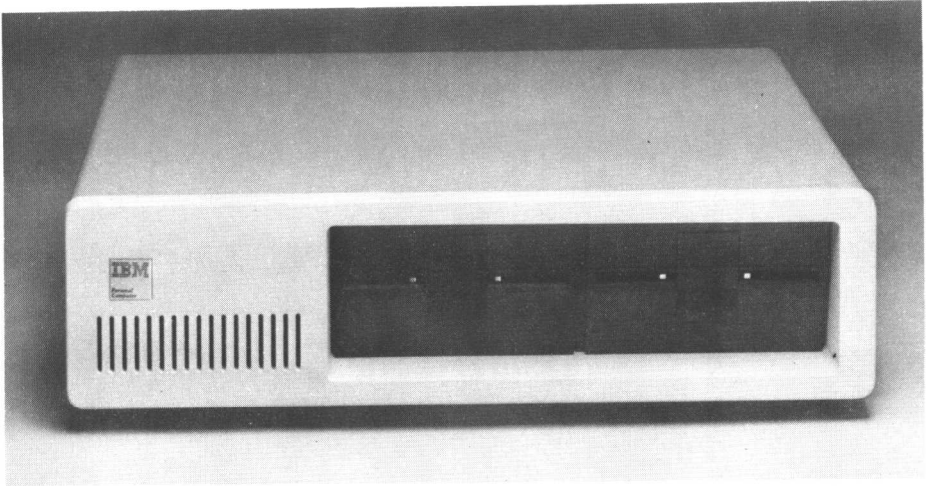


Figure 1-1. The IBM PC System Unit

The System Unit

The System Unit, shown in Figure 1-1, is the heart of the PC. Inside the System Unit is a printed circuit board, called the System Board, that contains the basic circuitry of the PC. The System Board also has five connectors called the System Expansion Slots, shown in Figure 1-2. Several manufacturers, including IBM, offer cards or boards that can be plugged into the System Expansion Slots to expand the functions of the PC. As we will see, these *option boards* allow you to tailor the PC to your requirements.

The Memory

Programs and data are stored in the memory of the PC, shown in Figure 1-3. There are two kinds of memory: ROM and RAM. *ROM* (read-only memory) is used to store programs and data that permanently reside in the PC. An example of a program stored in ROM is the Cassette BASIC program that comes with the PC. The contents of ROM are not lost when you turn the PC off. *RAM* (random-access memory) is used to store most of the programs and data that you will run. The contents of

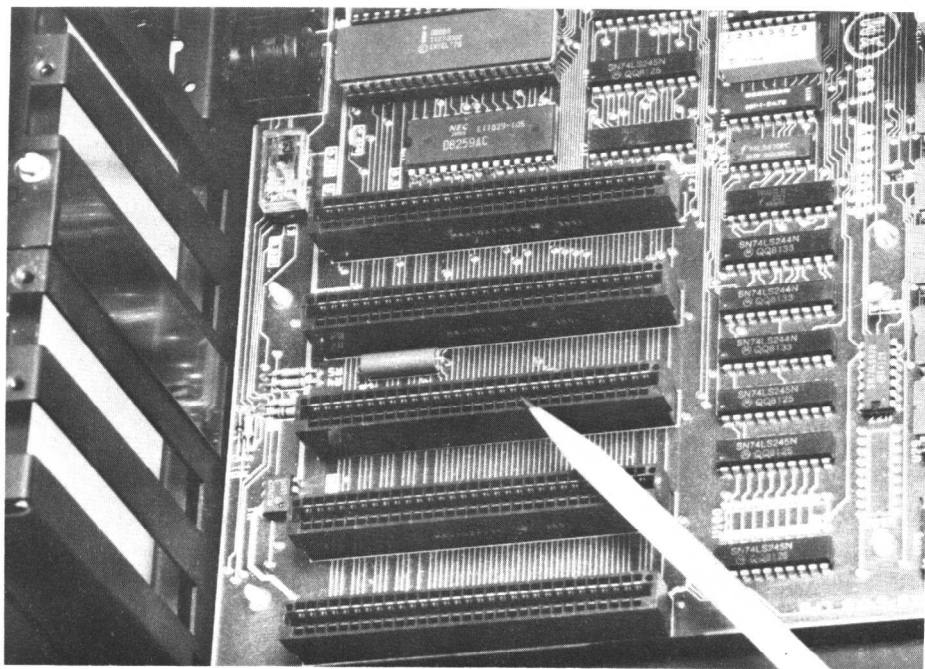


Figure 1-2. System Expansion Slots on the System Board

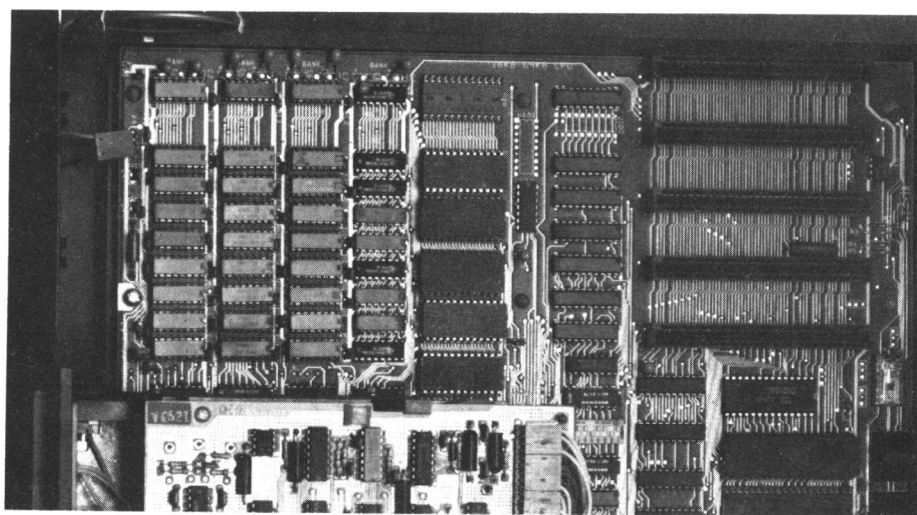


Figure 1-3. The 8088 microprocessor and memory on the System Board

RAM are lost when the PC is turned off.

Memory is organized in units called *bytes*. A single byte represents a value which can be interpreted in a number of ways, depending on the application. For example, a byte in memory can be used to represent a single character or a number. The System Board typically will contain 40 kilobytes (1 kilobyte = 1024 bytes) of ROM and up to 64 kilobytes (or 64KB) of RAM. As we will see, the RAM of the PC may be expanded through the installation of memory cards in the System Expansion Slots.

The Keyboard

The PC's keyboard is shown in Figure 1-4. The keyboard is like a regular typewriter keyboard with some additional keys that the PC uses for special functions. These keys will be discussed in Chapter 2.

The Display

There are four kinds of displays that can be used with the PC: the IBM Monochrome Display, a black and white video monitor, a color



Figure 1-4. The PC keyboard

monitor, or a regular television. Figure 1-5 shows some examples of displays that you can use with the PC.

The equipment required to attach a display to the PC depends upon the type of display that you use. An IBM Monochrome Display requires a Monochrome Display and Parallel Printer Adapter; a color or black and white video monitor or a television requires a Color/Graphics Monitor Adapter. Either adapter can be installed in a System Expansion Slot.

For programs that primarily display letters and numbers, the IBM Monochrome Display is a good choice. However, if you plan to use color and graphics to draw figures and shapes, you will want to configure your PC with the Color/Graphics Monitor Adapter. With this adapter, the least expensive display is a regular television with an RF modulator, a device that allows you to connect a television to the PC. The highest

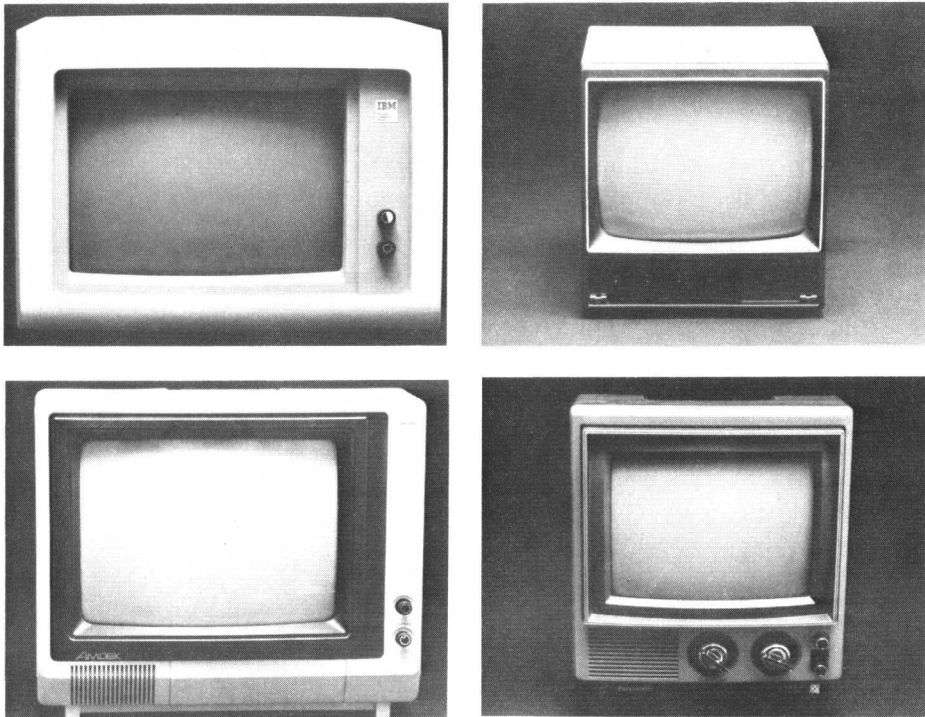


Figure 1-5. The IBM Monochrome Display, black and white monitor, color monitor, and television

quality image requires a color RGB monitor—that is, a monitor having separate inputs for the red, green, and blue color signals.

MASS STORAGE DEVICES

Mass storage devices allow you to permanently store programs and data. The speed and ease with which you can access this stored information depends upon the type of device that you use.

Cassette Recorder

A standard audio cassette recorder can be used with any PC for storing data and programs. Figure 1-6 shows a typical cassette recorder installation.

Floppy Disk Drives

Floppy disks are much better for data storage and retrieval than cassette tapes since floppy disks can store more information and access

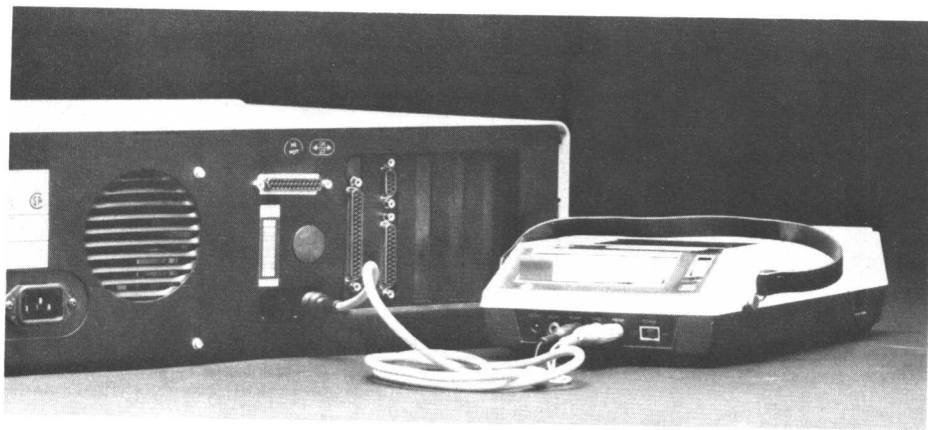


FIGURE 1-6. Cassette recorder attached to the PC

that information faster. Figure 1-7 shows two floppy disk drives mounted in the System Unit.

To use the floppy disk drives, you need a 5-1/4" Diskette Drive Adapter. This adapter can control up to four drives and mounts in a System

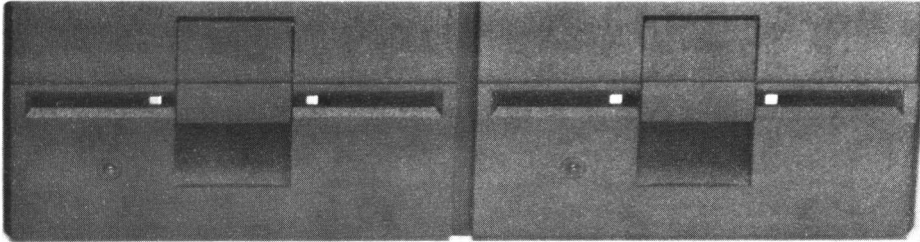
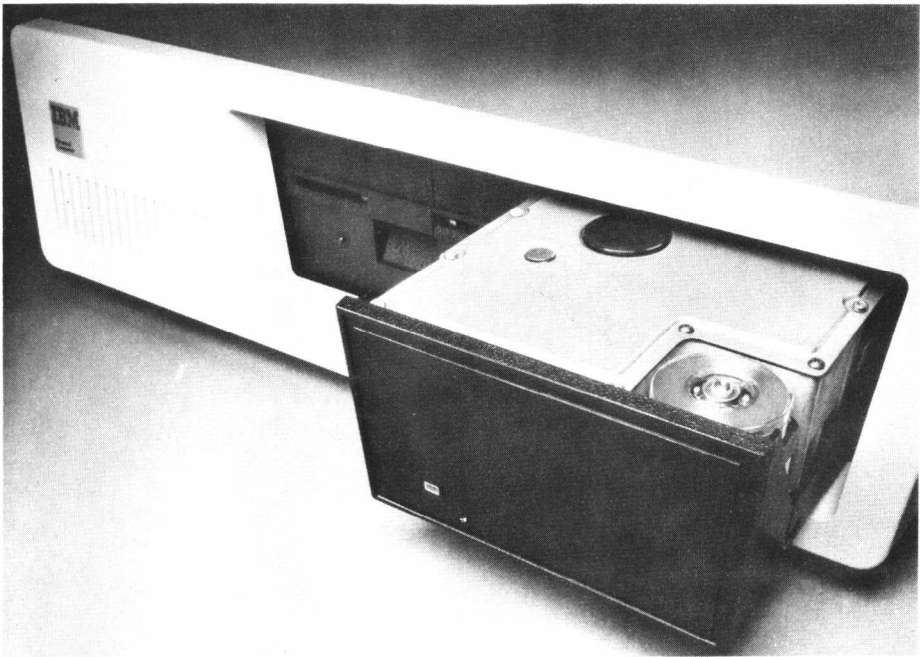


FIGURE 1-7. Floppy disk drives mounted in the System Unit



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FIGURE 1-8. A hard disk drive

Expansion Slot. The single-sided disk drives that IBM supplies hold about 160,000 bytes per disk; the double-sided drives hold 320,000 bytes.

Hard Disk Drives

The fastest and largest mass storage device for the PC is a hard disk drive. Hard disk drives, like the one shown in Figure 1-8, are typically capable of storing from 2 to 10 million bytes of data; they can be installed in the System Unit or mounted in a separate enclosure.

STANDARD PERIPHERALS

The PC can communicate with other kinds of devices outside of the System Unit. For this, IBM supplies several adapter cards that can be installed in the System Expansion Slots and that connect to the devices with the appropriate cables.

IBM Printer and the Parallel Printer Adapter

The IBM 80 CPS Matrix Printer provides hard copy for your programs. This printer, shown in Figure 1-9, can print a total of 96

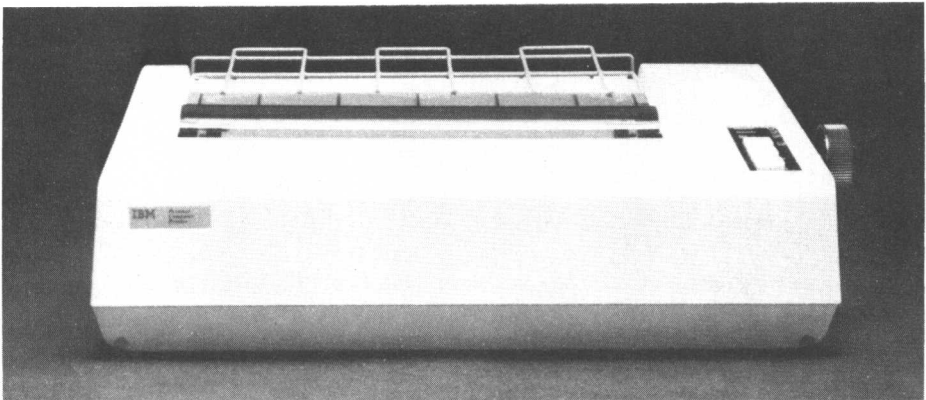


FIGURE 1-9. The IBM 80 CPS Matrix Printer

characters and 64 special graphics characters with various printing styles and with either 66, 80, or 132 characters per line.

There are two kinds of adapter cards that you can use to connect the printer to the PC: either the Parallel Printer Adapter or the combination Monochrome Display and Parallel Printer Adapter.

Asynchronous Communications Adapter

The Asynchronous Communications Adapter, shown in Figure 1-10, allows you to connect your PC with other devices for data communication. This communication can be with another PC, with a device set up to communicate with the RS-232 or current loop standards, or with another computer—for example, a remote database service—over telephone lines.

Game Control Adapter

The Game Control Adapter, shown in Figure 1-11, allows you to connect either joysticks or game paddles to the PC. These devices can be used to supply input that is more direct than the keyboard for programs such as games.

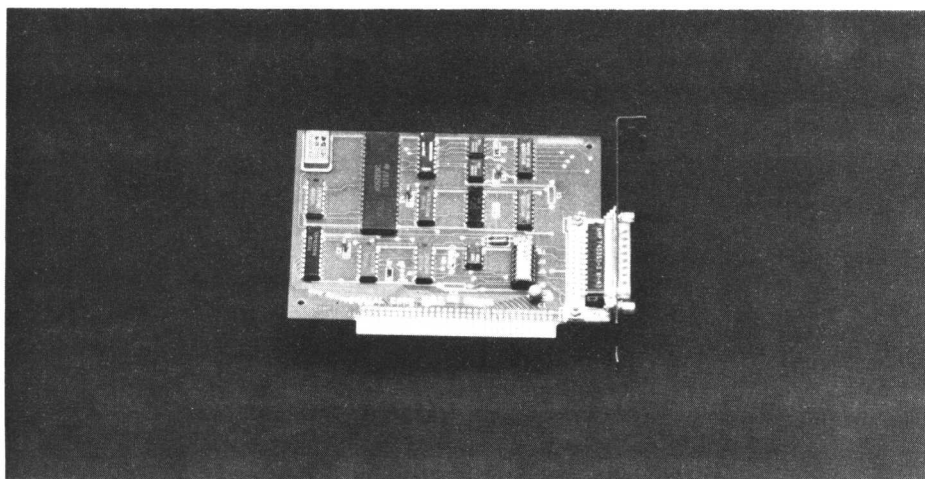


FIGURE 1-10. The Asynchronous Communications Adapter