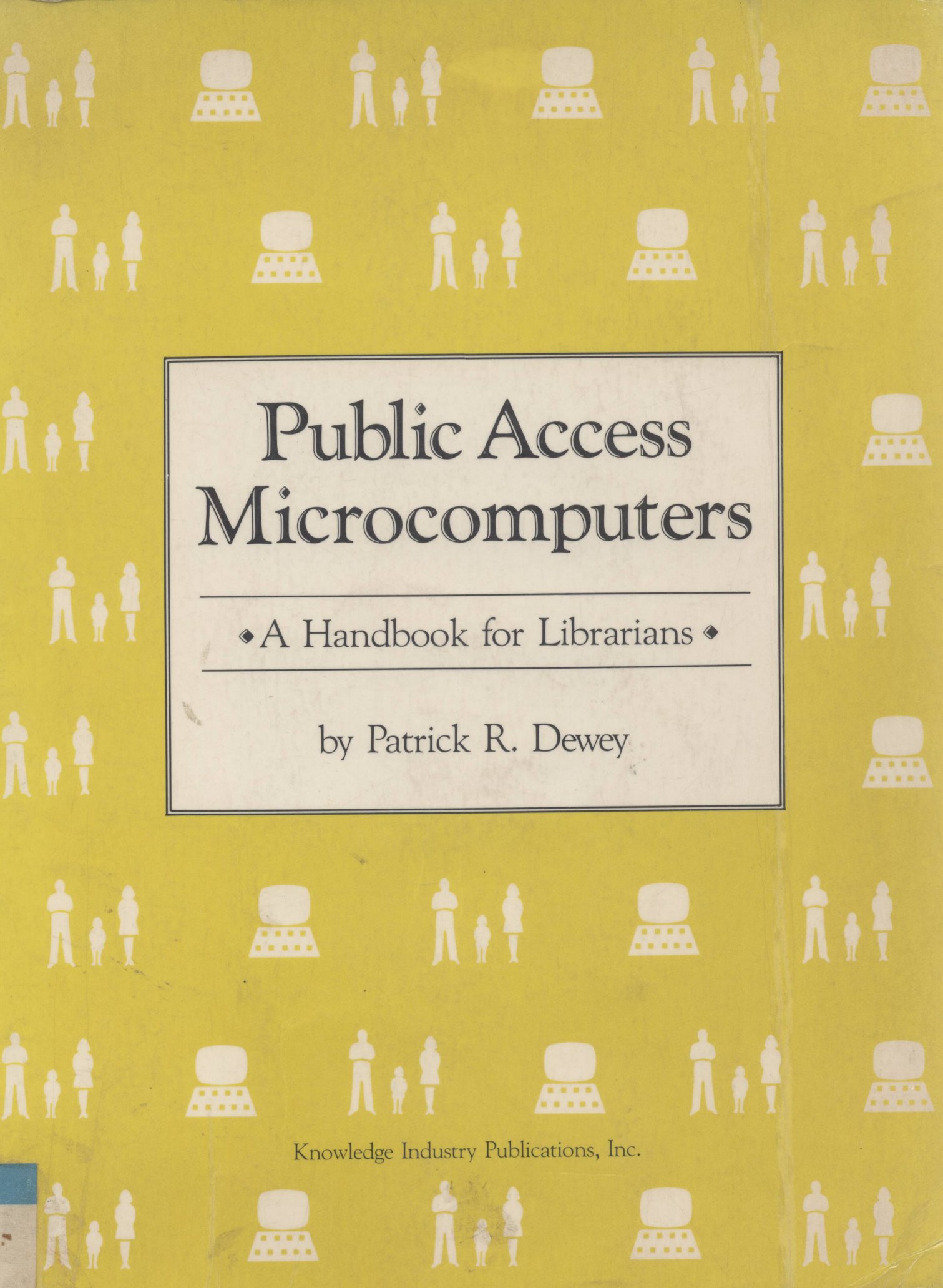

Public Access Microcomputers

◆A Handbook for Librarians◆

by Patrick R. Dewey

Knowledge Industry Publications, Inc.

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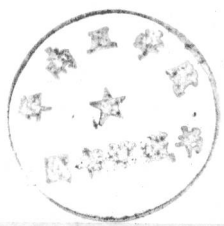

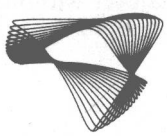

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This book is for my parents:
Hazel and Joseph Dewey
and for
Don, Barb, Erin
and, not to be forgotten,
Tinkerbelle

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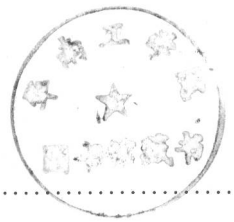

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Preface

Oh good grief, another book on microcomputers!

The microcomputer world is vast, involving millions of people and billions of dollars. It seems to have sprung up overnight and now touches nearly every aspect of life, including home, school, business and entertainment. A casual perusal of book and magazine stands reveals numerous microcomputer titles covering many and varied aspects of the world of microcomputers. This book is about a very small and specific—but important—corner of that world.

Two years of public access efforts by the staff of the North-Pulaski Branch of the Chicago Public Library have been fruitful and exciting. They have not been easy. After years of largely unsuccessful attempts to get patrons to show up at every imaginable inner city program, few of us were really ready when everyone decided to show up for the microcomputer. It seems that the time is just right for libraries to make the most of a tremendous promotional tool: public access microcomputers.

Anyone observing libraries with such services is immediately struck by the individuality of each library's program. They all do it differently, reflecting the versatility of the microcomputer. A major goal of this book is to inspire ideas and encourage readers to experiment. The book is also intended to help them avoid many of the initial pitfalls and problems in the process.

This is not a book about the many administrative or internal uses to which a microcomputer can obviously be put, such as catalog card and overdue notice production or circulation control. Further, no effort will be made to give anyone a quick course in microelectronics or computer science, both of which are beyond the scope of this book. We will only touch upon the essential aspects of hardware necessary for the introduction of public access microcomputers into the library.

Advice in Chapters 1 through 4 centers around the "basic three": identification of community and library needs and the corresponding level of service required; the selection

and purchase of hardware and software to fill those needs; and the control and management of what is ultimately acquired.

In Chapter 5, examples of public access projects in a number of libraries around the country provide a look at the many activities typical to personal computer centers. These should serve as helpful sources for ideas and suggestions, saving the beginner a great deal of time. The primary mission and concerns of managing a small- to medium-sized library will not be neglected: How does this technology fit in with the delivery of other library services? Can the potential impact of an increased workload be minimized?

Special activities, events and library computer clubs are discussed in Chapter 6, along with ways to promote these and other services. In Chapter 7, we will consider the newest and perhaps most exciting areas of service: public access to library-produced and remote data bases, and patron access to the library electronic bulletin board from home.

Examples of software are sprinkled throughout the book, many for the Apple computer—since that is where the bulk of my experience lies—but for other computers as well. Readers should keep in mind that these are presented only as examples and are not meant to be a comprehensive list. Do not select software here; look in the manner described and in the sources listed.

Finally, there are many more micros, types of software and peripherals that are on the market—or will be by the time this book is published—than we have described here. This book reports on those systems that have been used and tested in library public access programs to date. Other systems may work well for public access, so by all means investigate thoroughly before you purchase, and select the system that best suits your library's needs and the community it serves.

Patrick R. Dewey
February 1984

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Getting Started

WHAT ARE PUBLIC ACCESS MICROCOMPUTERS?

The concept of "public access microcomputers" refers to any microcomputer-based service directly available for public use, usually in a public library. It should be distinguished from "public access computers," which might pertain to any sort of computer, including mainframes.[1] This definition of public access microcomputers encompasses many different levels of services. It includes "hands-on" use of the equipment by patrons; using a micro to produce reference materials, such as wall charts; operating a community electronic bulletin board system (BBS); and providing online access to library-produced files and to other data base systems.

Public access micros were probably first installed in a public library in 1977.[2] They had small 8K memories and were not capable of many of the above projects. Even with their deficiencies, early public access micros were an immediate hit. As more complete and sophisticated systems (with disk drives, printers and modems) were installed, enthusiastic librarians began reporting almost universal success. It became evident that the public's curiosity about microcomputers was boundless.

In 1979 the ComputerTown USA! project was started. Four micros installed in the Menlo Park (CA) Public Library, the original ComputerTown, brought enthusiastic response from the community. (ComputerTown USA! is discussed more fully in Chapter 5.)

By 1981 some libraries had set up "computer centers" and "computer rooms," and others began workshops for patron training and "computer reading clubs" for children. A survey conducted in April 1982 by Kusack and Bowers, to determine the level of public

access service in libraries, revealed the "drawing power of the microcomputer." One librarian reported "traffic jams," while another said that "the Adult Continuing Education Department has experienced a 40% increase in the number of patrons [who] use the department."[3]

"Coinop" companies eventually appeared on the scene, and the first library microcomputer electronic bulletin board system for the public was established in late 1981.[4] Computer or software "fairs" (see Chapter 6) began popping up, even in libraries without public computers, and a few libraries began circulating small microcomputers such as the Sinclair ZX81. At least one library began making the Texas Instruments Speak N' Spell unit available to patrons.

Examples of innovative uses of micros in libraries have proliferated. A library in California created a computer van that takes 15 microcomputers on classroom visits. Some 8000 children have enjoyed this approach.[5] Elsewhere, a few experiments with online microcomputer services through consumer networks such as The Source and CompuServe have also been attempted. Some school and academic libraries began offering online encyclopedias to students in 1983.[6]

By late 1982, recognizing the need to share their knowledge, librarians in several states had organized into user groups, and several public access conferences were held.

THE PURPOSE OF PUBLIC ACCESS

Most librarians would probably agree that part of the public access microcomputer effort is aimed at providing the local community with "computer literacy"; the rest is part of the age-old library tradition of providing information and recreation. Beverly Hunter supplied a practical, broad-based definition of computer literacy in 1981:

> Computer literacy is whatever a person needs to be able to know about and do with computers in order to function effectively in our information-based society. This definition points out that what skills and knowledges and attitudes are needed will vary from person to person and from time to time, depending on what it is they are doing. This definition also points out that computers are tools in service of other work—not an end in themselves.[7]

Most of the people using a public microcomputer will be *non-librarians*, doing non-library chores. Micro use will fall into the broad categories of education, entertainment and practical functions, such as word processing, data base management, etc. Specific uses would fill an encyclopedia.

All age groups will find some use for the machine and all will have a natural curiosity about what it will do and how it might help them in life. Statistics from the North-Pulaski Branch Library (of the Chicago Public Library) show that in 1982 approximately 14% of all public access micro users were under the age of 12, 46% were from 12 to 21, and 40% were over 21. Preschoolers and senior citizens registered approximately 1% each.[8]

The most obvious benefit of a public access micro program is that it gives those who

don't have access to micros—or are hesitant about tackling a new technology—the chance to try them. Statistics reported for the first six months of microcomputer use at the Forsyth County (NC) Public Library indicate that ". . . over 40% of users had no previous experience and that most, at least initially, wanted computer skills (i.e., to know how micros work)."[9]

For many in the community, a public access micro may represent the best opportunity to gain experience with a computer. People want to see it, touch it and "kick the tires." Small businesses want the same try-out privileges. Students will also make use of library microcomputers. Although a recent study shows that more than two-thirds of all public schools have at least one microcomputer, not every student will have the chance to use one.[10]

Children are especially attracted to the micro. We are told that they will be living and growing with computers at home, school and work from now on. In some cases, public access micros are the only way a child can get close to a computer.

A public access microcomputer also benefits those who already have (or have access to) microcomputers. Library software collections are useful in the same way as book collections: Few people can afford to buy all the books that they wish to read. Until these needs subside, the library—especially the public library—is clearly the only place where many people can go for hands-on experience.

CHOOSING AREAS OF SERVICE

The first question for libraries to consider is: Is a personal computer center needed or possible? Not every library can or should have microcomputer service. It's important to remember that libraries, like people, are all different and each must fix the level of public access best managed and justified by the available staff and resources. Service can be simple or complex, superficial or comprehensive. Some general levels of public access service are listed below. All are discussed in the chapters to follow.

1. *No service*: Some small libraries may be physically unable to accommodate the many additional people a micro attracts. Security and other factors may also play a part in determining if a microcomputer should be installed.

2. *Moderate equipment and software*: This level may be as simple as providing Speak N' Spell. Computers with little software, small memories and no disk drives are the usual fare.

3. *Full service*: This means providing extensive software and/or hardware, including disk drives and a printer.

4. *Library-sponsored activities*: This level of service includes library-sponsored computer classes or computer clubs, in addition to equipment and software.

5. *Online services*: By means of a telecommunications link, libraries can provide the community with online services, such as the electronic bulletin board system, or access to networks such as The Source or CompuServe.

6. *Loan of software or hardware*: Some libraries may wish to circulate hardware or software to patrons. In the case of software circulation, libraries must make provisions for patrons to copy the programs they wish to borrow. For this reason, only public domain software can be considered for a software loan program. Libraries that lend equipment usually choose inexpensive machines for this purpose (see Chapter 4).

7. *Help (tutoring)*: Generally, this area is for academic and school libraries, since most public libraries cannot invest the time and staff necessary for such service.

8. *Software fairs, festivals, etc.*: These can be organized on a one-time basis (for libraries unable to provide other levels of service) or as ongoing events.

9. *Computer-assisted instruction (CAI)*: A library usually undertakes a CAI program as a cooperative effort with a school or in conjunction with in-house classes.

10. *Software collection*: This constitutes a multitude of levels, from elementary BASIC through more sophisticated programs.

11. *Library-produced data bases*: These include electronic bulletin board systems, wall charts for patron reference and any other library-produced data bases for public access.

It is impossible to delineate these areas exactly and many levels overlap, even in the same library or library system. They do not follow in a neat ladder format: e.g., it is not necessary for a library to offer full service for it to sponsor activities. The natural progression of adding equipment in response to patron demand may lead from one level to another. Each library will determine the level of service based on its own resources and on community needs (see Chapter 2). Some guidelines for getting started follow.

WHERE DO WE START?

Professional library staff time devoted to a micro project should not be excessive. Even so, learning about and using microcomputer equipment and software takes time and is the only sure way to have a successful program. Do not be a stranger to the equipment: Start with yourself.

Before purchasing, or before considering any particular microcomputer for purchase, browse through microcomputer journals and magazines. Attend local workshops, conferences, training sessions or software fairs. Visit a local library where such equipment is already in use and ask questions. If you have access to a micro on a regular basis, work with programs as often as possible. Start with simple ones and work up. Don't expect miracles overnight, but you should see some real progress in just a few weeks. Do not enroll in a programming course immediately; that can always be done later.

Experimenting with micros and various types of software is the best way to understand what a micro can do. However, before you can make any decisions about which micro to buy or which software to select, you must become familiar with basic micro hardware and software terminology.

LEARNING THE VOCABULARY

Since small computers are fundamentally not much different from their big brothers, most of what librarians already know of computer components will be directly applicable to micros. The terms "personal," "home" and "desk-top" computer are used fairly interchangeably with the word "microcomputer."

Hardware and Software

For convenience, we will begin our discussion by dividing the computer operation (aside from the human element) into two parts: *hardware* and *software*. Hardware includes all metal and plastic components, and silicon chips, that can be touched and picked up (and broken!). Software includes the *programs* and *data* that give the computer its individual capabilities and versatility. Programs and data change very rapidly; the hardware, very slowly. Programs can be roughly divided further into *applications software* and *systems software*. Applications software includes programs of major interest to the end user (whoever is using the micro). Within this category are games, educational programs, business programs, etc. Systems software refers to all programs that enable a computer to function and control its own operations. It includes, among other things, the operating system, assemblers and compilers. This book will concern itself mainly with applications software, the subject of Chapter 3.

Input and Output

Instructions are entered into a computer electronically by tapping the *keyboard*. Keyboards may be either the traditional typewriter-style (with raised keys) or flat membrane-style (with pressure-sensitive keys) not suitable for normal typing. Keyboards can be built-in or separate. More rarely, instructions can be entered by using a light pen, if one is attached, by voice commands or in other ways. This is the *input* process.

As the computer has processed whatever information has been fed in, the result, or *output*, is sent back to the user. Output can take the form of *soft copy* or *hard copy*. Soft copy is simply information displayed on the microcomputer screen or monitor, a unit which is similar to (and sometimes is) a television screen. The display on a monitor can be in color, black and white, green and, most recently, amber. A monitor generally offers better resolution than an ordinary TV screen. Hard copy refers to a paper printout that people can take away with them. It requires an additional piece of equipment, a printer. There are many types of printers that can be used with a public access system and these are discussed under "Peripherals," below.

The format of a microcomputer screen is an important consideration. Screens are measured in the number of columns or characters across and the number of lines up and down. They can display text or graphics. Most micros still come with a 40-column screen, but some machines allow for the addition of add-on circuit boards to expand to 80 columns. Eighty-column screens are preferable, particularly for word processing, since anything less makes it difficult to read the text or display it as it will ultimately be printed.

CENTRAL PROCESSING UNIT (CPU)

The *microprocessor* or *central processing unit* is the brain of the microcomputer, where arithmetic, control and logic operations occur. The CPU controls the microcomputer and therefore should be distinguished from the microcomputer itself.

A microcomputer uses a *chip* as its CPU—hence the term, "a computer on a chip." A chip is often described as a silicon wafer, which refers to its construction. This component has made the modern microcomputer possible. Chips are tiny, inexpensive circuit boards which come in various sizes. When the cabinets of most microcomputers are opened for inspection, the chips are seen lined up in rows. It is the construction and number of these chips that determine a computer's internal workspace or *memory*.

MEMORY

Memory can be divided into internal or working memory and external memory or storage (such as disk drives and tape drives, discussed under "Peripherals," below). Memory is generally measured in K, which stands for 1024 bytes. A *byte* represents one character—whether a letter, number or another symbol—of data. All data are stored digitally. A computer can only understand two states: 1 or 0, and all data are encoded as combinations of these discrete units known as binary digits, or *bits*. This is the basis of all chip technology.

In an 8-bit microprocessor, it takes eight bits to retain one byte (or one character) in memory. This is how we end up with memory that is expressed in multiples of eight: e.g., 48K, 64K, 128K, etc. The total memory is the total workspace available to the computer for the manipulation of data. In 8-bit micros, the computer processes these eight bits at one time, as a unit. Sixteen- and 32-bit machines process 16 or 32 bits, respectively, as units. This makes them much faster and capable of processing much more data than 8-bit micros.

Two principal kinds of internal memory are *ROM* (read only memory) and *RAM* (random access memory). ROM consists of programs embedded within the chip itself and cannot be changed by the user. This type of software, being part of the hardware, is called *firmware*. RAM is the main workspace available to the user. Data in RAM can be altered by the user, and therefore change frequently. Think of RAM as erasable, since it is lost (or erased) each time the computer is turned off—an important concept of which patrons should be made aware.

Some machines are referred to as having 48K, 64K, 128K, etc. of RAM memory, which gives us a basis for comparison. Since prices have been falling drastically in recent years, purchase enough RAM memory to meet the requirements of all of the software that fits into your scheme of service and is currently produced. For example, a microcomputer with disk drives should have a minimum of 64K RAM. Higher amounts of memory, such as 128K, are generally needed more for small business uses than for public access.

PERIPHERALS

Peripherals are all pieces of equipment that are not part of the computer proper, are usually external and are controlled by the computer. They include disk drives, printers and modems.

Disks and Disk Drives

Whenever the power is turned off, most microcomputers lose whatever data have been stored in the RAM (although bubble memory may ultimately change this situation). Also, the RAM can hold only one program or a limited amount of data at any one time. External *disks* are where data and programs are stored when not in use. *Disk drives* are essentially the motors that turn the disks. Since libraries can acquire as many disks as they want (or can store), disks can provide a microcomputer with virtually infinite storage capacity.

Programs can be transferred to disk and saved in *files* until needed again. Each disk is formatted electronically and broken down into concentric rings or tracks, each of which is further divided into smaller units, known as sectors.

Disks offer random access to information. An alternative is the use of *tape drives* and tapes, which must be read sequentially. For this reason, tape drives are slower and more awkward to use, and generally are not suited for public access use.

There are several types of disk drives, some more expensive than others, with advantages and disadvantages to each. It is a good idea to buy drives in pairs, because some programs require a program disk and a data disk. Two drives also make a microcomputer much more convenient to use. For the second or third public access machine in an institution, one drive may suffice.

The smallest and most inexpensive disk drive, and the kind most commonly used with microcomputers, is the 5¼-inch *floppy disk drive*. The disks themselves are called floppy disks, diskettes or floppies. Floppy disks look like small, flexible phonograph records. For use, they are inserted through a slot in the front of the disk drive and are read by a movable head.

The memory space on a floppy disk is about 100K; depending upon the computer, it can be more or less. Floppy disk drives also come in an 8-inch variety. Their additional memory capacity—a megabyte (one million bytes) or more—greatly increases the volume of data that can be online at one time.

Hard disk drives are much more expensive than floppies, but they can increase the memory space to 5, 10, 20 or more megabytes. Hard disks are usually sealed in an airtight case within the disk drive; some newer systems have removable hard disks that can be replaced. A smaller floppy drive is usually needed as a backup system for hard disk drives. Usually, a public access system will require a hard disk drive only if there are a number of micros in the same system. This forms a local network, in which many microcomputers share the same hard disk drive.

Interface Cards

To use drives and other peripherals, special circuit boards known as *interface cards* are needed. These special boards fit into the back of the microcomputer (although some systems come with certain cards built-in) and allow the micro to "communicate" with and control its peripherals.

Printers

There are two major kinds of impact printers suitable for public access: *dot matrix* and *daisy wheel*. Both are noisy. *Thermal* and other types of printers are not generally useful for public access unless a poor print quality and other problems are acceptable.

Dot Matrix and Daisy Wheel Printers

Dot matrix printers are equipped with tiny dots positioned as an array of small pins in the print head. Letters are produced as the head strikes the ribbon in a computer-directed pattern. Dot matrix printers have traditionally been inferior in print quality to daisy wheel printers, but this is changing. Generally speaking, they are less expensive than daisy wheel printers. Another advantage of a dot matrix printer is that, with various combinations of dots, it can produce graphics and different fonts (or typefaces). Some can also enlarge or reduce character size. The latter capability often allows a small dot matrix printer to produce 132 characters per line.

Daisy wheel printers get their name from the print wheel which is composed of spokes. The tip of each spoke has one print character. The wheel turns and a small hammer hits the appropriate spoke. The print quality is indistinguishable from that obtained when using a typewriter. Daisy wheel printers are sometimes called letter-quality printers. They do not produce graphics and will only print one size of type unless the print wheel is changed. Some daisy wheel printers have six or eight different typeface wheels available.

An important consideration, especially for a library, is the printer's speed, which is measured in characters per second (cps). Normally, dot matrix printers are faster. Another factor is the typeface. Some dot matrix printers use pseudo-descenders (the dots forming letters do not descend below a certain line) producing strange-looking "y"s and "p"s. A number of dot matrix printers also have a *buffer* or storage space (usually 2K) to hold data sent from the computer until they can be printed out. For some microcomputers, it is possible to purchase a larger buffer (16K or more) which will free the computer for other work while the printer continues to operate.

Paper

Paper is fed through the printer in one of two ways, either by *friction feed* or *tractor feed*. The friction-feed platen grips paper in typewriter fashion and allows the use of a single sheet of paper, such as a letterhead. Tractor-feed machines use adjustable sprockets to

guide "fan-fold" or computer paper through the printer. Some machines allow for both types of paper. *Pin wheel* printers differ from tractor feed in that they have the sprockets fixed to the end of the platen and only permit one size of paper.

Number of Columns

An important characteristic of printers is the number of columns they will print. If a small business or accounting package is planned, 80 columns will not be sufficient. Accounts receivable, accounts payable and general ledger programs nearly all require 132 columns. Word processing and ordinary printing (e.g., lists, labels, etc.) require only 80 columns or less.

Noise

As mentioned earlier, all printers suitable for public access are noisy. To combat the noise element, check into an *acoustic cabinet* or *hood.* Models are available for both dot matrix and daisy wheel printers. They can easily cut noise by 80%.

Modems

Data communications or telecommunications require the use of a *modem* (modulator/demodulator), a simple translation device that allows the computer to send and receive digital code over analog telephone lines. The transmission rate is measured in *baud* and the typical baud for a home computer system is 300 (equal to 30 characters per second). Types of modems include *acoustic couplers*, which cradle the telephone in a small box, and *direct connect modems*, which use a modular phone jack to plug directly into the line. The direct connect modem eliminates the extraneous noise that the computer might mistake for incoming data. If you plan to use a modem to connect to online services such as Dialog, you will need a 1200 baud modem. Investigate to be sure one is available for the micro you plan to buy.

OPERATING SYSTEMS

Every computer must operate with a control program, or *operating system*, which regulates the flow of information and how it is stored. The *disk operating system (DOS)* runs the disk drives, keeps track of program names and where they are stored, and performs a great many other housekeeping functions. Depending upon the computer, DOS can either be stored on disk and *booted* (loaded) into RAM when the system is turned on or stored permanently in ROM.

Virtually all manufacturers have proprietary operating systems that will work only with their brand of micro. One exception to this is CP/M (Control Program for Microcomputers). CP/M is an operating system that runs on a number of different machines, provided that they have a Z-80 microprocessor. This chip can be added to a micro, usually at a cost of several hundred dollars. However, since most major microcomputers can be adapted in this way, to some extent CP/M has become a common system that is widely