

Ask the Expert — Your Local Apple Service Dealer

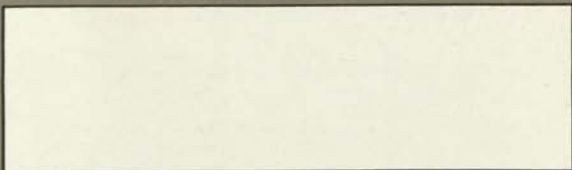
Apple's network of over 400 authorized service centers means that there's probably one located near you. Your local service dealer understands your needs and is in the best position to solve your individual problems.

If your Apple needs repair, he'll probably be able to give you one-day service. In some cases, he'll even be able to fix your Apple while you wait.

Talk to him about the Apple Extended Warranty. Then tell him you want to be a part of the program. He'll do the rest.



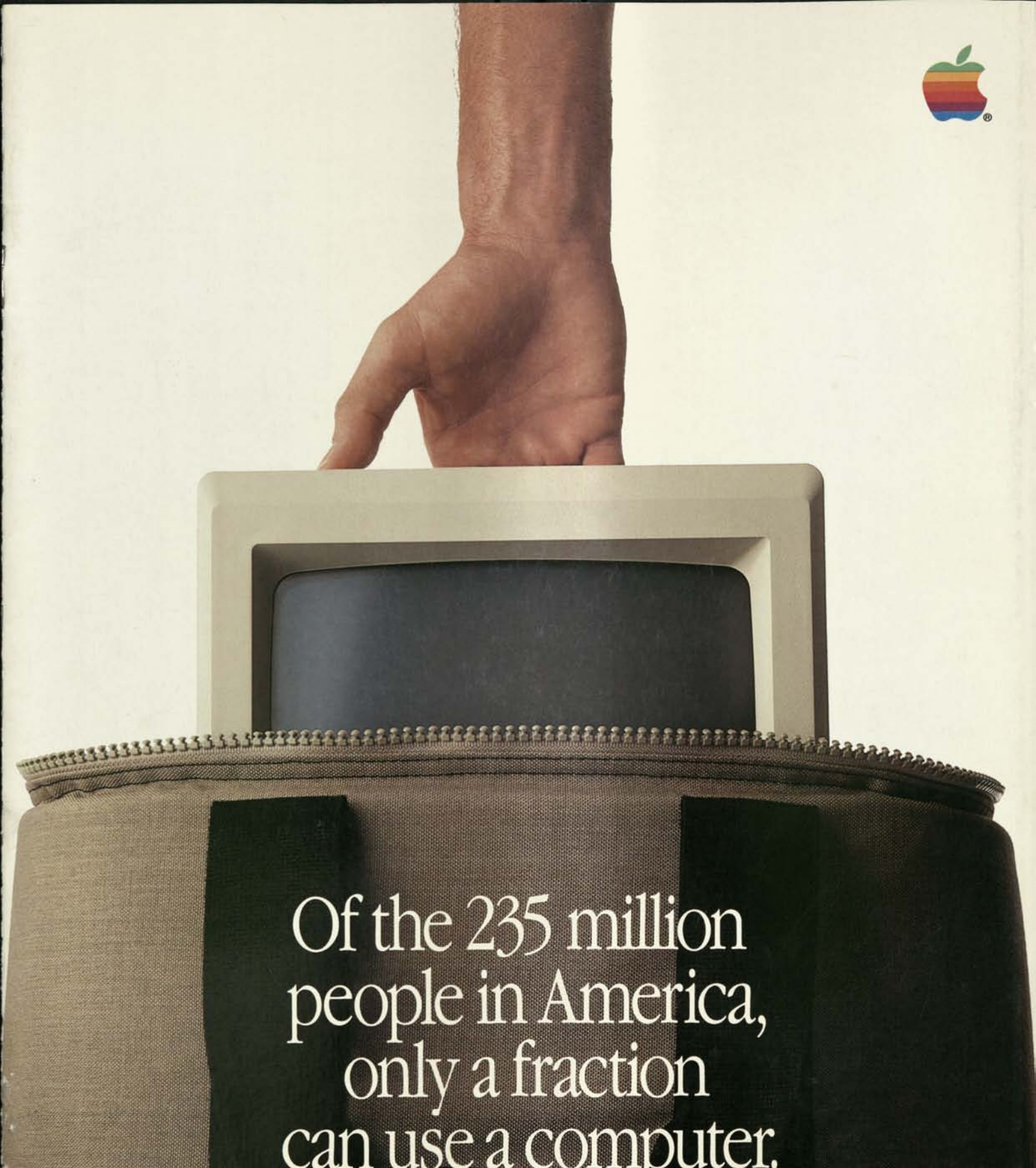
APPLE: EXCELLENCE IN PERSONAL COMPUTERS



 **apple computer inc.**
10260 Bandy Drive, Cupertino, California 95014

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MSR M49-1279

A hand is shown from the top, holding a beige computer monitor. The monitor is placed on top of a brown, textured suitcase with a visible zipper. The background is a plain, light-colored wall.

Of the 235 million
people in America,
only a fraction
can use a computer.

Introducing Macintosh. For the rest of us.

In the olden days, before 1984, not very many people used computers, for a very good reason.

Not very many people knew how.

And not very many people wanted to learn.

After all, in those days, it meant listening to your stomach growl through computer seminars. Falling asleep over computer manuals. And staying awake nights to memorize commands so complicated you'd have to be a computer to understand them.

Then, on a particularly bright day in Cupertino, California, some particularly bright engineers had a particularly bright idea: since computers are so smart, wouldn't it make more sense to teach computers about people, instead of teaching people about computers?

So it was that those very engineers worked long days and nights, and a few legal holidays, teaching tiny silicon chips all about people. How they make mistakes and change their minds. How they refer to file folders and save old phone numbers. How they labor for their livelihoods, and doodle in their spare time.



For the first time in recorded computer history, hardware engineers actually talked to software engineers in moderate tones of voice, and both were united by a common goal: to build the most powerful, most transportable, most flexible, most versatile computer not-very-much-money could buy.

And when the engineers were finally finished, they introduced us to a personal computer so personable it can practically shake hands.

And so easy to use most people already know how.

They didn't call it the QZ190, or the Zipchip 5000.

They called it Macintosh.™

And now we'd like to introduce it to you.





If you can point,
you can use a Macintosh.



You do it at baseball games. At the counter in grocery stores. And every time you let your fingers do the walking.

By now, you should be pretty good at pointing.

And having mastered the oldest known method of making yourself understood, you've also mastered using the most sophisticated personal computer yet developed.

Macintosh. Designed on the simple premise that a computer is a lot more useful if it's easy to use.

So, first of all, we made the screen layout resemble a desktop, displaying pictures of objects you'll have no trouble recognizing. File folders. Clipboards. Even a trash can.

Then, we developed a natural way for you to pick up, hold and move these objects around.

We put a pointer on the screen, and attached the pointer to a small, rolling box called a "mouse." The mouse fits in your hand, and as you move the mouse around on your desktop, you move the pointer on the screen.

To tell a Macintosh personal computer what you want to do, you simply move the mouse until you're pointing to the object or function you want. Then click the button on top of the mouse, and you instantly begin working with that object. Open a file folder. Review the papers inside. Read a memo. Use a calculator. And so on.

And whether you're working with numbers, words or even pictures, Macintosh works the same basic way. In other words, once you've learned to use one Macintosh program, you've learned to use them all.

If Macintosh seems extraordinarily simple, it's probably because conventional computers are extraordinarily complicated.



Macintosh



MacWrite



Clock



MacPaint



Trash Can



Palettes display available tools, line widths, and patterns.

The pointer becomes whatever tool you select to work with — in this case, a pencil.

You're not limited to the work area you see here. You can scroll up and down, left and right.



Point.Click.

To tell Macintosh what you want to do, all you have to do is point and click.

You move the pointer on the screen by moving the mouse on your desktop. When you get to the item you want to use, click once, and you've selected that item to work with.

In this case, the pointer appears as the pencil you've selected to put some finishing touches on an illustration you'd like to include in a memo.



"Pull-down menu" displays all your options.

To select whatever you want to "cut" from the screen, just put a rectangle around it.



Cut.

Once you've completed your illustration, you need to cut it out of the document you created it in, so that you can put it into the word processing program you used to write your memo.

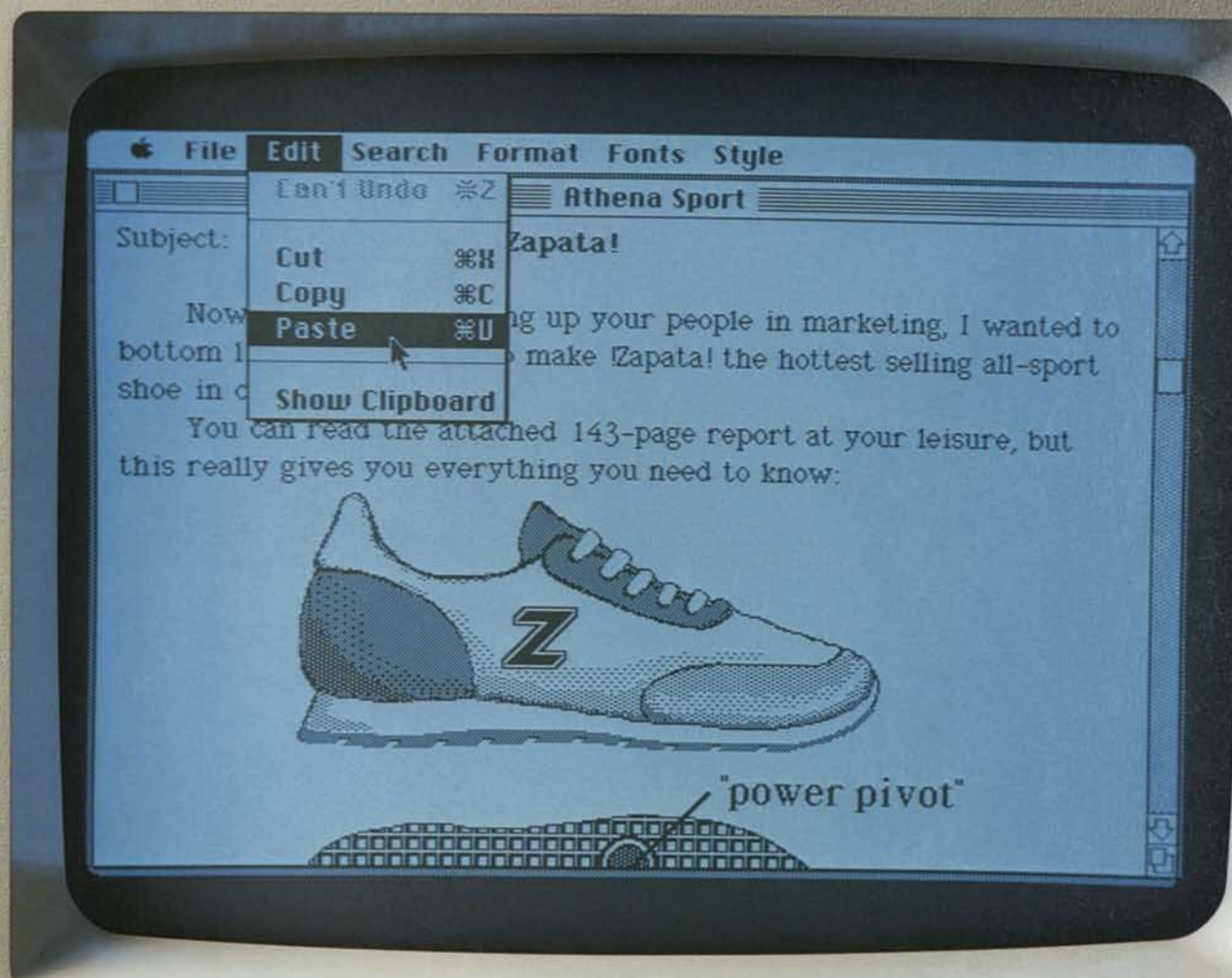
To do this, you simply use the mouse to draw a rectangle around the illustration, which tells Macintosh what you want to cut.

Then you move the pointer to the top of the screen where it says "Edit." Hold the mouse button down and you will see a list, or "pull-down menu," of the editing commands available. Then pull the pointer down this menu and point to the command "Cut," highlighted by a black bar.

Release the mouse button and, zap, it's done.



Macintosh makes room for your illustration in the text.



Paste.

And now, to finish your memo, bring up MacWrite™ Macintosh's word processing program. Just pick a place for your illustration.

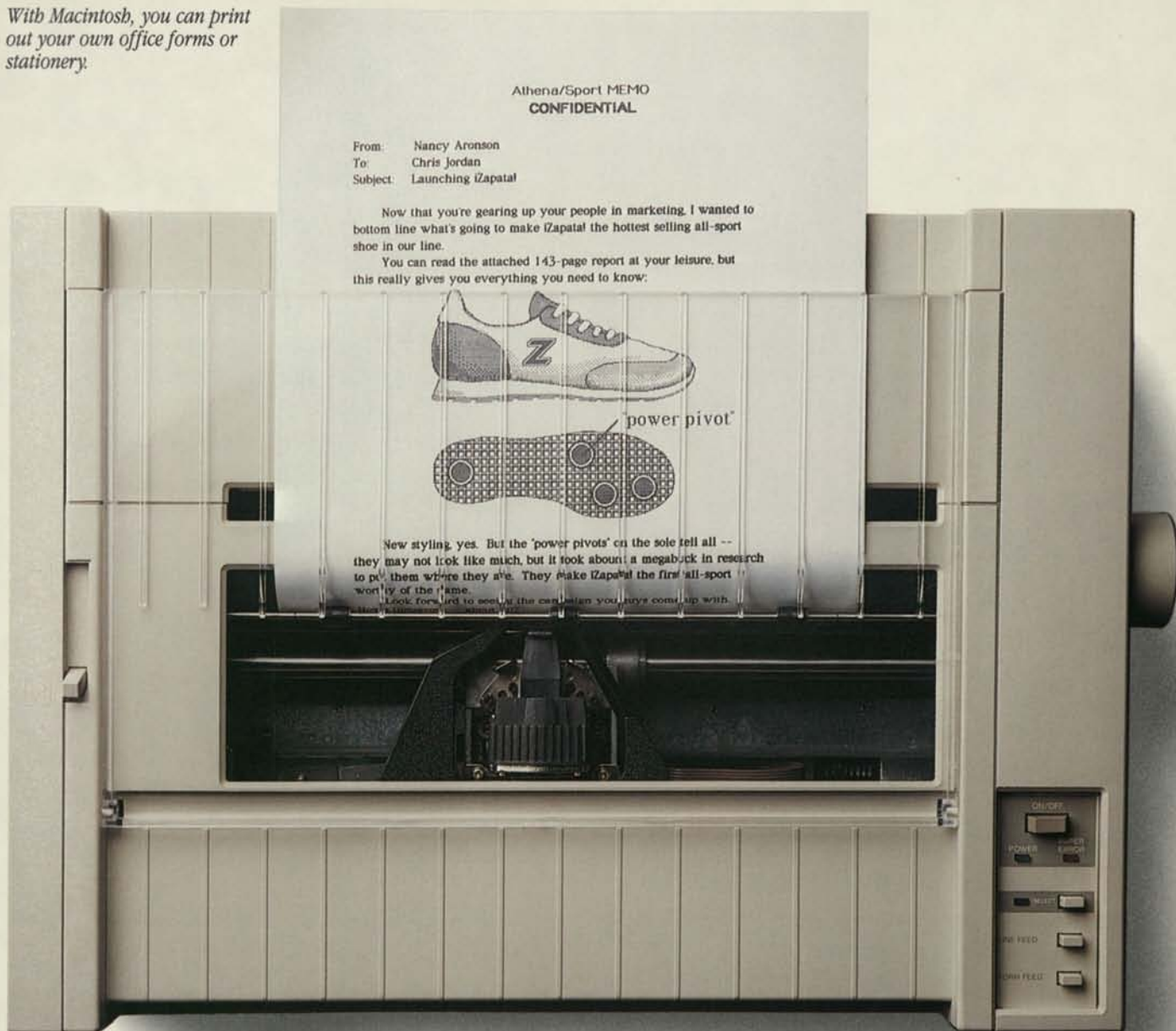
In the meantime, your illustration has been conveniently stored in another part of Macintosh's memory.

To paste the illustration into your memo, move the mouse pointer once again to the Edit menu at the top of the screen and hold the mouse button down.

This time, you pull the pointer down until "Paste" is highlighted. Release the mouse button and, once again, zap.



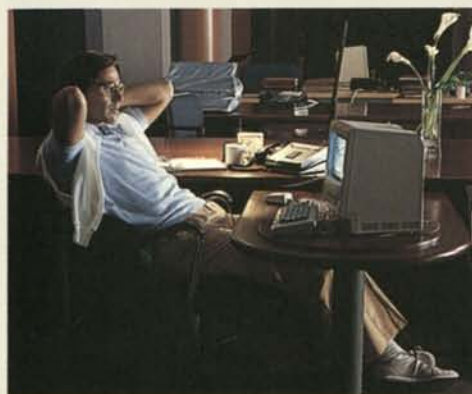
*With Macintosh, you can print
out your own office forms or
stationery.*



And Print.

You tell a Macintosh personal computer to print the same way you tell it to do everything else. And, provided you have a printer, you'll immediately see your work in print.

All your work. Nothing but your work. Because with Macintosh's companion printer, Imagewriter, you can print out everything you can put on a Macintosh's screen.



If you have a desk, you need a Macintosh.

Macintosh was designed for anyone who handles, collects, distributes, interprets, organizes, files, comprehends, generates, duplicates, or otherwise works with information.

Any information.

Whether it's words, numbers or pictures.

We've narrowed it down to anyone who sits at a desk.



If, for example, your desk is in a dormitory, Macintosh isn't just a tool, but a learning tool. For doing everything from problem sets in Astrophysics 538 to term papers in Art Appreciation 101. Not to mention perfecting skills in programming languages like Macintosh BASIC and Macintosh Pascal. Which explains why colleges and universities across the country are ordering Macintoshes by the campus-full.

If you own your own business, owning your own Macintosh personal computer could mean the difference between getting home before dark, and getting home before Christmas. With software programs like MacWrite™, MacPaint™, MacTerminal™, MacProject™, and MacDraw™, as well as data-base managers, business graphics programs and other personal productivity tools available from leading software developers, you can spend more time running your business, and less time chasing after it.

And even if you work for a company big enough to have its own mainframe or minicomputer, Macintosh can fit right in. With additional hardware, it can talk to IBM® mainframes in their very own 3278 protocols. It's also fluent in DEC® VT100™, VT52™ and plain old TTY.

If your company has a subsidiary abroad, your colleagues there can use all the same tools. Because Macintosh will be available in several international versions with local conventions (alphabets, currencies, dates, and more).

In other words, wherever there's a desk, there's a need for a Macintosh.

And the less you can see of your desktop, the more you could use one.



An ordinary personal computer makes Macintosh even easier to understand.

Every few years computers are introduced that establish new standards for the industry. In 1977 we had the Apple II. In 1981 the IBM PC.

Over the past three years the technology has advanced so rapidly that the distance between Macintosh and current generation personal computers is dramatic. See for yourself.

We're going to compare five of the most typical functions a computer performs, screen-to-screen, to show you the difference between doing them on an IBM PC and doing them on a Macintosh.

Take word processing, for example.

Any computer worth its weight in silicon does an adequate job of shuffling words. Provided, of course, you've memorized the "control QA" command to make it happen. And the IBM PC is no exception.

Macintosh, on the other hand, is quite an exception.

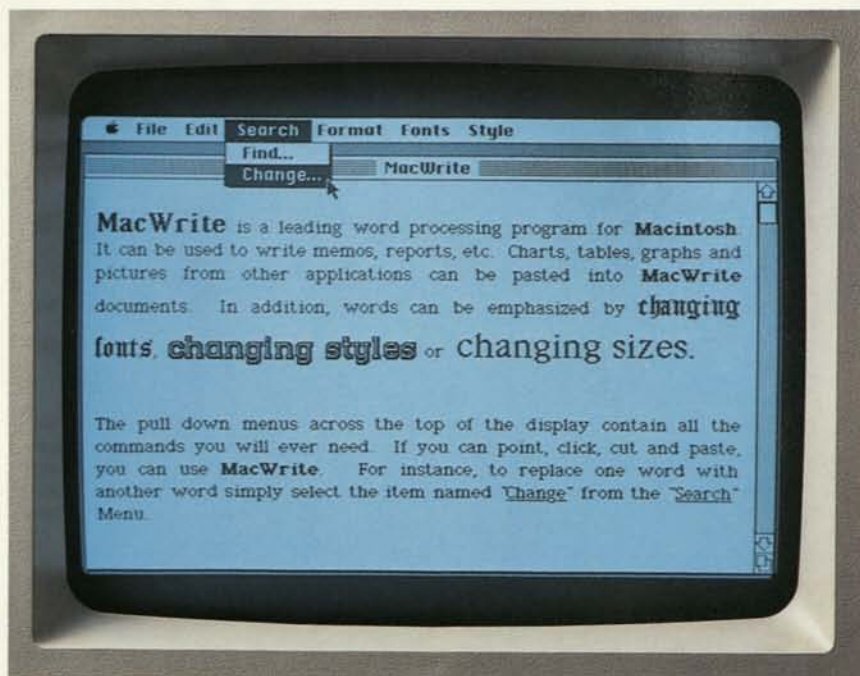
Using Macintosh's word processing program, MacWrite, anything and everything you might want to do with words can be done with a point-and-click of the mouse.

MacWrite not only shuffles words, it can shuffle them in several different type styles and sizes (not to mention boldface, italics and underlining). So you can create documents that look like they came from a typesetter, not a computer. For your foreign correspondence or scientific documents, the Macintosh keyboard gives you 217 characters, including accented letters and mathematical symbols.

But what really separates Macintosh from the blue suits is its extraordinary ability to mix text with graphics. You can actually illustrate your words, memos and



Word processing before Macintosh.



MacWrite.

Product comparisons were made using a standard configuration Macintosh and a standard configuration IBM-PC (5150 2 drive unit with 256K Bytes RAM, 5151 Monochrome Display). November 5, 1983.

letters with tables, charts, and free hand illustrations composed on other graphics programs. All by cutting and pasting with the mouse.

That capability alone makes Macintosh its very own form of communication. A new medium that allows you to supplement the power of the written word with the clarity of illustrations. In other words, if you can't make your point with a Macintosh, you may not have a point to make.

Actually, the difference between Macintosh and the IBM PC becomes obvious the minute you turn both of them on.

The two screens below show you how each of them greets you.



File listings before Macintosh.



Macintosh's Finder.

Notice the IBM presents you with a laundry list of files available for accessing. And multiple steps are required to "get at" the particular file you choose to work with.

Macintosh, on the other hand, shows you pictures of everything you've saved (charts, graphs, illustrations and documents), pretty much the same way you'd see them arranged on your desktop.

Even comparing a program as commonplace as the electronic spreadsheet clearly shows you that Macintosh is anything but commonplace.



Spreadsheets before Macintosh.



Microsoft's Multiplan for Macintosh.

Microsoft's Multiplan™ for Macintosh, designed to take full advantage of Macintosh's built-in Lisa Technology, replaces clumsy cursor keys with the point-and-click of the mouse.

Let's say you want to change the width of a column in your spreadsheet. With the IBM PC, that's a 4-key command sequence. On Macintosh, you simply use the pointer to widen the column, and click.

Naturally, Multiplan also allows you access to all of Macintosh's built-in desk



Business graphics before Macintosh.



Microsoft's Chart for Macintosh.

accessories. So should you need to make a few quick computations before entering new spreadsheet figures, you can use the built-in desk calculator, for example.

When it comes to business graphics, in all fairness, IBM has pie and bar charts to spare. Provided you can spare the additional cost to add a special card and separate color monitor required to make use of them.

When you compare the actual unit you purchase initially with our Macintosh, the IBM PC not only comes up short a few pie charts, it draws a complete blank.

Macintosh uses this business graphics program, Microsoft™ Chart, to turn numbers nobody understands into charts and graphs that everybody understands.



Terminal emulation before Macintosh.



MacTerminal.

With it, you can "cut" numbers you want charted from another Macintosh program and "paste" them directly into Chart. Just choose the style of chart you want from a pull-down "gallery" of pie and bar charts, line and scatter graphs.

Again, it all happens with a click of the mouse. So you can change your chart as quickly as you can change your mind. Maybe faster.

There is one thing that the IBM PC manages to do as well as Macintosh: IBM 3278 terminal emulation — so you can communicate with heftier IBM's.

And here's where ordinary personal computers draw a blank.

You've just seen some of the logic, the technology, the engineering genius and the software wizardry that separates Macintosh from conventional computers.

Now, we'd like to show you some of the magic.

First, there's MacPaint. A program that transforms Macintosh into a combination architect's drafting table, artist's easel and illustrator's sketch pad.

With MacPaint, for the first time in computer history, a personal computer can produce virtually any image the human hand can create. Because the mouse *allows* the human hand to create it.

MacPaint gives you total freedom to doodle. To cross-hatch. To spray paint. To fill in. To erase.

And even if you're not a terrific artist, MacPaint includes tools for designing everything from office forms to technical illustrations. Plus type styles to create captions, labels and headlines.

So you can have custom-designed graphics without hiring a design studio. Make your presentations more presentable by enlarging MacPaint illustrations or making transparencies for overhead projection. Or clarify a memo or report by "cutting out" your illustration and "pasting" it into your text.

What MacPaint does for helping you visualize your wildest imaginings, MacProject does for helping you visualize the unforeseen.



MacPaint produces virtually any image the human hand can create.

You simply enter all the tasks and resources involved in a project — whether it's opening a new office or producing a brochure — and MacProject will chart the "critical path" to completion, calculating dates and deadlines. If there's a single change in any phase of the project, it will automatically recalculate every phase.

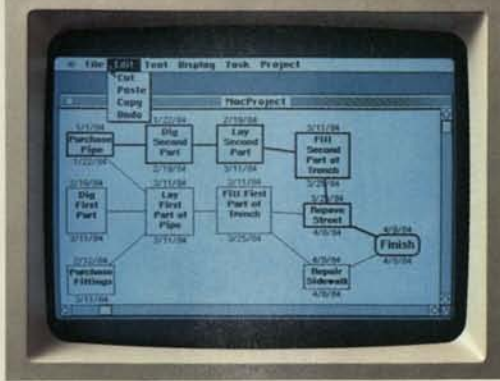
So with MacProject, you can generate business plans and status reports that reflect the realities of the job, not the limitations of your computer.

But more important than the practical benefits, programs like MacPaint and MacProject represent the very tangible difference an attitude can make. An

attitude that the only thing limiting what a computer can do is the imagination of the people creating it.

Not just the engineers who design it, but software developers like Lotus® Development Corporation, currently developing a Macintosh version of their 1-2-3™ program and Software Publishing Corporation with a new PFS:® filing program as easy to use as the Macintosh it was designed for. And Microsoft, with productivity tools like Multiplan, and Microsoft Chart, File, and Word.

If Macintosh has an extraordinary future ahead of it, it's because of the extraordinary people behind it.



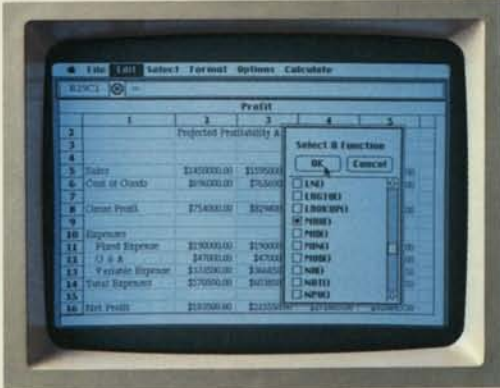
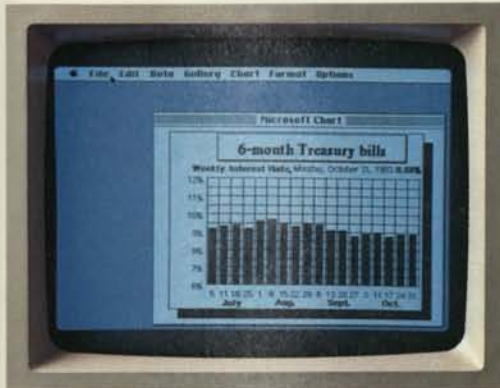
MacProject does for project management what VisiCalc® did for spreadsheets.



With Macintosh's unlimited graphics, there'll be no limit to the games it can play.



If you don't see a typeface you like here, Macintosh lets you design your own.



"Macintosh is much more natural, intuitive and in line with how people think and work... This is going to change the way people think about personal computers. Macintosh sets a whole new standard, and we want our products to take advantage of this."
Mitch Kapor, President, & Chairman of the Board, Lotus Development Corporation.

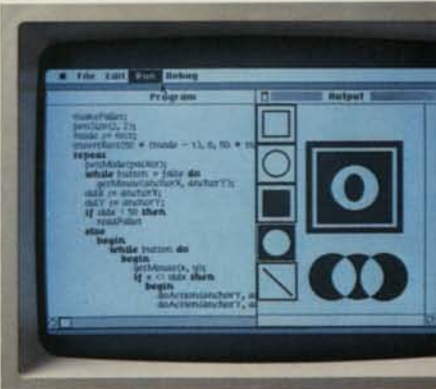
"To create a new standard takes something that's not just a little bit different. It takes something that's really new, and captures people's imaginations. Macintosh meets that standard."

Bill Gates, Chairman of the Board & CEO, Microsoft Corporation.



"...If you were to put machine X on the table and a Macintosh on the table beside it, and then put PFS: software on both machines...like a taste test...we think Macintosh's benefits would be pretty obvious."

Fred Gibbons, President, Software Publishing Corporation.



What makes Macintosh tick. And, someday, talk.

Macintosh has a lot in common with that most uncommon computer, the Lisa™ personal office system.

Its brain is the same blindingly fast 32-bit MC68000 microprocessor — far more powerful than the 16-bit 8008 found in current generation computers.

16-bit 8088 microprocessor.



Macintosh's 32-bit microprocessor.



Its heart is the same Lisa Technology of windows, icons, pull-down menus, software integration and mouse commands.

And, thanks to its size, if you can't bring the problem to a Macintosh, you can always bring a Macintosh to the problem. (Macintosh actually weighs 9 pounds less than the most popular "portable.")

Another miracle of miniaturization is Macintosh's built-in 3½" disk drive.



Standard 5¼" floppy disk.



Small footprint.

Macintosh is one third the size and volume of the IBM PC.

Its 3½" disks (400K) store more than conventional 5¼" floppies. So while they're big enough to hold a desk-full of work, they're small enough to fit in a shirt pocket.

And speaking of talking, Macintosh has a built-in polyphonic sound generator capable of producing high-quality human speech or music.



Macintosh's 400K 3½" disk.

On the back of the machine, you'll find built-in high-speed RS-232 and RS-422 AppleBus/serial

communications ports. Which means you can connect printers, modems and other peripherals without adding \$150 cards.

It also means that Macintosh is ready to hook in to a local area network. (With AppleBus, you can interconnect up to 16 different Apple computers and peripherals.)

Should you wish to double Macintosh's storage with an external disk drive, you can do so without paying extra for a disk controller card — that connector's built-in, too.

And, of course, there's a built-in connector for Macintosh's mouse, a feature that costs up to \$300 on computers that can't even run mouse-controlled software.

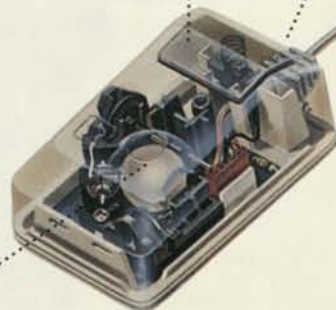
But the real genius of Macintosh isn't its serial ports or its polyphonic sound generator.

The real genius is that you don't have to be a genius to use a Macintosh.

You just have to be smart enough to buy one.

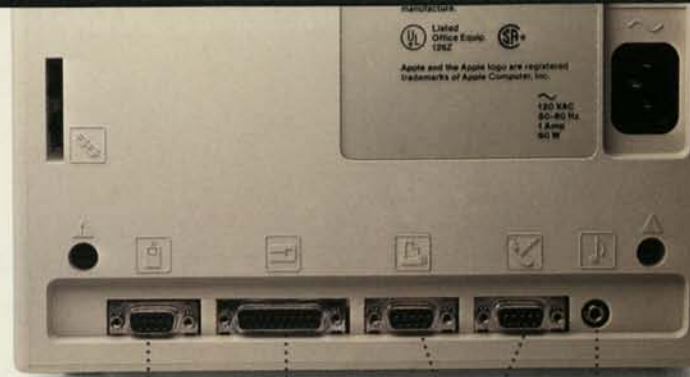
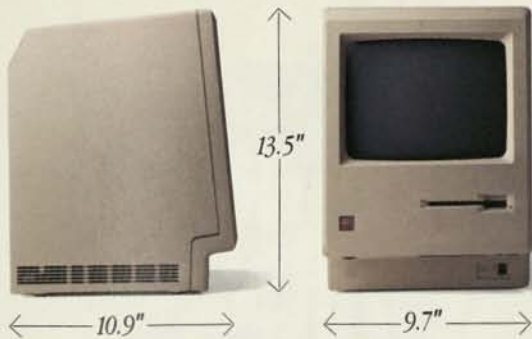
The Mouse itself. Replaced typed-in computer commands with a form of communication you already understand — pointing.

Some mice have two buttons. Macintosh has one. So it's extremely difficult to push the wrong button.



The inside story — a rotating ball and optical sensors translate movements of the mouse to Macintosh's screen pointer with pin-point accuracy.





Mouse connector. External disk drive connector. Polybionic sound port.

RS232, RS422, AppleBus serial communications ports for printers, modems and other peripherals.

9" high resolution 512 x 342 pixel bit-mapped display.

Ultra compact, switching-type power supply and high resolution video circuitry.

Battery for Macintosh's built-in clock/calendar.

Built-in handle for getting carried away.

Thanks to clever venting, Macintosh requires no internal fan.

Brightness control.

128K bytes RAM.

Built-in 3 1/2" disk drive.

Keyboard connector — a telephone-type jack you already know how to use.

Clock/calendar chip.

64K bytes ROM.

32-bit Motorola MC68000 microprocessor.

Macintosh's digital board — an entire 32-bit digital graphics computer in 80 square inches.

Robert Muhl

What to give the computer that has everything.

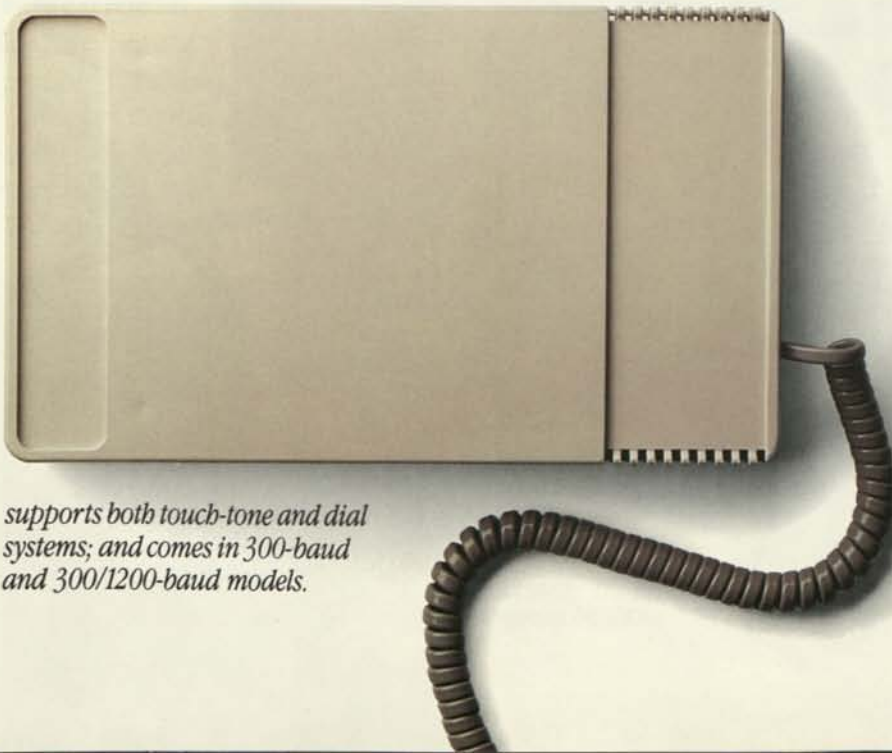
Macintosh comes well outfitted. The system includes the main unit (computer, display, built-in disk drive, and firmware), a detached keyboard; the mouse; a system disk (Finder and Desk Accessories); a tutorial diskette and audio diskette ("A Guided Tour of Macintosh"); and one—count it—*one* manual.

Everything you'll need to start doing everything you'll need to do.

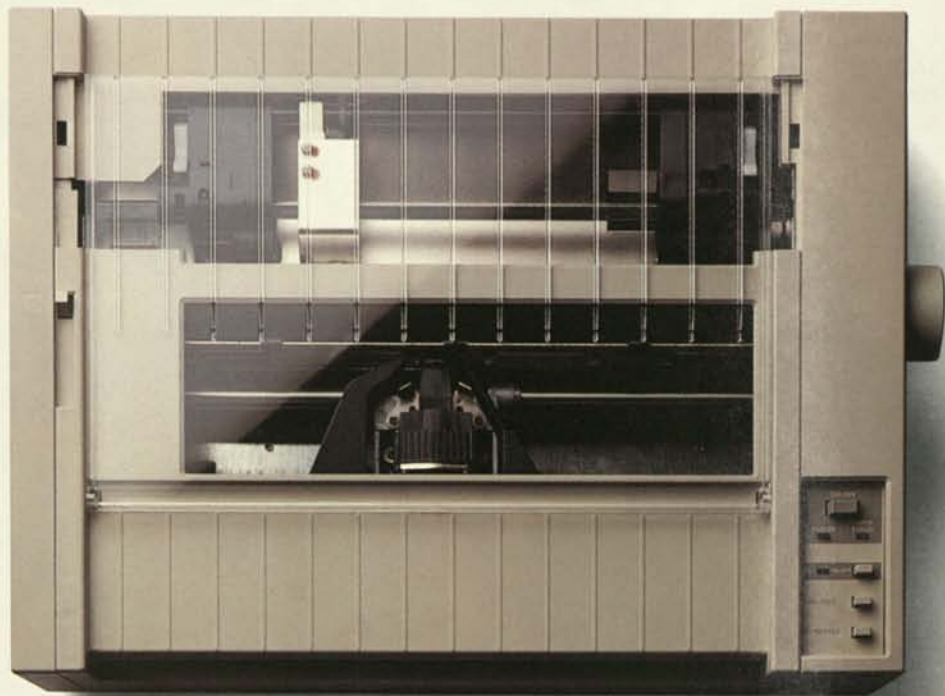
But, should your needs suddenly expand, so can Macintosh. As easily as putting a plug in a socket.

Apple Modem.

Using MacTerminal, a standard telephone and the Apple Modem, you can plug into electronic information services like Dow Jones News/Retrieval[®], The Source[™] and CompuServe[®]. Or communicate with other computers. It operates completely automatically, with both auto-dial and auto-answer;



supports both touch-tone and dial systems; and comes in 300-baud and 300/1200-baud models.



Apple Imagewriter Printer

Imagewriter produces high-fidelity printed copy of everything you see on a Macintosh screen. Multiple fonts. Pictures. Proportional text. Mixed text and graphics. And it prints on both sheet-fed and tractor-fed paper. It's fast, quiet, inexpensive.



**Apple
Numeric Keypad.**

Patterned after the standard accountant's calculator 10-key pad, the Numeric Keypad speeds up doing spreadsheets, accounting, and other number-related tasks. It plugs directly into the keyboard, and works with Macintosh applications.

Soft Carrying Case.

At less than 20 pounds in weight, Macintosh is easily carried from here to there. But handles always help. This durable, water-resistant carrying case is thickly padded so the Macintosh main unit, keyboard, mouse, manual and disks fit snugly inside.



Macintosh External Disk Drive.

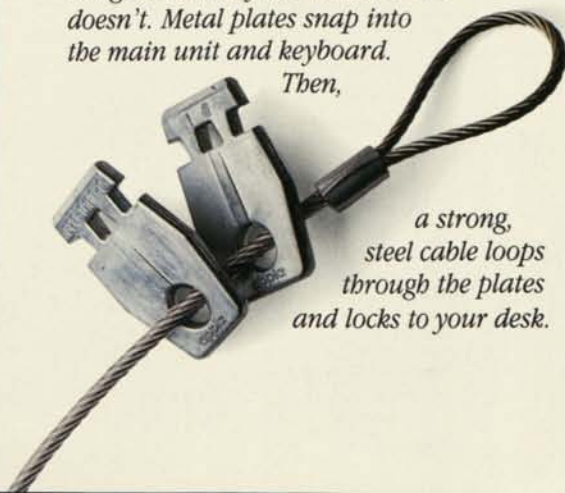
By adding a second high-capacity (400 kilobytes) 3 1/2" disk drive like the one already built into your Macintosh, you can access more documents and programs without swapping disks. It also speeds making backup copies of your information.



Security Kit.

Being transportable is one of Macintosh's many advantages. Provided it doesn't go anywhere without you. This specially designed security kit makes sure it doesn't. Metal plates snap into the main unit and keyboard.

Then,



a strong, steel cable loops through the plates and locks to your desk.

We could, as they say in computerese, dump another gigabyte (write another 50,000 or so pages) on Macintosh.

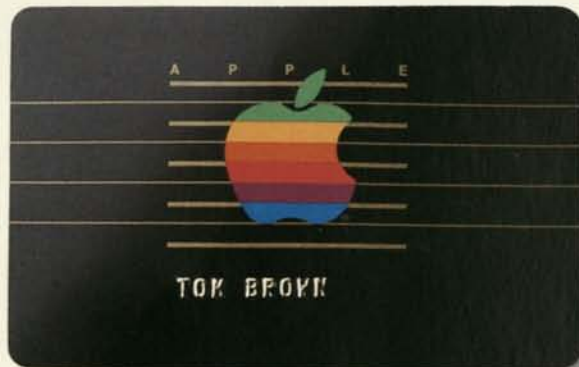
But you really can't appreciate how insanely great Macintosh is until you bring your index finger to an authorized Apple dealer.

Over 1,500 of them are eagerly waiting to put a mouse in your hand. To prove that, if you can point, you can use a Macintosh.

Should you be interested in low monthly

payments, the Apple Credit Card* may be your answer. If you fill out a credit application, in most cases you can take a Macintosh home the very same day.

Which makes owning the world's newest computer just as easy as using it.



Soon there'll be two kinds of people.
Those who use computers.
And those who use Apples.



For an authorized Apple dealer nearest you call (800) 538-9696. In Canada, call (800) 268-7796 or (800) 268-7637.

*The Apple Credit Card is not available in Canada.

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**Simplicity
is the
ultimate
sophistication.**



**Introducing
Apple II,[™]
the personal
computer.**

Sophisticated design



Apple II will change the way you think about computers. Compared to first generation "hobby" computers, Apple II is easier to use, faster, smaller and more powerful. It brings to personal computing a new level of simplicity through hardware and software sophistication. And Apple II can grow with you as your skill and experience with computers grows.

Sophisticated built-in features such as BASIC, the English-like programming language, advanced color graphics, and use of state-of-the-art high density memory components (16K ROMs and RAMs), set Apple II apart from all the others.

But you don't even need to know a ROM from a RAM to use and enjoy Apple II. Its beauty is in its simplicity. It's a complete, ready to use computer—not a kit. Everything is included. Hook it up to your color TV* and begin writing your own computer programs the very first evening. Even if you've had no

previous computer experience, you can invent your own color games, create artistic displays, or instruct Apple II to chart your home finances. Conversing with Apple II in BASIC is easy using its familiar typewriter-style keyboard.

Games have always been one of the most creatively challenging applications for the computer, and Apple II's sophistication shows through in the games it can help you create. Games like PONG or STARTREK. Apple BASIC contains advanced unique commands for using color graphics (COLOR=, PLOT, HLINE, VLINE, SCRN) which means creating dazzling color displays or writing your own

PONG type game becomes something even a beginner can master. Since text can be displayed along with graphics, your program can keep score, give and accept instructions and even comment on your ability as a player. Paddles and joysticks are interfaced easily using the built-in Apple GAME I/O connector. And a special BASIC command (PDL) automatically senses the position of the paddle. That simplifies writing action games. Apple II's built-in speaker sounds when the ball is hit, and when



gn makes it simple.

a point is made or lost. In **STARTREK**, you'll actually hear the phasers and photon torpedoes.

Apple II will do more than entertain you. Playing with it, you'll begin to learn what a computer is all about and how rewarding it can be. You'll discover that it's easy to program your Apple II to do things like teach your kids arithmetic or spelling. (Yes, it's OK to let your kids use Apple II. It's ruggedly engineered and has a virtually unbreakable plastic case.) And you can save your programs on an ordinary cassette tape using the built-in

cassette interface and your home cassette



recorder. Other sources of programs are the Apple software library and the Apple II owner down the block.

Increased memory can extend your horizons. For instance, with 12K or more memory, Apple II can generate a high-resolution (280h x 192v) graphic display in 4 colors useful for scientific, medical or artistic applications. The user memory can be expanded up to 48K bytes by simply inserting more memory packages in the sockets provided.

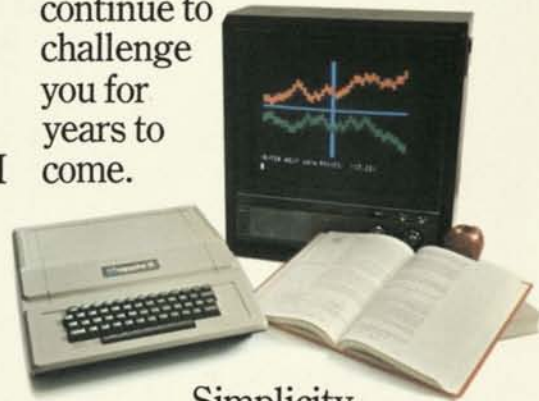
Also, there are several peripheral boards scheduled for introduction soon which will plug into the expansion connectors—Apple II

has eight built-in—enabling you to syn-

thesize music or talk to another computer over the phone. Many more interesting peripheral boards to expand your Apple II will be available this year.

As you become an expert, you'll grow to appreciate the sophistication inside Apple II. Its 2K byte ROM monitor contains a mini-assembler, a disassembler, single-step and trace routines, floating point package, a software-simulated 16-bit processor routine, and more.

Apple II is an advanced personal computer that will continue to challenge you for years to come.



Simplicity.
Sophistication. Apple II.

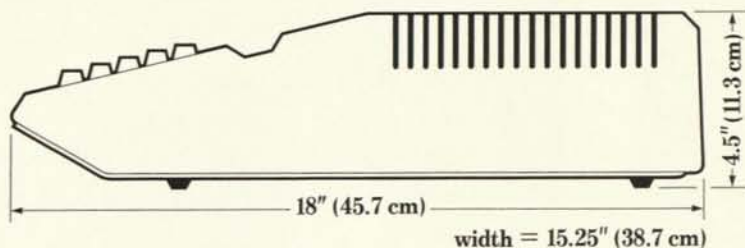
 **apple computer inc.™**

*Apple II plugs into a TV monitor or hooks up to any standard television using an inexpensive commercially available RF modulator (not supplied).

PONG is a trademark of Atari, Inc.

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Technical Overview



Apple II is a complete, self-contained, ready to use computer. Standard features include BASIC and Monitor in ROM (8K bytes), Color Graphics, up to 48K bytes RAM (4K included), cassette interface, Apple GAME I/O connector, typewriter-style ASCII keyboard, high-efficiency switching power supply and plastic molded case. Also included as standard are: 1 demonstration cassette tape, two game paddle controllers and detailed operations manual.

MICROPROCESSOR:

6502 operating at 1 MHz clock.

VIDEO DISPLAY

The Apple II video display section displays memory as either text, color graphics, or high-resolution graphics (completely transparent memory access). Both graphics modes can be selected to include 4 lines of text at the bottom of the display area. All display modes are software selectable. In addition, the user can select under software one of two memory blocks to be displayed.

Text

- 40 characters/line, 24 lines.
- 5 x 7 upper case characters.
- Normal, inverse or flashing characters.
- Extensive display control software in ROM.
- Full cursor control.
- Fast display — 1000 cps.

Color Graphics

- 40h x 48v resolution or 40h x 40v with 4 lines text.
- 15 colors — color generated digitally.
- BASIC commands to use graphics easily: COLOR=, PLOT x, y, HLIN, VLIN SCRN.

High Resolution Graphics

- 280h x 192v resolution or 280h x 160v with 4 lines text.
- 4 colors — black, white, violet, green.
- Displays 8K bytes (requires 12K minimum RAM).

MEMORY

RAM is organized into 3 increments. Each increment can be either 4K bytes using 4K chips or 16K bytes using advanced 16K chips. Memory may be easily increased by inserting an additional increment of chips. From 4K to 48K bytes of RAM can be contained on the single board. 8K bytes of ROM are supplied which permanently store Apple BASIC (6K) and a powerful system monitor (2K). Two additional ROM sockets are provided for future Apple software.

- Up to 48K bytes on-board RAM — no peripheral memory boards!
- Unique automatic RAM refresh system, completely transparent.
- Uses 4096, 2104 type 4K and 4116, 2116 type 16K RAMs.
- Fast memory — 350ns access time.

I/O

Apple II includes as standard an ASCII keyboard, audio cassette interface, 8 peripheral board connectors, speaker, Apple GAME I/O connector and two game paddle controllers.

- Reliable typewriter-style keyboard.
- Fast cassette interface — 1500 bps.
- Peripheral board connectors:
 - fully buffered busses & timing
 - Daisy-chained interrupt and DMA priority structure
- GAME I/O — 4 paddle inputs, 3 TTL inputs and 4 TTL outputs.

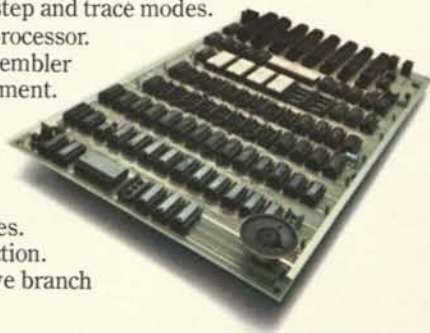
BASIC

Apple BASIC is an integer BASIC supplied in 6K bytes of ROM and includes the following features (in addition to normal basic features):

- Apple BASIC is a fast translated BASIC.
- Any length variable names (ALPHA, BETA\$).
- Syntax and range errors indicated immediately when entered.
- Multiple statements on one line.
- Integers from -32767 to +32767.
- String arrays to 255 characters. Single dimension integer arrays.
- Graphics Commands: COLOR=expr, PLOT, HLIN (draw horizontal line), VLIN, SCRN (x, y) (reads the screen color).
- Paddle read function: PDL (0-3).
- TEXT and Graphics Commands set display mode from BASIC.
- Immediate execution of most statements.
- Memory boundary adjust (does not destroy current program).
- Break and Continue program execution.
- Debug commands: line number trace and variable trace.
- Switchable I/O device assignments.
- Direct memory access: PEEK, POKE, CALL commands.
- Cassette SAVE and LOAD commands.
- Auto line number mode.
- RND, SGN, ASC, LEN and ABS functions.
- POP instruction pops the return stack one level.
- GOTO expr, GOSUB expr allowed.

MONITOR

- 2K byte ROM monitor.
- Screen control (intelligent display routines). Full cursor control.
- Scrolling window adjustable (protected screen feature).
- Software simulated single-step and trace modes.
- Software simulated 16-bit processor.
- Dis-assembler and mini-assembler
- Input/Output device assignment.
- Editing on keyboard entry.
- Floating point package.
- Breakpoint handling.
- Register examine/modify.
- Read/Write cassette routines.
- Inverse/Normal video selection.
- Hex add/subtract for relative branch calculations.



 **apple computer inc.**
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Due to our continuing program of product improvement, specifications are subject to change without notice.

Printed in U.S.A. 4/77

apple II



APPLE II PERSONAL COMPUTER SYSTEM





APPLE II

PERSONAL COMPUTER SYSTEM

APPLE II will change the way you think about computers. That's because it is specifically designed to handle the day to day tasks of education, financial planning, building security, scientific calculation, and entertainment. APPLE II is appealing and comfortable (like other appliances that make your life easier); and it brings to personal computing a new level of simplicity through hardware and software sophistication.

GETTING STARTED

APPLE II is faster, smaller, and more powerful than its predecessors. And it's more fun to use too, because of advanced, built-in features like:

- BASIC — The Language that Makes Programming Fun
- Fifteen-Color Standard Graphics (in an 1,880-Point Array) for Spectacular Visual Effects
- High-Resolution Graphics (in a 54,000-Point Array) for Finely-Detailed Displays
- Loudspeaker and Sound Capability that Brings Programs to Life
- Four Hand-Control Inputs for Games and Other Human-Input Applications
- Internal Memory Capacity of 48K Bytes of RAM, 12K Bytes of ROM; for Big-System Performance in a Small Package
- Eight Accessory Expansion Slots to let APPLE II Grow With Your Needs

You don't need to be an expert to use and enjoy APPLE II. It's a complete, read-to-run computer — not a kit. Connect it to your color TV* and start writing programs the very first evening. Become familiar with BASIC, using the 125 page Programming Manual. You'll gain deep satisfaction and a feeling of accomplishment as you learn to create color games and artistic displays; or instruct APPLE II to chart your home finances. Controlling the computer is easy; using its familiar, typewriter-style keyboard and conversational BASIC language.



SAY IT IN COLOR

APPLE's advanced graphics commands make brilliant, effective, color displays something even a beginner can master. And the usefulness of color extends far beyond entertainment. Multi-color charts and graphs can "humanize" your programs for greater interest and comprehension.

High-resolution graphics can take you even farther. APPLE's 54,000-point color display lets you explore applications ranging from architectural design to fingerprint analysis. And you can label your diagrams with upper/lower case characters, Greek letters or special symbols. You can even define your own unique character sets.

SOUND ADDS A NEW DIMENSION

APPLE II speaks for itself. In STAR WARS, you'll actually hear the phasers fire through a built-in speaker. And you can create your own music under computer control. But synthesized sound is more than a toy. Audible cues announce system functions or programming errors, so you don't have to watch the TV monitor to see what's happening. In your own programs, tones add life to games and presentations.

HAND CONTROLS INCLUDED

Up to four rotary hand controls and four pushbuttons connect directly to APPLE II (two of each come with the computer), and are used with simple BASIC commands. They assist in applications ranging from "ball and paddle" games to graphic design, where the operator interacts with figures on the screen.

USER PROGRAM- MABLE

A fast, powerful integer BASIC is built into APPLE II. It lets you write complex programs, and generate spectacular color graphics displays. For business and scientific programming, Applesoft Floating-Point BASIC provides an extensive library of mathematical and character-handling functions, as well as 9-digit precision in arithmetic calculations.

The built-in assembler, disassembler and monitor will be appreciated by advanced programmers in search of more speed or flexibility than BASIC can provide.

A LEARNING TOOL

APPLE II is a portable education. Using it, you'll begin to learn what a computer is all about. You'll discover how easy it is to create programs that help your kids with arithmetic or spelling. (Yes, it's OK to let your kids use APPLE II. It's ruggedly engineered and has a virtually unbreakable molded case.) You can save those programs on an ordinary cassette recorder, or on the optional floppy disk subsystem. As your skill grows, your library will too. And you will enjoy expanding that library in future years through your local Apple users group or from the rapidly growing Apple Software Bank.

APPLE GROWS WITH YOU

APPLE II was designed to grow with you, so we built in expandability at the start — with a hefty power supply and eight interface card slots right on the system circuit board. You can synthesize music, print mailing labels, control AC receptacles, or talk to another computer; all just by plugging in a card. And the best is yet to come, as new Apple hardware and software options appear on a monthly basis this year.

AND YET...

APPLE II is simple on the outside. Like a TV set or an automobile, it is sophisticated enough to be easy to use. But as you gain experience with it, you'll grow to appreciate the sophistication inside. It shows up in features like the built-in assembler, disassembler, utility routines, and monitor; a switching power supply that runs cool without fans; and a circuit design so trouble-free that we warrant it for one full year.

Introduce yourself to APPLE II — the advanced personal computer that's a tool for today, and a continuing challenge for years to come.

Simplicity. Sophistication. APPLE II



APPLE II

TECHNICAL OVERVIEW

APPLE II is a complete, self-contained, ready-to-use computer based on the 6502 microprocessor. Standard features include BASIC, assembler, disassembler, and monitor in ROM; color graphics, sockets for up to 48K bytes RAM, cassette interface, Apple game I/O connector, typewriter-style ASCII keyboard, high-efficiency switching power supply and rugged structural foam case. Also included as standard are: demonstration cassette tapes, two game controls, and detailed Reference and BASIC Programming manuals.

VIDEO DISPLAY

The APPLE II video circuitry displays memory as text, color graphics, or high-resolution graphics — software selectable. Both graphics modes can be selected to include 4 lines of text at the bottom of the display area. In either graphics mode the user can select (under software control) one of two memory pages to be displayed. The standard Apple provides an NTSC composite video output.

TEXT

- 40 characters/line, 24 lines
- 5 x 7 upper-case characters
- Normal, inverse or flashing characters
- Extensive display control software in ROM
- Full cursor control
- Fast display — 1000 cps

COLOR GRAPHICS

- 40h x 48v resolution (40h x 40v with 4 lines text)
- 15 colors — color generated digitally
- BASIC commands to use graphics easily

HIGH RESOLUTION GRAPHICS

- 280h x 192v resolution (or 280v x 160v with 4 lines text) 4 colors — black, white, violet, green
- Displays 8K bytes (16K RAM system recommended)

MEMORY

RAM is organized into 3 increments. Each increment can be either 4K bytes (using 4K chips) or 16K bytes (using advanced 16K chips). Memory may be easily expanded by inserting an additional increment of chips. Up to 48K bytes of RAM can be contained on the single board. 8K bytes of ROM (supplied) store Apple BASIC (6K) and a powerful system monitor (2K). Two additional ROM sockets are provided for future Apple software.

- Up to 48K bytes on-board RAM — no peripheral memory boards
- Unique automatic RAM refresh system, completely transparent
- Uses 4096 or 2104 type 4K, and 4116 or 2117 type 16K RAMs
- Fast memory — 350ns access time





I/O

APPLE II includes as standard an ASCII keyboard, audio cassette interface, 8 peripheral board connectors, speaker, game I/O connector and two game controls.

- Reliable, typewriter-style keyboard
- Fast cassette interface — 1500 bps
- Peripheral board connectors
 - Fully buffered, with interrupt and DMA priority structure
- GAME I/O — 4 paddle inputs, 3 TTL inputs and 4 TTL outputs

BASIC

Apple BASIC is a fast, translated integer BASIC that includes the following features (in addition to normal BASIC capabilities).

- Any-length variable names (ALPHA, BETA\$)
- Syntax and range errors indicated immediately when entered
- Multiple statements on one line
- Integers from -32767 to +32767
- String arrays to 255 characters. Single-dimension integer arrays
- Graphics Commands: COLOR = expr; PLOT X,Y; HLINE X₁, X₂ at Y; (draw horizontal line), VLINE Y₁, Y₂ at X; SCRN(x,y) (reads the screen color)
- Paddle read function: PDL(0-3)
- TEXT and Graphics Commands to set display mode from BASIC
- Immediate execution of most statements
- Memory boundary adjust (does not destroy current program)
- Break and Continue program execution
- Debug commands: line number trace and variable trace
- Switchable I/O device assignments
- Direct memory access: PEEK, POKE, CALL commands
- Cassette SAVE and LOAD commands
- Auto line number mode
- RND, SGN, ASC, LEN and ABS functions
- POP instruction pops the return stack one level
- GOTO expr, GOSUB expr allowed
- Fully interruptable

MONITOR

- 2K byte ROM monitor
- Screen control (intelligent display routines). Full cursor control
- Scrolling window adjustable (protected screen feature)
- Software simulated single-step and trace modes
- Disassembler and single-pass assembler
- Input/Output device assignment
- Editing on keyboard entry
- Floating-point package
- Breakpoint handling
- Register examine/modify
- Read/Write cassette routines
- Inverse/Normal/Flashing video selection
- Hex add/subtract for relative branch calculations

ORDERING INFORMATION

All non-European APPLE II systems are identical except for the amount of RAM supplied. Systems with 16K or more RAM include Applesoft BASIC on tape, with documentation. PAL and SECAM-compatible versions of APPLE II are available through Eurapple.

<u>Order No.</u>	<u>RAM</u>	<u>Order No.</u>	<u>RAM</u>
A2S0004	4K bytes	A2S0032	32K bytes
A2S0008	8K bytes	A2S0048	48K bytes
A2S0016	16K bytes		



APPLE INTELLIGENT INTERFACES

PARALLEL PRINTER INTERFACE CARD

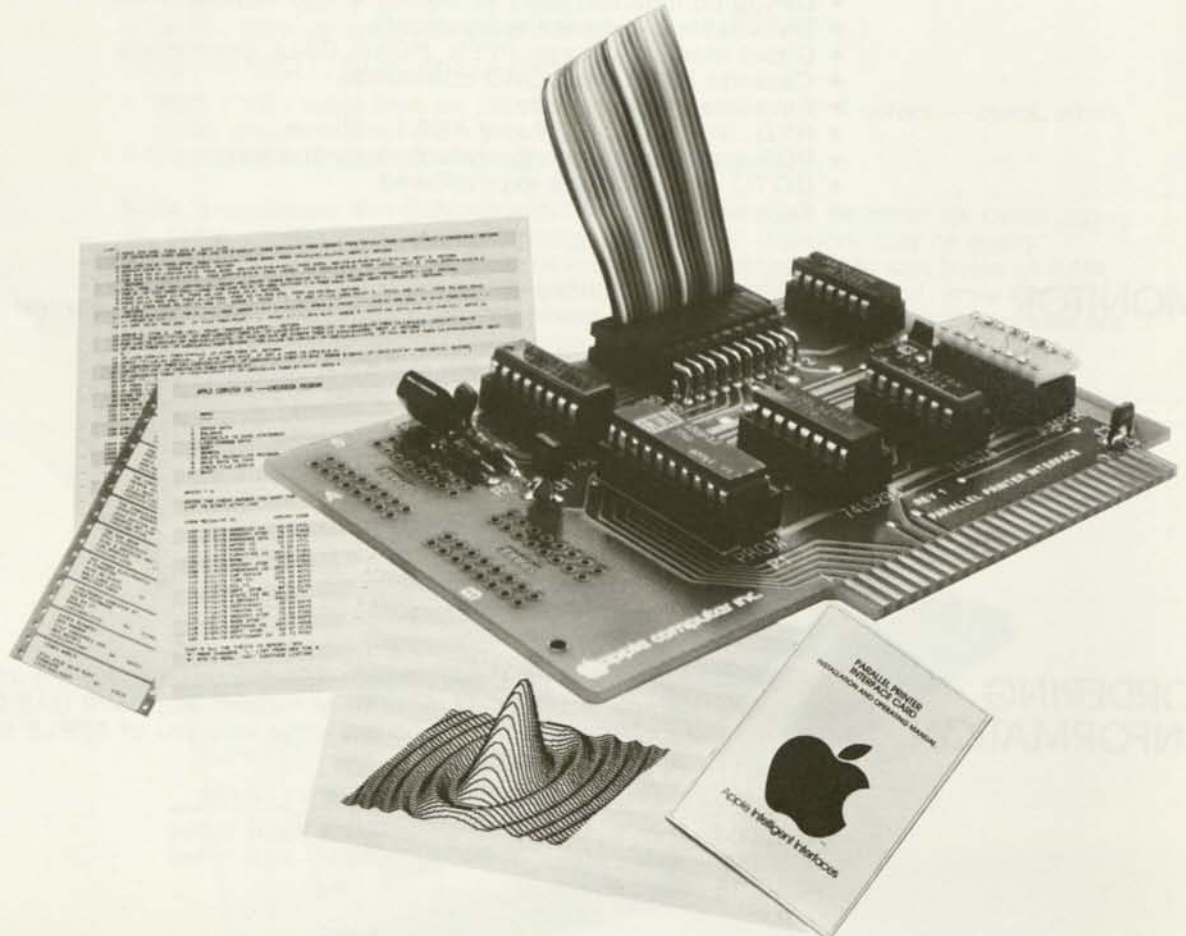
GENERAL DESCRIPTION

The Parallel Printer Interface Card opens up a whole range of printing applications for your APPLE II. With this card (and almost any popular printer), you can produce the reports, diagrams, labels and listings your application requires. And, because this interface is intelligent, it's easy to use — no complex control programs for you to write or load. The card's built-in brainpower does the work for you; while you concentrate on the job you want to do.

We designed this card to handle the whole task of printer control; so that your programs can use all the capabilities built into your printer. Expanded headlines, lower-case text, graphics — if the printer can do it, you can now program it simply and quickly, in BASIC. By building in the firmware that makes this card intelligent, we set a new performance standard for personal computer interfaces.

FEATURES

- No Programming Needed — All Required Software in On-Board ROM
- Allows Printing Through Simple BASIC Commands
- Allows Up to 255 Char/Line — Upper and Lower Case, Special Symbols, etc.
- Handles Printers Up to 5000 Char/Sec (3700 LPM @ 80 Char/Line)
- Fully Assembled — Not a Kit
- Interfaces to Most Popular Printers (Axiom, Centronics, SWTP, etc.) Through an 8-bit Parallel Port
- Easy Installation — Simply Plugs into a Connector in the APPLE II





USING THE PARALLEL PRINTER INTERFACE CARD

The intelligent Printer Interface Card allows your BASIC program to produce hard-copy output as easily as it "prints" on the TV monitor screen. Command interpretation and printer control details are handled by the firmware built into the card, to eliminate user programming requirements.

A simple BASIC command, such as PR#1, initializes the Printer Card. Subsequent PRINT statements will send data to the printer as well as the TV monitor at 40 characters/line. (The card does not normally have to be initialized again unless the APPLE II is turned OFF or RESET.)

A second command disables the TV monitor and sets the printer line width between 0 and 255 characters/line. Another command returns output to both the TV and printer, at 40 characters/line.

For special applications, there are commands to change the printer control character, and to disable the automatic printer card line feed (to allow use with printers that generate their own line feeds).

And finally, the command PR#0 turns the printer card OFF entirely.

INTERFACING A PRINTER TO YOUR APPLE II

The Parallel Printer Interface Card has been tested with Axiom, Centronics, Printronix, and SWTP printers. However, it is designed to work with almost any printer that can:

- Take in data through a 7- or 8-bit parallel port;
- Accept data when a STROBE signal (supplied by the APPLE II) tells the printer that the data is ready; and
- Return an ACKNOWLEDGE signal to the Printer Interface Card when it has taken the data in for printing.

Complete information on adapting the Printer Interface Card to various printers is supplied in the Parallel Printer Interface Card Manual.

SPECIFICATIONS

PARAMETER	DESCRIPTION
Data and Control	
Outputs:	Bits 0-7 and STROBE (Positive-going or negative-going acceptable)
HIGH-LEVEL OUTPUT:	2.7V (min.) 0.4mA (max.)
LOW-LEVEL OUTPUT:	0.5V (max.), 8.0mA (max.)
Control Input:	ACKNOWLEDGE (Positive-going or negative-going acceptable)
HIGH-LEVEL INPUT:	2.0V (min.), 20 μ A (max.)
LOW-LEVEL INPUT:	0.8V (max.), -0.4mA (max.)
Power Consumption:	5.0V at 150mA (max.)
Firmware Storage:	6309 (256x8) PROM, on card
Printer Control	
Characteristics	
LINE WIDTH:	Up to 255 characters/line
OUTPUT SPEED:	Up to 5000 characters/second, controlled by the printer
Card Size:	4.5" x 2.75" (not including connector fingers); fits inside the APPLE II
Printer Connection:	By means of 20-wire ribbon cable, included (user must supply connector on printer side of cable.)

ORDERING INFORMATION

Order Number: A2B0002. Supplied with:

- Parallel Printer Interface Card
- Firmware in ROM
- Configuration Jumper Block
- Ribbon Cable
- Manual



APPLE INTELLIGENT INTERFACES

COMMUNICATIONS INTERFACE CARD

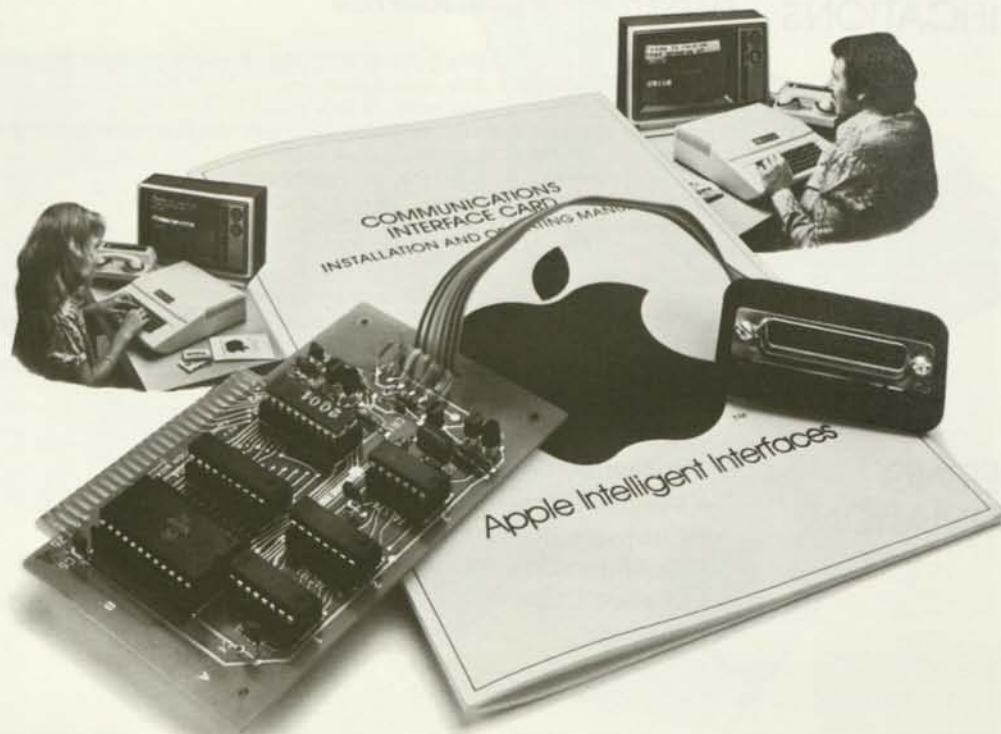
GENERAL DESCRIPTION

The Communications Interface Card extends the usefulness of your APPLE II by allowing it to "talk" (through a modem) with other computers and terminals over ordinary telephone lines. What's more, the card lets your system tap the immense resources of timesharing services and the telephone network itself. Now you can load programs over the phone lines; send messages to remote terminals through a timesharing network; or access your office computer from the comfort of your home.

But the Communications Card is more than just a telephone interface. It is a general purpose serial data controller. So you can also use it to run that printer or extra CRT display your application requires. And best of all, because this card is intelligent, you can do all these things, quickly and easily, in BASIC. There are no control programs to write or load. Built-in firmware lets the card handle the complete job of serial communications, so you can concentrate on the job you want to do.

FEATURES

- Permits Interactive Programming and Distributed Computing using Two or More APPLE II's
- Quickly Transfers Letters, Programs, or other Information over the Phone Lines Through Standard Modems or Acoustic Couplers
- Allows the APPLE to Become a Terminal for other Computer Systems
- Includes all Necessary Programs — No Software to Write
- Easily Controlled from BASIC using Simple Commands
- Fully Assembled and Tested — No Wiring or Soldering
- Communicates at 110 or 300 Baud, Half- or Full-Duplex
- Provides an RS-232C Serial Interface, with Industry Standard DB-25 Connector
- Works with Bell Telephone Hardware — or Similar Equipment from other Manufacturers
- Plugs into any APPLE II Expansion Slot for Fast Installation
- Uses the APPLE II Power Supply, for Economy and Convenience





USING THE COMMUNICATIONS INTERFACE CARD

The Communications Interface Card allows your APPLE II to exchange data with a remote computer as easily as it talks to its own keyboard and display; or output to a printer using the standard "PRINT" command. The details of this communication are completely controlled by firmware built into the card, to eliminate the need for user programming.

A simple BASIC command (such as PR#2) initializes the Communications Card to transmit any information that appears on the screen. A second command allows the APPLE II to receive data through the card. Another command allows the system to be controlled by data coming in through the card (instead of by commands from its own keyboard). A fourth transforms your computer into a "dumb terminal", moving data in and out but not operating on it.

There are commands to change the data transfer speed from 300 baud (normal) to 110; to set full or half-duplex transmission mode; and to provide special handling of lower-case characters.

INTERFACING SERIAL DEVICES TO YOUR APPLE II

The Communications Interface Card can be used to adapt a variety of serial equipment (devices that exchange data one bit at a time) to your APPLE II. Hardware that is compatible with this interface includes modems (telephone line adapters), printers, and other equipment that can:

- Transfer serial data at 110 or 300 baud;
- Connect to an RS-232C interface (which defines the voltage levels of the data signals)

Complete operating information, logic diagrams, and firmware listings are supplied in the Communications Interface Card Manual.

SPECIFICATIONS

PARAMETER	DESCRIPTION
Signal Level:	EIA RS-232C
Data Word Format:	1 start bit, 1 or 2 stop bits, 7 or 8 data bits; odd, even or no parity
Lower-Case Characters:	Can be optionally converted to upper-case, or can be passed through unmodified.
Power Consumption:	5V at 150mA (max.)
Firmware:	256-byte PROM, included on the card
Card Size:	4.5 by 2.75 inches (not including connector finger); fits entirely inside the APPLE II case
External Connector:	DB-25 female connector with mounting bracket

ORDERING INFORMATION

Order Number: A2B0003. Supplied with:

- Communication Interface Card
- Firmware in ROM
- Connector and Mounting Bracket
- Manual
- Demonstration Tape



APPLE INTELLIGENT INTERFACES

HIGH-SPEED SERIAL INTERFACE CARD

GENERAL DESCRIPTION

The High-Speed Serial Interface Card allows APPLE II to exchange data with computers, printers and other fast devices in serial format (one bit at a time). In the printer mode, it can produce charts, reports and labels on most popular printers. As a communications controller, it is ideal for situations in which large programs or blocks of data must be transferred. It is intended for use (in place of the Communications Interface Card) in applications that:

- Use data rates other than 110 or 300 baud (10 or 30 char/sec); or
- Require movement of large data blocks (256 or more bytes) without interruption

The Serial Card features on-board firmware that provides BASIC control in both block-data-transfer and printer-operation modes. A number of hardware and software switches on the card serve to adapt it to a wide variety of applications, yet it remains simple to use because of its built-in intelligence.

FEATURES

- Permits BASIC Control of High-Speed Printers and Plotters
- Quickly Transfers Large Blocks of Data by Telephone (through a modem), or Directly to Local Equipment
- Allows the APPLE II to Communicate with High-Speed Terminals and Other Computers
- Includes Control Software in ROM — No Programs to Write
- Handles Half-Duplex Communication from 75-19.2K Baud
- Provides Switch-Selectable Preset Conditions for Speed, Line Length, Auto Line Feed and Carriage Return Delay
- Fully Assembled and Tested—No Wiring Required
- Provides an RS-232C or Current Loop Serial Interface, with Industry Standard DB-25 Connector
- Works with Bell Telephone Hardware, or Similar Equipment from Other Manufacturers
- Plugs into Any APPLE II Expansion Slot for Fast Installation
- Uses the APPLE II Power Supply for Economy and Convenience





USING THE HIGH SPEED SERIAL INTERFACE CARD

The Serial Interface Card allows your APPLE II to exchange data with a remote computer or other high-speed device as easily as it talks to its own keyboard and display. You simply specify the area of memory whose contents are to be moved and the direction of movement (in or out). The rest of the job is handled by built-in firmware on the Serial Card.

A simple BASIC command (such as PR#1) initializes the Serial Card. A second command may then be used to specify any changes in speed, parity, etc., from the switch-selected preset conditions. Then, in the block transfer mode, a single statement will cause an entire data block to be transferred in or out of the APPLE II.

In the printer mode, information is automatically transmitted out through the card. Special provision is made for handling lower-case characters, carriage return delays, and printer line widths of up to 255 characters. BASIC listings are formatted.

INTERFACING HIGH-SPEED SERIAL DEVICES TO YOUR APPLE II

The Serial Interface Card can adapt a variety of serial equipment to your APPLE II. Hardware that is compatible with this interface includes modems (telephone line adapters), printers, plotters, computers, and other equipment that can:

- Transfer Serial Data at 75-19, 200 Baud, Half-Duplex
- Connector to an RS-232C Interface (which defines voltage levels and the connector type)

Complete operating information, logic diagrams and firmware listings are supplied in the Serial Interface Card Manual.

SPECIFICATIONS

PARAMETER	DESCRIPTION
Signal Level:	EIA RS-232C
Data Word Format:	1 start bit, 1 or 2 stop bits, 5-8 data bits; odd, even, or no parity; Checksum is optional.
Character Handling Options:	Lower-case characters can be optionally converted to upper-case or can be passed through unmodified and displayed in inverse video on the monitor screen.
Firmware:	512-byte PROM, included on card
Card Size:	4.5 x 2.75 inches (not including connector fingers); fits entirely inside the APPLE II case
External Connector:	DB-25 female connector with mounting bracket

ORDERING INFORMATION

Order Number: A2B0005. Supplied with:

- High-Speed Serial Interface Card
- Firmware in ROM
- Connector and Mounting Bracket
- Manual



APPLE INTELLIGENT SUBSYSTEMS

DISK II FLOPPY DISK SUBSYSTEM

GENERAL DESCRIPTION

Many computer applications depend upon rapid access to information. The home computer balancing a checkbook and the business computer managing inventory share this need. To provide for fast, low-cost data retrieval, Apple Computer, Inc. has developed Disk II.

Disk II simplifies the approach to your program library. No longer must you search through stacks of cassettes, or slowly read yards of tape to find the program you want. Now with a few keystrokes, your system will find and load any file by name. And it will do it quickly and reliably.

Disk II gives your system immediate access to large bodies of data. That makes inventory, address file, and recipe programs suddenly feasible. It means you can store a year's worth of financial records in one place, and sort through them quickly. And it allows you to handle many other applications that just were not practical before.

The Disk II Floppy Disk Subsystem consists of an intelligent interface card, a powerful Disk Operating System (DOS), and one or two mini-floppy drives. (The computer will handle up to seven interface cards and fourteen drives, for control of nearly 1.6 megabytes of data). The combination of ROM-based bootstrap loader and an operating system in RAM provides complete disk handling capability.

FEATURES

- Powerful Disk Operating Software:
 - LOAD and STORE files by name (Up to 35 Char/Name)
 - BASIC Program Chaining
 - Random or Sequential File Access
- Fast Access Time — 600msec (Max.) Across 35 Tracks
- Individual File Write-Protection
- Full Disk Capability in Systems with as Little as 16K RAM
- Data Transfer Rate of 156K Bits/sec
- Storage Capacity of 116 Kilobytes/Diskette
- High-Efficiency Subsystem Powered Directly from the APPLE II (Up to 14 Drives)
- Completely Assembled and Tested — Not a Kit
- Packaged in Heavy-Duty, Color-Coordinated Steel Cabinet



USING THE DISK II FLOPPY DISK SUBSYSTEM

The Disk II Subsystem allows your Apple to manipulate program and data files through simple BASIC statements. Command interpretation and file handling are controlled by software automatically loaded into RAM as the disk is initialized.

A BASIC statement such as PR#7 activates the Disk Subsystem. The CATALOG statement will then display a list of the files contained on a particular diskette. Other commands allow the user to Write-Protect a file, READ or WRITE it, and SAVE it back on the disk.

As data is stored on the subsystem, it is automatically put into unused sectors of the disk, which are linked together until a space of adequate size has been created to hold the new file. Thus the user gets the most efficient utilization of his disk area, yet does not have to know the maximum size of each file in advance.

Files stored on the disk can be copied, deleted, or renamed under program control. Volume numbers assigned to individual files or to diskettes allow the handling of successive files of the same name. And the CHAIN command permits the chaining together of multiple BASIC programs.

The Disk II Operating System fully supports both ROM Applesoft and Apple Integer BASIC through its universal command handler. All commands are completely explained in the manual supplied with Disk II.

SPECIFICATIONS

PARAMETER	DESCRIPTION
Commands:	OPEN, CLOSE, READ, WRITE, LOAD, SAVE, EXEC, RUN, APPEND, LOCK, CHAIN, UNLOCK, DELETE, MONITOR, NOMONITOR, MAXFILES, IN#, PR#, INIT, BLOAD, BSAVE Random or Sequential — arbitrary record length
Access Method:	
Bootstrap Loader Method:	By means of Loader routine in two 256 x 8 PROMs, on-card
Disk Drive:	Shugart 5-1/4" floppy disk.
Track Access Time:	Varies with number of tracks crossed. 200msec (avg.), 600msec (max. accross 35 tracks)
Disk Speed and Latency:	300 rpm, 100 msec avg. latency
Disk Capacity:	116K bytes (formatted), soft-sectored
Data Transfer Rate:	156K bits per second
Physical Dimensions:	Card — 4.5" x 2.75" (not including connector fingers): fits inside the APPLE II Drive — 6.1" x 8.75" x 3.8" (WDH)
Controller Capacity:	Up to two drives per controller. Multiple controllers can be used

ORDERING INFORMATION

Order Number: A2M0004. Supplied with:

- Floppy Disk Interface Card
- Bootstrap in ROM
- Disk Drive and Connecting Cable
- System Software on Diskette
- Manual
- Blank Diskette

Order Number: A2M0003. Supplied with:

- Second Disk Drive and Connecting Cable



APPLE DOCUMENTATION & ACCESSORIES

SYSTEM DOCUMENTATION

All Apple computers come with complete documentation for users at every level of technical expertise.

APPLE II BASIC PROGRAMMING MANUAL

This manual starts from the beginning with how to plug in the Apple. It then guides the user's first programming efforts. A humorous style and abundant examples make this the ideal textbook for newcomers to personal computing.

(Order No. A2L0005, 125 pages. Supplied with Apple systems)

APPLE II REFERENCE MANUAL

This manual addresses the details of the system: hardware schematics, firmware listings, special system features, and use of the monitor. It is aimed at the user who is comfortable with BASIC and wishes to become familiar with the advanced features of the APPLE II.

(Order No. A2L0001, 151 pages. Supplied with Apple systems)

APPLESOFT REFERENCE MANUAL

This manual introduces Applesoft: an extended BASIC language for business and scientific applications. It is written for the user who has some familiarity with the BASIC language.

(Order No. A2L0004, 75 pages. Supplied with systems using 16K or more RAM)

6500 μ P HARDWARE MANUAL

This manual is directed at the hardware designer who wants detailed information about the 6502 microprocessor used in the APPLE II. (Order No. A2L0002, 165 pages)

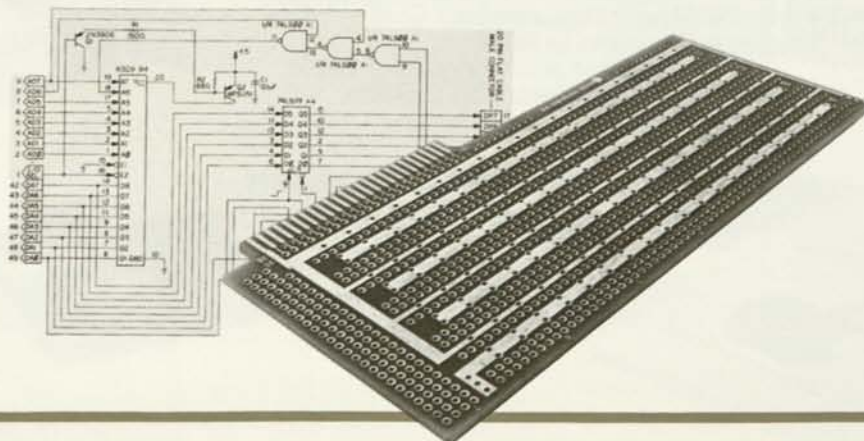
6500 μ P PROGRAMMING MANUAL

This manual addresses the internal structure and assembly language programming of the 6502 microprocessor. It assumes that the reader is moderately familiar with computer concepts. (Order No. A20003, 239 pages)

ACCESSORIES

HOBBY/ PROTOTYPING CARD

The Hobby/Prototyping Card provides the user with a means of building up experimental circuitry for the Apple computer. This 2 3/4" x 7", double-sided circuit board includes a hole pattern (on 100-mil centers) that accepts all conventional integrated circuits and passive components. The card plugs directly into one of eight sockets on the Apple circuit board, and fits entirely within the APPLE II case. Documentation includes a complete system bus description to aid the interface designer. (Order No. A2B0001.)





APPLE SOFTWARE BANK

SYSTEM SOFTWARE OPTIONS

APPLESOFT II FLOATING- POINT BASIC LANGUAGE

Applesoft II is an expanded version of Microsoft's popular floating-point BASIC. Its 9-digit arithmetic and large function library make it ideal for business and scientific programs. New features like high-resolution graphics routines, cassette data STORE/RECALL, and user-programmable error messages make the language both powerful and easy to use. Capabilities include:

- 3 Data Types — Real, Integer, and String
- Data Display in either Fixed-Point or Scientific Notation
- N-Dimensional Arrays and N-Letter Variable Names (first two letters significant)
- Extensive Mathematical, Logical and Scientific Capabilities
 - EXP, LN, SQ.RT., SIN, COS, TAN, ARCTAN
 - AND, OR, NOT, ABS, INT, RANDOM, SIGN
- String Operations to Aid the Business Programmer:
 - Compare: =, >, <, >=, <=, ><
 - Concatenate: +
 - Variable Type Conversion: ASC, STR, VAL
 - Substring Separation: LEFT, RIGHT, MID, LEN
- Graphics Statements that Simplify Display Programming:
 - Print Format Control: NORMAL, INVERSE, FLASH
 - Graphics Control: COLOR, PLOT, POSN, LINE, DRAW, SCRIN, GRAPHICS, TEXT, HIRES, ROT, SCALE, SHAPELOAD
- General Operations that Include and Extend Upon Dartmouth BASIC:
 - Program Manipulation: CLEAR, NEW LIST, RUN, CONT, LOAD, SAVE
 - Variable and Function Definition: DATA, DEF. FUNCT, DIM
 - Data Handling and Storage: READ, RESTORE, STORE, RECALL
 - Loops and Branching: FOR...NEXT, IF...GOTO, IF...THEN, ON...GOTO, ON...GOSUB, ONERRGOTO, RESUME, GOTO, GOSUB, RETURN
 - Input/Output and Format Control: INPUT, PRINT, IN#, PR#, VTAB, TAB, HOME, PADDLE
 - Machine Level Statements: PEEK, POKE, CALL, POP, LOMEM, HIMEM

Applesoft II is supplied as a cassette tape or a plug-in ROM card. The tape version runs in systems with 16K or more of RAM (24K or more for high-resolution graphics). The ROM version will run in 4K or more of RAM, but requires 16K RAM if high-resolution graphics are used. A comprehensive reference manual is included. Order Numbers: A2B0009 (card, available 7/78); A2T0004 (tape)

PROGRAM- MER'S AID #1

Programmer's Aid #1 is a ROM-based library of routines to simplify and enhance your programs. Its capabilities include:

- High-Resolution Graphics Generation
- Program Renumbering and Linking
- Tape Verification
- Musical Tone Generation (12 timbres and 5 octaves)
- RAM Testing
- Machine Language Program Relocation

Programmer's Aid #1 is packaged as a single 2K-byte ROM to be inserted in socket D0 of the APPLE II. The routines upon which it is based are completely documented in the manual which accompanies the package. Order No. A2M0019



APPLE INTELLIGENT SUBSYSTEMS

INPUT / OUTPUT DEVICES

For the user's convenience, Apple Computer has assembled a family of compatible products that enhance the usefulness of the APPLE II.

PRINTER II (Centronics MICROPRINTER-PI)

This compact, desk-top printer employs electric discharge technology to print up to 80 characters per line at 150 lines per minute. The printer produces 5 x 7 dot-matrix characters at 5, 10, or 20 characters per inch. It prints the full 96-character ASCII set, including lower-case letters. It is quiet and reliable, and uses no toner or ribbon. It prints on 4.75", aluminum-coated roll stock. The printer is supplied with a Parallel Printer Interface Card, all necessary cables and connectors, and operating documentation. (Order No. A2M0010)

PRINTER IIA (Centronics 779)

The 779 is a medium-speed impact printer for home and business applications requiring low-cost, multi-copy printing. It prints 132 (5 x 7) dot-matrix characters per line, at 60 characters per second. This printer is capable of reproducing the 64-character, upper-case ASCII set; and its tractor paper feed allows printing of five-part forms in widths to 9.8". The mechanism is packaged in a low-profile, desk-top cabinet. Printer IIA is supplied with a Parallel Printer Interface Card, all necessary cables and connectors, and operating documentation. (Order No. A2M0011)

MONITOR II

This 9-inch (diagonal) video monitor is the ideal display for the APPLE II when color output is not required. It sits neatly on top of the computer, and provides a very clean and sharp picture. It accepts direct video input from the system, so no modulator is required. Monitor II comes complete with all necessary cables, connectors, and documentation. (Order No. A2M0005)

SPEECHLAB™ VOICE RECOGNITION UNIT (Heuristics 20A)

This plug-in module allows the APPLE II to recognize a spoken vocabulary of up to 32 user-selected words. The computer can be programmed to perform any task desired upon recognition of a key word. This product is well-suited to both entertainment and serious research uses; and has great potential in applications for the physically handicapped. The Voice Recognition Unit comes as a plug-in card, with a microphone and complete documentation. (Order No. A2M0015)

AC LINE CONTROL UNIT (Mountain Hardware Introl™)

This product allows the APPLE II to remotely switch any AC device ON or OFF. It operates by sending control signals through a building's AC power lines to up to 64 adapters located at outlets throughout the structure. Each remote adapter will switch and sense the status of two independent, 500-watt outlets. Installation is entirely by means of plug-in modules, so no re-wiring is required. Complete isolation from the AC line means there is no danger of shock or short-circuit. The master controller (which plugs into the APPLE II) and the remote adapters are sold separately, with full documentation. (Master Controller — Order No. A2M0012) (Dual Channel Remote Adapter — Order No. A2M0013)

TAPE RECORDER

A tape recorder is the basic program and data storage mechanism for the APPLE II. This one offers the convenience of pushbutton operation; and it runs from either batteries or the AC line. (Order No. A2M0017)

MODEM IIA

Modem IIA is an acoustic coupler which links the APPLE II (through the Communications Interface Card) to the telephone network. The modem is a 103A-type asynchronous device, suitable for data communication at 110 or 300 baud (10 or 30 char/sec). It operates in either the Originate or Answer modes. Connection to the phone system is accomplished by placing the telephone handset in position on top of the modem. No permanent connection or wiring changes are required.

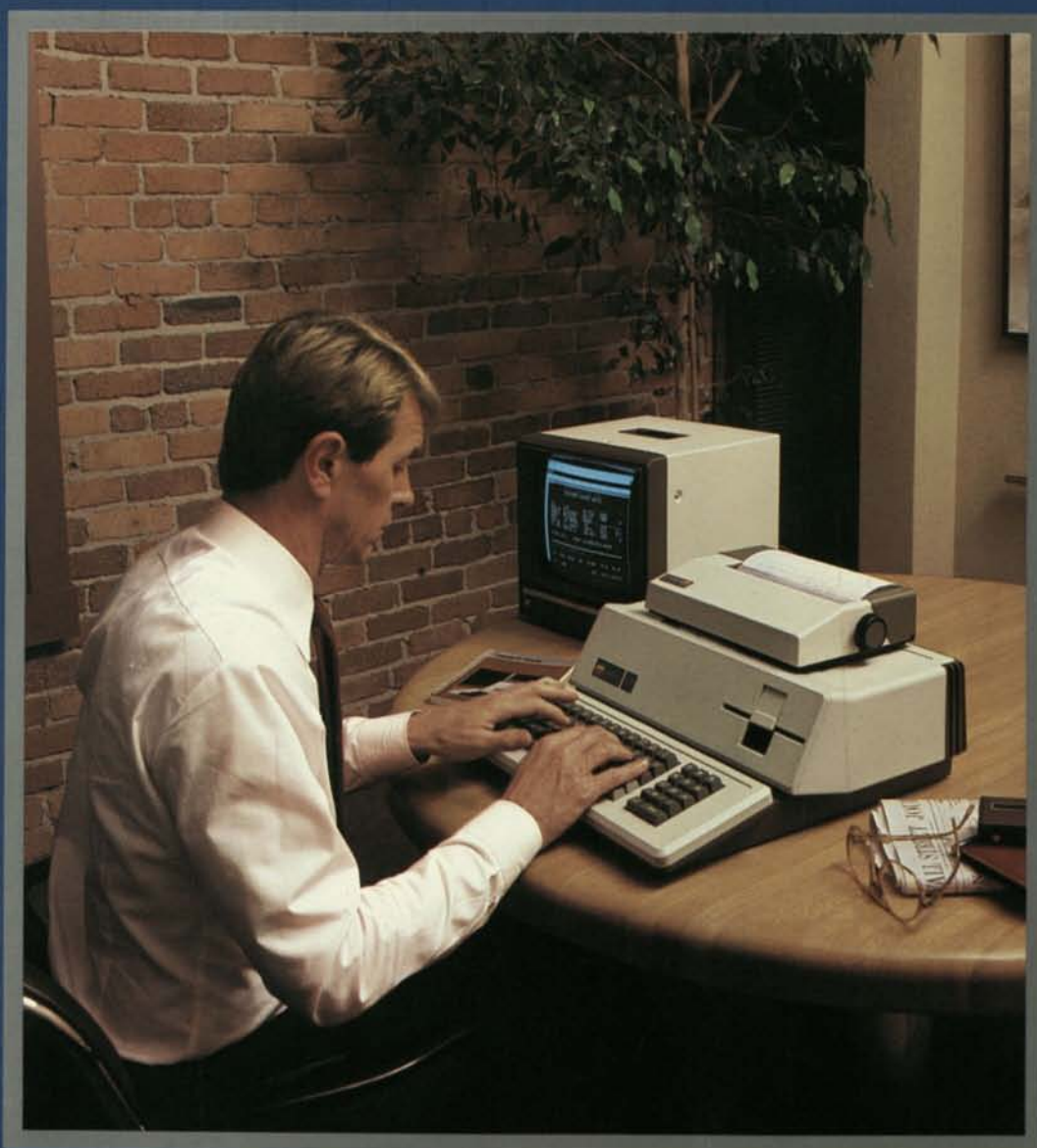
Modem IIA is supplied with a Communications Interface Card, demonstration tape, all required cables, and complete documentation. (Order No. A2M0018)



10260 Bandley Drive
Cupertino, California 95014
(408) 996-1010

Apple III Information Analyst

More Than A Worksaver



Apple III and the Value of Your Time

Benjamin Franklin said it best: time is money. Particularly in business, where financial success is often the direct result of time wisely invested.

Are you making the best use of your time?

Think about it. What if you could analyze data faster than ever before? What if you could examine more elements of a sales forecast—and meet your deadline with time to spare? What if you could communicate bid factors to clients more quickly? Wouldn't your time be more productive?

The Apple III Information Analyst System has been designed specifically to tackle the tasks that eat into your business day. Tasks like preparing detailed budgets. Performing complex pricing analyses. Developing long-term schedules. Determining returns on investments. Ascertaining the time value of money. Maintaining a comprehensive mailing list. And more.

But is that all a computer system should do for you?

In a fast-moving, productive office, it should do even more. That's why the Apple III is also a full-function word processor, ready to tackle your paperwork problems, too. It can help you create letters, memos, reports, even books in record time. That's another reason why the Apple III is more than a worksaver. It's the simple, affordable solution to many complex business problems.

*The Apple III Information Analyst. Put it to work increasing the value of **your** time.*



The Managerial Tool Box

Apple III grew from an understanding of your needs. The Apple III Information Analyst helps expand your personal efficiency—so that you can concentrate on the creative aspects of your job.

Memory Capacity for People Who Mean Business

Sophisticated tasks demand large memory, and the Apple III Information Analyst has it—96K bytes of memory (internally expandable to 128K bytes). So you can develop forecasts around sophisticated models, sort large files rapidly, and still have room to grow!

The Data Bank

Apple III's convenient, built-in disk drive means greater user efficiency, and easy, cost-effective system expansion, too. You're more productive, because Apple III lets you store and retrieve data in just seconds. You're saving money, because Apple III lets you add up to

three external disk drives without purchasing additional control hardware or software.

Convenience is the Key

You can't beat Apple III for efficient data entry. Its keyboard has been sculptured for maximum typing speed and accuracy. And all key tops are textured to guard against glare (and finger slips, too). Standard features include auto-repeat on each key for repetitive character entry, and four, directional cursor control keys for single-keystroke cursor movement.

Apple III Has Your Numbers

Knowing that business computing demands rapid numerical entry, the Apple III Information Analyst has been designed with a built-in, calculator-style, numeric key pad. It's a bonus for anyone used to "touch typing" entries on a desktop calculator.

See It... And Believe It

Entered data appears on a 12", high-resolution, video monitor. It displays clear, crisp text that's easy on the eyes. And Apple III's profes-

sional, 80-character, upper/lower case display gives you an accurate picture of what your reports will look like when printed.

Real Time... All the Time

Apple III's clock/calendar can conveniently place the date on each file. This is especially handy for distinguishing among revisions. You have full control over whether or not to use this feature on your printouts. And the clock/calendar is continuously powered by its own long-life batteries, so your system stays right on time—even if it's unplugged!

The Perfect Couple

Apple III has been engineered to grow with your needs. Two built-in interfaces—one for a telephone interface or letter-quality printer, the other for an Apple Silentype™ thermal printer—make your first system expansions quick and economical. Other accessories plug into expansion slots inside the system.



Apple III The Electronic Worksheet

The Apple III Information Analyst System offers VisiCalc III,[™] an outstanding software tool for forecasting and modeling. Any problem you might wish to tackle using rows and columns can be solved quickly—and accurately—with Apple's VisiCalc III.

A Tool for Every Manager and Professional

VisiCalc III is a manager's right arm. Administrators can use it to plan budgets, compare actuals with forecasts, and modify projections. Accountants can rapidly calculate rate-of-return, pro formas, and financial statements. Marketing managers can develop highly-accurate forecasting models and pricing strategies to guide their efforts. Engineers will find VisiCalc III helpful to create models, study causes, effects, and trade-offs—all in seconds, instead of hours or days. The Apple III Information Analyst—a powerful productivity tool for every manager and professional.

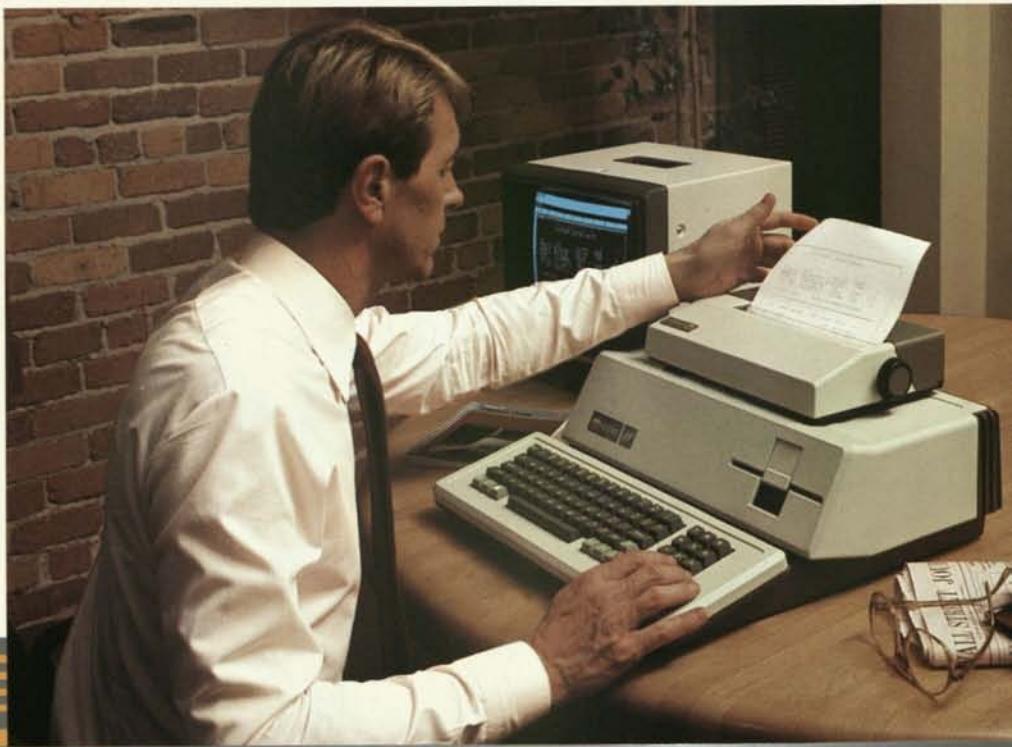
Flexibility and Simplicity

VisiCalc III provides an electronic ledger sheet for words, numbers, and formulas—enough for a five-year forecast. It offers the built-in functions—average, net present value, and many more—that you need to get the job done with a minimum of effort. Calculations are performed simply by entering formulas and data. Your Apple III delivers the answers automatically and instantly.

And VisiCalc III is easy to use. You don't need to be a programmer or computer specialist to receive full benefit from its every feature. Its comprehensive operating manual provides step-by-step instructions and real-world examples—so you can apply VisiCalc III to your own needs immediately.

Adaptability and Versatility

With the Apple III Information Analyst System and VisiCalc III, you can ask "What if...?" questions to determine how different circumstances or variables will affect your numbers. For example, imagine that you've created a business forecast model that takes your Gross Profit, Cost, and Net Income into account. Sometime later, you become concerned about an increase in interest rates. You begin to wonder what the impact would be if your vendors decided to raise finance charges by 2%. With a few keystrokes, the Apple III will update your forecast based on this assumption and display the new information for your review. All that number-crunching with no paper, no pencil, no eraser, no calculator, no frazzled nerves—and no waste of valuable time. Go ahead. Say "What if...?" Apple III will do the rest.



and more...

The Direct Mail Wizard

Direct mail puts you in touch with the people you want to reach. And it's affordable. You can use it to announce new products or services. Introduce your business to new prospects. Remind current customers to take advantage of special sales or discounts. In short, you can quickly and economically deliver any message you wish.

The Apple III Information Analyst offers Mail List Manager, a program that puts cost-effective direct mail benefits at your fingertips. You can maintain any number of names and addresses, sort them by name or zip code, and selectively print mailing labels. Mail List Manager stores almost 1,000 names and addresses per diskette, and sorts them in 75 seconds. And there's no limit to the number of diskettes you can use. Whether you want to mail a form letter to specific individuals, or a brochure to certain businesses within a selected zip code area, Mail List Manager will handle the task efficiently and quickly.



Speaking the Language of Business

You don't need to be a programmer to enjoy big benefits from the Apple III Information Analyst System. But, if you want to program, Apple Business BASIC lets you create software tailored to your precise needs. This language is easy to use and is compatible with thousands of available BASIC programs, so you'll have a head start in creating your own. A particular benefit of this "human engineered" language is its formatting capability. With Apple Business BASIC, your reports can't help but look good!

The Information Analyst Package

The Apple III Information Analyst contains everything you need to put the system to work for you today. With your order, you'll receive:

System Hardware

- Apple III Professional Computer System with built-in disk drive, calculator-style numeric pad, keyboard, clock/calendar, serial (RS232) and Apple Silentype thermal printer interfaces, and 96K bytes RAM (128K bytes optional);
- A second Apple Disk III disk drive;
- A 12", black and white, high-resolution, video monitor.

Software

- Apple's Sophisticated Operating System (SOS);
- VisiCalc III;
- Mail List Manager;
- Apple Business BASIC.



Design the System That's Right for Your Needs

Apple offers accessories and software programs for all your personal computing requirements. Choose the ones you'll need to make your Apple III work best for you. Here's just a sample of what's available.

Printers

The Apple Silentype thermal printer provides draft-quality text and graphic output on paper—at a very affordable price. This compact, versatile unit is portable and flexible, because it receives both its power and intelligence from your Apple computer.



For letter quality printing, Apple offers a fast, daisy-wheel printer. A choice of type styles and carbon or cloth ribbons further complements its text and graphics capability.



More Storage

Need more storage on-line? The Apple III can support up to three external Disk III drives without the need for additional hardware or software. (Your first Disk III is built right into the Apple III computer.)



From the Apple Software Bank

Use Apple's Word Painter™ software to open up your paperwork bottleneck. This word processing package for the Apple III handles everything from simple memos to lengthy manuals. Word Painter's professional editing capabilities allow you to manipulate words, sentences, paragraphs, and even whole pages of text. Normally cumbersome operations—centering, indenting paragraphs, searching for and replacing information—are all automatic. Word Painter is a perfect companion to the Apple III Information Analyst for increasing the value of your time.

The Apple Owner's Protection Plan

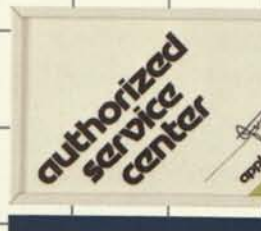
Economically protect your Apple III investment with Apple's Extended Warranty. It covers your Apple III for one full year beyond the initial 90-day warranty period. If you add Apple disk drives or Apple peripheral boards during the year, they're automatically covered. You don't have to buy additional protection. The Apple Extended Warranty is an insurance policy for your Apple III—at an affordable price.



Ask the Expert—Your Local Apple Dealer

Apple has a nationwide network of more than 600 dealers and service centers. There's probably one near you. Your local dealer understands your needs and is in the best position to individually address them.

If you want to learn more about the Apple III Information Analyst, visit your dealer for a personal demonstration. Talk with him about what you want your system to do for you. Then tell him you want to put an Apple to work. He'll do the rest.



Notice
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Designed by Apple Computer
260 Bayview
Sunnyvale, California 95014



 **apple computer inc.**

10260 Bandley Drive
Cupertino, California 95014
(408) 996-1010



Product
Information



20863 Stevens Creek Blvd. B3-C
Cupertino, California 95014
(408) 996-1010

March 1977

Apple Computer Inc.

Apple Computer Inc. has been in business since January of 1976, supplying both hardware and software to the home and hobby computer enthusiast. We have recently expanded our engineering and production capabilities through a tripling of personnel and by moving to new facilities located in Cupertino, California. We are dedicated to supplying the best possible home computer products at the lowest possible price.

APPLE-I™

DESCRIPTION

The Apple-I Computer is a truly complete microcomputer system constructed on a single PC board. It is recommended for the experienced computer hobbyist. Based on the MOS Technology 6502 microprocessor, Apple-I also has a built-in video terminal and sockets for 8K bytes of on-board RAM memory. With the addition of a keyboard and video monitor, you'll have an extremely powerful computer system that can be used for anything from developing programs to playing games or running BASIC.

Combining the computer, video terminal and dynamic memory on a single board has resulted in a large reduction in chip count, which means more reliability and lower cost. Since the Apple-I comes fully assembled and tested and has a complete power supply on-board, initial set-up is essentially "trouble free".

VIDEO DISPLAY

Using the built-in video terminal and keyboard interface, you avoid all the expense, noise and maintenance associated with a teletype. And the Apple-I video terminal is six times faster than a teletype, which means more throughput and less waiting. Apple-I connects directly to a video monitor (or home TV with an inexpensive RF modulator) and displays 960 easy to read characters in 24 rows of 40 characters per line with automatic scrolling. The video display section contains its own 1K bytes of memory, so all the RAM memory is available for user programs. And the Keyboard Interface lets you use almost any ASCII-encoded keyboard.

Apple-I makes it possible for many people with limited budgets to step up to a video terminal as an I/O device for their computer.

Compared to switches and LED's, a video terminal can display vast amounts of information simultaneously. Apple-I can display the contents of 192 memory locations at once on the screen. And the firmware in PROMS enables you to enter, display and debug programs (all in hex) from the

keyboard, rendering a front panel unnecessary. The firmware also allows your programs to print characters on the display, and since you'll be looking at letters and numbers instead of just LED's, the door is open to all kinds of alphanumeric software (i.e., Games and BASIC).

MEMORY

Apple-I uses 16-pin 4K dynamic memory chips. That's 8K bytes of on-board RAM in 16 IC's—the equivalent of 64 2102's!

The system is fully expandable to 65K via an edge connector which carries both the address and data busses, power supplies and all timing signals. All dynamic memory refreshing for both on and off-board memory is done automatically.

SOFTWARE

A tape of **APPLE-I BASIC** is included free with the Cassette Interface. Apple-I Basic features immediate error messages and fast execution, and lets you program in a higher level language immediately and without added cost. Also available now are a dis-assembler and many games.

I/O

The Apple-I Cassette Interface Board works every time. It plugs directly into the upright connector on the main board and stands only 2" high. Since it is very fast (1500 bits per second), you can read or write 4K bytes in about 20 seconds. All timing is done in software, which results in crystal-controlled accuracy and uniformity from unit to unit.

Unlike some other cassette interfaces which require an expensive tape recorder, the Apple-I Cassette Interface works reliably with almost any audio-grade cassette recorder.

APPLE-II™

DESCRIPTION

APPLE-II is our newest product. It represents several advancements in the personal computing state-of-the-art: the incorporation of color graphics onto a single-board system along with color graphic commands in a BASIC; a ROM BASIC and monitor; and the use of the new 16K x 1 RAM chips to achieve 48K bytes on-board memory space.

Because of its advanced design, Apple-II uses 1/3 to 1/4 the number of components used in first generation personal computing products. This has a significant effect on reliability and enables Apple-II to be priced below competitive systems. Apple-II is delivered **fully assembled and tested**, making it a truly off-the-shelf computer system, priced below the cost of many kits.

Apple-II consists of a 6502 microprocessor, powerful video display electronics including color graphics, from 4K to 48K bytes on-board RAM, up to 12K bytes ROM (8K supplied—6K BASIC, 2K monitor), a cassette interface, an ASCII keyboard and the APPLE GAME I/O connector for paddles and other game controls, all on an 8½ x 14 (legal size) PC board. The system is supplied fully cased, with power supply and keyboard, ready to use, or the Apple-II board may be purchased separately.

VIDEO DISPLAY

Apple-II includes a versatile video display section which displays memory as **text, color graphics, or hi-resolution graphics** (completely transparent memory access). Both graphics modes can be optionally selected to include 4 lines of text at the bottom of the display area. **All display modes are software selectable.** In addition, the user can select under software one of two memory blocks to be displayed.

Text

- 40 characters/line, 24 lines.
- 5 x 7 upper case characters.
- Normal or inverse video.
- Extensive display control software in ROM.
- Full cursor control.
- Fast display.
- Dual page mode.

Color Graphics

- 40h x 48v resolution.
(40h x 40v with 4 lines text).
- 16 colors.
- BASIC commands to use easily: COLOR=, PLOT, HLIN, VLIN, SCRN.
- Color generation done digitally.
- Dual page mode.

Hi Resolution Graphics

- 280h x 192v dots.
(280h x 160v with 4 lines text).
- 4 colors—black, white, blue, green.
- Displays 8K bytes (requires 12K minimum system).
- Dual page mode.

MEMORY

Apple-II uses **both** the 4K and the new 16K dynamic RAMS. By using 3 rows of the 16K chips (24 chips) **48K bytes on-board RAM** is achieved. Apple first delivered a microcomputer using 16K RAMS in December, 1976. Since these 16K chips reduce the memory chip count by a factor of 16 (compared to 2102's), the reliability is far superior and the power requirements are reduced enormously. The 16K RAM will be the chip used in future microcomputers, available now, from Apple.

Apple-II also includes 8K bytes of ROM memory which contains BASIC (6K) and a powerful system monitor (2K). This makes loading BASIC from tape unnecessary and assures that BASIC is just a few keystrokes away. Two extra ROM sockets are included for future Apple software.

- **Up to 48K bytes on-board RAM—no external RAM boards needed!**
- The only personal computer system to use 16K RAMS.
- 24 chips = 48K bytes, the equivalent of 384 2102's at 1/20 the power!
- Unique automatic dynamic RAM refresh system (completely transparent).
- **BASIC and MONITOR in ROM.**

I/O

Apple-II contains a fast cassette interface (1500 bps) which can be called from the monitor or from BASIC (SAVE, LOAD). It is extremely reliable and can be used with **any** home cassette recorder.

Apple-II has 8 connectors which serve as a peripheral card motherboard. The connectors contain the address, data, control and timing busses, all fully buffered.

Each peripheral slot is numbered (0-7). Many Apple-II peripherals will contain on-card ROM-resident driver software, enabling the BASIC to call the peripheral by simply specifying a slot number (i.e. PR #4, IN #5).

Also included are an ASCII keyboard port, speaker, and Apple Game I/O connector. The Apple Game I/O connector greatly simplifies interfacing game controls. It has inputs for 4 pots (paddles, joysticks, etc.), 3 TTL inputs and 4 TTL outputs.

- **Fast cassette interface:** 1500 bps
- **8-slot motherboard**
 - Fully buffered busses and timing.
 - Daisy-chained interrupt priority structure.
 - Daisy-chained DMA priority structure for burst-mode or cycle-steal DMA.
- ASCII keyboard input port.
 - Supplies all power.
 - 7 bits ASCII and positive strobe inputs.
- GAME I/O Connector. Inputs for paddles, joysticks, buttons, etc.

• PERIPHERAL BOARDS — COMING SOON

- Music Synthesis Package
- Parallel Interface Board
- Serial Interface Board
- A/D, D/A Board
- EROM Board with 2708 programmer
- Mini Floppy Controller

APPLE-II™

SOFTWARE

Monitor

The system monitor is supplied in ROM and enables the user to enter, examine, debug and run assembly language programs. It also contains very useful screen control routines, the cassette routines, a dis-assembler and other debug aids. Since it is supplied in ROM, it is immediately available when the computer is turned on and cannot be inadvertently clobbered.

- 2K byte ROM monitor.
- Screen control (intelligent display routines).
- Full cursor control.
- Scrolling window adjustable (protected screen feature).
- Inverse/Normal video selection.
- Versatile memory store/examine commands.
- Read/Write cassette routines.
- Dis-assembler.
- Mini-assembler.
- Software simulated single-step and trace modes.
- Breakpoint handling.
- Register examine/modify.
- Input/Output device assignment.
- Hex add/subtract for relative branch calculations.
- Editing on keyboard entry.
- Direct calls to BASIC.
- Floating point package.
- Software simulated 16-bit processor.

Basic

APPLE BASIC is an Integer BASIC supplied in 6K bytes of ROM and includes the following features (in addition to normal basic features):

- APPLE BASIC is a **fast** translated BASIC.
- Any length variable names (ALPHA, BETA\$).
- Syntax and range errors indicated **immediately** when line is entered.
- Multiple statements on one line.
- Integers from -32767 to +32767.
- String arrays to 255 characters.
- Single dimension integer arrays.
- GRAPHICS COMMANDS: COLOR=expr, PLOT, HLINE (draw horizontal line), VLINE, SCRN (x,y) (reads the screen color).
- Paddle read function: PDL (0-3).
- TEXT and Graphics commands set display mode from BASIC.
- Immediate execution of most statements.
- Memory boundary adjust commands (does not destroy current program).
- Break and Continue program execution.
- Debug commands: line number trace and variable trace (DSP APPLE).
- Switchable I/O device assignments using APPLE ROM-based peripherals.
- Direct memory access: PEEK, POKE, CALL commands.
- Cassette SAVE and LOAD commands.
- Auto line number mode.
- RND, SGN, ASC, LEN and ABS functions.
- POP instruction pops the return stack one level.
- GOTO expr, GOSUB expr allowed.

For further information contact your local computer store, or call or write:

Apple Computer Inc.

20863 Stevens Creek Blvd. B3-C
Cupertino, California 95014

(408) 996-1010



contributors guide



The **Apple Software Bank** is a service that provides for the collection and distribution of software contributed by users, as well as APPLE's own software. Through this facility, programs you write can be made available to all APPLE users as well as giving you access to the efforts of other APPLE users.

Aside from the pleasure of knowing that your work is helping others, if your program is accepted into the **Apple Software Bank** you will receive all the credit due an author in print, and your choice of the following:

- a. A \$10.00 **Apple Software Certificate**, which may be used toward the purchase of any APPLE product,
- or
- b. Four programs of your choice from the list of user contributions in the **Apple Software Bank**.

Submitting a program or set of programs to the **Apple Software Bank**, once the programs are written and tested, is just a matter of filling in these forms and mailing them with a cassette tape containing the program (and a listing of the program, if available) to **Apple Computer, Inc.** In filling out the forms, there is this primary consideration to keep in mind: What would **you** like to see in a program submitted by someone else? It's a safe bet that you'd like the program to work as advertised, and to be well-documented (so that it is easy to understand). No doubt you'd also like it to be convenient to use, reasonably quick, and compact.

Please keep your form readable, **use a typewriter if possible**. In particular, both sides of the **PROGRAM DESCRIPTION FORM** will be duplicated and distributed to other users exactly as you have filled them out. Your program is not likely to become very popular (or be very useful) if the instructions about how to use it are unreadable.

FILLING IN THE PROGRAM SUBMITTAL FORM

Most of the form is self-explanatory. The **PROGRAM TITLE** should be short, and give a good idea about the major goal of the program. If the title is at all complex, please underline one or two key words that might help someone find your program among a long list of programs. For example, the title

A Chess Program with Graphic Presentation
has the important words "Chess" and "Graphic" underlined.

The **ABSTRACT** is a brief description of the program. It has a strict limit of 50 words. It might be worth putting this abstract into your program as well, in the form of comments or REMarks.

The form next asks that you indicate your choice of either a \$10.00 **Apple Software Certificate** or any four user programs, should your program be accepted. Please read the **ACKNOWLEDGEMENT AND AGREEMENT** carefully. This agreement must be signed and dated before a program can be considered as a contribution to the **Apple Software Bank**.

FILLING IN THE PROGRAM DESCRIPTION FORM

The **PROGRAM TITLE** should be the same title used in the **PROGRAM SUBMITTAL** form. Under **PROGRAM LANGUAGE**, indicate the language or languages in which your program is written. For example, if your program is in Integer Basic with an Assembly Language subroutine, you should check the box marked "Other," and write in the fact that both languages are used.

The next category, **PROGRAM DESCRIPTION**, is especially important. This section describes what your program does. It is easy to give too brief a description:

This program plays Chess.

Here is the beginning of a more useful description:

This program plays Chess. The positions of both sides are shown graphically on the screen. This program allows castling, but does not permit pawn captures En Passant, which it will reject as illegal moves. The computer always takes the first move . . .

PROGRAM DESCRIPTION

INITIALS

[Faint, illegible text covering the majority of the page, likely bleed-through from the reverse side.]

The description must be clear and complete, even if it requires additional pages. As you are writing, keep in mind that the description must distinguish *your* program from others based on a similar topic.

As the **PROGRAM DESCRIPTION** explains what the program does for the user, the **INSTRUCTIONS** explain how to use it. Using the imaginary Chess program as an example, these instructions would probably not be adequate:

Load the program. After each computer move, make your move.

The operating instructions might be more useful if they began like this:

After you load the program and type RUN, the computer will display the chess board. The computer plays White, and you will be playing Black. Moves are made by using standard Chess notation, such as Q-KB3, followed by a press of the (RETURN) button. See the REFERENCES section of this form for some books that explain Chess notation . . .

PROGRAM LIMITATIONS should include warnings about what the program doesn't do. For example, the Chess program has the limitation that it doesn't allow captures En Passant, and might not allow handicapping openings. A square root program might not take square roots of negative numbers, and a financial program might not be able to work with figures over \$99,999,999.99. Any such limitations should be mentioned. You know your program best; think of how people might misuse it, and warn them in this section.

If you use someone's program, you might want to know how that program accomplishes what it does. So might anybody who uses your program. In the **ALGORITHMS** section, you should explain how the program operates. This explanation often will include a flow-chart.

Sometimes a program can easily be modified to do a related task. For example, the Chess program might allow Black to move first if line 380 GOSUB 12000 is changed to 380 GOSUB 13010. Any such hints should be included under **PROGRAM MODIFICATIONS**.

REFERENCES are helpful—they might save you a lot of writing for one thing. References should be annotated. Rather than a cryptic reference like this:

Knuth, The Art of Programming, Vol. 3, pg. 131

you might want to say more:

The general approach was chosen from the many sorting procedures in this reference. The specific technique used here appears in . . .

If your **PROGRAM DESCRIPTION** contains unusual terms, it might be a great kindness to supply a glossary of those terms. Other useful items that a considerate programmer might supply the user include a list of variable names, a copy of the program with lots of REMs for readability, and another copy without the REMs which is smaller and faster. None of this is required, but better programmers do it as a matter of personal pride.

PROGRAM ACCEPTANCE

The **Apple Software Bank** will review all programs submitted. If the program does not duplicate what we already have, if the documentation is clear and complete (and legible), and if the program operates correctly and seems to be of interest to a variety of APPLE users, we will incorporate it into the **Apple Software Bank**. You will receive your four complimentary programs or a \$10 **Apple Software Certificate** with your notice of acceptance. If the program is not accepted, a letter of explanation will accompany the returned material.

CHECKLIST

When you are ready to mail your program to the **Apple Software Bank**, check that you have included all of the necessary items:

1. Cassette tape or diskette with program. (This will be returned.)
2. Completed **PROGRAM SUBMITTAL** form. It must be signed and dated.
3. Both sides of the **PROGRAM DESCRIPTION** form filled out. **Legibly**.

Mail all of the above materials to:

Apple Software Bank
Apple Computer, Inc.
10260 Bandlely Drive
Cupertino, California 95014



program description

PLEASE PRINT OR TYPE

INSTRUCTIONS (HOW DO I USE IT?) _____

USE ADDITIONAL SHEETS AS REQUIRED

PROGRAM LIMITATIONS (WHAT DOESN'T IT DO? OPERATING LIMITS AND WARNINGS.) _____

USE ADDITIONAL SHEETS AS REQUIRED

ALGORITHMS USED (HOW DOES IT WORK?) _____

USE ADDITIONAL SHEETS AS REQUIRED

PROGRAM MODIFICATIONS (INTERESTING MINOR MODIFICATIONS, IF ANY.) _____

USE ADDITIONAL SHEETS AS REQUIRED

REFERENCES (BIBLIOGRAPHY, GLOSSARY, ETC.) _____

USE ADDITIONAL SHEETS AS REQUIRED

The user accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

Neither Apple Computer, Inc. nor the contributor makes any express or implied warranty of any kind with regard to this program material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Neither Apple Computer, Inc. nor the contributor shall be liable for incidental or consequential damages in connection with or arising out of the furnishing, use or performance of this program material.



program submittal

PLEASE TYPE OR PRINT

NAME _____
FIRST INITIAL LAST
 ADDRESS _____
 CITY _____ STATE _____ ZIP _____

FOR BANK USE ONLY —
DO NOT FILL IN.

PROGRAM # _____
 CATEGORY NAME _____
 CHECKED BY _____
 DATE _____

PROGRAM TITLE

UNDERLINE ONE
OR TWO KEYWORDS _____

THIS IS A: NEW PROGRAM REVISION TO PROGRAM # _____

PROGRAM CATEGORY CHECK THE MOST APPROPRIATE CATEGORY INTO WHICH YOUR PROGRAM FITS.

- | | | |
|--|--|--|
| <input type="checkbox"/> ARTS/HUMANITIES | <input type="checkbox"/> GAMES | <input type="checkbox"/> SYSTEM SOFTWARE |
| <input type="checkbox"/> BUSINESS | <input type="checkbox"/> HOME UTILITY | <input type="checkbox"/> OTHER: _____ |
| <input type="checkbox"/> EDUCATION | <input type="checkbox"/> MATH/ENGINEERING | _____ |
| <input type="checkbox"/> FINANCE | <input type="checkbox"/> SOCIAL/NATURAL SCIENCES | _____ |

ABSTRACT (BRIEF DESCRIPTION)

IF MY PROGRAM IS ACCEPTED INTO THE APPLE SOFTWARE BANK, I WOULD LIKE TO RECEIVE:

- | | |
|---|--|
| <input type="checkbox"/> A TEN DOLLAR (\$10.00) APPLE SOFTWARE CERTIFICATE (GOOD TOWARDS PURCHASE OF ANY APPLE PRODUCTS). | <input type="checkbox"/> FOUR PROGRAMS FROM THE USER SECTION OF THE APPLE SOFTWARE BANK. |
| | 1 _____ 4 _____ |
| | 2 _____ ALTERNATE _____ |
| | 3 _____ _____ |

ACKNOWLEDGEMENT AND AGREEMENT

To the best of my knowledge and belief, I am the sole and exclusive owner of the program material described below and have the right to contribute such program material without breaching any obligation of mine or any other person concerning nondisclosure of proprietary or confidential information of other persons, organizations or business entities. I hereby contribute this program material on a nonconfidential and nonobligatory basis to Apple Computer, Inc. for inclusion in its SOFTWARE BANK, and I agree that Apple Computer, Inc. may use, duplicate, modify, publish, and sell the program material, and authorize others to do so, without obligation or liability of any kind. Apple Computer, Inc. may publish my name and address, as the contributor of the program material, to facilitate user inquiries pertaining to such program material.

SIGNATURE _____ DATE _____

Apples In Training



Apple—The Trainer's Computer

Training has always been important in organizations because of its measurable influence on performance and productivity. To train people effectively, you've got to use the latest technology—and today that means the personal computer.

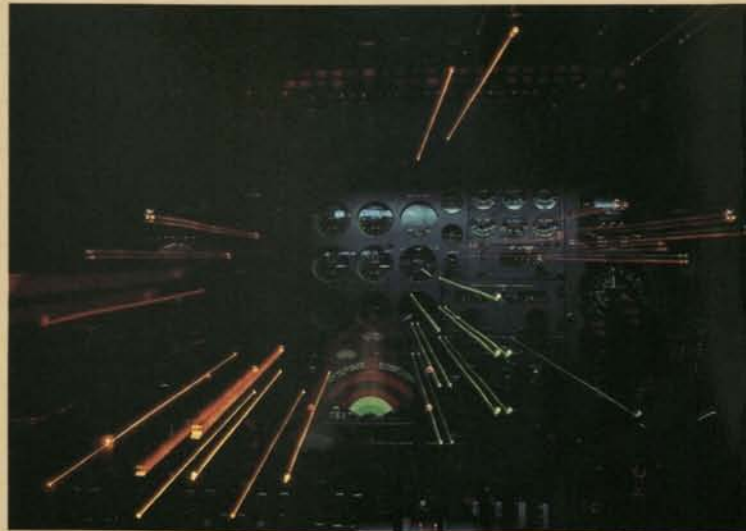
Today, when you hear the words "personal computer," you inevitably hear about Apple. Powerful, easy-to-use, and portable, Apple computers are changing the way we live, the way we work—and the way we're trained. High schools and colleges use Apples to teach everything from auto mechanics to foreign languages. And now, the business and service sectors are using them to train sales people, service personnel, administrators, nurses, pilots, and many other professionals.

Why? Because with Apple computers your training programs can be friendlier, more motivating, more "personal." Self-paced and more consistent. And above all, more cost-effective. The Apple's unique combination of features and capabilities makes it all possible. With the Apple you can orchestrate a variety of instructional forms, including sound, high-resolution graphics, color, simulations, and interactive video capabilities.

But the Apple II is more than just a fancy piece of hardware. It's the heart of a sophisticated training system that allows you to:

- create your own dynamic instructional programs, without having to rely on outside consultants or programmers;
- engage and motivate students, making it easier for them to learn;

One company has developed a low-cost, highly sophisticated simulation for teaching pilots, using Apple II Plus computer systems with interactive video programs.



In the southwestern U.S., telephone personnel are being trained in just hours on Apple systems that exploit computer simulation techniques to explain the "why" of installation procedures.

- simulate real-life conditions, so your students are better prepared from experience even as they leave the classroom;

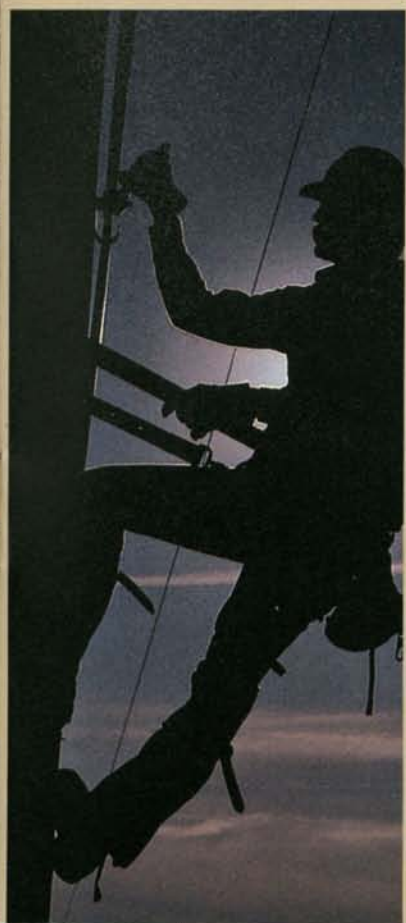
- handle administrative tasks more efficiently, leaving you more time to spend with the individuals who need extra help;

- test student comprehension as often as you like, identifying problem areas earlier;

- modify instruction based on results, thereby providing additional review when it's necessary and avoiding needless elaboration when it's not;

- document results quickly and thoroughly, so you can demonstrate the effectiveness of your training programs.

The apple is the most powerful training delivery system you'll ever use—and one of the smartest business investments you'll ever make.



Apple II—A Powerful Training Delivery System

As a training delivery system, Apple computers adjust to *your* requirements, not the other way around. Here are six good reasons why.

1. They're simple to use.

Whether you're training people with them or being trained on one, Apples are easy, even fun to work with. A few simple keystrokes are all it takes for students to work their way through a lesson, or for instructors to modify a training lesson. (There also are "touch screen" and light pen accessories commercially available for the Apple, which eliminate the need to use keyboards at all and make it even simpler and faster for students to interact with training program materials.

2. They motivate students. Students find themselves becoming more involved with the training process when they use an Apple, because of its ability to combine sound, graphics, animation, and other displayed information with the latest video technologies. Studies show that increased motivation results in speedier comprehension and greater retention—and in fact, that's just what happens when training is done on an Apple.

3. They're effective.

Apple-based instruction works so well because it's consistent, and because it allows for self-paced, individualized learning. These characteristics and capabilities help maximize the productivity of both the instructor and the student.

Self-paced learning is easy with an Apple training system, because the Apple itself can be an infinitely patient instructor, letting students repeat lessons they're unsure of and skip ones that are already familiar. The result is a highly efficient training process that not only makes students competent as fast as they're able to learn, but also frees instructors from repetitious, lock-step lecturing so they can work individually with those students needing extra help.

4. They're efficient.

Every Apple in a training classroom is actually like another instructor's assistant. And the students really benefit from all the individual attention. The Apple moves students efficiently through the exercises that help them become competent in the skills and knowledge they need.

The instructor in an Apple training classroom benefits, too. Instead of being tied down spending time with the *mechanics* of delivering the course, the instructor is free to give extra help to those who need it. And free to commend and encourage students as they progress through the course.

5. They deliver consistent training. With Apple-based training, the quality of instruction doesn't vary from instructor to instructor, or from one location to another. Lessons are always clear and carefully organized. And the student controls the pace.

6. They save you money.

Considering their wide range of applications and capabilities (even aside from training), Apples are just plain inexpensive to begin with. The same systems you use for training can also be used to run a department or a business, or to evaluate complex problems such as sales forecasting and inventory accounting.

Apple training systems also help you cut your company's costs. Because of their portability, you can deliver training directly to the field, instead of transporting students to a single training site and having to pay for their lodging, meals, and other expenses.

Electronics companies know reliable hardware. That's why they're training assemblers to become technicians on Apple systems.

Apple computers used by the military deliver diagnostic service training that ensures the competency of technicians on missile firing teams.





Apple—The Training Program Developer's System

You don't have to be an experienced computer programmer to develop training materials on an Apple, thanks to the Apple PILOT family of software products: Apple PILOT, Apple SuperPILOT™, Apple Co-PILOT™, and Apple SuperPILOT, Log™.

Apple PILOT and Apple SuperPILOT are powerful, easy-to-learn languages that let you use simple commands to author or customize your own sophisticated training programs. Apple SuperPILOT is an enhanced version of the Apple PILOT program, with added features such as a single, simple command that lets you easily control by program a videotape recorder, videodisc, or other audio-visual device. Other SuperPILOT extensions include the capability to display colored text on colored background, as well as double-sized text and characters in bold typeface.

The customer service groups of some companies are using Apple computers to develop and deliver technician training lessons. The net result: service personnel learn to diagnose problems faster, becoming more productive.



Apple Co-PILOT is an interactive tutorial on using PILOT. It takes you through most of the 20 PILOT commands and instructions, and provides an excellent introduction to the language.

Apple SuperPILOT Log is a student record keeping system that works with Apple SuperPILOT, and saves many hours of administrative time. With SuperPILOT Log you can perform student analysis (to determine a specific student's progress), item analysis (to determine how students are responding to a particular question), or class analysis (to determine—and display graphically—the class curve for any training program).

The Apple PILOT family of software products allows you to tap some of the Apple's most effective training features: sound effects, high-resolution graphics, color, and interactive video control.

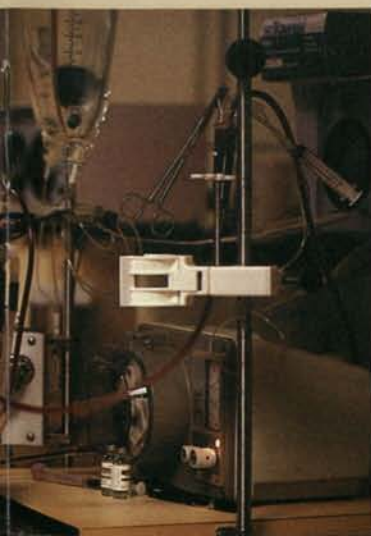
■ **Sound.** The Apple's built-in speaker can be used to reinforce correct answers or alert students to their mistakes. Sounds can be created to prompt users for responses—or reward and amuse them with music.

■ **Color and Graphics.** Using Apple PILOT, you can easily put shapes, colors, even animation to work in your training materials. In teaching complex technical skills such as electronic circuit assembly, for example, you can reduce confusion just by differentiating wires and components with colors. You'll notice a marked increase in overall student comprehension, too, thanks to the Apple's ability to present information graphically with sharp, colorful pie charts, diagrams, and other visual aids.

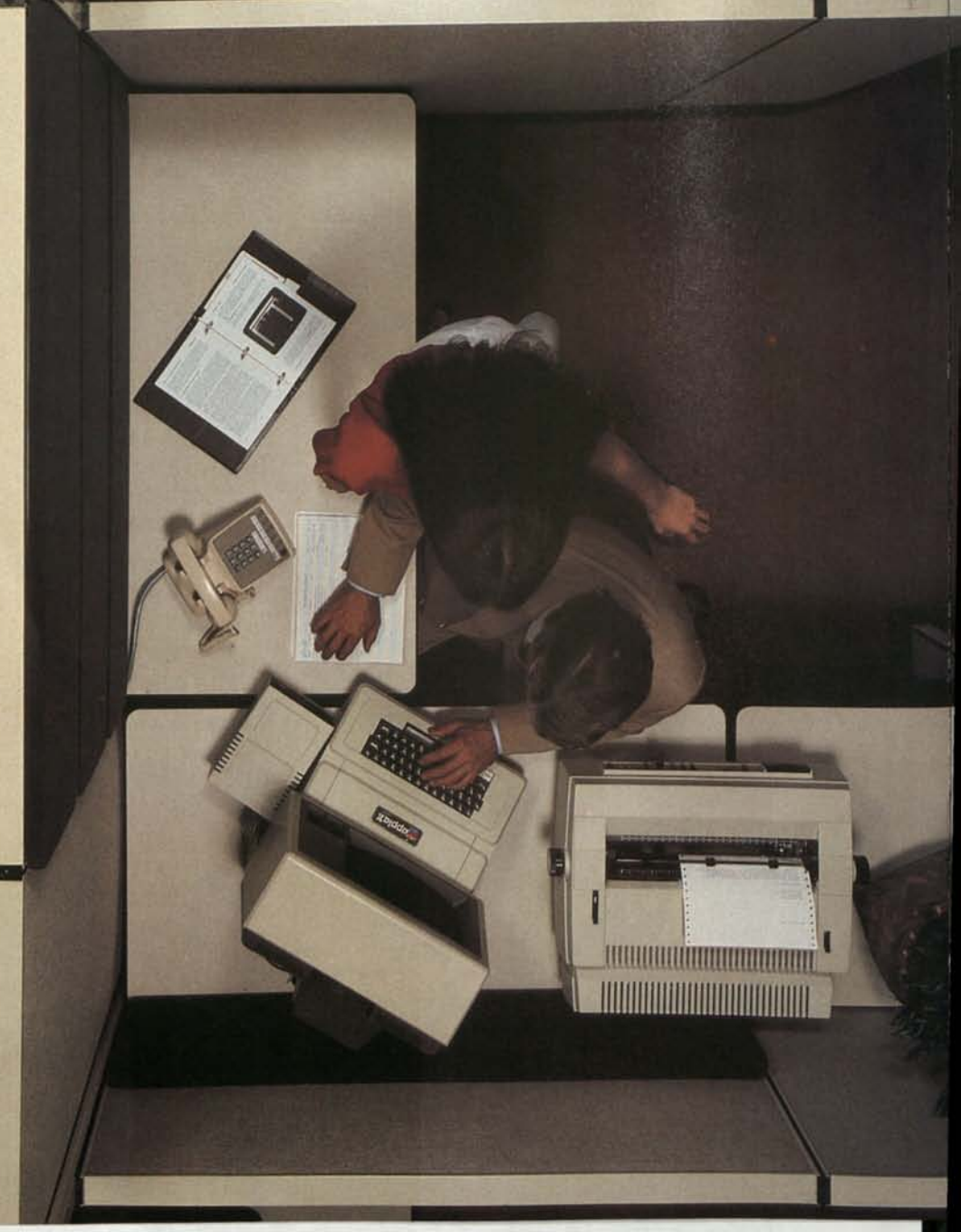
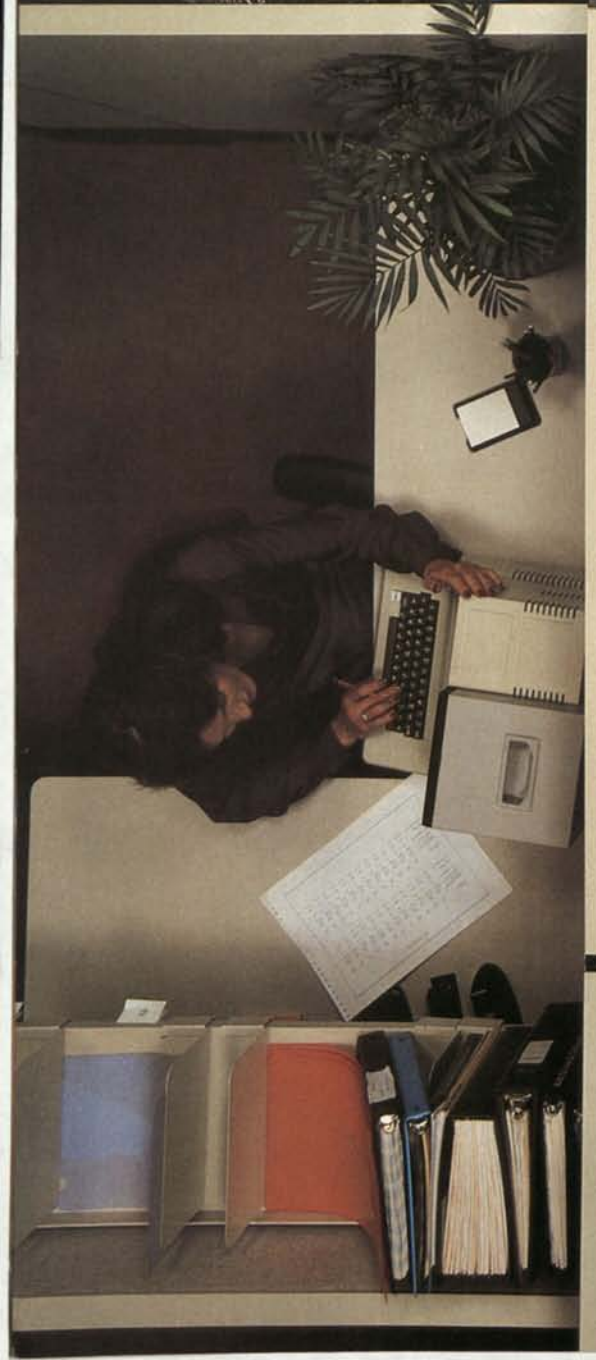
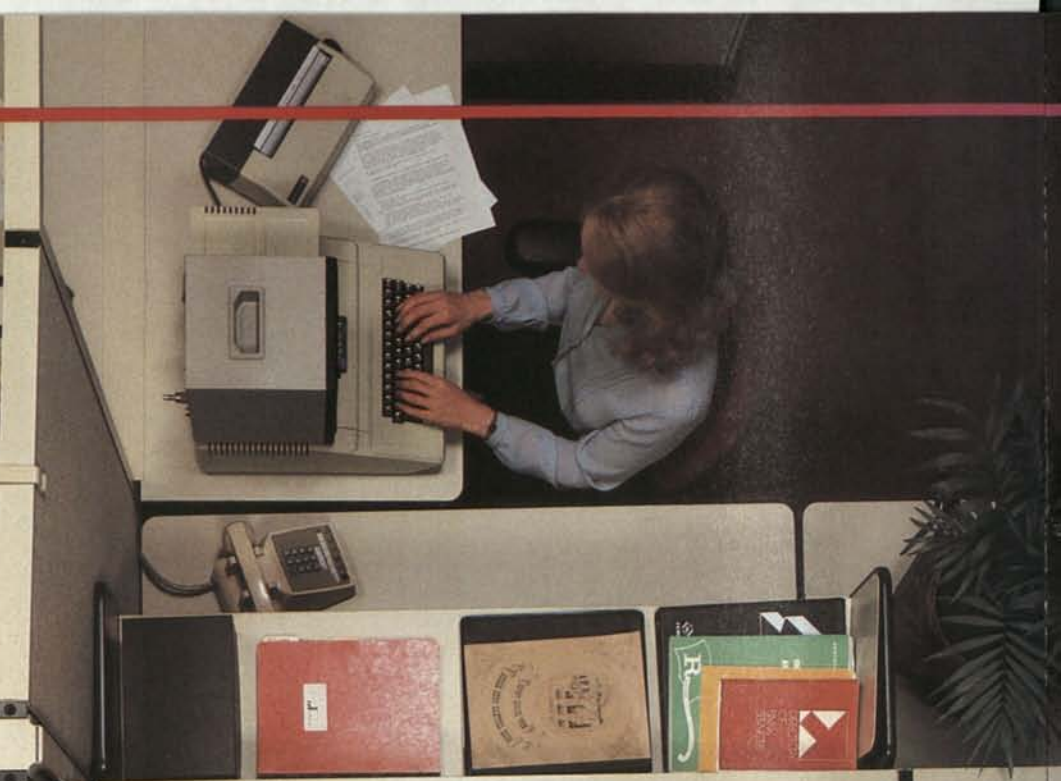
■ **Interactive Video.** Perhaps the most exciting feature of Apple II training systems is their ability to integrate sound effects and text on the screen with the audio-visual information of videotape or video disc. This combination of media is simple in concept, yet amazingly effective in producing student comprehension and competency.

When used with a video interface, the Apple can precisely control a videotape recorder or video disc player, allowing you to mix selected video segments with graphics, computer-assisted instruction, and test questions. You can also do branching and remediation. These features allow you to: 1) keep your present videotapes current; 2) extend the utility of older video materials by simply updating them to exclude segments that are no longer valid. The money you save over replacing older materials will in itself quickly pay for the Apple.

Apples are being used in all kinds of interactive training situations. One application by the American Heart Association teaches proper cardio-pulmonary resuscitation (CPR) techniques in 20 minutes—techniques that previously required four hours of instruction. It's done by means of an electronic "patient," videotaped demonstration, and an Apple II system that controls the exchange of student/"patient" responses.



The Regional Kidney Disease Program in Minneapolis converted its existing videotape library for use in Apple-based, interactive video training of nurses and medical technicians. Students progress at their own pace, while the computer systems handle all record-keeping and testing. And instructors are able to assist those who need it most, thereby making the best use of their time.



Apple—A System And A Company You Can Rely On

With Apple, support is more than a marketing buzzword. It's part of the reputation our success is based on, a reputation for high quality, helpful cooperation, thorough documentation, and—when needed—fast service turnaround.

■ **Nearby Service**

Centers. There are over 1,500 authorized Apple service centers worldwide. All are staffed with reliable, highly competent people who have passed rigorous service training programs (which utilize the training strengths of the Apple, we might add). All maintain a ready inventory of extra parts and modules, so that repairs can usually be done in minutes while you wait.

■ **A National Accounts Program.** If you're interested in buying Apples in quantity, you may qualify for volume purchase discounts and comprehensive service and support. This not only saves you money, but provides a quick way to introduce Apples in a multiple-location, national training program, with the confidence of obtaining complete support in each of your locations. For more details, talk with your Apple sales representative or a local, authorized National Accounts Support Dealer.

Fast service, complete support. They put the shine on the Apple—and on your training programs.



**Apple Computer
Regional Sales Offices**

Northern CA, Northern NV

1335 Bordeaux Drive
Sunnyvale, CA 94086
(408) 734-3202

**AK, OR, WA, West MT,
West ID**

9450 S.W. Commerce Circle/
Suite 160
Wilsonville, OR 97070
(503) 682-3544

Southern CA, Southern NV

17275 Derian Avenue
Irvine, CA 92714
(714) 549-0119

**AZ, CO, NM, East MT,
East ID, UT, WY**

3760 Highland Drive
Salt Lake City, UT 84106
(801) 278-0433

AR, LA, OK, TX

12201 Merit, Suite 700
Dallas, TX 75251
(214) 385-3553

IA, KS, MO, NE, South IL

700 Office Parkway—Suite 27
St. Louis, MO 63141
(314) 432-7883

MN, ND, SD, WI, North IL

Two Crossroads of Commerce
Rolling Meadows, IL 60008
(312) 577-2143

**IN, KY, MI, OH, WV,
West PA, Pittsburg**

9916 Carver Drive
Cincinnati, OH 45242
(513) 793-0318

**NY, North NJ, Manhattan,
Long Island**

1 Penn Plaza, Suite 1620
New York, NY 10119
(212) 736-6680

CT, MA, ME, NH, RI, VT

80-B Turnpike Road
Westboro, MA 01581
(617) 366-5726

**DC, DE, MD, NC, SC, VA,
East PA, South NJ**

Clark Bldg.—Suite 220
5565 Sterrett Place
Columbia, MD 21044
(301) 730-2255

AL, FL, GA, MS, TN

245 Perimeter Center Parkway
Suite 400
Atlanta, GA 30346
(404) 396-7643



10260 Bandley Drive
Cupertino, California 95014
(408) 996-1010
TLX 171-576

Apple Blossom

**SCHOOL
BONUS PROGRAM**

THE NEXT STEP IN COMPUTER LITERACY





AppleBlossom

Teaching tools change. Values remain. Just as yesterday's students turned to their composition books to write, drill and practice, today's students turn on their Apples to create, analyze and learn. But the values remain; education prepares students for the world. And today's world demands computer knowledge.

In 1981 to help students and teachers start using Apples, we introduced Apple Seed, a computer literacy program for first time users. Your response was outstanding. Over 4000 schools from all over the U.S. and Canada participated in Apple Seed.

The results of Apple Seed convinced us that educators demand and appreciate quality instructional material. And so today we introduce AppleBlossom—the next step in computer literacy. AppleBlossom brings educators a choice of the best material available today to go with their Apple. Included are exciting new materials from such major educational publishers as McGraw Hill, Reader's Digest, and Science Research Associates—programs that fit all levels of education

and meet the needs of teachers, students, and administrators.

AppleBlossom: The next step in computer literacy.

How AppleBlossom Works The Bonus Point Plan

Each Apple system you buy or lease between February 15 and July 31, 1982 earns you one bonus point. Each AppleBlossom package is available for a specified number of bonus points. The minimum is two. You add up your bonus points from your Apple system purchases, pick the AppleBlossom packages you qualify for, and enjoy your selection of outstanding books and software.

The selection of packages includes computer literacy, computer awareness, math instruction and school administration. Some packages give you a wide view of Apple's capabilities in many subjects; others focus on one topic only. But all provide you with what you expect from Apple: computer education in a class by itself.



Take Your Pick of These AppleBlossom Packages

Teach computer skills to your students with AppleBlossom's Computer Literacy Kits. Choose from three separate packages: Computer Literacy Basic, Computer Literacy Pascal and Computer Literacy Plus.

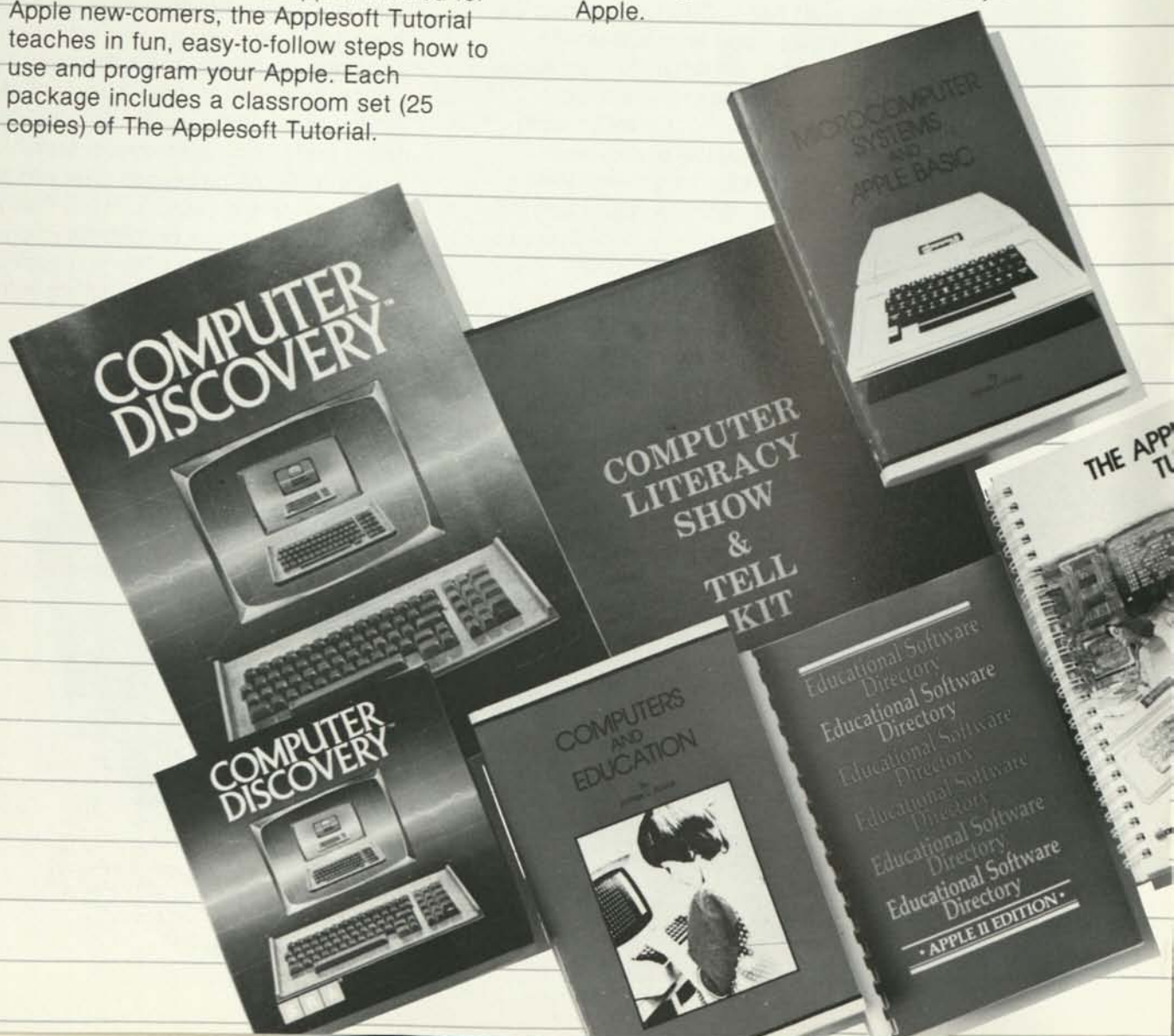
#1 Computer Literacy Basic Two Bonus Points

Explain the "what," "why," and "how" of microcomputing today to your class. These materials, which were used in the Apple Seed Program, include:

The Applesoft Tutorial. Apple's popular self-tutorial introduction to Applesoft Basic and the Apple. Geared for Apple new-comers, the Applesoft Tutorial teaches in fun, easy-to-follow steps how to use and program your Apple. Each package includes a classroom set (25 copies) of The Applesoft Tutorial.

Computer Discovery (Science Research Associates). Gives beginners "hands-on" Apple experience. Teaches students to understand programming concepts. By moving a robot to kick a ball across a soccer field, students learn about algorithms, variables, conditional structures, and debugging. Computer Discovery includes an Instructor's Guide, Student Workbook, and two diskettes.

Show and Tell (Sterling Swift Publishing). See and feel a floppy disk, integrated circuit and magnetic tape. Show & Tell contains examples of real computer equipment plus an explanation of their significance. Bound in a durable, vinyl notebook, Show & Tell traces computer technology from the abacus to today's Apple.



Computers and Education (Sterling Swift Publishing Co.). Covers computer history, educational applications, and current trends. Also provides a guide to the selection of equipment, and recommendations for setting up a computer lab.

Microcomputer Systems and Apple Basic (Sterling Swift Publishing Co.). In simple, non-technical language, this text covers computer development, computer languages and steps in flowcharting Basic.

Swift's 1982 Educational Software Directory (Sterling Swift Publishing Co.). The only up-to-date comprehensive directory of educational software for the Apple. Includes a short description, price and equipment requirements for thousands of educational programs. Classroom Computer News described the 1981 edition as a "sorely needed...well organized and well designed guide." The 1982 directory has over twice as many entries as the previous edition. Essential for Apple users and educators.

#2 **Computer Literacy Pascal** Three Bonus Points

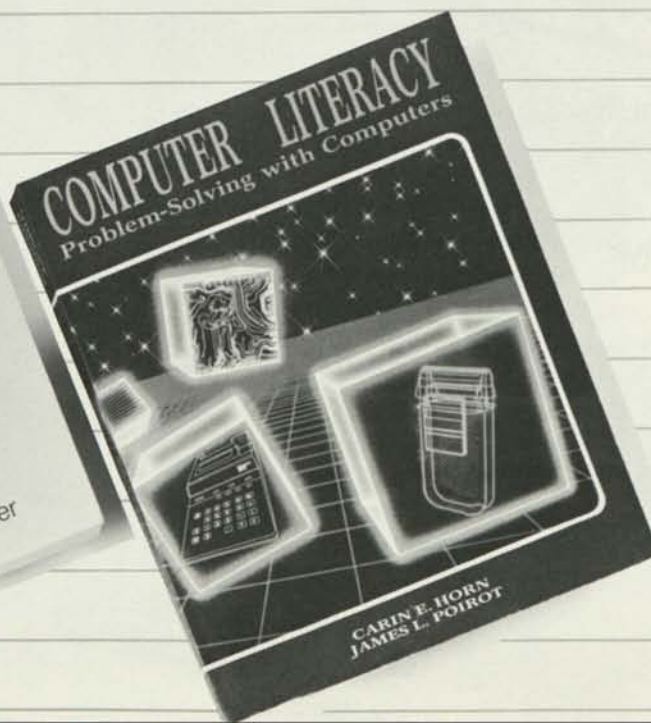
A Pascal version of our successful Basic package. A classroom set (25 copies) of **Apple Pascal, A Hands-On Approach** (McGraw Hill) is included in-

stead of The Applesoft Tutorial. Written by Arthur Luehrmann and Herbert Peckham, this book teaches how to write, enter, and run Pascal programs. An excellent tutorial for high school and colleges; considered the finest text today for teaching Pascal.

#3 **Computer Literacy Plus** Four Bonus Points

Includes all the top quality instructional materials in Computer Literacy Basic plus an important extra: a classroom set of **Computer Literacy: Problem-Solving With Computers**. (Carin E. Horn and Dr. James Poirot, Sterling Swift Publishing Co.).

Designed for the student with no previous computer education, it discusses what computers are, how they work, and how they are being used in our society. Includes information on computer-related occupations. The Computing Teacher said about Computer Literacy, "This is one of those books that you wish...had been available as a text before your first encounter with a computer terminal." A Teacher's Manual and 25 copies of Computer Literacy are included with Computer Literacy Plus.



#4 Math Facts I and #5 Math Facts II

Three Bonus Points Each

Math Facts I contains:

- The Arithmetic Classroom: Addition
- The Arithmetic Classroom: Subtraction
- Reader's Digest EDU-DISKS - Level 3
- The Applesoft Tutorial (25 copies)

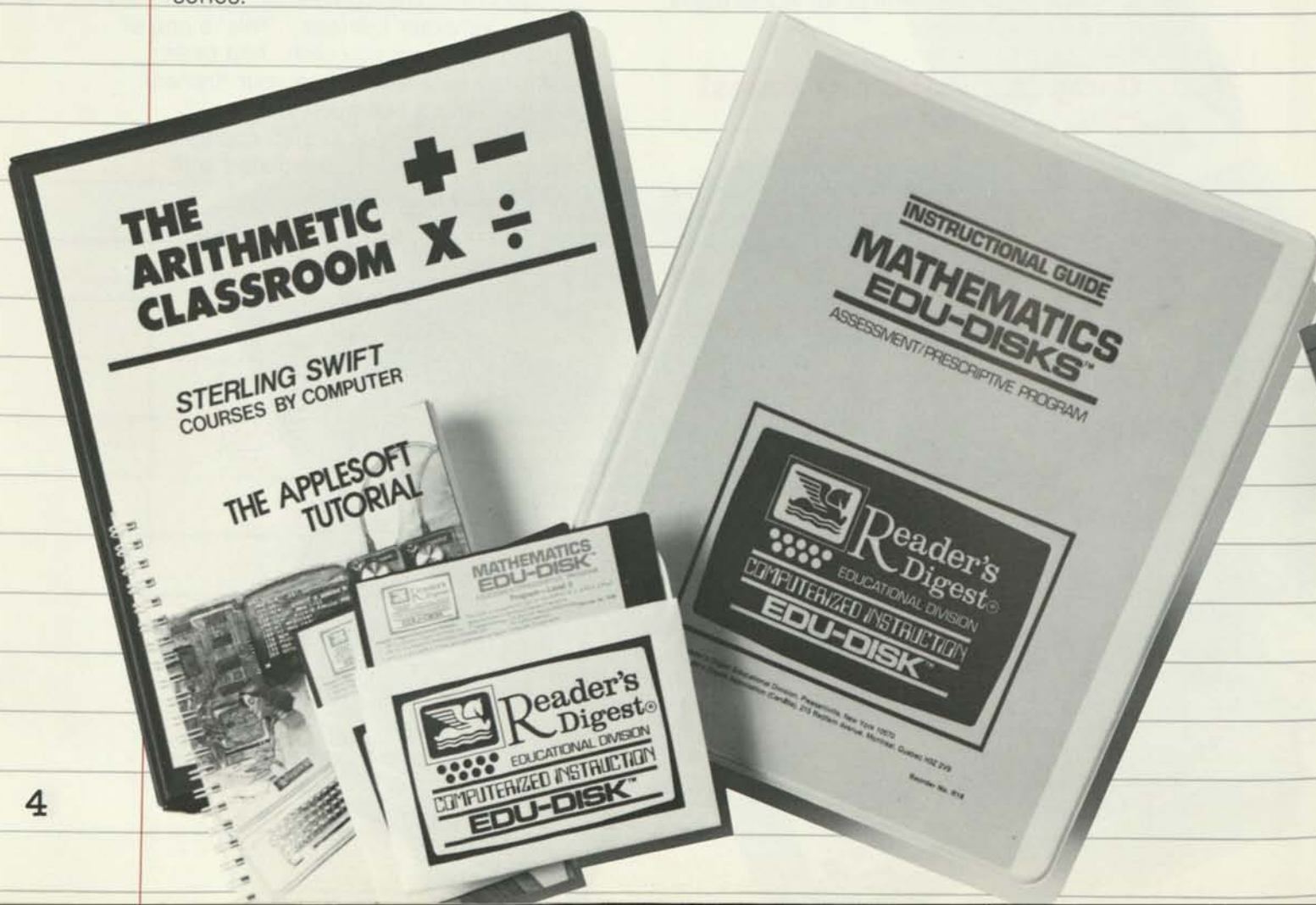
Math Facts II contains:

- The Arithmetic Classroom: Multiplication
- The Arithmetic Classroom: Division
- Reader's Digest EDU-DISKS - Level 7
- The Applesoft Tutorial (25 copies)

The Arithmetic Classroom. (Sterling Swift Publishing Co.). An outstanding new instructional package for basic math facts. Students learn to add, subtract, multiply and divide with the help of MicroMan who points out the way to mathematical literacy. Includes assessment, so students can check their own progress. Designed by Courses by Computers, the content correlates with all major basal mathematics series.

Mathematics EDU-DISKS™ (Reader's Digest Education Division). This new courseware provides a comprehensive assessment for each student in your class, pointing out their weak areas objective by objective. You can use this assessment for activities off the Apple or prescribe further drill on any area for each student.

Level 3 EDU-DISKS contain the twenty entry level objectives for the third grade, and can be used remedially above grade three. Level 7 EDU-DISKS contain the thirty-seven entry-level objectives for grade seven and can be used to assess all elementary school objectives as well as having remedial use for grades above seven.



#6 Meet Your Apple

Two Bonus Points

Here's your chance to have fun, learn new ideas, and see why kids throughout the nation are crowding around their Apples. Meet Your Apple introduces you to the amazing Apple II Plus. In your package you'll receive:

Cross Clues (SRA). Super word game for two. Consists of hidden interlocked words that players scramble to uncover. Teaches spelling patterns, increases vocabulary, and is highly addictive.

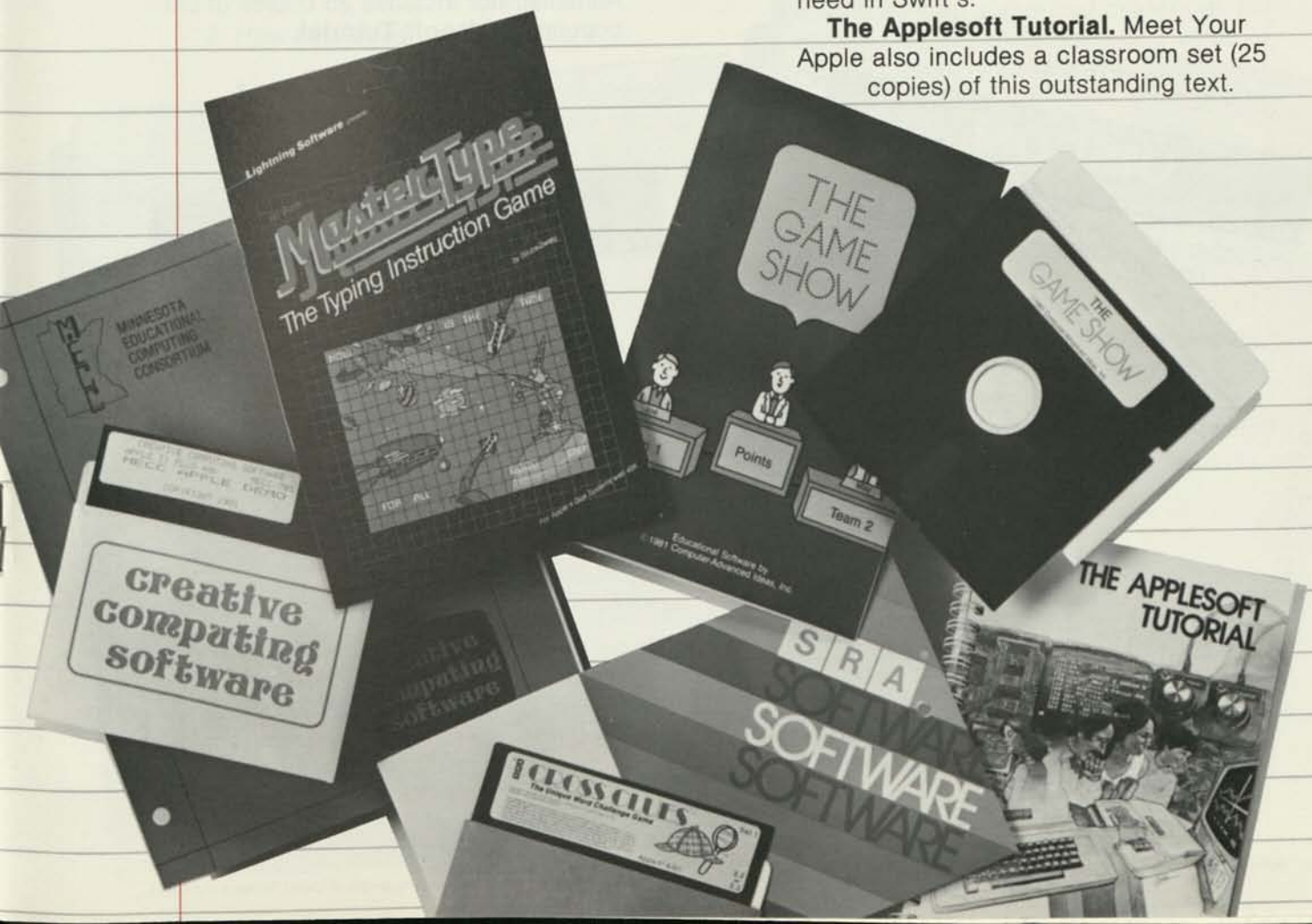
Game Show (Computer Advanced Ideas). Set up just like a TV game show. Entertains students while educating them about varied subjects—word recognition, history, even airplanes. Includes an easy to use authoring system so you can add your own subjects to correlate with your curriculum.

Master Type (Lightning Software). End butterfingers on the Apple keyboard. Students learn to type as they wage pitched battles against attacking enemy words. Seventeen progressive lessons provide a continuous challenge and develops mastery of the entire keyboard.

Apple Demonstration Diskette (Creative Computing). Done by the Minnesota Education Computing Consortium (MECC), this demo shows off Apple's incredible capabilities. The demo includes: Apple Features, Drill and Practice, Music and Industrial Arts, Mathematics Tutorial, a Science Simulation, material generation in Language Arts, an Educational Game, and Problem Solving.

Swift's 1982 Educational Software Directory (Sterling Swift Publishing). Essential reference tool for teachers and administrators. Lists all Apple educational software. Save time. Find the software you need in Swift's.

The Applesoft Tutorial. Meet Your Apple also includes a classroom set (25 copies) of this outstanding text.



#7 **AppleBlossom For the Administrator**

Five Bonus Points

Automate your school administrative functions with AppleBlossom. At the heart of this special package is two modules of the UNICOM Educational Management Series. This series is made up of several interlocking modules which provide the tools necessary to perform important school administrative tasks. These UNICOM programs are a result of extensive consultation with educators, who have provided both insight and real-world experience. All modules have undergone field testing by administrators and each module is simple to use, and produces reports which are practical and meaningful in day to day school management.

The Grade Reporting Module is designed to maintain data on students, courses, and instructors. From this enrollment and grade data, you can print report cards, calculate grade point averages, accumulate year to date credits, and print honor rolls; course enrollment statistics

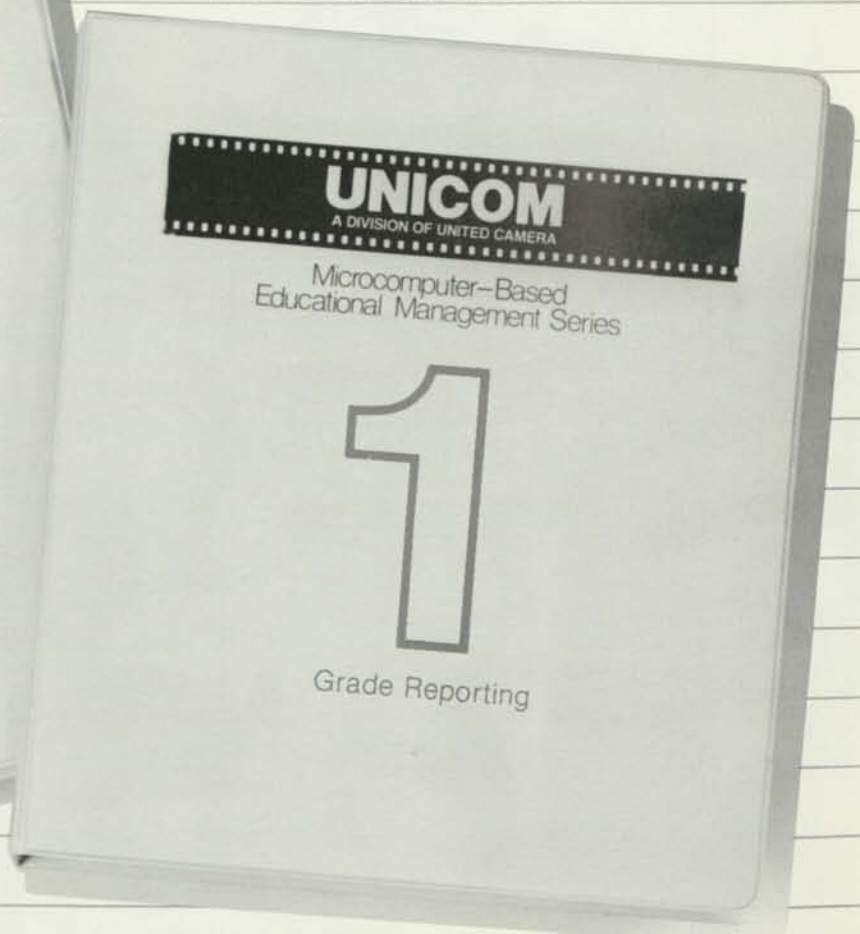
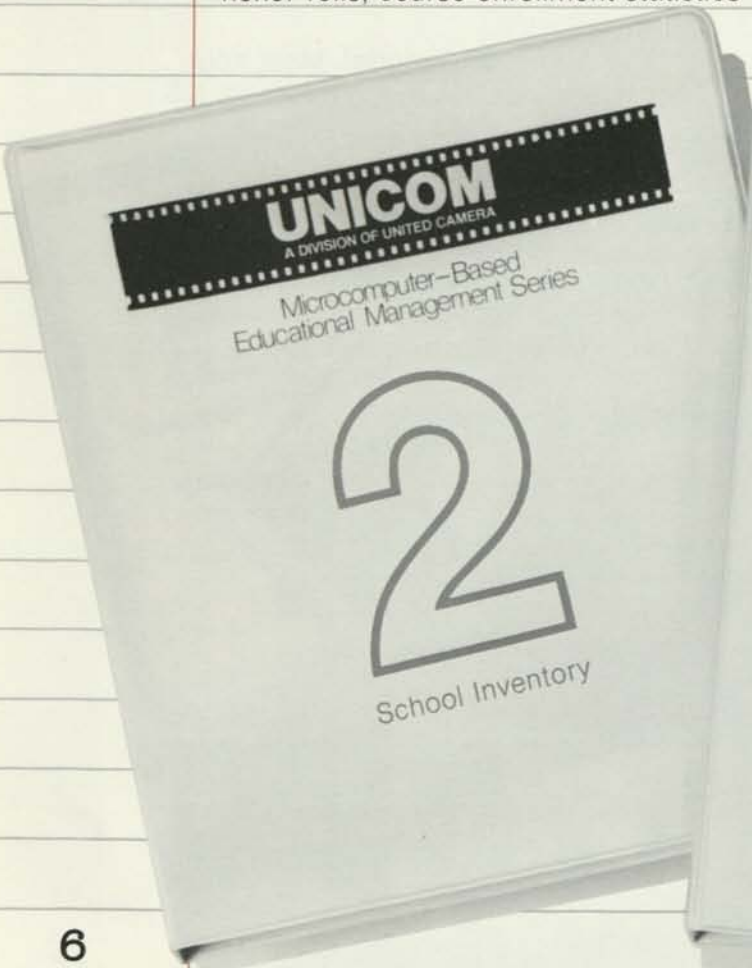
and reports on student and instructor schedules are also available.

The School Inventory Module, operating in a similar fashion, allows the management of various media and patron data. Specific functions include circulation control, generation of inventory status reports, past-due notices, and utilization statistics.

All modules of the UNICOM Educational Management Series require an Apple II Plus with 48K, two disk drives, video monitor, 132 column printer and a SuperKram™ card. (The SuperKram card is included in your AppleBlossom package.)

Each module is registered at the UNICOM Service/Support Center upon receipt of the required licensing agreement. This entitles the user to both warranty protection of ninety days and support through telephone communication.

In addition to the administrative modules, AppleBlossom for the Administrator includes 25 copies of our popular **Applesoft Tutorial**.



Questions and Answers About AppleBlossom

1. How do I earn AppleBlossom points?

Buy or lease two or more Apple systems (Apple II Plus with 48K and one disk drive). Each Apple system earns you one point. Each AppleBlossom package is available for a specific number of points. The points you earn from your Apple purchases entitle you to receive free AppleBlossom packages equal to the point value.

IF YOU BUY YOU'LL EARN YOU CHOOSE

2 Apple systems	2 points	Apple Blossom Package worth 2 points
10 Apple systems	10 points	Any combination of AppleBlossom Packages worth 10 points.

The more Apple systems you buy, the more AppleBlossoms you pick.

2. How long does your offer last?

To qualify for AppleBlossom, a school must purchase between February 15 and July 31, 1982. Date of purchase order is considered the official date of purchase. All applications must be received at the AppleBlossom Program Headquarters by no later than August 15, 1982.

3. Is AppleBlossom open only to schools purchasing their first Apples?

No, Apple Blossom is open to all schools.

4. Why do AppleBlossom programs require an Apple system with 48K?

Quality teaching needs quality teaching tools. The courseware in AppleBlossom takes full advantage of Apple's outstanding graphics, sound and animation capabilities.

5. Can I make a substitution in an AppleBlossom package?

No. Almost all the packages are already offered in several variations.

6. Do I have to buy disk drives as well as the Apples?

Yes, the AppleBlossom software will not run without disk drives.

7. Where can I see a demonstration of the AppleBlossom packages and pick up an application form?

AppleBlossom is available only through the 1100 authorized Apple dealers in the U.S. and Canada. Purchases made from any other than authorized dealers do not qualify. Besides the outstanding value of AppleBlossom, your dealer provides you support—an important plus when you're making an educational investment.

8. I can't afford a big equipment expense now. Any suggestions?

Take a look at the Apple Classroom Leasing Program. It's the smart way to conserve your capital and still get the Apple systems you need. Here are some typical money-saving costs with Apple Classroom Leasing:

# Systems*	Purchase Price	Lease Cost Month 1	Lease Cost Months 2-36
2	4,350	435	179
4	8,700	870	357
10	21,750	859	859

*Each system includes an Apple II Plus 48K, and a disk drive with controller.

9. What schools are eligible for AppleBlossom?

All schools and school districts are eligible including public, private, elementary, secondary schools, and colleges and universities. And a school may buy as many Apple systems as they wish. However, all purchase orders in a single application must have the same buyer's name on it, and must be for two or more systems.

10. How long will I have to wait before delivery of my AppleBlossom packages?

We will send you an acknowledgment within two days of receipt of your application, giving you an estimated shipping date.

How To Take Advantage of AppleBlossom.

1. See a demonstration at your local authorized Apple dealer.
2. Get a purchase order from your school or school district.
3. Now that you've purchased your Apple systems, get a signed application from your dealer.
4. Figure your points. Put your choice of AppleBlossom packages on your application.
5. Mail your AppleBlossom application and purchase order in the pre-addressed envelope to:

Mailing Address

AppleBlossom
1705 N. 4th Street
San Jose, CA 95112

AppleBlossom

SRA Educational Courseware is available under a license agreement rather than through sale. Customers obtain the right to possess and use SRA Educational Courseware by agreeing to the provisions of the SRA Agreement for SRA Licensed Courseware.

Computer Discovery and Cross Clues are licensed products of SRA and signing the SRA license agreement is required to take advantage of the AppleBlossom offer.

The Show and Tell Kit, Computers and Education, Microcomputer Systems and Apple BASIC, Swift's 1982 Educational Software Directory, and The Arithmetic Classroom are all available from Sterling Swift Publishing Co., 1600 Fortview Road, Austin, Texas, 78704, (512) 444-7570.

Mastertype is a product of Lightning Software, 2160 Yale Street, Palo Alto, CA.

Reader's Digest EDU-DISKS are a product of Reader's Digest Educational Division, Pleasantville, New York, 10570, (914) 769-7000.

The Game Show is a product of Computer Advanced Ideas, Inc., 1442A Walnut St. Suite 341, Berkeley, CA 94709.

The Grade Reporting Module and School Inventory Module are products of UNICOM, 297 Elmwood Avenue, Providence, Rhode Island 02907, (401) 467-5600.

The Apple Demonstration Diskette is distributed by Creative Computing, 39 E. Hanover Ave., Morris Plains, NJ 07950. (201) 540-0445.

AppleBlossom Bonus Packages

#1 Computer Literacy Basic

Component	Retail Price†
Applesoft Tutorials (25 copies)	250.00
Computer Discovery (two diskettes, teachers guide, student workbook)	150.00
School Literacy Kit Show & Tell Kit Computers and Education Microcomputers and Apple Basic	99.95
Swift's 1982 Educational Software Directory	11.95
Two Bonus Points	Total 511.90

#2 Computer Literacy Pascal * *

Component	Retail Price
Apple Pascal: A Hands On Approach (25 copies)	348.75
Computer Discovery (two diskettes, teachers guide, student workbook)	150.00
School Literacy Kit Show & Tell Kit Computers and Education Microcomputers and Apple Basic	99.95
Swift's 1982 Educational Software Directory	11.95
Three Bonus Points	Total 610.65

#3 Computer Literacy Plus

Component	Retail Price
Applesoft Tutorials (25 copies)	250.00
Computer Discovery (two diskettes, teachers guide, student workbook)	150.00
School Literacy Kit Show & Tell Kit Computers and Education Microcomputers and Apple Basic	99.95
Swift's 1982 Educational Software Directory	11.95
Computer Literacy (25 copies plus teacher's guide)	356.70
Four Bonus Points	Total 868.60

#4 Math Facts I

Component	Retail Price
The Arithmetic Classroom— Addition	129.95
The Arithmetic Classroom— Subtraction	129.95
Reader's Digest Level 3	129.90
Applesoft Tutorial (25 copies)	250.00
Three Bonus Points	Total 659.80

#5 Math Facts II

Component	Retail Price
The Arithmetic Classroom— Multiplication	129.95
The Arithmetic Classroom— Division	129.95
Reader's Digest Level 7	129.90
Applesoft Tutorial (25 copies)	250.00
Three Bonus Points	Total 659.80

#6 Meet Your Apple

Component	Retail Price
Cross Clues	39.95
The Game Show	45.00
Apple Demonstration Diskette	19.95
Mastertype	39.95
Applesoft Tutorial (25 copies)	250.00
Swift's 1982 Educational Software Directory	11.95
Two Bonus Points	Total 406.80

#7 AppleBlossom for the Administrator

Component	Retail Price
Grade Reporting Module	250.00
School Inventory Module	250.00
SuperKram Board*	175.00
Applesoft Tutorial (25 copies)	250.00
Five Bonus Points	Total 925.00

** The language Apple Pascal is not included with this package and must be purchased separately. Hardware requirements for Apple Pascal include a language card (Apple Product # A2B0043). *Apple Pascal: A Hands On Approach* is published by McGraw Hill.

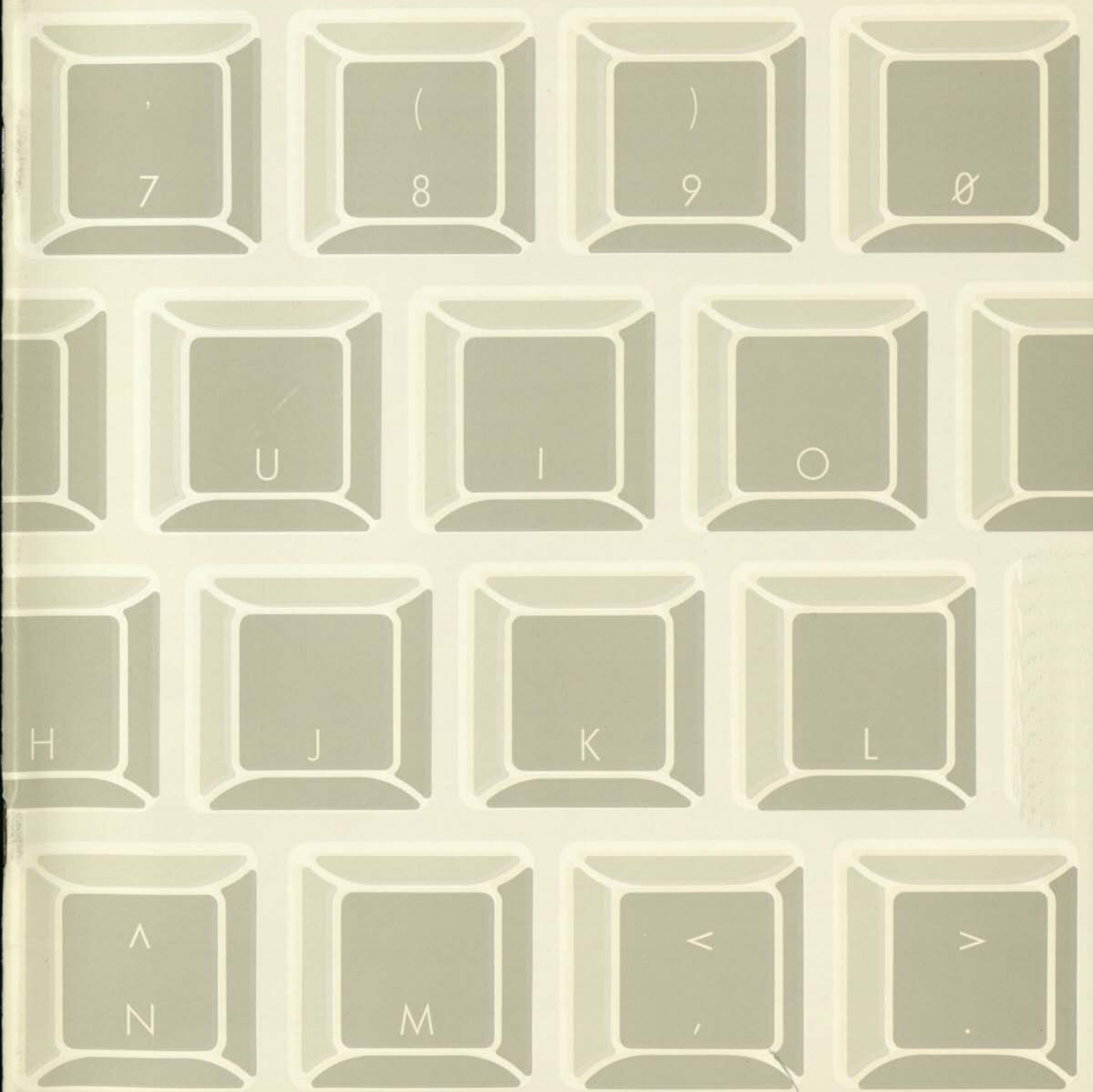
*The SuperKram Board is necessary to run the school administrator software and is included in the package.

†The retail prices listed are manufacturers' suggested retail price.



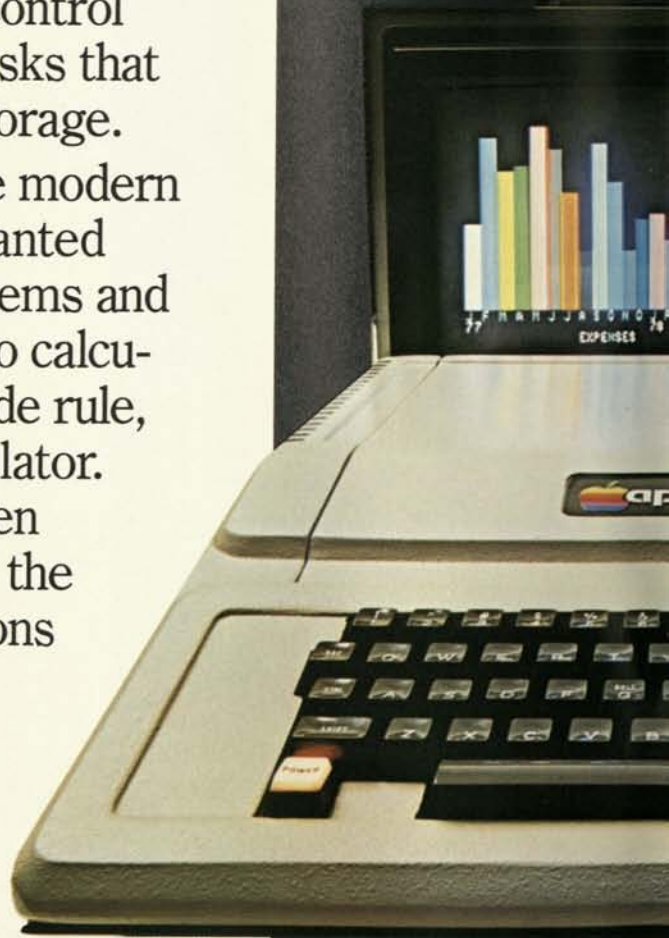
10260 Bandley Drive
Cupertino, California 95014
(408) 996-1010
TLX 171576

A CONSUMER'S GUIDE TO PERSONAL COMPUTERS



WHAT IS A COMPUTER? A computer is both a powerful calculator and a system for storing, updating and using information. It solves complex mathematical problems very rapidly. And a computer can also communicate in words and pictures as well as numbers, maintain records, control equipment and do many other tasks that require extensive information storage.

Computers became part of the modern lifestyle because mankind wanted better tools for solving problems and keeping records. One need led to calculating machines—the Abacus, slide rule, adding machine and pocket calculator. The other can be traced back even further through filing cabinets to the picture writing of early civilizations and the notched sticks of primitive man.

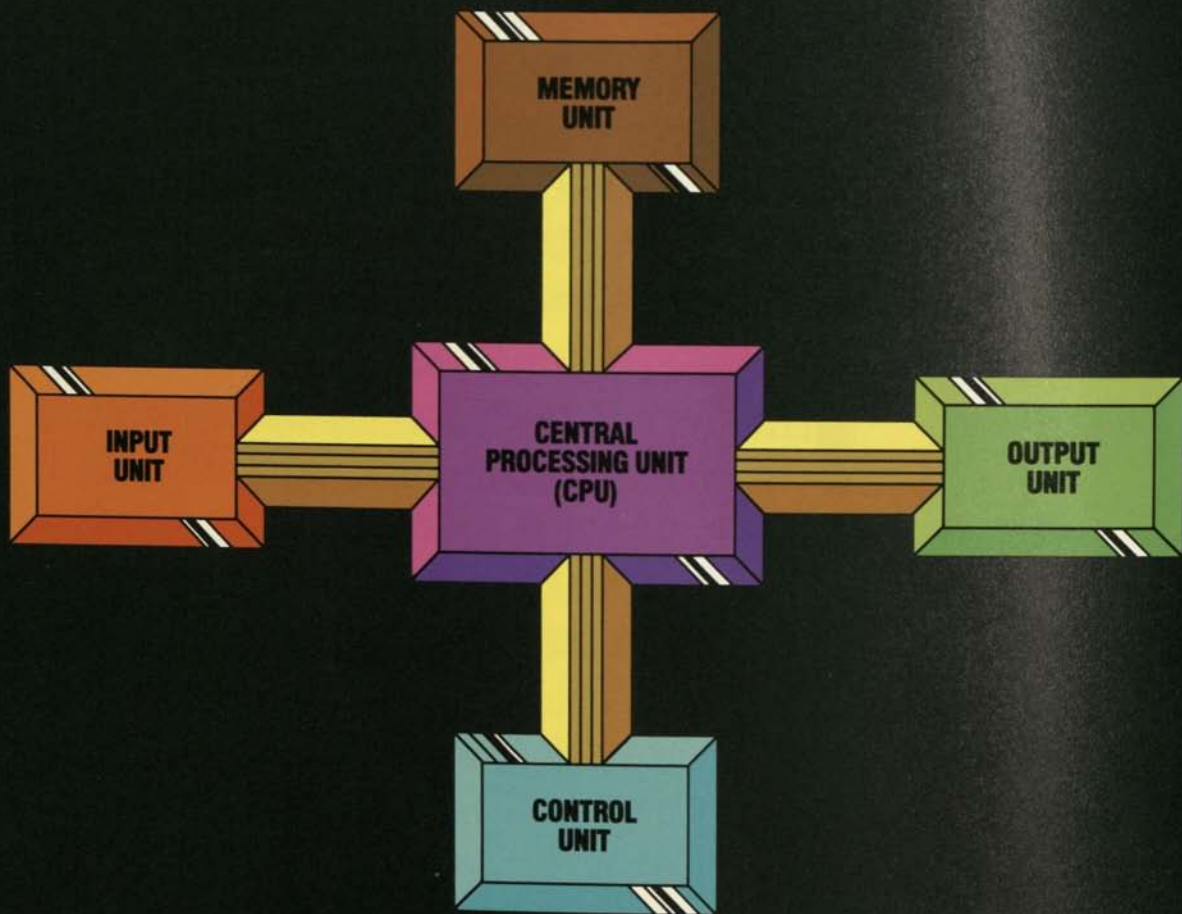


The first electronic computer was really a giant calculator named ENIAC (Electronic Numerical Integrator and Calculator). Built in the 1940's with 18,000 vacuum tubes, it filled a large room and consumed 130,000 watts of power. It could be called the first personal computer – only a few experts could run it.

Today's personal computer built with a microprocessor has about five times the computational power of ENIAC, is portable, about 18 inches square, needs about 50 watts of power and can easily be used by all members of a family.



©1978 Apple Computer Inc.
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Computers, like some calculators, are programmed—given a series of instructions by the user—to govern their operation. All computers consist of five basic parts. These subsystems are:

1. CPU OR CENTRAL PROCESSING UNIT

The CPU is the “brain”—the part that manipulates all information and performs all calculations.

2. CONTROL UNIT

The CPU is controlled by two kinds of programs. “Software” programs are entered by the machine operator, stored in the memory unit and can be changed as often as desired. “Firmware” programs are built into the system, usually in devices called Read Only Memory (ROM) that store instructions permanently. Each instruction generally requires several computer operations. The control unit and firmware enable the computer to perform these operations in the right order and at the proper times.

3. MEMORY UNIT

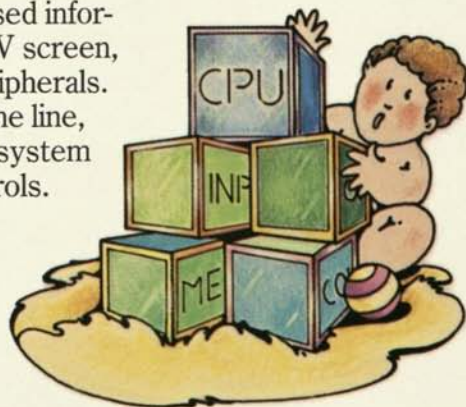
Software programs and data being processed are stored in the memory unit. This memory can be “randomly addressed,” which allows the CPU to store and fetch (write and read) data rapidly. For the computer to handle more and more tasks, RAM must be expandable and able to “swap” programs and information with storage peripherals such as tape cassettes and magnetic disk memories.

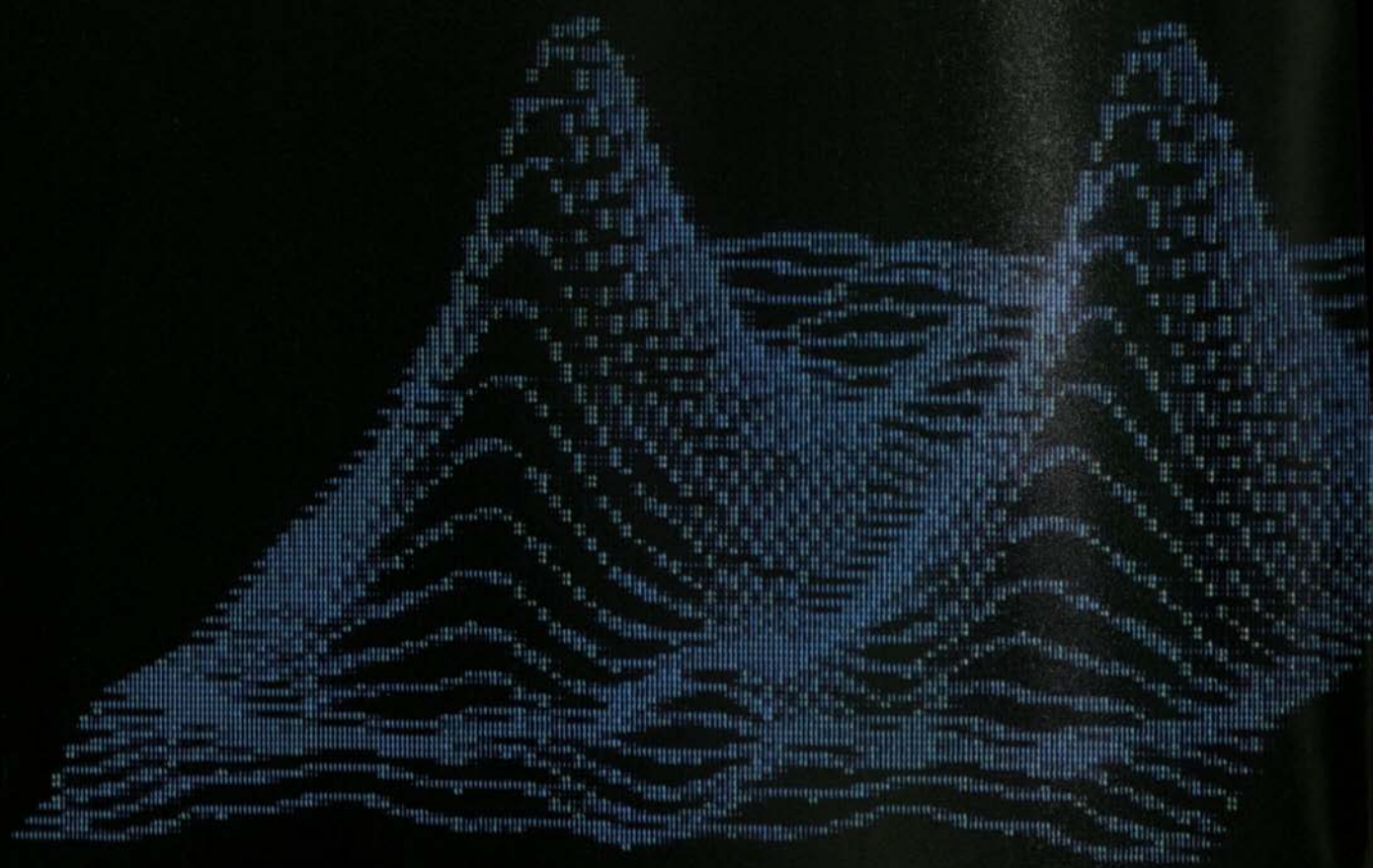
4. INPUT INTERFACE UNIT

Information, control signals and software enter the computer through this unit, which is attached to a keyboard and other peripherals. For control applications, the input should also be connectable to thermostats and other electrical instruments.

5. OUTPUT INTERFACE UNIT

Results of calculations and processed information go out through here to a TV screen, printer, tape cassette or other peripherals. Outputs could also go to a telephone line, home security and environmental system controls or even to appliance controls.





How does a programmer communicate with a computer? Think of the computer as another country with its own language. If you went to France for a vacation, you could learn French first or hire an interpreter.

A computer programmer can learn to use special "machine languages" or he can use interpreter languages that the computer, itself, translates into instructions. Such interpreters include BASIC, FORTRAN, COBOL, PASCAL, APL, etc. Because BASIC is the most versatile and simplest to learn, it is the preferred language for personal computers.

WHAT WILL A COMPUTER DO?

It will do calculations, keep records and perform control tasks accurately, rapidly and tirelessly – and even play games with the children or help you compose and play electronic music. A personal computer is a servant that can save time, educate, entertain, control and guard your home 24 hours a day. It's used by adults for household management, business and technical work, and enjoyment. It's used by children to learn about computers and to develop mental skills and manual dexterity. An advanced personal computer can do this and more – such as expand to include new capabilities, like telephone answering, as they become available as "enhancements."





WHO USES COMPUTERS TODAY?

Until 1977, computer systems cost \$20,000 to \$2,000,000. Now, systems in the \$1,000 range make it possible for any family to own a computer. Over 100,000 personal computers are already in use and the growth rate indicates that seven out of 10 American homes will have one by 1985. Computers are becoming as much a part of the progressive household as microwave ovens, encyclopedias and color TV recorders.

Homemakers use computers as appliances to plan budgets, menus and kitchen inventories, to record tax deductions and balance checking accounts. Personal business applications range from consulting engineering to investment management. A quality personal computer easily handles computations for such demanding fields as architectural design and thermal dynamics.

But the greatest impact will be on the young. Your children are entering a world that has made computerized methods the key to success in many business and professional fields. Personal computers are designed to help prepare children for this world.

Schools have begun to use computer-aided instruction. College courses in math, statistics, science and engineering are increasingly computer-oriented. Because the personal computer gives the student additional help, it is expected to replace most calculators at the college level in five years—just as calculators replaced slide rules—and be widely used at other grade levels.







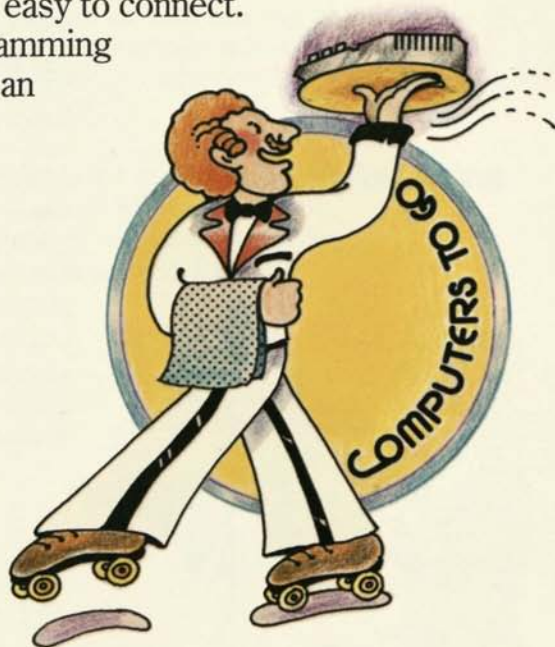
Enjoyment is a major reason for the popularity of programmable computers. You don't need to be a programmer to use a computer—program libraries are available—but many users get great satisfaction from developing their own personal programs. Ask the neighbor who owns one. Some have even taught their computers to operate with voice commands spoken in plain English!

HOW DOES A PERSONAL COMPUTER DIFFER FROM OTHER COMPUTERS?

The major difference is ease of use. A good personal computer comes ready to use with a built-in keyboard for input and a program library on tape cassettes. It connects to an audio cassette recorder for program loading and information storage, and to a TV set for output. They are as easy to connect as the speakers of a hi-fi system.

Other peripherals are also easy to connect.

The best ones have programming aids that help you become an expert at your own pace.



HOW DO YOU SELECT A

The machines on the market today range from cheap units that only use "canned" programs to versatile, high performance, user-programmable systems. You can start sorting them out by defining your needs and planning your applications. Remember to keep the whole family in mind. Once you have your goals in place, evaluate the alternatives, make a fair comparison, reach a conclusion and make the purchase. Your evaluation should cover these important questions:

MANUFACTURER'S REPUTATION?

Do as you would in buying an appliance. Check the manufacturer's reputation. Look for quality construction. Ask about service. Who can repair the computer and how long will it take? Is there a warranty? How do dealers feel about the manufacturer's business practices? Talk to people who have personal computers.

EASE OF USE?

All computers compute but each is human-engineered to provide different benefits. You defined the benefits that should be built into your choice when you defined your family's needs. Generally, ease of use comes first. Is the computer easy to set up, operate and program? Can it help the whole family learn how a computer operates? Is it suitable for household management tasks like kitchen inventory, financial planning, mailing lists and phone directory? Will it meet your personal business and technical computation needs? Does it have enough memory for your calculations? Can it also serve as a home entertainment center?

SYSTEM EXPANDABILITY?

Ask the dealer to describe which features meet your initial needs and which can meet your future needs. What comes with the basic computer? Can the memory and interface units be expanded? Is it easy to expand? How do you add peripherals like a printer, typewriter or disk memory and accessories like a remote control outlet, voice or music synthesizer and security system? Don't settle for a system that cannot grow with your needs. Ask any computer owner—expandability is a *must* because interests and needs will change as you learn more about computer applications.

PERSONAL COMPUTER?

GRAPHICS? AUDIO?

Most home computers can put pictures on a black and white TV screen. The better models provide color and sound, too. Can you use color? How many colors? How many dots on the screen? Can you plot at your choice of screen locations? Is there audio output? The uses of audio output include warning the programmer that he has made an error, making interactive games more realistic, generating computer music and alarms.

SOFTWARE SUPPORT?

It's not only satisfying to run personally written programs but also essential for some home and many professional and educational applications. If you want to go beyond a cassette library, ask about languages and other software support. Is the computer programmable in machine language? In BASIC? What kinds of commands and how many commands are available? Does it come in cassette, ROM, or both?

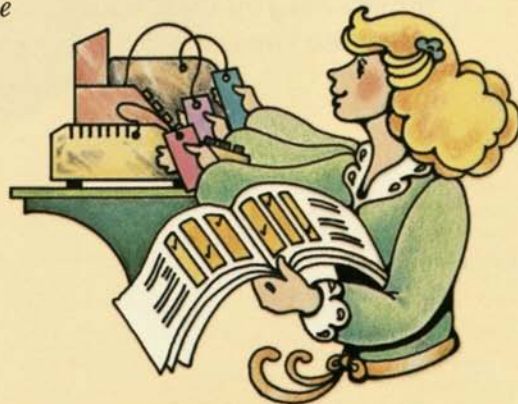
DOCUMENTATION (MANUALS)?

Documentation reflects the quality of system design and support. Ask to see *all* manuals and look through them carefully. The technical or "shop" manual should be only the beginning of the user's library. You need a software programming manual with clearly referenced commands and statements, a self-teaching manual on programming methods and documentation on peripheral units.

PERIPHERALS AND INTERFACES?

These are two keys to expandability. When comparing peripheral costs, always ask if the peripherals connect directly. If not, ask how much the interfaces will cost. And find out if you have to re-develop your software to use them. Look for a wide choice and don't accept vague promises of "future enhancements." A system with a good selection now will probably have a better one in the future.

This consumer's guide was written for people in all walks of life. Personal computer users range from persons with no previous technical experience to persons with long experience in computer technology. If you are a beginner, don't be intimidated by the technical jargon. Learn from it. Buy the system that suits your needs now, but look ahead. Plan for growth—yours and the computer's.



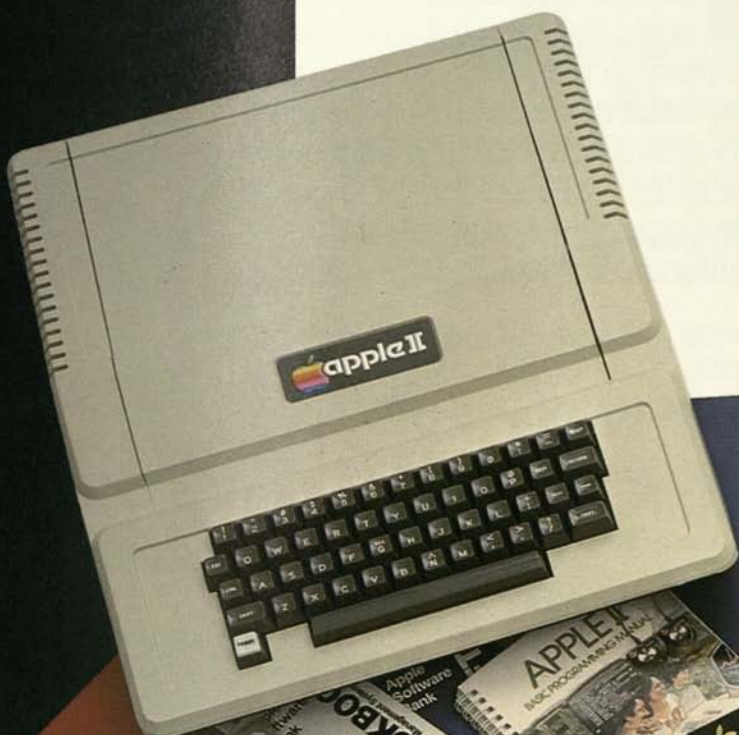
THE APPLE II™ PERSONAL COMPUTER

You can begin your evaluation by checking our reputation. We are Apple Computer Inc.®, a pioneer in the personal computer business and now the leading manufacturer of personal computers for the home.

The system at the right is APPLE II, today's most popular personal computer. It comes with a 1-year limited warranty with all warranty limits spelled out. Service is readily available and the basic computer system is on a single board that unplugs for rapid service. Expansion is also handled with plug-ins.

APPLE II has all the computer capabilities we've mentioned, plus many advanced features that help make it a good investment. For example, the optional peripheral interfaces are "intelligent"—they contain their own firmware to keep software simple and performance high as you expand the system. This is only one of the personal computer "firsts" you'll find in APPLE II.

APPLE II is light weight and portable. It weighs only 11 pounds and is housed in a strong case molded of structural foam. It is as easy to carry as a briefcase in its optional vinyl carrying case. The computer is sold completely assembled, tested and ready for use a few minutes after you bring it home. All you do is connect an inexpensive modulator between the computer and your color TV set.



PERSONAL COMPUTER CHECK-OFF LIST

A shopping list will help you make a fair comparison between APPLE II and other personal computers when you get to the computer store. Read through the check-off list that starts below, mark the items that fit your family's needs and make an item by item comparison at the store. For the name of the nearest Apple Computer dealer call (408) 996-1010 in California or 800-538-9696 toll free.

Brand A	Brand B	Apple II
		✓
		✓
		✓
		✓
		✓
		✓
		✓

WARRANTY AND SERVICING

- 1-year limited warranty
- Service readily available
- Plug-in boards for fast, low cost service

COMPUTER ELECTRONICS

- One cabinet holds all electronics and interfaces
- Power supply with output sufficient to power complete system expanded to 48 kilobytes of Random Access Memory (48K RAM), 12 kilobytes of Read Only Memory (12K ROM) and 8 peripheral interface and accessory cards
- Keyboard with quality feel of office typewriter and N-key rollover that virtually eliminates speed related typing errors
- Single-board computer construction

Brand A	Brand B	Apple II
		✓
		✓
		✓
		✓
		✓
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		✓
		✓
		✓
		✓

Easy, on-board expansion of memory—user or dealer installable

- Random Access Memory—4,096 to 48 kilobytes (4K to 48K RAM)
- Read Only Memory to 12 kilobytes (to 12K ROM)

Peripheral interface and accessory cards plug into eight connectors for easy expansion of system input/output capability

15-color output to standard color TV using inexpensive modulator

High speed cassette input/output interface to any standard audio cassette recorder. Program loading time is approximately 20 seconds per 4,096 bytes of program or data

Audio speaker built-in to enhance both program writing and game playing

Four inputs for using four game paddles (two game controls supplied) or for connecting thermostats and other resistor type sensors.

Seven single input/output lines for connecting touch switches and other on-off sensors and for controlling relays, lights or other devices

SYSTEM SOFTWARE AND PROGRAMMING AIDS

BASIC language built-in. Two BASIC interpreters are supplied. An education BASIC utilizing integer arithmetic is resident in ROM. An extended floating point BASIC with 9-digit precision and scientific notation for scientific and business applications is supplied on a tape cassette or as an optional ROM accessory

- Integer BASIC has 56 easy to use commands, statements and arithmetic operators
- Extended floating point BASIC has 116 commands, statements, arithmetic operators and transcendental functions.

Brand A	Brand B	Apple II
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		✓

Education cassettes

- Hangman—a spelling quiz program
- Color Math—a flash card math quiz
- Mastermind—a color guessing game for logical thinking development
- Routines for drawing high resolution graphics shapes

Entertainment cassettes

- Slot Machine
- Blackjack
- Star Wars
- Star Trek
- Breakout
- Biorhythm

Other sources of programs

- *Some Common BASIC Programs*, Osborne and Associates—a book of business, statistics, mathematics and engineering programs. These programs run in APPLESOFT II
- *101 BASIC Computer Games*, Creative Computing—most of these games will run in APPLESOFT II
- *What to Do After You Hit Return*, Peoples Computer Company—a book of programs that will run on the APPLE II
- Magnemedia, Inc.—extensive library of educational programs that run on APPLE II

DOCUMENTATION

Programming Manual. Over 100 pages of step by step, self-teaching procedures on “how to program” in BASIC for the beginner

Basic Language Reference Manual. Over 70 pages describing how to use the floating point BASIC language and a listing of all commands, operators and statements with syntax examples

Brand A	Brand B	Apple II
		✓
		✓
		✓
		✓
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		✓
		✓
		✓
		✓

System Reference Manual. Includes hardware description, software description, firmware description, detailed schematic diagram and general information on most aspects of the computer

Microprocessor Manuals. Complete documentation on how to design and program with the 6502 CPU at the component level is provided in 6502 Hardware Manual and Programming Manual

Technical Descriptions. Each peripheral interface has a Technical Product Description and Instruction Manual

INTELLIGENT PERIPHERAL INTERFACES AND ACCESSORIES

All APPLE II Intelligent Interfaces have built-in programs that eliminate the need for loading a cassette or writing a routine into your program to drive the peripheral. Each peripheral is addressed with simple BASIC commands for input and output control such as PR# x to output or IN# x to input.

Hobby Prototyping Board (A2B0001) – board for custom interface designs has 100-mil-grid hole pattern for wire wrapping or soldering

Parallel Printer Interface (A2B0002) – interface for most standard parallel input printers such as Centronics, Selecterm, Anderson Jacobson, Axiom, etc.

Communications Interface (A2B0003) – RS232C modem interface for telephone line data communications at 110 or 300 baud data rates (half or full duplex). APPLE II will operate as a computer or as an intelligent terminal in a distributed processing network with this board installed

High Speed Serial Interface (A2B0005) – RS232 serial interface to high speed printers, plotters and other instruments with standard RS232 interfaces operating half duplex. Data transmission rates are selectable from 110 to 9600 baud

Mass Memory Floppy Disk Subsystem (A2M0004) – one 116K-byte drive with interface that also interfaces second 116K-byte mini-floppy disk drive, giving you expansion to 232K bytes

Brand A	Brand B	Apple II
		✓
		✓
		✓
		✓
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		✓
		✓

APPLESOFT II – BASIC Firmware Board (A2B0009) – peripheral board containing APPLESOFT II, the 12K extended floating point BASIC language. Is switchable between business/scientific BASIC and education BASIC. Plugs into peripheral card slot.

PROGRAMMERS AID #1 (A2M0012) – available July 1978. Plugs into ROM socket on computer board and provides the following functions:

- Program renumber/append
- Tape verify
- High resolution graphics
- Musical tone generation
- Machine language program relocation
- Memory test diagnostics





APPLE II PERIPHERAL EQUIPMENT

All APPLE II peripherals connect directly to the computer. Those peripherals that would normally require interface electronics are supplied with the appropriate APPLE II Intelligent Interface.

MASS MEMORY FLOPPY DISK SUBSYSTEM

(A2M0004)– see Intelligent Peripheral Interfaces

MONITOR II

(A2M0005)– 9-inch, black and white television monitor

PRINTER II

(A2M0010)– Centronics Model μ P1 printer with interface electronics

PRINTER IIA

(A2M0011)– Centronics Model 779 printer with tractor feed and interface electronics

REMOTE AC CONTROLLER

(A2M0012)– sending unit of Mountain Hardware INTROL system for controlling appliances and other AC line powered equipment

DUAL CHANNEL AC REMOTE

(A2M0013)– receiving unit of Mountain Hardware INTROL system

SPEECHLAB™

(A2M0015)– Heuristics Model 20A speech recognition system for controlling the APPLE II with voice commands

TAPE RECORDER

(A2M0017)– audio tape recorder for loading and saving data and programs on cassettes

NOW MAKE YOUR INVESTMENT.

We invited you to make a feature by feature comparison because we believe APPLE II is the best investment you can make in a personal computer system. It delivers quality and performance at low cost today and it will not become obsolete when your family's needs change in the future. APPLE II can be summed up in three words: *long term usefulness*. If you agree that value is the best investment, go down to the nearest Apple Computer dealer and make that investment today.



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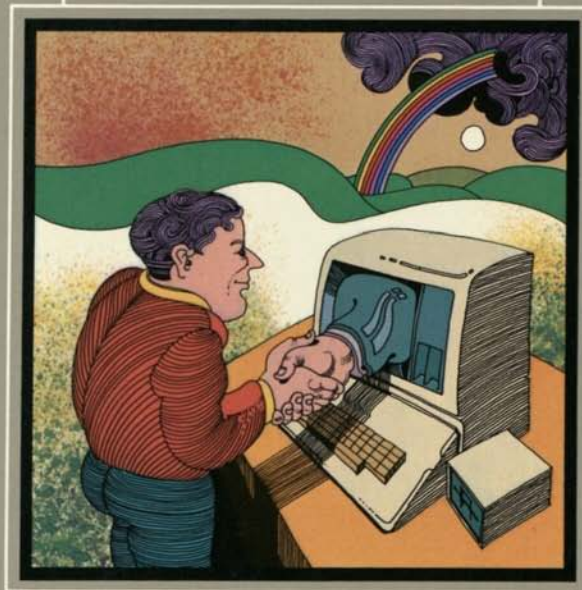
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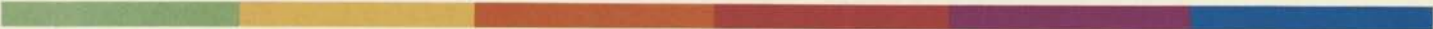


A Personal Guide to Personal Computers

A P P L E C O M P U T E R







A Personal Guide to Personal Computers

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Introduction

The Computer Revolution is over.

They won.

Whether humankind won as well is still being debated. Everyone is glad for direct dialing, of course, but then there are the waves of junk mail and nine-page utility bills, of bank problems and synthetic telephone voices, of arbitrarily transmuted personal names and habits. And behind it all, for good or ill, hums the computer, the blindest of social engineers, an electronic arbiter before whom there is no appeal.

But a second, happier computer revolution is already under way. This one is shifting computer power from the hands of the few—those who control the giant computers—into the hands of the many. The instrument of this revolution is the personal computer. It's putting computer power, for the first time, at the disposal of individuals.

What can you do with this power? You can put it to work producing answers to personal questions—questions about investments, taxes, and housing costs; questions about personal files and records; questions

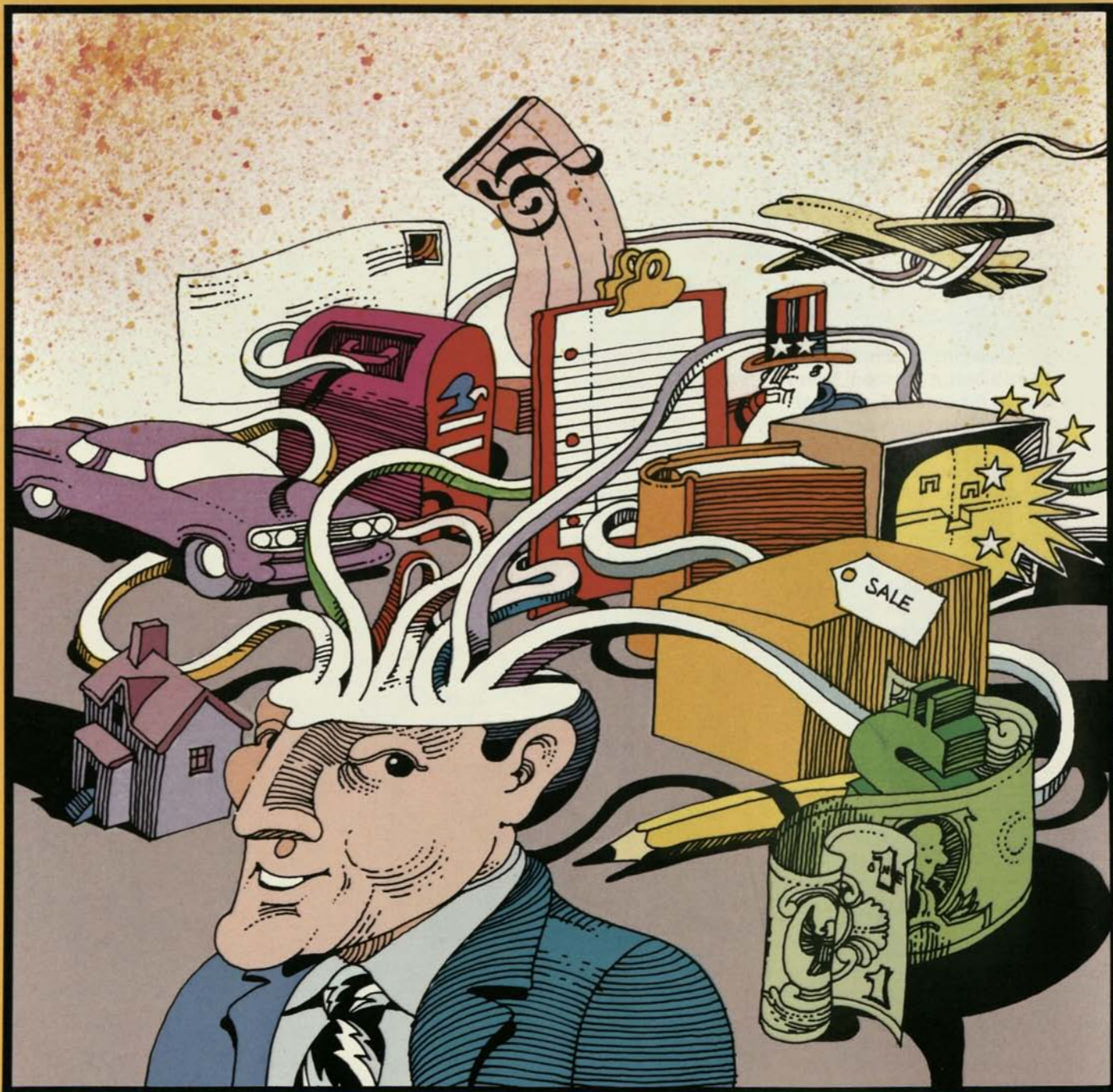
about business management, budgeting, and forecasting; questions about history, chemistry, astronomy, mathematics, languages, and art. Questions about almost anything.

You don't need to be a technophile to get started, either. Instead, you simply answer a few basic questions: What is a personal computer? What will one do for me? How do I shop for one? How do I run it? What will it cost?

These, in fact, are the questions addressed in this book.

The first question may be the simplest to answer. What is a personal computer? It's a tool for making personal solutions, just as a telephone is a tool for making personal communications. To understand the personal computer's usefulness, this common sense description is all one needs to know.

In fact, common sense is the best approach to the other four questions and to computers in general. It frees one from the fear of computer jargon and technical arcana. It helps one get to the point. It's the approach that this book strives to maintain.



What Will A Personal Computer Do For Me?

What an auto does for your body, a personal computer does for your mind, taking you across intellectual distances that you'd have neither the time nor the stamina to cross on your own. Most important, the personal computer's instant adaptability lets it carry you in virtually any direction you choose.

Seven Powers

In a general sense, personal computers have seven application areas. You may be surprised to find how many of them are already familiar to you.

Managing finances. A personal computer is a powerful tool for riding herd on your money. At home, it keeps track of budgets, mortgages, depreciation, tax records of all kinds, auto expense records, income and expenses for church groups or clubs — you get the idea.

A personal computer also makes it simple to see the differences, in dollars and cents, between various complicated repayment schedules on homes and cars. On these and other expensive purchases, a personal computer can actually save you enough money to pay for itself.

A personal computer can help you make better long term investments, too. Growth in money markets, T-bills, and IRAs can all be forecast and compared side by side. If you play the stock market or invest in property, you can compute a truckload of variables that will help you find a good buy and steer clear of a bad one.



In addition, the personal computer is useful for managing business finances. Its prodigious number-crunching ability makes it an indispensable accounting tool. You can also use it to do sophisticated business analyses—forecasting, statistical surveying, financial modeling, and more.

Word processing. Word processing—the next giant step beyond typing—a perfect application for personal computers. Like a typewriter, the personal computer lets you type any document you want. But the computer lets you rearrange what you've written, instantly displaying your new version on the computer's video monitor. You can weed out typos, correct your syntax, even try out a new page format. The computer instantly adjusts the entire document to accommodate the most major or minor changes. When all your changes have been made, the computer records or saves the document on a disk. You can store all your work there until you wish to review or further revise it. Hook the computer to a printer and you can

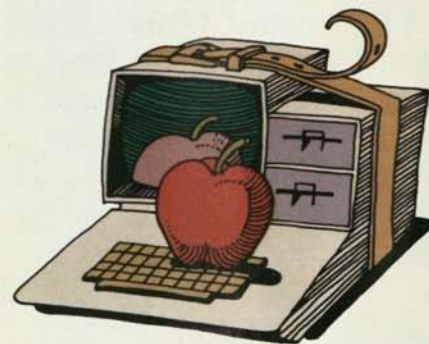
print that document, letter-perfect, automatically.

Consider an example. If you had typed this entire book on a personal computer set up to do word processing (as this writer did, incidentally), it would be easy to delete this sentence without having to retype the entire manuscript. You would simply tap two or three keys. The computer would take out the sentence and adjust *all* the following copy, filling the space where the sentence had been. You could insert a new sentence—or chapter—just as easily.

Because word processing makes changes easier, it encourages your best writing efforts.

You can compose as you go, deleting parts that aren't leading anywhere and stitching together those parts that you want to develop. Many people end up writing in the same, spontaneous way they think—trying a number of approaches and quickly compiling the best parts of each. In the end, because word processing enormously speeds the process of making changes, it makes even short documents far easier to compose—and often far easier to read.

Education. Adaptable, never tiring, and fun to learn from, the personal computer is a potent tool in education. It's a natural



with subjects that require drill and practice, such as spelling, multiplication tables, foreign language vocabularies, and sight reading in music.

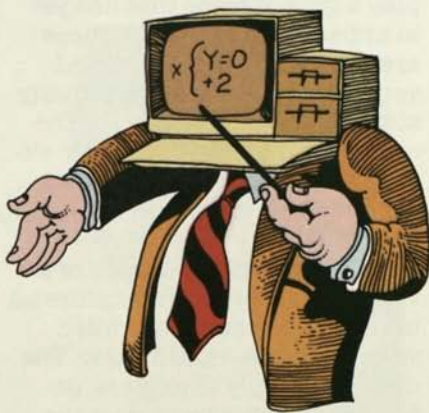
The computer gives the student an exercise and he types in a response. The computer then evaluates the response, adjusts itself to the student's skills, and poses exercises at a more appropriate level of difficulty. A personal computer gives a student undivided attention, too. The machine advances the student at his or her own pace, selects areas that need attention, and gives encouragement with congratulations and entertaining visual effects. Best of all, since students are in charge of the computer,



they find themselves in charge of their own education. Their sense of accomplishment flourishes.

A personal computer can lecture as well, combining text, music, and graphics—illustrations, diagrams, charts, even entire video tapes—to teach anything from auto maintenance to art history. When lecturing is combined with drills and practice, students can be quizzed, evaluated, given the results, and reviewed at the same time.

Personal computers also play educational games, everything from skill games that teach hand-eye coordination to math games that teach players how to run a small business.



When the world first encountered the copying machine, the stereo record player, and the hand-held calculator, understanding their function wasn't a problem. The copying machine copied, the calculator calculated, the record player played records.

But the personal computer doesn't have a single, definitive role. One minute it's an enormously powerful calculator, the next minute it's a word processor, and the next minute it's a game machine. Small wonder that a first encounter with a personal computer can produce a cloud of confusion.

The confusion begins to lift when one recognizes the difference between computers and computer *programs*.

The personal computer is simply a program player. Its single function is to run whatever program it is fed—economic model, word processing, or game—in the same way a record player runs Tchaikovsky, Miles Davis, or Rodney Dangerfield.

It follows that software is of first importance, inasmuch as it determines what the computer does. Bad software, like bad records, makes even the best hardware perform badly.

Some of the best games teach students through fantastic simulations.

A simulation is simply a computerized representation of something else in action—anything from a lunar lander or a nuclear reactor to the food chain in a fresh water lake. Students makes decisions about the vital factors that control the simulation. To save fuel, should the lander descend faster—or slower? Will using the reactor's backup

cooling system prevent a meltdown—or cause one? Will removing the lake's algae help or hurt the fish? Students make the decisions and the computer instantly adjusts the simulation's action. Immediately, the students see the consequences of their decisions on the entire simulation and gain first-hand experience solving complex, interrelated problems.

Finally, using a personal computer is educational in itself.

This is no small matter, since the widespread use of computers in business, education, and the home means that everyone will soon need a basic knowledge of computers. There's no easier or more effective way to gain that knowledge than having your own personal computer.

Record keeping. If computers have an insatiable appetite for anything, it's long lists—the longer, the better. With the right program (there are many on the market), a personal computer will help you catalog virtually anything—business files of every sort, personal tax records, parts inventories, private librar-



ies, recipe files, even information on which fishing flies work best in which streams.

Keeping these records electronically is fast and convenient, but that's just the beginning. A personal computer will also automatically cross-reference nearly any combination of topics you care to examine.

For example, at tax time, you need to find your deductible expenses. With a personal computer, you can automatically sort through your entire electronic file of receipts and, in seconds, locate all those marked "deductible."

But you also need to further classify those deductible receipts as "medical," "business," and so forth. Command the computer again and it will perform this task almost instantly.

Finally, if you were curious about the number of deductible business lunches you had with John Locke, your attorney at Locke, Stocke, and Barrell, you could command the computer once more and have your answer.

All this, and you'd never once have to wade into closets and drawers to look for your old files.



Entertainment. Personal computers don't just toil, however. They also play some pretty impressive games. All the most popular arcade games—invaders, lunar lander, and far more—are available in scaled-down versions.

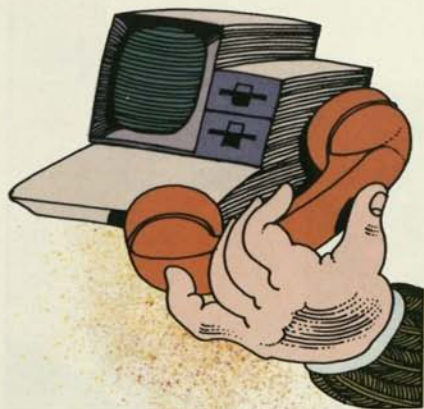
But personal computers also play a type of game that has yet to appear in any arcade. These are the vastly imaginative 'adventure' games. They're actually simulations that put you in the midst of all kinds of fantastic situations and invite you to work out your own solutions to their challenges.

The most popular kind of adventure game lets you explore an underground labyrinth filled with treasure—and danger. The object is simply to explore, defeating disaster and gathering

wealth, and get back alive. You command the simulation in plain English, which the computer is programmed to read. Depending on your command, the computer serves up the appropriate next step in your adventure—onward and downward, toward waiting dragons, sorcery, and gold.

Telecommunications. This simply means letting your computer use your telephone line (via a handy gizmo called a modem) to communicate with other computers.

Think about the possibilities. You can work at home, using your personal computer and



"We bought our personal computer for our 13-year-old son. We thought Rick might try writing a few simple programs himself." Thus did Lou and Adela Parada of Pinole, California, keep Rick occupied for the summer.

They succeeded beyond their wildest dreams.

At first, Rick and his family used the system for games. However, he soon read the tutorial manuals that came with the computer and taught himself how to program in BASIC. Within a month, he was writing programs for his mother's T-shirt business.

Mrs. Parada stocks 850 different T-shirt transfers, 150 silk-screen designs, and 30 shirt styles—in a variety of sizes and colors—from 10 suppliers. Record keeping was slow and difficult until Rick put the computer to work on the problem.

Rick's programs save his mother time reviewing invoices and counting inventory. One program identifies all available transfers by supplier, order number, category, and wholesale

value. It also keeps a record of purchase dates, figures out the quantity at hand, and calculates the wholesale value of the entire transfer inventory. A second program keeps a detailed record of daily sales, figures the cost of goods sold, and calculates total sales tax payments.

Rick has written other programs for his mother's business. He also does some programming for his school and uses the computer to do homework.

As they've increased their use of the computer, the family has added new equipment, including a printer, disk drives, and new software. Mrs. Parada uses several commercially available small-business programs. One of them, a general ledger program, saves her the \$100 per month she used to pay to a computer service bureau. Another program keeps a budget of both home and business expenses.

Mrs. Parada recommends the system to friends and other businesses. "The benefits to our family, to our business, and especially to our son have been phenomenal."

your phone to talk with your office's main computer. Or you can get late-breaking stock prices by connecting your personal computer to big computers in New York via telephone. Link your computer to computers in Chicago for information on commodities trading, or call someone else's personal computer to leave short messages or 40-page business reports. Others can contact your computer, too, and deliver information you need.

With personal computer telecommunications, you can also shop by computer catalog, browse through specialized computer libraries, do your banking, and more. All of these transactions, of course, take place at the speed of light.

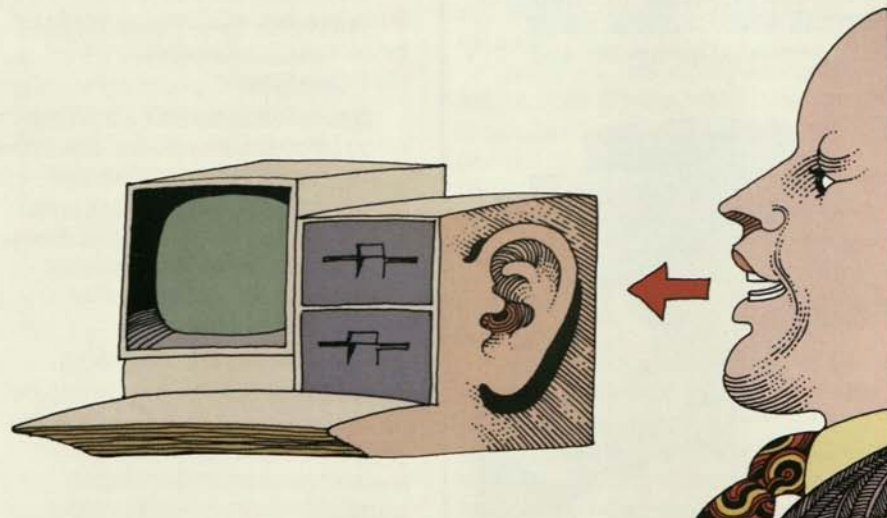
Programming. Programming is nothing more than making up your own instructions for the computer in a language it can understand. Learning a computer language—BASIC or Pascal, for example—takes time and work, but is generally a lot easier than learning a human language like French or Latin. In fact, you can learn enough in just a few

hours to write elementary but useful programs.

Programming lets you apply the power of your personal computer to the area of interest that suits you. Care to examine the aerodynamics of insect flight? Want to re-enact the world chess championship of 1958? Feel like experimenting with designs for a summer house? If you know how to program, you can tell the computer to come up with just the answers you're looking for.

Summing up. A personal computer can vastly supplement

your abilities in seven broad areas—finance management, word processing, education, record keeping, entertainment, telecommunications, and programming. The personal computer enables you to use its enormous data-crunching powers to reach formerly inaccessible solutions involving money, paperwork, class lessons, record keeping, games, communications, and just about anything else that interests you.



When you bring a personal computer into your home, you can plug into the whole world. Your computer can be equipped to join networks of computers all over the globe, computers containing vast quantities of every kind of information. You can even do office work at home by hooking into your company's large computers.

This kind of computer-to-computer communication is called telecommunications. It's made possible by using your telephone (and/or certain specialized communications lines) to link your computer to something called a data base, a library of information (data) stored in a computer.

The number, variety, and uses of data bases now available over public networks is impressive. You can use them to visit with friends, send and receive

mail, store facts or shuttle them from remote file to remote file, search libraries, take part in conferences, rent a car, select and pay for a TV set, run your own business, monitor stock and commodity prices, search for information on a multitude of subjects from abortion to zoology, play games, and even publish a novel. You can link your computer to hundreds of libraries that you may search and use without ever leaving your home. And because these libraries are electronically updated, their information is always current.

Two popular networks, The SourceSM and CompuServe,TM offer a wide range of information and communications services, including in-depth Dow JonesTM stock statistics and general news service, the UPI news wire, and a composite of stories from 11 different news sources.



How Do I Shop For A System?

The place to start is in a computer store. However, your visits there will be more fruitful if you first learn a bit about computer systems in general.

The Computer System

Hardware. At the heart of the system is the computer itself, usually a low box with a keyboard that looks something like an electric typewriter. Inside the box are the computer's power supply, circuit boards, and other electronics. The computer does all the "thinking"—simple calculating, really, but at blinding speed.

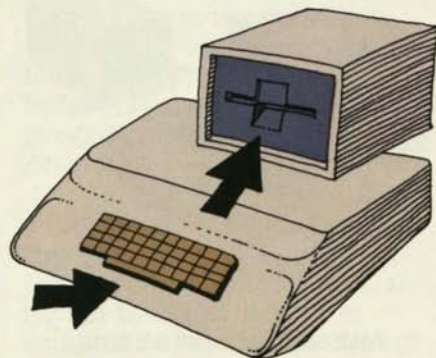
Yet the computer alone has no communication to or from the outside world. Its "thinking" power remains undirected and useless until two important components are added: first, a device through which a user can tell the computer what to think, and second, a device for communicating the computer's results. In short, a computer needs data sent in—input—and it needs to send data out—output.

With its input and output attachments, the useless computer now becomes a useful computer

system. You can classify almost all computer attachments as either input devices or output devices.

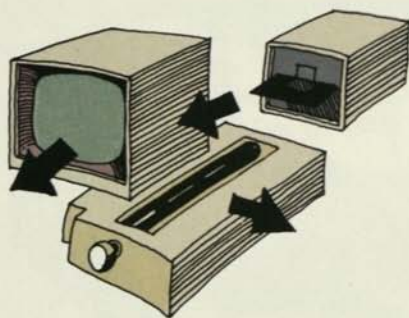
Input. For entering information into the computer, the two most common devices are the keyboard and the disk drive. The keyboard lets you enter in any information you choose. It's especially useful for composing the very long sets of instructions—programs—that prepare the machine to crunch numbers, process words, and so forth. But the keyboard is slow. If you had to send the computer every program you use via the keyboard, you'd spend all your time typing and precious little time computing. You need a way to send pre-composed programs to the computer at more computerlike speeds.

That's precisely the function of a disk drive. This little machine, attached or built into the computer, "reads" information stored on a floppy disk, a remov-



able recording disk that looks like a small, flexible 45 rpm record. The disk drive then feeds the information to the computer in seconds.

Output. Personal computers send out information in two ways. The first is via a small TV or a special video monitor. Plugged into a TV or monitor, your computer can instantly display numbers, words, and pictures on the video screen. The second way is through the disk drive, which can "write" information as well as "read" it. The computer sends its data to the disk drive, which quickly records the information on a disk.



Although almost all computer attachments can be classified as either input or output devices, the disk drive is an input *and* output device—an I/O unit, in computer jargon. With a keyboard and monitor, plus this I/O device, you and your computer can communicate freely.

Ready to go. Now the computer has what it needs to be used by people. Input goes to the computer via the keyboard and/or the disk drive. Output is sent from the computer to the monitor, where you can look it over, or to the disk drive, where you can store it for later use. With these basic devices, you and your computer can begin to talk to each other. But what will you talk about? This is where software comes in.

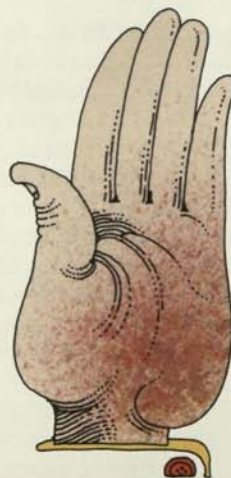
Software. Software is the generic name for all computer programs. A program itself is simply a list of thinking directions you give a computer. Though you can learn to write your own programs, you certainly don't have to. Most personal computer users buy ready-made programs, then feed them to the computer via the disk drive.

Once instructed by the program, the computer is ready to respond to you. For example, if you load a computer with a calculating program, the computer acquires the ability to add, subtract, multiply, divide, and much more. Now you can type in formulas and equations and tell the computer to manipulate them for you. Similarly, a word processing program equips the computer with a catalog of skills for manipulating words, paragraphs, and pages. You put those skills to work on the words you type into the computer.

Because it completely controls a computer's "thinking," software is as important as hardware. Clumsily composed software will force even the best computer to think clumsily. Cleverly written software, on the

other hand, will make your computer a better thinker and easier to use. For these reasons, the quality and quantity of compatible software should play a major role in determining the brand of hardware you buy.

But wait! It's extremely important to think about service as well. A computer system is a big investment and needs to be protected by reliable service policies and competent service people. A short section on this subject appears in the "How To Buy" discussions on pages 27 and 28–29.



Summing up. Now you have three categories to think about — hardware, software, and service. Hardware means the computer and its I/O devices, such as the machine's keyboard and disk drive for input, the monitor and disk drive for output. Software simply means any kind of program, usually on a floppy disk. Like books or records, software can cover every conceivable interest, and the number of programs is continually expanding. Service is self-explanatory.

Hardware, software, and service. Those are the basics. Virtually all your computer shopping will fall into one or more of these three categories.

How To Buy Software

Software comes first. Software determines what your computer can do for you. It's so important that you should start your computer shopping by finding the software you like, then buying the computer that runs it.

Fortunately, there's an effective and nontechnical way to approach software (and com-



puters in general). Start with the obvious. Ask yourself, "What do I want to do with this computer system?" The answer will point you to the kinds of software you want.

For instance. Let's say you want your computer to help you do family budgeting more easily and accurately. You also want it to speed up your income tax estimations and all that nasty, year-long record keeping. You do a lot of writing, too, so you want your computer to handle all your writing projects: personal correspondence, reports for the office,

your church newsletter. And games—it has to play games.

Now you know what you're looking for. You need a family budget program, an income tax program, a word processing program, and some game programs.

Caution #1. Having decided this, you encounter two important concerns. The first is quality. For the right balance of computer efficiency and ease of use, both your programs and their instruction books must be well written. You can learn about the quality of a program by asking for software demonstrations—and explanations—in almost any computer store. Also ask for the names of people who have bought the program, then contact them. You'll find their reports most enlightening.

Caution #2. The second concern is compatibility. Not all program disks run on all computers. This incompatibility is traceable to the computer's operating system.

When you buy a piece of software, you get more than the program you shopped for. Also tucked away on your disk is another program called the op-

erating system. Loaded into a computer along with the word processing, game, or other program you're using, this stowaway sets up a vital communications link between that program and the computer's "brain" or central processing unit (CPU). The operating system takes the main program's commands and passes them down to the CPU in a language it can understand.

The problem is this. There are different kinds of CPUs, and each kind understands only its own language. When a program disk's operating system doesn't speak the CPU's single language, everything jerks to a halt. The main program just can't get

through to the computer's thick-witted brain.

Here is the point of all this technical talk. The largest libraries of available programs use just a few common operating systems, with names like DOS (disk operating system) and CP/M® (control program/micro-computer). Since you want as many programs as possible available for your computer, your system's software and hardware should use one of these common operating systems.

For instance, cont'd. Now back to your software hunt. You've answered the first question: What do I want my programs to do? You know you're

looking for family budget software, income tax software, word processing software, and game software.

Software publishers, like book publishers, handle similar subjects in different ways. Most software publishers, for example, offer some kind of program for computing your taxes. How would you sort through all these tax programs to find the one that suits you? Generally, the same way you'd select a book on taxes that suits you.

Boss out the turkeys. First, eliminate any that are poorly written. This applies not only to computer programs but to their crucial instruction manuals as well. After all, the program is useless if you can't understand how to use it. At a good computer store, you can browse through the program's instruction manual and try out the program. If the manual or the program is clumsy or just plain hard to figure out, pass up the whole package. It will cause more frustrations than it will resolve.

Four factors. You'll still be left with several possibilities. Take a



close look at each and evaluate how it has balanced four factors: power, ease of use, cost, and support. Applied to programs, "power" refers to what they can actually do. Some programs do more than others. Some don't do as much, but are easier to master and put to use. Some do all kinds of tricks and are easy to use, but also are very expensive. Finally, if the disk develops a flaw, the publisher's replacement policy could mean big bucks saved or lost. Power, simplicity, cost, and

support—you'll find that different programs emphasize different parts of this formula.

Of course, which of these variations you choose is a matter of personal preference. For example, if you want a tax program that can handle very complex problems, you'll probably favor detailed programs that are harder to master. If you want a few simple answers and nothing more, you'll probably prefer the more basic programs. If you want the simplest of ways to do



the most complex problems, you'll be happy to pay extra for the hottest, slickest software you can find.

One last point. As with any fairly expensive purchase, don't choose something that won't last. Do two things. Look for software that will still be useful when you know how to do more with your machine, and, to outflank disaster, look for software with a good warranty.

Most software publishers protect you in case of mishap. If a program disk is destroyed (it happens) or wears out (usually only after thousands of uses), they'll replace it for a fraction of its original cost. This replace-



ment is a one-time offer, of course, inasmuch as large giveaways cause software houses, like other businesses, to go profoundly broke.

How To Buy Hardware

The question, again. Begin by first asking the same basic question you asked about software: "What do I want it to do for me?" Don't be diverted by technical details. They're pertinent only to the degree that they help answer the main question. Remember, the computer is supposed to *solve* problems, not create them.

Less power vs. more power. For those who want a less expensive way to give personal computing a try, the low-cost, low-power personal computers offer a useful introduction. Two typical low-power systems are described on pages 37-39. But practical programs for tax management and word processing are beyond the abilities of the low-power personal computer. For the sake of this exercise, you'll pass them by.



What's left, essentially, are the machines you're looking for—full-scale personal computers, with a range of peripheral devices, from which you can assemble a system to handle all the work you need done, and then some.

You'll find a good many variations among these machines. Yes, this one can run tax programs, but how quickly? That one does filing, but how many files can it handle? And how easily? Others play games, but in color and with sound effects? As you examine the possibilities, you'll refine the one essential shopping question: What do I want this system to do for me?

Four factors. In the process, you'll balance the same four essential factors you balanced with software—power, ease of use, cost, and service/support. Applied to software, these questions ask how effectively a computer system's built-in potential has been put to use. Applied to hardware, they ask about the built-in computing potential itself.

As you balance each of these categories, you'll learn a few general concepts about hardware. Once you learn them, you'll find that they apply to all the personal computers you examine.

Power. The first category—a computer's power—depends on several elements. One of them is the CPU (central processing unit), the famous "computer on a chip." Although a computer is full of chips, only the CPU is capable of computing. All the others are only helpers for the CPU, simply storing information that the CPU needs for "thinking."

Personal computers may be built around one of a number of different CPUs, chips with names like 6502, 8088, Z80, 68000, and more. As you encounter each different CPU, find out

what operating system it understands. Remember that this determines how many programs can put the computer to work. Make sure that the CPU in the computer you choose understands a well-known operating system, one used by plenty of good software.

Note also that some CPUs work faster than others. This can be an advantage when you handle massive quantities of data, like a month's worth of company bookkeeping. The general rule about speed is that more is better. However, if you really need high speed, make sure that the rest of the computer will permit the fast CPU to use its speed. Some machines move data to and from a fast CPU along inherently slower data paths. This forces the CPU to wait for the information to come and go, cancelling the CPU's speed advantage. It's like driving a Ferrari in a traffic jam. So, when you hear about faster and slower CPUs, concentrate on the net effect. Will a system with a fast CPU offer enough practical advantages to outweigh its higher cost? Will the extra speed actually give you faster answers?

A personal computer, like the largest mainframe computer and the smallest electronic calculator, is an extremely simple electronic counting device. All it can count are zeros and ones. Pretty primitive, actually.

In fact, the computer would be as stupid as a stump if it weren't for its one really useful quality—blinding speed. It does all of its thick-witted sorting of zeros and ones at the speed of light.

These two properties—the computer's crude ability to differentiate zeros from ones, and its incomparable speed—are put to remarkably clever use by computer programmers. They can translate almost anything into number strings made entirely of zeros and ones. The English alphabet, chemical formulas, even moving pictures can all be assigned equivalent strings of numbers that the computer understands. That's essentially what programming is—the art

of translating any and all kinds of directions into these special, computer-readable strings of numbers.

The computer's speed vastly overshadows its crude numerical abilities, allowing the computer to calculate or "crunch" hundreds of number strings every second. Following a program's number directions, the computer churns out appropriate number answers in response.

However, programmers have neatly spared the user from getting bogged down in all these numbers. They simply include one more number list that automatically turns human directions into computer number language, and vice versa. The final results get processed, flashed on the computer screen, and voila! Your answer is served.

All of which is nice to know, but no more important for using a computer than a knowledge of auto ignition systems is necessary for driving a car.

Another element that determines a computer's power is its internal memory. Internal memory is a grid of chips inside a computer that holds all the machine's knowledge. One block of memory comes already filled with important information that can't be changed by the computer. This unalterable part of memory is called read only memory, or ROM, because the CPU can "read" this data but can't "write" in any new data.

Another block of internal memory is empty and can be filled with any kind of information. All data written into this part of memory is easily altered. When you enter a program into the computer, the program is copied into this part of memory. The results that a computer generates are also "written" here. The information held in this memory block can be altered to your liking, then stored on a floppy disk for future use.

This alterable part of memory is designed to make life easy for the CPU. It lets the CPU grab needed data randomly, without wading through rows of unneeded data to reach it. Therefore, this part of memory is called random access memory,

or RAM. Unlike read only memory (ROM), RAM goes blank when the computer's power is turned off. Not a problem, really. The computer system user merely copies RAM data onto a disk before shutting down. When the computer is turned back on, the recorded information can be copied back into RAM.

The more RAM a computer has, the more it can do. A computer with more RAM can be loaded with longer, more powerful programs. The computer also has more room for holding the information it's generating. That means the machine can work on larger, more complex jobs of every kind. The more RAM, the better. However, RAM, like lunch, is never free, a fact discussed under "What Will It Cost" (pages 37-39).

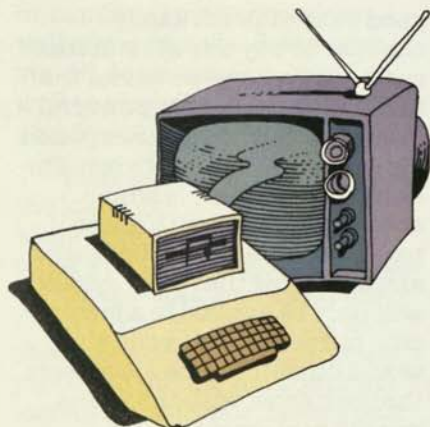
The capacities of all computer memory—RAM, ROM, and disk drive—are measured in the same units, called bytes. A byte is simply an eight-part code that stands for a single character (letter or number). Each part of the code, by the way, is called a bit.

The computer uses bytes the way people use letters and numbers. By stringing bytes into uni-

maginably vast arrays, a computer can count or spell anything a person wants it to. The computer also handles all the translating, so users see normal letters and numbers displayed on the monitor or coming out of a printer. A computer stores these bytes by the thousands. A thousand bytes, called a kilobyte, or K, is the standard measure of memory size. Thus, "64K RAM" means that the computer's random access memory can hold approximately 64,000 bytes of information. A "256K disk storage capacity" means that a certain floppy disk can store about 256,000 bytes of information.

Note strictly for the record that 1K actually contains 1,024 bytes. If you think you care to know why, the glossary and your computer dealer will tell you. But forget all that for now. Everyone, including the manufacturers, rounds it off to 1,000 bytes even. You can do the same.

You've looked at CPUs, operating systems, and memory. They make up the basic computer itself. Next, you'll need to know about the devices you add that make a computer into a computer system.



A basic system will include a TV monitor plus a disk drive. A personal computer can actually be attached to your own television (with the help of a relatively inexpensive connecting device). But you may want a special video monitor. Those that are made exclusively for use with the computers offer one basic but significant advantage over ordinary TV sets: they're designed to give sharper images. This can make an enormous difference when you're working with a display screen full of numbers or words.

Like regular televisions, monitors come in various screen sizes, the most popular being 9

A computer system, like a TV, is only as useful as the program it's running. That makes it important to know how to buy good software.

Go to a computer store and tell the salesperson that you want to talk about programs. Tell him what kind of work you want to do. For each category—budget work, word processing, and language study, for example—the salesperson will pull out two or three programs.

In the face of so many bewildering computer programs, you may anticipate overwhelming confusion. Take heart, the salesperson will rescue you. One by one, he'll load each program into

and 12 inches, measured diagonally. Though the smaller screens have their uses, 12-inch screens, unsurprisingly, are easier to read; they're virtually mandatory for word processing with 80-character lines. A video monitor, by the way, does not function as a TV set when detached from the computer; it only runs on computer signals.

a computer and explain just a bit about how each works.

As you watch him use a program, you'll see functions that are especially impressive or especially confusing. Ask about them immediately; you should get lots of answers. Soon you'll have a feel for how software works and what makes one program better than another. Then grab all the brochures you can find and go home to do some studying.

In a week, you'll be ready to talk about the specific software you want. This, in turn, leaves you ready to talk about buying a computer system as well, one that will fit your purposes and your software perfectly.

A video monitor costs more than a black and white TV, but it increases the computer's usefulness.

An ordinary cassette recorder can be used in lieu of a disk drive. However, you'll discover that with a cassette player it takes you ages to load programs and save data. When you're working with anything

but tiny, limited programs, this can be extremely cumbersome. A disk drive moves data with far greater efficiency and—despite its higher cost—is really the only practical device for most people. It uses a recording medium that is similar to a small, flexible record in a square plastic sleeve. The entire disk, sleeve and all, is simply put into a slot in the front of the drive.

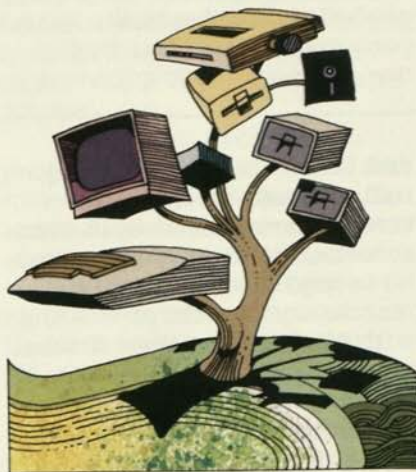
Whatever hardware you consider, think about how it can be used, adapted, or expanded to meet future needs as well as current ones. This is important, because once you get the hang of computing, you'll want to use your system for many applications you may not yet need or even be aware of. Currently, for example, you may want a system for doing office work at home. Later you may also want to send that work straight to your office by telephone—and that's when you'll be glad that you opted for an expandable system.

With some personal computers, expansion is a fairly simple matter. Just remove the computer's cover, find the expansion slots, and plug in a ready-made circuit board. If it's expandable, your system will let you add tele-

communications equipment, printers, graphics plotters, and even control devices for operating lights, locks, thermostats, and many other kinds of equipment.

You can also add ready-made circuit cards that increase your computer's memory, its programming language ability, its operating system comprehension (thus its program library), and more.

In short, an expandable machine is able to grow with your interests and offers exceedingly



good value. It's obviously cheaper to buy one system that can become more powerful than to buy a second, more powerful system to replace an unexpandable system you've outgrown. Perhaps the only people who shouldn't bother with an expandable system are those who already know that their system will only be applied to a few specific purposes. Everyone else would do well to look at systems that can grow with the user's growing interests.

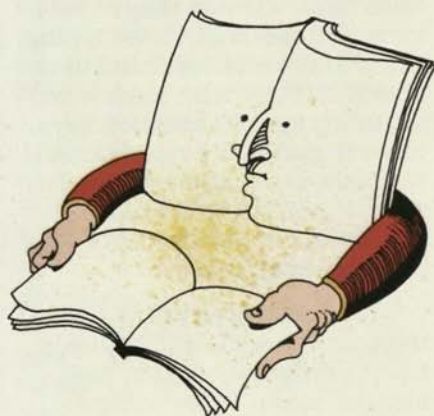
All these matters pertain to the computer's "power." Recall, however, that this power must still be balanced against three other considerations: ease of use, cost, and service. As you examine these considerations, you'll realize they affect your system's usefulness fully as much as its inherent power.

Simplicity. Ease of use is probably the most immediate criterion, and certainly one of the most important, for choosing a personal computer. After all, a middling repair policy or high price tag will only vex you briefly. But a system that's hard to use—with poor instructions, a tinny and cluttered keyboard,

or cumbersome procedures—will aggravate you every time you sit down to use it. You'd do well to check for several important features.

First and foremost, examine the instruction manuals that come with the personal computer you're interested in. These books are vital, your most important key for unlocking the power of the machine. Initially, you'll use them a good deal for learning the basics. Later you'll refer to them for answers to your increasingly knowledgeable questions. Another way to look at it is this: if the books are your key, and you can't make sense out of them, then you're locked out of your computer.

All manuals are not created equal. If they're hard to follow, or incomplete, think twice about buying the machine. There's probably an equally good computer elsewhere, made better by good instructions. A computer dealer should be able to help you here. Ask him about the quality of any of his machines' manuals. If he doesn't know or isn't too concerned, go to another sales person, even another store, until you get some useful opinions.



Personal computer instruction manuals can be fairly imposing pieces of literature. But don't go into shock. Remember that the computer manufacturer provides all the instructions at once, even though you will only absorb them a bit at a time—over weeks, months, or even years. Further, you may never need to refer to some of the books, such as those for technical reference only.

Your computer's manuals should have several qualities. First, they should be wonderfully plain and clear, with sentences that are reasonably free of computer jargon. Second, they should be thoughtfully organ-

ized. Each table of contents should reflect this organization and show a sensible progression through the book's material.

Third, it's important that the books do more than simply drill you in one rote operation after another. Instead, they should give you a feel for the machine, should lead you to begin making connections on your own. In fact, some of the better manuals are written in such a way that readers actually realize how the machine works before finishing the instructions. They may *never* finish the book, but simply go on to use the machine and instruct themselves.

In summary, look at the books that come with your machine and see if they look promising. If they seem confusing or unorganized, check out other machines and other manuals. Keep looking until you find a set of manuals that will really help make a system effective.

Now that you've done the hard work of scrutinizing the computer system's manuals, take on an easier but very important task. Give the computer's keyboard a test run. Whether you're considering inexpensive



or very expensive personal computers, they should have comfortable keyboards. The least expensive computers have, instead of keys, a one-piece, pressure-sensitive surface marked with typewriter key positions. This helps keep costs very low, but also makes typing glacially slow. Virtually all other personal computers use regular keyboards, like those on electric typewriters.

However, keyboard quality can vary a great deal. In fact, you would do well to test every brand. Some keyboards may look like those on fairly standard electric typewriters, but the keys won't

“feed back” the way they should for sustained, high-speed typing. Other keyboards feel fine, but are poorly laid out, with too few or too many special-function keys, or with standard keys serving too many nonstandard uses. In the end, you'll find the best keyboards on only a few of the better personal computers.

Take time to examine several monitors as well. You'll quickly see the difference that screen size can make. To test image sharpness, get the sales person to display some 80-column, lower-case text on the monitors you're examining. Check the text display in standard mode (light letters on dark screen) and inverse mode (dark letters on light screen). If you want to use your system for games, look at some moving images, too. They shouldn't leave a lingering “ghost” after they move.

Finally, let it be said again: a personal computer's convenience and simplicity depends mostly on its software. Be *certain* that the machine you want not only has lots of software, but that the software and the manuals are simple, clearly written, and easy to use.



Cost. A machine's power and its ease of use should be balanced against a third factor—cost. More is said in “What Will It Cost” on pages 37–39. For now, simply consider two things. First a computer buyer's chief concern is not finding a price, but finding a solution. While busily saving a little here and a lot there, don't inadvertently buy a system that can't really do everything you want it to do. Second, recall that there is a big difference between the cost of a computer and the cost of a usable computer system. This fact of computing life will show certain of the low-cost computers to be not so low cost after all, while some of the more

expensive machines will look like a pretty decent value.

Service. Finally, think about service. The real issue, when your system won't run, is how quickly you can get things going again.

Your primary source of service is the dealer from whom you purchase your system (see "The Computer Store," pages 28–29). However, the kind of repair service a dealer provides for your system's hardware depends, in part, on the hardware's brand. Some computer companies require dealers to learn basic repairs for their computers. A dealer can fix those brands in one day, or maybe even less.



Other brands must be shipped to a central repair facility. Obviously, shipping for repairs takes longer—up to two weeks.

Computers are also sold by mail-order outlets, often at discount, but most of these outlets extend no service help. Caveat emptor. If you encounter problems or even have questions, you're on your own. For someone who really knows personal computers, has a source of good technical help, wants nothing other than a bargain on a very specific piece of hardware, and is willing to hazard cross-country shipping, a mail-order purchase may seem to make sense. Most users, however, need technical assistance—service that's established, accessible, and competent.

Finally, several computer companies sell a number of protection plans that will cover all repairs and maintenance on your machine for a yearly fee. Together with a helpful local dealer, such plans can assure the computer's uninterrupted well-being and the owner's peace of mind. These plans cost about 10 percent of a system's purchase price, but this expense must be weighed against the possible

cost of repairs paid out of pocket. Whether a protection plan is a smart buy depends on how much use or abuse the computer will receive, and how much or how little you care to be involved in its maintenance.

Summing up. Buying a system's hardware, then, requires you to strike a balance between power, simplicity, cost, and service. Ask yourself that one easy question, "What do I want this computer system to do?" Your answer will tell you which of these criteria are most important to you and which system will give you what you want.

Having armed yourself with basic computer information and some very useful questions,



you're ready to look for a good place to shop.

The Computer Store

Because its products are so powerful and so little understood by the general public, a computer store has to provide customers with more help than perhaps any other kind of retail outlet. The sales people must know what they're selling in intricate detail. They must understand what you want and work to find it for you. After you buy, they must provide you with service and support. If you consign yourself to the care of a dealer who can't do all this, you could end up with an inadequate system and inadequate help in the future.

The stores. You'll encounter three general kinds of computer stores. There are independent dealers who set up and run their own businesses. There are franchise dealers who share ownership of their computer store with a centralized corporation. And there are department store

chains that are starting to sell personal computers, some adding computer departments to certain stores, others selling the systems in their office products departments. Each kind of store has advantages and disadvantages.

Independent dealers usually put all their effort into just three or four different computer brands. The strategy is to achieve greater mastery of the systems they sell and thereby produce cogent demonstrations, better support—and, they hope, more sales. The approach is sound, providing the sales people really do know their stuff.

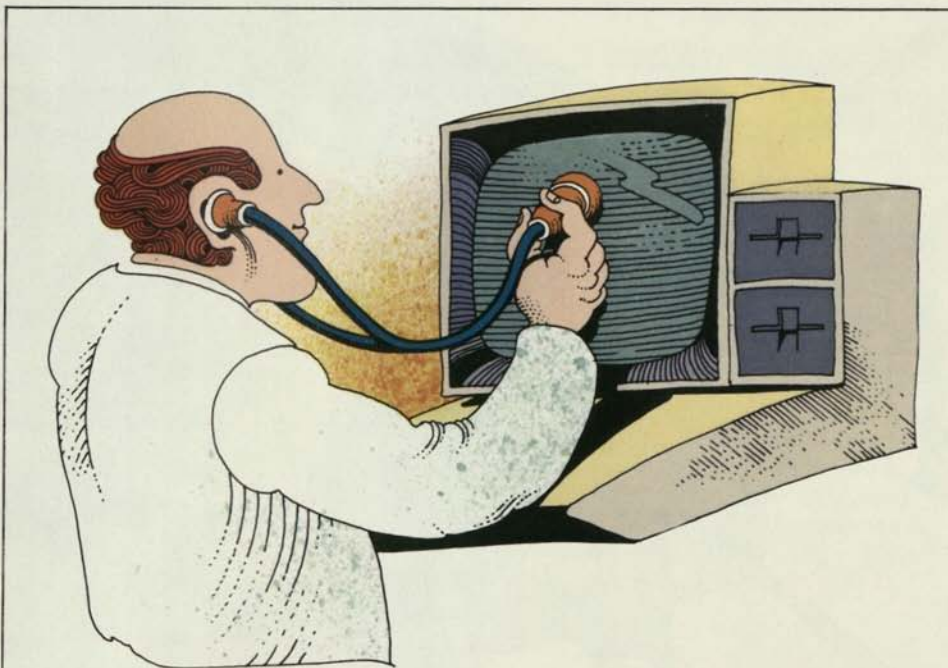
Franchise computer stores can show you most of the personal computer brands on the market. However, coping with this many systems can spread a sales person's expertise mighty thin. You might see more machines, but you might not learn much about them.

The department store chains hope to do for computer shopping what they've done for appliance and television shopping. Depending on the sales people you encounter, that could be good or bad.

Sales people. As you can gather, the most important element in each store is the sales person. A good one should quickly make it clear that your interests take priority over his or hers. If your sales person wants mostly to sell you a pet package, disengage yourself and find somebody else.

If you find that your sales person's heart is in the right place, then go on to discover if he or she has a real working knowledge of the store's computer products. A good salesperson should be able to give you a complete demonstration of all the software and hardware about which you're curious. And help you do a little hands-on experimentation, too. If this is the case, you may have the store you want.

Service and support. However, after the sales person has helped you choose the system you want, you must find out one thing more. Ask about the store's service and support policies. If your wonderful but mysterious machine becomes sick, a good dealer will expedite all repairs for you and may be qualified to repair the machine you buy. By exchanging plug-in chips and



boards, a dealer may actually make repairs for you while you wait.

Support, on the other hand, means helping you get running. When you buy a system, your dealer should assemble and run it—both software and hardware—to make sure that everything works together as it should. The dealer should also familiarize you with basic setup and operating procedures. Fi-

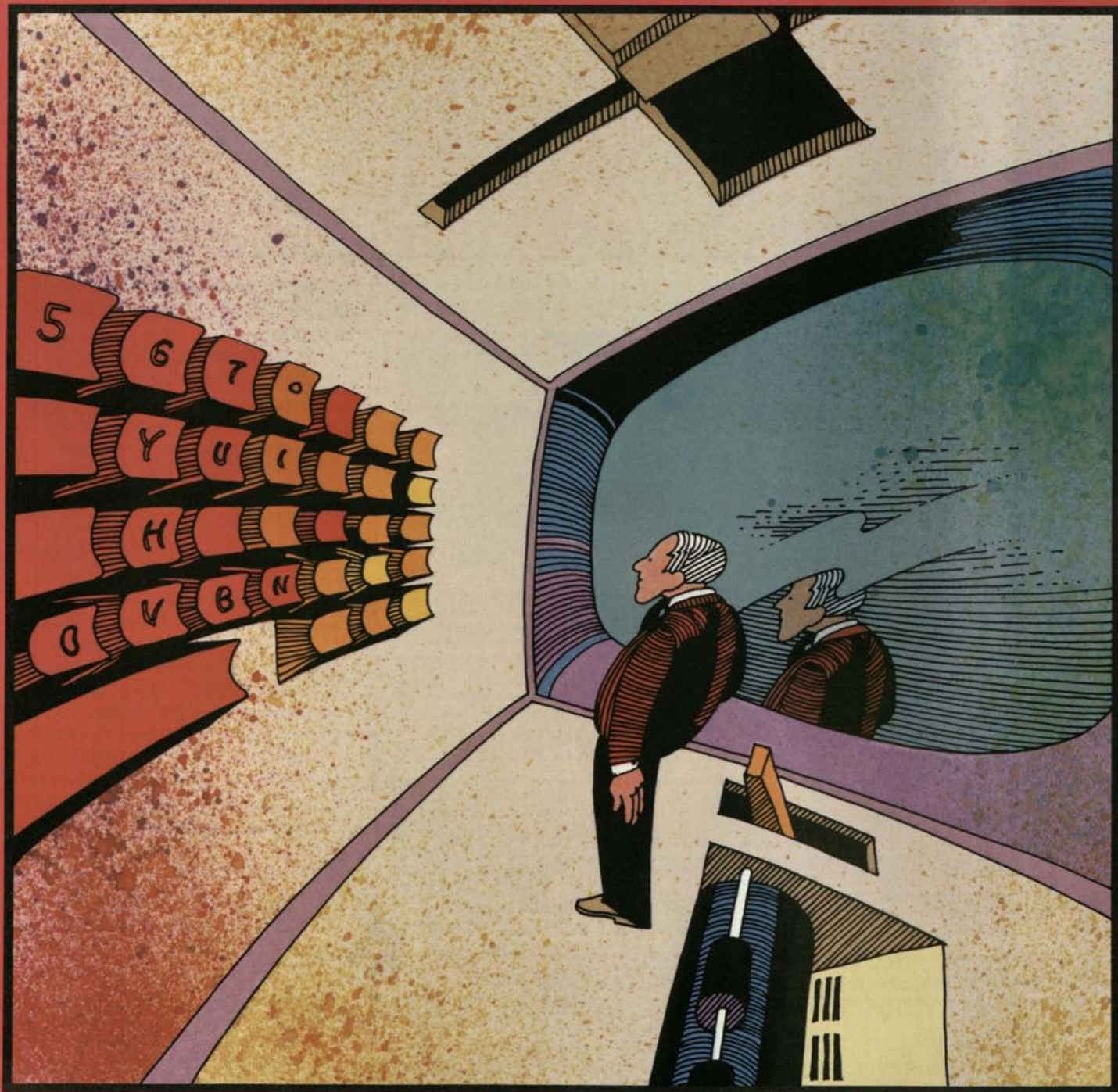
nally, you should be able to call him if you have problems getting things going.

Good dealers frequently offer evening or weekend training seminars for a modest fee. Such seminars cover software and hardware and help you get started computing that much faster. For new users, the money is well spent. For an extra charge, some dealers offer additional support in the form of a

hotline, a phone number you can call for answers to technical problems.

If you find a dealer who understands your purposes, can demonstrate all the software and hardware you care to examine, and provides good service and support, then you've found at least one good place to buy your system.



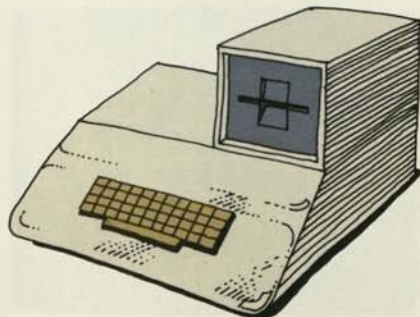


How Do I Run This Thing?

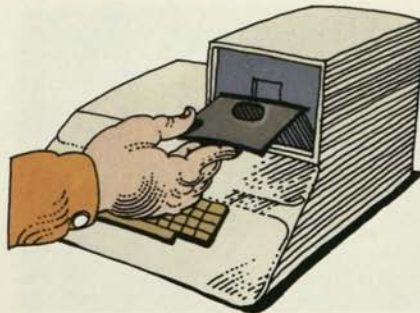
The following illustrations show you, in brief, how to set up and use a personal computer. Though the program in the example is simpler than most, it still gives you a good idea of the way programs work.

Getting Started

Setting up. Before you can use your personal computer, of course, you'll have to connect the computer with the disk drive and monitor. Once your system is put together, you can simply leave it together—moving it is really no harder than moving an electric typewriter.



Loading the program. To use the system, you simply put a program disk in the disk drive and turn on the power. The computer will automatically check the disk drive for a program diskette. Then, on its own or with a simple command, it will find your program, copy it into RAM, and display the program's starting point on the screen.



Using the program.

No. 1. Well-written programs give you plenty of directions. This simple program, called Basic Finance I, starts with a complete explanation of what the program can do.

1

BASIC FINANCE I-----COPYRIGHT 1978
APPLE COMPUTER INC

THIS PROGRAM CALCULATES AMOUNT, PAYMENT,
DEPOSIT, INTEREST RATE (APR), NUMBER OF
PAYMENTS, BALLOON PAYMENTS, AND
AMORTIZATION SCHEDULES FOR LOANS, LEASES
AND SAVINGS ACCOUNTS.
HIT RETURN WHEN READY... ■

No. 2. Tapping the "return" key brings up the program's next instruction screen, which lists several ways to put the program to work. In this example, we want to compute the monthly payments on a car loan. Therefore, we type in "2," as shown on the bottom line, and hit "return."

Nos. 3-6. The program automatically asks some questions. Entering answers prepares the computer to do multiple calculations about the loan. We tell the computer to work with a 60-month, \$10,000 loan at 18 percent.

```
2
BASIC FINANCE I-----COPYRIGHT 1973
      APPLE COMPUTER INC
YOU MAY CALCULATE ANY OF THE FOLLOWING
1 INTEREST RATE (APR)
2 PAYMENT/DEPOSIT AMOUNT
3 NUMBER OF PAYMENTS/DEPOSITS
4 TOTAL AMOUNT OR,
5 BALLOON PAYMENT
WHICH (ENTER BY NUMBER PLEASE) ? 2
```

```
3
      APPLE COMPUTER INC
OK, NOW I NEED TO KNOW THE FOLLOWING
ANNUAL INTEREST RATE (APR) IN % ? 18
TERM OF THE ACCOUNT:
YOU MAY ENTER ANY COMBINATION OF YEARS,
QUARTERS, MONTHS, WEEKS, OR DAYS.
NUMBER OF YEARS ?
NUMBER OF QUARTERS ?
NUMBER OF MONTHS ? 60
NUMBER OF WEEKS ?
NUMBER OF DAYS ?
```

```
4
      WITH INTEREST TO BE COMPOUNDED:
1 YEARLY
2 QUARTERLY
3 MONTHLY
4 WEEKLY
5 DAILY
WHICH ? 3
```

```
5
      WILL YOU BE MAKING
1 MONTHLY PAYMENTS/DEPOSITS, OR
2 A SINGLE PAYMENT/DEPOSIT ONLY...
WHICH ? 1
```

```
6
      ENTER TOTAL AMOUNT ? 10000
```

No. 7. After answering the final question, we hit the computer's "return" key, producing an almost instantaneous response. The computer automatically displays a chart showing the monthly cost for the \$10,000 loan, over five years, compared with leasing the car or putting the money into savings. Our 60-month car loan, shown below, would cost \$253.93 per month. The computer asks if we also want to see the five-year amortization schedule for the loan. Why not? We type in "yes."

7 BASIC FINANCE I-----COPYRIGHT 1978
APPLE COMPUTER INC

	LOAN	LEASE	SAVINGS
AMOUNT	10000.00	10000.00	10000.00
PMT/DEP	253.93	250.18	102.39
# PMTS	60	60	60
BALLOON	.41	.15	.81
APR %	18.00	18.00	18.00

COMPOUNDED MONTHLY OVER 60 MONTHS
BASED ON 365 DAYS PER ACCOUNTING YEAR
LIKE AN AMORTIZATION SCHEDULE (Y/N) ? Y

Nos. 8-9. We answer the questions, hit "return"...

8

```

AMORTIZATION SCHEDULE FOR:
1 LOAN
2 LEASE, OR
3 SAVINGS ACCOUNT
WHICH ? 1
    
```

9

```

WOULD YOU LIKE:
1 A COMPLETE AMORTIZATION SCHEDULE, OR
2 A YEARLY SUMMARY ONLY
WHICH ? 1
FIRST SUBTOTAL AFTER PAYMENT NO. ? 1
    
```

No. 10. ...and, almost instantly, the computer displays the first 12 months of the complex schedule. By continuing, we can examine the entire schedule. By exiting, we can start again, experimenting with other loan amounts, interest rates, repayment periods, and so forth.

10 APPLE COMPUTER INC
LOAN AMORTIZATION SCHEDULE

PMT#	INTEREST	PRINCIPAL	BALANCE
1	154.40	100.00	9984.60
2	148.44	105.49	9879.11
3	142.49	110.99	9773.12
4	136.53	116.46	9666.66
5	130.58	121.94	9559.72
6	124.63	127.42	9452.30
7	118.68	132.90	9344.40
8	112.72	138.38	9236.02
9	106.77	143.86	9127.16
10	100.82	149.34	9017.82
11	94.86	154.82	8908.00
12	88.91	160.30	8797.70
13	82.96	165.78	8686.92
14	77.00	171.26	8575.66
15	71.05	176.74	8463.92
16	65.10	182.22	8351.70
17	59.15	187.70	8239.00
18	53.20	193.18	8125.82
19	47.25	198.66	8012.16
20	41.30	204.14	7898.02
21	35.35	209.62	7783.40
22	29.40	215.10	7668.30
23	23.45	220.58	7552.72
24	17.50	226.06	7436.66
25	11.55	231.54	7320.12
26	5.60	237.02	7203.10
27	0.65	242.50	7085.60
28		247.98	6967.62
29		253.46	6849.16
30		258.94	6730.22
31		264.42	6610.80
32		269.90	6490.90
33		275.38	6370.52
34		280.86	6249.66
35		286.34	6128.32
36		291.82	6006.50
37		297.30	5884.20
38		302.78	5761.42
39		308.26	5638.16
40		313.74	5514.42
41		319.22	5390.20
42		324.70	5265.50
43		330.18	5140.32
44		335.66	5014.66
45		341.14	4888.52
46		346.62	4761.90
47		352.10	4634.80
48		357.58	4507.22
49		363.06	4379.16
50		368.54	4250.62
51		374.02	4121.60
52		379.50	3992.10
53		384.98	3862.12
54		390.46	3731.66
55		395.94	3600.72
56		401.42	3469.30
57		406.90	3337.40
58		412.38	3205.02
59		417.86	3072.16
60		423.34	2938.82
YR 1	1691.75	1176.05	9000.00
COM	1691.75	1176.05	9000.00

HIT 'RTN' TO CONTINUE, ANY KEY TO EXIT

The Real World

Other programs. The programs you're likely to use most, however, have abbreviated directions that are initially harder to follow. Don't be dismayed. You'll quickly find them far simpler to use than longer directions, which have at least two drawbacks.

First, a user memorizes most program directions in short order. Once this happens, wading through long and numbingly familiar directions becomes tedious. Second, "hand-holding" directions like those in "Basic Finance I" use up large chunks of computer memory space—space that could be used to expand the capabilities of the program.

A more typical program screen looks like this:

```

VAL ■ INPUT FORECAST CMOHT PPHOTH BLANK
( ) -> F1=PRINT F2=JMP (ESC)=REM MODE)
RGH3 *REGION 3 NEXT MONTH UNIT FORECAST>

```

	CULTI- DATOR	FITCH FORK	HOE
LOS ANGELES			
SEARCH	100	200	500
ANAL	300	500	100
LA	320	715	415
SAN FRANCISCO			
SEARCH	400	100	100
ANAL	700	100	100
SFC	1000	475	165

```

0163 2005 00 001 01 01 01 2008
DEND RGN3 1 1 0 12 1 LEFT

```

On the main screen for Senior Analyst, a powerful financial-modeling program, directions and controls are abbreviated on the top and bottom lines. The abbreviations are explained in the program's instruction manual. With them you command the computer to arrange and label the "worksheet's" columns and rows, to enter information (new or from storage), to automatically perform various mathematical operations on the information, and more. Also, the program's commands can be used in any sequence and at any time.

Information shuffled back and forth between a computer and its disk drive is in little danger of being damaged or lost in transit. The reason is that only copies of the information are moved. The original information is still stored in the disk drive.

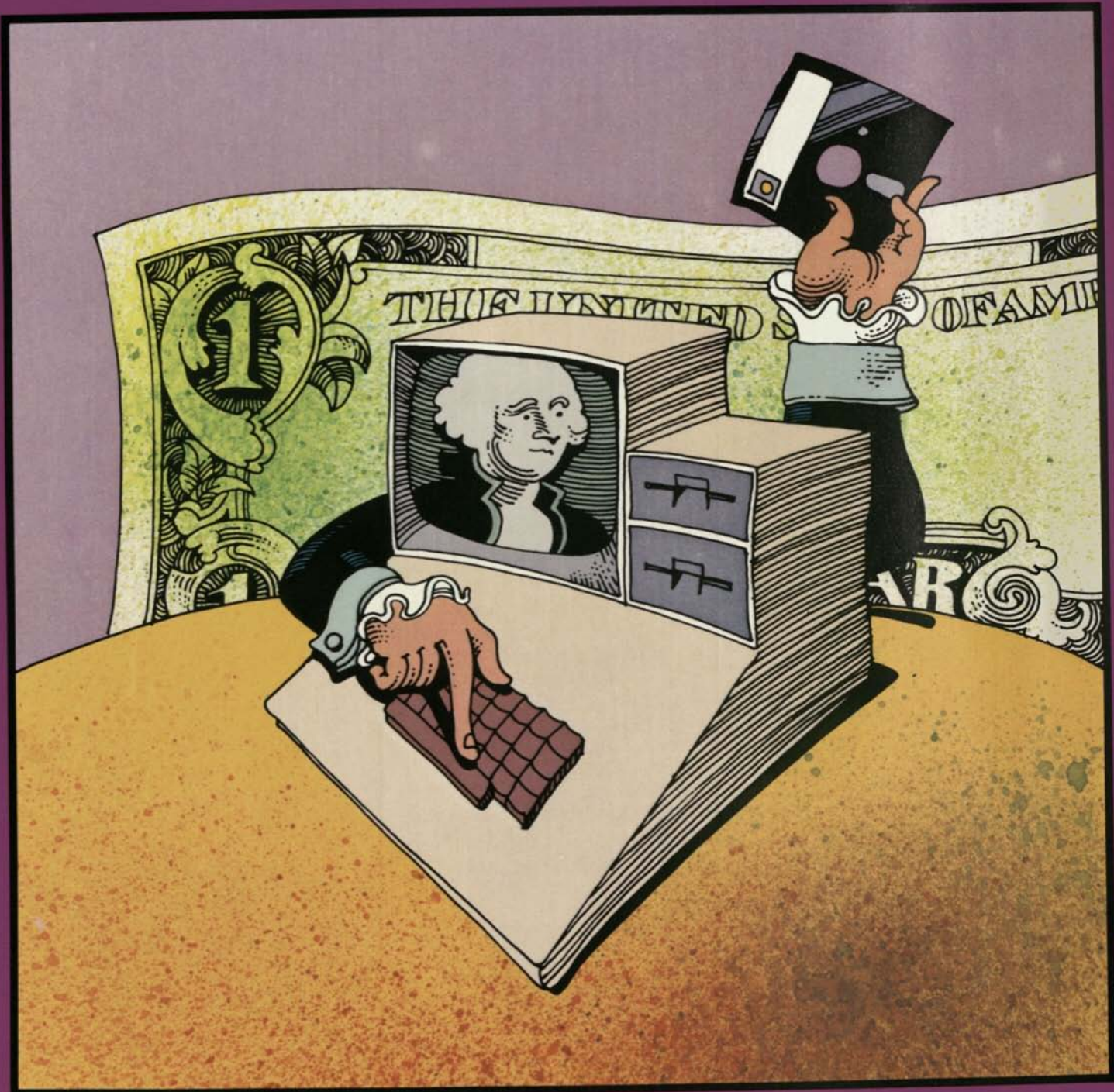
The computer uses the disk drive to make a permanent record of any information the user wants to save. The disk drive works like a very fast tape recorder, recording information on a magnetic medium, the floppy disk. Like information recorded on tape, information "written" on disks is safely stored for future reference.

When the user needs that stored information, he tells the computer to "load" the information into its own short-term memory (RAM), where the data

can be examined and revised. The computer looks up the data on the disk, "reads" it, and copies it into RAM.

But note that the information in RAM is just a copy. The permanent record is still safely tucked away on the disk. The user can modify or even wipe out the computer's RAM copy and nothing will be lost. The disk's permanent record remains untouched.

The user can keep that permanent magnetic recording as long as he wants. He can copy it into RAM as many times as he wants. And when he has no further use for the original, he can record over it—something that's as difficult to do unintentionally on a computer as it is on a tape recorder.



What Will It Cost?

What a personal computer costs is a function of what you want the computer to do. Usually, the more it does, the more it costs.

Typical Systems

Because personal computer costs vary considerably, you should get specific prices from a computer dealer. Remember, though, that *system* costs, not just computer costs, are what you're interested in. For this reason, it's useful to describe several typical personal computer systems and identify the kind of work they do.

System #1. A starter system might consist of three components—a 16K RAM computer, a cassette tape player for I/O, and a standard TV. The great virtue of such a system is that it keeps costs to a minimum while introducing you to the wonderful mysteries of computing. With it you could explore short educational programs, a programming language and, happily, not a few games.

Functions like accounting and word processing, however,



require a machine with more memory, usually a minimum of 48K. Furthermore, starter systems are not expandable and lack the professional feel of more substantial machines. Finally, the tape deck makes data storage and retrieval intolerably slow, and the TV does a relatively poor job of resolving images.

Starter computers generally have full keyboards, though some use calculator-style keys which preclude touch typing. On several starter computer key-

boards, the arrangement of special keys is confusing.

System #2. The second representative system is likely to be built around a more powerful, more expensive computer with at least 32K of memory. This system is faster and easier to use because it includes a disk drive. The family TV may still be doing monitor duty. This system is more potent than the first for several reasons. The computer's 32K RAM is large enough to handle more powerful programs. Also, the disk drive stores and retrieves data much faster and more reliably than a cassette recorder. Consequently,



programs can be longer and more elaborate. This system can be used for financial matters, such as balancing checkbooks and solving budgeting problems. It can also be used for word processing jobs (such as letters and memos) and for many filekeeping tasks.

System #3. The third representative personal computer system is the most powerful, the most adaptable, and the most expensive.

At the heart of the system is a 48K computer, expandable to 64K. Coupled to this computer are one disk drive, a high-resolution monitor, and a printer. The system's printer lets you make



printed copies of all your work—letters, research papers, office reports, and so forth.

System #3 can do all that the other systems do and more. In its simplest configurations, it can handle extensive budgets and financial models, long word processing projects, mailing lists, and lengthy files. By adding more internal memory, more mass storage, and peripheral devices such as a data communications modem, this system becomes the sort of computer setup favored in corporate corner offices.

This system handles a number of especially powerful programs. VisiCalc®, for example, is an “electronic spread sheet”—a calculating program with a columns-and-rows format. Within these columns and rows you can set up and instantly calculate (and instantly re-calculate) the complex interlocking numbers that go into budgets, forecasts, and models. Word processing programs like Apple Writer use the system's additional RAM to make major reports, books, and other demanding projects easier to write and edit. A variety of other programs do sophisticated graphics—charts, graphs, maps,

and so forth—for business and educational applications. In color, yet.

These popular and powerful programs are only part of the story. The vast majority of programs—software libraries of several thousand volumes—have been written for this kind of system. Even highly specialized programs are available. Need to calculate a year's feed costs for 200 dairy cattle? Care to simulate a nuclear reactor? You can buy such programs for system #3 right now. Last but not least, the games that run on these machines are pretty impressive, too.

Because this system is so flexible, however, prices can vary a good deal. A low-cost version of this third system could be assembled around the 48K computer alone. This version would drop the printer and substitute the family TV and a cassette tape player for the other components. This holds total costs to about the price of the computer alone, plus the price of software.

At the high end, the 48K computer could be increased to 64K or even 128K with the addition of plug-in RAM circuit cards. It could have two disk

drives for more convenient data handling, a high-resolution black and white (or color) monitor, a modem for communicating data to other systems by phone, and a high speed, letter-quality printer. Software could include word processing, calculating "spread sheet," business graphics, data communications (for using the modem), and perhaps one or two other programs tailored for specific technical purposes. A system like this is worth several thousand dollars—and is fully able to help you run a small business or part of a large one.

Expandability. You could save in the future if the computer you buy now is expandable. True, you'll pay for expansion accessories like circuit cards and more powerful peripheral devices. But the cost of replacing your nonexpandable computer with something more powerful could be higher still.

Costs And The Future

But perhaps you wonder if the smartest way to get a good price on a personal computer



isn't simply to wait a few years. After all, couldn't the massive price reductions that swept the electronic calculator market in the '70s come to the personal computer market in the '80s?

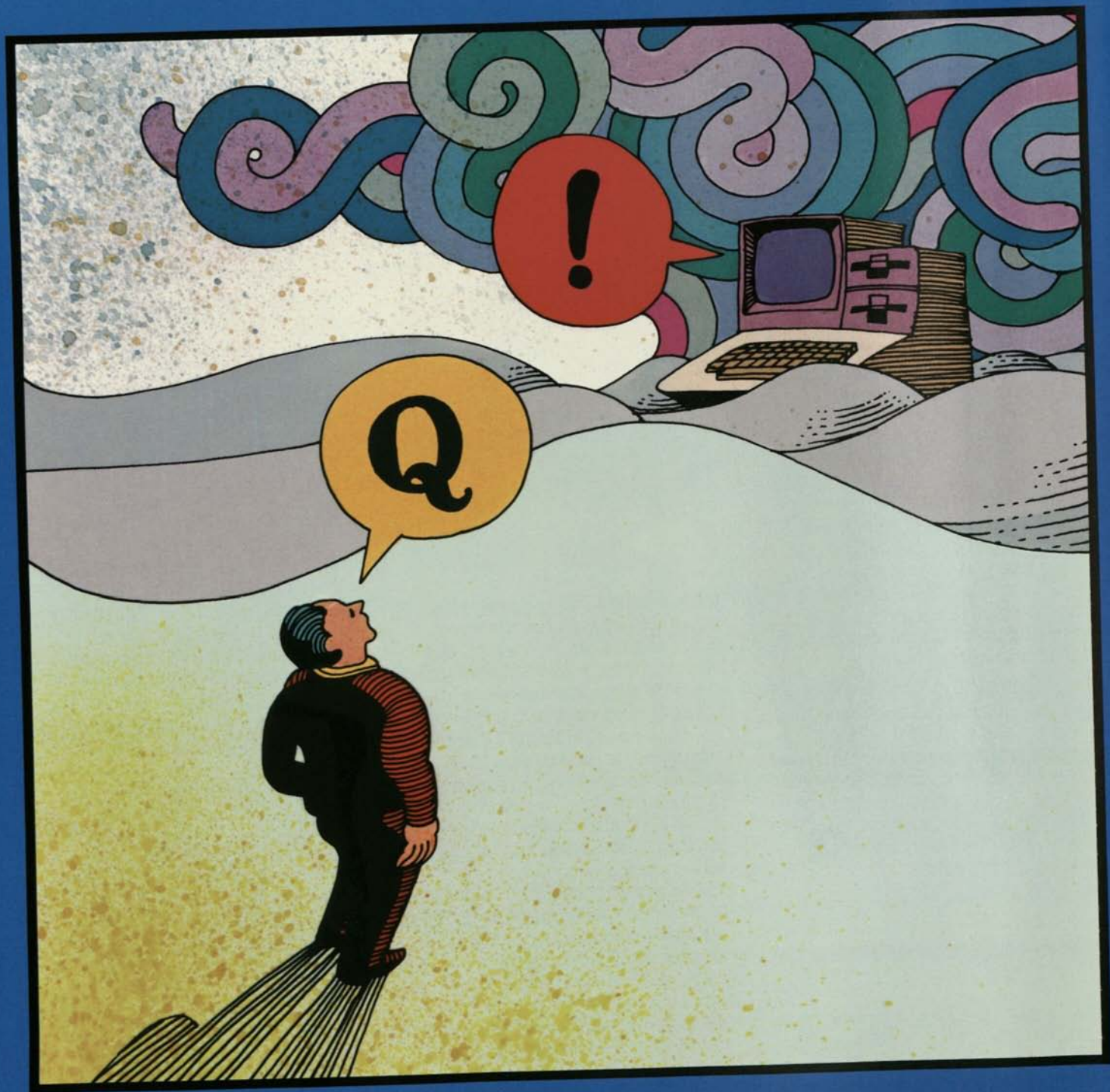
Several facts argue against such drastic reductions. Chips for new computers are indeed dropping in price, but a computer also contains lots of plastic, metal, and other materials which *rise* in price each year. The same is true of labor costs. Most important, personal computer systems require enormous and continuing support—software and manual development, applications support, repair, and more. Such expenses were never part of the cost of calculators and digital watches. These hefty

costs, which are related to wage scales, will rise.

Such factors will probably keep the cost of personal computers from plummeting in the near future—and perhaps in the foreseeable future. Effective costs are decreasing, however. In fact, for years to come, computers that do more for less will continually appear.

In the final analysis, the ultimate personal computer will always be in the future and therefore unavailable. The dilemma for buyers is this—will the disadvantages of one's current computerlessness be outweighed by the advantage of a future price reduction? The telephone's early days illustrate the problem. In 1924, the phone cost more and did less than today. It was, nevertheless, a radically powerful communicating tool and those who used it presumably gained more than those who decided to wait for the perfect phone—another device whose appearance is always in the future.





Questions And Answers

Q. Computers are so new to me that I don't even know where to begin. Where do I?

A. Start with your own interests and ask yourself if a computer can help you with them. It's that simple. If you don't think you'll benefit from buying a computer now, wait.

Q. I'd get a computer tomorrow if learning to use it weren't so complicated. Isn't there a simple way into all this?

A. The answer, perhaps, is "Simple compared to what?" Learning to use a computer probably takes less time than learning to drive a car, and most people think learning to drive is pretty simple. The fact is that computers seem complicated because they're so new. Once you're around them, you begin to understand them quickly. In fact, for people who have grown up around computers—your kids, maybe—learning to use a personal computer seems quite natural. However, for the vast majority who came to maturity without personal computers, it seems difficult. In their case, the answer is either that there is no simple way or that the simple way is to take the plunge.

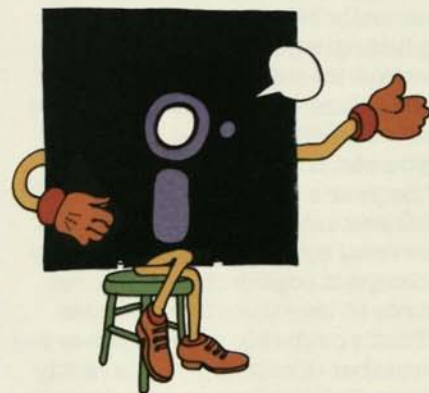
Q. Does a personal computer become a personal pain in the neck, like the computers that do my bank statement and my electric bill?

A. Nope. In fact, you'll find that a personal computer is utterly under your control. If it ever refuses to cooperate, you can, *in extremis*, simply turn it off. And you'll find that a computer rather quickly loses its mystique. One day soon, you'll look from your computer to your calculator laying mute and bland in your desk drawer, and you'll see the strong family resemblance. A computer is just an overgrown calculator, about as uncontrollable as a light bulb.

Q. How do I actually learn to use a program?

A. Start by loading the program into your computer. Some simple programs—games, for example—begin by explaining themselves. However, you'll learn most programs through experimentation guided by the program's instruction manual. Poor instructions make this process difficult, leaving you to figure out not only the program but the wretched directions as well.

Learning your first program will almost surely seem strange



and slow. Don't be dismayed; this is a perfectly normal first encounter. After you learn two or three programs, the strangeness fades. Learning all others is far easier.

Rather quickly, the program's commands will occupy only the back of your mind, in the same way that a car's controls—clutch, brake, gas, and so forth—are only at the back of your mind when you drive. You're free to focus on the problem you want your computer to solve.

Q. Is computer information safe to store? If I put my tax records on a disk, am I taking a risk that they might be destroyed?

A. Your disk records may actually be safer. First, like a phonograph record, a disk can retain its information quite a long time when properly stored and handled. Second, because you can copy a disk containing the year's tax records in roughly 20 seconds, you could produce several complete and extremely compact copies of your tax records in less than five minutes. That's probably several times the number of copies you currently have. Put one in your safe-deposit box, if you want.

Q. Something as complex as a computer system must be terribly sensitive. Aren't the odds pretty good that I'll somehow fry the computer or the program?

A. Against all expectation, a personal computer system and its data are really quite rugged.

The system's monitor needs no more care than a regular TV. The disk drive won't take abuse, but it requires no special handling. The computer itself is perhaps the least delicate system component. Its integrated circuits have no moving parts and are as rugged as those in a transistor radio, though heavy and prolonged vibration may cause chips to become unseated from

their sockets. Such vibration must presumably be heavier and more prolonged than that aboard the space shuttle during launch, inasmuch as an Apple computer on the shuttle's second flight operated without a hitch.



Computers are not without their weaknesses, of course. Extreme humidity, enough to form condensation inside the computer, can cause short-circuiting. Don't use your computer system in the shower.

Of greater concern is static electricity. Pick up a static charge from your carpet or your cat, stick your ungrounded finger in the computer's innards,

and you might instantly ruin any chip you touch. If you must use a computer amid heavy static, remember to touch metal before you touch the computer.

Computer data, on disks and in the computer, are also pretty tough stuff. When you've loaded the computer with your own stored data and are ready to work, don't worry about making irreversible errors. You can always reload the computer with a fresh copy of the data from storage.

However, if you don't pay attention to what you're doing, you may run into two problems. You might lose new data by turning off the computer before saving your work permanently on a disk. You might also confuse information you want to keep with information you want to eliminate. The computer will follow your orders blindly, so think twice about the commands you're using before activating them.

There are also a few general hazards that data cannot withstand. In the same way that they ruin tape recordings, magnetic fields will irretrievably scramble information on disks. Therefore, never lay a disk on top of a color

TV, large loudspeaker, electric motor, or other device with magnets in it.

Q. If I buy a computer now, will it become outmoded quickly?

A. That depends on how you think about computers. If sizing new technology is the single criterion for judging a system, then most personal systems could be called "outmoded" before they ever go on sale. If a system is judged by its utility, however, then the computer you buy now may never be outmoded. It will always be an effective problem-solving machine. True, it won't do as much as its descendants presumably will. Then again, today's personal computer will always do more than a thousand people with paper and pencils can do.

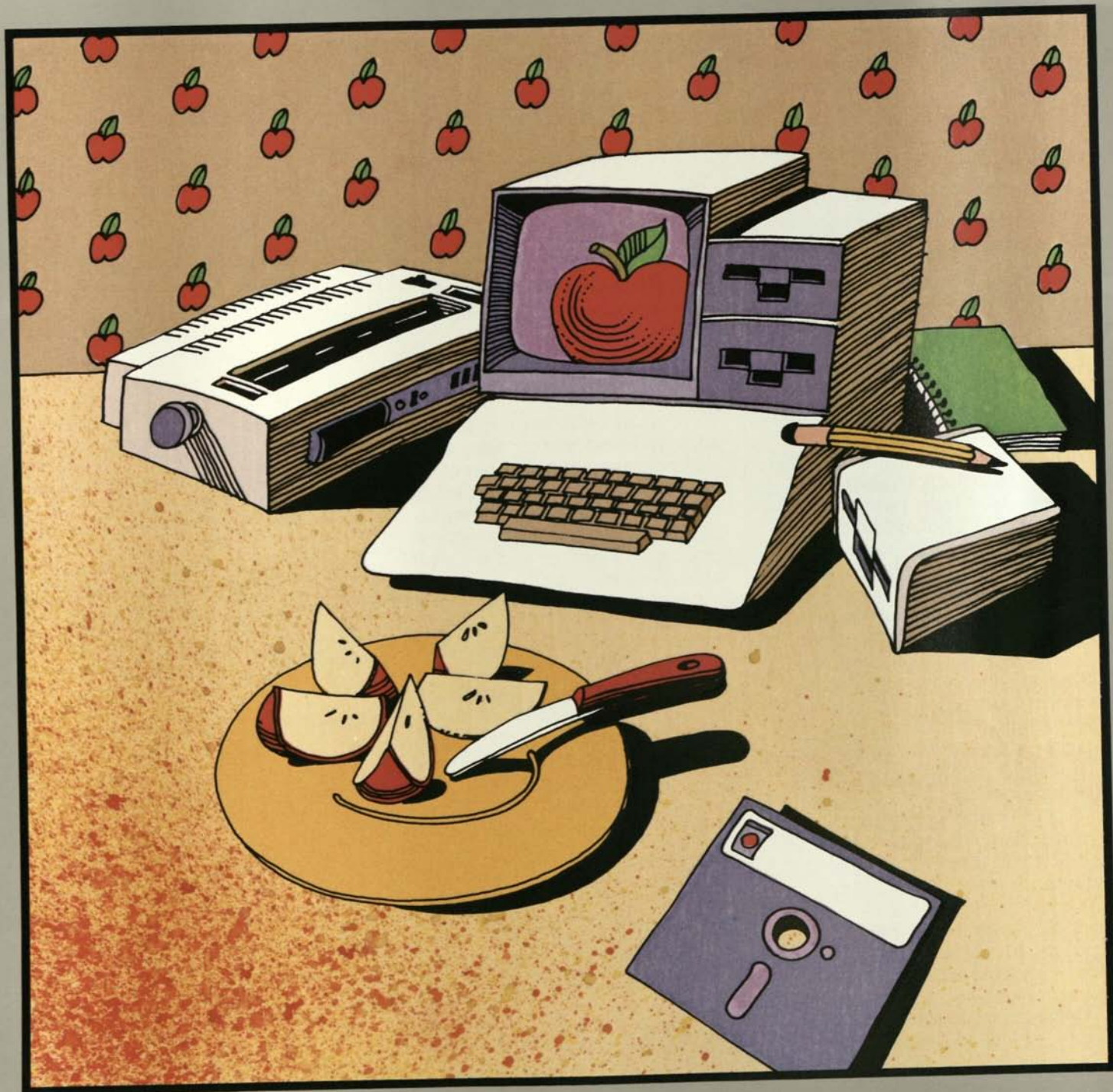
Q. I plan to get a personal computer soon, but first I want to talk with some experienced computer users. How do I find them?

A. By finding a local computer-users' group. These associations of computerphiles have sprung up all over the country and are an excellent source of information, ideas, and assistance. Groups in your area will include

people whose computer interests range from the basic to the complex. Your computer dealer can put you in touch with virtually all of the groups near you.

You may also want to peruse some publications for personal computer users. A number of general interest computer magazines, such as *Personal Computing* and *Popular Computing*, are published monthly and are available on newsracks and in computer stores. Special interest magazines like *Softalk* and *Nibble*, aimed at users of specific kinds of computers, are also available. These special interest publications will be especially valuable to you after you buy your system and begin exploring it fully.





Apple Systems

Plain and simple, we want you to buy an Apple computer. However, we've tried to refrain from making Apple the hero of this book for two very sensible reasons. First, readers see through that sort of thing. Second, when people draw their own conclusions about personal computers, Apple seems to do pretty well. Here are five reasons why.

Our Point Of View

One. Apple has more experience with personal computers than anyone—we invented them. And they're our only business. That's why Apple's engineering and performance are so good that they set the standard for the industry. For the whole story, ask a computer dealer for our hardware and software catalogs.

Two. There are literally thousands of programs available for Apple computers—more than for any other computer ever made. And by simply plugging in an additional circuit board, an Apple computer will also run hundreds of programs written for CP/M® operating systems.



Three. Apple is famous for its clearly written, self-teaching instruction manuals. You'll also find a wealth of help and information in Apple dealers' training classes and in Apple users' groups.

Four. Apple is the most flexible personal computer available. You can use it with a cassette

player and TV to make a starter system with full power. Then you can use its eight expansion slots to simply plug in hundreds of home, scientific, educational, and business accessories.

Five. Apple service is outstanding. More than 1,000 authorized Apple service centers nationwide can perform most repairs while you wait. You can also protect your investment with the Apple Extended Limited Warranty, a protection policy that covers your entire system, including system software.

Ad Infinitum. Those are just some of the reasons why Apple computers look so good to so many people. For the entire story, drop into any personal computer store and ask about Apple. Or talk with any of the half million people who drew their own conclusions and bought an Apple personal computer.

We think you may do the same.

Personal Computer Glossary

Most of the computer terms used in this book are defined below. Other frequently used computer terms are included as well, so this glossary may help clarify future computer conversations and readings.

acoustic coupler. A mechanical device that allows a telephone handset to be connected to a modem. The term is sometimes used to refer to the entire modem. See *modem*.

address. A number that identifies the specific location where a piece of information is stored in the memory of the computer.

alphanumeric. Characters consisting of letters and numerals, as opposed to special characters. See *special character*.

application program. Software designed for a specific purpose (such as accounts payable or receivable, payroll, inventory, and so forth).

ASCII. American Standard Code for Information Interchange. Computers use binary numbers to represent letters, numerals, and special characters. The ASCII code specifies which binary number will stand for each character and provides a standard that allows computers from different manufacturers to "talk" to each other.

assembly language. A means of communicating with a computer at a low level. Assembly language lies

between high-level languages (such as BASIC and Pascal) and machine language (the ones and zeros the computer understands at its most basic level). Programmers use assembly language to make efficient use of memory space and to create a program that runs quickly. See *machine language*.

backup. An extra copy of information stored on a disk. If the program or other data stored on the first disk becomes damaged, it is still available on the backup copy.

BASIC. Beginner's All-purpose Symbolic Instruction Code. The most used high-level language for small computers.

baud. A measure of the speed at which computer information travels (normally between a computer and a peripheral or between two computers). A baud is equal to one bit per second.

binary numbers. A numbering system that uses only ones and zeros. It is an efficient way of storing information in a computer because the hundreds of thousands of microscopic switches in a computer can only be on (1) or off (0).

bit. A binary digit (1 or 0), the smallest item of useful information that a computer can handle.

boot. To "start up" a program. See *bootstrap*.

bootstrap. A piece of software, usually stored permanently in memory, that activates other pieces of software in order to bring the computer from "off" into readiness for use.

bps. Bits per second. A measure of data-transmission speed showing the number of bits of information that pass a given point in one second.

bubble memory. A new method of storing information for a computer using microscopic magnetic bubbles. Although the technology was developed almost a decade ago, it is still expensive and not generally available for small computers.

bug. An error. A hardware bug is a malfunction or design error in the computer or its peripherals. A software bug is a programming error.

bus. The means used to transfer information from one part of a computer to another.

byte. A sequence of bits that represents a single character. In most small computers, a byte is eight bits.

CAD/CAM. Computer-Aided Design/Computer-Aided Manufacturing.

CAI. Computer-Aided Instruction. Teaching by means of a computer,

normally involving interaction between the student and the computer. The computer informs the student of right and wrong answers as he makes them, and is able to respond to the student's emerging proficiency.

central processing unit. See *CPU*.

channel. A path for the transmission of information between two points.

character. A single letter, number, or other symbol. In a small computer, a character is normally represented by eight bits (one byte).

chip. A generic term for an integrated circuit (IC), a single package holding hundreds of thousands of microscopic components. The term comes from the slices (chips) of silicon of which they are composed.

clock. In a small computer, a repeating signal (usually millions of cycles per second) that controls the microprocessor "brain." Each time the clock sends a pulse, the computer performs a single task.

command. A word or character that causes a computer to do something.

compiler. A piece of software that takes a series of commands written in a high-level language (easy for people to use) and translates them into a lower-level language more effective for the computer to use.

computer. Any device that can receive and then follow instructions to

manipulate information. In any computer, both the set of instructions and the information on which the instructions operate may be varied from one moment to another. A device whose instructions may not be changed is not a computer. The distinction between a programmable calculator and a computer is that the computer can manipulate text as well as numbers, whereas the calculator can only handle numbers.

computer network. Two or more connected computers that have the ability to exchange information.

computer program. A series of commands, instructions, or statements put together in a way that tells a computer to do a specific thing or series of things.

control characters. Characters or commands obtained by holding down the key marked "CONTROL" while pressing another key on the keyboard.

CP/M. Control Program/Microcomputer. See *operating system*.

CPU. Central Processing Unit, the heart of a computer. The CPU controls all operations of all parts of the computer and does the actual calculations. In personal computers, CPU usually refers to just one of the chips in the machine.

CRT. Cathode-ray tube. A TV-like device used with most small computers to display the information the computer has generated.

cursor. A position indicator on a CRT. It's normally a flashing or non-flashing square or rectangle.

data. A general term meaning any and all information, facts, numbers, letters, and symbols which can be acted on or produced by a computer.

data base. A collection of related data that can be retrieved by a computer, such as a mailing list or list of accounts.

debug. To go through a program to remove mistakes.

diagnostics. A specialized program that checks the computer for problems and tries to isolate any problems that it finds.

disassembler. A program that translates a computer's native language into assembly language.

disk (also diskette). A round piece of magnetic-coated material, either rigid metal or flexible (floppy) plastic, used to store data with greater density, speed, and reliability than is available on cassettes. See *floppy disk*.

disk drive. A peripheral device that can store and retrieve information on a disk. See *disk*.

display. A method of representing computer information in visual form. The most common ways of representing computer information are via CRTs and printed paper.

documentation. (1) The instruction manual for a piece of hardware

or software. (2) The process of gathering information while writing a computer program so that others using the program are able to see what was done.

DOS. Disk Operating System. See *operating system*.

downtime. Any period of time when the computer is not available or not working.

firmware. A term referring to software that has been permanently placed in memory, usually into ROM (read-only memory).

floppy disk. A thin, flexible disk of plastic with a magnetic coating used for data storage. The usual disk sizes employed with small computers are 5 1/4" and 8".

flowchart. A common method of graphically planning what a piece of software should do before the actual writing process begins, or for describing what it does after it is written.

FORTTRAN. FORMula TRANslation. A high-level computer language used primarily for mathematical computations. Although FORTRAN is available for some small computers, it is mainly used with large commercial systems.

hard copy. A paper printout of information produced by the computer. See *printout*.

hardware. The physical part of the computer (such as the CRT, CPU, memory) as opposed to software.

hexadecimal numbers. A number system with the base of 16. It is commonly used by programmers to indicate locations and contents of a computer's memory.

high-level language. Any programming language that allows a person to give instructions to a computer in English-like text rather than in the numerical (binary) code of ones and zeros that the computer understands. BASIC and Pascal are examples of high-level languages.

impact printer. See *printer*.

initialize. To prepare a disk so that the computer can later store data on it.

input. The transfer of data into the computer.

input/output. Called I/O for short, this is a general term for 1) the external equipment (such as a modem or printer) connected to a computer and 2) the two-way exchange of information that goes on between the computer and that equipment.

integrated circuit (IC). Also known as a chip, this is a group of interrelated circuits in a single package. See *chip*.

interactive. Describes a computer system in which a two-way conversation goes on between the user and the computer.

interface. A piece of hardware or software used to connect two devices (computers and peripherals)

that cannot be directly hooked together.

interpreter. A computer program that translates a single line of a high-level language at a time for the computer. Interpreters are more convenient but less efficient than compilers. BASIC is generally used as an interpreter, while FORTRAN is a compiler. See *compiler*.

I/O. See *input/output*.

K. Abbreviation for kilobyte, which means one thousand bytes. Actually, a kilobyte contains 1,024 bytes, the "extra" 24 bytes resulting from the computer's binary counting methods. A computer with "32K bytes of memory" has 32 X 1024, or 32,768, bytes of memory. See *byte*.

kilobyte. See *K*.

language. A set of conventions (symbols and terms) specifying how to tell a computer what to do.

letter quality printer. See *printer*.

line printer. See *printer*.

load. To put data and/or programs into a computer.

LSI. Large-scale integration.

machine language. The "native language" of a computer; those fundamental instructions the machine is capable of recognizing and executing. The instructions are represented in binary code (ones and zeros).

memory. Circuitry and devices that hold information in the form of

binary ones and zeros that the computer can access. Examples are main memory (integrated circuits), floppy disks, and cassette tape.

menu. A list of commands that most ready-made programs will display on request.

microcomputer. A computer based on a microprocessor.

microprocessor. The central processing unit of a computer (usually in a single integrated circuit) that holds all the elements for manipulating data and performing arithmetic calculations.

MIS. Management information system. The use of a computer for providing information useful to managers (such as inventories, sales, and accounts payable and receivable).

modem. MOdulator-DEModulator. This device allows a computer to communicate over phone lines and other communication media. It changes the computer's digital information into musical tones (modulating) and from musical tones to digital information (demodulating).

modulator. See *RF modulator*.

monitor. A television set, often one that is specially manufactured to be connected to a computer.

network. An interconnected system of computers and/or terminals. The components do not have to be physically close to one another and are often connected by telephone lines.

node. A station on a network. A node can be a computer or a terminal.

operating system. "Traffic cop" software that oversees the overall operation of a computer system. This group of programs acts as an intermediary between the hardware and the applications software. Any piece of applications software must be written for a specific operating system—DOS, SOS, CP/M, and so forth.

output. See *input/output*.

parallel. Two or more things happening at the same time. A parallel interface is one that can send a number of bits simultaneously. Contrast with *serial*.

Pascal. A high-level programming language named after the seventeenth-century French mathematician Blaise Pascal.

peripheral. A piece of equipment (usually hardware) that is external to the computer itself. The most common peripherals used with popular computers are disk drives, printers, and cassette-tape recorders.

personal computer. A general purpose computer that is inexpensive enough to be owned by an individual with a moderate income.

printer. An output device that produces a printed ("hard") copy of the information generated by the computer. A line printer prints a whole

line of text at a time. A serial printer prints one character at a time. A thermal printer makes characters by applying heat to heat-sensitive paper. An impact printer makes characters by striking a ribbon and paper like a typewriter does. A letter quality printer produces documents of better-than-typewriter quality.

printout. A printed copy of the information produced by the computer.

program. 1) A set of instructions that tell the computer to do something. 2) To prepare the set of instructions.

RAM. Random access memory. The main type of memory used in a small computer. The time required for the computer to find one piece of information in RAM is essentially the same no matter where the information is stored. Also known as read/write memory because data in RAM can be easily changed.

RF modulator. A device that lets a personal computer use any ordinary television set for output. Also called simply a modulator.

ROM. Read only memory. Memory where information is permanently stored and cannot be altered. This form of memory is also random access.

save. To store a program on a disk or somewhere other than in the computer's memory.

scroll. To move all the text on the screen (usually upwards) to make

room for more text (usually on the bottom.)

serial. Things occurring one after the other. A serial interface is one that sends out one bit at a time. Contrast with *parallel*.

simulation. A computerized representation of something in action.

software. Programs or segments of programs. The term was coined to contrast with hardware—the actual mechanics and circuitry of a computer.

software house. A company that writes programs or customizes programs specifically to the needs of an individual customer.

SOS. Sophisticated Operating System. See *operating system*.

special character. A character that can be displayed by the computer, but is not a letter or numeral, such as: @",%!#\$%&*()_+/,.

system. An organized collection of hardware and software that works together.

system software. General-purpose programs that allow programmers to modify applications programs. BASIC may be considered part of the system software; so is the computer's operating system.

telecommunication. Transmission of data between a computer and another computer or terminal in a different location. This can be done with phone lines, satellites, radio

waves, optical fibers, or other means.

terminal. A piece of equipment with a keyboard for input and an output device such as a CRT or printer. A terminal is used to communicate with the computer.

thermal printer. See *printer*.

timesharing. A process whereby the facilities of a single (usually large) computer are shared by a number of users. Timesharing requires large amounts of memory and special software to make it seem that each user has the whole computer to himself.

track. A section of a disk or tape.

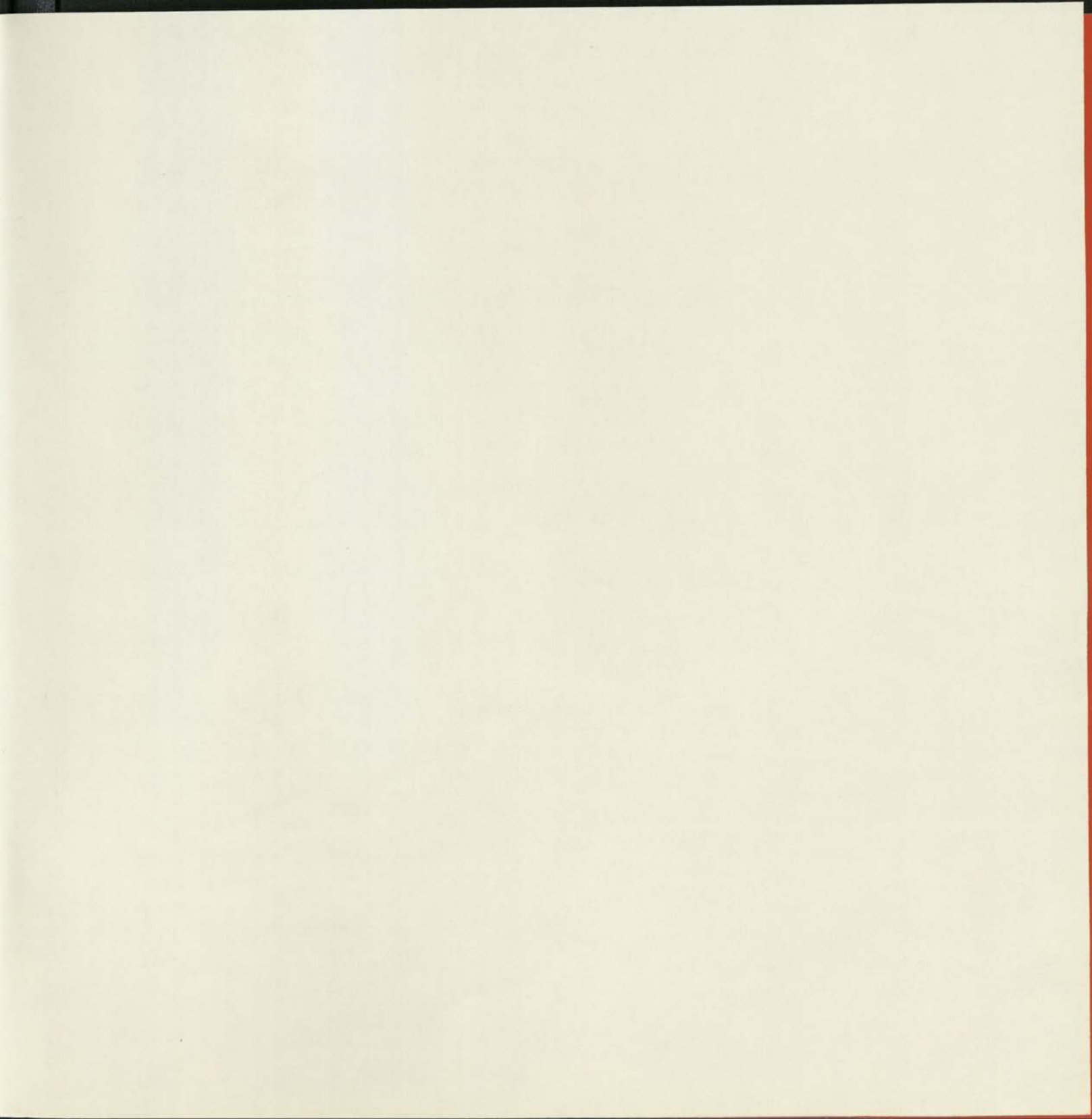
users' group. An association of people who meet to exchange information about a particular computer or group of computers.

volatile memory. Hardware which requires continual electrical power to keep from losing information. Most RAM is volatile; ROM is not.

window. A portion of the computer's display that is dedicated to some special purpose.

word. A group of characters or data that occupies one location in the computer's memory.

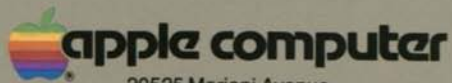
word processing. The entry, manipulation, editing, and storage of text using a computer.



Faint, illegible text in the left margin, possibly bleed-through from the reverse side of the page.







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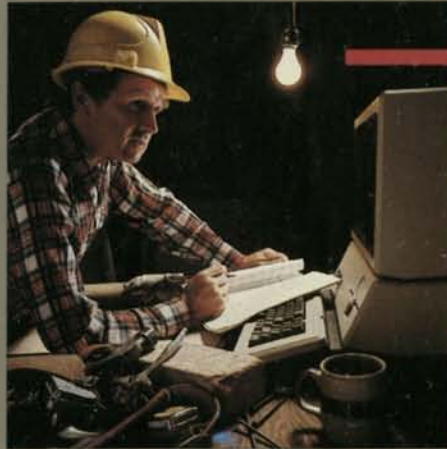
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Personal Computers in Business

An Introduction and Buyer's Guide





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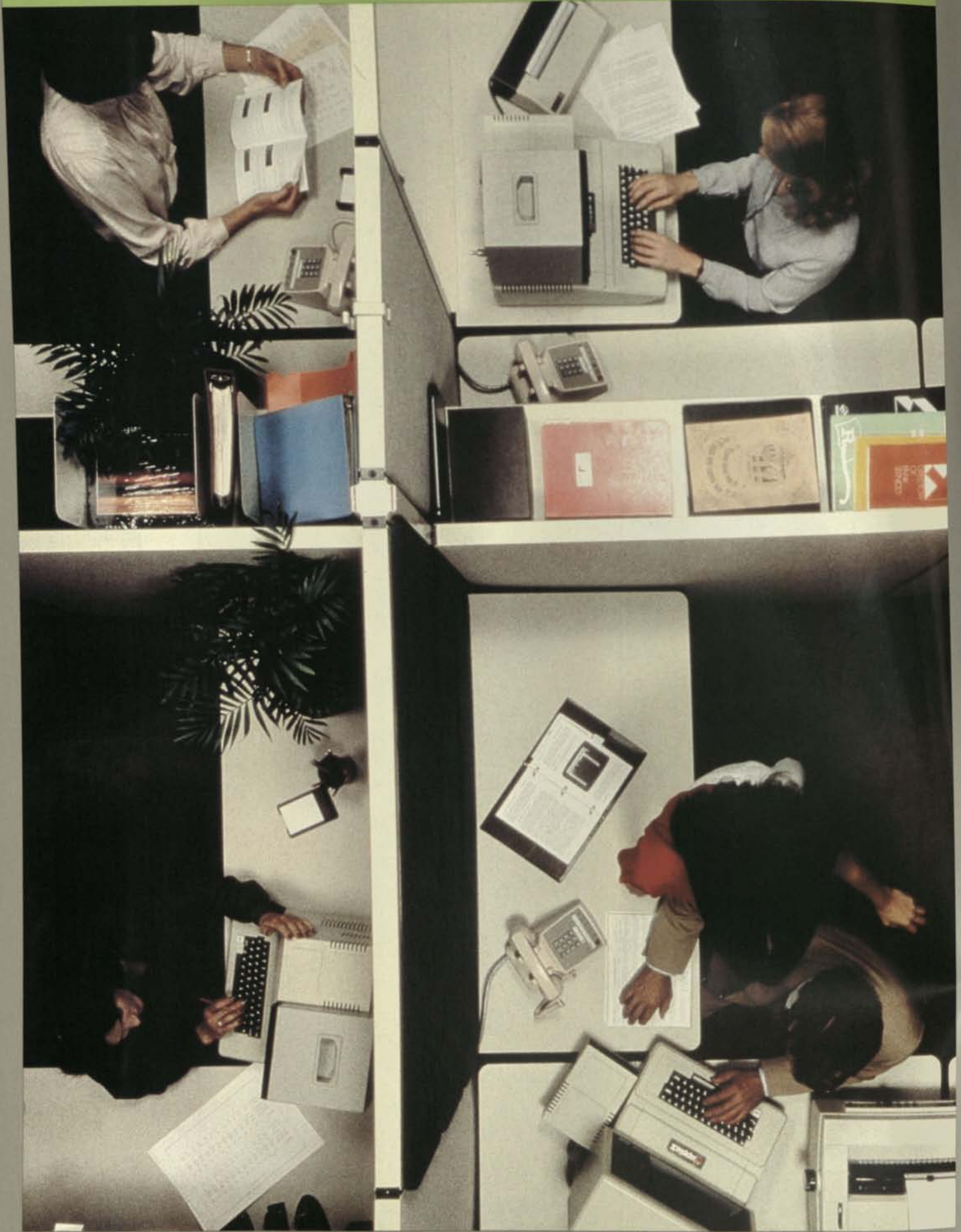
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About This Book

If you're like most business people, you know very little about computers, personal or otherwise. (You might even prefer to keep it that way.) But you also know that, within the next few years, computers are likely to be necessities in even the smallest business ventures. If you haven't taken advantage of computers by then, you can be sure your competition will have—but by that time you'll be running to catch a fast-moving train.

So we've written this book for you: to acquaint you with personal computers, show you how they're used in businesses (large and small), and how to buy one. It won't make you an overnight computer expert, but it will help you ask questions and listen more critically to computer dealers.

We've made it nontechnical because we want to make the personal computer understandable. We've also tried to be as objective as possible, because we believe that the more you know about personal computers, the better equipped you'll be to evaluate different personal computer systems. Then it will be easier for you to see why, in spite of growing competition, Apple personal computers are the best selling personal computers in the world.





How a Personal Computer Can Improve Your Business

If the idea of computerizing your business intrigues yet baffles you, you have lots of company. In the few short years since portable, affordable computers were introduced, business people everywhere have viewed the personal computer, this "bicycle for the brain," with a mixture of excitement and at least a little reluctance.

And understandably so. Until a few years ago, computers were simply too big and costly for any but large companies to afford, and often so complex that only highly specialized systems analysts and programmers could operate them. It was easy to conceive of the personal computer as a valuable management tool that could help people cut costs, increase productivity, and make better management decisions. But how?

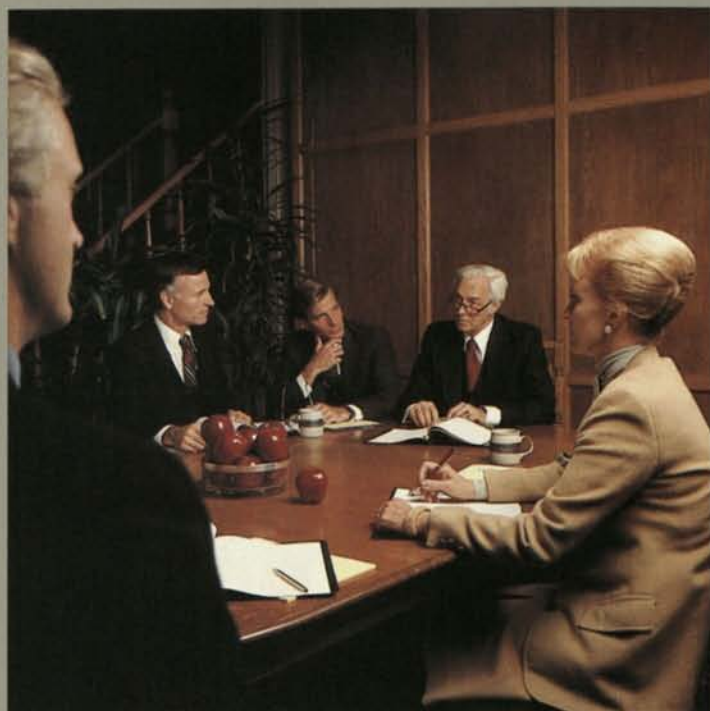
Today, we have the answer. Personal computer systems now pack more computing power than their room-size forebears, cost less than an office copier, and fit comfortably on a desk top. Excellent, off-the-shelf computer programs streamline a wide range of business tasks—financial modeling, accounting, word processing, statistical analysis, and many more. Most of these programs are easy to use, since they have been designed for the executive, manager, professional, and small business owner with little or no computer experience.

How Personal Computers are Used in Business

One of the real beauties of the personal computer is its versatility. Unlike "dedicated" computers designed to perform a single task (word processing, for instance), the personal computer is something of a general purpose, electronic workhorse, able to perform a wide range of tasks with extraordinary speed and accuracy. In business, you'll find it applied most frequently to modeling and forecasting, graphic illustrations, word processing, data base management, accounting, training, and communications.

Modeling and Forecasting

The speed with which the personal computer can perform complex calculations makes it a valuable tool for managers, planners, and analysts involved in financial modeling and forecasting—examining the corporate past and predicting the corporate future. As an "electronic worksheet," the computer replaces the laborious spreadsheet-and-calculator method of planning (or costly timeshare-system planning). It offers managers a better means of exploring the "what-ifs" of different business situations. It also allows them to develop more accurate business plans, sales and cash-flow forecasts, department budgets, product and marketing strategies, and material and labor estimates. Sophisticated mathematical formulas are built into the better modeling programs, so the computer does all the calculating and recalculating work when different assumptions are tested.



Graphic Illustrations

Computer-generated graphs, charts, and maps have become valuable decision-making tools for managers who otherwise would have to digest and interpret truckloads of statistics generated by computer printouts. Easy to produce and easy to understand, graphs and charts prove particularly useful in monitoring performance, spotting trends, and evaluating business opportunities. They also serve as valuable communication tools. Graphics programs designed for business use can convert virtually any numeric information—profit and loss, gross margin, forecast, sales, budget, cash flow—into presentation-quality bar, pie, line, and scatter graphs.

Word Processing

What the electronic calculator did for the number, the word processing computer has done for the written word. It has shortened, practically exponentially, the time it takes to produce and edit memos, personalized form letters, reports, even book-length manuscripts.

Far removed from the humble manual typewriter, the computer takes advantage of a television like screen to display text before it's printed. This way, it's possible to edit a document—add sentences, delete or move paragraphs, correct spelling errors, and search for and replace words—in a single operation, before text is committed to paper. A printer, linked to the computer, then produces letter-perfect copy.

The computer can also store written information so it can be edited and updated whenever necessary. The text stored by the computer is as easy to update as it is to edit. And the printer can produce letter-perfect copies of each updated text.

Data Base Management

In computer jargon, filing information electronically is given a rather complex name: data base management. Data base management systems keep records (of personnel, sales statistics, marketing survey abstracts, for example) that can be easily updated and manipulated in various ways.

If you own a small business and maintain a computer list of several hundred customers, you might use it to generate mailing labels for a special promotion, review purchase activities for the fourth quarter, or send a letter just to customers with certain zip codes.

If you are a manager or executive of a large business, you might use a personal computer to draw on department-maintained data bases that store financial information as well as abstracts of professional journals.

And, by linking your computer to data bases stored on larger, mainframe computers, you can tap into more complex information banks.



Accounting

Accounting by computer streamlines the five most basic business functions: general ledger, accounts receivable, accounts payable, sales invoicing/inventory control, and payroll. Besides cutting the time that it takes to do the same work by hand, computerized accounting offers businesses an opportunity to improve cash flow management, boost the collection rate of receivables, plan payments to take advantage of vendor discounts, and maintain inventory levels that minimize cash investment and improve customer service. Who stands to benefit most from personal computer accounting systems? The small business owner or bookkeeper who ordinarily handles the books, or whose books go to an accountant or bookkeeping service bureau each month or quarter.

Training

A personal computer is a masterful training tool. Programs are available that make it easy to develop dynamic instructional materials. These, in turn, open the door to new, more creative approaches toward improving employee performance and productivity.

The personal computer is the teacher. Sales, management, and service employees learn in a one-on-one, self-paced environment in which the computer actively prompts, monitors, and tests for understanding. And the teacher is quite talented—it can blend text with sound, graphics, color, simulations, and video technology. Besides increasing learning retention, Computer-Assisted Instruction (CAI) and Computer-Assisted Training (CAT) programs make better use of meeting time, fit more readily into demanding executive schedules, and travel to branch offices more economically than do training personnel.



Communications

To extend the potential of the personal computer, many business people link it, usually by telephone, to an interoffice "network" of other personal computers, to data bases stored in large, mainframe computers, and to information services provided by commercial computer networks. These communication links allow managers to share data bases and models used in business planning, to speed delivery of correspondence by electronic mail, and to draw on information found in large, complex data bases.

It's unlikely, of course, that you'll use a personal computer for all these functions. As a manager, you might rely on a personal computer to help you develop business models and budgets. Or you might use it to produce graphs that compare actual sales against forecasts,

or expenditures against budgets. As a small business owner, you may depend on a personal computer to automate your accounting procedures or to generate letters and mailing labels for direct mail advertising. For attorneys and writers, the personal computer is an obvious route to streamlined preparation and editing of lengthy documents.

Bottom-line Benefits

What makes a personal computer valuable? The fact that it can accomplish so many different tasks—and with such speed and accuracy—that it greatly increases personal productivity. With the computer handling the tedious, repetitive activities that produce most business bottlenecks, you and your staff are free to pursue more creative, productive tasks—tasks that make your business grow.

What's in a Name?

Personal computers. Microcomputers. Desktop computers. Small business computers. Microcomputers. Minicomputers. By these—or any other name—computers essentially do the same work: process thousands of instructions in millionths of seconds. They're a little like automobiles, varying less in function than in physical appearance, power, and price.

A few years ago, when economical, compact computers were introduced, people distinguished them from traditional mainframe computers with names like "microcomputer" and "minicomputer," referring as much to the computer's physical size as to its computing power. Today, however, if you had to draw dividing lines between "sizes" of computers, they would have to be pretty fuzzy ones. With advancements in technology, many of the smallest computers are more capable than room-size ones built a few years ago.

The personal computer, for example, contains all the circuitry of the large computers several years back. This circuitry is located on just a few chips, each smaller than your fingernail. Actually, today's minicomputers may duplicate or even exceed the power of mainframe computers that only a few years ago required their own climate-controlled rooms. Of course today's mainframes or "megacomputers," even though they're physically



smaller than the mainframes of yesteryear, far outstrip the most ambitious minicomputers. The fastest (and most expensive) computer in the world, for example, is about the size of an upended sports car.

It's not physical size, though, that determines the effectiveness of a computer. Brainpower (memory size and the speed with which the computer can carry out instructions) as well as utility (what the computer can accomplish) are better measuring sticks.

In terms of power, the flexible, compact personal computers (otherwise known as microcomputers and desktop computers) lie at one end of a continuum that is constantly changing. Farther along, yet somewhat overlapping in functions, are the more expensive and powerful minicomputers that handle the complex data processing needs of large corporations. At the far end are the megacomputers used to help launch space shuttles and build sophisticated econometric models.



Improve Efficiency

Working with computer-stored records, you reduce the time it takes to manage paperwork. For example, by transferring accounting tasks to the computer, you no longer need to maintain hand-written journals of receivables, sales, inventory, and the general ledger. The computer will maintain them for you and generate printed reports as well.

At the same time, you no longer need to manually update each accounting journal when you sit down to record invoices or cash receipts. Simply enter

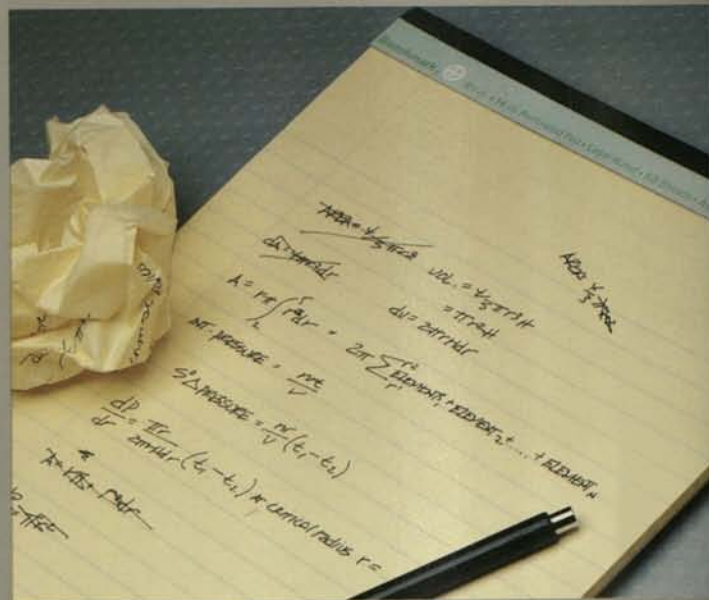


the new data once, and the computer performs calculations, feeds new information into appropriate accounts, and, when you specify, generates a printed invoice and/or report.

Reduce Errors

With aggravating predictability, costly errors manage to slip past even the most watchful executive. Often these errors are the result of manually recording information incorrectly, of miscalculating, or of typing mistakes into reports. With the help of the computer, however, you can significantly narrow your margin of error.

The computer virtually eliminates mistakes that result from miscalculating, because it automatically performs, with unflinching consistency, complex calculations. In addition, watchdogs built into programs can call your attention to incongruous data or unrecognizable information you've entered, or to words whose spellings don't match those in the program's extensive vocabulary. Immediately,



you have an opportunity to validate the information or correct what otherwise might prove to be an expensive oversight.

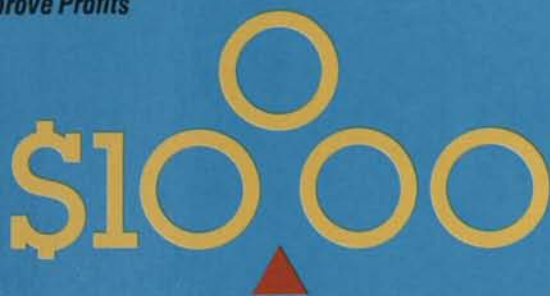
Cut Costs

Using the computer to monitor expenditures more closely, you can learn where to trim fat in overhead, provide tighter budget controls, speed your billing cycle, and take advantage of discounts offered by vendors. If you handle inventory, you can use the computer to help you place more timely orders, project more accurately what stock levels you need, and order in more economical lot sizes.

Make Better Decisions

Obviously, modeling and forecasting programs are tools for good decision making. So are the computer's summarizing capabilities. They enable you to absorb information from a much larger pool of data than you could have were you to rely on your own statistical resources and manual calculations.

Because the computer can manipulate that information quickly, it can point out subtleties you may not otherwise notice. And the information is consistently accurate. In addition, it provides unlimited opportunities for examining "what-if" situations. You'll also find it easier to spot trends and troubles with fewer uncertainties. The result? Sounder, more effective management decisions.

Improve Profits**Increase Profits**

As you use the computer to help you manage your resources more effectively, reduce errors, and cut costs, you'll also increase your profit margin.

Modeling and forecasting programs are good examples of this. They enable you to examine various business decisions before committing to the one you think will prove most profitable. When comparing several investment opportunities, for instance, you can use the computer to rapidly test assumptions that identify potential rates of return, production costs, labor and material requirements, cash flow, and other variables that affect profits.

Improve Customer Service

You'll measurably improve the quality of service your customers receive when you use the computer to keep track of orders and inventory. You'll also substantially improve turn-around time on orders, provide more detailed account statements, and be able to set up different discount and credit systems tailored to customer needs. With the computer, you're in a better position to know who has placed orders, where they are, and which have been filled.

Increase Productivity

Perhaps the most satisfying contribution the personal computer makes in business is at the individual level—improving the *quality* of the work experience. It brings computer intelligence to people, helping them manage more efficiently, more creatively, and more effectively.

For the manager developing business plans, the manufacturer planning material requirements, the small business owner tracking sales—for business people in every profession, at every level of management—the computer becomes one half of a man-machine partnership. It is available for tens of thousands of different, personal tasks that open the door to better ideas and a more pleasurable journey.

The View From Pepperidge Farm

At Pepperidge Farm in Norwalk, Connecticut—where they're said to make the breads like Grandma used to bake—founder Margaret Rudken's ancient black stove is proudly on display in the lobby. But behind the scenes are mainframe computers and, in the offices of managers, personal computers in growing numbers.

Peter J. Zezima, manager of business systems, says the personal computers purchased for managers at Pepperidge Farm are being used for everything from market forecasting to production scheduling, and from labor analysis to simulations and profit/loss analysis. In fact, the company's own list of personal computer applications exceeds 900.

The personal computers have had an almost revolutionary effect upon many of the company's departments. Zezima says, "In the past, business reports and applications that used to take days can now be done in hours and minutes. The systems have been extremely cost effective.



"You can run a business more efficiently by putting computer power in the hands of the people who make the decisions. And it's a lot easier to teach a manager to use an Apple than it is to teach a computer specialist how to run a firm."

Apparently the management of Pepperidge Farm agrees. The firm now has more than 300 trained personal computer users, and is in the process of linking all their personal computers into a single communications network supported by a large central computer. The network, Zezima says, allows for electronic mail, as well as shared word processing, graphics, and distributed processing.



Personal Computers for the Manager/Professional

By the light of the silvery CRT*, then, you have opportunities for huge gains in productivity. As a manager, you will realize these gains in the preparation and presentation of corporate budgets and forecasts, in report writing, record keeping, and communications.

As a professional—particularly if you are in accounting, financial planning, and tax consulting—you share with managers the need for the computer's calculating powers. You share, too, with the small business owner and entrepreneur, the need for sound, automated accounting systems. So it is with professionals in medicine, law, and architecture. They view the personal computer as a route to more accurate client records, improved report writing, more efficient project coordination, and increased research capability.

Thousands of programs have been developed for the personal computer to meet the general and specialized needs of managers and professionals in virtually every type of business. Most of these programs, however, are directly related to, or are hybrids of, the applications described in the next pages.

Financial Modeling and Forecasting—Let the Computer Crunch Numbers

What if you had taken an overseas assignment? What if you had married? Or married someone else? What if you had pursued a career in music rather than management? What if you had(n't) missed that phone call?

Everybody speculates. At one level, "what if?" is an exercise in fancy. In business, though, what-ifs can literally be \$64,000 questions. At the core of financial models and forecasts, what-if questions are crucial to a company's strategic management. They teach a company about its past, its future, its profits, its market position, its competition. How they are handled can make the difference between prosperity and survival.

Until recently, managers and executives responsible for financial models and forecasts had to develop them by hand if

they didn't have easy access to mainframe computers. The introduction of "micromodelers," though, has placed the power of those mainframe financial modelers in the hands of anyone with access to a personal computer.

Planning by Computer

Some of the personal computer's success is due to the sophisticated financial modeling programs that have been written for it. Described as "worth buying a computer for," these financial modeling programs have virtually revolutionized business planning. Easy for the novice to use, they have dramatically reduced the time it takes to develop budgets, sales plans, forecasts, cost analyses, investment analyses, P&L projections, schedules, and cash flow projections.

More important, however, modeling programs and the personal computer improve the *quality* of management decisions. They allow management

to absorb and manipulate mountains of computational ore quickly and accurately ("crunch numbers" in computer jargon). As a result, managers are freed from the calculations and clerical work involved in manual planning. They have more time to develop data, examine strategies, and consider strategic alternatives. With access to more timely and complete information, they also can make more reliable projections.

Chances are, whatever task you can perform with a calculator, pencil, and spreadsheet, you can handle more efficiently with a personal computer and an "electronic worksheet."

In Electronic Worksheets VisiCalc® is King...

"Electronic worksheet" is a term synonymous with computer modeling. Replacing calculator, spreadsheet, and pencil, it offers managers, as we've said, a way to project the company's future and test different assumptions without having to perform

APPLE EQUITIES, INC.
INCOME PROPERTY INVESTMENT ANALYSIS

DATE: 2/1/80 SALE PRICE: 298000
PREPARED FOR: ABC INVESTMENTS CO. LONG TERM: 30000
PREPARED BY: APPLE EQUITIES, INC. ADDRESS: 8070
PROPERTY: 1-1/2 ACRE LOT LAND: 18075 27.7
STREET, ADDR.: 361 S. HUNTER RD. PERM PERM: 29000 10
CITY, STATE: CHAPARRAL, CA.

YTD USEFUL LIFE IN STRAIGHT LINE DEPRECIATION METHOD

EXISTING FINANCING

LOAN	AMOUNT	BALLOON	TERM	INT RATE	INT/PER	PMT/PER
1ST	120000	0	30	11.5	1144.76	14149.36
2ND	10000	0	30	11.5	100.00	6340.00
3RD	10000	0	30	11.5	100.00	1000.00
TOTAL	130000	0			1344.76	21089.36

POTENTIAL FINANCING

LOAN	AMOUNT	BALLOON	TERM	INT RATE	INT/PER	PMT/PER
1ST	120000	0	30	11.5	1144.76	14149.36
2ND	10000	0	30	11.5	100.00	1149.00
3RD	10000	0	30	11.5	100.00	1000.00
TOTAL	130000	0			1344.76	21089.36

YEAR-BY-YEAR INCOME FIRST YEAR

SCHEDULED GROSS INCOME	26700.00
DEPRECIATION	(1111.00)
GROSS OPERATING INCOME	25589.00
PROPERTY TAXES	(200.00)
OPERATING EXPENSES @ 10.0%	(2558.90)
NET OPERATING INCOME	23130.10
DEBT SERVICE	(1000.00)
GROSS SPENDABLE	22130.10
EQUITY GAINS	300.00
DEPRECIATION	(1000.00)
NET YEARLY INCOME	21430.10
2.0% CHANGE INCOME	428.60
TAX SAVING FOR TEN YEARS @ 30%	1285.80
RETURN ON EQUITY	1285.80
GROSS MULTIPLE	10.00
CASH ON CASH RETURN	10.00
CAPITALIZATION RATE	10.00

THE AMOUNTS AND PERCENTAGES SHOWN ARE ESTIMATES BASED UPON INFORMATION BELIEVED TO BE RELIABLE, BUT NO REPRESENTATION IS MADE BY APPLE EQUITIES AS TO FACT OR FUTURE INCOME ACTUALLY RECEIVED.



Financial modeling programs developed for the personal computer have dramatically reduced the time it takes to develop budgets, sales plans, forecasts, projections, and schedules.

*CRT, the cathode ray tube used to display information on a computer screen.

...But It's Not the Only Kid on the Block

Since VisiCalc first appeared, a raft of competitive programs has swept into the market, each with features unique to its intended audience. Some of these programs make it possible to perform a wide range of complex calculations, build models of virtually any size and format, consolidate several different models, and transfer data from one model to another.

Most electronic worksheets, for example, give you the option of plugging your own formulas into your model, or using standard calculations that have been built into the program—such as SUM, MIN(imum), MAX(imum), AVERAGE, PCT (percent), and various trigonometric functions. Most pro-

grams also allow you to examine and work with two different sections of your worksheet at the same time. In these instances, the computer screen is divided into two windows ("split screen" is the official name for this operation).

In addition, some modeling programs provide built-in advanced functions that include sophisticated statistical analysis techniques. One program calculates three kinds of depreciation, as well as compound growth rate, net present value, and linear regression forecast. Another is geared to real estate investment analysis, calculating amortization as well as mortgage loan analysis options. Still another allows managers to generate fitted curves and moving averages, create "smoothed" data, compute

standard deviation, and perform multiple linear regression.

Several micromodelers also let managers consolidate models or sections of models, exchange formulas, and share data, such as regional sales figures stored in different locations.

Business Graphics— Pictures Worth a Thousand Printouts

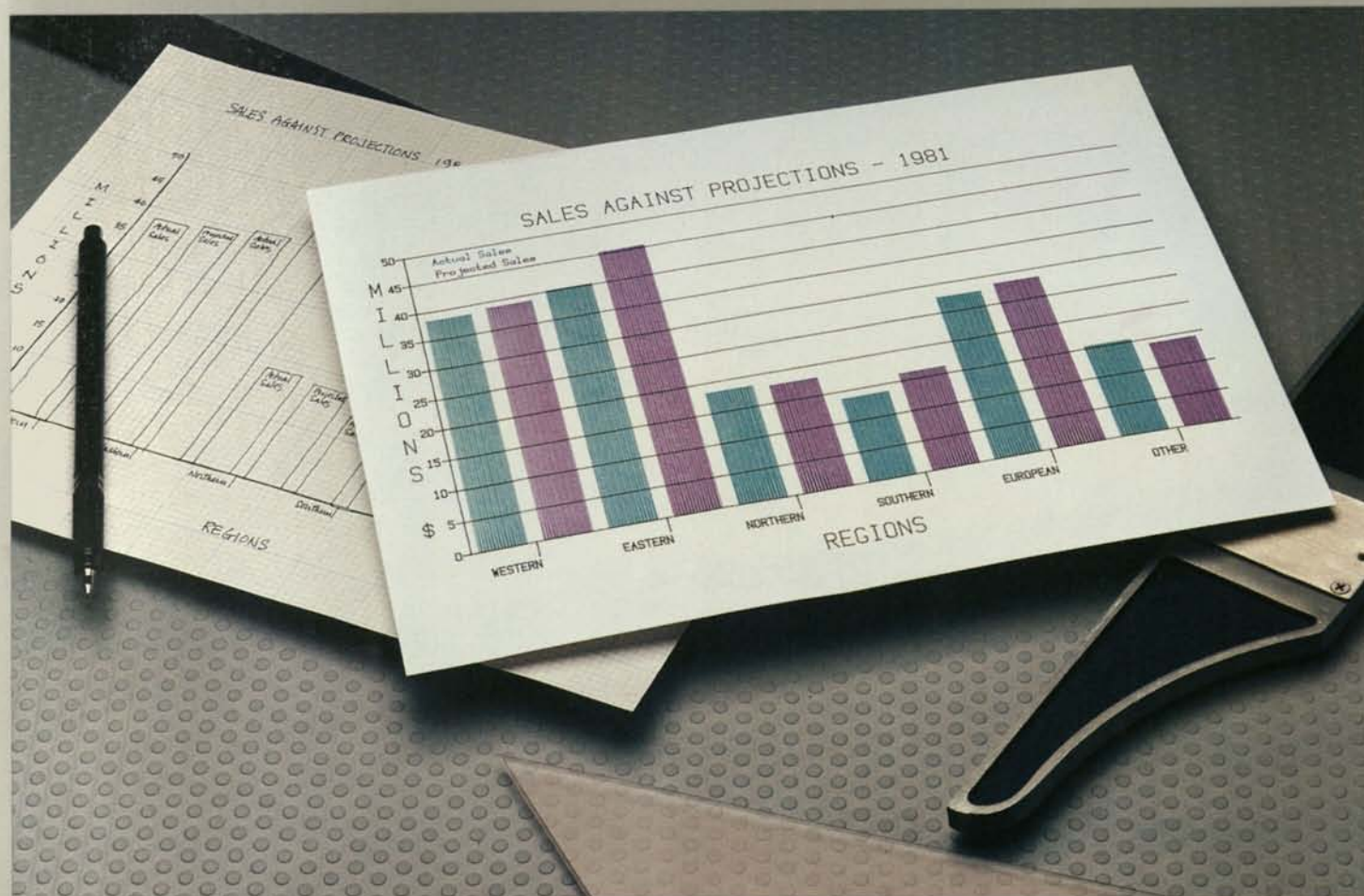
Like personal computers and mainframe computers before them, computer graphics once was the domain of the scientists and engineers who produced the technology—and the few companies willing to pour time and big dollars into making that

technology tractable. But because of its value as a decision-making tool, computer graphics is expected to become a favorite of business in the next few years.

With the introduction of low-cost computer graphics programs, managers and executives now can convert the endless streams of numbers on computer printouts into useful, easily understood graphs and charts. These graphs and charts help them spot trends, pinpoint problem areas, and make better business decisions.

The Manager as Artist

To the manager overloaded with work and pressured to make quick decisions, simple pictures



With low-cost computer graphics programs, managers now can use the personal computer to convert data from computer printouts into easily understood graphs and charts.

Customer Account Summary

Region 2 Sales Summary

Rec	Name	Address	City	St	Zip	Title	F. Name	L. Name	Mo	Day	Year	Amount	Rep	Ind
1	G & H Supply Co.	1465 34th St.	Seattle	WA	98118	Mrs.	Barbara	Harden	03	01	82	16259	Willis	Mfg.
2	Westside Industries	455 Pacific Ave.	Verdi	NV	89439	Mr.	Thomas	Richter	02	01	82	55666	Nunes	Mfg.
3	Tbol Supply Co.	156 E. Elm St.	Monterey	CA	90226	Mr.	Robert	Stevens	02	18	82	13240	Jones	Imp.
4	Sanders Contractors	219 S. 18th St.	Tucson	AZ	85719	Mr.	William	Thayer	03	06	82	13500	West	Med.
5	Harrington Corp.	167 San Pedro St.	Phoenix	AZ	85001	Mr.	Buford	Heilhook	02	24	82	27400	Calder	Bld.

Record

Character

Field

File

How Data Base Management Systems Work

Proper coding is the key to record keeping by computer. Coding is the computer's way of indexing or cross-referencing the information it stores. In your hypothetical three-by-five box, for example, your client might show up, alphabetically, in two places: by last name and by company name. The computer's filing system is considerably more flexible, and much easier to use. It can locate your client by last name, first name, company name, title, zip code, city, state, model number, type of product, type of business, birthday, clothing size, shoe size, annual income, golf handicap... by any code you specify.

What's in a Data Base?

Information stored in any computer data base falls into four categories: records, fields, characters, and files. Consider the customer account summary above.

The row of information describing G & H Supply Co. is a *record* (a collection of information about one item). This particular record has 15 different *fields* of information; that is, the computer would lead you to G & H Supply Co. if you asked for it by record number, name, address (street name or number), city, state, zip code, and so on. You could even call up G & H Supply by asking for a *character* (a single letter or number within a field), such as: "List all companies with names beginning with 'G'." Your *file* is the collection of all records, in this case all records listed in the sales summary.

Essentially, then, using these four categories, you have a means of setting up a flexible referencing system for the information you want to store.

The Integrated Data Base

In addition to using records, fields, and characters to store and manipulate information, data base management systems can be linked to other programs. When connected to an electronic worksheet program, for example, data flows directly into a report according to the format you establish. Using the customer account summary shown above, it's possible to create a sales summary by representative, quarter, order amount, or region. The same data can also be used in a graphics program, for inclusion in comparative bar or pie charts.

Or it could be used in a word processing program, to generate form letters and mailing labels. A networking program makes the data accessible to more than one computer user.

Features to Look For

There are probably more different features to be evaluated in a data management package than in most other programs you may buy for a personal computer. Standard features, however, let you:

- set up your own forms for entering and updating information;
- use a standard form that the program provides;

- retrieve records according to your own specifications, such as all addresses with a certain zip code or customers with a balance greater than \$1,000;
- update selected records individually through a "search" routine, or a group of records simultaneously through what is sometimes called "global" updating—changing all records meeting a given criterion with just one command, such as entering the name of a new salesperson for a group of customers;
- change the format even though your information has already been established (you may want to add another field, for example, or expand the size of one already defined);
- compress information to take full advantage of the computer's storage capacity;
- exchange data with other programs, such as VisiCalc;
- maintain a "computed value" field for reports (an example would be the "Net Amount Due"; it subtracts the "Discount" field from the "Gross Invoice" field yet "Net Amount Due" is a field used only when printing the report—it's not kept in the record);
- produce reports with more than one line per record, and with automatic column positioning.

Word Processing: Making Fast, Light Work of Words

The marriage of typewriters and computers produced one sure approach to office productivity: let the computer do the drudge work. The computer proved it could easily generate memos, letters (even personalized form letters), reports, mailing labels, and book-length manuscripts in a fraction of the time an ordinary typewriter takes. And with fewer errors and better looks.

"Word processing" simply means that, instead of using a typewriter that prints your words on paper, you type those words into a computer, which prints your material by means of a printer—usually a "letter-quality" printer—connected to the computer.

How to Write by Computer

When you write by computer, the computer's screen displays your text and allows you to make any number of corrections and revisions before you commit it to paper. A "cursor"—a small block or arrow—is like your pencil point or eraser; it takes you forward or backward through your text. Use it to juggle words around, correct typing errors, switch phrases or paragraphs from one spot to another, delete material, insert

(Continued on page 20)

Doctor, Lawyer... Personal Computer

A general medical office may need to bill thousands of patients over the course of a year. What's the most painless way to present the bill?

Complex legal forms can be standard from client to client, yet still require customizing. What's the jurisprudient course of action?

From health education to timekeeping and billing, from intensive care monitoring to precedent-searching, medical and legal professionals are finding good reason to buy personal computer systems.

Until Dr. Paul Kauffman of Gillette, Wyoming, bought his first personal computer, he was "paying an accountant \$1,000 a month—and I wasn't getting nearly the amount of information that I'm getting now." In Southern California, obstetrician/gynecologist Dr. Larry Stoneburner depends on his personal computer to create reports on patients who have been referred to him for special testing.

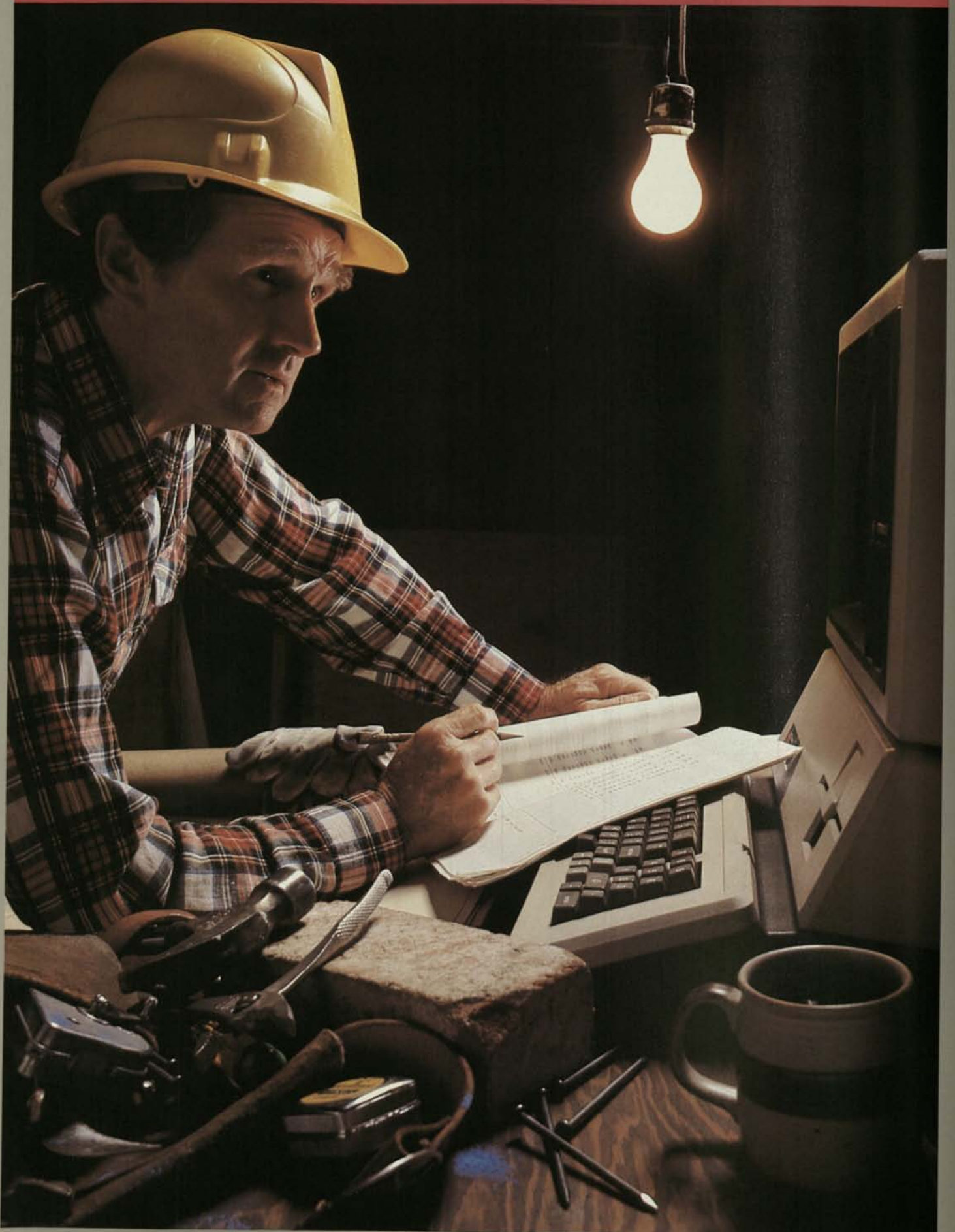
At the St. Vincent's Hospital Diabetes Center in Los Angeles, California, Dr. Leona Miller has developed a program for her personal computer that measures each patient's knowledge about diabetes. With the results of the computer's assessments, doctors and dieticians work together to "fill in the gaps," assuring that patients have the necessary information to take proper care of themselves. Other physicians are using personal computers to take patient histories, finding that many patients are less embarrassed about giving personal information to a computer than to a nurse.



The privacy of personal computing appeals to lawyers as well—along with the more obvious financial benefits. Attorney Felix "Butch" Clayton of Charleston, South Carolina, is a case in point.

Clayton stresses that the advent of sophisticated computers that small and medium-size business can afford has brought increased client confidentiality. Many law firms that once used outside agencies for their record-keeping can now handle the task in-house. "Any time you open up your client files to the outside, you have security problems," cautions Clayton. "With your own computer, the information stays right where it belongs—in your office."

Clayton, enthusiastic about personal computers even before he bought his own, has won several associates to his way of thinking. One was a partner who "went to a symposium and came back wanting a \$9000 computer system to do estate planning—until he realized he could do it all on mine." Clayton's personal computer is now being used so heavily for estate and tax planning—and billing—that he is purchasing another one for word processing.



Personal Computer\$ for the \$mall Bu\$ine\$\$

Jack Bettles runs two businesses that have practically nothing in common. One is an oil and gas exploration consulting firm, the other is a racquetball club. He runs both of them smoothly on one personal computer using small business accounting programs.

Both businesses have benefited from automated accounting, he says. "The accounts receivable package has really improved our cash flow. Before, we used to pay someone else to do our books, but it would take two or three weeks to get them back. Then it would take us another week just to get the statements out. With the computer, we can print 300 statements and have them in the mail in a few hours. We get paid a lot faster, too."

Bettles' experience—and the experience of hundreds of others—only begins to illustrate the value of personal computers to small business. With a personal computer and the commercially available accounting programs written for it, it's possible for small business owners to greatly reduce the time it takes to manually handle the meat and potatoes operations of a business: general ledger (G/L), accounts receivable (A/R), accounts payable (A/P), inventory, and payroll.

Automated accounting systems also significantly improve the accuracy of record keeping, and eliminate money spent on outside accounting or timesharing services. Most important, though, they allow for better control of company finances, improve cash flow management, and increase the potential for greater short-term and long-term profits.

Commercially available small business accounting programs were among the first programs to enter the market after the debut of personal computers. Now in use for several years, many have proven themselves extremely reliable and easy for the novice to use. Most

```

BPI ACCOUNTING SYSTEM, VERSION 1.8.2
POSTING DISK
* PAGE 1 *

1. RUN QUEUE                2. ERASE QUEUE
3. PAGE                     4. CO. CODE & DATE
5. CHANGE PROG DISK        6. PRINTER & ID LINE

31. POST                     32. PROFIT AND LOSS
33. TRIAL BALANCE           34. BALANCE SHEET

41. END-OF-MONTH            42. END-OF-QUARTER
43. END-OF-4TH-QTR         44. END-OF-FISC. YEAR

91. COPY DATA DISK        92. CHECK DISK SPACE

COMPANY CODE: XXXXXX
'AS OF' DATE: MM/DD/YY
PRINTER: OFF
COMMAND QUEUE: EMPTY

ENTER COMMAND NUMBER ==> 1
  
```

programs, for instance, are structured around a list of program functions, called a "menu"—like the one above. It lets the user choose among the many functions the program will do. Most small business accounting programs also are reasonably priced and adaptable to any size small business.

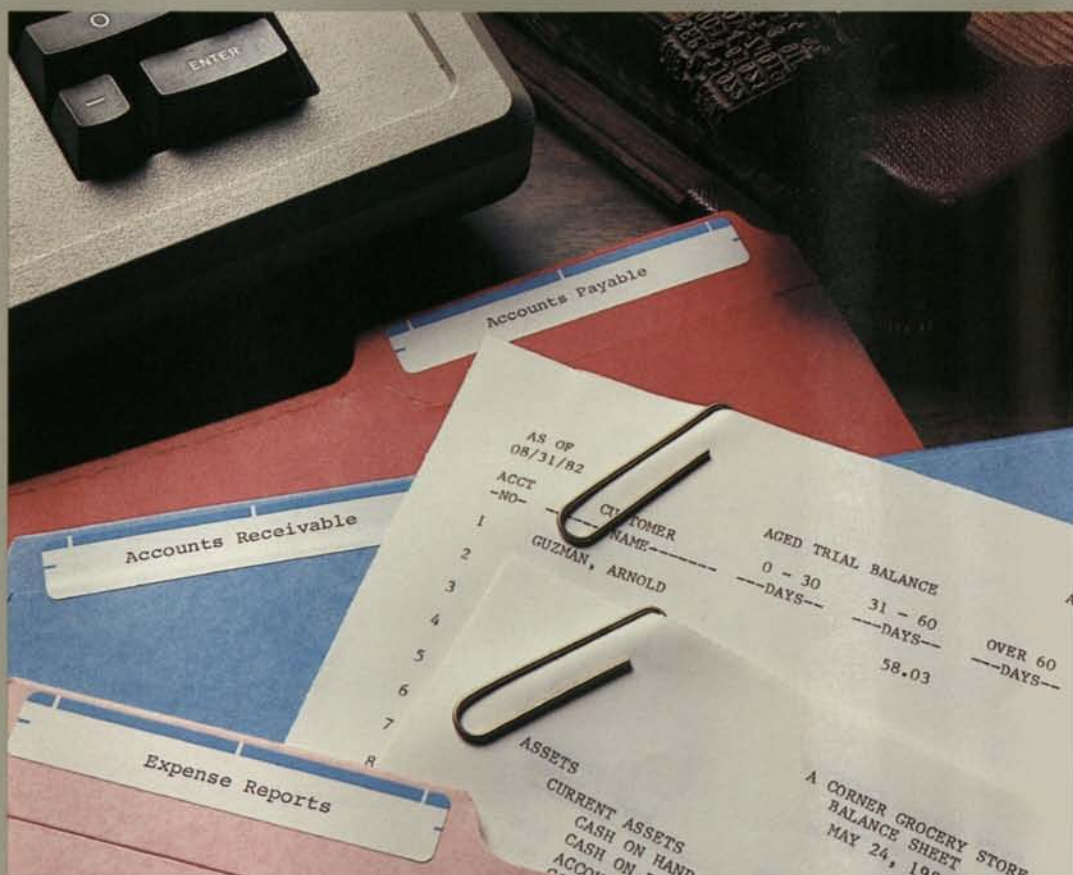
Between bottom-line cash flow improvements and the time saved on paperwork, you can probably justify the cost of a personal computer on the basis of a single accounting operation alone. There are many programs, however, unrelated to accounting, that you can use to streamline other small business operations. Word processing, data base management, and telecommunications are some of the obvious choices. Another program, financial modeling and forecasting ("electronic worksheets"), puts into your own hands the same kind of management tool that larger companies have used for years.



Automating the General Ledger (G/L)

Nothing so clearly gauges a company's financial condition as the general ledger. As the foundation for profit and loss statements and balance sheets, the G/L serves as scorekeeper for a company's every transaction involving cash and non-cash receipts and expenses.

Computerizing the G/L, you'll find it much easier to maintain your chart of accounts and general journal, and to produce standard profit and loss statements and balance sheets. In addition, many G/L programs generate valuable analytical reports—actual-to-budget, prior year comparisons, and comparative balance sheets—that couldn't be expected from manual accounting systems. With these reports, you're in a better position to observe trends, and weed out problems that cut into profits, before those problems take root.



Features to Look For

Almost all G/L programs designed for personal computers offer the same basic features. Nevertheless, descriptive terms vary considerably. One program's "P&L statement," for example, is another program's "operating statement." A "journal file" for one is a "transaction file" for another. And so on.

Commonly, however, any G/L program will:

- keep a master chart of accounts (with user definable account numbers) that maintains basic information about each;
- maintain a general ledger that records and summarizes financial information for each account;
- print financial reports and summaries;
- generate audit trails through transaction listings.

When you examine various programs, consider the types of reports and report structures they offer. Almost all G/L programs, for instance, now include a "financial statement formatter" that allow you to set your own specifications for reports such as P&L statements and balance sheets. This way, you can print reports that conform to your existing formats.

With many programs, you also can print out master charts of accounts as well as transaction listings, general ledger, cash-receipts and cash-disbursements journals, and consolidation summaries. Some even provide amortization and depreciation schedules. (Most reports are based on 12-month and year-to-date reporting periods, though some make room for 12 previous months as well.)

Typically, G/L programs are built around easy-to-follow menus. Many also are designed to accept information from other departments and compatible accounting programs: usually billing, accounts receivable, accounts payable, inventory, payroll, and job costing.

Programs vary in terms of their account capacity, operating method, and types of reports that can be generated. For example, some programs are tailored to businesses with 150 or fewer accounts and a few hundred transactions monthly; others, designed for larger small businesses, can accommodate multiple companies with several thousand transactions annually.

Accounts Receivable (A/R): Which Way Does Your Cash Flow?

As illustrated by the cartoon showing a man leaping from a burning building while clutching his accounts receivable journal, A/R is the heart of every business—the basic record of everything it receives and everything it is owed. Managed effectively, A/R allows a healthy cash flow into the company coffers.

A computerized accounts receivable system essentially does the same things a manual system does—maintains customer files and keeps a history of each account—but with greater accuracy and in a fraction of the time required to prepare them by hand. Ultimately,

an A/R program can significantly improve customer service with prompt and accurate monthly statements. It also can improve cash flow through reduced turnaround time on collections.

Features to Look For

Besides maintaining customer files and accounts, A/R programs can:

- generate accurate monthly customer statements (on either ordinary paper or preprinted forms);
- automatically post receipts to each account and to the general ledger;
- automatically "age" accounts into 30, 60, 90, and 120-day time periods;
- calculate and post service charges on past due accounts;
- provide up-to-date information on account activity and status.

You can expect all A/R programs to offer these basic services, usually through the use of menus that list program options. Differences, though subtle and

varied, lie primarily in the number of customers that can be accommodated, accounting methods used, and types of reports offered. For example, some programs can handle only several hundred customer records on each 5 1/4-inch floppy disk of storage (see page 39). Others can support up to 1,200 customer records on each disk, or several thousand on each hard disk. Some programs are structured around a simple balance forward method of accounting; others are structured around an open item accounting method. (Several programs give you a choice.)

You'll also find that most programs feed into the general ledger, though only a few post each A/R transaction on a daily basis.

The types of reports vary as well. Some programs offer only the bare-bones customer lists, trial balances, cash receipts journal, and daily transactions. Others generate as many as 20 additional reports, including sales analyses by customer, region, salesperson, and customer category; general ledger posting report; debit and credit entry lists; and twelve-month sales histories.

Found: Jack of All Trades for Exports and Records

Running his export company in San Diego, California, and a retail record store in nearby La Jolla, Luis Carrillo uses three personal computers. "It's the best investment I've ever made, and I've been in business for twenty-five years," says Carrillo, who is making plans to put five more personal computers into his executives' offices. "We use the Apple in our main office 90 percent of the time every day—when not for accounting, for VisiCalc, word processing, or direct mail. There are so many applications, it's really up to your imagination.

"In our export company, customers call from Mexico, Brazil, Argentina. They ask 'How much will this cost or that cost?' From records in the computer, we can tell them right away—also how reliable the manufacturer is and when they can realistically expect shipment."

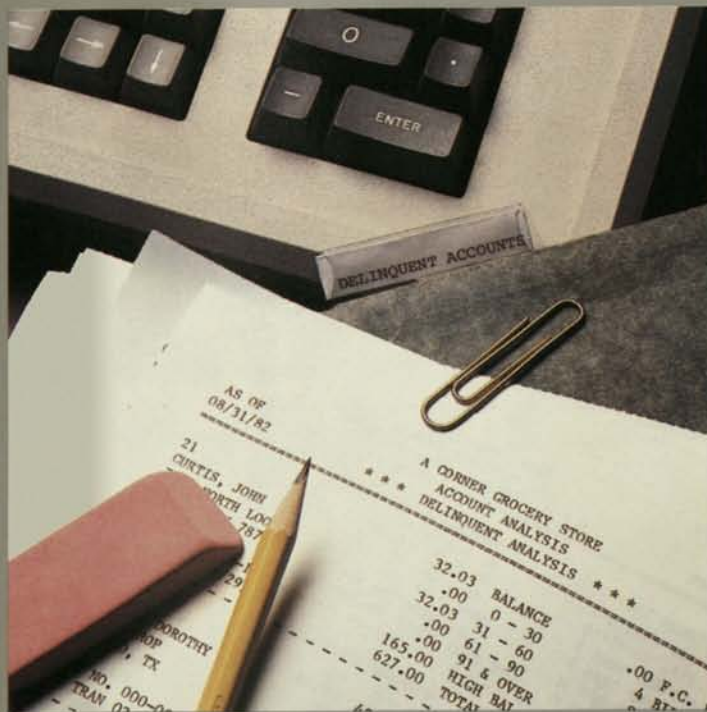
In his record shop, Carrillo's managers are building a computerized file of record distributors so they can handle special orders more rapidly. "We get a lot of special orders," Carrillo explains. "Keeping track of distributors who specialize in rare



recordings helps my staff respond to customers more rapidly."

It was his need for greater control over finances, however, that led Carrillo to consider a personal computer. "Two years ago I just didn't have the information available in time to really control things. I would get aging of our accounts receivable around May 20 for April—that's way too late if you want to collect on time. Now I get the aging report on the fifth of every month. We can see right away who's behind; then we get on the telephone.

"We did a study once, with VisiCalc, to see how long it took to collect before we had a computer. It was amazing. We found that, with the computer, we'd cut collection time way down—in dollars, we saved about \$250,000."



Accounts Payable (A/P)

Few small businesses see accounts payable (A/P) as a source of profits—quite the opposite, in fact. With computer-based accounts payable systems, though, you can actually make money by planning payments to capitalize on short-term investments. You can also save money when you plan payments to take advantage of vendor discounts and reduce short-term borrowing.

Features to Look For

Integrated into the general ledger, and menu-driven like other accounting programs, A/P programs typically:

- give you a choice of different payment methods (all outstanding invoices, pay by due date, partial payments, selected invoices);
- provide audit trails;
- flag and/or automatically pay invoices that offer discounts;
- automatically generate checks and mailing labels or envelopes;

- generate A/P aging reports by invoice.

Like general ledger and accounts payable programs, A/P programs differ in the range of reports they offer. But you can expect to find in better programs monthly and/or year-to-date transaction summaries, master vendor lists (alphabetically or by number), cash requirements projections, trial balances, G/L distribution reports, and check registers.

Inventory Control: How to Earn More With Less

Situation: Hypothetical Acme Widget Company has just received a call from a customer looking for brass widgets. While the Acme clerk sifts through a wall of index cards or physically examines the store's brass widget inventory, the customer calls four other distributors. At ABC Widget, a clerk punches a couple of keys on the computer and, within seconds, tells the customer that ABC carries plenty of brass widgets. Question: Which store makes the sale?

Perhaps this is an oversimplification, but it illustrates a classic problem in inventory control: under manually-operated systems, most small business owners have no way to keep track of everything in stock.

Inventory control, though one of the most complex tasks for a personal computer to perform, can help you significantly improve control of stock levels, cash flow, and—most important—customer service. With the computer, for example, you can find out instantly if an item is stocked or on order. You can readily identify and weed out slow-moving and obsolete products and thus reduce your carrying costs. Also, you can find out sooner that profitable stock needs to be reordered, so it will always be available, thus improving customer service and reducing lost sales.

One reason for the complexities of inventory management is the nature of small business. Requirements vary so widely that it is difficult to find a program with universal appeal. The program that suits a small retailer who simply buys and sells products is probably inadequate for the manufacturer who uses bills of materials and job costing. Nor will it work for the auto parts distributor who stocks a huge inventory, or the appliance store owner who keeps track of warranties by product, model, or serial number.

Still, with an increase in flexible programs designed for personal computers—and improvements in technology that now make room for larger, more complex inventories—computerized inventory offers significant gains in small business profitability.

Features to Look For

The better inventory programs let you:

- maintain a master record of each item in stock (including product number, name or description, quantity on hand, unit cost, unit price, retail price, and total cost);
- identify stock by unit, weight, volume, or liquid or dry measure;
- work with several costing methods, such as LIFO (last in, first out), FIFO (first in, first out), and averaging;
- call up any item on record to find out quantity in stock, on order, or on back order;
- delete or update any item on record;
- automatically record sales, receipts, and adjustments (such as returns, shrinkage, or overages) and transfer information to the G/L and A/R;
- tag products with several prices (normal retail, discount, and bulk order, for example);
- identify reorder levels, which the computer can watch for and flag (even calculate and suggest reorder quantities based on sales);
- learn, within a few seconds, the total value of your inventory by product and/or department;
- sort, search, and arrange information into summaries and reports by merchandising category, department, location, vendor, or periods (commonly month-to-date and year-to-date).



Most inventory control programs allow for printed, customized master lists, sales and activity summaries, profit margin reports, reorder and back-ordered items reports, and department activity summaries. With some programs, you also can print purchase orders and price labels for products.

Of particular interest to many small business owners, though, will be the inventory worksheets the computer generates. Organized by location and/or bin number, these worksheets are particularly helpful for reconciling computer records with an actual physical count.

For example, when ABC Widget takes its annual physical inventory, the computer prints out a master record with a list of various widgets in stock, numbers on hand, and their location. Clerks then simply count and compare their results with the report results; discrepancies are quickly corrected.

Payroll

You can use a personal computer to handle your payroll—a task generally agreed to be time consuming and repetitious. Working with a payroll program, your personal computer can:

- automatically calculate deductions for federal and state taxes, insurance, and other benefits;
- print payroll checks and stubs;
- automatically post information to the general ledger;
- complete preprinted W-2 forms and quarterly tax reports;
- print mailing labels.

In the Wings: Electronic Letters, Words, and Worksheets

As you explore the potential of the personal computer, you'll find dozens of other uses for it beyond small business accounting. Very likely, you'll first lean toward the programs managers and professionals use most frequently: word processing, mailing list and data base management, financial modeling, and telecommunications.

Word processing, for example, allows you to generate and update price lists, contracts, memos, letters, and proposals with extraordinary speed and accuracy (see page 19). Mailing list/data base management programs help you keep better records of customers and clients (see page 17). With your computer hooked to a modem, you'll be able to take advantage of electronic mail services and tap information in computerized libraries all over the world (see page 20).

Outside of accounting, however, perhaps the most valuable tool available to you through the personal computer is an electronic worksheet, otherwise known as a financial modeling and forecasting program (see page 13). Electronic worksheet/financial modeling programs duplicate the same techniques large corporations depend on for strategic planning. They allow you to examine the "what-ifs" of your business: What if we beef up our widget inventory, and sales increase six percent? What if we beef up the widgets, and operating costs go up?

The Computerization of Farmer Brown

When Eddie Neiman read about a service that supplied personal computer users with valuable agricultural information, he wasted no time in getting his personal computer hooked into the network. "I bought the computer primarily to help out with crop analysis and budgeting," Neiman says, "but since I plugged into AGNET™ (AGricultural Computer NETWORK), the computer has been working overtime."

Neiman and his brother manage a 3,000-acre grain farm outside Paoli, Colorado, about 170 miles northeast of Denver. "Running a farm the size of ours takes a lot of planning," Neiman points out. "You don't just throw seeds on the ground and wait for the crop to come in. AGNET gives us concrete facts and figures we can work with to operate this place more efficiently."

The Neiman brothers use the network to help determine which crops grow best in the various soils on their farm. They also consult the market trend analysis service for updated market reports and comments by specialists. And before buying new machinery, they survey their options using the equipment analysis package.

Neil Pullen of Sac City, Iowa, is another whose business has improved through personal computers. He had subscribed to a commercial, computerized bookkeeping service until he realized that one year's service payments would pay for a personal computer—and that bookkeeping was just the beginning of what the personal computer could do. So he began using computers in his



seed dealership for inventory, accounts payable, and accounts receivable.

Now, in addition to accounting and word processing software, Pullen has an inexpensive data base management program which allows him to keep comprehensive records on each of his seed fields. Each fall, new files are started with information on fertilizer, insecticide, and herbicide bids. As spring approaches, daily temperatures are recorded to determine when each field is ready for planting. Information is also kept on the variety of seed sown, and the application dates of pest and weed control chemicals.

The summer months find Pullen's computer correlating each crop's calendar age with daily temperature data to pinpoint the proper harvesting time. The selling price of the seed is entered into the data base so that each field's productivity can be calculated.

The computer's usefulness doesn't end there, however. By adding the results of soil analysis tests to his information, Pullen can see how different varieties of seeds perform in various soils. Then he can choose the optimum seed for the next planting in each field, or improve the soil for a particular type of seed.



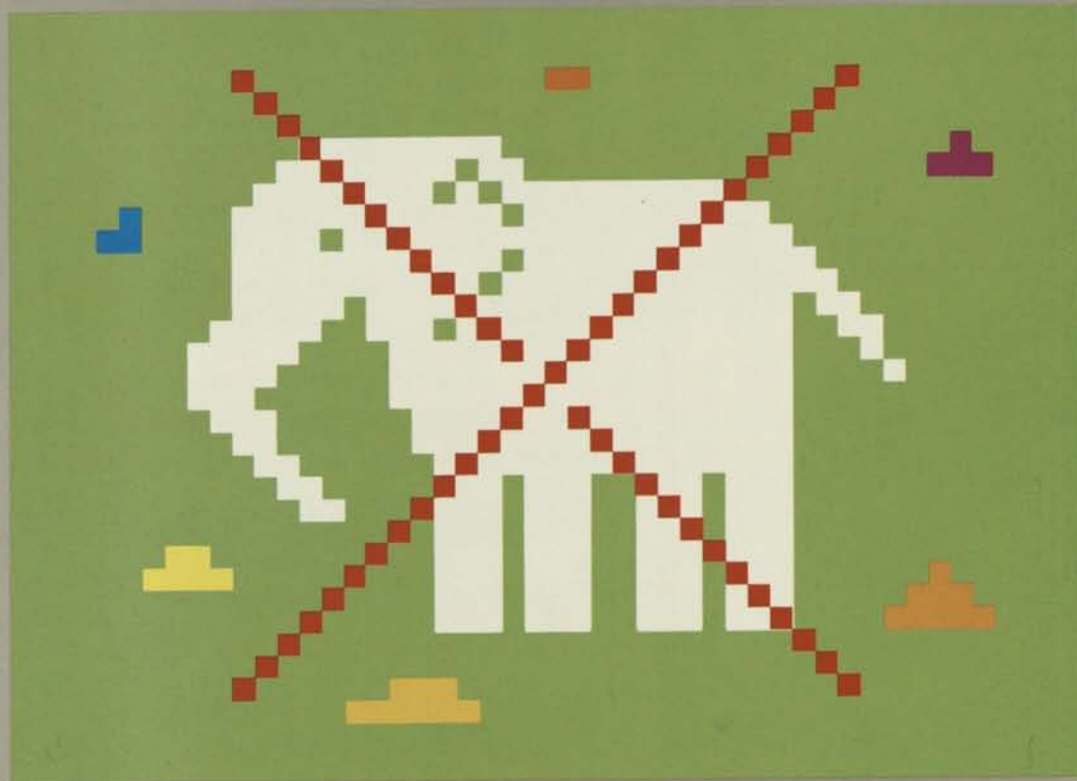
How to Buy a Personal Computer

Anyone in earshot of a discussion on computers has heard the horror stories. About the manager who poured buckets of dollars into computer consulting, a computer, and custom programming...for a system that to this day doesn't do its job.

Or the independent retailer who got a "really great deal" from the friend of a friend of a brother-in-law...and a slightly used computer with a terrific payroll program. Unfortunately, with only two employees, the retailer didn't need a terrific payroll program. The programs he did need, though, weren't available for the computer he had. Really great deal? For the seller, yes.

You can avoid these electronic white elephants simply by approaching the selection of a personal computer realistically. First, keep in mind that the computer is a *tool* you use rather than an end in itself. Second, the personal computer is a *system*—a combination of software, hardware, and peripherals. Properly arranged, these components help you solve various business problems. Third, a computer system is likely to be the most sophisticated piece of office equipment you will ever buy, so you're wise to evaluate each component under the hard light of objectivity, just as you would any other business investment.

If all you want in a personal computer is word processing, then your task in choosing a computer system is a fairly simple one. You first need to identify which tasks you want a word processing system to handle. Perhaps you want to be able to underline words, or use italics or bold face type. Then compare the various systems to find the one that comes closest to your specifications. The more tasks you want the computer to handle, the more complex the selection process becomes.



The key to successful office automation is in the groundwork. Getting the computer in hand is merely the last step in a process that begins with careful planning. Identifying your needs is the first, and usually most complicated, step.

The more you know about your own needs, the easier it will be for you to evaluate the software, hardware, peripherals, and support that successfully bring computer power to your work.

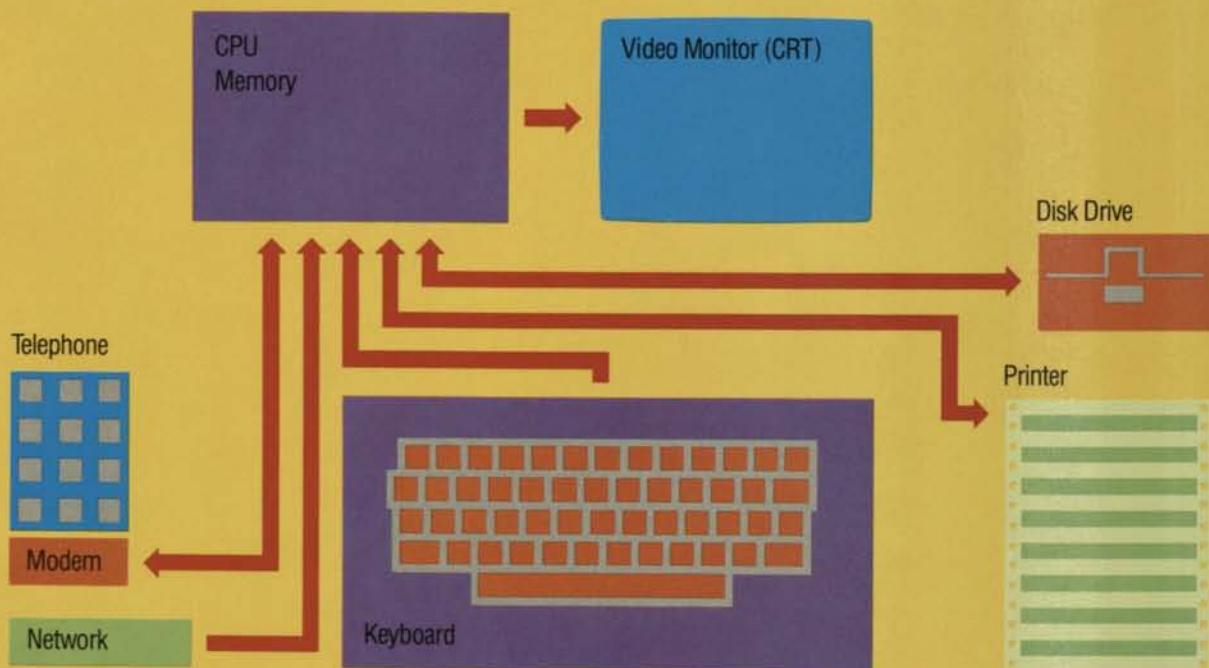
Ten Commandments of Computer Planning

The most important rule to keep in mind when you look at any computer system is your own needs. Buying backwards—that is, buying the computer first, then looking for programs it can use—is like catching the wrong train. It may be a good machine, but it's probably not going to get you where you want to go. *First, find the software that will do the job you want; then find the equipment that will put it to work.*

Start with the following strategies:

1. Allow plenty of time to learn about, decide on, and implement a personal computer system. It's true that advancements in technology have produced computers that are relatively easy for the novice to use. Nonetheless, you must expect to put in some degree of effort to become acquainted with the enormous range of computer programs, hardware, and peripherals designed for personal computer users.
2. If you work in a large company, take advantage of the computer expertise in your company's data processing department. Managers of data processing and management information systems can lend excellent advice and direction to the computer selection process.

How Computers Work



With a personal computer, you typically use the keyboard to enter commands or information. Then the central processing unit (CPU) goes to work. Following your instructions, and using memory as its work area, the CPU collects and stores information on disks inserted in the disk drives. It also sends information to the

monitor for display, performs calculations, sends material to the printer for printing, and transmits and collects information to and from other computers by means of a telephone and modem.

In some companies, they may provide additional support through personal computer training courses that shorten the learning curve. Also, when a company makes multiple purchases, the data processing managers can help assure a level of standardization that allows personal computers to exchange information with each other and with larger computers inside and outside the company.

3. Start small and stay basic. At first, automate only the areas of your work or business that you understand best. Later on, when you have successfully converted one area to automation, add other applications. (It's also a good idea to start with a noncritical task; that way, you don't need to have the system functioning perfectly the first day in order to stay in business.)

4. Provide realistic budgets that consider hidden costs. Include everything you think might be necessary to the system you purchase. This means software, including possible program modifications; hardware, including peripheral equipment, storage disks, and other initial supplies; maintenance contracts; costs, if any, for installation, training, insurance, and furniture; and, if you retain a consultant, consulting fees.

5. Buy only from major suppliers with sound reputations and solid track records. They can provide you with reliable support both before and after the sale. And because this support is as much a part of the computer system as the hardware, don't hesitate to ask for, and check, references.

6. Look for a computer that can grow with your business. The computer system you choose should be able to accommodate additional transactions and tasks you require as your own productivity increases over the next three to five years.

7. If you retain a professional consultant, choose carefully. Computer consulting fees are often high compared to the modest price you'll pay for a personal computer system. If you do decide to work with a consultant, choose one who has a clear understanding of your business needs.

8. Maintain realistic expectations. Keep in mind that the computer is a tool used to solve problems. It won't make decisions for you or eliminate your staff. Neither is the computer a cure-all for a badly managed

department or business; it will only automate your problems. In fact, the best candidates for computerizing are those departments, offices, and businesses that are functioning under well-structured—if time-consuming—manual systems, because they most easily convert to automation. If your office or business leans more toward chaos than controlled growth, you'd be wise to upgrade your manual procedures before you apply computer power to them.

9. Take advantage of the wealth of information on personal computers available through computer magazines, trade shows, seminars, and professional publications that are beginning to regularly address the issue of personal computers in business (see "Sources of Information," page 44).

10. Plan for a transition period if you are automating an accounting system. When you do implement a personal computer system, run the new, automated procedures alongside manual procedures until you gain confidence with automated operations.

Creating a Plan

You won't need to share your office with a team of systems analysts and programmers just to put a personal computer to work. That may have been the case ten years ago, but today you can do the planning yourself by accurately identifying your needs before you compare, and decide among, personal computer systems. (In fact, planning actually accounts for 80 percent of the work in choosing a personal computer.)

Then, once you've clearly targeted your needs, computer sales representatives can help identify and tailor systems to meet them.

Define the Job

To begin, pinpoint the applications that would benefit from computer control—usually cumbersome manual systems that function smoothly, if sluggishly.

If you're losing valuable management time because of an overload of paperwork, for example, look at your procedures for developing sales forecasts or other financial models, and the procedures you use to get out reports. Do you spend a lot of time working with spread

sheets? Maybe it's the paperwork—preparing each spreadsheet, calculating, and recalculating. Or perhaps it's because information you need trickles in randomly from other departments or divisions. You may also find you're locked in with reports and correspondence that require repetitious review, revision, and retyping—another bottleneck the computer can relieve.

Accounting may be the area you will want to automate first if you run a small business. If so, identify each accounting task you want the computer to handle, such as the general ledger, accounts receivable, inventory control, and others. Identify as well the peripheral functions you may eventually want to automate, such as mail list management or word processing.

After you have identified the jobs you want the computer to handle, write down, in order of importance, which ones you think will benefit most from auto-

mation. At the same time, consider which ones will give you the greatest profit leverage. If it's cost management of raw materials—for which the prices fluctuate widely on the wholesale market—then consider automating cost data, inventory, and forecasts to take advantage of favorable market conditions.

Describe the Job

Next, prepare a job description for the computer. For complex applications, this is the most time-consuming part of planning—and the biggest stumbling block for the first-time buyer. Your efforts, however, will pay off handsomely in a computer that does precisely what you expect of it. A job description or specification—whether it constitutes two pages describing a single application, or twenty pages describing a series of applications—will indicate how much computer you'll

need for the information you work with, and what kind of software you'll need to handle the work.

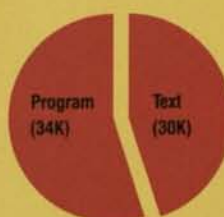
Example 1: Word Processing

The simplest computer job description you'll prepare is for word processing. Start by collecting examples of your correspondence and reports. They will be your guide to the type of word processing program, amount of computer memory, and type of printing mechanism you'll need.

The appearance your correspondence and reports should take will determine the type of word processing program and printer you choose. If you underline words or phrases in your reports, for example, you'll want to find a word processing program capable of underlining. If you work with subscripts or superscripts, they, too, should be considered when you look at different word processing programs.

How Much Text/Financial Model Can You Fit in a Personal Computer?

A Personal Computer with 64K Random Access Memory (64K RAM)



You can work with about 15 pages of text at a time

A Personal Computer with 128K Random Access Memory (128K RAM)

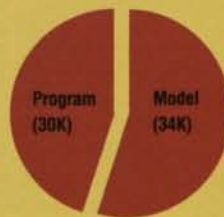


You can work with about 40 pages of text at a time

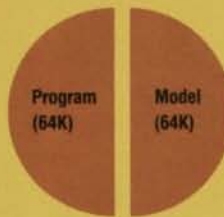
A Personal Computer with 256K Random Access Memory (256K RAM)



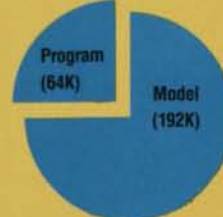
You can work with about 40 pages of text at a time*



You can build a financial model about twice the size or complexity of the department budget shown on page 34



You can build a financial model about four times the size or complexity of the department budget shown on page 34



You can build a financial model more than ten times the complexity of the department budget shown on page 34

*Sometimes, only part of the available memory is used to keep operations efficient

Computer programs vary in the amount of Random Access Memory (RAM) they need in order to operate. For general comparison, though, we've used a popular word processing program and a financial modeling program to show you how much "work space" or RAM you have in personal computers after programs are loaded. Permanent storage, of course, is another issue; using disks, you can store unlimited documents and financial models.

The length of the documents you produce will have something to say about the amount of computer memory you'll need. (By computer memory, we mean computer "desk space"—the amount of room you have inside the computer to do the work. Some memory is needed by the instructions or program that operate the computer equipment; what's left over is the room you have to work with. See the illustration on page 33.)

For instance, if you generate ten-page, single-spaced reports every week, you'll want to look for a computer with enough (48K) memory to hold at least ten pages of text at once, besides the instructions that operate the program and equipment. (A personal computer with "128K" of memory normally can hold at least forty double-spaced pages of text at a time, as well as the operating system and program instructions. It can also permanently store your forty page documents on floppy or hard disks.)

The type of text you normally generate will also influence the type of printer you hook up to the computer. If you regularly send out memos or letters on company letterhead, for example, you'll need to look for a printer that will produce letter-quality text on single sheets of paper. If, instead, you generate lengthy reports for internal use, you may want a printer that can print at high speeds on continuous sheets.

Word processing programs offer other features you may need—a spelling checker, for instance, if you are a bad speller or poor typist; or a way to link parts of different documents if you build reports that way; or a facility to reproduce form letters if you frequently make use of them.

Once you've collected samples of your correspondence and reports, make a list of the most important elements you need in a word processing program.

DEPARTMENT BUDGET							
	OCT	NOV	DEC	JAN	AUG	SEPT	12 MO TOTAL
Exempt Management	4	4	4	4	4	4	4
Exempt Personnel	14	14	14	15	17	17	17
Non-Exempt Personnel	4	5	5	5	6	6	6
TOTAL HEAD COUNT	22	23	23	23	27	27	27
Non-Exempt Salaries	5200	7860	7940	8000	11320	11440	114870
Exempt Salaries	42200	46820	47300	47660	73240	73960	718350
Total Salaries	47400	54680	55240	55660	84560	85400	833130
Temp. Clerical	300	300	300	300	300	300	3600
Fringe Benefits	18960	21860	22080	22300	33820	34160	338260
Furniture	0	10000	0	0	7000	0	40000
Use Tax	500	500	0	0	0	0	2560
Depr:Equipment	1100	1300	1300	1300	400	400	4800
Maint:Equipment	400	400	400	400	400	400	4800
Depr:Furn/Fixt.	360	440	440	440	640	640	6500
Postage/Freight	400	400	400	400	400	400	4800
Office Supplies	440	520	520	520	760	760	7800
Trade Shows	800	0	0	6000	0	8000	32000
Travel/Transp.	2000	200	200	0	300	300	10000
Training	4800	4800	4800	4800	6300	6300	67800
Advertising	16000	16000	16000	16000	16000	16000	168000
Community Affairs	2500	3000	3500	3500	3500	3500	35500
Graphics	3500	3500	3500	4000	6000	6000	61000
Exhibits	1200	2400	4000	8000	4000	4000	5400
Seminar Mat'ls	5000	0	0	0	0	0	10000
Mailings	7000	0	0	0	0	0	21000
Market Research	10600	0	0	10600	0	10600	84450
Bus. Lunches	1000	0	0	0	1000	0	4000
Forms/Printing	20000	0	0	0	0	0	80000
Outside Services	7600	7600	8000	0	8000	8000	88000
Emp. Communications	4000	0	0	4000	0	0	16000
Public Relations	20000	20000	20000	20000	20000	20000	240000
Seminars & Meetings	5000	5000	5000	5000	5000	5000	60000
Misc. Allocations	10000	10000	10000	10000	10000	10000	120000
FCST. TOTALS	198060	162900	155680	173220	208380	220160	2349400
QTR. TOTALS			516640			627100	
ACTUAL EXPENSES	207531	183216	161510	NA	NA	NA	NA
ACTUAL QTRS.			552257			NA	
MONTHLY VARIANCE	9471	20316	5830	NA	NA	NA	NA
CUM. VARIANCE	9471	29787	35617	NA	NA	NA	NA

This department budget uses or fills up about "20K" of computer memory—nearly all the available capacity of a 48K computer loaded with the financial modeling program used to create the budget.

Example 2: Financial Modeling/Forecasting

Collect samples of all your financial models and forecasts, and make a note of their size, the calculation rules you used to produce each model, and how the models were used (do you use models in presentations, as a personal decision support tool, or both?).

Model size, calculation rules, and model functions provide the framework for system specification. Model size and requirements will help determine the memory size and computer

program you'll need. (With some financial modeling programs, regardless of the computer's memory capacity, you can create models only of a limited size.) Since different programs offer built-in calculation rules, the rules you need will help determine the program. Model function will determine the nature of the printing mechanism, if one is necessary.

The department budget illustrated above fills up about "20K" of memory, nearly all the available capacity of a computer with "48K" of memory, after it already holds the program itself. If you want to build more complex models, or consolidate models, you'll need a computer with considerably larger memory or a computer program that stores information on the disk until it's needed. Such programs can handle much larger models, and offer great flexibility, but at the cost of slower operation.

Example 3: Mail List/Data Base Management

When you're planning for computer management of mailing lists, client or customer files, patient records, and other information data bases, there are several things to consider.

One is the computer's *permanent storage capacity*; it determines how many records you can keep on permanent file. This storage is typically provided on floppy or hard disks (see "Disk Storage," page 39). Besides the number of records you want to store, you also must decide how you want to organize them. By name, address, telephone number, title, zip code? And how do you want to use the information? How do you want to retrieve records? By name, address, description, subject?

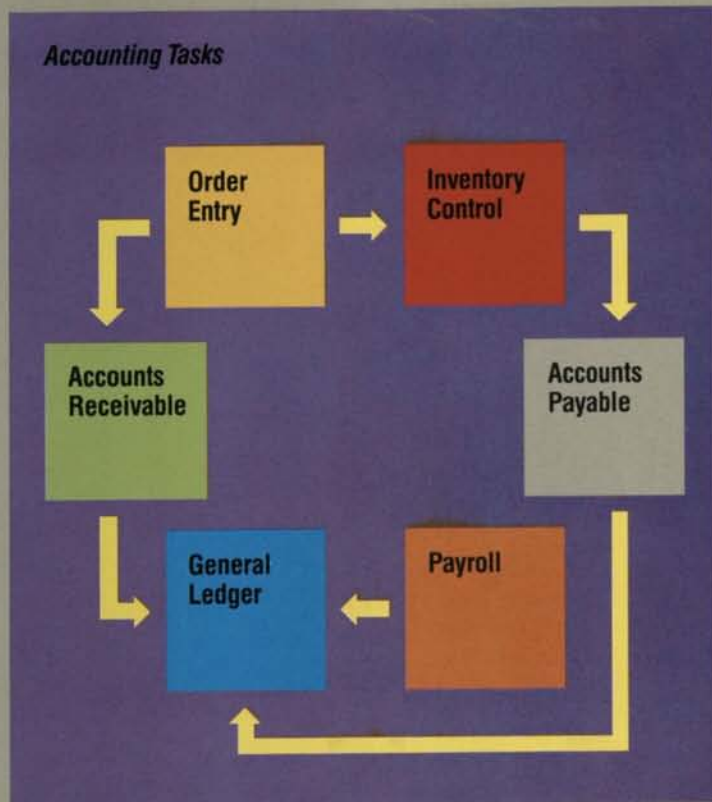
To find out how much storage space you'll need, the procedure is really quite simple. Say you wanted to computerize an address list for 100 clients that you currently keep on 100 three-by-five cards. Each card might include the client's name, title, company name, address, telephone number, and perhaps a few words that identify the nature of the account:

How many typewriter keystrokes are required to get this information on a three-by-five card? In this case, including the spaces between words and six carriage returns: 182 keystrokes. To find out how much permanent storage you would need in a computer, multiply the *maximum* number of keystrokes you would use for one card by the total number of cards (in this case, 100) in your file.

In our example, you would need disk storage space for at least 18,200 characters (or "bytes")—and more, if you plan to add new names to your file. (A single floppy disk stores anywhere from 80,000 to as many as one million characters.)

The example, though something of an exaggeration, holds true for records of greater complexity as well. Determine the *maximum* number of keystrokes required to type whatever record you want the computer to keep. Then multiply that figure by the number of records you'll need to store (now as well as a few years down the road).

Your computer sales representative can help you determine exactly how much disk storage capacity you'll need for different data bases, but you



should take the time to identify the types of information you want to include in a data base, and how many records you want to store.

Example 4: Accounting

Identifying your needs for a computerized accounting system is a tricky process because five commonly used tasks—accounts payable, general ledger, payroll, and billing/inventory control—are interdependent. That means that the computer system must be designed to coordinate all the activities in such a way that you avoid duplication of effort.

A computer dealer who specializes in computer accounting systems is your best source of advice when you plan to automate your accounting procedures. Still, you should have a clear idea of the types of information you want to enter, store, and generate with the computer.

To determine how much permanent storage space you need in a computer, you count and multiply. Count the number of keystrokes (including spaces and carriage returns) required to enter information on, say, this three-by-five card; then multiply by the number of cards you want to keep on file.

How Much Disk Storage Do You Need?

54 characters

17 characters

21 characters

22 characters

26 characters

36 characters

Robert J. Peabody, Vice President of Consumer Services.

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How to Evaluate Software

Keep these guidelines in mind when you compare different software packages:

- Stick with established, tested software that's widely used. Avoid new-to-the-market programs unless they're distributed by a company that's reputable and committed to thorough consumer testing and debugging. New, untried software can have more bugs than a flea circus.
- Look for programs that are "user friendly." If a program is easy to use, you'll enjoy working with the computer and want to find additional uses for it. It also will be easier for you to train others. If the program is complicated, on the other hand, you'll find you avoid using the program as well as the computer.
- Look closely at the instruction manuals ("documentation") that come with the software you're considering. Since the manuals are your primary guide to a program, they should be clearly written and easy to understand. They should, for example, explain how to start and stop the program, perform routine operations, and correct standard errors.
- The "commands" you use with each program to instruct the computer should be logical and easy to remember. For instance, in a typical word processing program, you tell the computer to "save" or "print" text you create. The best programs also have built-in prompts or reviews in case you do forget a command.
- If you use the computer for several tasks, such as financial modeling, word processing, and business graphics (or general ledger, accounts payable, and payroll), look for programs that integrate the tasks. This way, you can easily transfer data from one program to another.

- Talk to people who are using the software you are considering. Ask if the program runs smoothly. Determine the learning time required to make full use of the program. And find out if it's easy to use.
- Test drive the program on the computer you're interested in. Examine it for ease of use and speed in carrying out instructions. How long will it take to run the most complex calculation you want to perform?
- Weigh costs against performance. You may decide to compromise a little on program advantages in favor of a lower price for a similar program. It may be short of your ideal, yet satisfy your main requirements.

How to Buy Hardware

*"Nothing to it,"
Smiled the salesman,
"I can show you best;
Just boot the disk into the RAM,
The CPU will do the rest."*

Given the dazzling display of buzzwords that shroud the computer in such mystery, it's no wonder that the most conspicuous part of a personal computer system—the physical machinery—is also the most elusive when it comes to evaluation. Particularly for the first-time buyer.

The way to begin is to evaluate hardware in terms of utility. Can the computer run the software you want to use, and can it store the information you need to work with? Will it be able to expand with your evolving needs? Questions like these enable you to evaluate hardware in terms of memory size, the amount of storage space available for your records, compatibility with other computers, compatibility with peripheral equipment, expandability, and service support.

Hardware Components

At first the computer appears to be nothing more than a television attached to a typewriter. On closer inspection, though, you'll find it has four major components:

1. the actual computer and memory bank, housed in a cabinet;
2. a record-player like disk drive that magnetically stores programs and data on "floppy" or "hard" disks (sometimes cassette recorders are used to store information, but they're usually too slow for business uses);
3. a typewriter-like keyboard that allows you to enter information into the computer (*input device*);
4. a video monitor that displays information (*output device*).

In addition, computer hardware often includes "peripheral" equipment, such as a printer (also an "output" device) that produces reports and graphs, or a communication device (modem) that links one computer to another through telephone lines.

The Computer

The computer itself has two parts—the central processing unit (CPU) and a memory bank.

The *central processing unit* (CPU) is the nerve center of the system. Physically, it's a collection of silicon chips, each about the size of a fingernail, containing thousands of miniature circuits. Taking cues from you at the keyboard or from a program in the memory bank, the CPU executes all the instructions necessary to process data, display information on the monitor, and communicate with disk storage devices. A CPU typically is built around a "microprocessor" with a number such as 6502 or Z-80. This is the "brain" of the computer.

You'll probably hear the terms "8-bit" or "16-bit" used to describe different processors. These terms refer to the amount of information, or number of "bits," that the computer can manipulate at once. ("Bit" refers to Binary digIT, the smallest unit of information the processor can recognize. Eight bits constitute a "byte," the equivalent of a single character.) An 8-bit processor is like a van that can carry eight passengers—it can receive 8 "bits" of information at once. A 16-bit processor is the 16-passenger van—it can handle 16 bits at once and is therefore twice as efficient for some classes of operations. It's also more expensive. For many business applications, a computer with an 8-bit processor is perfectly adequate.

The computer's *memory bank* stores programs, information, and instructions. Memory is measured by the number of characters it can store.

It's easier, though, to measure computer memory in terms of either "K", the equivalent of 1,024 characters, or "M", the equivalent of 1,048,576 characters. A computer with "64K" of memory, then, can store approximately 64,000 characters or bytes at one time. A computer with "1M" of memory can store about 1 million characters or bytes at one time.

Some memory is used to store the programs (software) that control the computer's basic operations; some is used to store the programs you need for different applications; and some is used to hold the information you are using. Most businesses use computers with at least 64K of memory.

Disk Storage

Disk storage systems are a sort of electronic counterpart to the office filing cabinet. Composed of magnetic disks and one or more disk drives, a disk storage system provides permanent storage of information you would otherwise lose when you turn the computer off.

Personal computer systems generally offer two types of disk storage: 1) removable, "floppy" disk storage; and 2) fixed, hard disk storage.

Floppy disks are so named because they are circular (usually either 5 1/4 or 8 inches in diameter), made of flexible plastic, and coated with the same kind of magnetic material used for recording tape. For protection, each floppy disk is permanently sandwiched inside a square, cardboardlike jacket.

Floppy disks vary considerably in the amount of information they can store. Typically, however, a single 5 1/4-inch disk can store the equivalent of about 20,000 words or 80 typed pages (100,000 bytes). "Double-density" disks can provide as much as a million bytes of storage.

Using floppy disks offers the possibility of almost unlimited storage capacity, however, be-

cause you can remove one from the disk drive and replace it with another. You can store statistical data on one disk, financial summaries on another, employee records on a third, and so on.

Floppy disks also insure privacy. You can take a disk of sensitive information out of the drive and put it in your pocket. And disks are easy to mail.

Because floppy disk storage is both reliable and reasonably priced. It is far and away the most popular storage medium for small computers. Its one drawback is that sometimes a single disk can't hold all the data you need to work with for a specific application, so you need to replace one disk with another to complete work on a single program.

Hard disk storage suits businesses that require greater storage capacity than floppy disks can provide. Hard disks (such as the "Winchester" disks used by most personal computers) are made of magnetically-coated metal. They also can store, in about the same space, 35 to 150 times what a floppy disk can store. That amounts to as much as 20 million characters—enough to handle the most complex transactions. Un-

like floppy disks, which are removable, hard disks are "fixed." This means that they're permanently held in the disk drive, away from environmental hazards.

Though hard disk storage systems are more expensive than floppy disk systems, they are less expensive on a per byte basis; they can store large files; and they provide faster access to information.

The Keyboard

The computer's keyboard, or input device, is a close first cousin to the office typewriter. It is your primary means of entering information into the computer.

Typically, a computer keyboard includes most of the characters found on a typewriter, plus special function keys that allow you to delete or repeat characters. Look also for a calculator-style numeric keypad found on more sophisticated personal computer systems. It should be a requirement if you plan to use the computer for numeric applications. (Some systems offer numeric keypads as a separate accessory.)

The Monitor

Like a television, the video monitor—also known as a terminal, output device, or CRT (cathode ray tube)—displays information you need to see in order to communicate with the computer. Unlike a television, however, the monitor also functions as a sort of fluid scratch pad that allows you to manipulate information without having to use paper.

The moment you plug an electronic spreadsheet program into the computer, for instance, the monitor displays the spreadsheet form and perhaps some of the commands you might want to employ. It also displays the figures you enter, "erases" the figures you want to delete, and reenters new information as you dictate. Through the monitor, the program also may call your attention to possible errors, suggest a way to correct them, and then make the necessary changes that you command.

Video monitors display information on a screen just as a television displays images, but because the computer information isn't broadcast, it appears in sharper focus. Monitors are usually described by the number of vertical lines (usually 24) and horizontal characters (40 to 80) that can fit on the screen. Sometimes televisions are modified to serve as video monitors, though they provide considerably less clarity than the CRT and are limited to about 12 vertical lines and 40 horizontal characters.

Look for standard-size monitors (at least a 12-inch diagonal screen) when you evaluate personal computer systems; working for several hours with smaller screens can produce eye fatigue.



Disk storage is the personal computer's way of permanently storing information. Typically, there are two types of permanent storage: bottom, 1) removable "floppy" disk storage; and top, 2) fixed hard disk storage.

- Look for a supplier with experience assembling personal computer systems similar to the one you need. Ask for names of customers who have implemented programs you are considering, and talk to several of them.
- Your dealers should have a sound business reputation and a solid track record for fast and reliable service support. (Again, ask for, and be sure to check, references.)
- Choose a dealer who is geographically near enough to provide maintenance and repairs when required. If you have

to send a computer you depend on 2,000 miles away for a simple repair, the time you're without computer power could stretch into months.

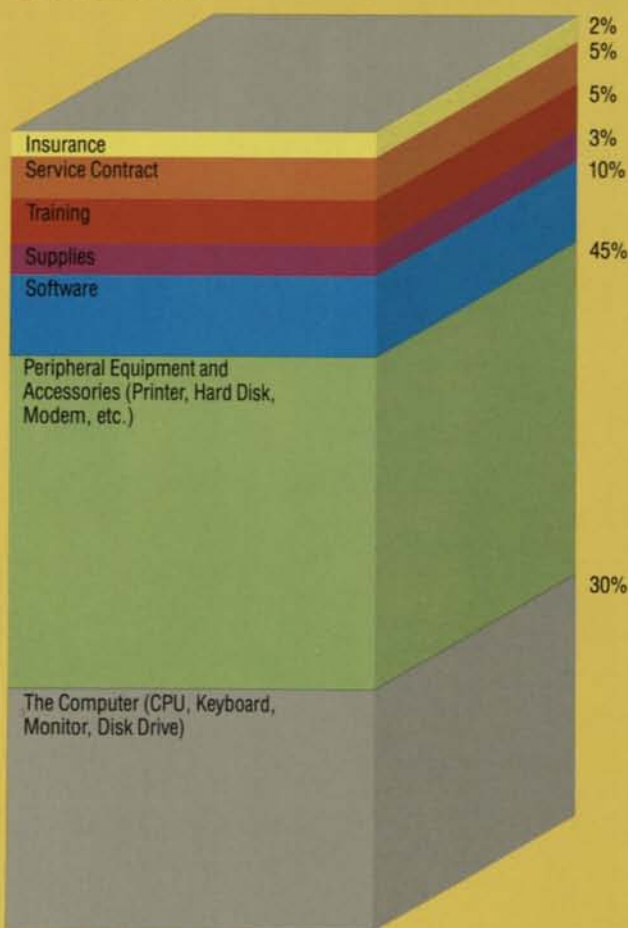
The Service Contract

Personal computers generally enjoy an excellent reputation for reliability, because the components themselves are manufactured under strict standards of quality. Like people, though, almost every computer may have a bad day now and then, and "crash."

For that reason, many computer suppliers provide service contracts that cover parts and labor on repairs, and include a schedule for routine preventive maintenance. (Without a contract, computers are serviced on a straight time and materials basis.)

The price of a service contract varies from one manufacturer to the next. Typically, however, you're charged either a flat rate or a percentage (usually one or two percent) of the cost of the system. (Rule of Thumb: The more costly the service contract, the less confident the manufacturer is of its product.)

What's in the Cost of a Personal Computer System?*



* Plus, if necessary, fees for custom programming

How Much Will the Computer Cost?

It's been estimated that, if automobile production costs had dropped, and features had improved, as rapidly as they have for computers over the last few years, a Rolls Royce would run you around \$2.75, it would get three million miles to the gallon, and deliver enough power to drive the Queen Elizabeth II.

That's how dramatically improvements in technology have affected the price, efficiency, and power of computers. With personal computer systems often costing less than \$5,000, you can look for a twofold payback—in the money you save and make putting the computer to work for you, and in the benefits that new tax laws provide (see "Your Computer and the IRS," following).

How to Estimate Computer Costs

To price a personal computer system, prepare an estimate like the one shown at right, itemizing the costs for software, hardware, peripheral equipment, and supplies. Remember also to include installation and training costs, insurance, and the cost for an extended warranty or service contract.

When you estimate costs for training, include both the out-of-pocket expenses for classes or seminars you take, and the cost of office time necessary to learn enough about a program to put it to work. A financial modeling program, for example, may take a half-day of your time before you can make rudimentary use of it. Other programs, depending on their complexity, require more or less orientation time.

You'll find that costs for formal training vary widely—from \$75 to \$100 for a six- to eight-hour class on a particular application, to \$1,000 or more for an intensive, week-long computer literacy course.

Financing

You can buy or lease a personal computer system, but the direction you take will hinge on your financial situation. Your tax accountant or attorney can help you decide on the most advantageous route.

Direct Purchase

Under normal circumstances, the cheapest way to buy a personal computer is to pay cash. Cash eliminates the high cost of the borrowed dollar. You neither tie up future income, nor commit yourself to interest charges on a depreciating asset.

System Pricing Worksheet**Hardware**

Processor, disk drive, and keyboard	\$ _____
Additional memory _____ K	\$ _____
Additional disk drives _____ @ \$ _____ /drive	\$ _____
Monitor	\$ _____
Printer:	
Thermal	\$ _____
Dot Matrix	\$ _____
Impact	\$ _____
Line	\$ _____
Paper catcher	\$ _____
Cover	\$ _____
Language cards	\$ _____
Interface cards	
Serial	\$ _____
Printer	\$ _____
Other	\$ _____
Graphics tablet	\$ _____
Modem	\$ _____
Total Hardware	\$ _____

Software

Systems software	\$ _____
Utilities	\$ _____
Applications:	
Financial modeling	\$ _____
Business graphics	\$ _____
Word processing	\$ _____
Project management	\$ _____

General ledger	\$ _____
Accounts payable	\$ _____
Accounts receivable	\$ _____
Payroll	\$ _____
Job costing	\$ _____
Data base management	\$ _____
Inventory control	\$ _____
Mail list	\$ _____
Other	\$ _____
Software modifications	\$ _____
Custom software	\$ _____
Total Software	\$ _____

Accessories & Supplies

Floppy disks _____ @ \$ _____	\$ _____
Paper	\$ _____
Forms	\$ _____
Disk storage cases	\$ _____
Furniture	\$ _____
Total Accessories	\$ _____

Service Contract \$ _____**Training** \$ _____**Installation** \$ _____**Insurance** \$ _____**TOTAL ESTIMATED COST** \$ _____

Or, under the new Asset Cost Recovery System (ACRS), you can depreciate the cost of your computer over a five-year period, using specific rates for each year: 15 percent the first year, 22 percent the second, and 21 percent in the next three years. If you're using your computer for research and development, you can write it off over a three-year period. (And if you can't take advantage of these tax deductions because of other deductions or business losses, you can take a slower write-off over a twelve- or twenty-five-year period.)

Third, you'll be able to claim a larger investment tax credit for computer purchases you depreciate under the ACRS. You can claim a 10 percent investment tax credit for business equipment with a five-year life, where prior law allowed you to claim only two-thirds of 10 percent.

This is only a brief summary, and since tax situations vary so widely, you should consult with your tax accountant or attorney to examine provisions that concern you.

Where to Shop for Products and Services

Before 1975, you wouldn't have been able to find a "computer store" no matter how meticulously you scoured the countryside. They simply didn't exist. If you wanted a computer before 1975, you went through the manufacturer.

Today, thousands of computer stores dot the globe, many specializing in small computer systems. Some manufacturers also sell their products through department stores and office equipment suppliers.

Leasing

In the face of rising inflation, however, cash-conscious businesses may lean toward leasing as a practical, readily available source of financing. Though more expensive than direct-purchase buying, leasing requires no initial out-of-pocket expenses such as a deposit or down payment. In addition, taxes, delivery, software, and other costs that are not typically financed by a bank can be included in the cost of a lease.

Your Computer and the IRS

Of the 109 provisions logged into the "Economic Recovery Tax Act of 1981," 3 provisions give a particular boost to computer owners and lessees. They provide a full write-off for many personal computers, as well as new rates for depreciation and investment tax credit.

One new tax law provision allows businesses to deduct, in the same year, the first \$5,000 of equipment acquired in 1982 and 1983; the first \$7,500 in purchases in 1984 and 1985; and the first \$10,000 of purchases after 1985. That means an immediate full write-off for many personal computer systems. And if the cost of your computer exceeds the deduction you can take, you can capitalize and depreciate the excess under new methods of depreciation.



The Case for Apple

Whatever business you're in, we want you to invest in Apple personal computers. We have refrained, however, from making Apple the hero of this book. Readers see through that sort of thing, and, besides, when people draw their own conclusions about personal computers, Apple does pretty well. Here's why:

First. Apple has more experience with personal computers than anyone. We *invented* them. They're all we do. And in spite of growing competition from other companies—including rivals 100 times our size—Apple is still recognized as the industry leader. We build into Apple products a level of quality, performance, and value that has earned the respect and loyalty of more than half a million of customers.

Second. Apple systems are the most flexible personal computers available. Our own product line includes a growing family of compatible hardware, software, and peripheral equipment. More than 300 independent companies have also developed hardware and software for Apple systems. Add these to Apple's product line and you have a vast array of computer products that can be tailored to meet a wide range of business and professional needs—including our own.



At Apple, *everyone* uses Apples. The Sales Department uses them for sales forecasting, trend analysis, management reports, client tracking, commission tracking, and direct mail advertising. Management Information Systems uses them as part of a company-wide electronic mail system, and to consolidate field sales forecasts. Our service centers use them for inventory control, customer billing, and profit and loss statements. And, naturally, we used an Apple to write this book.

Third. Apple systems support more packaged software than any other personal computer. Literally thousands of programs are commercially available to run on Apple computers—more than for any other computer ever made. And by simply plugging in additional circuit boards, an Apple computer will run hundreds of programs written for other computers.

Fourth. Apple is famous for its clearly written, self-teaching instruction manuals. You'll also find a wealth of help and information in Apple dealers' training classes and in business and professional Apple users' groups.

Fifth. Apple's commitment to quality and reliability is reflected in a product repair record that is the envy of the industry. Our quality assurance department inspects all components and materials prior to assembly to ensure conformance to Apple's stringent quality standards. Then, after assembly, our manufacturing department tests every computer at least six more times, operating it continuously for days to make sure it's functioning properly. Only then is it shipped.



Sixth. We've created a worldwide network of service and support you can count on. At more than 2,500 service centers worldwide, you can find full-support dealers who are trained to evaluate your needs and suggest the combination of system, software, and peripherals that would best meet them. In addition, Apple has instituted a National Account Program for corporations that need to introduce, purchase, and support large numbers of computers for their organizations.

Seventh. Apple has developed the most extensive service program of any personal computer company—a program that lets you choose the level of support that's right for your needs. All parts and repairs on Apple systems are covered automatically by our Level 1 service agreement—under the original warranty for the first 90 days. Apple owners can also purchase Apple Care (a carry-in service contract, renewable in one year increments) that protects them against service costs on Apple-manufactured products for one year. And National Account customers can arrange to obtain on-site service that covers all Apple-manufactured products as well as many Apple-compatible products developed by other companies.

These are just some of the reasons why Apple is the best selling personal computer in the world. You're sure to find other reasons when you visit your authorized Apple dealer. Or when you talk with any of the half million people who drew their own conclusions and bought an Apple personal computer.

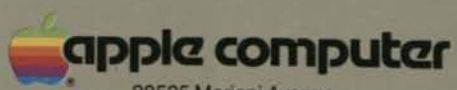
We think you may do the same.



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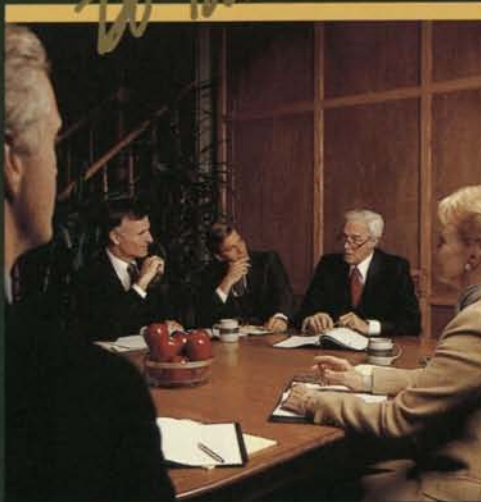
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Account

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*For The Way
you
Do Business*



The Apple III Personal Computer System

For The Professional



The Quickest Things In The World

Ideas. They're born in an instant. And, even after riding a long way on great intentions, they can die just as suddenly — without their own source of momentum.

Most managers, professionals, and entrepreneurs know that what keeps ideas in motion, what finally makes them happen, is sheer determination applied with the proper tools. In today's business world, the most powerful and the most versatile tool at your disposal is the Apple III Personal Computer System.

Decisions. They're made in a snap. But the most informed — the most successful — are often based on information that required man-years to collect. The trick is to synthesize all that information quickly.

The Apple III helps you do this. It's designed to meet the information handling of decision makers at all levels, in every kind and size of company. And it can be expanded in a variety of ways so that, as your responsibilities increase, your ability to handle them stays one step ahead.

Opportunities. They appear without warning — and disappear during a moment's hesitation. How do you evaluate them fast enough to know which ones are worth taking?

With the Apple III. Whether you're looking at sales projections, commodity trendlines, or complex bid specifications, the Apple III allows you to organize and analyze information that can mean the difference between a blunder and a brilliant play.

Apple III... Your Key To Performance In A Fast-Moving World

Some business functions never change. Only our ways of doing them get better.

Decision makers and professionals in every field will always need to plan budgets, generate reports, make projections, and handle dozens of other tasks. The Apple III helps you accomplish your goals — faster, more accurately, and with more useful results — whether you're a:

- **Manager** — looking for a better way than paper, pencil, and calculator to create sales forecasts and departmental budgets;
- **Professional** — who wants a tool versatile enough to help him reach and keep track of



clients, produce written documents, and generate charts or graphs;

- **Entrepreneur** — whose business requires fast, accurate information to insure success;
- **Programmer** — in need of a powerful software development system, with advanced language and mass storage capabilities;
- **Administrator** — whose job depends on accurately keeping and using records, and efficiently scheduling resources.

When people think of personal computers, they think of Apple.

Professional computers used to be bulky, expensive, and difficult to operate. Many still are. But the Apple III is a professional computer with an important difference: it's designed for personal use.

"Personal computer" isn't just another way to say small computer — but it's true that the Apple III system *is* compact enough to sit on your desk and still leave room for papers, elbows, and other things that

need space while you're working. By personal we don't just mean *possession*, either — though once you see the effect an Apple III has on your own productivity, you may rule out sharing it with anybody.

When we say personal — and we ought to know, since we popularized the phrase — we mean a computer so simple to operate that you don't need anyone to show you how to use it. We mean a computer you don't have to wait your turn for (or spend half your budget on), because it's always available and ready to be used, one-on-one.



The Apple III keeps pace with your professional growth.

Because the Apple III is the personal computer for professionals, it can expand to meet your needs as they develop.

The Apple III is designed with growth in mind. You just plug the most common accessories (such as monitors, printers, and up to three Disk III drives) right into the back, without having to open the Apple III.

As your needs grow, the Apple III's internal memory can grow, too, from 128K bytes to 256K bytes — without using any of the Apple III's four internal expansion slots. The slots let you quickly and easily add interface cards for mass storage (with ProFile™, Apple's 5-megabyte hard disk), communications, plotters, test equipment control, and many other types of applications.

Also, Apple as a company offers a wide variety of hardware and software products for the Apple III. Disk storage systems, printers, and software for word processing, graphics, modeling, and communications are all available today. As your professional computing needs become more sophisticated, the Apple III has the essential tools to keep you moving ahead.

In addition, over 300 companies produce and distribute Apple-compatible products — the largest support industry of any personal computer manufacturer — and you'll capitalize on this strength

with the Apple III. You can even run most Apple II programs on an Apple III, thanks to a built-in Emulation Mode. This kind of support and upward compatibility means true security for your investment, now and in the future.



Apple III... A Fully Integrated Computer System

Designed from the start with the professional in mind, the Apple III provides many features to increase your personal efficiency.

The compact design fits conveniently on top of your desk. There are no complicated installation procedures to follow. Simply plug the Apple III into a standard electrical outlet and you're ready to start using it.

A built-in disk drive and controller lets you conveniently run programs and store financial models, text, and other information on space-saving diskettes. The Apple III also lets you add up to three additional Disk III disk drives without purchasing additional peripheral cards.

The human-engineered keyboard emphasizes comfort and convenience. Features include sculptured keys for greater speed and accuracy, a 13-key numeric keypad for fast entry of numerical data, and automatic repeat on every key. Several special function keys and four directional arrow keys simplify program control and movement through text.

A high-resolution video display (560 x 192 dots) displays up to 80 characters (upper and lower case) by 24 lines of text. In addition, a wide variety of character fonts (including inverse video) are available. These features make it easy to

create and edit letters, reports, graphs and financial models.

The large internal memory can handle over 131,000 characters (128K bytes) of information, more than enough to develop and update large forecasting models, long documents, and a host of other applications important in today's business and professional environment. For still larger tasks, you can increase the Apple III's memory to handle over 262,000 characters (256K bytes) of information. And because you can do this without the use of expansion slots, you won't sacrifice any of the system's ability to handle special hardware for special applications.

Two built-in ports on the back of the Apple III allow you to attach a number of accessories *without* buying extra control cards. A "serial" port allows you to attach a letter-quality printer, another computer, or a modem for data communications by telephone. A Silentyte Interface provides direct connection for your Apple III Silentyte draft-quality printer.

Easy system growth is accomplished using four expansion slots inside the Apple III. These slots allow you to install a wide variety of accessory products in just minutes. Combined with the Apple III's other expansion capabilities — larger expandable memory, up to three additional floppy disk drives, and the ProFile™ Personal Mass Storage System — the Apple III is extremely flexible in its ability to grow with your needs.





An advanced control program, called the Apple III Sophisticated Operating System (SOS™), serves as a flexible, powerful foundation for applications and language systems on the Apple III. SOS takes care of all internal "housekeeping functions," such as knowing which disk drive contains the file you are using. SOS's convenient "information clustering" feature allows you to store files in a hierarchical structure, making it easier to find and retrieve them. This feature is especially useful for mass storage devices such as ProFile, where hundreds of files may be categorized, stored, and referenced in a simple manner. SOS also makes it easier to add accessories such as printers and plotters, too, thanks to a menu-driven system configuration program that lets you name devices and access them directly. You can focus your whole attention on word processing, problem-solving, or programming, and leave the details of running the Apple III and its accessories to SOS.

A comprehensive, 90-day limited warranty covers all Apple products. After that, Apple's Extended Limited Warranty is available to cover your Apple III in renewable yearly increments. The Extended Limited Warranty not only covers the initial system, but also the Silentyper printer, and any Disk IIIs or Apple interface cards you purchase during the year. (A separate, low-cost, limited warranty is available for ProFile.)



Apple III... For Professional Applications

Financial modeling, business graphics, word processing — Apple III can assist you on a day-to-day basis in these and other application areas. A complete, powerful computer system, the Apple III increases your productivity in formulating and communicating decisions, creating and distributing memos and documents, and performing numerous other business functions.

VisiCalc™ III — A Powerful Modeling and Forecasting Tool

Created specially for the Apple III, VisiCalc III lets you design, edit, and display an electronic worksheet 63 columns by 254 rows in size, which can be used for working with words, numbers, or formulas. Built-in functions such as Sum, Average, and Net Present Value simplify operation and allow you to concentrate on decision-making.

VisiCalc III is remarkably easy to use, and acts as a natural extension of your own thinking process. It's especially valuable for tackling "What If?" questions. As you modify information in your model to reflect different alternatives, VisiCalc III calculates and displays the results instantly.

Accountants use VisiCalc III to structure and prepare financial statements. Sales

managers use it to develop forecasts. And administrators use it to plan budgets and allocate resources. It makes decision analysis simpler whenever you can organize information into row-and-column format and test various alternatives.

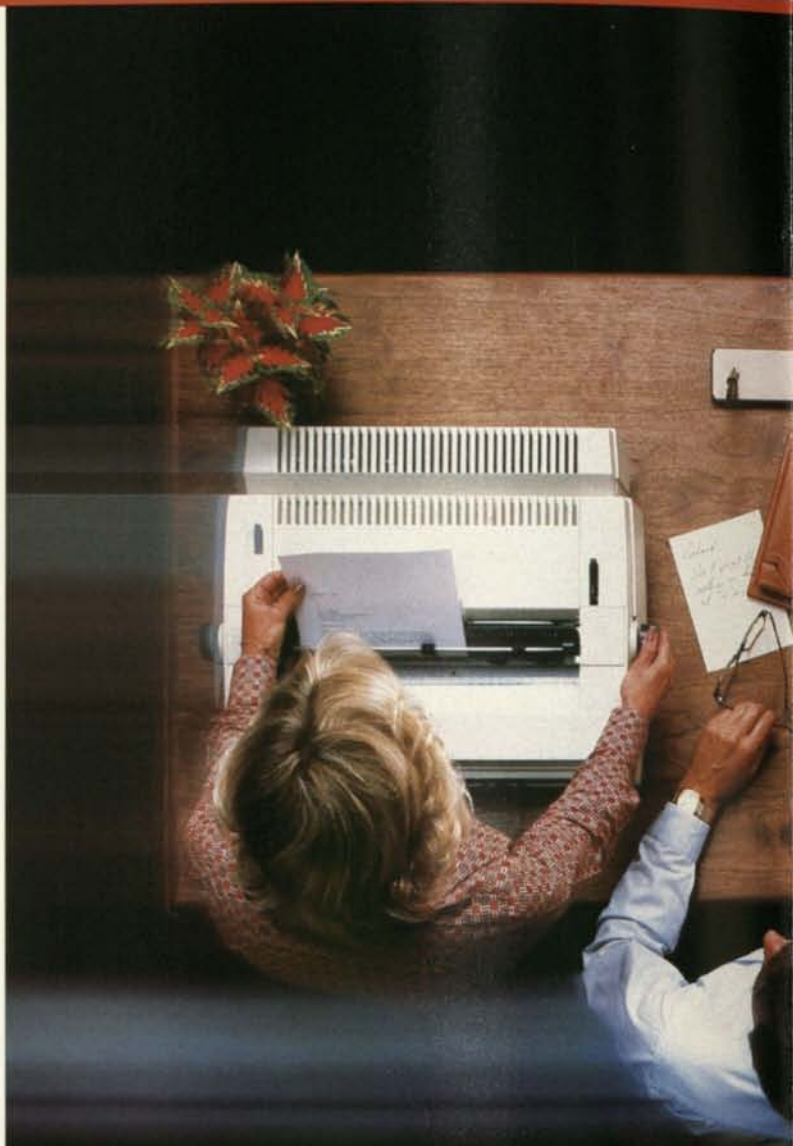
Apple Business Graphics — Graphs and Charts That Tell the Whole Story

Graphs are often essential for understanding and communicating numerical data. Apple III Business Graphics makes generating and printing them easy.

Designed to work directly with VisiCalc III, Apple III Business Graphics lets you combine and plot information stored in one or more VisiCalc (or other) files, without having to re-enter data. More than 70 easy-to-learn commands, which can be reviewed from the program's convenient HELP screens, let you create, modify, and print:

- automatically scaled and numbered line, bar, and pie charts from numerical data;
- exponential, parabolic, and sinusoidal plots;
- best-fit curves;
- sums, differences, and multiples of existing graphs.

Apple III Business Graphics also lets you store, retrieve, and print any graph by means of a few keystrokes. The program produces graphs on the monitor screen, on a printer, or on a plotter, to meet your particular needs.





Apple Writer III™ — The Latest Word in Word Processing

Apple Writer III simplifies creating, editing, and printing any kind of document, from simple memos to form letters or lengthy articles and reports.

Apple Writer III has several special features that help eliminate redundant typing when generating large documents. Easy-to-use commands let you insert or delete words, sentences, paragraphs, or large blocks of text instantly. With Apple Writer III you can also move this text within a document or between documents. In addition, "Glossary" files allow you to store vocabularies of frequently-used words or phrases, which can be inserted into text with just three keystrokes.

Apple Writer III is also designed to work with other Apple III products. For example, you can insert VisiCalc III models in the middle of reports to present tabular information or to simplify complex explanations. You can also use Apple Writer III with Mail List Manager to create form letters with a personalized touch.

Apple Writer III has a unique Word Processing Language, WPL. You can automate frequently performed word processing tasks with WPL, by combining all of the manual keystrokes into a single program. And WPL lets you generate forms — such as memos, invoices, and notices — that effectively customize your use of Apple Writer III and simplify your document processing tasks.

Mail List Manager™ — The Quick Way to Handle Labels and Lists

Put cost-effective direct mail benefits at your fingertips with Apple's Mail List Manager. A highly flexible new product for the Apple III, it allows you to maintain names, addresses, phone numbers, and classified information on your customers or clients.

You can create, maintain, and print mailing label files up to 960 entries long. (Larger lists may be maintained by segmenting them into files of 960 labels each.) And these labels may be in any format appropriate to your needs. When retrieving information you can search by name, ZIP code, or even by *approximate* name (which is useful when you don't know the exact spelling).

Printing with Mail List Manager is very flexible, too. Mailing, phone, and other kinds of lists can be printed in their entirety or in part. When printing labels, you can use any size and type of label on the market, or your own custom labels.

Whether you want to mail a form letter to a list of people, or a brochure to certain businesses within a selected ZIP code area, Mail List Manager handles the task quickly and efficiently.



Apple III... For Communications

Access III™ – The Smart Approach To Communications

The Apple III personal computer system can also double as a smart terminal, with Access III. The product allows the Apple III to send or receive information or act as a smart terminal in a central timesharing system.

Access III uses the Apple's built-in serial (RS232) port to transmit information to and from another Apple III or a central computing system. This information can then be displayed on your monitor screen, printed, or stored on a disk file – capabilities you'll find convenient when including centralized data in reports or developing programs for larger computer systems.

In addition, Access III's terminal emulation mode lets you use the Apple as a terminal for any system that supports asynchronous communications. With timesharing systems you'll reduce on-line charges and save money, because the Apple III allows you to develop programs or text files locally.



Apple III... For Program Development

Speaking the Language of Business

You don't need to be a professional programmer to learn programming on an Apple III — but programmers will enjoy many of its convenient features.

Apple Business BASIC is a powerful computer language that lets you use commands similar to ordinary English. Business BASIC takes full advantage of the Apple III's large memory workspace, advanced file handling capabilities, and wide range of output formats and instruction statements, all of which make it one of the most powerful BASICs available.

Application Development With Pascal

Apple III Pascal creates a powerful application development environment. This includes provisions for complete text processing, file maintenance, and program compilation.

Apple III Pascal is an adaptation and improvement of UCSD Pascal, the micro-computer industry standard. Because it offers a compiled language, you can execute programs quickly in minimal space. In addition, the discipline imposed by the Pascal language can significantly increase programmer productivity.

Upward-compatible and consistent with Apple II Pascal, the Apple III implementation offers significant advantages in performance, memory, and features. Apple III Pascal is the language of choice for application programs used by businesses, the scientific community, and higher education.

32-Bit Floating-Point Arithmetic

Recently, the Institute of Electrical and Electronics Engineers (IEEE) proposed a Standard for Floating-Point Arithmetic which specifies accuracy, internal formats, rounding modes, and special treatment of exceptions (such as overflow, underflow, and division by zero). The Standard provides an environment that facilitates the development of high-quality numerical software.

The Apple III Pascal System offers 32-bit floating-point operations which conform to this new IEEE Standard. That's just another reason why the Apple III is a truly professional, personal computer system.



Apple III — Adding To Your Capabilities

ProFile™: the New, Personal Mass Storage System for the Apple III

Extend the capabilities and power of the Apple III with Apple's new, ProFile Personal Mass Storage System. Its environmentally sealed hard disk lets you store and retrieve nearly 5 million characters of information (the equivalent of about 35 diskettes). That means you can keep many small files or several large ones on line at the same time, without having to change diskettes.

ProFile lets you retrieve information more quickly, too. It's much faster than a conventional floppy disk drive.

ProFile is ideal for . . .

Financial Modeling. ProFile can store all your VisiCalc III or other financial modeling files, and access them within seconds. Coupled with the Apple III's huge 256K memory option, it gives you plenty of room to expand your modeling capabilities.

Forecasting and Budgeting. ProFile helps you make better decisions, because it lets you draw on multiple information sources quickly when generating answers to questions about pricing, market share, profits, and other variables.

Software Development. When developing Apple III software in either Pascal or Business BASIC, ProFile lets you keep all successive versions of both source and object code on the same disk. Pascal programmers will find ProFile especially valuable, because it permits quick access to the various files needed for a typical Pascal program.

Graphics. ProFile and Apple III Business Graphics allows you to create large, highly sophisticated graphics programs. And ProFile's access speed produces finished graphic displays and plots many times faster than conventional floppy disk drives.

Word Processing. ProFile lets you quickly store more than 1,200 pages of single-spaced, typed text. In addition, text and mailing lists can be stored on a single drive to simplify generating form letters.

Mailing Lists. ProFile allows you to store and quickly access, from a single disk, multiple mailing files of names and addresses, up to 960 records for each list, which have been created with Mail List Manager. And when you segment larger lists into files of 960 labels each, you can use ProFile to maintain and print them efficiently from a single storage device.





Disk III – Economical Add-On Storage

The Apple III comes with a built-in disk drive for storing 143,000 characters (140K bytes) of information (over 40 typed, single-spaced pages) on an inexpensive, removable diskette. You can add up to three Disk IIIs to your system *without* the need for additional interface cards or control software.

Universal Parallel Interface Card

The Universal Parallel Interface Card, which plugs into one of the four internal expansion slots, greatly extends the capabilities of the Apple III by permitting you to connect the system to a wide variety of high-speed printers, plotters, and industrial or laboratory equipment. The Parallel Interface Card also allows high-speed transfer of data between the Apple III and other computers or remote terminals.

Silentype™ – Apple's Quiet Thermal Printer

Silentype is ideal for draft-quality text and charts. It's quiet, very economical, and compact. Installation couldn't be simpler, because it plugs directly into its own special socket on the back of the Apple III.

High-Speed, Letter-Quality Printer

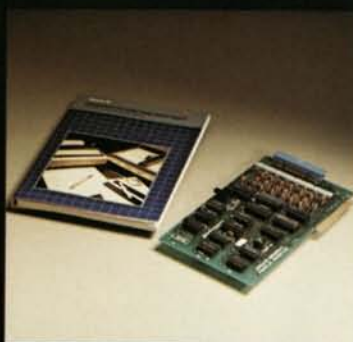
Apple offers a high-speed, "daisy wheel" printer for generating professional looking, letter-quality text. The printer comes with a choice of type fonts and plugs directly into the back of the Apple III.

High-Resolution Monitor III

Styled to complement the professional design of the Apple III, Monitor III displays crisp graphics with a resolution of 560 by 192, and provides up to 80 characters by 24 lines of highly readable text. It offers sharp focus over the entire screen, even in the corners, and the non-glare screen is easy on the eyes.

For further information, ask the expert: your local, authorized Apple dealer.

Apple has a worldwide network of more than 2000 dealers — which means there's probably one near you. Your full support dealer can evaluate your needs, recommend appropriate solutions, and provide after-sale support, such as training, installation, and a variety of carry-in or on-site maintenance programs. See your dealer today for a personal demonstration, or if you have questions about the Apple III that this brochure didn't answer.

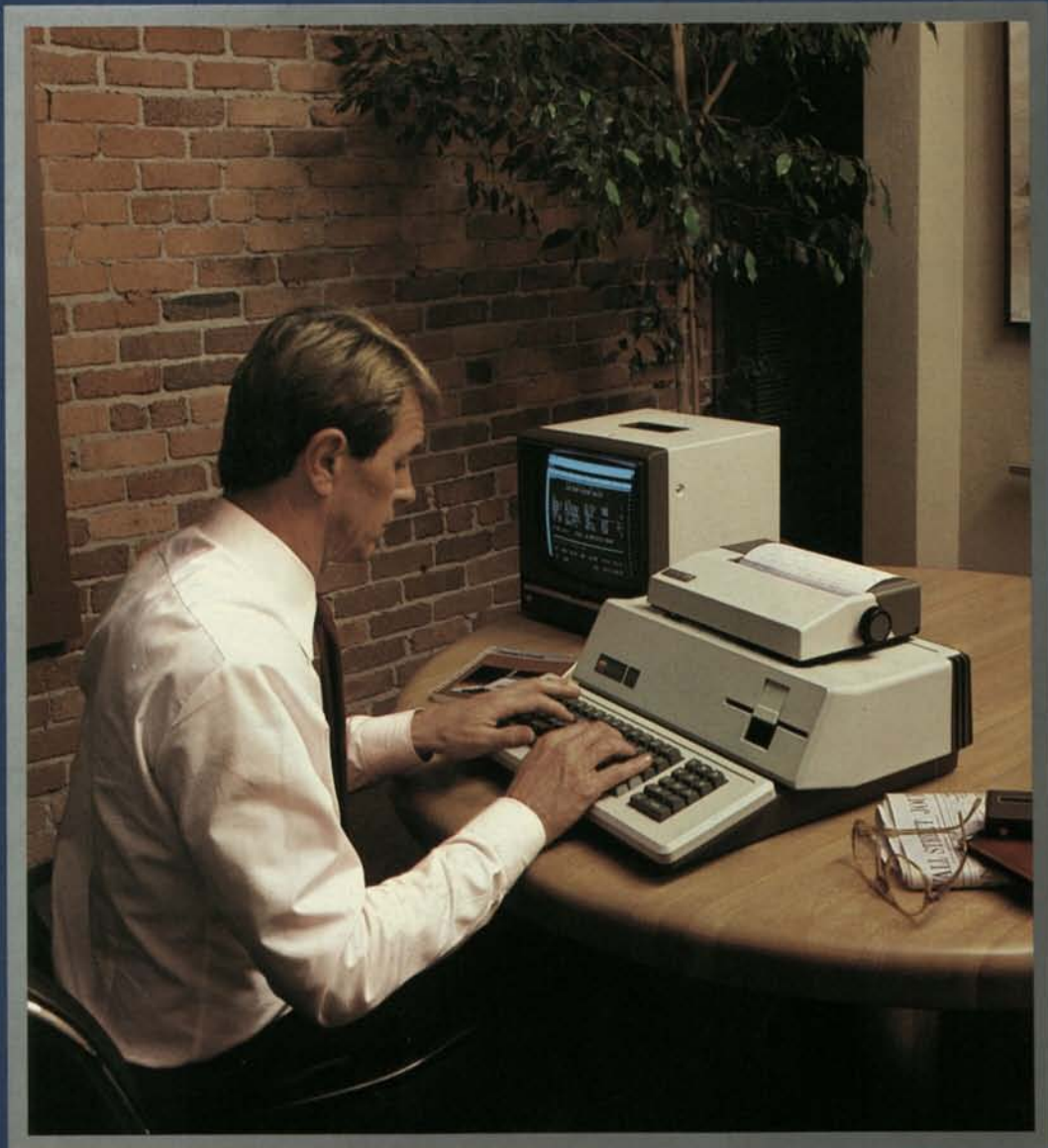




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TLX 171-576

Apple III Information Analyst

More Than A Worksaver



Apple III and the Value of Your Time

Benjamin Franklin said it best: time is money. Particularly in business, where financial success is often the direct result of time wisely invested.

Are you making the best use of your time?

Think about it. What if you could analyze data faster than ever before? What if you could examine more elements of a sales forecast—and meet your deadline with time to spare? What if you could communicate bid factors to clients more quickly? Wouldn't your time be more productive?

The Apple III Information Analyst System has been designed specifically to tackle the tasks that eat into your business day. Tasks like preparing detailed budgets. Performing complex pricing analyses. Developing long-term schedules. Determining returns on investments. Ascertaining the time value of money. Maintaining a comprehensive mailing list. And more.

But is that all a computer system should do for you?

In a fast-moving, productive office, it should do even more. That's why the Apple III is also a full-function word processor, ready to tackle your paperwork problems, too. It can help you create letters, memos, reports, even books in record time. That's another reason why the Apple III is more than a worksaver. It's the simple, affordable solution to many complex business problems.

*The Apple III Information Analyst. Put it to work increasing the value of **your** time.*



The Managerial Tool Box

Apple III grew from an understanding of your needs. The Apple III Information Analyst helps expand your personal efficiency—so that you can concentrate on the creative aspects of your job.

Memory Capacity for People Who Mean Business

Sophisticated tasks demand large memory, and the Apple III Information Analyst has it—96K bytes of memory (internally expandable to 128K bytes). So you can develop forecasts around sophisticated models, sort large files rapidly, and still have room to grow!

The Data Bank

Apple III's convenient, built-in disk drive means greater user efficiency, and easy, cost-effective system expansion, too. You're more productive, because Apple III lets you store and retrieve data in just seconds. You're saving money, because Apple III lets you add up to

three external disk drives without purchasing additional control hardware or software.

Convenience is the Key

You can't beat Apple III for efficient data entry. Its keyboard has been sculptured for maximum typing speed and accuracy. And all key-tops are textured to guard against glare (and finger slips, too). Standard features include auto-repeat on each key for repetitive character entry, and four, directional cursor control keys for single-keystroke cursor movement.

Apple III Has Your Numbers

Knowing that business computing demands rapid numerical entry, the Apple III Information Analyst has been designed with a built-in, calculator-style, numeric key pad. It's a bonus for anyone used to "touch typing" entries on a desk-top calculator.

See It... And Believe It

Entered data appears on a 12", high-resolution, video monitor. It displays clear, crisp text that's easy on the eyes. And Apple III's profes-

sional, 80-character, upper/lower case display gives you an accurate picture of what your reports will look like when printed.

Real Time... All the Time

Apple III's clock/calendar can conveniently place the date on each file. This is especially handy for distinguishing among revisions. You have full control over whether or not to use this feature on your printouts. And the clock/calendar is continuously powered by its own long-life batteries, so your system stays right on time—even if it's unplugged!

The Perfect Couple

Apple III has been engineered to grow with your needs. Two built-in interfaces—one for a telephone interface or letter-quality printer, the other for an Apple Silentype™ thermal printer—make your first system expansions quick and economical. Other accessories plug into expansion slots inside the system.



Apple III The Electronic Worksheet

The Apple III Information Analyst System offers VisiCalc III,™ an outstanding software tool for forecasting and modeling. Any problem you might wish to tackle using rows and columns can be solved quickly—and accurately—with Apple's VisiCalc III.

A Tool for Every Manager and Professional

VisiCalc III is a manager's right arm. Administrators can use it to plan budgets, compare actuals with forecasts, and modify projections. Accountants can rapidly calculate rate-of-return, pro formas, and financial statements. Marketing managers can develop highly-accurate forecasting models and pricing strategies to guide their efforts. Engineers will find VisiCalc III helpful to create models, study causes, effects, and trade-offs—all in seconds, instead of hours or days. The Apple III Information Analyst—a powerful productivity tool for every manager and professional.



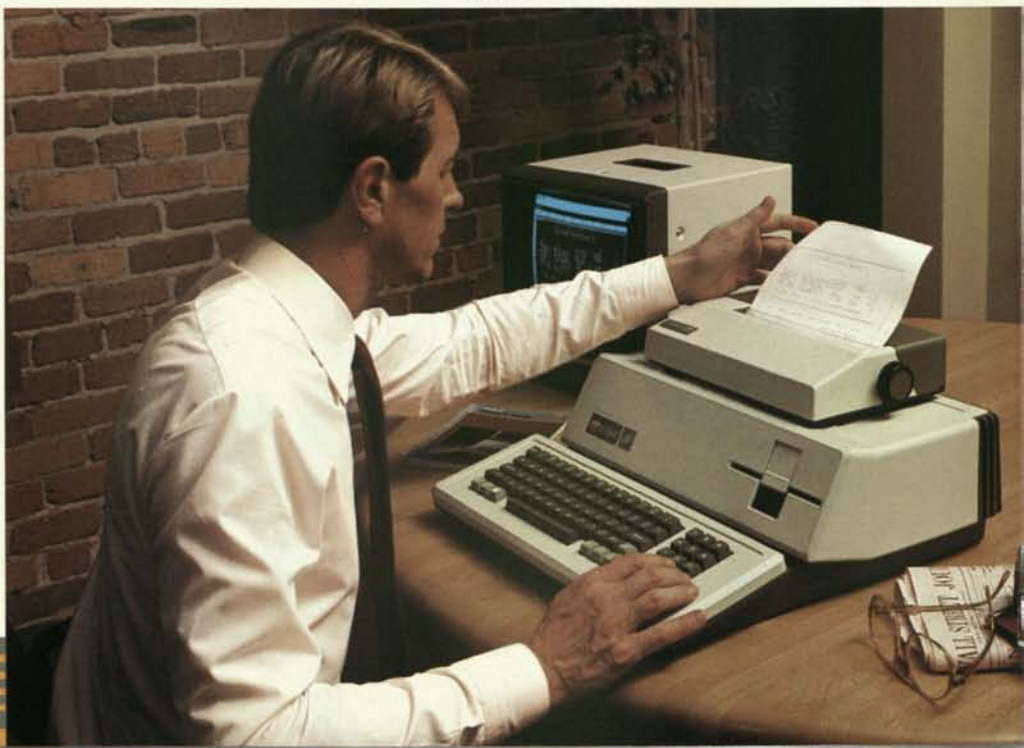
Flexibility and Simplicity

VisiCalc III provides an electronic ledger sheet for words, numbers, and formulas—enough for a five-year forecast. It offers the built-in functions—average, net present value, and many more—that you need to get the job done with a minimum of effort. Calculations are performed simply by entering formulas and data. Your Apple III delivers the answers automatically and instantly.

And VisiCalc III is easy to use. You don't need to be a programmer or computer specialist to receive full benefit from its every feature. Its comprehensive operating manual provides step-by-step instructions and real-world examples—so you can apply VisiCalc III to your own needs immediately.

Adaptability and Versatility

With the Apple III Information Analyst System and VisiCalc III, you can ask "What if...?" questions to determine how different circumstances or variables will affect your numbers. For example, imagine that you've created a business forecast model that takes your Gross Profit, Cost, and Net Income into account. Sometime later, you become concerned about an increase in interest rates. You begin to wonder what the impact would be if your vendors decided to raise finance charges by 2%. With a few keystrokes, the Apple III will update your forecast based on this assumption and display the new information for your review. All that number-crunching with no paper, no pencil, no eraser, no calculator, no frazzled nerves—and no waste of valuable time. Go ahead. Say "What if...?" Apple III will do the rest.



and more...

The Direct Mail Wizard

Direct mail puts you in touch with the people you want to reach. And it's affordable. You can use it to announce new products or services. Introduce your business to new prospects. Remind current customers to take advantage of special sales or discounts. In short, you can quickly and economically deliver any message you wish.

The Apple III Information Analyst offers Mail List Manager, a program that puts cost-effective direct mail benefits at your fingertips. You can maintain any number of names and addresses, sort them by name or zip code, and selectively print mailing labels. Mail List Manager stores almost 1,000 names and addresses per diskette, and sorts them in 75 seconds. And there's no limit to the number of diskettes you can use. Whether you want to mail a form letter to specific individuals, or a brochure to certain businesses within a selected zip code area, Mail List Manager will handle the task efficiently and quickly.



Speaking the Language of Business

You don't need to be a programmer to enjoy big benefits from the Apple III Information Analyst System. But, if you want to program, Apple Business BASIC lets you create software tailored to your precise needs. This language is easy to use and is compatible with thousands of available BASIC programs, so you'll have a head start in creating your own. A particular benefit of this "human engineered" language is its formatting capability. With Apple Business BASIC, your reports can't help but look good!

The Information Analyst Package

The Apple III Information Analyst contains everything you need to put the system to work for you today. With your order, you'll receive:

System Hardware

- Apple III Professional Computer System with built-in disk drive, calculator-style numeric pad, keyboard, clock/calendar, serial (RS232) and Apple Silentype thermal printer interfaces, and 96K bytes RAM (128K bytes optional);
- A second Apple Disk III disk drive;
- A 12", black and white, high-resolution, video monitor.

Software

- Apple's Sophisticated Operating System (SOS);
- VisiCalc III;
- Mail List Manager;
- Apple Business BASIC.



Design the System That's Right for Your Needs

Apple offers accessories and software programs for all your personal computing requirements. Choose the ones you'll need to make your Apple III work best for you. Here's just a sample of what's available.

Printers

The Apple Silentype thermal printer provides draft-quality text and graphic output on paper—at a very affordable price. This compact, versatile unit is portable and flexible, because it receives both its power and intelligence from your Apple computer.



For letter quality printing, Apple offers a fast, daisy-wheel printer. A choice of type styles and carbon or cloth ribbons further complements its text and graphics capability.



More Storage

Need more storage on-line? The Apple III can support up to three external Disk III drives without the need for additional hardware or software. (Your first Disk III is built right into the Apple III computer.)



From the Apple Software Bank

Use Apple's Word Painter™ software to open up your paperwork bottleneck. This word processing package for the Apple III handles everything from simple memos to lengthy manuals. Word Painter's professional editing capabilities allow you to manipulate words, sentences, paragraphs, and even whole pages of text. Normally cumbersome operations—centering, indenting paragraphs, searching for and replacing information—are all automatic. Word Painter is a perfect companion to the Apple III Information Analyst for increasing the value of your time.

The Apple Owner's Protection Plan

Economically protect your Apple III investment with Apple's Extended Warranty. It covers your Apple III for one full year beyond the initial 90-day warranty period. If you add Apple disk drives or Apple peripheral boards during the year, they're automatically covered. You don't have to buy additional protection. The Apple Extended Warranty is an insurance policy for your Apple III—at an affordable price.



Ask the Expert—Your Local Apple Dealer

Apple has a nationwide network of more than 600 dealers and service centers. There's probably one near you. Your local dealer understands your needs and is in the best position to individually address them.

If you want to learn more about the Apple III Information Analyst, visit your dealer for a personal demonstration. Talk with him about what you want your system to do for you. Then tell him you want to put an Apple to work. He'll do the rest.



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Quick File III

Let Your Apple III Master Your Personal Files and Records

Quick File III will help you organize and manage information important to your everyday activities. With it, you can easily turn your stacks of receipts, notes, lists, and schedules into coherent and accessible reports. You can design your own forms for collecting information; print mailing labels, tables, and index cards; and select which subcategories of information you wish to review.

Quick File III deftly manages small- to medium-sized files of 300 to 600 records. Use Quick File III to coordinate your vital business activities such as appointment calendars, phone lists, expense reports—and even to catalog legal documents. Delegate business tasks including your “to do” lists, sales forecasts, project schedules, manufacturing data, and customer lists. And replace legions of bulky paperwork like index and business cards.

At home, use Quick File III to keep track of your investments, book collection, travel itinerary, and scattered notes; photographs, recipes, and holiday/birthday lists; household inventory for insurance policies; and itemized deduction categories for income tax records.

Quick File III—a friendly, fun way to keep valuable information up to date and at your fingertips.

Benefits

Quick File III

- lets you design forms to meet your special needs with the ability to later add and delete new categories of information...
- gives you valuable insight into your records by helping you selectively search, display and summarize them...
- saves you time and effort in producing repetitive reports, calculations, and corrections...
- coordinates your activities, appointments and project schedules—preventing the loss of critical details...
- centralizes many files, reports, and lists—neatly, and in one place...
- provides you with several useful features all in one package: calculated categories, forms you can design, mailing labels, row and column (tabular) reports, printer options, and more.

Quick File III— A Closer Look

Quick File III helps you collect, order and report back your facts. It is based on three simple, clear menus: the Main Menu, File Menu and the Report Menu. It also has the convenience of a File Catalog and a Report Catalog. You control the rest of your activities with a fast and efficient set of ⌘-options or commands. Throughout the program you can always return to the place you just left by pressing the ESCAPE key. HELP screens are available where needed.

Designing Forms to Collect Information

Quick File lets you create your own forms for collecting facts and figures. All you have to do is

- tell Quick File the categories of information you plan to store
- position those categories with the ⌘ and arrow keys.

Later, if you want to reorder those categories, add new ones, delete an old one, or even rename an existing category, Quick File III has a special menu item just for those situations. And you never need to retype your old data.

Quick File III

Viewing Your Records

One special feature Quick File III provides is two different views of your file: one record or many records at a time. With two keystrokes you can switch between these two displays. Looking at many records at a time, arranged in rows and columns, gives you a very helpful overview of your file.

At any time, you can select which of your categories you want to see in the multi-record display. You can change their order, add or delete existing categories. You may, for instance, want to see only Last Name, Address, and Phone Number in a file of 15 categories.

In addition to selecting which categories, or columns, you want to see, you can choose which rows you want to include. Quick File III lets you establish a set of rules to screen out various records from your view of the file.

Adding and Changing Your Records

Quick File III lets you insert and delete new records with two keystrokes or make an exact copy of a record you already have. Another handy feature is that you can set "standard values" for categories as you add new records. If you are adding many records with a 408 area code, for instance, you could set the area code category to "408." All new records would thus have "408" already filled in for you.

Arranging (Sorting) Your Records

You can arrange your records in correct alphabetical, numeric or date or time order whenever you want—for review or reports. Just press ⌘-A for Arrange. Quick File III lets you order your file on all 15 categories.

Creating Reports

Report writing is simple when you work with Quick File III. You can create two types of report formats—tables (rows and columns) and labels or index cards—and save up to eight of those formats with every file.

Quick File provides a whole host of other convenient reporting features, listed under Report Specifications.

System Configuration

To use Quick File III you will need the following system:

- an Apple III system with at least 128K bytes RAM;
- an external disk drive (either Disk III or ProFile hard disk drive);
- Monitor III (or any suitable video display device);
- a compatible printer * and printer interface *.

*Note: Apple III Computer Systems and Quick File III work with several printers and appropriate interfaces, including those specified below:

- Apple Silentype Printer (Apple Product A3M0001) using built-in Silentype interface;
- Qume Sprint 5™ (Distributed Product D2M0060) using Apple III built-in RS-232 interface;
- A printer that uses the Universal Parallel Interface Card (Apple Product A3B0002).

Technical Specifications

Language:

written in Apple III Pascal

File Specifications:

- Maximum number of files per directory or diskette: 26
- Maximum number of categories (fields) per record: 15
- Maximum category length: 76 characters
- Maximum record length: 76 x 15 or 1140 characters

Report Specifications:

- Two types of report formats: tabular, and index cards or labels
- Tabular report offers totals, subtotals and a calculated field
- Choice of which rows and columns are printed and in what order
- Option to line up decimals and numbers neatly
- Title line separate from report name
- Maximum of 8 report formats stored per file
- Printer widths up to 180 columns
- Drivers for Qume and Silentype shipped on the Quick File III diskette

Quick File III

Capacity:

- Maximum number of records per file: varies with record length
- For an average record of 75 characters, 250 records on a 128K Apple III and 550 records on a 256K Apple III
- Memory-based program

Summary of Quick File ⌘-Options:

⌘-A	Arrange	⌘-K	Copy a record
⌘-B/E	Beginning/End of file	⌘-L	Change record/report layout
⌘-C	Calculated category	⌘-N	Report name, title
⌘-D	Delete	⌘-O	Printer options
⌘-F	Find records	⌘-P	Print
⌘-G	Group totals	⌘-R	Record selection rules
⌘-H	Help	⌘-S	Set standard/default values
⌘-I	Insert	⌘-T	Totals
⌘-J	Justify an entry	⌘-V	Print category names
⌘-Z	Zoom In or Out to one or many records		

The Quick File III Package Order No. A3D0020

With your Quick File III order you will receive these items:

- Quick File III boot diskette;
- Quick File III program diskette;
- Quick File III sample files diskette;
- Quick File III Sampler (tutorial manual).

THE APPLE ADVANTAGE

MAKING LIFE EASIER FOR SOFTWARE DEVELOPERS

Have any great ideas you'd like to share? Ever wondered how to make them realities? Or wondered what others in the field thought about a product you've developed? What about working directly with the people behind the technology that helped inspire your product?

The Personal Computer Systems (PCS) Division at Apple Computer is set up to address the questions and needs of software developers, helping innovative ideas and products like yours reach thousands of Apple users.

HOW DOES IT WORK?

Whether you're developing and marketing your own high-quality, Apple-compatible products, or whether you'd like us to take a look at them for a joint marketing effort, the first step is to contact Vendor Support, part of Apple's Technical Support Department.

Since independent developers of Apple-compatible software require a license to use Apple software in their products, a special licensing program has been designed both to protect Apple's copyrights, as well as to put the company in touch with some of its best supporters. Licensing is quick and easy, and offers developers a host of advantages. A complete information package is just a phone call away.

WHAT ARE THE BENEFITS OF LICENSING?

Recognition and support by Apple. Licensing not only allows you to incorporate Apple software in your product, but makes possible direct communications with the people who can be of help. Apple offers a wide variety

of support services, including access to internally developed tools, technical documentation otherwise not found in manuals, periodic announcements and updates—as well as an electronic mail service to provide speedy answers to technical questions.

WHAT ABOUT SOFTWARE EVALUATION?

Also within PCS is a Product Selection Board and a professional team of software evaluators. If you're interested in having Apple evaluate your product, simply send it to us on an unprotected, 16-sector diskette along with complete documentation.

The evaluation process takes approximately 45 working days, and includes ongoing two-way communications between Apple and you. At the end of that time, a status report detailing any problems or suggestions based on the evaluation will be provided.

The mailing address for software submissions is:

Apple Computer, Inc.
Software Acquisition
& Evaluation
20525 Mariani Avenue
Cupertino, CA 95014

CAN I MAKE A SUGGESTION?

Absolutely. Your comments are always welcome. Forms are available from Vendor Support that will allow you, as a developer, to make any hardware or software suggestions you'd like Apple to consider.

NCC RESPONDENTS CONTACT:

Vendor Support
Technical Support Dept.
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014





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VENDOR LICENSING PROGRAM SERVICES AND SUPPORT



APPLE offers a Vendor Licensing and Support Program to encourage software and hardware development for APPLE Products by outside vendors. The purpose of the program is to establish positive working relationships and open new lines of communication with developers interested in APPLE and its Products.

Anyone developing software for use on APPLE computers, is no doubt using APPLE software and is required to be licensed by APPLE. The program is designed to protect APPLE's copyrights and trademarks and to provide the developer with information and guide lines on how to work with APPLE effectively. Fees for licensing run on an annual basis with a payment plan to accommodate both custom development and high volume businesses. The fees cover administrative costs only, and are automatically renewable under the same Agreement upon notice from APPLE. The Agreement allows the developer to incorporate and distribute APPLE software with his/her own products. The annual renewal policy allows for updates, changes, improvements and innovations to be incorporated into the program in a timely, comprehensive manner. Completion of the License Agreement also qualifies the developer to be placed on an active data base. This information allows us to sort by specifics, provide updates on related software packages when possible, and search for developers by market/application area.

The Technical Support Department is staffed by professionals, each an expert in one or more area of APPLE software. Each member of the department can be contacted directly by licensed developers. They offer help with programming difficulties, and generally try to provide answers when none can be had from manuals.

In addition, an electronic mail system is provided for up-to-the-minute news on Software Products and new services. For serious developers of both hardware and software, there is no substitute for quality support. Questions can be responded to quickly and accurately, and documentation provided simultaneously.

Another aspect to the Technical Support Department is its commitment to training all software and hardware developers who are interested in APPLE Products. Several Technical Workshops have been successfully completed in various areas throughout the United States and Europe. Information on future workshops and locations can be obtained directly from the department.

One of the newest services established, is a program whereby qualified developers can receive a hardware discount on an APPLE II or APPLE III. The program is administered through the OEM Sales department, but written requests from developers will also be accepted for evaluation by members of the Technical Support Department. Specific information on the product or project under development should be included in the request, along with the specific hardware needed. The OEM department will then notify the developer of the status of the request.

For further information on the Vendor Support program, contact the Technical Support department at 408-973-3086.



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SOFTWARE EVALUATION PROCEDURES



APPLE receives hundreds of letters and programs from people wishing to have their software programs evaluated for possible acquisition by APPLE. We are flattered. We acknowledge the energy which has gone into most of these efforts.

When these packages are received, each one is first checked for completeness. The software must be completed and accompanied by a finished manual. The receipt is then acknowledged with a letter to the author and the program is read by our Software Acquisition Group. It is given an evaluation for functionality, scope, and completeness. The report, which is the result of this evaluation, is submitted to our Product Selection Board. All inquiries are held in the strictest of confidence. Upon completion of the Product Selection Board Evaluation, the author is sent a follow-up letter as to the status of the program.

At this point, the program can fall into one of three categories:

1. Not accepted
2. Referred
3. Extensive Evaluation

If the program is not accepted we will send the program back upon the author's request.

If the program looks promising, but does not fit into our marketing plan we will offer to refer the program to another publisher.

If the package is kept for extensive evaluation the author will receive a letter stating so and we will make contact in two weeks with further information.

Two critical areas of evaluation are considered: (1) the technical stature of the program, and (2) the marketing viability of the program.

To insure a prospective program will add value to the broad base of APPLE customers, it must meet APPLE's standards. These standards are based on the criteria demanded by APPLE users, based on past experience in the marketplace.

From a marketing standpoint, each program is evaluated in the areas of market impact, user interface, and the additional cost to APPLE to bring the program up to APPLE's standards for publication.

We look forward to the opportunity to evaluate software which is submitted through these channels. If you need further information regarding these procedures, please contact the Software Vendor Support Department at 408-973-3011.



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CATALOG OF PASCAL TECHNICAL NOTES

APRIL, 1982



Apple Pascal Technical Notes are a series of documents which address certain topics in a level of detail not possible in users' manuals. These Notes are supplied to APPLE vendors and OEMs by PCSD Vendor Technical Support. The Pascal Technical Notes should not be confused with the Apple Tech Notes, which is a series covering general APPLE (II and III) technical information. The Apple Tech Notes are provided to APPLE dealers by Technical Communications. The list of currently available Pascal Technical Notes, along with an abstract of each Note, is given below. Pascal Technical Notes 1-3, 5-9 and 13, 14 are obsolete and no longer available.

PASCAL TECHNICAL NOTE # 4: APPLE PASCAL SYSTEM DISK DIRECTORY STRUCTURE

Pascal data structures are provided which completely describe the directory structure of an Apple Pascal blocked volume (a diskette would be one example).

PASCAL TECHNICAL NOTE #10: CONFIGURATION AND USE OF THE APPLE II PASCAL 1.1 RUNTIME OPERATING SYSTEM

The APPLE II Pascal Runtime Operating System can be combined with a vendor's Pascal program to yield a software package which will execute on an APPLE II, even if the Pascal Language System is not present on the target APPLE.

This Technical Note is the documentation which accompanies the APPLE II Pascal Runtime Operating System Product. This document describes:

1. The software components of the Runtime System;
2. Hardware requirements of the user system;
3. Differences between the Pascal Language System and the Runtime System;
4. Restrictions and caveats;
5. Runtime System Configuration Utilities;
6. The Runtime System bootstrapping process;
7. Error handling examples.

PASCAL TECHNICAL NOTE #11: APPLE PASCAL 1.1 BIOS RECONFIGURATION USING ATTACH

ATTACH is a utility which allows the user to 'attach' a custom driver to the Apple Pascal version 1.1 BIOS. Listings of drivers used in BIOS are used as examples.

PASCAL TECHNICAL NOTE #12: DISK II FORMATTER ROUTINE

This document describes the Apple Pascal Formatter Subroutine. This subroutine allows the user to format a floppy diskette in a Disk II from a Pascal program.

An example program and 6 pages of documentation are provided.

PASCAL TECHNICAL NOTE #15: SHORT GRAPHICS MODULE

This document describes the SHORTGRAPHICS unit, which is contained in the APPLE II SYSTEM.LIBRARY. SHORTGRAPHICS is a subset of TURTLEGRAPHICS, with the "relative polar coordinate" features removed to save memory.

A listing of the interface section of SHORTGRAPHICS is provided.

PASCAL TECHNICAL NOTE #16: APPLE PASCAL OBJECT MODULE FORMAT

This Technical Note describes the object module format of APPLE II and APPLE III code files.



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THE SHORT GRAPHICS MODULE

FOR APPLE II PASCAL 1.1



Many applications, especially those designed to use the 48K Runtime system, run out of memory quickly if they use the TURTLEGRAPHICS unit provided with the standard SYSTEM LIBRARY.

If your application uses (or can be modified to use) only those TURTLEGRAPHICS procedures which refer to absolute screen co-ordinates, you can use the SHORTGRAPHICS unit. This special library unit SHORTGRAPHICS has been created which removes the "relative polar coordinate" features of TURTLEGRAPHICS in order to save memory.

This unit also facilitates the display of additional character sets on the graphics screen.

The following procedures and functions are not supported by SHORTGRAPHICS:

- Procedure TURN (Angle:Integer);
- Procedure TURNT0 (Angle:Integer);
- Procedure MOVE (Dist:Integer);
- Function TURTLE (Angle: Integer);

The unit occupies the same slots in SYSTEM.LIBRARY as does TURTLEGRAPHICS; thus you may not use both in the same program.

Documentation and technical support are provided for the SHORTGRAPHICS module.

MEMORY CONSIDERATIONS

Graphic programs which use SHORTGRAPHICS rather than TURTLEGRAPHICS have an additional 2472 bytes of programming space.

SHORTGRAPHICS also conditionally frees up an additional 3700 bytes in the 64K system and 298 bytes in the 48K system.



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DOS 3.3.1P

FOR THE APPLE II



At this point in time micro computer protection schemes have proven unsuccessful and there appears to be no immediate change in this situation. There are some situations where a *limited degree of protection is desirable. If you feel this is the case with your DOS 3.3 based product, you may be interested in using the DOS 3.3.1P disk protection scheme.*

Unprotected Software Products are vulnerable to being copied. This may mean a serious loss of revenue to the software developer if the supporting hardware and documentation are not sufficient in themselves, to prevent software piracy.

DOS 3.3.1P is designed to operate on a DOS 3.3 system.

DOS 3.3.1P, if properly implemented, will protect your software from being copied by such programs as FID and COPY. It will also protect against many nibble copy programs. It will not, however, protect against the "state

of the art" copy programs that have been recently developed.

As is true with all protection schemes, DOS 3.3.1P will increase the cost of developing and producing your software. This is mostly due to the need for more foolproof error handling and the more involved copying process. DOS 3.3.1P is less forgiving of poorly adjusted disk drives than is DOS 3.3.

Documentation and technical support are provided to help you use DOS 3.3.1P.



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LICENSEE: _____ APPLE COMPUTER, INC.

Date: _____ Date: _____

By: _____ By: _____
(Terri Hasbrouck, Vendor Support)

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2. Description of Licensee Products:

3. Termination Date of Agreement:

4. Package Copyright Notices:

5. Plan Selected:

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If the Plan A fee is:	Then the Plan B fee is:
\$ 25.00	\$400 annually (1st 20 products) + \$5 add-on fee for additional products, due quarterly.
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FEE LIST

APPLE II DOS PACKAGES:		PASCAL OS, INTERP	50.
DOS 3.3 Standard Protected*	\$ 50.	Includes SYSTEM.APPLE, SYSTEM.PASCAL, SYSTEM.MISCINFO, SYSTEM.CHARSET, SYSTEM.LIBRARY	
DOS 3.2.1 Standard Protected*	75.		
DOS 3.2.1 Copy	25.	PASCAL SHORT GRAPHICS MODULE*+	25.
DOS 3.3 Copy	50.	APPLEGRAPHICS	25.
FID	50.		
DOS Language Card	25.	APPLE III PACKAGES:	
Includes APPLESOFT/FP BASIC, HELLO/INTBASIC programs.		SOS	100.
		Includes SOS.KERNEL and DRIVERS	
DOS TOOLKIT	50.	BUSINESS BASIC	50.
GRAPHICS FAST DRAW	25.	APPLE III PASCAL PRODUCTS:	
APPLE PILOT +	50.	PASCAL OS/INTERP	100.
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APPLE II PASCAL TOOLS:		SYSTEM.FILER	50.
PASCAL FORMATTER	25.	SETUP.CODE	25.
PASCAL FORMATTER SUBROUTINE*+	50.	All FORMAT.CODE	25.
SYSTEM.FILER	50.	GRAPHICS DRIVER	50.
APPLE II PASCAL PRODUCTS:			
PASCAL 48K RUNTIME*	50.		
(Will run on a 64K system. Fees not to exceed \$300.)			
Includes SYSTEM.APPLE, SYSTEM.PASCAL, SYSTEM.MISCINFO, SYSTEM.LIBRARY, SYSTEM.CHARSET, SYSTEM.ATTACH, RTSETMODE.CODE, RTBOOTLOAD.CODE, RTSTND.APPLE, RTSTRP.APPLE			

Please note the SYSTEM.EDITOR is not available for licensing.

* To be furnished by Apple Computer, Inc.

+ Price = yearly total, regardless of number of products, for these packages only.

EXHIBIT B - PAYMENT TO APPLE COMPUTER

[Faint, illegible text, likely a payment form or invoice]



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Software Requested _____

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Phone Number _____

Type of Shared Disk System _____

Number of Apple Computers Accessing _____

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Initial _____

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1. An authorized representative of ORGANIZATION has signed a copy of this Agreement and returned it with the appropriate fee specified in Exhibit A to an authorized APPLE dealer ("DEALER"), who will forward it to APPLE's Technical Support Department for approval.
2. All access to the Software on the Shared System is made only as part of normal operations of the ORGANIZATION.
3. All users of the Software on the Shared System shall acknowledge to ORGANIZATION that they will not make unauthorized use of the Software, in particular by making unauthorized copies of the Software.
4. For protected Software covered by this Agreement, the original diskettes containing the Software together with proof of purchase are sent to APPLE (care of Technical Support Department), retaining any backup copies. APPLE will promptly send replacement copies coded specifically for use with the Shared System.
5. The fee to be paid by ORGANIZATION is based on the number of APPLE computers on the Shared System, the suggested retail price of the Software, any royalties required, administrative costs, etc. Please see Exhibit A for specific pricing.

In the event that ORGANIZATION later adds APPLE computers to the Shared System, their serial numbers shall be added to the cover page of this Agreement, and ORGANIZATION agrees to pay the appropriate additional fee to the APPLE authorized dealer from which such additional computers were purchased.

Recommended:

Apple Authorized Dealer

Dealer Name _____

Address _____

Signature _____

Date _____

Accepted for ORGANIZATION:

Signature _____

Title _____

Date _____

Approved by APPLE:

Signature _____

(Terri Hasbrouck, Vendor Support)

Date _____



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How to Seek Less and Find More



Quick File II,
Quick File III,
AppleFile III –
Your Apple
Connection
to Data
Management





Data Management Simplified

Most of us are overwhelmed with information. If paper isn't piled high on our desks, it's probably buried in dozens of files, some of it never to be found again.

If you're lucky, you eventually find what you need when you need it. Still, that's hardly the most effective way to run a business or, for that matter, your day-to-day personal affairs. There should be a better way, right?

There is: data management. By harnessing the speed and power of your personal computer, data management software is able to organize, file, and manage all kinds of information—and lots of it. Data management can help you to do a better job, because when you have the information you need at your fingertips, you're in control. And that means better decisions, with more time to analyze important facts.

A data management program is like a file folder. Instead of housing an unwieldy collection of papers or index cards, your data base file is highly compact and stored electronically for repeated use. You can access it for any number of reasons.

Let's say you've created a file listing sales by product for each of five sales regions, and you want to cross-index it for the names of all sales reps who have met their annual quotas. Data management enables you to do that, delivering the information *in seconds*.

It's Not What You Know—It's How You Use It

Data management can save you time and help you make more informed decisions. In effect, it lets you do what you do better by:

- centralizing a variety of files in one location, ending frantic searches for information you need;
- ensuring that the facts you keep are accurate;
- reducing the time you spend preparing reports and calculations designed for repeated use, as well as the time you spend entering repeatedly used data;
- letting you select the exact information you want, providing valuable insight into the significance of your data;
- protecting important details from being misplaced or lost.

Creative Data Management: More Ways to Establish Order

The number of possible uses for data management programs are as varied as the reasons people collect and use information. The following are just a few of the many ways people are using their Apple® computers today with data management programs:

- cross-indexing articles and journal abstracts;
- maintaining appointment calendars and tracking time spent with clients;
- listing project schedules and daily tasks, by employee or subcontractor;
- flagging important data to remind clients of upcoming appointments;
- completing expense reports;
- maintaining membership records;



- creating itineraries and hotel lists to facilitate travel plans;
- listing asset and expense records for insurance and tax purposes;
- cataloging collections—video tapes, rare books, wines, etc.

Choosing the Right Data Management Program

There are many types of data management programs available today; the challenge is selecting the right one for you. Before making your final choice, you should consider the following:

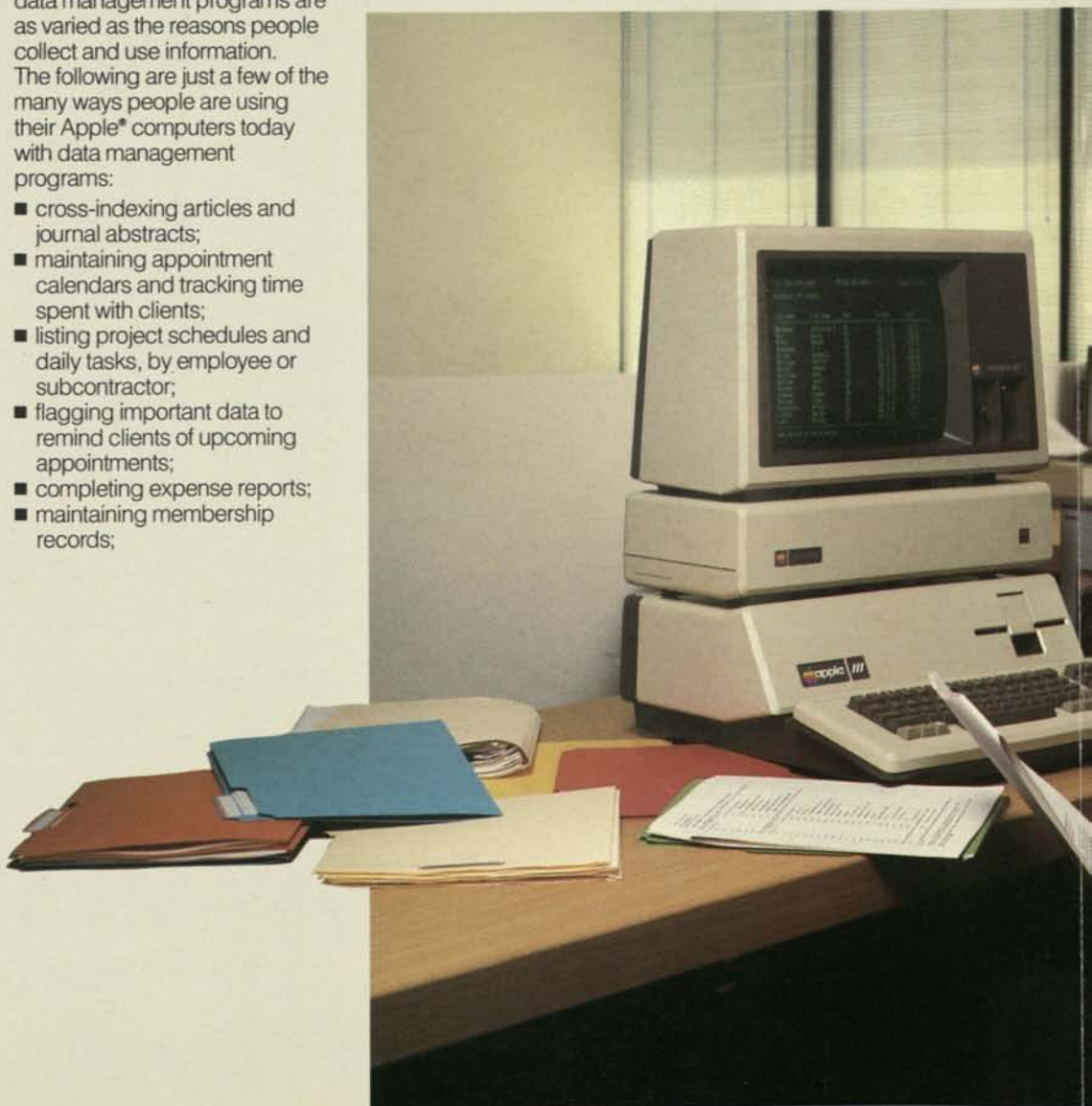
Volume of Information

The first thing you should evaluate is the amount of information you want to manage. If your file contains more than 1000 records, you'll want a program with a large storage capacity. Look for one that utilizes a "disk-based" storage system—it is capable of holding more information than your computer can store in its memory.

If your storage requirements are small, however, you may be able to use a "memory-based" program, capable of fitting an entire file into the computer's memory.

Type of Information

Your next consideration should be the type of information you need to manage. Is it sensitive? Is it vital—like customer or employee records—to your business? Or is it personal information, like phone lists and



appointment schedules, that you intend to use at your desk?

If the information is highly sensitive, or crucial to your organization, you should look for a data management program that offers the following features:

- **Data Types**—rules that enable you to tell the computer what kind of information (phone numbers, dates, text) goes into each part of a record;
- **Entry Rules**—more detailed rules (e.g., only phone numbers with a certain area code) that determine precisely what information can be entered;
- **Data Integrity**—information entered is automatically checked for reliability; in the event a record is damaged, the program will notify you and help you rebuild the file;
- **Passwords**—tools to prevent unauthorized access to your data base.

Think of programs with these features as “structured” pro-



grams, and those without them as less formal—more flexible than structured programs, but with fewer capabilities for ensuring the accuracy and security of your data.

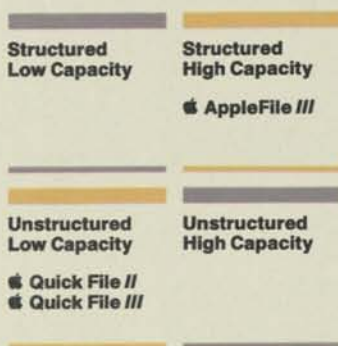
Information Use

Now consider who will actually use the information in your data base. If it's for personal use,

you may want an unstructured program readily adaptable to most any need, like Quick File II or Quick File III.

If the data base is to be used throughout your company, however, or by several people in a department, a structured data management program—such as AppleFile III—is probably better suited to your needs.

The following chart has been designed to help you further understand these key distinctions.



Quick File™—The Personal Data Management Solution

Quick File II and Quick File III are nearly identical data management programs designed to work with small to medium-size files. Flexible and easy to customize, they are ideal for personal use in the home or office.

Each features easy-to-use menus, summary *Help* screens, plus the convenience of allowing you to custom-design forms for data entry. With Quick File, you can also redesign forms without retyping data; sort or arrange files by any one or all 15 possible categories (fields); as well as view records either one at a time or several at once, arranged

in rows and columns. Extremely versatile, Quick File allows you to create several report formats—row and column, index card, or label.

The major difference between these two programs is their storage capacity: Quick File II can manage up to 500 records on an Apple IIe with 128K memory, while Quick File III can handle 1250 records on a 256K Apple III.

AppleFile III—The Professional Data Management Solution

AppleFile III is a data management program designed to work with your Apple III and a high-volume mass storage device, such as Apple's ProFile.™ It offers more structure and greater capacity (up to 16 megabytes per file) than either of the programs in the Quick File family, and is especially well suited to the professional data management needs of individuals as well as organizations.

With AppleFile III, you can store, arrange, and review records easily; print reports in rows and columns; summarize data with totals, averages, and counts. You can also keep information organized in any of eight orders (e.g., alphabetically by last name, or chronologically by birth date), or create a temporary order with which to print reports.

You can, in addition, use AppleFile to scan thousands of records by listing a summary portion of each record. It also allows you to redesign files—without retyping data. And, as a structured data management program, AppleFile III provides data integrity and record protection. It automatically evaluates entries for clerical errors, ensuring they conform to criteria you've defined; plus it offers user-defined passwords to protect your data from unauthorized use.

Apple, the Apple logo, ProFile, and Quick File are trademarks of Apple Computer, Inc.



Comparing Data Management Programs

The following table highlights key differences among Apple's data management programs. It can

help you select one that's right for you and can also help you evaluate other data base programs

on the market today. Contact your authorized Apple dealer for additional assistance.

Characteristic	Quick File II	Quick File III	AppleFile III
Capacity			
Maximum fields (categories)	15	15	80
Maximum characters per field	76	76	255
Maximum characters per record	1140	1140	1000 ¹
Maximum records per file	Varies with record length, disk space, and (for AppleFile III) number of keys		
For average record of 100 characters...			
with 64K Apple IIe	100	NA	NA
with 128K Apple IIe	500	NA	NA
with 128K Apple III	NA	225	NA
with 256K Apple III	NA	1250	20,000 to 30,000 ²
Data Entry			
Field types ³	1	1	8
Entry rules	no	no	yes
Standard entries	yes	yes	yes
User-defined forms	yes	yes	no
Reports			
Row-and-column format	yes	yes	yes
Label format	yes	yes	no
Print reports as ASCII files	yes	yes	yes
Maximum columns per report	15	15	40
Maximum report formats per file	8	8	limited only by disk space
Subtotal levels	1	1	8
Calculated columns	1	1	0
Totals/averages/counts	totals only	totals only	all
Search criteria	range/equals/not/contains	range/equals/not/contains	range only
General			
Passwords	no	no	yes
Change file without loss of data	yes	yes	yes
Merge similar files	no	no	yes
Access method	memory based	memory based	disk based (RPS) ⁴
Data accessible programmatically	no	no	yes ⁴
File structure separate from data	no	no	yes
Protection from power failure	no	no	yes
Help screens	limited	limited	extensive
System Requirements			
Computer	Apple IIe (minimum 64K)	Apple III (minimum 128K)	Apple III (minimum 256K)
Disk drive(s)	two Disk IIs	one Disk III	ProFile or other mass storage system
Monitor ⁵	Monitor III	Monitor III	Monitor III
Printer	optional	optional	optional

¹ Number of characters depends on field types used.

² This assumes three small keys and an empty 5-megabyte ProFile.

³ For Quick File: text with date and time formats; for AppleFile: text, phone, real, integer, SSN, money, time, and clock—all with special formats available.

⁴ AppleFile data is accessible programmatically through RPS (Apple III Record Processing Services).

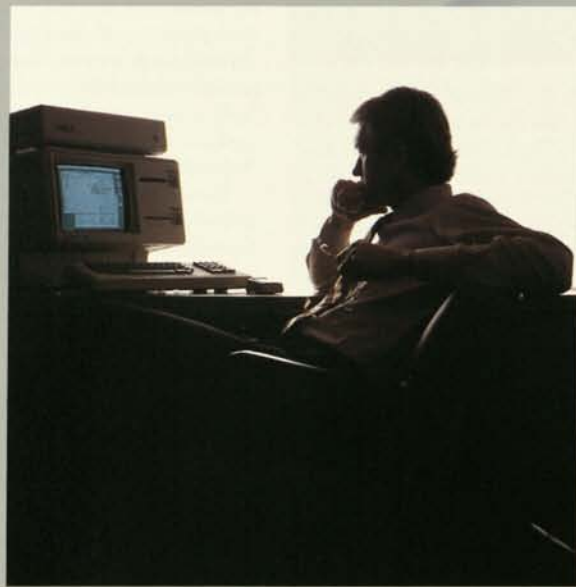
⁵ Or any compatible video monitor.



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Lisa

Lisa. It works the way you do.



This Is Lisa, From Apple.

You've never worked with a personal computer like it. Because Lisa™ works the way you do.

The system is so simple to use that you control it intuitively. Lisa has no conventional computer commands. Instead, you operate it by pointing to familiar pictures on the screen. You can actually learn to do useful work with Lisa in 20 to 30 minutes.

Lisa's radical simplicity is matched by its power. The system replaces conventional computer programs with a pool of powerful business tools. From it you spontaneously select what you need, exactly when you need it. Words, numbers, charts, graphs, pictures—Lisa lets you create and combine them naturally to produce clear answers to your questions and clear information for your organization.

The Lisa system. The only personal computer that's simpler and more powerful is your own mind.

The New Computing

Lisa at Work. You can do more using Lisa and one hand than you can using a conventional computer and both hands. That's because you control the entire Lisa system with a simple device called a mouse. The keyboard is just for typing.



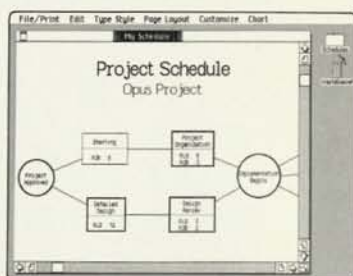
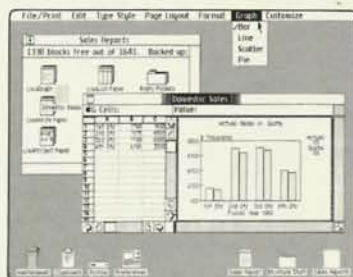
With the mouse, you control a pointer on the computer's screen. Point to the screen's graphic images, select what you want, and Lisa does the rest instantly. With incredible speed and simplicity—and without the usual thicket of computer commands—you handle every operation you need.

Using the mouse and Lisa's graphics, you can select and operate any business application; move information from one application (such as LisaCalc) to another (such as LisaWrite); create, examine, reorganize, and revise files; run modems, printers, and other peripheral devices; and communicate with central computers.

The mouse and the natural movement of your own hand. They're all you need to control Lisa. That makes it the one personal computer you already know how to use.

Learn Faster, Do More. Each of Lisa's six business applications is formidable. LisaCalc, LisaList, and LisaProject let you do modeling, list management, and project scheduling. LisaWrite handles everything you write. LisaGraph and LisaDraw help you create business graphs and virtually any other graphics that your work requires.

But what each application does is only the start. Working together, they do even more.



First, all of Lisa's applications are controlled in the same way, using the mouse. That lets you learn your first application fast and subsequent applications even faster. In fact, in less time than it takes to learn a typical personal computer program, you can learn to use *all* of Lisa's business applications.

Second, valuable data from one application can be made even more valuable by using it in another application. For example, you can cut important infor-



mation from LisaCalc and paste it into a LisaWrite report. The possibilities are endless. They're also simple and spontaneous because cutting and pasting are done in seconds, using only the mouse.

A Picture Vs. A Thousand Words. Lisa also gives you the unparalleled advantage of using pictures as easily as words. That lets you communicate in radically simpler, more powerful ways. Graphs and charts are just the start. Lisa's remarkable software frees you to create precisely the illustrations your messages need—everything from quick sketches in memos to sophisticated materials for presentations.

And Lisa lets you print all of it exactly as it looks on the screen. Lisa's dot matrix printer reproduces *all* your work with a sharpness matched only by printers that cost much more. Lisa's daisy wheel printer can duplicate anything on the screen, too, including graphics.

Lisa's integrated software and extraordinary graphics let you multiply the power of all your information. That gives you a business advantage that no conventional personal computer can offer.

Technology That Means Business

Unmatched Hardware. On your desk, Lisa is quiet (no fan), convenient (advanced ergonomics), and streamlined (reduced footprint). It also has the speed and capacity to crunch every task you use it for. The system has a 32/16-bit central processor, and one megabyte of main memory.

It uses ProFile,TM Apple's high-speed hard disk storage device, to keep all business applications and files instantly available. Two built-in floppy disk drives handle an additional 1.7 megabytes of usable information and let you quickly make backup files, do automatic system tests, and use additional data, languages, and programs. Lisa also handles extra tasks, such as printing, while you continue important work on the screen.

Lisa's keyboard is standard and simple—the mouse replaces special function keys. The 12-inch, bit-mapped, black-on-white screen lets you create extraordinary graphics and up to 132 columns and 40 rows of sharp, clear text.

At the back of the system, you can plug in printers, modems (including auto-dial/auto-answer), and more.

Supersoftware. Lisa's six comprehensive applications are prodigious office tools for the most important business functions. Its sophisticated spreadsheet, list management, word processing, and graphing applications do far more and are easier to use than any typical personal computer programs. And Lisa's project scheduling and graphics editing applications do fundamental management tasks that are simply not possible with conventional personal computers.

These six are just the start. Three languages—powerful versions of BASIC, Pascal, and COBOL—let you use as well as write additional business

programs. And with the Lisa Applications Development Tool Kit, programmers will be able to create Lisa-style programs that extend the system's powers even further.

Lisa In Your Office

Today. Lisa's effectiveness starts as soon as you plug it in. The system performs all the powerful functions you need with stunning simplicity. Surprisingly, it's priced like many conventional personal computers. Even if your department's budget is limited, you can put Lisa to work now.

And Tomorrow. Better still, you can keep Lisa working even when your department grows. That's because the Lisa system expands in amazing ways. You can use Lisa to search valuable commercial data bases such as MicroNet, Dow Jones News And Quotes, and The Source. You can use Lisa as a terminal for corporate mainframes, central minicomputers, or virtually any other large computer system. And you'll be able to link together any of your Lisa systems (and other Apple computers) with AppleNet,TM the fast, inexpensive, reliable network being developed by Apple. AppleNet can start small and grow to cover your whole organization.

All Kinds of Backup. Support and service for Lisa are as flexible and comprehensive as the system itself.

Lisa instruction, for example, is efficient in organizations of any size. With the system's innovative self-teaching materials, a single user can put Lisa to work in less than 30 minutes. Self-instruction for conventional per-

sonal computers takes about ten times as long. And if whole departments need to learn en masse, Apple can provide complete training programs—and even help your business develop its own specialized programs.

Service for Lisa is just as broad. You can get fast, economical service for any number of systems. You can even set up your own service department. Apple can provide all the training and supplies.

In a word, no matter how you put Lisa to work in your company, you'll have support and service that work the way you want.



The Lisa System. You Should Know More.

It's the only personal computer that works the way you do. To learn how you can put Lisa to work, call Apple at 800-662-9238. We'll give you the phone number of the national accounts office or authorized Lisa dealer in your area.



Specifications

Display:

- 12 inch screen (measured diagonally).
- Full-screen bit-mapped display
 - 364 lines by 720 dots.
 - up to 40 lines of 132 characters.
- 60 Hz refresh rate.
- Contrast level under software control.
- Contrast-enhancing screen.

Keyboard:

- Detached, standard typewriter-style.
- N-key rollover.
- Sculptured keytops
 - textured, nonslip, nonglare.
- Numerical keypad with raised dot on 5 key.
- Full ASCII character set, up to 77 keys.
- All keys programmable.
- Smart interface with control-oriented processor.

Mouse:

- Extremely fast, intuitive cursor positioning.
- Works well on any surface.
- Simple one-button design eliminates confusion and the need to learn commands.

Disk storage:

- 860K bytes (per drive) formatted storage.
- 1.4M bytes (per drive) unformatted capacity.
- 62.5 tracks/inch.
- 10,000 bits/inch.
- Automatic disk eject.
- Smart interface with 6504 processor.

Main processor:

- MC68000 32/16-bit CPU
 - 32-bit internal architecture.
 - 16-bit external data path.
 - Seven levels of interrupts.

Real-time clock:

- Software system on-off control.
- Interval and event timing.
- COPS processor, battery backup.

Main memory:

- 16K bytes of boot ROM.
- Up to 1M bytes RAM.
- Parity error detection.

Memory management:

- Permits operating system to relocate segments in memory.
- Provides access controls for block memory.
- Segmentation into 128 variable-length blocks.

Communications interface:

- Two serial ports
 - SCC controller.
 - programmable.
 - full-function.
- RS-232 with full-duplex channels.

- Full modem control and ring indicator on one channel.
- Baud rates software-programmable.
- One parallel port
 - 8-bit bidirectional.
 - handshake control.

Audio output:

- Built-in speaker with software-controllable tone generator.

Expansion board slots:

- Three slots.
- Zero insertion-force connectors.
- Direct connection to system bus.
- DMA capability.
- Memory-mapped I/O.
- Vector interrupt capability.
- Direct connection of power supply:
 - digital ground.
 - +5V, -5V, +12V, -12V.
 - allows up to 10W total (maximum rating) for all three cards.
 - +5V standby (at 58 mA) per board.

Weight and dimensions:

- Computer console:
 - Weight: 48 lb. (22 kg).
 - Height: 13.8 in. (350 mm).
 - Width: 18.7 in. (475 mm).
 - Depth: 15.2 in. (388 mm) [16 in. (403 mm) with keyboard under front].
- Keyboard:
 - Weight: 4 lb. (1.8 kg).
 - Height: 2.7 in. (68 mm).
 - Width: 18.7 in. (475 mm).
 - Depth: 6.5 in. (165 mm).

Power requirements:

- 115 or 230 V. AC.
- 48 to 68 Hz.
- 270 W (maximum).

Environmental requirements:

- Ambient temperature: 40°–108° F (5°–42° C).
- Relative humidity: 15–80%, noncondensing.

Applications:

- LisaCalc (spreadsheet modeling), LisaList (list management), LisaProject (project scheduling), LisaWrite (word processing), LisaGraph (business graphics), LisaDraw (graphics editor), LisaTerminal (terminal emulation).

Languages and development environment:

- BASIC, Pascal, COBOL, Lisa Editor, Assembler, Linker, Debugger, and a wide range of utilities.

Communications:

- 3270 BSC.

System expansion:

- Apple Dot Matrix Printer, Apple Daisy Wheel Printer, Apple ProFile (5MB hard-disk storage device), Modem, 2-port parallel card, and AppleNet Local Area Network (Ethernet connections available for Apple products).

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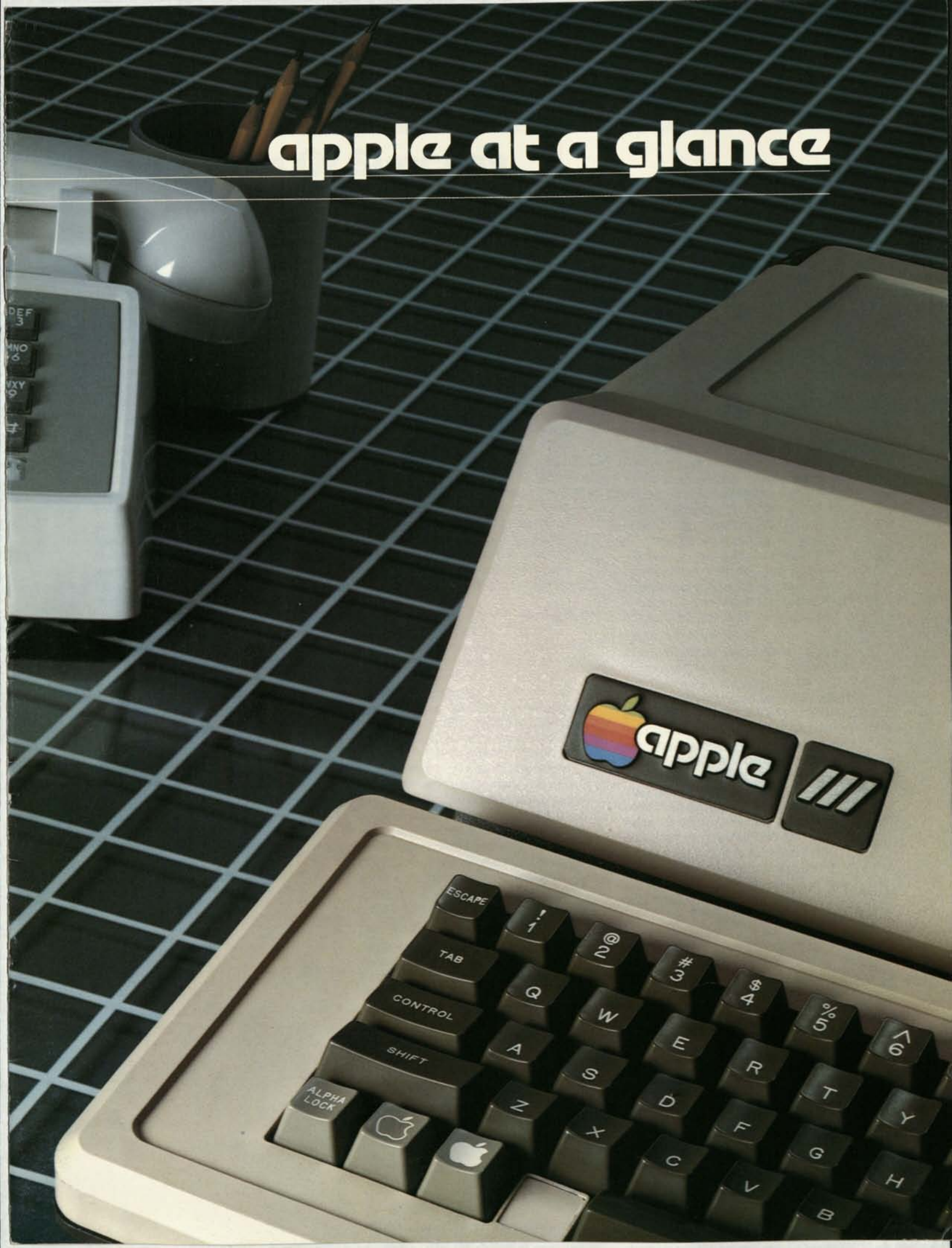
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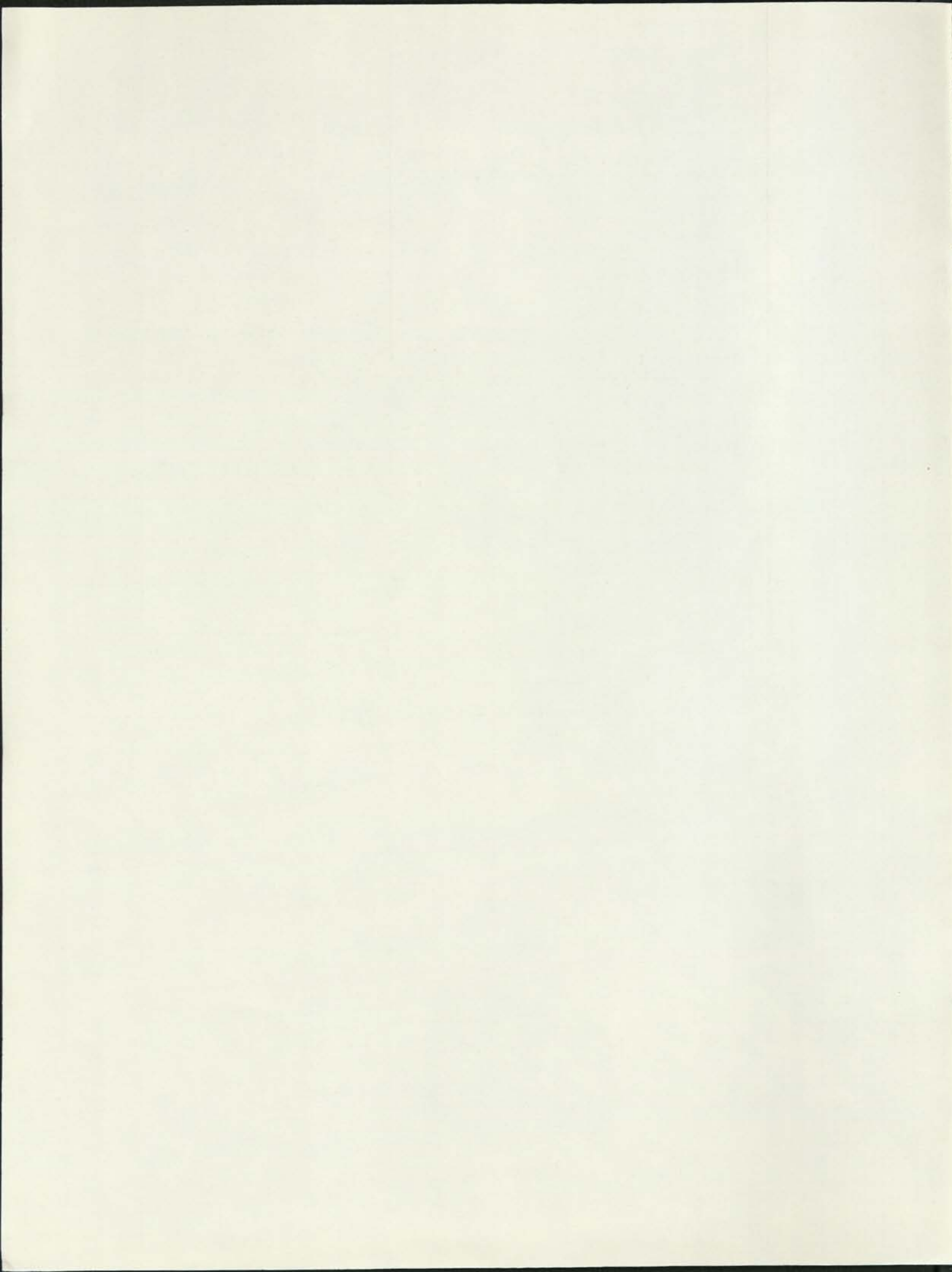
Product specifications may change without notice.

apple at a glance





apple



The Seeds Of Success

The advent of a personal, affordable computer is one of those milestones of technology which mark the beginning of a new and better way to accomplish work and express creativity. Apple, acknowledged as a leader in personal computers, was the first company to make available to millions what was once available only to large organizations—computer power.

Founded in 1976, the company was the brainchild of two young engineers with big dreams and small resources. They made the prototype Apple computer in a garage, that now proverbial birthplace of many great ideas in California's Silicon Valley. This humble beginning—a nice but true touch to their success story—didn't detract from the technological sophistication of the computer they christened "Apple", a whimsical name as unusual as the product itself.

Acclaim By Innovation

Computer hobbyists were the first market of the fledgling company. Most were electronics engineers, targeted because they could easily recognize the high performance and overall quality of the new computer. And recognize it they did: demand for the Apple I soared, soon outstripping the production capabilities of the garage. Apple had arrived.

In 1977, the company revolutionized the personal computer market with the introduction of the Apple II, the first fully assembled computer of its kind. Unlike the "kits" offered by the competition, its performance did not depend upon the varying talents of its users to solder, wire, assemble components, and "debug" the finished product.

Additionally, the Apple II was the first fully programmable computer of its size. It brought many of the capabilities of large data processing systems into the everyday lives of individuals, at a cost and convenience not previously possible. Acceptance of the Apple rapidly spread from hobbyists to business managers and other professionals.

Today, Apple Computer Systems are used in small businesses and large corporations; in elementary and secondary schools; in college classrooms; in science and engineering laboratories; and in homes throughout the world. By any standard—price/performance, dependability, enhanceability, service, software support, ease of understanding and operation—Apple is the preferred personal computer.

Service And Support

Apple's commitment to quality is reflected not only in its products, but in its outstanding service and user support as well. There are more than 500 authorized Apple Service Centers worldwide: the largest personal computer maintenance network in existence. There's a hotline to Apple Headquarters in Cupertino, California, where applications experts stand by to provide assistance by telephone

when needed. And—because excellence is designed into every product—Apple is able to back its computer systems with the lowest-priced Extended Warranty package in the industry. This total support, unique in the personal computer field, is another reason why the Apple computer is the best personal computer available.

Documentation

Apple's philosophy of excellence is also demonstrated in its comprehensive documentation. As the design of its computers indicates, Apple understands the challenge and utility of simplicity. Apple equipment and program manuals contain easy to follow exercises and clear, detailed explanations of procedures. Apple's objective is to educate and build user confidence and familiarity so that Apple products can be put to work quickly.

Apple's Future

According to Business Week Magazine*, "Of all the companies that owe their existence to the hobby computer phenomena, only Apple has emerged so far with the strength to become a significant factor in the small-computer markets of the 1980s."

Apple's dedication to quality is the basis of this strength and the most effective way it can continue its remarkable growth. Through its advanced research and development activities and commitment to product excellence, Apple is determined to expand its position as the preferred personal computer manufacturer. It is well on its way.

*Surviving the Microcomputer Shift, April 14, 1979.

APPLE AT A GLANCE

A Summary of
Apple Products

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The following is a mini-catalog of Apple products. For more detailed product information and specifications, visit your local Apple dealer. Ask him for the latest copy of Apple In Depth, a complete reference guide to Apple products.

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PERSONAL COMPUTER SYSTEMS

APPLE II

Apple IIs are typewriter-sized tools that can make working more productive, learning more exciting, and leisure time more creative. Their built-in BASIC language (Applesoft Floating-Point BASIC in the Apple II Plus, Integer BASIC in the Apple II), makes it easy to create programs that do things for you. Color and sound capabilities keep your interest (and the kids', too); and 48K bytes internal memory capacity means your Apple can handle sophisticated business and scientific tasks. Eight accessory slots let the system grow with your needs.



APPLE II SOFTWARE BANK

Apple and more than 170 other companies offer programs for use with your system. Whether you're looking for help with accounts receivable records or a new type of entertainment, you'll find it in the Apple Software Bank. And just as important—you'll find the documentation you need to get started quickly, even if you've never used a computer before!

THE CONTROLLER Small Business Management and Accounting

The Controller helps a business manager handle his General Ledger, Accounts Receivable, and Accounts Payable computer software. Designed for non-technical people, it easily maintains the ledger, and customer and vendor accounts of many small businesses. The Controller helps control cash flow, reduces paperwork, eliminates "catch-up" accounting, and provides concise summary reports that allow managers to make better decisions.

The Controller is packaged in an attractive 3-ring binder with a manual and diskettes. It requires 48K RAM, dual disk drives, Applesoft BASIC language, and Printer IIA.

THE CASHIER A New Concept in Store Management

The Cashier simplifies a retailer's job by monitoring inventory levels and creating sales documents. It processes backorders, down payments, and refunds, and can manage an inventory of more than 800 stock numbers. Transaction and customer account information is automatically used to generate sales receipts, billing records, mailing lists, and accounting summaries. The result is better control of inventory, resulting in reduced shrinkage.

The system is packaged in a binder with a manual and diskettes. It requires 48K RAM, dual disk drives, Applesoft BASIC language, and Printer IIA.

APPLE WRITER Text Editing Made Simple

Apple Writer helps you create and edit memos, letters, even a novel. You can enter text, save and insert segments from a diskette, and search the document to replace letters, words, or phrases automatically. An optional printer puts your thoughts on paper, letter-perfect every time.

Apple Writer is packaged with a manual and program diskette. It requires 48K RAM and one disk drive. For printing documents, a printer and interface are necessary.

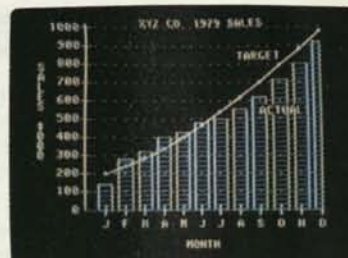


APPLE AT A GLANCE

APPLE PLOT "Charting" the Way

Apple Plot helps you turn any information (from sales and stock activities to caloric intake and miles per gallon), into dramatic, comprehensive bar, line or scatter charts. The program allows you to update and change information as needed, and to label the charts exactly as you wish. Add a printer, and you can put your graphs on paper for presentations or later analysis.

Apple Plot is packaged with a manual and program diskette. It requires 48K RAM, Applesoft BASIC language, and one disk drive. For printing charts, a printer and interface are required.



APPLE POST Mailing List Maintenance the Apple Way

Apple Post helps you create and use mailing lists of up to 500 names and addresses per diskette. It allows for easy entry and editing, and can print customer lists or actual labels by name or zip code. Apple Post even lets you locate names and phone numbers quickly, and uses a unique "phonetic search" feature when correct spelling is not known.

Apple Post is packaged including a manual and program diskette. It requires 48K RAM, 2-6 disk drives, Applesoft BASIC language, and Printer IIA.

DOW JONES SERIES: PORTFOLIO EVALUATOR The Stockmarket at Your Fingertips

Get the most from your stock investments. Use Portfolio Evaluator to maintain up to 50 stock portfolios per diskette, analyzing each for short and long term gains and losses, and current values.

The Portfolio Evaluator is packaged including a manual, program diskette, and Dow Jones News Retrieval Directory. It requires 32K RAM, Applesoft BASIC language, and one disk drive. For printing portfolios, a printer and interface are required.



SHELL GAMES An Entertaining Approach to Learning

The Shell Games is a library of teaching aides for the home or classroom. Starting with an introductory color cartoon called "The Animated Apple", selection expands to include matching, multiple choice, and true/false quizzes on a variety of subjects. The Shell Games also contains an editor, so you can create your own quiz problems to place in each "shell." (You don't have to be a programmer.) In a few short minutes, you can enter a complete set of questions into any one of the three quiz programs; revisions can be made just as quickly.

The Shell Games is packaged with a manual and program diskette. It requires 48K RAM, the Integer BASIC language, and one disk drive.

APPLE II LANGUAGE LIBRARY

APPLE PILOT The Teacher's Aide (available early third quarter 1980)

Apple PILOT is a powerful system for the courseware author. Without becoming a programming expert, you'll quickly become proficient in developing courseware for your particular classroom needs. And your student users will learn more, too, because Apple PILOT lets you offer much more than simple language capabilities. Color graphics, sound effects, and a character set editor encourage you to build around words, pictures, and sounds.

Apple PILOT is packaged with a manual and program diskettes. It requires 48K RAM, DOS 3.3 or the Apple Language System, and one or two disk drives. For printing lessons, a printer and interface are required.

APPLE PASCAL The Powerful, Flexible Language

Apple Pascal, is one of the most sophisticated, structured programming languages available on a small computer. Its advanced capabilities boost program performance and cut software development time for large business, scientific, and educational applications.

Apple Pascal is packaged with the Apple Language System. It requires 48K RAM (giving the Apple system 64K after Language Card installation), and one disk drive (up to six drives are supported).

APPLE FORTRAN For the FORTRAN Programmer (available early third quarter 1980)

FORTRAN is a powerful programming language for mathematics, engineering, and scientific applications. Apple FORTRAN is the ANSI Standard Subset of the recently-defined FORTRAN 77, with many enhanced features and capabilities. The package is supplied and documented for those who are already familiar with the FORTRAN language, so that they may develop, modify, and use FORTRAN programs on an Apple II.

Apple FORTRAN is packaged with a manual and program diskettes. Apple FORTRAN requires 48K RAM, the Apple Language System (which increases RAM to 64K), and one disk drive (although two drives are recommended).

APPLESOFT AND INTEGER BASIC How to Program an Apple Without Really Trying

When you purchase an Apple II, you buy more than hardware—you receive a built-in programming system as well. This "firmware" makes it easy to create interesting and useful software, even if you've never programmed before. In the Apple II computer, the resident firmware is Integer BASIC; in the Apple II Plus, it is Applesoft Extended Floating-Point BASIC. Both are versions of the very popular BASIC programming language.

OPERATING SYSTEM

DOS 3.3 The Apple Disk II "Housekeeper" (available third quarter 1980)

DOS 3.3 helps you take advantage of your Disk II Floppy Disk Subsystem by keeping track of files, saving and retrieving information, and performing a variety of other "housekeeping" chores. If you are using a previous version of DOS (e.g., DOS 3.2.1), you'll need the DOS Update Kit (available third quarter 1980), which boosts the capacity of older disks to 143K bytes to accommodate the new software.

DOS 3.3 will be packaged with all Disk IIs with controller card and includes a manual and appropriate diskettes. (Your system must have at least 32K RAM to support a Disk II drive and DOS 3.3.)

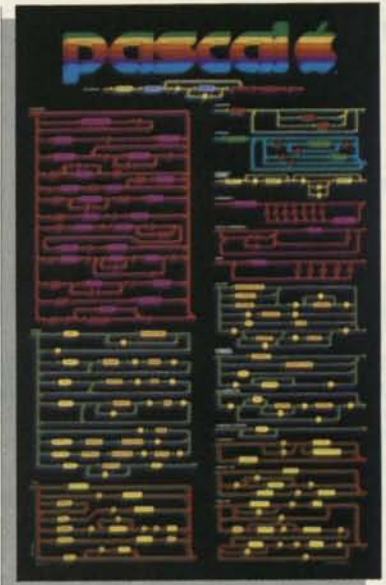
PERSONAL AND ENTERTAINMENT SOFTWARE

CHECKBOOK

Maintains check records, including the date, amount, recipient, and classification code for each check. It allows records to be saved, sorted, searched, and displayed. Trial balances can be run and the account can be reconciled against a bank statement. Requires 16K RAM and Integer BASIC; available in cassette tape only.

MICROCHESS

Try your skill at this ancient game of strategy. Plays at eight levels of skill, so you're always evenly matched. Requires 16K RAM and Integer BASIC for tape; 32K RAM and Integer BASIC for diskette.



STELLAR INVADERS

You're being attacked by alien invaders! All that stands between you and them is your "tank." While the aliens are dropping bombs, you must fire at their ranks and destroy them before they destroy you. Requires 48K RAM, either Applesoft or Integer BASIC, and one disk drive.

APPLE BOWL

Enjoy this realistic simulation of a bowling alley. You control the ball; Apple keeps the score. Requires 16K RAM and Integer BASIC for cassette tape; 32K RAM and Integer BASIC for diskette.

ACCESSORIES

DISK II FLOPPY DISK SUBSYSTEM

Dynamic and Versatile
Data Storage

Disk II expands the capability of your Apple II through the use of flexible, or "floppy," disks for data storage. Extended data storage capacity, fast data retrieval speed, and random access to stored data—all of these, and more, are available through the Disk II Subsystem.

Disk II comes with or without controller card. It is packaged with the current version of DOS (Disk Operating System) and a complete manual. A minimum of 32K RAM is required to support Disk II.

SILENTYPE™ THERMAL PRINTER

The Silentype is a quiet, versatile, and compact thermal graphics printer. It offers increased flexibility over other printers in its class because it receives both its power and intelligence from your Apple computer. With a few simple keystrokes, you can change margins and line spacing, specify printing intensity, even print finely detailed charts and graphs. It's the right choice for clear, readable, draft-quality hardcopy.

The Silentype is packaged with its own interface card, a roll of heat-sensitive paper, and manual. A minimum of 16K RAM is required to support the Silentype.

INTERFACE CARDS

Intelligent Interfaces to
Expand Your Apple System

Apple provides four intelligent interface cards to expand your Apple system.

The Serial Card allows an Apple computer to exchange data with computers, printers, and other devices in serial format (one bit at a time). It is intended for use (in place of the Communications Interface Card) in applications that use data rates other than 110 or 300 baud, and that involve serial printers that don't require "handshake"

The Communications Card allows you to connect an Apple to modems, CRT terminals, and other devices employing a serial RS-232C interface. The card's built-in intelligence lets you control these devices easily, in BASIC.

The Parallel Card lets you generate reports, listings, labels, and letters with your Apple, using a variety of parallel-interfaced printers.

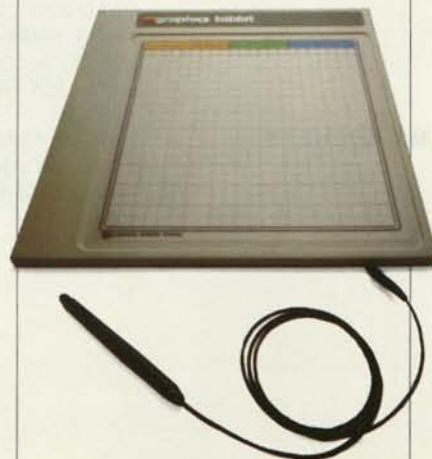
The Centronics Card, a special version of the Parallel Interface Card, is available for use specifically with the Centronics 779 printer.

GRAPHICS TABLET

Creative Electronics for
the 80s

The Graphics Tablet is an image input device that allows you to enter pictorial information directly (by sketching or tracing). Powerful software provides a comprehensive set of menu-selectable functions.

The Graphics Tablet is packaged with its own interface card, connecting cable and stylus, control firmware in ROM, and software programs on diskette. It requires 48K RAM, Applesoft BASIC, and one disk drive.



EXPANSION OPTIONS—GROWING YOUR APPLE SYSTEM

THE APPLE LANGUAGE SYSTEM

This system provides Apple users with the powerful Pascal language, as well as the Integer and Applesoft BASIC interpreters. It does this by means of the Language Card, which provides 16K of RAM memory that electrically replace the ROM firmware built into each Apple. This technique gives Apple II owners access to all available languages, as well as the hardware needed to run future language processors as they appear.

The Apple Language System is packaged with the Language Card, Pascal and BASICS diskettes, and manuals. It requires 48K RAM and one disk drive.

APPLESOFT FIRMWARE CARD

This card provides access to a library of programs written in this extended BASIC language. It contains hardware and software controls that allow it to electrically replace the existing Integer BASIC firmware in Apple II computers.

INTEGER BASIC FIRMWARE CARD

This card provides access to a library of programs written in the Integer BASIC language. It contains hardware and software controls that allow it to electrically replace the existing Applesoft BASIC firmware in Apple II Plus computers.

16K BYTE EXPANSION MEMORY MODULE (RAM)

This module allows user memory expansion in 16K byte increments for any 16K or 32K Apple II computer. The module contains eight RAM devices, installation instructions, and a test program to insure that installation was done properly.

EXPANSION OPTIONS ADDENDUM

Many companies offer both hardware and software products compatible with Apple II computer systems. The products listed below are manufactured by others, but may be ordered from Apple through Apple Authorized Dealers.

MODEM IIB (Novation CAT)

Modem IIB extends the power of your Apple II by allowing it to tap the resources of timesharing services, computerized bulletin boards, or your office computer from the comfort of your home. The Modem IIB package consists of an acoustic coupler (modem) and the Apple Communications Interface Card.

PRINTER IIA (Centronics 779)

Printer IIA is a medium-speed impact printer for home and business applications. It prints 80 to 132 (5x7) dot-matrix characters per line, at 60 characters per second. Printer IIA is supplied with the Centronics Printer Interface Card, cable and connector, operating documentation, and warranty.

CLOCK/CALENDAR CARD (Mountain Hardware)

This plug-in card provides a 388-day calendar and clock, with resolution to 1/1000 second. A built-in rechargeable battery keeps the clock on time up to four days without system power, and external batteries may be used for longer periods. Supplied with complete operating instructions and rechargeable battery.

MONITOR II (A variety of 9" monitors will be supplied)

This 9-inch (diagonal) video monitor is the ideal display for the Apple when color output is not required. It sits neatly on top of the computer, and provides a very clean and sharp picture. It accepts direct video input from the computer. Supplied with cable adapter and documentation.



APPLE III PROFESSIONAL COMPUTER SYSTEM

Apple III is a professional, desk-top computer system designed for sophisticated business application needs. Its outstanding, built-in hardware includes a 143K byte Disk III drive; a calculator-style numeric key pad; a clock/calendar card; and two interfaces—serial and Silentype Thermal Printer—for easy, economical system expansion. Additionally, an optional 12", black and white, high resolution video monitor is available to complete the system.

The Apple III is offered in specific configurations to meet your requirements.

THE APPLE III INFORMATION ANALYST

The Apple III Information Analyst tackles the time-consuming tasks of budget development, forecasting, scheduling, pricing, return-on-investment, projections, time value of money calculations, and other activities. You can ask "What if...?" as often as you wish, to solve thousands of different problems. The Apple III Information Analyst offers work saving features that make it the most powerful, easy to use timesaver available.

THE APPLE III WORD PROCESSOR

The Apple III Word Processor has been human-engineered from the ground up for full function word processing. Its state-of-the-art features rival those of systems selling for \$10,000 and more. With its extensive editing, formatting, and printing capabilities, the Apple III Word Processor is the last word in personal computer word processing.

