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Window Wizard Bill Atkinson

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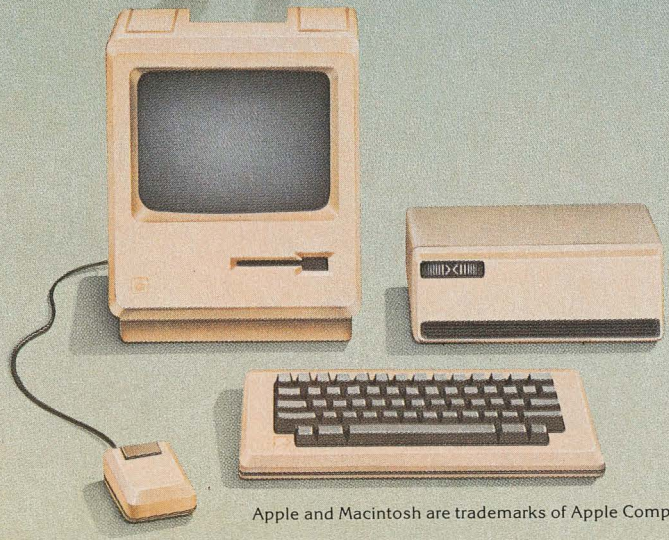

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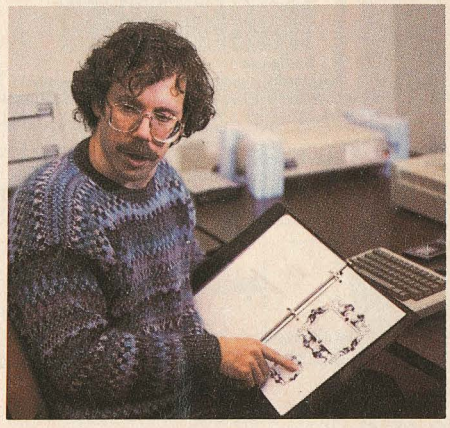

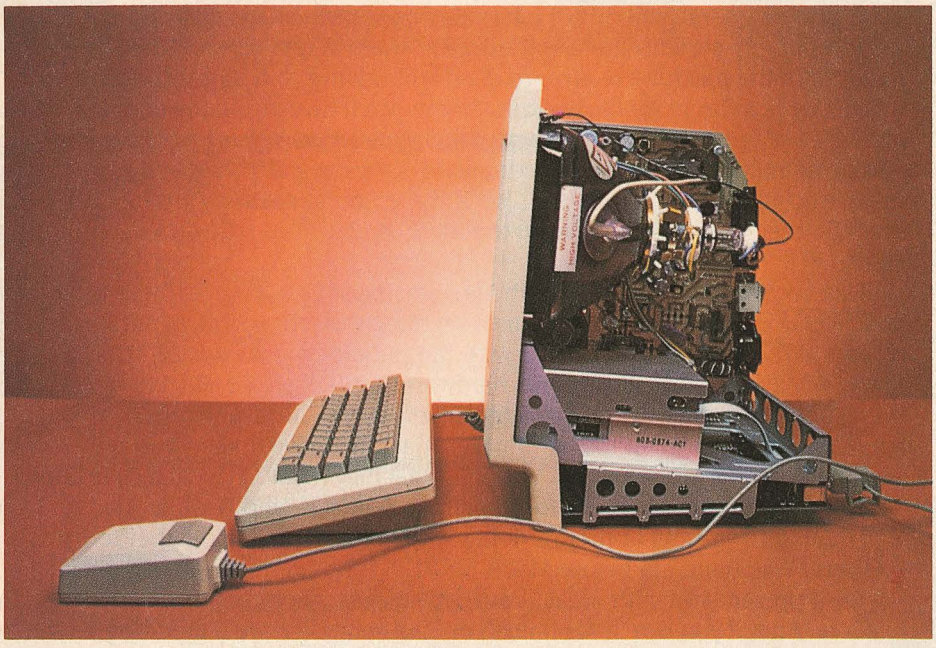

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A Chance For Breakthrough

"Insanely great" is a rallying cry among the Macintosh group at Apple Computer. The machine is insanely great; the hardware is insanely great; the operating system is insanely great; the software is insanely great. By extension, the Mac group is insanely great.

There are many ways to cross the line into insanity. Some come by it naturally, with or without accompanying talents. With talent, it's called genius. Some stumble into it through sensory deprivation. Some choose insanity as an escape from reality; others, as the only response to a sane world. Some visit; others live there.

The connecting thread through all instances is the altered yet internally consistent perspective of what is euphemistically called reality. The trick is to keep one's feet planted here so a return is possible. As Salvador Dali so poignantly observed, the only difference between a madman and himself is that he isn't mad. When insanity reaches this pinnacle, the result is breakthrough.

And break through Mac does. Mac seduces you with its illusion. You play with images in the context of a desktop. You pull down menus with an eekless mouse to perform basic functions. A click here. A double-click there. Add a little click and drag and voila! You have performed and conquered. That wasn't so hard. You're a believer.

The illusion has enough familiarity to lull you into a false sense of security, enough novelty to pique your imagination and curiosity. Certainly the stuff of greatness. But greatness is not merely an idea whose time has come. Greatness is supratemporal. It is great because it is right.

That which wishes to be great supplicates recognition. It invites brutal scrutiny of its external manifestations of internal consistencies. This takes time. And qualified people to explore the implications, ramifications, dynamics, and sublime nuances of the machine relative to itself and relative to a larger context.

ST.Mac is a forum for these explorations. We'll investigate the concept of computing as a process. In prior incarnations, this concept was eclipsed by each particular machine's enigmatic command structures. To master the tool of the mind, you first became its slave. Yet if the computer is truly the mind's tool, it must be easy to know and simple to follow. An intuitive reflex that gives form to ideas.

Lisa Technology, shared by both Macintosh and Lisa, is movement toward that goal. It allows for accessibility within a seemingly inexhaustible depth and breadth of uses. *ST.Mac* will acquaint you with the people who prosecute these applications. What kind of software and hardware is planned for Macintosh? How do these differ in performance on other machines? Will Lisa Technology cultivate applications beyond the scope of other machines? We'll keep you informed on who these people are, what they've done, what they're doing, what they're thinking.

ST.Mac will introduce you to others like yourself who operate Mac and Lisa and their software. What they're doing with the machine. How they're using the software. Was there life before Mac?

We'll present you with ideas, opinions, trends, shortcuts, news, reviews, and features. And, if you own a Macintosh or Lisa computer, we'll literally give you the information. *ST.Mac* believes that computers can change the way we work, think, and live. We'll show you how.

In time, someone might say Macintosh is more like a great thought than a great machine. Mac? Insane, yes. Great, we think so. Join us in the discovery.

M.S.R.

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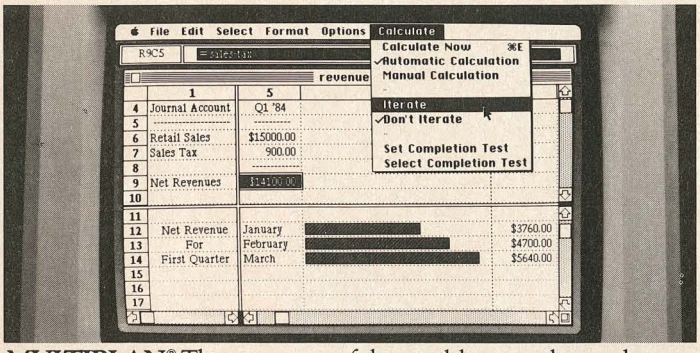

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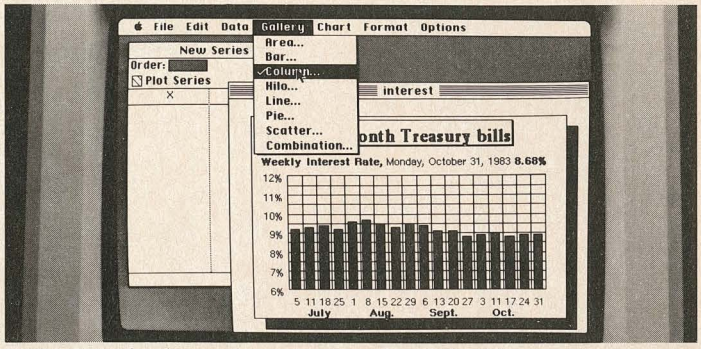

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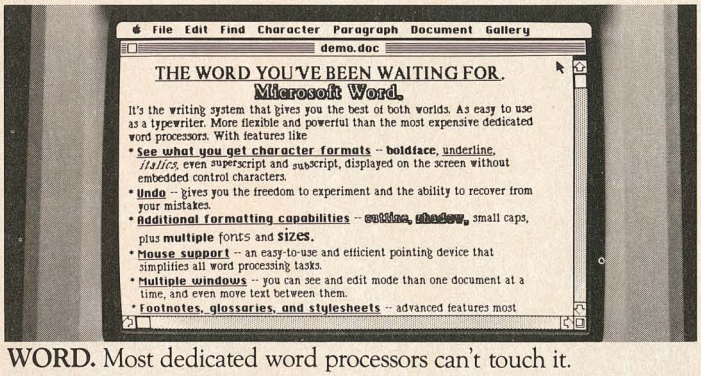

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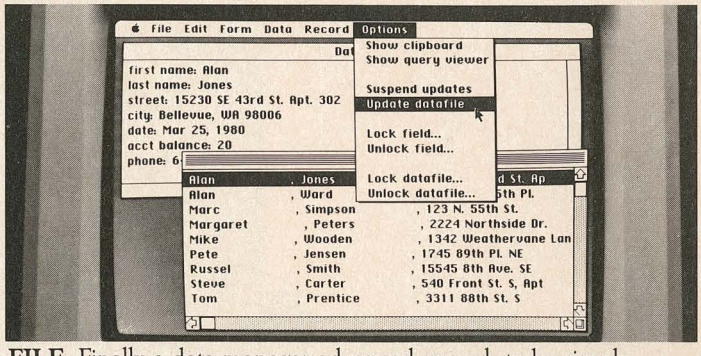

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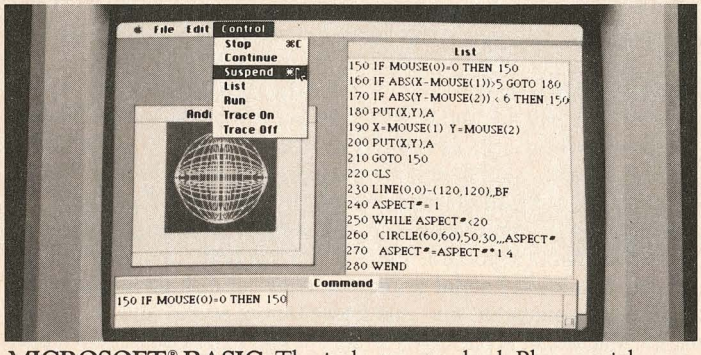

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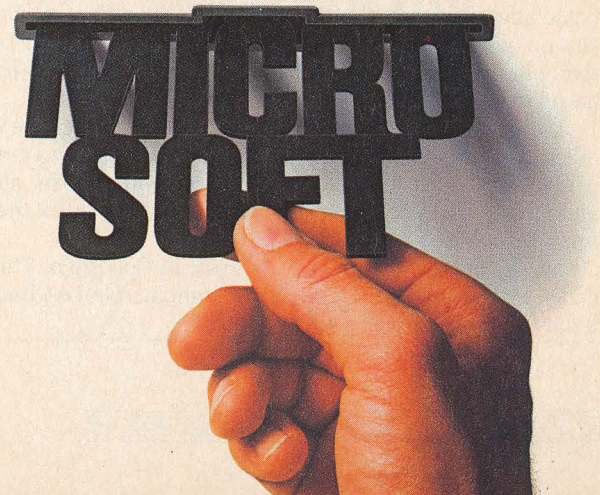


Macintosh!

Real magic—the stuff that makes dreams come true—is a scarce commodity. It seldom happens twice to the same person.

Think about it.

Margaret Mitchell never wrote another book after *Gone with the Wind*. You probably can't name another book written by Alex Haley, the author of *Roots*. Dusty Rhodes had only one great season with the New York Giants.

Magic is rare. For that reason, it makes everything around it special when it does happen.

Magic happened once in Cupertino. A guy named Steve made a computer. Another guy named Steve convinced the first guy to form a company and sell the device. Whence came Apple Computer, Inc., and the wonderful, marvelous, unbelievable, accessible Apple II. The Apple II became *the* personal computer, the choice of most people who wanted a real computer and not a toy. The magic lasted and Apple prospered.

But you can't depend on magic. Apple can testify that magic is a fickle ally, prone to desertion at exactly the wrong moment. There was no magic left for the Apple III, which has essentially been left to swing in the wind in the wake of the Apple II and the Apple 68000-based machines.

Lots of people, even some outside Apple, thought there was magic in Lisa. And indeed, there might be. But the magic was not apparent when Lisa's release was delayed for several months after it was announced, and when sales did not blast off the top of the charts in Apple's marketing offices.

For all of that, the magic's returned to Cupertino. This time it's called Macintosh, and it'll do for the computerphobe what the Apple II did for the computer nerd.

Macintosh is to microcomputers what Katharine Hepburn is to acting, what Dr. J. is to basketball, what Willie Shoemaker is to horse racing, what Nureyev is to dancing, what Mayor Daly was to Chicago politics, what Louis Armstrong was to music, what John D. Rockefeller was to oil.

Macintosh is the microcomputer nonpareil. At least for now.

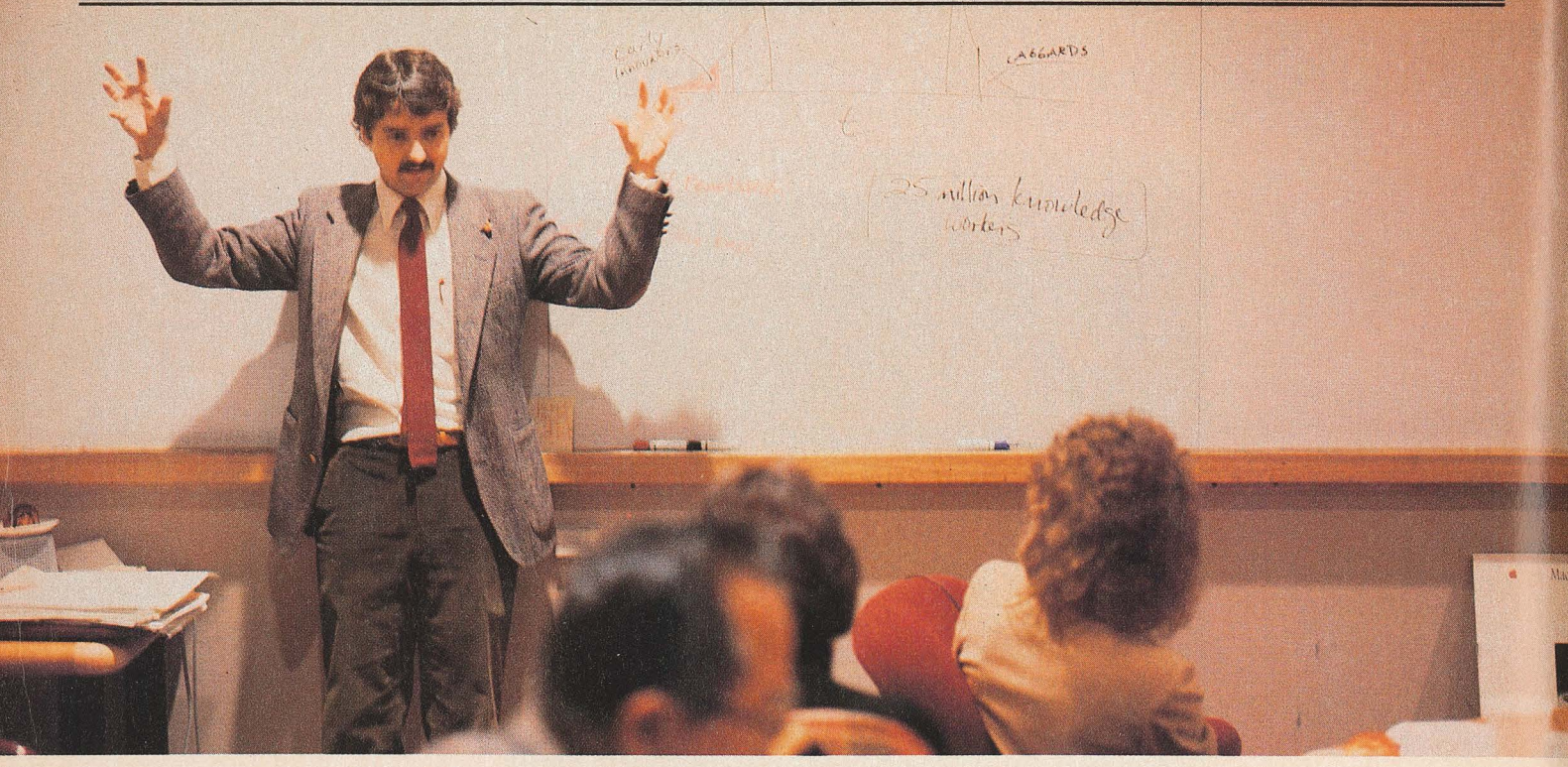
Dollars and Sense

What you pay for Mac is $2,495. What you get is a nifty personal computer that consists essentially of a Motorola 68000 thirty-two-bit microprocessor running at eight megahertz, 128K of random access memory, 64K of read-only memory, one 400K-capacity 3 1/2-inch Sony disk drive, a nine-inch diagonal black-and-white video display, a mouse, and a detachable keyboard. You also get five ports in the back of the chassis: two RS-422 serial ports, one external disk drive connector, one mouse connector, and one four-channel sound and voice connector. Macintosh is packaged small enough to be considered a portable computer.

Apple is betting that Mac's speed, graphics, and ease of use will make $2,495 a bargain. That's an assumption that can stand investigation. How one looks at a price depends on the context of the alternatives. Rational persons believe that candy bars priced at $2,495 would come too dear, but new Porsches priced at that level would be quite a steal. So the question of price comes down to questions of intrinsic value and competitive value.

Intrinsic value is generally a measure of the "true" value of a given product. In the case of Macintosh, the question is, will it perform sufficient services in a home, study, or work environment to justify its price tag? No one who's been close to Mac doubts that its intrinsic

Powerful, Portable, and Uniquely Apple



Macintosh Marketing Manager Mike Murray tells junketing journalists about Apple's target audience.

value is at least $2,495.

Competitive value is generally a measure of whether more or better like products can be bought for equivalent cash. This is a more subjective evaluation and necessitates taking a look at Mac's components, measuring them against their opposite number on other computers.

The Graphics

It's best to consider the graphics first, because most of Mac's attributes stem from what's become known as Lisa Technology. As generally defined, Lisa Technology features a high-resolution, bit-mapped video display, a desktop metaphor, and a mouse for control. In Macintosh, the display is 512 dots by 342 dots—extraordinary resolution on such a small screen.

Two results of that resolution are immediately apparent. The first is the clarity of graphic images on the screen. The second is the detailed nature of screen dumps from the video display. No computer except Lisa can match Mac in those two areas.

The sharpness of the video images is necessary to carry off the desktop metaphor. The desktop metaphor is central to the attempt to bring personal computing to the layperson. Representing computer actions and everyday actions in visual form makes the process more understandable. The pictures that stand for everyday items or actions on a desktop are called icons, and work is done by manipulating them.

Files are represented by pictures of file folders, the calculator by a picture of a calculator, the clock by a picture of a clock, and so forth. To file away a document, you just ask the computer to put it in the appropriate file folder. That's what you'd do with a piece of paper, so that's what you do with Mac.

But to carry off the metaphor successfully requires having at least the resolution of the Macintosh. Indistinct or barely distinguishable icons would ruin the suspension of disbelief required to make the metaphor work.

Basic to the functioning of the icons on the Mac desktop is a set of routines called *QuickDraw*, written by Bill Atkinson. Because these routines reside in a part of ROM memory, let's look at memory features next.

Memories Are Made of This

As mentioned earlier, Mac has 128K of RAM and 64K of ROM. Depending on the computer you are comparing Mac to, that's a lot, a little, or about the same. Mac's RAM is trivial compared to Lisa's

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THE NEW YORK TIMES (May 17, 1983): "ThinkTank is so easy to use, and so relatively errorproof that even a first-timer feels as if he's in control of the computer, instead of the other way around."

SCIENCE DIGEST (August, 1983): "you may well find yourself hooked."

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1,024K (one megabyte), the same as an enhanced Apple II with an added memory card, and less than the usual configuration of the IBM Personal Computer, which is normally sold with 256K of RAM. Just two years ago, few microcomputers were equipped with that much RAM memory.

If 128K seems too little, consider that Apple has crammed enough into its 64K of ROM memory to make the 128K act larger. Many routines necessary to the successful functioning of any computer have been stored in ROM for the Macintosh. These same routines are more commonly stored in RAM on comparable computers, so the casual observer need beware of oversimplification. Mac's 128K of RAM is relatively unencumbered work space. That's not necessarily true of the computer next to it at your local store.

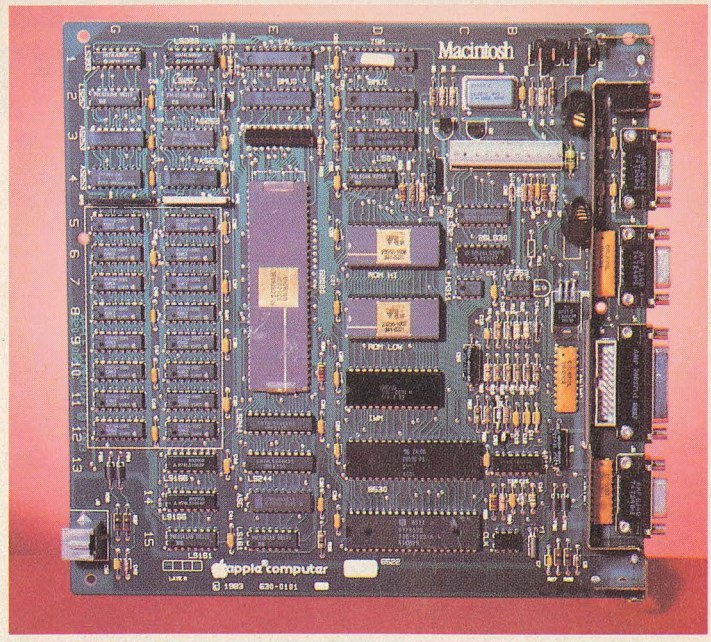
Also in ROM are the *QuickDraw* routines and a series of routines that standardize the user interface function—specifically the mouse and its interaction with pull-down menus from a menu bar. The fact that this code is already written and resident in ROM encourages third-party software developers to use it, rather than to spend man-months developing different, albeit proprietary, routines.

Apple believes all this will entice most applications developers to standardize on Mac's desktop metaphor, which, if Apple is right, means there'll be almost no learning curve for a Mac owner who adopts a new applications package. That seems too good to be true; only time will tell if third-party software developers will abandon their generally anarchistic ways and fall into line.

The Fastest Chip in the West

All the nifty ROM routines and all the clever metaphors in the world don't a popular computer make. If you don't believe that, just look at Lisa, which shares many of Mac's attributes and which sells only well enough to prevent abandonment. What those elements require is execution. That's where Mac shines and the original Lisa fell short.

Execution depends on the central processing unit, also known as the microprocessor. Apple has adopted the 68000, which sits in both



Mac's logic board. From left to right: the memory chips, the 68000 microprocessor, the system ROMs, and the serial, disk drive, and mouse ports that protrude from the back of the machine.

Macintosh and Lisa. The difference is that the CPU is required to perform lots more work in Lisa, where the overhead of keeping track of six applications programs burdens the microprocessor. Macintosh runs only one applications program at any given time, which simplifies the tasks required of the CPU.

On both computers, a lesser CPU would be inadequate. Any other microprocessor embedded in Lisa would bring the system to its knees, with a response time that could be measured in minutes and hours rather than in seconds and minutes. In Macintosh, the 68000 provides the computing power to keep Mac moving at a spritelier clip than any comparable computer.

The extra punch of the 68000 over the other commonly used microprocessors, such as the 8088, Z80, and 6502, comes from its ability to handle larger chunks of data in a single operation. The Z80 chip, commonly used in CP/M machines, and the 6502, used in the Apple II, the Apple III, Atari, and Commodore microcomputers, both handle eight bits (one byte) of data at a time. The 8088 is a hybrid chip in the sense that it does some operations sixteen bits at a time and others in eight-bit increments.

The furor over how many bits a CPU is worth is much ado over little. IBM has convinced the world that its computers are sixteen-bit machines, even though the 8088 is a hybrid. Likewise, Apple has adopted the IBM convention, calling Lisa and Mac thirty-two-bit machines, even though the 68000 performs certain functions sixteen bits at a time.

In equivalent circumstances, it can be assumed that the 8088 is faster than a 6502 or a Z80 and that the 68000 is faster than an 8088. But processing speed is often an oversimplified and overweighted factor in assessing microcomputers. *Interface Age* performed a benchmark test of an accounting function in which the IBM Personal Computer was the slowest of several computers tested—including being 50 percent slower than an Apple II. The results were published at a time when the IBM PC was the bestselling micro.

More important than processing speed is whether a computer performs well enough to satisfy its owner. One owner may demand a computer that will sort three thousand records in three seconds. The next owner may settle for the same number of records in three minutes because of other compensating features.

The salient point is that the performance must not detract from the owner's use of the machine. And from that standpoint, Macintosh should satisfy even the most demanding owner's requirements. Apple's benchmark tests—admittedly not an unprejudiced source of data—

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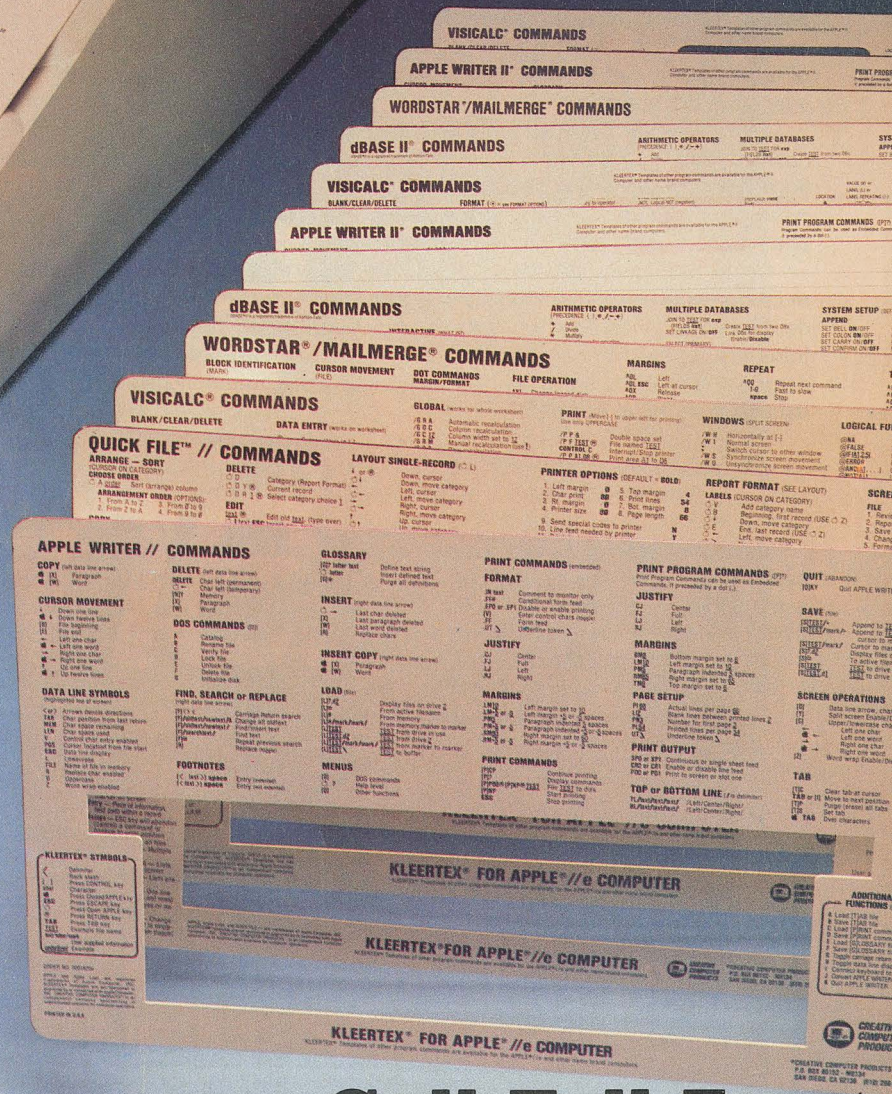

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The Drive for Leadership

Apple's selection of Sony's 3 1/2-inch disk drive for Macintosh is in keeping with a hallowed company tradition. Apple was one of the first companies to offer the 5 1/4-inch floppy disk drives as an alternative to TTY paper tape or cassette magnetic tape input and storage devices.

It's little known that when Apple first decided to offer disk drives, they placed an order so large that it nearly dried up the supply. Of course, that was in the days when drive manufacturers couldn't make nearly so many units as they can today. Nevertheless, manufacturers of other micros had a tough time obtaining reliable drive suppliers, a fact that left Apple in the driver's seat.

Apple will get no chance to achieve such a dominant buying position this time around—Hewlett-Packard has also adopted the Sony drive for its HP-150 micro. Indeed, choosing 3 1/2-inch drives represents something of a risk for Apple, even as it reasserts the company's position as an industry trendsetter.

On the plus side is the nature of the Sony floppy disk itself. Today's microcomputer owners will testify to the fact that entrusting valuable data to a 5 1/4-inch floppy is a dicey proposition. Practically everything can, and does, happen to floppies. Food and drink spills, fingerprints, footprints, and a variety of other mishaps commonly cause data on floppies to be lost.

Such occurrences should be minimized by Apple's selection of a cartridge-cased floppy. The cartridge includes a window that slides open when the disk is placed in the drive; data is read from and written to the disk through the resultant opening.

Steve Jobs is wont to emphasize the added protection provided by the cartridge by skidding a floppy across the table. It's an effective demonstration, since no one in his right mind would treat a 5 1/4-inch floppy that way if it contained valuable data.

Added reliability and staying in the forefront of technology are the upside for Apple in their choice of drives; supply and storage space represent the risks.

The question of supply may turn out to be a straw horse, depending on who becomes the average Macintosh buyer. Apple is marketing Mac with only one drive, and there is not a huge supply of Sony drives available to serve as second drives.

Apple clearly doesn't think a second drive is necessary, judging from its lack of provision for the drive as an integral part of the machine. Instead, Apple has placed a port at the rear of the chassis for connection of a second drive. The placement implies that Apple expects few owners to want to carry an extra drive around with them.

Apple's apparent expectations fly in the face of conventional wisdom and market experience. Nearly all serious users of microcomputers buy systems with two storage devices. A second drive—or a hard disk—is generally handy in copying situations and allows a user to keep the applications disk in the first drive and a data disk in the second.

The Sony drive is a single-sided drive that will lay 400K on the disk. That would seem sufficient, but in practice there's some frustration over what appears to be limited disk storage. Once a user has customized a disk with choices from the Control Panel and added an application, there's precious little data storage room remaining.

The storage situation, at least in environments where Mac will remain relatively stationary, can be resolved by adding a Davong hard disk. But the whole question of the drive choices represents the single area in which the Mac may be vulnerable when compared to other microcomputers that routinely provide more drives and more storage.

Ports of Call

There are dozens of niceties outside the range of knowledge or interest of the typical computer owner that might help sway a potential buyer in the direction of a Mac. But one Apple innovation should receive good notices and be a real attraction: the addition of two RS-422 serial ports.

Past microcomputers have adopted either the S-100 or the RS-232 standard for moving data around. Apple and IBM both use the RS-232. Either of the prior standards has its drawbacks, however. The S-100 standard is excellent for sending data long distances in a networking environment, but it is more difficult to configure for various devices and has a narrow bandwidth, which means that relatively little data at a time can be transmitted.

The strength of the RS-232 standard is its flexibility. Configuring peripherals or other computers to the RS-232 standard borders on the trivial. It shares with the S-100 standard the limitation of a narrow bandwidth and, in addition, provides a weaker signal that carries a significantly shorter distance in networking environments.

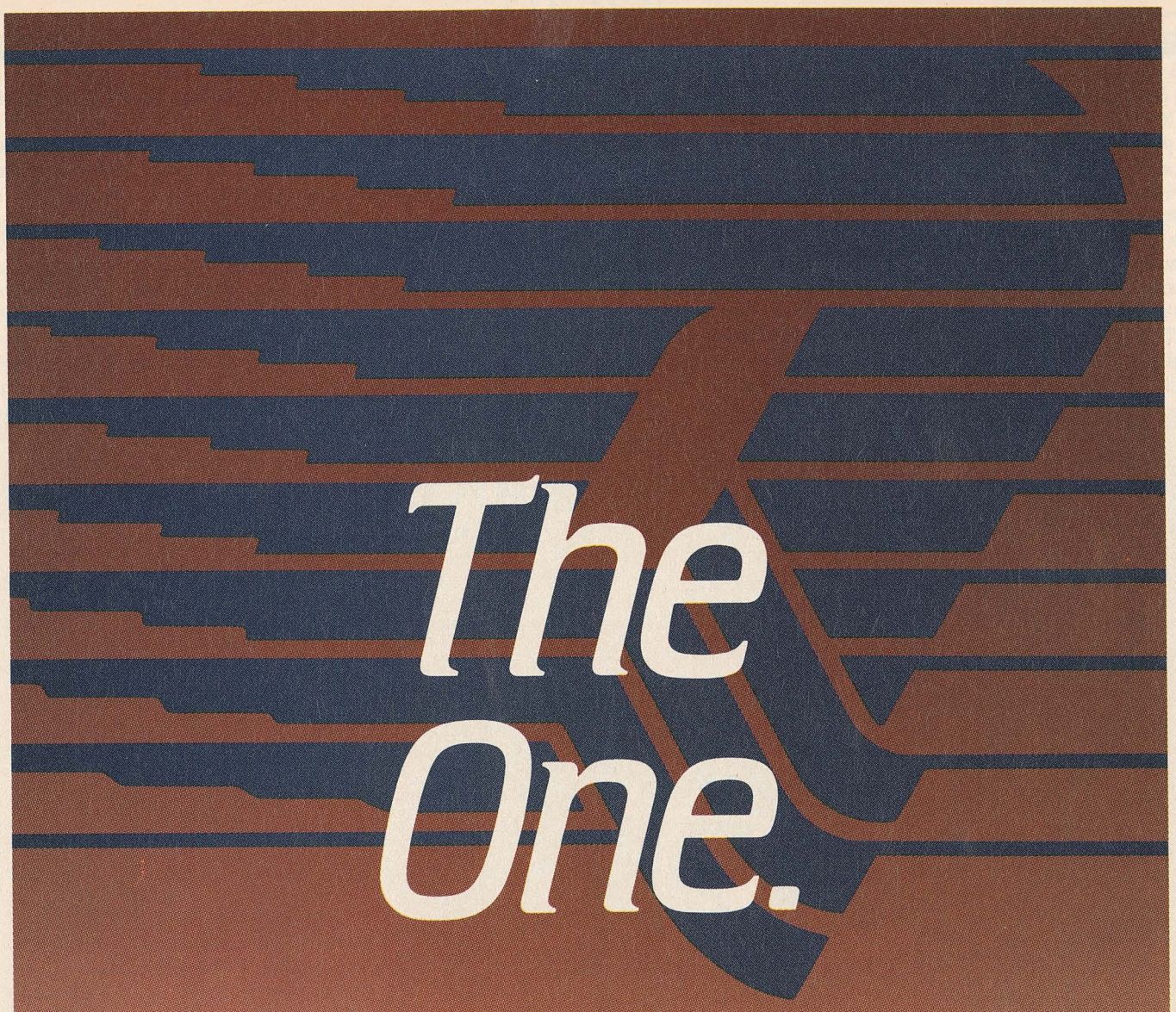
Apple's choice of the RS-422 represents a move to a higher standard of excellence. The RS-422 ports can function as RS-232 ports to provide some compatibility with current technology. But the 422's stronger signal and wider bandwidth will eventually make compatibility moot.

The RS-422 standard has the reach of the S-100 standard, but a bandwidth of one megabyte—meaning that one million pieces of data can theoretically be shipped down the line at a time. That's increased performance of such magnitude that it almost defies understanding. It's rather like changing transportation modes from a Piper Cub to a Boeing 747.

Mac is a closed system in the sense that outside peripheral developers will not have direct access to the data bus. But the power of the RS-422 ports should present opportunities as yet unperceived for a variety of hardware solutions.

Competitive Value Again

A potential microcomputer buyer can easily get swamped in a morass of conflicting claims and deceptive comparisons. Like audio equipment sales, microcomputer sales are beginning to depend on



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which salesperson can pull off the quickest "Now You See It, Now You Don't" sales pitch to the unsuspecting buyer.

But any dispassionate investigation of microcomputers for potential purchase will reveal that Mac is at the top of the list in competitive value.

Macintosh is graphically superior to any other reasonably priced microcomputer. Mac performs faster than its competition. Mac has enough memory to pull yeoman duty. Its RS-422 ports give it the only truly powerful means of communicating with the outside world contained on any microcomputer. So what if disk storage isn't all it could be?

Then there's the feature of portability. Mac will do the same work as those industry behemoths (as microcomputers go) and can be easily moved from place to place. Portability is not enough of a reason to buy Mac; it's only an additional one.

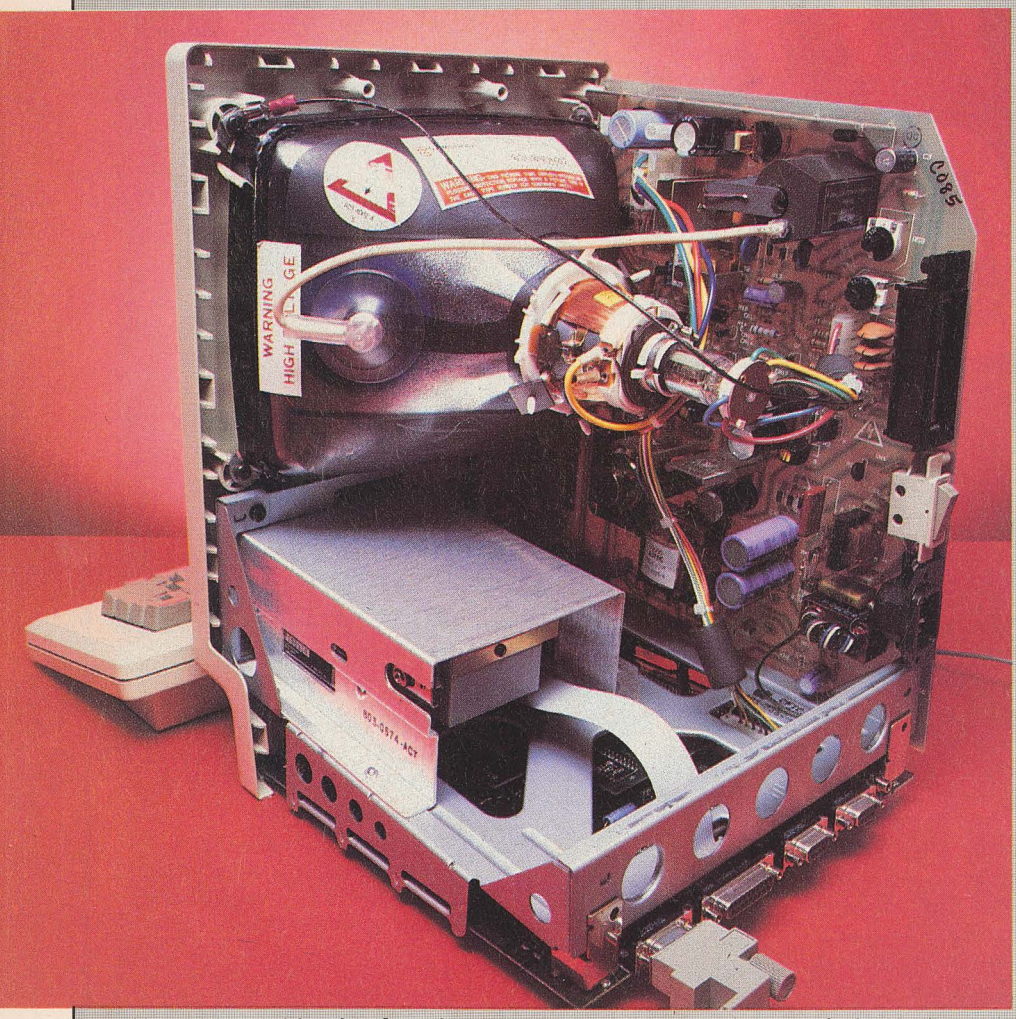
Mac is heavy enough that no one will be seen tripping the light fantastic on the streets of Paris with a Mac under his arm. Mac is heavy enough that it'll be a drag to race through airports, trying to catch that plane. But it's light enough that you can take it home at night, or to the school library, or to Tahiti.

Of Mice and Men

Most of all, Mac is a friendly little devil. At slightly more than twenty pounds dripping wet, Mac doesn't have the intimidating appearance of some of its fellow computers that look as though they just arrived from the steel forges of Pittsburgh.

Mac's approachable demeanor isn't belied by actual use either. Never has a personal computer been easier to learn. No more typing

Peeking under Mac's Skin



Almost invariably, the first thing that impresses new viewers of Macintosh is its size: The machine packs many times the power of an IBM PC, for example, in a box many times smaller.

Macintosh's designers pulled off that feat of prestidigitation by taking a concept that's almost sacred to the electronics industry—large-scale integration of electronic components—and extending it upward. To the integrated circuit manufacturer, large-scale integration means packaging as much circuitry as possible in as little space as possible. It's the concept that has given us everything from the electronic watch to the inexpensive calculator to the computer on a chip. It's also a concept that's basic to the design of Mac's hardware.

If you look inside a working IBM PC, you'll see not only a very large circuit board at the bottom of the machine, but a number of smaller boards plugged into that larger board. If you were to look inside a Macintosh—which you can't do very easily, since it's neither necessary nor possible to go fishing around in Mac's interior—you would see two fairly small boards that together don't equal the size of the IBM's single motherboard. And not only aren't there any other circuit boards plugged into those two boards, there isn't even any way to add more boards inside Mac.

Mac's economical use of space is a direct achievement of what Apple hardware designer Burrell Smith saw as one of the major design goals for Mac: to solve as many problems as possible by making the right tradeoffs.

One of the key tradeoffs is modularity versus integration. The typical way designers have responded to this problem has been to divide the circuitry by function, putting one or maybe two major functions on each board. That approach, exemplified by the PC, requires not only a main circuit board (the motherboard) with the microprocessor and memory, but a slew of smaller support boards. To make the PC usable, buyers must add a minimum of two boards: a disk controller board and a board to drive the display.

Adding extra boards to a basic system is both expensive and time consuming. The boards and connectors cost far more than it would have cost if the same functions had been integrated into a single board. The advantage is a certain degree of flexibility. Circuit boards can be swapped in and out to configure a system to your own requirements, much as you'd order options for your car.

Mac's designers took a page from the

operating system commands to find your work. No more having to keep in the forefront of your memory the different command structures of your favorite half dozen applications programs.

Instead, you firmly grasp a quadrangular object called a mouse and roll it around on your desktop. The movement causes a cursor on the screen to mimic your hand motions as it moves in sync with the mouse. When the cursor is pointing at something you want, you merely click the mouse button and what you asked for on-screen happens.

Expect some quibblers to ding Apple for choosing to have only one button for their mouse. The naysayers will claim that two or even three buttons are preferable because the extra buttons allow for deeper layers of complexity in using the mouse.

Do they ever miss the point! The whole concept of Macintosh is that computing doesn't have to be complex. No longer do you have to remember to start your *VisiCalc* commands with a slash and your *WordStar* commands with an escape. And for those folks with two left thumbs, they don't have to remember which is the left button and which is the right and, of the two, which initiates a sequence and which ends it. Instead, you click the button. Something happens. Click it again and something else happens. One click, one action. Nothing could be simpler. And that's the whole point.

Folks who are afraid to cozy up to one of those other computers for fear that the computer will reverse evolution and make a monkey out of them needn't fear Mac. Macintosh comes leagues closer than any other personal computer to operating at the intuitive level. That it falls shy of that mark doesn't diminish the progress Apple has made in translating personal computing into everyday terms.

integrated circuit manufacturers' book and arrived at a different solution to the tradeoff between modularity and integration. That solution involved, first of all, the recognition that there is more or less a standard set of "options" that users will want to add to their computers. These include a card to run a video display, a disk controller, a clock, and a reasonable amount of memory.

Bearing that in mind, Mac's designers opted to include all of those options in the standard Mac. That, in turn, allowed them to combine certain circuit functions, thereby getting much more efficient use out of the available space.

For example, at the heart of any circuitry that drives a video display are various timing signals—repetitive electronic signals that are nonetheless expensive to generate because of the high degree of precision they require. Timing signals also happen to be a key element of disk controller circuitry. Therein lies a paradigm of the way Mac's designers coaxed increased efficiency out of their circuitry: They used one set of timing circuitry for both the video display controller and the disk controller, thus saving the extra circuit that the board-per-function system design would have required. Multiply those savings by the complexity of any computer and you can start to understand how Apple was able to come up with a machine that's so long on power and so small on your desk.

But this is not the end of the story. Not only did the Mac group integrate more functions into each piece of circuitry, they also integrated more circuitry into each chip. They achieved this by combining functions usually available only on separate chips into custom designed chips. In some cases, the Mac designers specified completely new chips.

Much of the circuitry for the disk controller, for example, is on a proprietary chip designed by Apple and manufactured by one of the mainline integrated circuit companies. In other instances, semicustom chips with names like PAL (programmable array logic) and HAL (hard-wire array logic) are used. Such chips are slightly modified versions of otherwise standard devices. Mac uses six HALs; those six chips replace functions that Smith says would otherwise require twenty to thirty chips.

Of course, every tradeoff has its dark side, and the charge you may hear leveled at Macintosh is that, yes, it's very small and powerful, but *it's not expandable*.

And in the traditional sense—being able to add circuit cards within the machine—that charge is warranted. But bear in mind that most of the functions requiring additional boards in other machines are already incorporated into Macintosh.

In addition, people making that accusation overlook one very important and innovative aspect of Mac: its pair of extremely high-speed serial ports, which are capable of operation at up to one megahertz—that's over a thousand times faster than the serial ports typically available on other machines.

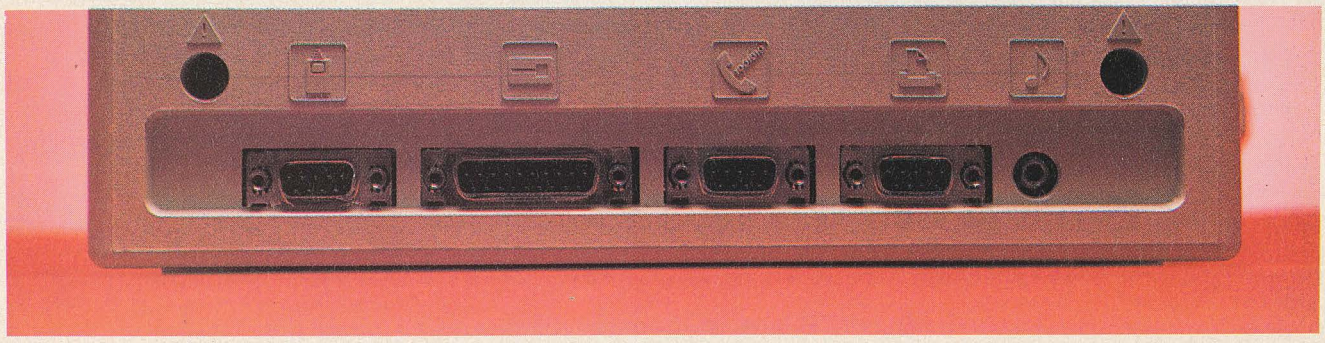
These ports offer an incredibly easy, standardized way to add new peripherals and functions. That's important, because not only does it mean that your Macintosh is the same as every other Macintosh, and thus will run any and all software ever written for Macintoshes, it also means that you won't run into compatibility problems when you want to add peripherals—a modem or printer, for example.

By now, you have a pretty good idea of what's inside Mac and why it was put there. All the elements mentioned so far—disk controller, video controller, clock, serial ports—live on what Apple calls the digital board. Also on that board are the thirty-two-bit MC68000 microprocessor itself, 64K of read-only memory (ROM), and 128K of random access memory (RAM). In fact, everything in Mac except the power supply and some high-voltage circuitry for the video display is on that digital board. Those last two items are on the analog board, where their high voltages remain safely separated from the more delicate digital chips.

The analog and digital boards contain most of the functions of Mac, although they most definitely do not take up most of the space. That honor goes to the video display tube, a nine-inch black-and-white screen of very high resolution—512 by 342 pixels, for those of you with a mind for numbers.

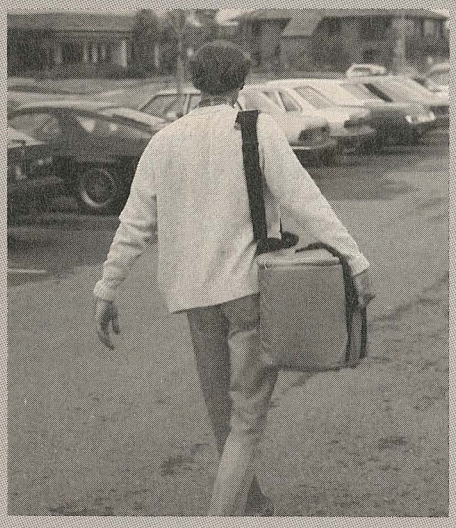
Finally, nestled between the tube and the digital board is a minifloppy disk drive. The drive, manufactured for Apple by Sony, uses a 3 1/2-inch disk that holds as much data as your standard vanilla 5 1/4-inch disk. The floppies are packaged inside a hard plastic shell with a window that closes automatically, so you can throw them at your boss without throwing away your data.

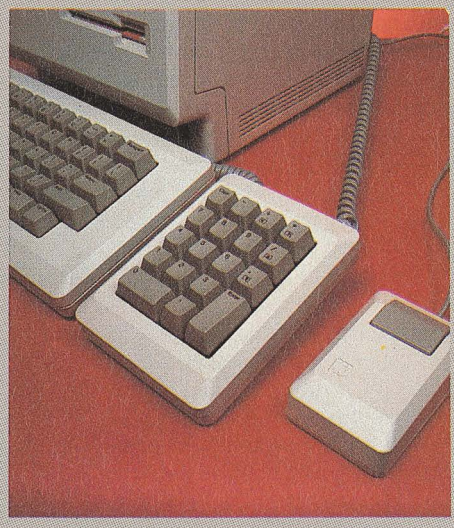
Sometimes, good things do come in really small packages.—Kevin Goldstein

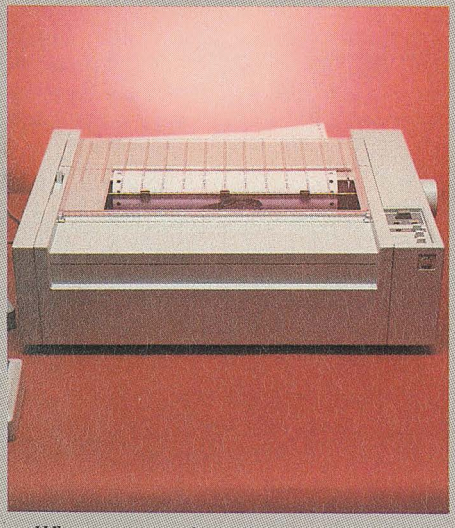


Mac's back. Ports are identified by icons rather than words.

PERIPHERALLY SPEAKING







What can you do with just a bare-bones Macintosh? Practically nothing, Ollie. You'll have an awkward time moving it about and it'll be a prime target for folks with sticky fingers. Your Mac can't talk to the outside world or print the document you just created. But you can saw off the top and create one of the world's most expensive planters.

Apple foresaw all that and is fielding a representative lineup of peripherals to fill in the gaps.

Mac is portable in the sense that it doesn't take a forklift, three elephants, and the strong man from the circus to get it from your office desk to your car. Mac has a handle of sorts, but how will you conveniently carry the keyboard and the mouse? You'll buy a carrying case, of course.

Apple's carrying case is a top-drawer product, selling for $99. It has special pockets for the keyboard, the mouse, and some disk cartridges. It's not a violation of the Constitution to buy a Mac, take it home, and let it sit. But the little devil's so cute, the impulse to take it out in public and show it off will be well nigh irresistible.

When you're showing it off outside its normal environment, you've got the very real prospect of theft on your hands. Mac is light enough to be whisked away in a few seconds while your back is turned. For $49, you can remove temptation by buying a security kit that will take you back to the days when you were using bicycle locks. But you'll need the extra security unless you intend to keep Mac cooped up all the time.

If your Macintosh is intended for business use, that could imply doing serious number-crunching. For spreadsheet applications, there's a numeric keypad available at $129. In addition to the standard keys needed to make a keypad functional, Apple's included a set of field motion keys that let you move around inside cell documents such as those created by *Multiplan*.

A computer as powerful as Mac should have a link to the outside world. That means a modem, and Apple gives you a choice of two: a 300-baud modem or a 300/1200-baud modem. Both are made by U.S. Robotics, but each has significant modifications dictated by Apple that make the product different from the USR brand. The 300-baud modem will go for $225, the faster one for $495. Take your time in deciding which to get—*MacTerminal* won't be ready until later, and you'll need it or some other communications software in conjunction with the modem. But you won't want a mute Mac.

Given Mac's ability to mix text and graphics in documents, you'll certainly want a printer so that the full effect of such one-upmanship won't be lost on your IBM-owning friends. Apple's touting the Imagewriter, a serial printer with enhanced graphics capability.

The Imagewriter is made by Tokyo Electronics, but Apple's added several enhancements of its own to make the printer responsive to the high-quality demands Mac and Lisa will make on it. At 120 characters per second, the Imagewriter is slightly faster than most other inexpensive dot-matrix printers. And you can induce such quality from it that your friends will think you've got a letter-quality printer with a private supply of daisy-wheel fonts.

The Imagewriter costs $495 if you buy it with your Macintosh, $595 otherwise.

All of the above items are ready and waiting for you at your local computer store. What's not there yet is a second disk drive. In the years since Apple introduced reasonably priced floppy-disk-drive technology to personal computers, most serious users in either the office or the home have found a second disk drive more of a requirement than a luxury. That's likely to be the case with Macintosh also.

The second drive, which will attach to Mac through a port in the back, won't be available from Apple until late winter or early spring, and it's likely that the supply then won't be able to keep up with demand. The price, $495, won't discourage many.

And Software Too

Enough discussion about the hardware and design delights of Macintosh. As Apple learned with the Apple III, if there's no software, there are no buyers.

That doesn't look to be a problem for Macintosh. A reasonably full and versatile lineup of applications software should be available at the time the machine is released for sale or soon thereafter. Apple has seeded seventy-five software companies with machines to give the third-party developers a head start on getting products ready for Mac. Not every one of those companies intends to take advantage of that head start in the next few months, but enough do to indicate that every Mac owner, from business user to home user to hacker, should find sufficient software for his interests.

Apple itself will be providing several applications, and Microsoft is right alongside with several more. Software Publishing Corporation will also have a significant line of Mac-compatible software soon. In addition, many companies will be delivering software a piece at a time into the marketplace.

The business user should have all the tools he wants or needs by midyear. Apple is starting him out with *MacPaint*, a graphics package, and *MacWrite*, a word processor. Microsoft will supply *Multiplan*, which currently runs on everything except Bic ballpoints. That means that word processing, spreadsheet calculations, and graphics will be available immediately.

Microsoft will follow through with *Word*, *File*, and *Chart*, three other business packages that will provide alternatives or, in the case of *File*, add the capability of database storage.

Software Publishing Corporation expects to have *PFS:File* and *PFS:Report* out shortly, with *PFS:Graph* and *PFS:Write* to follow later.

Lotus should soon announce release of *1-2-3* for Macintosh. *1-2-3*'s the program that's dominated the IBM PC market for a full year, putting a fully integrated spreadsheet, filing, and graphing package at the user's fingertips.

Microsoft, Software Publishing, and Lotus are ensuring that almost all common business requirements will be addressed by some of the most powerful and popular microcomputer software.

Apple will be supplementing the business area with *MacTerminal*, *MacProject*, and *MacDraw*. *MacTerminal* is an easy-to-configure communications package. *MacProject* is a critical path–oriented project manager. *MacDraw* adds another dimension to business graphics.

A hybrid package, one that will probably be useful to both business and home users, is *Think Tank* from Living Video Text. *Think Tank* is touted as an idea processor. That's a new concept in applications software. Apparently, *Think Tank* successfully implements the concept because it's received consistently superior reviews.

Mac's black-and-white screen doesn't seem to be discouraging entertainment software developers. Penguin Software is preparing its line of graphic adventures for the Mac, and, as might be expected, Infocom will soon introduce its full line of bestselling text adventures.

Chess players will have a choice of excellent products. Hayden will soon have *Sargon III* ready for Mac, while Odesta is readying *Chess 7.0*. Both are superior opponents for the micro-owning chess player.

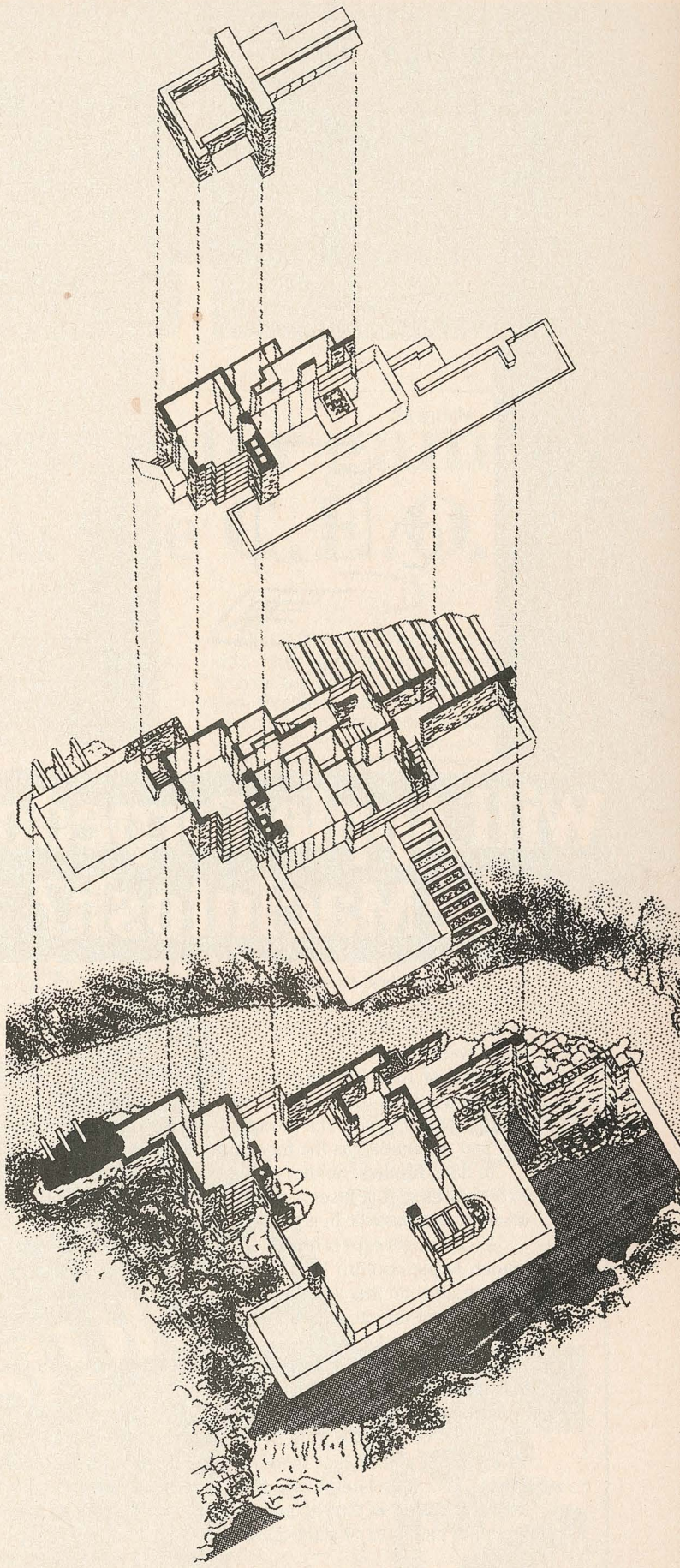
Hayden will follow *Sargon III* with its line of educational software. In addition, Apple has contracted for a version of Logo to be ready sometime late this year.

Hobbyist programmers will have ample tools to work with. Microsoft will soon release a version of its Basic. Macintosh Basic and Macintosh Pascal from Apple will follow. Apple will also introduce *Mac Assembler/Debugger* for the hardcore hacker.

In addition, Penguin will be providing its *Graphics Magician* in Mac formats.

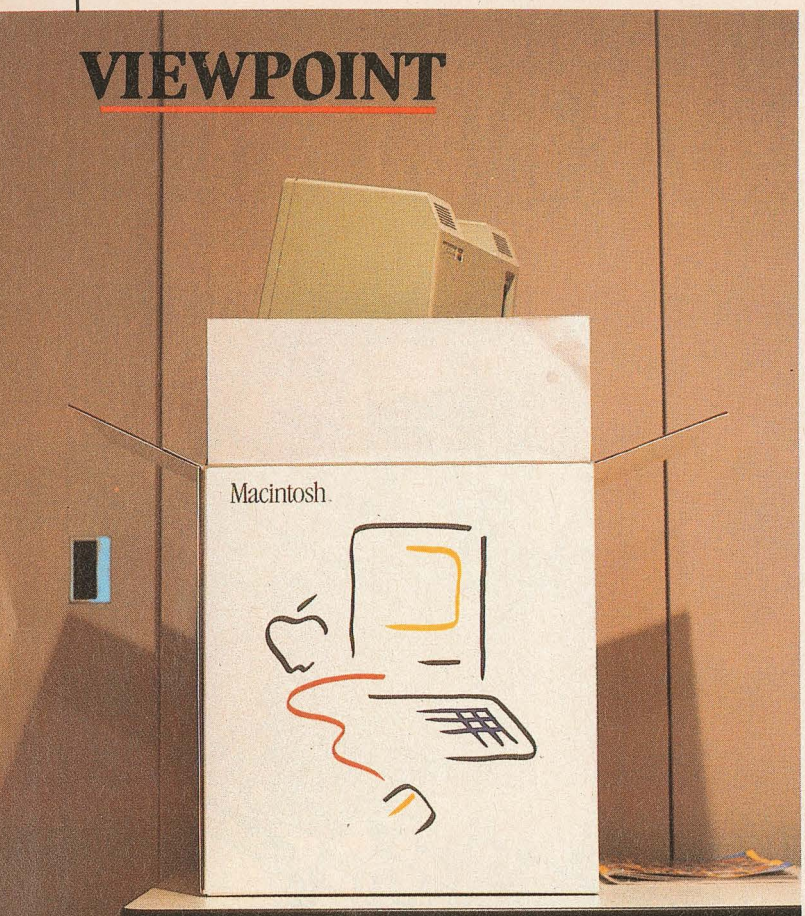
Future issues of *ST.Mac* will carry complete reviews as the software becomes available. The crux of the matter is that a wide variety of software for varying applications will be ready soon.

In Macintosh, Apple has built a computer that will be a potent laborer in business, a fun companion at home, and an intelligent servant to the student. Who could ask for anything more?



Exploded axonometric of Fallingwater, Mill Run, Pennsylvania (1935–1937). Designed by Frank Lloyd Wright. MacPaint *rendering by Kurt Wahlner.*

VIEWPOINT



Will Apple Torpedo The Macintosh?

For the second straight year, Apple Computer took advantage of the forum provided by its annual stockholders' meeting to become a contestant in the "Bet Your Company" microcomputer sweepstakes.

Last year, to much harrahing and huzzahing, Apple unveiled Lisa, a new kind of microcomputer with a new kind of foundation underneath it. The foundation was called Lisa Technology and was hailed as the forerunner of mighty things.

To date, Apple is neither as big a winner as they had hoped to be nor as drab a loser as many would make them out to be on their Lisa system. In effect, the jury is still out.

As one might expect from a company that's been an industry leader, Apple couldn't be satisfied with an inconclusive decision on Lisa. So this year they bet the company again.

This time the product is Macintosh. It's a dilly. It's a dandy. It's a winner. Or is it?

Let's get the record straight before we start trying to answer that question.

Around Apple's Cupertino headquarters, they're saying that Macintosh defines the state of the art. Even allowing for a certain pride of authorship, there's a lot to be said for that claim. Mac is fast, Mac is efficient, Mac is versatile, Mac is easy to learn, and Mac is easy to use. Those would seem to be the essential elements of state of the art.

In addition, there's that great name. Would you rather have a Mac or an Otrona? A Mac or a Corvus Concept? A Mac or an IBM Personal Computer? Mac is a name as friendly and personal as the computer to which it's applied.

But that still begs the question of whether, as one concerned retailer phrased it, Apple can turn a silk purse into a sow's ear.

To a degree that's what happened to Lisa, and it could happen to Mac. Lisa is everything Mac is and more—with the notable exceptions of fast and economical. Lisa was champagne in a beer world. Lisa was Maria Callas singing at Whiskey a-Go-Go. Lisa was Picasso doing packaging art for feminine hygiene products.

What Lisa actually was, of course, was Apple's first organized attempt to invade the hallowed sanctums of the Fortune 1000, those companies that can buy hundreds—nay, count them, thousands—of small computers at the drop of a purchase order. Nobody did.

Apple had looked upon the Fortune 1000 and saw that they were rich. So what did a couple of grand per machine matter? Not a whit, as it turned out. Apple introduced Lisa at ten grand and soon cut the price to eight. No long lines were sighted and no traffic advisories were issued to avoid congestion outside the retail establishments carrying the Lisa. No red carpets were laid in greeting when Apple's national account sales force arrived at the doorsteps of the Fortune 1000.

In all fairness it should be reported that Apple has actually made and sold almost as many Lisa microcomputers to date as it had projected it would. That's pretty shocking, all in all, and either speaks to the low level of ambition within the Lisa group or a defeatist attitude in head-to-head sales with IBM. Because Lisa was supposed to be Apple's entree to IBM's turf.

All this background is necessary in order to understand the difficulties in assessing Mac's chances. If Lisa could fail, why can't Mac? And for the same reason?

The answer, of course, is that Mac *can* fail and for exactly the same reason. If Mac isn't a success, it won't be because Apple can't make great computers, it'll be because they can't sell against IBM and stubbornly refuse to attempt to sell against anybody else.

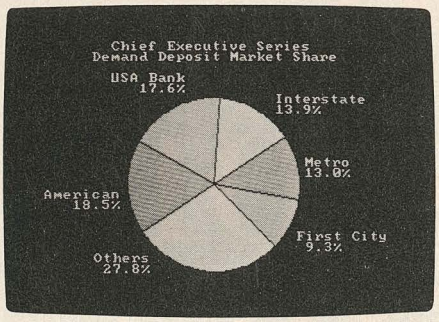
Mac is a great machine. If such a thing as a literate hacker isn't a contradiction in terms, you'll soon be seeing odes of joy and love dedicated to Mac. It's that good a computer, and it's that good a computer for everyone.

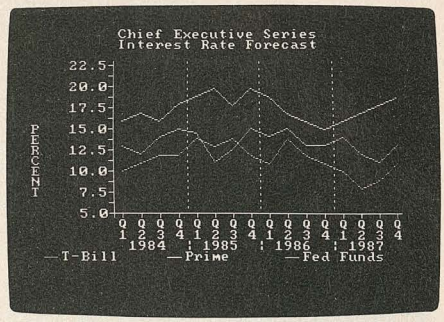
So who does Apple say they'll sell Mac to? The company has its eye on the twenty-five million (yes, dear hearts, that's 25,000,000) "knowledge workers" in the U.S. Apple targeted that category after it had been identified by Booz Allen in a management consulting survey. What the devil is a knowledge worker? Don't welders have special knowledge? Aren't medical practitioners dealing in knowledge?

Well, actually, we're not talking about knowledge, we're talking about paper-pushing. Apple wants its proudest product to become an instrument of embedded bureaucracy. That's like entering Secretariat in a race without removing the hobbles.

To reduce Mac to a paper-pushing machine on a par with a Xerox copier or a Pitney-Bowes mailing machine is shocking. For shame, Apple!

The Apple II is the proudest invention of our time. Jobs and Wozniak constructed a device so iconoclastic that it's literally true that there are more Apples doing more jobs in more places than any other machine in history. That's the heritage that Mac should build on.—A.T.





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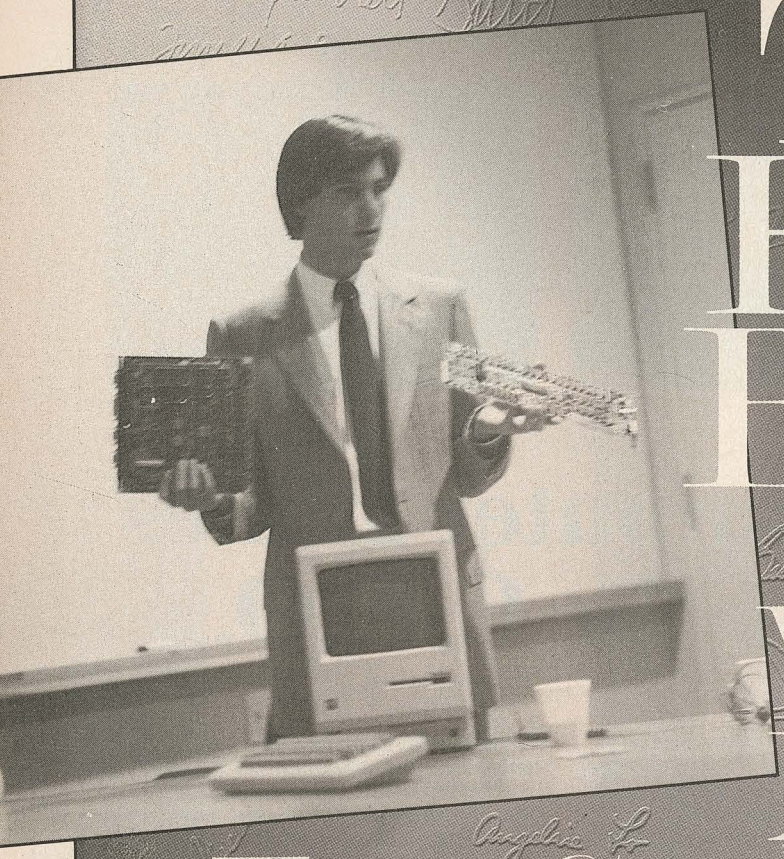

The History Begins Windows, Xerox, and Two Guys Named STEVE

BY DOUG CLAPP

To understand Macintosh, it's necessary to understand a bit of the history of personal computers: what personal computers are and where they came from. Despite the revolutionary Macintosh ease of use (or, more accurately, because of it), Macintosh represents today's ultimate personal computer: a one-person machine that's powerful and affordable, small and fast.

Along the way, we need to mention a couple of guys named Steve, examine where the idea of windows came from, and take a few swipes at the average user interface.

A thread that runs through the story, although not always explicitly mentioned, is the fact that the large computer corporations consistently misjudged the promise and phenomena of personal computing, time and time again.

The misjudgment began in the sixties, at a time when IBM and other corporations were producing mammoth computers and mammoth corporate incomes. The mammoth computers were called mainframes: huge, expensive machines that were carefully tended by the data processing priesthood.

Much of the material in this article appears in a slightly different form in the book, Macintosh! Complete, *published by Softalk Books.*

Times were good and revenues were growing. No one in the large corporations, it seemed, believed the future would be anything but more of the same.

If the large corporations thought about small computers at all, it was only to dismiss the idea as silly or, worse yet, totally unprofitable.

Hobbyists, however, thought differently. In the basements of America, they were busy soldering circuit boards, inserting chips, stringing wires, and trying to make their contraptions "listen" to keyboards and "talk" to television screens.

In those days, hobby computers had rows of toggle switches on the front panels. The switches were used to program the computers by entering a precise series of 1s and 0s. Only true hobbyists could withstand such a grueling task.

Apple's Beginnings

About this time, the mists of history recede a bit. Enter Steve Jobs and Steve Wozniak, one hobbyist/visionary and one hobbyist/engineer. Jobs previously had been one of the first ten programmers hired by Atari to program video arcade machines. Wozniak was a technician employed by Hewlett-Packard, a large computer manufacturer.

Wozniak helped design calculators for HP but found calculator design boring, at least in comparison to designing computers. He asked for a transfer to HP's Research and Development division, but was turned down; after all, he was only a degreeless technician, not a computer engineer.

Scorned, Wozniak designed a computer anyway, putting in four months of almost nonstop after-hours work. The result was a motherboard: the complete circuitry of a computer, less display, drives, and keyboard.

Wozniak brought the computer to his supervisors. Did Hewlett-Packard want to sell it? No. They did, however, grant Wozniak a legal release for his design.

Wozniak proudly showed his creation to fellow members of the now legendary Stanford Homebrew Computer Club, many of whom in the early seventies went on to create Silicon Valley's high-flying, high-tech companies. Another of the club's members was Steve Jobs, who convinced Wozniak to form a business and market a computer based on Wozniak's design.

Wozniak and Jobs next met with Paul Terrell, who had started a chain of hobbyist computer stores. Terrell agreed to buy fifty of the circuit boards for $549 each, provided they could be delivered in a month. The retail price of these Apple I's was to be about $650.

Making computer boards meant spending money for parts. Jobs happened to own a VW microbus (fittingly). And Wozniak owned a scientific desktop calculator (appropriately). The bus and calculator were sold and pawned (respectively).

Jobs and Wozniak next paid a visit to a large computer parts distributor. They presented their list of required parts and were told the terms were "net thirty days."

Jobs and Wozniak didn't know what "net thirty days" meant, but they did know it meant they didn't have to pay immediately. So they took the parts.

"Thirty days net" means, of course, that the entire balance is due in thirty days. It was a hefty balance.

Few computers were ever assembled as quickly as those that next flowed from Jobs's garage. By month's end, twenty boards were completed and delivered—and they worked.

Jobs, from the beginning, saw beyond the small-scale hobbyist operation. With help from Wozniak's father, himself an engineer, Jobs persuaded Wozniak to integrate the computer into a case, complete with keyboard (a unique idea, in those days), for sale as a consumer item (another unique thought).

Sales boomed, talented people and investment capital both arrived at the proper times, Wozniak designed other marvels, Jobs made canny business decisions that belied his youth, and Apple Computer was born and prospered.

A happy ending.

A happy middle, actually. Because Jobs and Wozniak weren't the only would-be small-computer manufacturers of those early days of microcomputing (in the late 1970s). Others tried, but most failed. Some, but not many, of the others are still around today.

Explaining Success

Apple's success can be explained in many ways, timing not the least of them. But the crucial ingredient was probably this: As Jobs envisioned from the start, Apples have always been created for use by ordinary people.

Not dull, simple-minded, illiterate people, but reasonably intelligent adults (and children) who aren't necessarily fascinated by computer science. People who want computers for what they can do, not merely for what they are.

People who aren't thrilled by toggle switches.

That's a lot of people. By the time you read these words, more than one million people will own Apples. Apple Computer, Inc., is now a member of the Fortune 500—the only company to make the five-hundred-largest list within five years of incorporation.

Good products alone don't ensure success, however. Apple Computer also made an early commitment to support both Apple dealers and Apple customers. The result is a national network of dealers that not only sell but also service Apples, should the need arise. And lots of Apple customers who feel well satisfied with "their" computer company.

Apple also made a strong commitment to independent software vendors—non-Apple companies that create and market software programs for Apple computers. That close cooperation has led to a staggering number of programs for Apples. In fact, there are more than fifteen thousand programs now available for Apple computers.

If anything, Apple was even more supportive of outside software developers during the creation of the Macintosh. If fifteen thousand programs are now available for the Apple II (and IIe and III), think what will soon be available for the Macintosh.

Certainly, there are other computers, some of them fine machines. Some are more expensive, some less expensive. By now, many of the major computer manufacturers are marketing computers called Personal, Advanced Personal, Personal Business, Professional, or simply Home Computer.

It's easy to forget that Apple Computer, Inc., now is one of the major computer manufacturers, with approximately forty-five hundred employees world-wide. Apple computers are manufactured in California; Texas; Cork, Ireland; and Singapore. Apple has corporate offices in Tokyo, London, Paris, Milan, Munich, Sidney, Toronto, and other spots around the globe, including a few places in Cupertino, California.

Apple's success has been achieved without creating an unresponsive, elitist, corporate bureaucracy.

By the end of the decade, international sales of Apples may account for 50 percent of corporate revenues.

Somehow, success was achieved without creating an unresponsive, elitist, corporate bureaucracy—one of the reasons Apple consistently attracts some of the best corporate and engineering talent available.

Which means that other corporations will be playing catch-up for some time to come.

Which, in turn, brings us to the Apple Macintosh computer.

But first let's talk about money.

Price and Performance

Personal computers could actually have been marketed as long as thirty years ago. But they weren't. They would have cost hundreds of thousands of dollars, and nobody would have bought them, even if they'd had the money and a place to put them (about the space required by a two-car garage).

One of the Macintosh's most amazing features is its price. Amazing because that price reflects:

- The high cost of new and powerful chips, like the MC68000.
- The considerable cost of parts such as advanced, high-capacity disk drives, displays, and power supplies.
- Research and development—the cost of many person-years of work creating the Macintosh hardware, software programs, and operating systems. (If it's easy to use, you can bet it took a long time to develop and program.)
- All other costs.

About ten years ago, a computer with some of Mac's power and features actually existed. It was the Xerox Alto computer. It cost roughly $32,000. A few years later, Xerox announced another computer with some Mac-like features: the Xerox Star. It cost $16,000.

As you might expect, neither machine caught the public's fancy. It took talent and hard work to create the Macintosh. It took talent and hard work to make it affordable.

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From whence Mac Sprang

The Xerox Alto and Xerox Star were Mac's ancestors, but the story begins somewhat earlier. A good place to begin is with Alan Kay, a man who was, and still is, a brilliant computer scientist.

In the early seventies, Kay founded the Learning Research Group at the Xerox Palo Alto Research Center. The LRG at Xerox PARC, as it was called, conducted research in a number of areas aimed at making computers more powerful and easier to use. Much of the group's work was fueled by Alan Kay's vision of personal computing: the Dynabook.

The Dynabook was a simple but stunning idea: a computer with the power of a mainframe contained in a portable unit the size of a notebook. The Dynabook would have a flat screen, both visual and audio communications capabilities, and be able to tap into larger computing and information networks.

In one form or another, scientists have been trying to realize the Dynabook ever since.

The Demise of Modes

One piece of the Dynabook puzzle was the Preemption Dilemma. This dilemma is familiar to everyone who works with computers, although most people don't know that the condition has such an academic-sounding title. It means simply that computers trap you into doing things their way, and heaven help you if you're not sure what that way is.

The traps are called *modes*. With most computers, you're always in one mode or another; some things can be done in one place, other things can't. To get from, say, Edit mode to System mode, you need to know the right commands. If you forget what those commands are, or use them incorrectly, you won't get where you want to go. Instead, you may get somewhere you greatly don't want to go.

Much of the misery inflicted on computer users over the years comes from these omnipresent modes. The dilemma of the Preemption Dilemma is that choices you might desire are denied, or preempted, by the computer. "Do it my way, or else!" seems to be the message.

About this time, most people have a few messages of their own for the computer.

So the LRG at the PARC set about the task of eliminating modes. It wasn't easy. When you eliminate modes, you have to change quite a few other things as well.

The standard "user interface" was the next target for demolition.

The user is you. The interface is everything between you and whatever you want the computer to do. Generally, it means information on the display screen and how you express your wishes to the computer.

If modes are bad, most user interfaces are worse. It's still possible, this very day, to visit your local computer store, plunk down four or five thousand dollars, and take home a computer that, when turned on, greets you with the marvelously expressive symbols:

A>

on an otherwise blank screen.

Not, you'll agree, a swell user interface.

The solution to all this was the concept of *windowing*, a solution that made what was in the computer visible to users outside the computer.

The hammerstroke of inspiration was that windows shouldn't appear on the screen, they should overlap, like sheets of paper. If you can shuffle papers, you should be able to shuffle windows; and each window could contain information entirely different from information in other windows. Each window could hold a different document, and a different "tool" to work with the document. If you don't like where you are, leave.

No traps.

That's a pretty good basic definition of Macintosh.

Implementing the ideas was difficult. It's easier merely to want something than to actually get it. Often, some of the best ideas are impractical—the technology isn't perfected or affordable or even yet invented.

A> isn't friendly, but it is a cheap and simple way to design a user interface.

Mac's Mom

Xerox never produced a machine that both typified these ideas and was even moderately affordable. But Apple did.

Lisa was first out of the blocks. After fifty million dollars of research and development costs, and months of fevered speculation, Apple announced Lisa in January 1983.

Lisa is another of Mac's ancestors—in this case, Mac's dad (well, maybe "mom" would be the appropriate metaphor). The Lisa incorporates the hardware and software advances just described: windows, modeless operation, and so on. Optionally, it features a number of integrated programs ideal for business use and other demanding applications.

Lisa costs about double Macintosh or more, depending on the features you select.

Macintosh is not merely Lisa writ small, however. In many ways, Macintosh is Lisa writ affordable.

Now history repeats itself. Xerox is a big computer manufacturer. As we've seen, they had (and have) some top computer people on the payroll.

Macintosh is not merely Lisa writ small. In many ways Macintosh is Lisa writ affordable.

But Apple introduced the Macintosh, not Xerox, or IBM, or any of the other "big" computer companies. Again, Steve Jobs was the instigator.

Jobs realized that making Macintosh affordable required many elements and precise timing. A fast and powerful processor, such as the 68000, was needed. A new generation of high-capacity memory chips was needed to save space and reduce power consumption. A small, high-capacity disk drive was needed for storage. Other sophisticated chips, parts, and gizmos were needed, as was a small, lightweight, dependable, "switching" power supply.

If fancy parts were all it took, we'd be inundated with Mac-like machines. Making Macintosh small, fast, and affordable also took a special hardware design.

But even that wasn't enough. Without internal programming, the Mac would be only an attractive exterior on a pile of potential.

In many respects, software systems are machines as real as any machine we can see and touch. They're designed, built, and tested with the same extraordinary care and patience given to machines made of metal and silicon.

To a casual observer, Macintosh duplicates many of the concepts found in the software of machines like the Xerox Star and Xerox Alto: windows, icons, high-resolution bit-mapped display, extensive use of a mouse for input, and more.

In fact, many of the people responsible for the ideas first conceived at Xerox are now Apple employees, some of them within the Macintosh programming group.

What isn't as readily apparent is the fact that Apple scientists took the Xerox concepts and extended them, refined them, honed them, and polished them to a degree never attempted at Xerox. And succeeded: The creation of Macintosh software took three years of effort and thousands of hours of programming.

The result is a machine that is uniquely Macintosh and uniquely Apple: small, personal, innovative, affordable.

The Macintosh is an amazing computer. But no one is amazed that Apple is the company responsible for Macintosh.


File
Edit
Goodies
Font
FontSize
Style
Confidential
JAPAN
Open
Write/Paint
Eject
Cancel
Backspace
Tab
Caps Lock
Return
Shift
Shift
Option
Enter
Option

Using MAC

The Importance of Being Easy

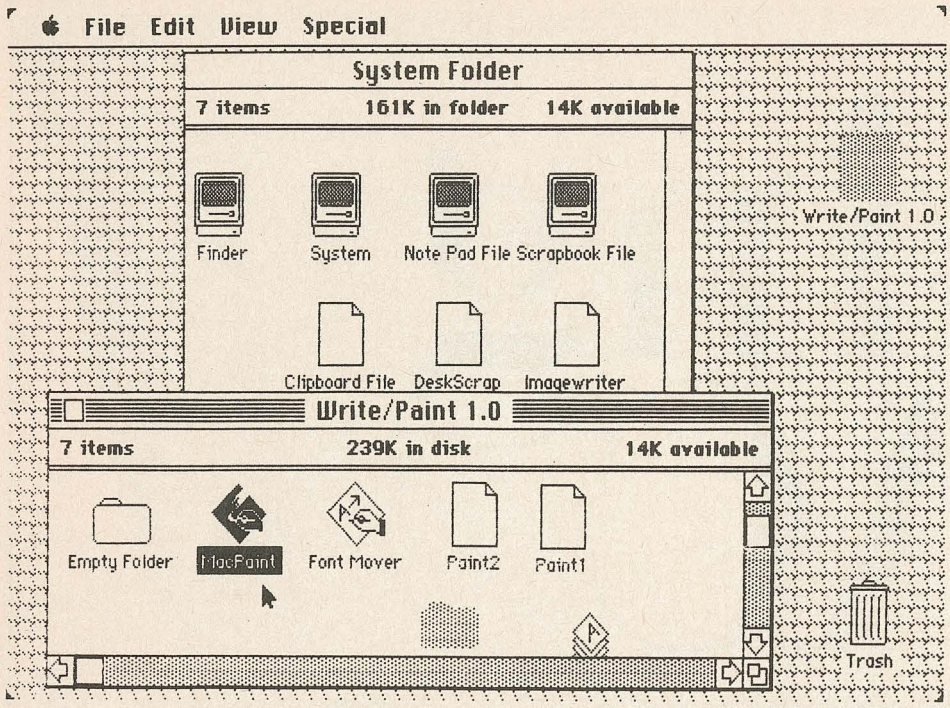
by Alden Woodard

The Apple Macintosh is a small, fast, extremely easy to use computer. Macintosh is small because of clever hardware engineering and the use of new technology, such as the 3 1/2-inch Sony disk drive. Primarily because of the Motorola MC68000, an advanced thirty-two-bit microprocessor, Macintosh is about ten times faster than an Apple II and double the speed of an IBM PC.

But the true wonder of Macintosh is the machine's user interface: how Macintosh displays information on-screen and how users put Macintosh through its paces.

The Last Generation

Before Lisa and Macintosh, computers were ordered about primarily through the keyboard. Commands and instructions were carefully typed in, usually followed by an obligatory press of a Return key. Whether you were using MS-DOS, or DOS 3.3, or any number of applications programs, the rules were

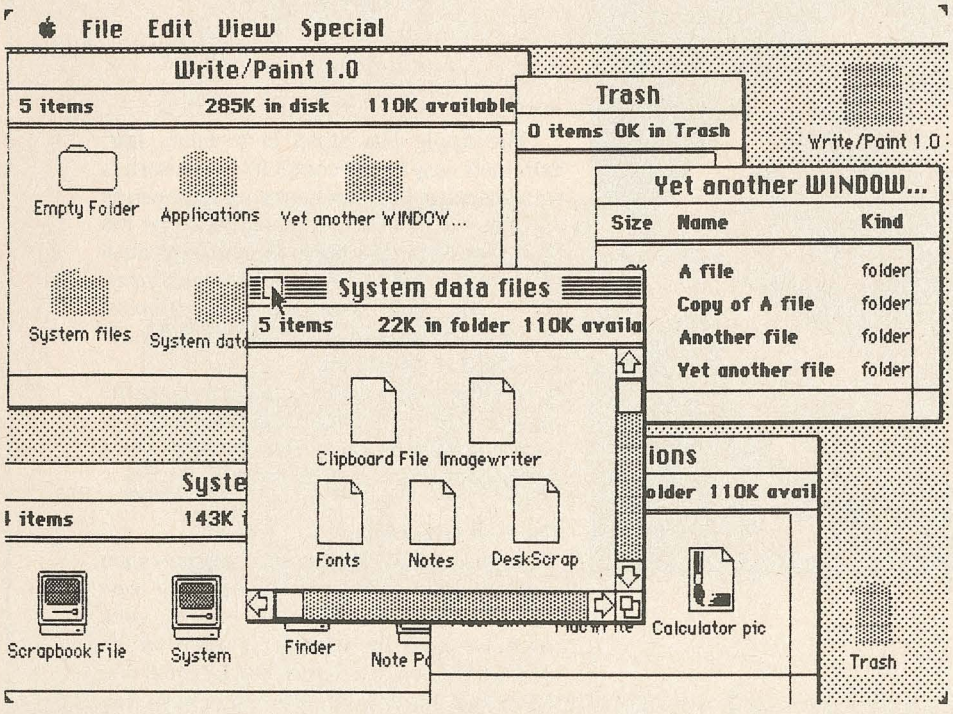


Windows on Mac's electronic desktop are similar to sheets of paper on conventional desktops. Small pictures, or icons, describe the kind of information contained within, like the MacPaint icon pointed to in this display.

essentially the same: First learn the commands, then type them in properly. The more commands you knew, the more you could do with your computer. Learning the ins and outs of each command required spending hours behind the keyboard. Having a good memory helped.

Macintosh is a radical departure from the typed-command form of computer interaction. With Macintosh, information is given, whenever possible, in the form of pictures. Commands are seldom given through the keyboard; instead, a device called a mouse is used to control an on-screen pointer. The pointer, not surprisingly, points at pictorial objects on-screen or is used to make selections from menus that instantly appear on the display.

The keyboard is used only for entering numbers or text. In practice, an enormous amount of work can be done without hardly touching the keyboard.

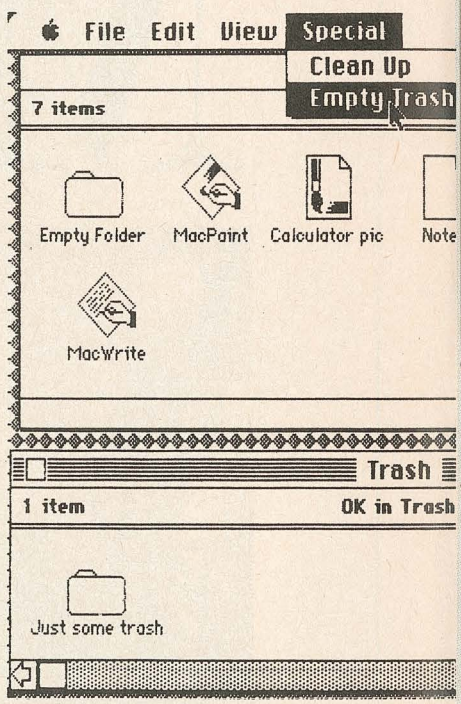


Windows may be stacked, overlapped, or strewn about the desktop. If two or more windows are present, you can always tell the active one: It's the window in front.

The Visual Machine

More than anything else, Macintosh is a visual machine. The screen is graphic, bit-mapped, and has a high resolution: 512 dots by 342 dots. The consistent high resolution displayed on the screen makes it possible to create pictures that look like pictures, and text that looks like real text, in any number of font types, sizes, and styles.

The graphic nature of Macintosh does away with the need for excess words. When given, messages are clear and conversational, but not all messages are given in words. A good example can be seen by switching on the Macintosh without first inserting a disk. After a soft beep, the screen displays a picture of a disk. In the center of the disk, a question mark is calmly blinking. Without words, the meaning is clear: Well, are you going to insert a disk?



To dispose of an icon, use the mouse to slide it over to the Trash (bottom right). Then select

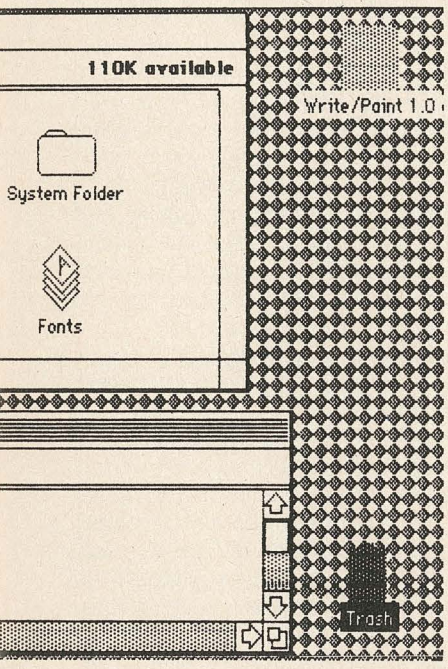
The Desktop

Behind the impressive graphics are a number of basic ideas. One fundamental Macintosh idea is the concept of the *desktop*. Macintosh's electronic desktop is used much like more traditional desktops: Information is displayed, organized, shuffled about, and otherwise manipulated. Information on the desktop is displayed as icons: small pictorial representations that visually describe the type

of information contained within. A letter might be represented by an icon filled with small lines that suggest a text document; a graphic document might be shown as an icon that includes a brush and a swash of paint.

Windows on the Macintosh display are similar to sheets of paper on conventional desktops. Like paper, windows contain information and can be stacked on top of each other, or they can be left strewn over the desktop, with some sheets partially or fully obscuring other sheets.

But windows have some notable advantages over paper. Macintosh windows can be resized to cover the entire screen or shrunk to the size of a matchbook. Windows may contain text, drawings, electronic spread-

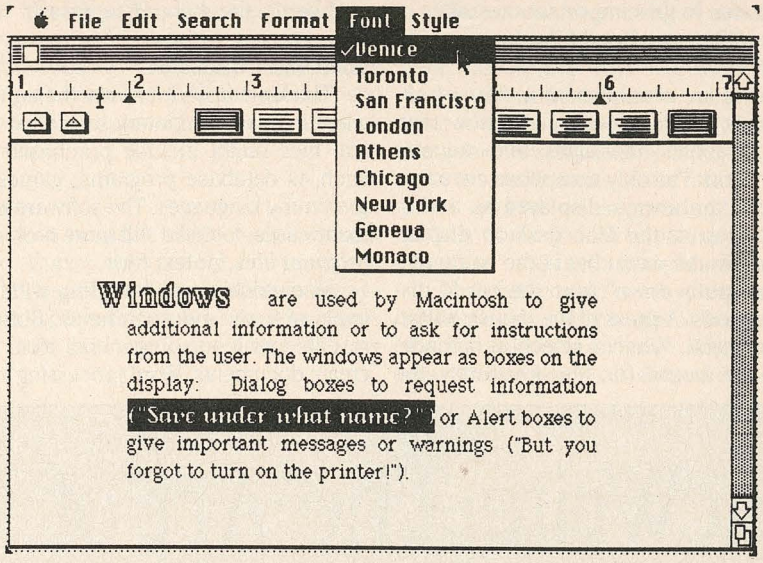


Empty Trash from the Special menu and watch your document disappear.

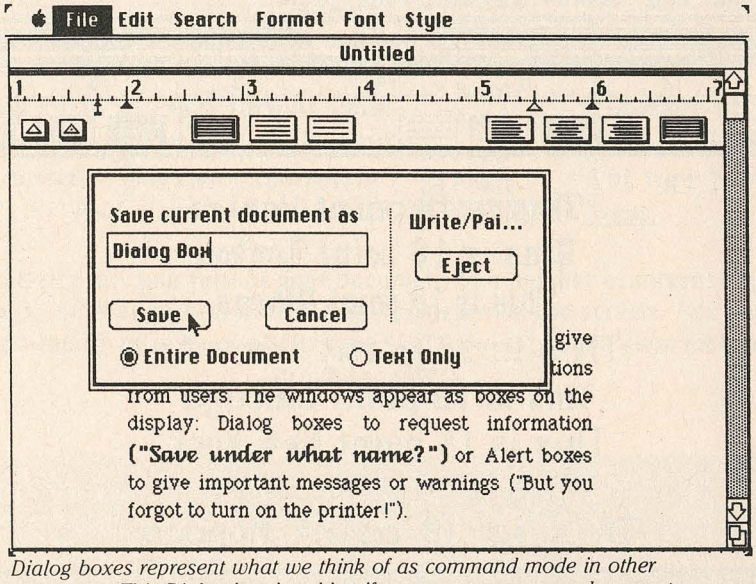
sheets, or icons that can be opened to display still more windows of information or additional icons. The idea of windows within windows is a powerful concept that allows an easy method of handling related information, or of constructing highly detailed layers of information.

Most windows have a common appearance. A small "close box" in the upper left corner of a window allows the closing of windows; in most cases, the window then zooms back into the icon where it originated. The title bar at the top of the window is used to reposition the window using the mouse. Scroll bars at the side (and sometimes bottom) of windows are used to view large documents.

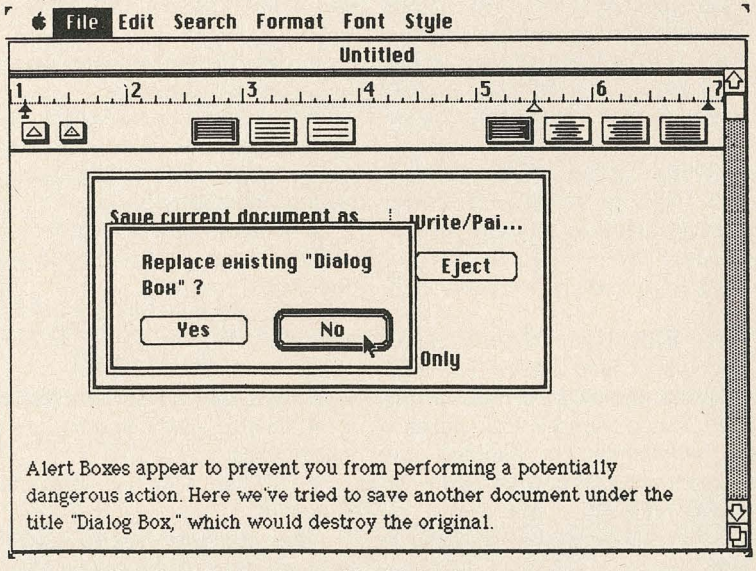
Windows are also used by Macintosh to give additional information or to receive instructions from users. The windows appear as boxes on the display: Dialog boxes to request information ("Save under what name?")



A moment ago, all the text in this display was in the same type font. Highlighting a portion of text and clicking the Venice font on the pull-down menu gave us this customized effect.



Dialog boxes represent what we think of as command mode in other computers. This Dialog box is asking if we want to save our document and, if so, under what name.



Here's an Alert box sitting on top of the Dialog box, warning us that something terrible may be about to happen.

or Alert boxes to give important messages or warnings ("But you forgot to turn on the printer!").

Windows are omnipresent in Macintosh. Everything is displayed within a window: text, numbers, graphics, messages, and requests for information. The only exceptions are menu bars, which are always displayed as a strip across the top of the Mac desktop display. Each word on the menu bar is the name of a menu that "pulls down" from the bar to display commands. A press of the mouse button opens the menu. When a selection is made, by using the mouse (or, less frequently, the keyboard), the menu disappears.

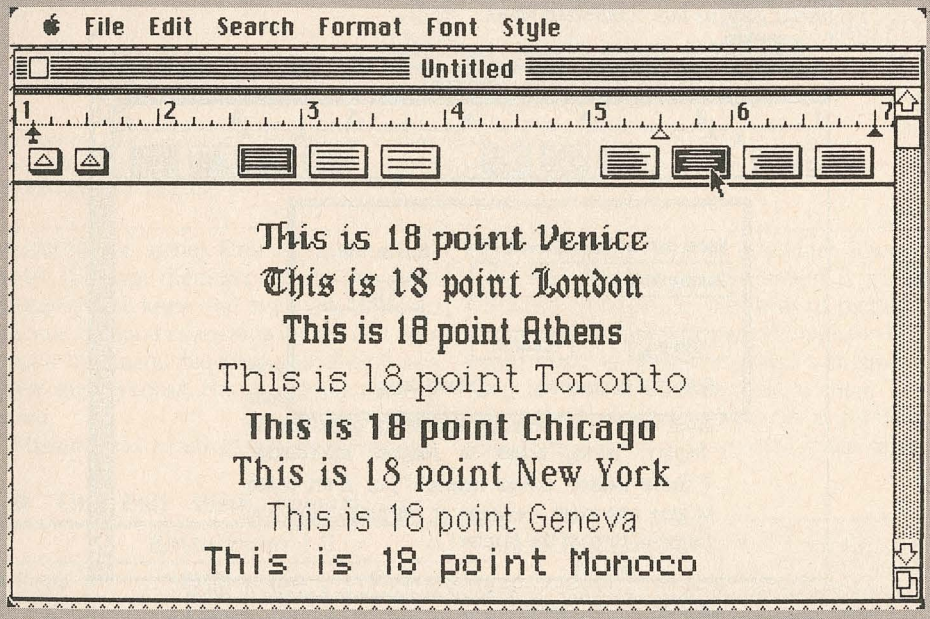
Tools and Documents

The Macintosh icons are the equivalent of what, in other computers, are called files. Typical files might include purchased software such as database programs, games, or programming languages. The software is used, in many cases, to make still more files: data files, program files, or text files.

Macintosh simplifies filing with the concepts of tools and documents. Both are represented as icons. In general, tools are what create documents: Word processing tools such as *MacWrite* are used to create text documents; graphic tools such as *MacPaint* are used to create graphic documents; and cell tools, like Microsoft's *Multiplan*, are used to create any document best manipulated on a grid. Electronic spreadsheets serve as a good grid example.

At present, all Macintosh applications programs fall into one of those three categories: text, graphic, or cell. The beauty of the tool/document design, however, is that users need not be concerned about which applications program to load first. Words like *load*, in fact, aren't needed; users merely select the docu-

MacWrite: The Art of Word Processing



MacWrite is the first Macintosh word processor. An excellent demonstration of Mac's capabilities, *MacWrite* vigorously adheres to all the Macintosh software design guidelines. And it should: *MacWrite* is an Apple product that was created in concert with the creation of other Macintosh software.

All the editing functions of Macintosh are available in *MacWrite*, along with several advanced capabilities. A rundown of features includes:

- Five type sizes, which are completely mixable.
- Six type styles: plain text, bold, italic, underlined, outlined, and shadow. The latter five are mixable and may be used in any combination: You could make text both italic and bold, for example, or outlined and shadowed and underlined and italic. Let your aesthetics be your guide.
- An Undo Typing feature to retrieve deleted text.
- Four text formats: flush left, flush right, centered, and fully justified (straight margins on both the left and right sides of the text).
- Three spacing options: single, single-and-a-half, and double.
- Easy insertion of additional rulers in the text. Rulers are used to set and control justification, spacing, tabs, and other formatting characteristics.
- Multiline headers and footers, which may contain text, page numbers, date and time, and file name.
- Decimal tabs, which align columns of numbers evenly on either side of decimal points.
- Up to ten user-set tabs per rule.
- Flexible search and replace with various options.
- Full and easy use of the Macintosh Clipboard.

When it comes time to print the document, you get to make various other choices. Among the more notable *MacWrite* printing features are:

- A choice of four paper sizes, including legal size and twelve-inch European.
- Tall or wide paper orientation.
- Three choices of print quality: high resolution (beautiful and a bit slow), standard resolution (good and fast), and draft (blazingly fast, but with only one type font and size, and no italics).
- The option to print any range of pages within a document: from page 3 to page 7, for example.
- The ability to print multiple copies of a single document.

The true beauty of *MacWrite* is that the screen displays exactly what will be printed. Not close, or sort of—*exactly*. Often, in fact, the print quality is slightly superior to the high resolution of the Mac screen, because of a tendency for printed letters to "fill in" with ink.

Using MacWrite

To begin a *MacWrite* document from scratch, you simply click the mouse button twice on the Finder *MacWrite* icon. After a bit of humming, the *MacWrite* menu bar appears, accompanied by a blank window labeled Untitled. An insertion bar blinks calmly in the upper left corner of the window.

The menu bar choices are File, Edit, Search, Format, Font, and Style (and, of course, the Apple menu).

A default type font and size may be accepted, or one of the nine available type fonts may be chosen from the Font menu. Any subsequent text is then displayed in the new font. Changes may be made at any time, and they may affect only a single character or the entire document, as you specify.

Then there's style. The Style menu gives you the choice of plain text, bold, italic, underlined, outlined, and shadow, plus any one of five type sizes for your text. The mix-and-match capabilities are virtually unlimited.

ment they wish to work with and Macintosh first takes care of finding the proper tool. To work with a letter previously created, it's only necessary to open the icon titled Letter (done with the mouse). Macintosh then finds *MacWrite*, opens a *MacWrite* window, and displays the letter within the *MacWrite* window. Or, to start from scratch, the *MacWrite* icon is opened into a window, just as the document window was opened.

Documents may work with a number of different tools. Text documents can easily be used with spelling checkers, word counters, or any other "secondary tool" that works with text. The Macintosh Desk Accessories (covered separately in this article) are good examples of minitools; in effect, Desk Accessories are small, self-contained tools that can be used anywhere and anytime, without disturbing work in progress.

The Mouse

Macintosh wouldn't be Macintosh without a mouse. Cursor keys would not provide a substitute; because the Mac display is always a graphic display of objects, using cursor keys would result in a confusing maze of right angles.

The mouse was an ideal solution to the dilemma of pointing. As the mouse is rolled over the desktop (the real desktop), a ball under the mouse moves, coordinates are relayed to the computer, and a pointer on the Macintosh display moves in perfect sympathy with the movements of the mouse. After only a few minutes of use, moving the on-screen pointer is an intuitive, natural process that seems to require no thought whatsoever.

The pointer also conveys additional information by changing shape. When on the desktop, the pointer is an arrow. When in text documents, the pointer is shaped somewhat like

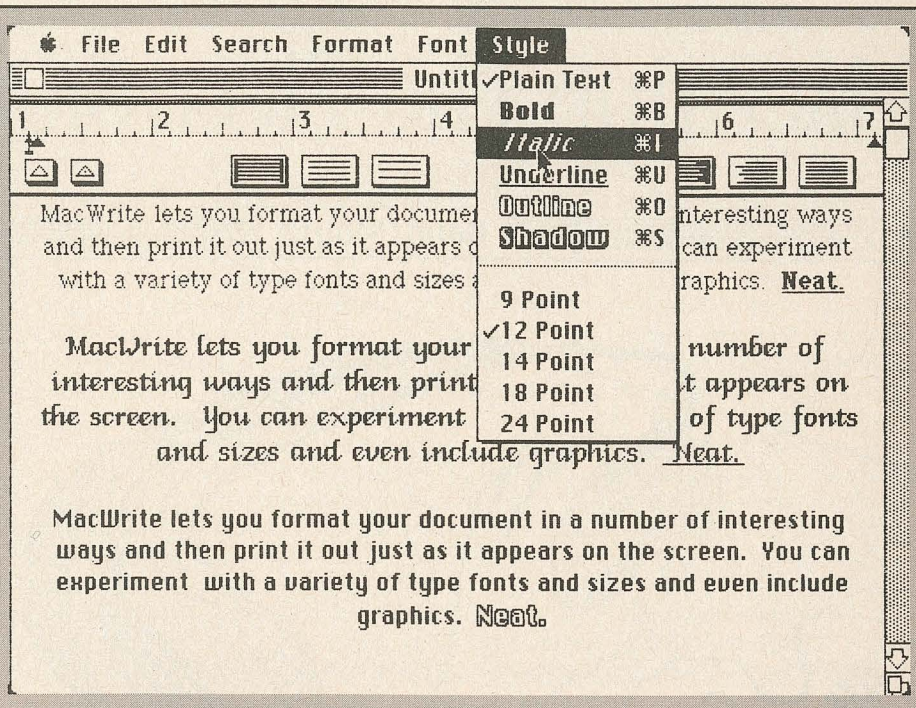
The *MacWrite* ruler (which, naturally, looks just like a ruler) gives you access to justification, tab, and spacing options, chosen by clicking in the appropriate box (or, in the case of tab, by "pulling" tabs from a tab well).

Typing in any size, font, style, and format is as straightforward as everything else about Macintosh. To change text parameters after you've typed in text, simply select the text to be changed by using the mouse. The text is immediately inverted (to a black-on-white display). The entire process of text creation, editing, and change is not only simple, it's fun. You may find yourself wanting to spend whole afternoons with your document: shuffling, changing, reformatting, stylizing, or just fooling around.

Let's explore a few more options. The Search functions appear in a Dialog box, after you've called them up from the Search menu. Just type in what to find, click the Find Next box, and the characters are located and instantly inverted. If the characters don't exist, another box pops up to relay the news.

Change is just a slightly more involved version of Find. Here, the choices are Find Next, Change Then Find, Change, and Change All. Type in what to find and what to change the found characters to. (One advantage here is that both groups of characters are visible at once, which reduces typing errors.)

Another useful option is Undo Typing, found on the File menu. Say that your mind is wandering and you delete a chunk of text that you'd really like to keep in your document. Don't panic; just select Undo Typing from the File menu to resurrect your last deletion.



Creative writing takes on a whole new meaning with MacWrite. *You can experiment with a variety of type styles, sizes, and page layouts before printing your document.*

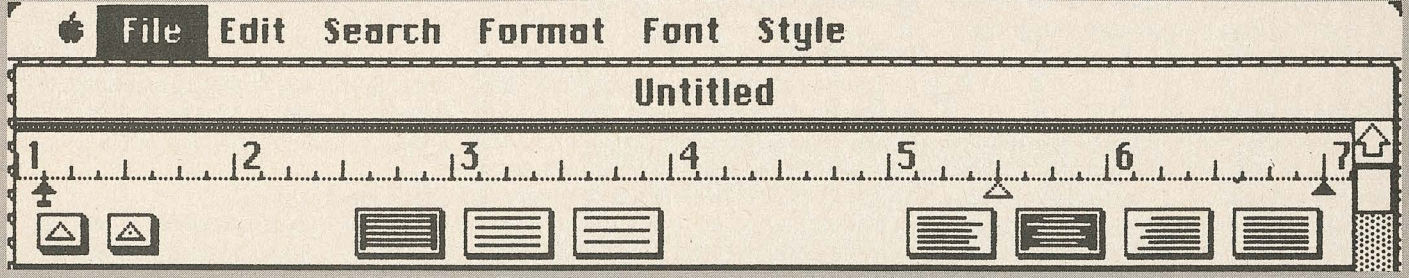
Limitations

MacWrite has a few limitations, primarily because it was written to be a fast and easy tool for ordinary folks with typical needs, not for professional writers. The program's main drawback is its limited document length: about ten pages of single-spaced text. To be fair, most people seldom create documents longer than ten pages, and those that do can always break up their masterpieces into sections or chapters.

Other word processors have options that serious users need: spelling checkers, true footnote capability, flexible printer selection, document merge, horizontal scrolling, and more. *MacWrite* lacks these.

But the advantages inherent in Macintosh, which are so well integrated in *MacWrite*, are enough to make *MacWrite* a winner. Besides, it's easy to envision a *SuperMacWrite*, with all the advantages of *MacWrite*—and then some.

That program is surely on the way.



Setting margins in MacWrite *is as easy as moving the margin tabs in and out with the mouse. You can select from three spacing options, as well as flush left, flush right, centered, and justified type by pointing and clicking on the appropriate box.*

a capital I. When in spreadsheets, or other cell documents, the pointer becomes a hollow cross. In graphic documents, the pointer is often shaped like a rifle scope crosshair.

Once an object is covered with the pointer, the mouse button is held down or clicked to give commands. A single click selects an object or icon to work with. Two fast clicks open the icon into a window. Want a menu? Just point to a menu bar title and hold down the button.

Holding the button down and rolling the mouse performs a number of actions, usually selecting a large area of information to work with or "dragging" through a menu to reach a desired selection.

In all, it's hard to find anyone who, after using a mouse for any length of time, would willingly go back to keyboards and cursor keys.

The Keyboard

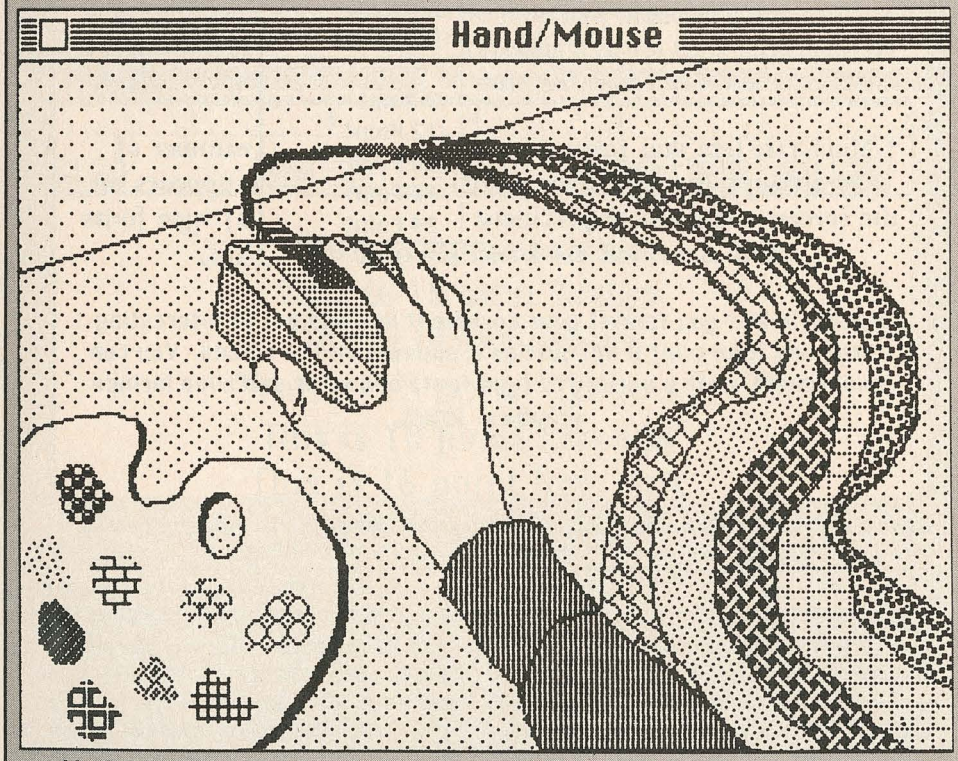
For now, keyboards are still a necessary item. Macintosh comes equipped with a detachable keyboard that is lightweight, offers a complete complement of keys (in a proper layout), and has an excellent touch. Touch typists will love the Mac keyboard; those with less agile fingers will appreciate the size of the Return, Shift, Tab, and Backspace keys.

The Macintosh keyboard is entirely software-mapped: Each key can represent whatever programmers dream up. At present, pressing the Option key gives access to a second symbol for each key. The symbols are a collection of Greek, mathematical, and business designations such as the trademark sign.

The key to the left of the space bar marked with a cloverleaf symbol is the Command key. Holding down the Command key while pressing another key gives the same effect as using the mouse to make selections from pull-down menus—another aid for quick typists.

All keys have an automatic repeat feature

MacPaint: The Electronic Palette



MacPaint is an amazing program—arguably the most amazing program ever written for a microcomputer.

Why is it so amazing? *MacPaint* allows you to paint, draw, erase, write, change, enlarge, shrink, copy, and do just about anything else you can imagine with either text or graphics. And a few things you probably couldn't imagine, too.

Behind MacPaint

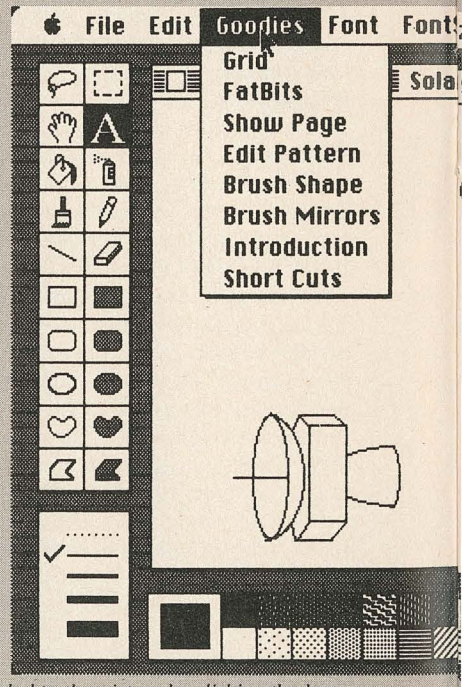
Essentially, *MacPaint* is a front end to the *QuickDraw* routines stored in Macintosh's internal ROM memory. The *QuickDraw* routines provide the speed and the sizzle behind everything on the Macintosh screen: windows, dialogs, icons, and all forms of text.

MacPaint uses those same routines as a software foundation for a graphics program with a wealth of nifty features. In a sense, *MacPaint* is a primer on how everything in Macintosh works. It may not always look like it, but everything on the Macintosh screen is graphics—that's the conceptual key to this remarkable machine.

On the Screen

Like all Macintosh applications programs, *MacPaint* has a menu bar at the top of the screen. The main selections on the menu bar include the ever-present Apple menu full of Desk Accessories; a File menu for loading, saving, and printing graphic creations; a Goodies menu full of, well, goodies; an Edit menu; and menus for selecting type size, style, and other attributes when text is used.

The remainder of the screen is divided into three main areas. Graphic tools sit along the left side of the screen, patterns are along the bottom, and a drawing area is in the center of the screen. The drawing area is actually a window into an area equal to that of a standard 8 1/2-by-11 sheet of paper. The drawing area can be shifted on-screen; additionally, the entire page can be viewed by a selection from the Goodies menu.



Text is added to the picture by clicking the box marked A, choosing an insertion point, and then just typing it in. From the Font, FontSize, and

Using MacPaint

You begin using *MacPaint* by clicking a graphic tool from the selection at the left edge of the screen and clicking a pattern at the bottom of the screen. Or, simpler yet,

that can be controlled, or turned off, by setting the Control Panel (found on the Apple menu). A keystroke buffer also ensures that fast typists won't lose keystrokes, although Macintosh's speed can easily keep up with all but the very best typists.

The Finder

The key to Macintosh is the Finder: the first screen that greets you when you begin using Macintosh, and the screen that you always return to after using any of the Macintosh tools or documents.

The Finder is the Macintosh operating system. Like more well-known operating systems, the Finder allows you to examine files, copy files, and check how much space remains in memory or on disk. With other computers, using the operating system conjures up visions of blinking cursors waiting for commands. The Mac operating system is the Finder menu bar and the collection of icons mentioned earlier.

By using the menus and the mouse, it's possible (and easy) to do anything that can be done with ordinary operating systems. In one well-known operating system, for example, copying a file from one drive to another involves this command:

COPY A:EXAMPLE.TXT B:/V

With the Finder, the same action is accomplished by using the mouse to move an icon from one window into another window, a process that's much easier to do than to describe.

Icons (files) are deleted by moving them into the Trash icon. The Trash is emptied at your convenience by selecting Empty Trash from the menu bar.

Other choices on the menu bar allow you to check the size and type of icon, display the disk contents in words rather than as icons,

you can use the tool and pattern that are preset when you first begin using *MacPaint*.

Creating visual images is a matter of positioning the pointer within the drawing area, pressing the mouse button, and rolling the mouse—another incarnation of the familiar dragging technique.

The graphic tools include:

- A brush that paints in black, white, or a pattern. A variety of brush shapes can be chosen, from small, round shapes to large squares that create bold swaths.
- A pencil that produces thin, pencil-like lines in black or white.

Style menus you can customize the text to fit your needs right on the screen.

- A paint sprayer. The effect is exactly what you'd imagine.
- A hand. Clicking the hand and then moving it into the drawing area lets you grab the "page" and move it to a new location.
- An eraser. It works just like a blackboard eraser, wiping out what's underneath as it's moved across the drawing area.
- A paint bucket. The bucket will fill any document, or any enclosed portion of a document, with the paint of your choice.

Two methods of selecting areas for further manipulation are also included: a selection rectangle and a selection lasso that allow you to snare any part of the document. Once an area has been selected, the area can be moved, copied, stretched, rotated, or inverted, or the edges can be traced—an awesome demonstration of the speed and flexibility of *MacPaint* and, by extension, of the entire set of *QuickDraw* routines.

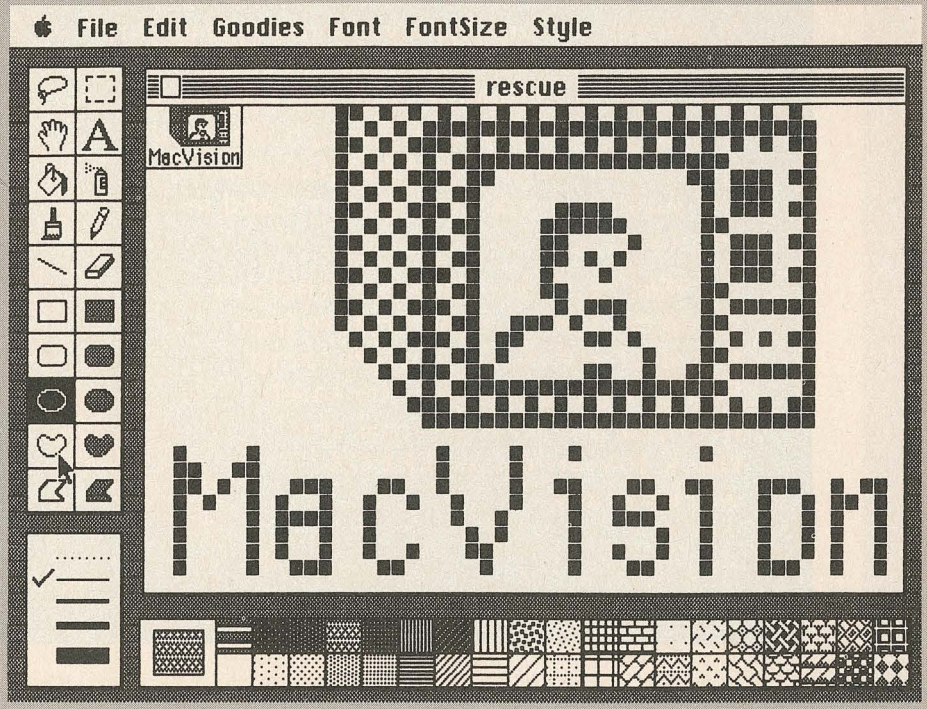
Several imaginative graphic aids can be found on the Goodies menu. Fat Bits provides a blowup of any section of the *MacPaint* document that you choose, allowing you to work with an enlargement of any area on the screen, for precise pixel-by-pixel control. A Grid feature limits movement to four pixel hops—a necessity for architectural work and other projects that would, traditionally, be done on graph paper. Brush Mirrors allows you to draw in up to four places at once, for a kaleidoscopic effect.

At first glance, *MacPaint* appears to be a fun but trivial program—delighting everyone but leaving most people with the feeling that it's merely a diversion, a cute program with little substance.

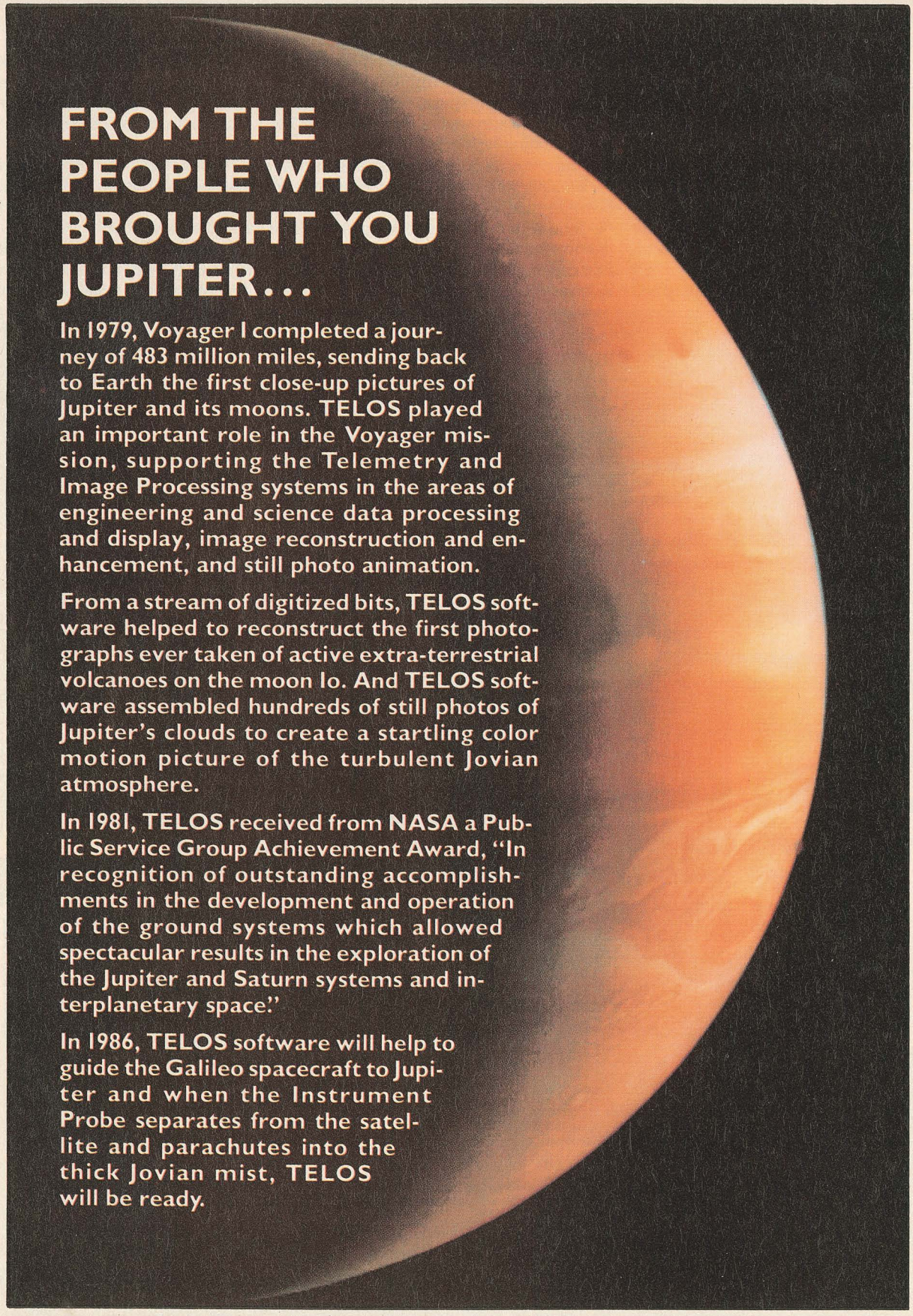
This is absolutely incorrect. *MacPaint* is capable of serious work and day-by-day duty in the business trenches of the largest corporations. All the traditional office forms, from memo pads to sophisticated forms, invoices, receipts, and purchase orders, can be created with *MacPaint*. Make one form and copy five hundred; using this capability alone would shortly recoup the cost of a Macintosh for many businesses.

In the hands of an artist, *MacPaint* can yield stunning results. But the beauty of *MacPaint* is that everyone gets a chance to be an artist. *MacPaint* makes you a believer in your own talent, even if you thought you had none.

Clearly, *MacPaint* will be a huge software success. What may not be so obvious is that *MacPaint* will be responsible for the selling of thousands of Macintosh computers.



Fat Bits is a magnified drawing mode that gives MacPaint *a lot of its power. Besides allowing you to turn individual pixels on and off, Fat Bits gives you access to all of the drawing functions in 8× magnification. In the upper left corner is the magnified segment in its actual size.*



FROM THE PEOPLE WHO BROUGHT YOU JUPITER...

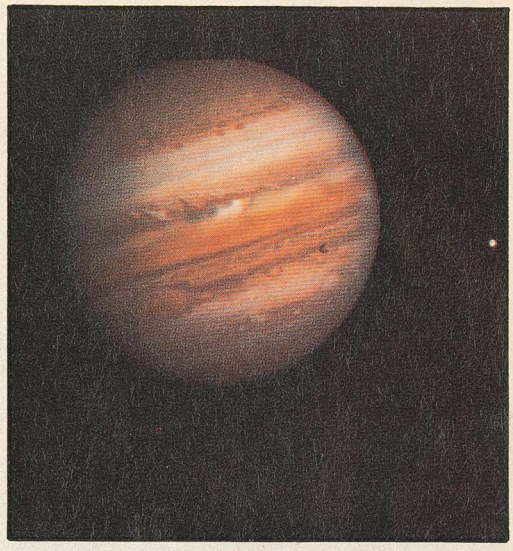
In 1979, Voyager I completed a journey of 483 million miles, sending back to Earth the first close-up pictures of Jupiter and its moons. TELOS played an important role in the Voyager mission, supporting the Telemetry and Image Processing systems in the areas of engineering and science data processing and display, image reconstruction and enhancement, and still photo animation.

From a stream of digitized bits, TELOS software helped to reconstruct the first photographs ever taken of active extra-terrestrial volcanoes on the moon Io. And TELOS software assembled hundreds of still photos of Jupiter's clouds to create a startling color motion picture of the turbulent Jovian atmosphere.

In 1981, TELOS received from NASA a Public Service Group Achievement Award, "In recognition of outstanding accomplishments in the development and operation of the ground systems which allowed spectacular results in the exploration of the Jupiter and Saturn systems and interplanetary space."

In 1986, TELOS software will help to guide the Galileo spacecraft to Jupiter and when the Instrument Probe separates from the satellite and parachutes into the thick Jovian mist, TELOS will be ready.

TELOS EXPLORES THE OUTER LIMITS OF THE MACINTOSH



Telos software is helping NASA explore the heavens. And soon a remarkable new line of Telos software for the Macintosh will help you do some exploring of your own.

Telos congratulates Apple on the introduction of the Macintosh

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TELOS™

make duplicates of icons, print the contents of the disk, open icons into windows, or simply close them all up again into tidy pictures. A Clean Up command is also available to arrange your icons into neat rows.

Transferring Information

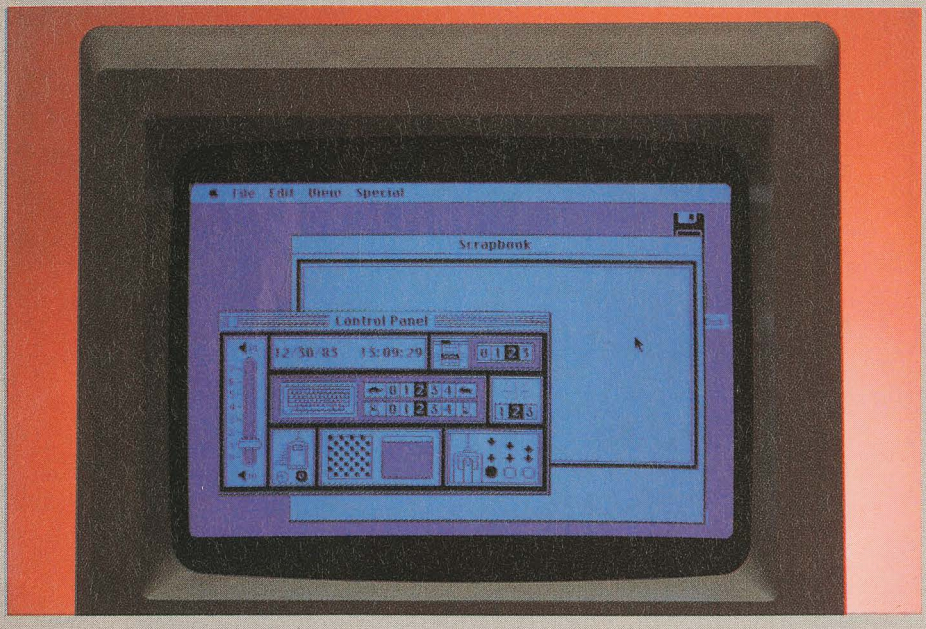
The latest rage in computers is the integrated program: a program made up of different modules (word processor, spreadsheet, database) that pass information from one part of the program to another part. In most cases, integrated programs require mastering yet another set of commands.

Macintosh does the integrators one better. With Macintosh, everything is integrated; any information in one tool can be easily transferred to another tool, even if the tools are radically different in nature. A picture drawn with *MacPaint* can be quickly moved into a document created with *MacWrite*. A portion of a spreadsheet can be added to the same *MacWrite* document or moved into *MacPaint* for graphic manipulation. The possibilities are almost endless, and the process is amazingly simple.

The credit goes to a special window called a Clipboard. Although not typically in view, the Clipboard window is always ready to receive information from any program. After you've first selected an area within a document (by holding down the mouse button and moving the pointer), the information selected can be either Cut (removed) or Copied from the document onto the Clipboard. The information stays on the Clipboard until replaced with new information. Anything on the Clipboard can be Pasted into the same, or a different, document—anytime, anywhere.

In practice, using the Clipboard is a simple process. Select with the mouse, choose Cut from the File menu, quit the application

Minitools for the Working Mac



The Control Panel accessory lets you customize Mac to your own preferences. Speaker volume too low? Keys repeat too quickly? Use the mouse to make the necessary adjustments.

Everything on the Macintosh screen is based on the metaphor of the desktop. As on a real desktop, papers (windows) on the Macintosh screen can be shuffled, rearranged, or overlapped, and objects can be moved around.

In real life, we like to have clocks, calculators, notepads, and other accessories on our desks as convenient minitools. Need a little quick arithmetic? Pick up a calculator and punch in some numbers, then plug the numbers into the document you're working on.

That's how it's done on traditional desktops, and that's how it's done on the Macintosh screen. The Mac's minitools are called Desk Accessories. Six Desk Accessories are currently available: a Clock, a Note Pad, a Calculator, a Scrapbook, the Control Panel, and Keycaps.

The Desk Accessories reside on the Apple menu that always appears on the leftmost position of the menu bar at the top of the Macintosh screen and are available in all Macintosh programs.

Like all objects on the Macintosh screen, Desk Accessories look like what they are: The Clock looks like a clock, the Calculator looks like a typical four-function calculator, and the Note Pad looks like an ordinary notepad.

When viewed as software, the Desk Accessories are anything but ordinary. In effect, the Desk Accessories are full-fledged applications programs with three interesting characteristics:

- They're small and fast.
- They can be selected and used anytime and anywhere.
- Information from them can be easily transferred into whatever document is currently open.

Selecting a Desk Accessory is easy. Place the pointer over the black apple on the menu bar, press the mouse button, then drag down until the accessory you wish to open is inverted. Release the mouse button and the accessory obediently appears on the desktop, ready for use.

Desk Accessories are shown in windows, like almost everything on the Macintosh screen. Each accessory can be moved around on-screen by positioning the pointer on the title bar at the top of the accessory's window and dragging the accessory to a new position. Each accessory can be put away by clicking a small "close box" in the upper left corner.

Detailing the Desk Accessories

The Clock is one of the simplest, yet most useful, accessories. Thanks to a penlight battery tucked into the back of Macintosh, the Clock keeps time even when the computer is switched off or unplugged. The Clock is set from the Control Panel, another desk accessory, and the time and date information can be quickly moved into any document. Like all Desk Accessories, the Clock can be selected and left on the desktop, regardless of whatever else is also there. The Clock may be covered with a number of windows or other accessories, but it's perfectly happy to reside on the bottom of the pile until called to the front with a single click.

One convenient way of using the Clock is to place it in an accessible corner of the display screen. Next, size the document window so that only a sliver of the clock is visible. When you need the time, click on

(*MacWrite*, for example), then open a new tool (*MacPaint*, say), pick a spot for the transferred information to go, then choose Paste from the *MacPaint* File menu.

Your text is immediately nestled into the *MacPaint* window.

The power and simplicity of transferring information between Macintosh tools will be even more apparent as new software is marketed for this amazing machine. If programmers follow the rules carefully prescribed by Apple for third-party software, any information in any program can be transferred to any other program—an eye-opening thought.

Editing

Information can be moved anywhere in Macintosh, and it can also be edited anywhere within Macintosh. A powerful set of text editing routines—almost a mini-word processor—are packed into Mac's internal memory ROMs. The routines allow sophisticated editing capabilities, including word wraparound, multiple fonts and styles, and selection and deletion—all available whenever characters are typed into the keyboard.

Editing is easily done with the mouse. After text is entered, the pointer is positioned in the text. Next, the mouse button is clicked to select an insertion point. Any new text entered will then be inserted into the previous text, beginning at the insertion point. Or the pointer can be placed anywhere in a word and the mouse button clicked twice. This double-click will select an entire word and note the selection by inverting (white on black) the word. Using the File menu, the word can then be Cut or Copied; hitting the Backspace key will delete the entire word with one press.

Larger areas can be selected by holding the mouse button down and dragging the pointer over the text. As the pointer passes, the text inverts and can then be Cut, Copied,

the edge of the Clock to bring it to the front. Then click on the document window to hide the Clock once again.

Keycaps is, essentially, a demonstration accessory. The window functions as a display of the Macintosh keyboard, with appropriate key-cap designations. Press the Shift key, however, and the designations change. Press the Option key and Mac's alternative character set appears to replace the more conventional key-cap legends. The alternative character set is a hodgepodge of mathematical, Greek, scientific, and business symbols. If you need to use any of these symbols, it's nice to have Keycaps hang around to remind you where they are on the Macintosh keyboard.

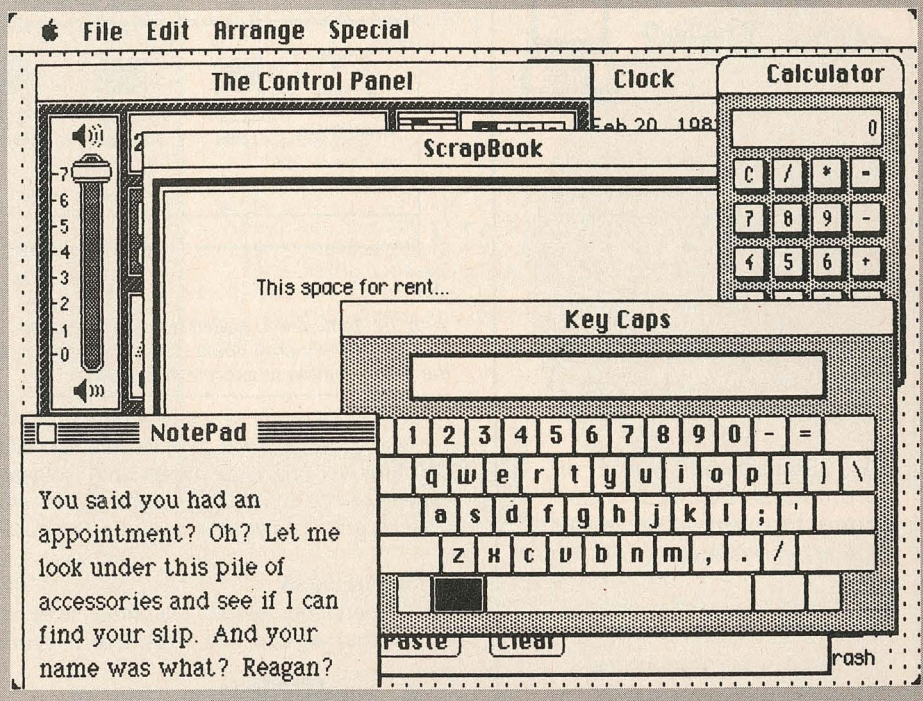
The Calculator is reassuringly familiar. Nothing fancy here, just a simple, Mac-held calculator that adds, subtracts, multiplies, and divides. Just like the one you've stashed away at home in some forgotten drawer.

The Puzzle is a replica of those puzzles we all remember from childhood—the ones with the plastic squares of numbers, all thoroughly out of sequence. Solving the Puzzle requires sliding the numbers around and around until they're back in the proper order. On Macintosh, the squares are moved by clicks of the mouse, but the task is as tedious as ever.

The Note Pad is a mini-word processor. It consists of eight pages that can be flipped through, forward or backward, by clicking in the upturned corner of the top page or the corner of the page visible underneath. Unlike *MacWrite* and other, more sophisticated word processors, the Note Pad limits you to one type style, size, and font.

Users aren't likely to complain too loudly; the Note Pad is a convenient way to jot down notes or stray thoughts, and anything entered on the Note Pad can be easily transferred to other Macintosh applications. This is done in the same way that all information is transferred between Macintosh applications: Simply Cut or Copy the information when the Desk Accessory is the topmost window on-screen, then paste the information in the desired spot in the applications program.

We've saved two of the most interesting accessories until last. The first is the Scrapbook—a graphic clipboard that functions exactly like the standard Macintosh Clipboard, with one exception: The Scrapbook is used only to move portions of graphic documents into other documents.



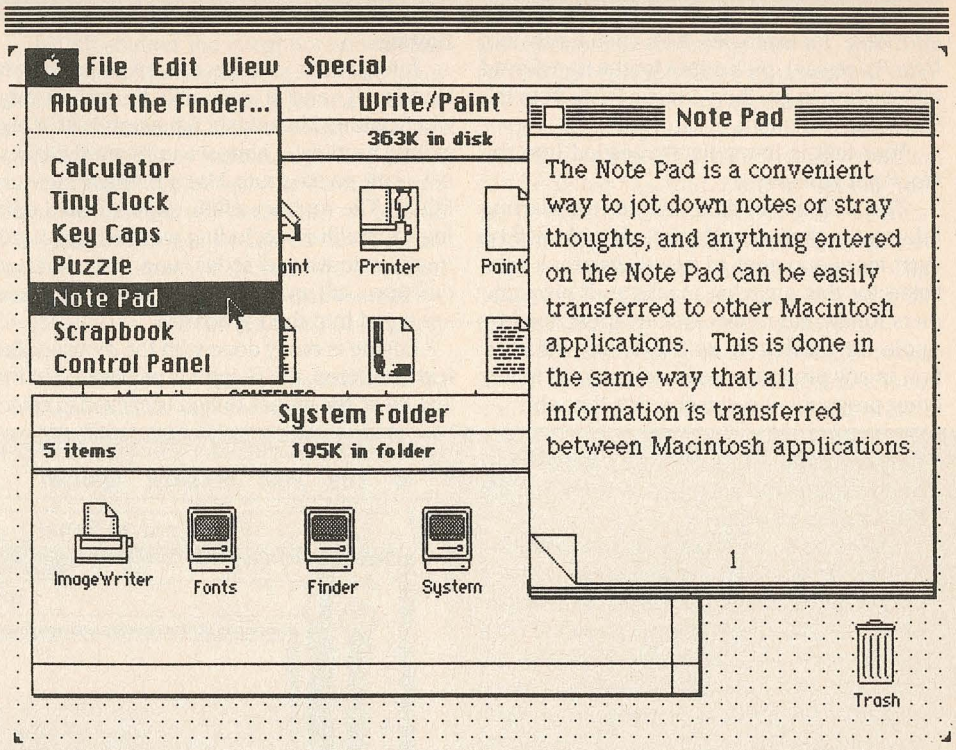
Desk Accessories can be used in any Macintosh application. They reside on the Apple menu and can be selected at the click of a mouse. Software developers are sure to introduce many more accessories than the ones shown in this display.

When using *MacPaint*, you'll find that the Scrapbook behaves like the Clipboard does in text applications. Move anything from *MacPaint* and it appears in the Scrapbook. When you begin another application (*MacWrite*, say), the Scrapbook is still available and contains your graphic picture. One Paste and the picture is inserted into the new document.

The last accessory is the Control Panel, an excellent demonstration of what's possible with Desk Accessories. The Control Panel allows you to customize each Macintosh disk, if you wish, in a variety of ways. The settings of the Control Panel are saved to disk at the end of a session. Some of the things you can customize from the Control Panel are the pattern of the desktop, the volume of the internal speaker, whether keys repeat (and, if they do, the speed of repeat), the number of times that menu items blink when selected, the ratio of mouse movement to on-screen pointer movement, and the speed at which the text Insertion Bar blinks. The Clock is also set on the Control Panel.

As handy as Desk Accessories are, the concept that underlies them is even more important. Desk Accessories aren't limited to the ones included with Macintosh. Software developers are free to create their own Desk Accessories for use with new or existing applications programs.

In the months to come, expect clever, useful, and intriguing new Desk Accessories, all as easy to use as those now packaged with Macintosh.



With the Apple menu pulled down, you can see the lineup of Desk Accessories waiting to be selected. Simply drag down with the mouse until your menu choice is highlighted; then release the mouse button to execute your choice.

or deleted as easily as a single word.

Like other routines in ROM, the text editing internal programs mean that software developers have, in effect, major portions of their programs prewritten by Apple Computer.

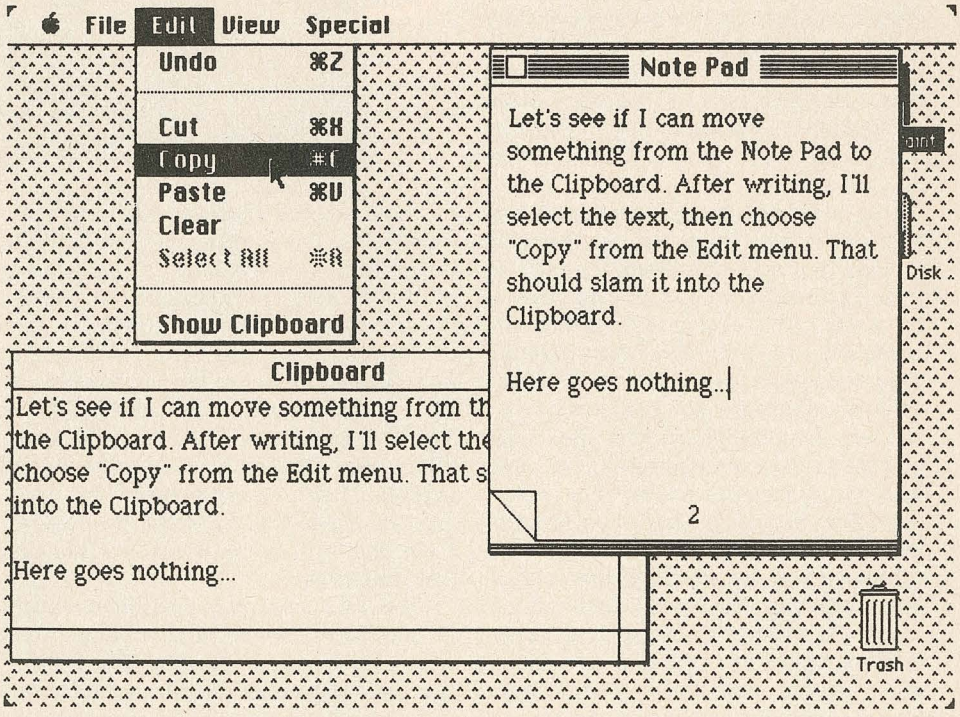
Using Macintosh

As mentioned earlier, Macintosh is easier to use than to describe. With that in mind, let's invent a typical work session. Because you're itching by now to get your hands on a Macintosh, you get to be the phantom MacUser.

Ready? The wand waves, a cloud of dense gray smoke envelopes your body, and you slowly lose consciousness. You awake to find yourself. . .

seated in front of your Macintosh, which

continued on page 36



Cut, Copy, and Paste (found on the Edit menu) can be used to accomplish block moves and other advanced editing in Macintosh applications.

Apple Software Gets Hard-Core

A wave of Macintosh software is being readied by a number of well-known (and not-so-well-known) companies. Among the better-known is a company called Apple Computer, Inc.

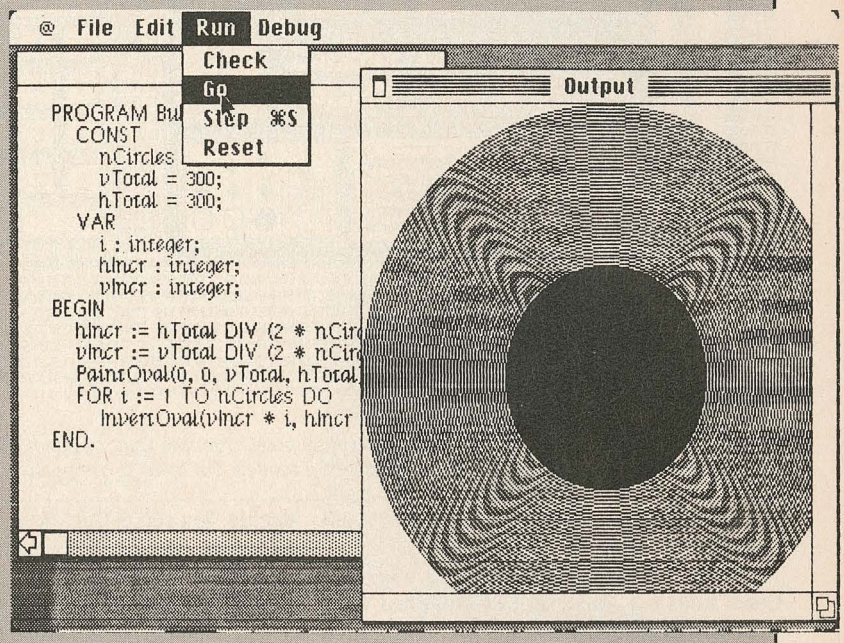
Apple is preparing a range of software for release in 1984. On the schedule are:

- **Macintosh Pascal.** An exciting version of Pascal, *Macintosh Pascal* is interpreted, not compiled like most existing Pascal versions. Whip up your program, click "Go," and the program runs—instantaneously and amazingly fast. *Macintosh Pascal* is an ideal Pascal for beginners, but it also offers features that Pascal veterans will appreciate, including a number of prewritten procedures and functions to access windows, menus, buttons, and other Macish delights.

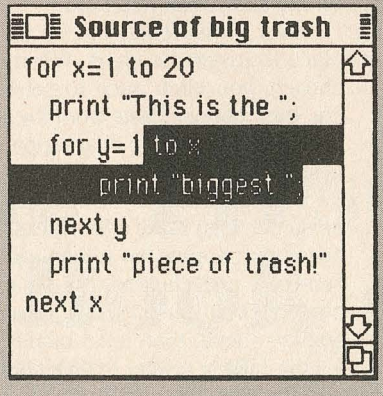
Macintosh Pascal also boldfaces Pascal keywords, for an attractive textbook "look," and whizzes through programs at the click of a mouse button, properly indenting and otherwise Pascalizing programs hastily typed in.

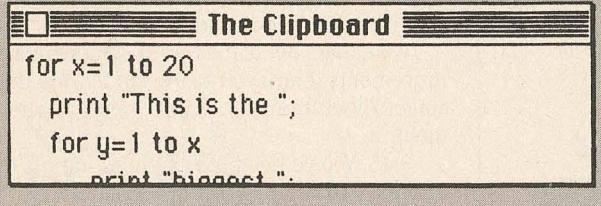
- **Macintosh Basic.** Although not available until possibly this summer, *MacBasic* will be well worth the wait. The language is neither interpreted nor compiled; instead, *MacBasic* is "incrementally compiled": As each program line is entered, it's compiled to an intermediate form of code, much like the p-Code of UCSD Pascal. The result is a Basic that is—like everything else on Mac—fast. (Early indications track *MacBasic* at about ten times the speed of *Microsoft Basic* on the IBM PC.)

But *MacBasic* will offer more than speed. The language is fully concurrent; up to ten programs can run at the same time and, if desired, pass information between programs or share files on disk.



Pascal programmers will even find they can edit a program while it is running. As Instant Pascal *is an interpreted language, its programs will be quick to write and debug.*

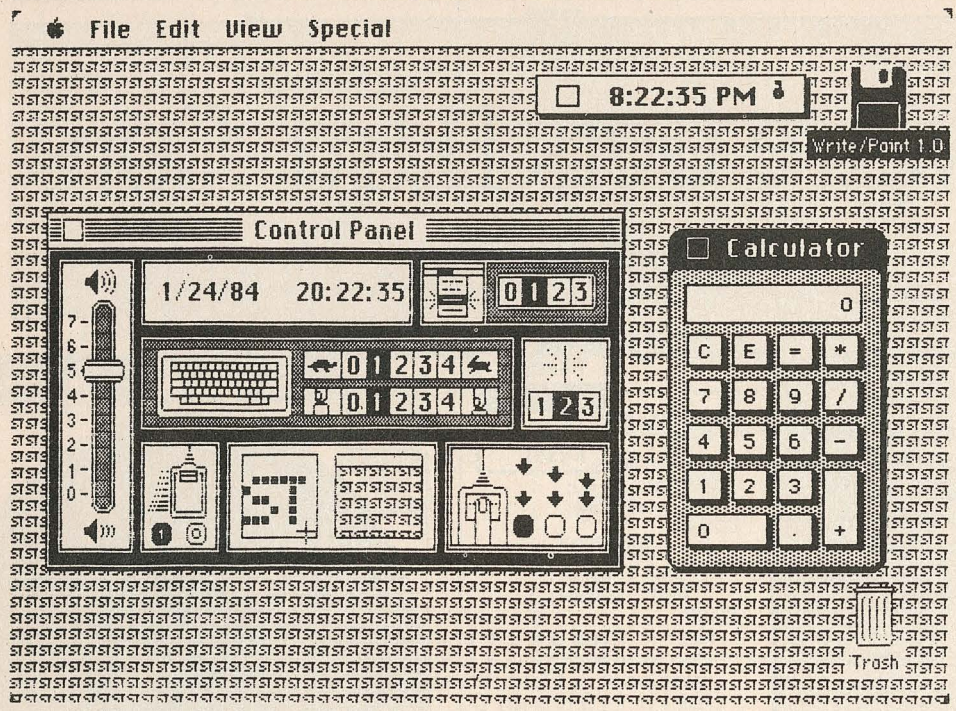




Macintosh Basic programs are edited in the usual Mac ways. Other computers' Basics require whole utility programs just to get the editing capabilities made possible by Mac's Clipboard.

The Mac version of Basic won't require line numbers (unless you want them), uses words rather than line numbers for subroutines (GOSUB TITLESCREEN), and comes with advanced flow-of-control structures like DO-LOOP, CASE, and an extended IF-THEN statement that helps in writing clear, powerful programs.

- **MacTerminal.** *MacTerminal* is a communications program that makes being on-line blissfully easy. The program also offers full use of the Mac Clipboard, for capturing information or pasting in prewritten command sequences. When coupled with the Macintosh 1200-baud modem, *MacTerminal* may devastate both your personal life and your phone bill.
- **Logo.** Expected by fall, Apple's version of Logo is rumored to be a full implementation of this interesting new language, created by developers in close contact with Seymour Papert, author of the original Logo.
- **Assembler.** For those who want it, a 68000 assembler for Macintosh will be available soon. Although details are few, the assembler will provide complete access to all the software marvels of Mac, for those who feel at ease with the intricacies of assembler.
- **C compiler.** Also now nearing completion, a C compiler may be released by Apple or by an outside software developer. Folks who should know say it'll be good. Stay tuned.
- **MacDraw.** Sometime in 1984, expect an enhanced version of *MacPaint*. Expect to read all about it in *ST.Mac*. Expect to be amazed. Again.



Desktop patterns may be custom-designed, pixel by pixel, from the Control Panel. This stylish background was personalized with the initials of a modest but tasteful computer publication.

whimsically is occupying a small area on your elegant teak desk.

Time to finish up that letter to your East Coast sales rep. You grab a disk marked Write & Chart, slide it into Mac's drive, and switch the machine on.

After a few seconds of whirring and humming, you're greeted with the Finder screen. You click twice on the disk icon. Up zooms a window full of icons that represent your recent correspondence.

No need to keep some of those letters, you decide. You select Get Info from the File menu and read detailed information about a few selected letter icons. Then, using the mouse, you slide a few letter icons over to the Trash, which obligingly absorbs them from view. Next, you select Empty Trash from the Special menu, and ditch the letters for good.

The gray Mac desktop looks a little bright today, especially in light of your previous evening's activities. You select Control Panel from the Apple menu and design a new desktop pattern: black, with only a few tasteful specks of white. Much better. You move the sliding dial on the Control Panel down a bit, lowering the volume of Mac's internal speaker. Better yet.

Time to get to work—no more fooling around with the machine (time for that later). You click twice on the icon titled East Coast Rep.

The Finder display disappears, followed by a few seconds of low-pitched whirring, followed by the *MacWrite* display, followed (two seconds later) by the appearance of your letter in the *MacWrite* window.

The letter's a bit flat. With a few quick mouse motions you boldface a few words, underline a few others, and slice out some needless verbiage.

Wait a minute. Wouldn't a chart make the point of this letter clearer?

You save your letter and exit *MacWrite*. Back to the Finder. You place the mouse pointer over Chart and click twice.

Seconds later, the Chart display appears. Using the mouse and the keyboard number keys, you enter a string of numbers: 22, 50, 33, 47, and 12. (The numbers are short for millions in sales, which your rep will understand.)

One more mouse click and a bar chart of your figures appears.

Something smaller would be nice. After one sweep of the mouse and two more clicks, a pie chart appears to replace the bar chart. You fiddle around a bit, selecting patterns for each pie slice. Then you use the mouse to pull out the largest slice. An exploded pie chart. Nice.

You select Copy from the File menu, then exit Chart, return to the Finder, and click twice on the East Coast Rep icon.

Back in the letter, you decide on a good place to insert the chart. When the place is chosen, you click once to set the insertion bar, then choose Paste from the File menu.

In a flash, the pie chart appears, properly nestled in your letter.

It looks good, so you select Print from the menu bar, then make a few clicks in the Dialog boxes that appear on-screen: one click near Fan-Fold, one click near 8 1/2 by 11, and a final click to select High Resolution print quality—better than letter quality (try finding a letter-quality printer that prints in a number of different type sizes!).

Your Imagewriter printer quietly streams out the letter. It looks great.

Well, that's out of the way. Two more mouse movements return you to the Finder. You then select Clock from the Apple menu to check the time.

9:45. You've been hard at it for almost ten minutes. Time for a well-deserved break.

Later, while sipping a Perrier on the patio, you realize that during your recent session with Mac you used the keyboard only once: to enter a few numbers.

Good thing: You're a terrible typist.

Macintosh!

COMPLETE

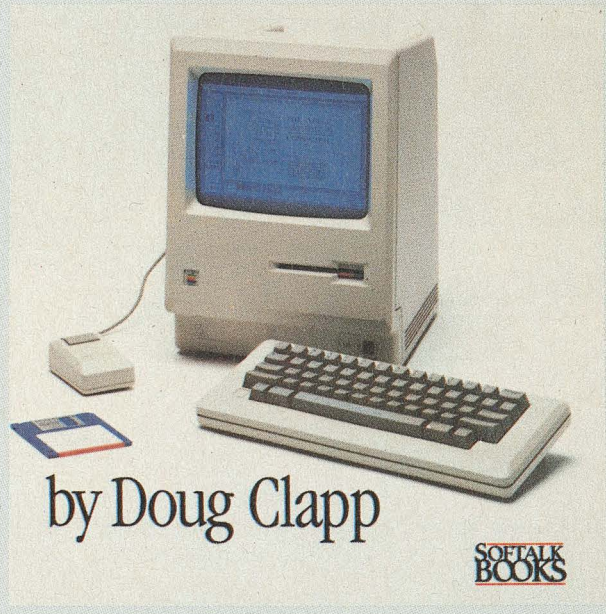
Macintosh set a new record for the number of magazine covers on which it appeared after it was first announced. That's because Macintosh sets new standards for speed and power in an easy-to-use personal computer. That's a not inconsiderable claim, but one that's certainly borne up under early scrutiny.

There are lots of things to know about Macintosh. Icons, windows, dialog boxes, alert boxes, pull-down menus, a mouse, the *Finder*, and *QuickDraw* are just some of the elements that enable Macintosh to give new definition to the state of the art. To stay current with personal computer technology, you need to know about these things.

And you can.

Macintosh! Complete was written by Doug Clapp, who spent six months behind the scenes at Apple while the Mac was in its finishing stages. He received extensive, no-strings cooperation as he delved into the hardware, the software, and the process that's become Macintosh.

Macintosh! Complete is 300 pages of facts, tips, and provocative opinions. It's the definitive work on what Macintosh is. You can get it now from Softalk Books for only $19.95.



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GRAPHICS WIZARDRY

The Art of BILL ATKINSON

Steve Jobs cared. But not initially. The famous visit to Xerox wasn't Jobs's idea, and Jobs wasn't even convinced that the trip was necessary. Bill Atkinson, with help from Jeff Raskin, talked Jobs into making the visit.

Had the visit not taken place, it's virtually certain that there would have been no Apple Lisa computer, and no Apple Macintosh computer.

Atkinson's persuasion that day was not the first of his accomplishments at Apple. The Atkinson accomplishments began much earlier and still continue. Of Atkinson himself, there is much to say. A bona fide genius, Atkinson is a driven man who admits to having little in his life outside of computer programming, but who doesn't consider himself a programmer.

He considers himself an artist, a sculptor, a man who takes concepts of programming and treats them like clay: shaping and reshaping over and over and over again; powered by will, unwilling to stop until the last limit of invention and speed and compaction has been reached—the machine limit. The hardware limit of the machine. Beyond here, no man can go: The software is as utterly fast as anyone will ever make it for the particular computer it runs on.

There is no conceit in Atkinson's characterization of himself. He speaks quietly of how computers should be. He uses no jargon, no technospeak. He becomes angry only when explaining how computers, even now, make computer users think, "Oh, stupid me."

Atkinson knows that the computers are the stupid ones. He's using his life to change that.

At home, the family room is a computer room. At various times, it's contained four Lisa computers, two Macintosh computers, four Apple II computers, three printers, various 5 1/2-inch disk drives, and eight hard disks, each with a capacity of millions of bytes of storage.

Atkinson began in chemistry, gulped down the field, then moved into neural chemistry: the chemistry of the brain. He began using computers in his studies and became seduced by computer graphics, an amazingly complex field strewn with arcane and difficult mathematical concepts.

A fellow researcher was slicing human brains in an attempt to gain understanding into basic physical structures. Atkinson converted the brain slices into three-dimensional computer graphics and then mapped in structures: what is where in the human brain.

The results were stunning—an achievement in both the field of medicine and the field of computer science. Atkinson's work can be seen on the October 1978 cover of *Scientific American*. The film he produced is now used in more than six hundred medical schools across the country.

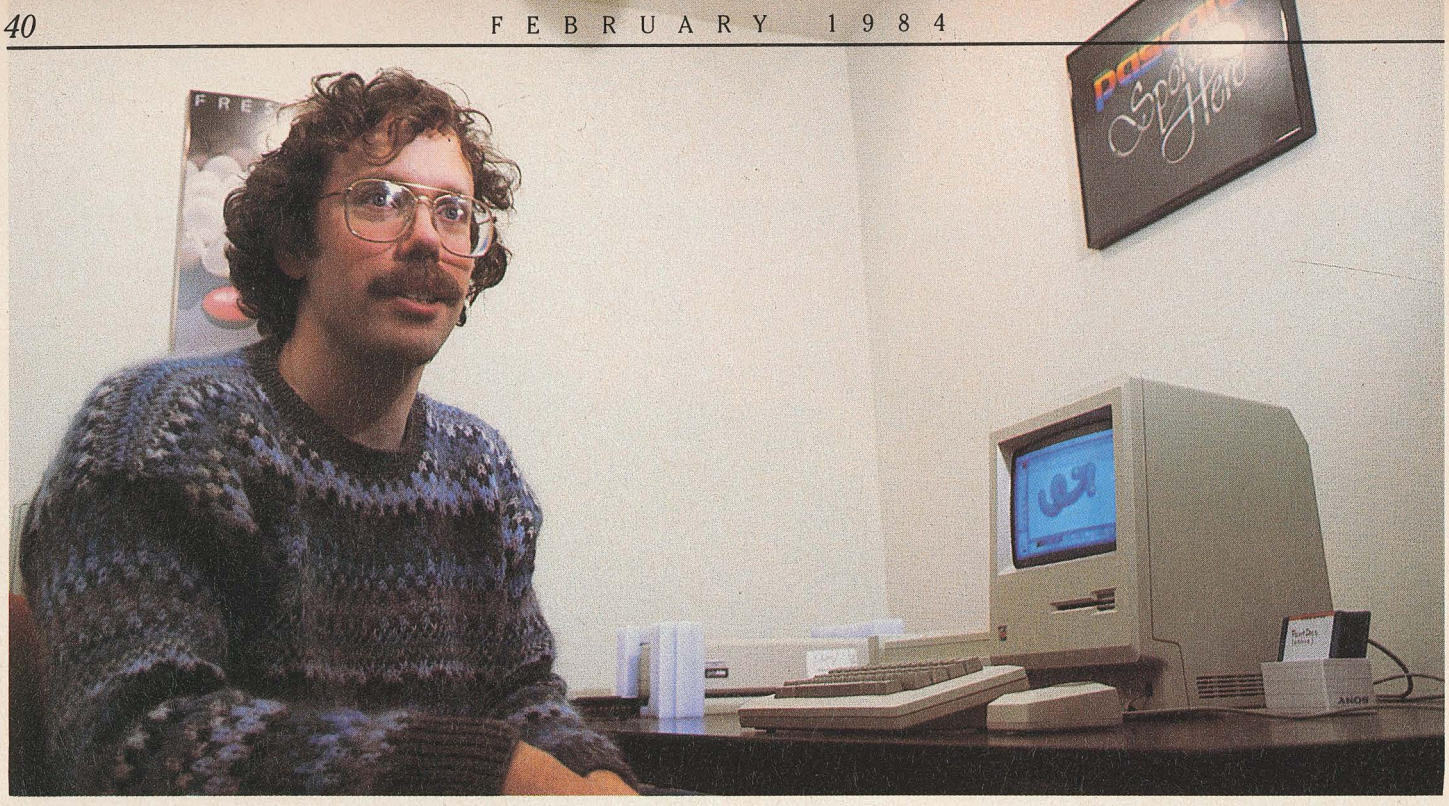
Bill Atkinson is not your ordinary guy.

But the decision had to be made: chemistry or computers. Atkinson chose computers, and founded a company to develop medical computer interfaces for hospitals: Synaptic Systems Corporation.

His life was perfectly in order when, in March of 1978, a friend who had gone to work for a company called Apple gave him a call. A few days later, a pair of plane tickets arrived in the mail.

Atkinson journeyed to Cupertino to find a company that employed thirty people and was already successful in the small-computer field.

by Doug Clapp



Programmer Bill Atkinson, creator of QuickDraw, *feels that there are remarkably few compromises in the Macintosh.*

After all, Apple had actually shipped more than nine hundred machines!

Apple also had Jobs, Wozniak, and something more important: a dream about how computers should be.

Thoroughly seduced, Atkinson stayed—not the first, or the last, to be seduced by dreams, Jobs, Wozniak, or Apple. Apple people had a dream. What they didn't have was a software development problem. Or so they thought. Atkinson thought otherwise. Not believing Basic to be enough, he set out to investigate UCSD Pascal, then under development.

He battled for its inclusion in Apple's marketing plans. He argued with Steve Jobs, who had no use for Pascal. He was rebuffed. Jobs, admittedly, is a tough person to argue with. "Jobs knows when somebody's BS-ing him," Atkinson remembers. "And he also knows when someone isn't."

It ended with Jobs commenting, "Okay, you've got two months to convince me."

Atkinson did, and also convinced Apple's then-president Mike Markkula. "The turning point was when Markkula saw Pascal's screen editor. That did it."

Apple Pascal was a hit; much like *VisiCalc*, it legitimized the Apple as a real computer, one capable of serious tasks.

The Visit

Atkinson kept updated on computer developments. He'd heard about the research at Xerox and convinced Jobs to take the thirty-minute trip to Xerox PARC.

The visit lasted only about an hour. All were amazed. Windows! The future. Jobs was immediately determined to incorporate the Xerox discoveries into Apple products. As always, the Jobs gut feeling was correct.

Atkinson was sure that he could duplicate the Xerox programming efforts. At the top of the list was something called arbitrary region clipping.

Clipping is a computer graphics term. It is something that can be done fast, or done in great detail, but not both at once. Arbitrary region clipping, simply put, is the technique of updating, or writing to, an on-screen window that is partially obscured by one or more overlapping windows. The math necessary had not been discovered to permit both graphic speed and graphic detail when working with regions. Atkinson, getting only a glimpse of the Xerox computers, thought that Xerox had, indeed, discovered the philosopher's stone of graphic computing. And if they could do it, he reasoned, he could do it also.

But they hadn't. Certain aspects of working with regions—graphics of all types: windows, irregular shapes such as polygons and freehand drawings—had eluded the scientists at Xerox. Questions remained: How to overlap windows? How to move them around? How to quickly clip and display the contents of areas underneath, the second they came into view? The problems persisted: determining exactly what was showing on-screen—slivers of several windows?—and ascertaining the size of a given stack of windows, as well as the maximum number of windows that could appear on-screen at any one time.

Atkinson set about duplicating the secret that hadn't been discovered. Six months later—six long, agonizing months pushing at the limits of mathematics—he was closer to discovery, but still the secret escaped his grasp.

The Answer

Fortunately, Atkinson doesn't sleep. At least not sleep as most of us know it. For months, he had kept a dreamlog of his mind's activities during sleep. Now, when he slept, it was a mix of consciousness and unconsciousness: half dreams and half wakefulness. Much like an advanced yogi, Atkinson flowed downward without ever completely losing awareness of self, dreamed, and surfaced again, remembering what had occurred. Even during the night, the intellect persisted; the problems were gnawed at and probed.

The answer came in that twilight between dreams and reality. Atkinson woke himself, fully aware that he had solved the problem at last, and wrote down the secret. Atkinson named the secret *QuickDraw*.

The secret was his alone on the day he got into his car, headed for Apple, and woke up in a hospital bed. He remembers nothing after entering his car. His best guess is that he was thinking, his mind lost somewhere, wrestling with a problem. Or, it might have been a dog in the street, or a child that ran between two cars.

No one knows. What is known is this: The car was traveling at high speed when it hit the rear of a parked semitrailer. The car flew under the semi, the top completely sheared off.

Miraculously, Atkinson survived with only slight physical damage. A more troubling effect of the accident was temporary retrograde amnesia, a condition that wipes out memories of recent events.

When Jobs was notified of the accident, he raced to the hospital. He remained at the bedside until Atkinson regained consciousness.

When Atkinson finally opened his eyes, he looked at Jobs and said, "Don't worry, Steve, I still remember how to do regions."

Atkinson would go on to regain health, with no lasting effects from the accident. The Lisa would be born and Macintosh would follow.

Today, windows can be found on other computers. But there are profound differences between Apple windows and other displays. VisiCorp has *VisiOn*, which manages windows. But the VisiCorp windows are slow and appear as a rough-edged mock-up of the advanced features of Lisa. Microsoft has a window manager that separates the screen into windows. But the Microsoft windows never overlap and never can overlap; as one window is enlarged, others (also shown on screen) must become smaller. The concept is more properly called tiling than windowing.

Microsoft doesn't have the secret. Nor does VisiCorp. Nor does IBM. The secret remains at Apple, in Lisa and in Macintosh.

Apple is now in the final stages of patenting Bill Atkinson's discovery. When they finish, Atkinson has promised to divulge the secret, probably first in the pages of a technical journal concerned with mathematics and computer graphics.

Until then, it remains a secret on display.

Atkinson was rewarded by Apple with the honor of becoming one of the few Apple fellows. Beyond the prestige of the honor comes this: Steve Jobs gives you an envelope. We can assume that the envelope contains riches, but possibly it does not.

No one, however, has ever returned the envelope.

To Come

To casual users, *QuickDraw* receives a showcase in *MacPaint*, a program that Atkinson created on the condition that its functions and appearance would be his, and his alone. It is the creation of one person, and it shows a consistency that is impossible in team efforts. Like all of his programming efforts, Atkinson labored over *MacPaint*

through revision after revision, always seeking a maximum of speed and function and smallness.

It shows.

Atkinson expects that Mac will be a standard-setter. "The II was the first standard, then the IBM PC, and now the Mac will be the standard for personal computers.

"It's such a neat machine. It's really fun. With some things, you want to do a good job, but you end up having to make compromises. There are remarkably few compromises in Macintosh."

These days, Atkinson works mostly at home, although he has a fully stocked cubicle at Apple alongside the other programmers—programmers with stories of their own and achievements that strain after the accomplishments of Atkinson.

What's next? Again, it is a secret. But guesses can be made, especially in light of this comment: "If I don't do it, some other corporation will. If they do it, they'll screw it up. If I do it, it'll be done right."

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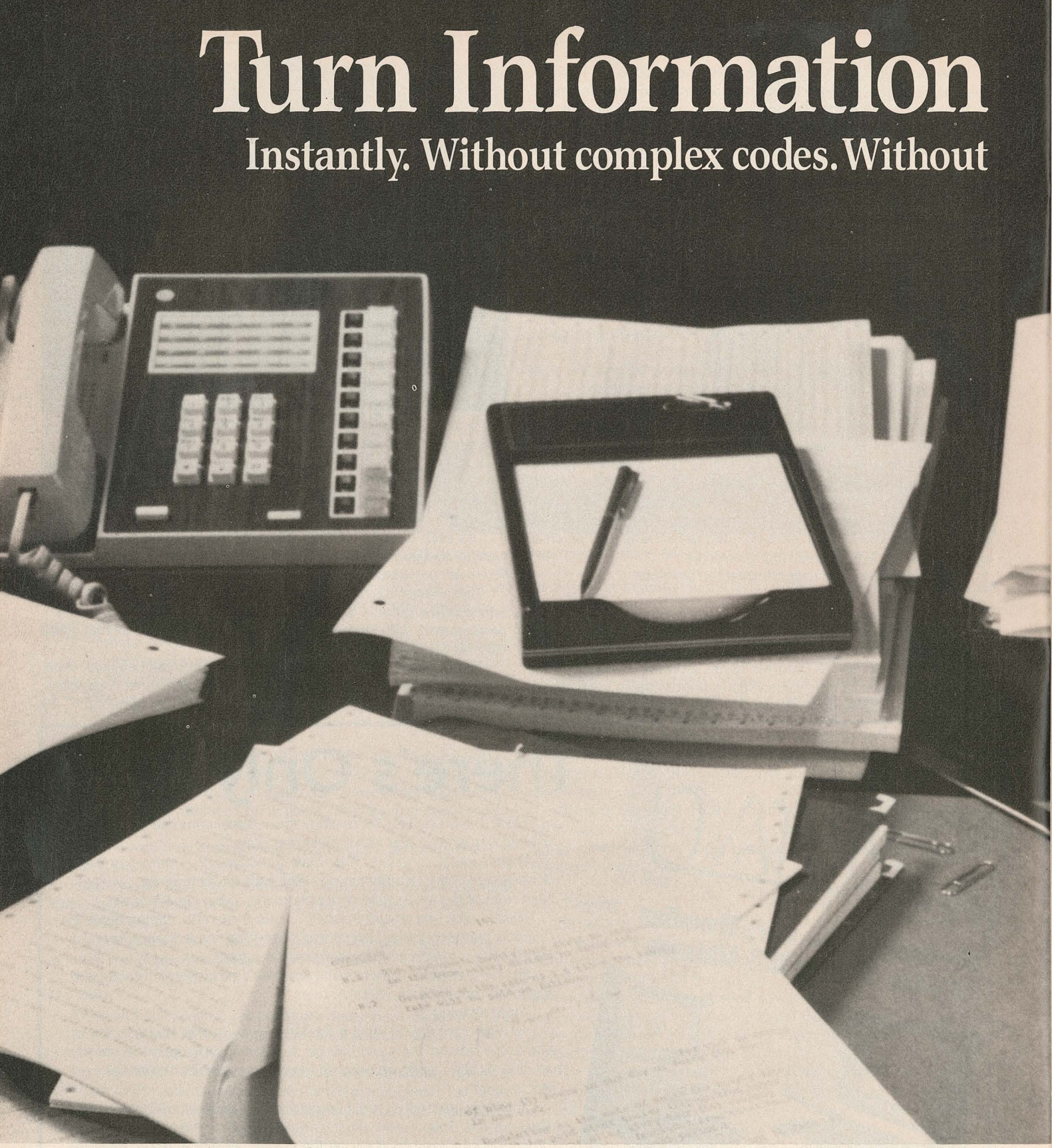

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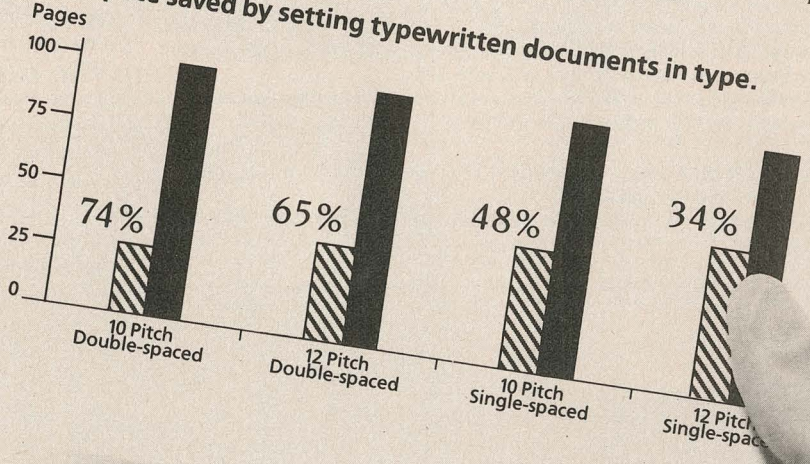

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ALL THIS AND LISA 2

Lisa's got track shoes. Soon it'll have wings. Then we'll see whether Lisa has legs.

It's turned out that Apple and its customers have had diametrically opposed viewpoints on Lisa. Apple has always claimed that speed, or the lack thereof, was not the point of Lisa. Apple always asked potential customers to look at the totality of the being.

The customers did, and they always responded, "But it's so slow." Slow and Lisa have almost become synonymous, in the same way that controversial and James Watt or fanatic and Ayatollah Khomeini have almost become synonymous.

Now Apple's taken some of the hobbles off Lisa and expects to remove more in the next few months. That was the good news about Lisa coming out of Apple's stockholders' meeting last month, and it augurs well for what is truly a nifty machine.

The new versions are called Lisa 2, Lisa 2/5, and Lisa 2/10, and they seem designed to address Lisa's two major shortcomings—speed and an odd floppy disk format.

The new Lisa products will carry 512K of standard RAM memory, exactly half as much as the old Lisa. The Lisa 2 will come equipped with a single 3 1/2-inch Sony floppy disk drive. The Lisa 2/5 will have the Sony drive and Apple's ProFile, a five-megabyte external hard disk. The Lisa 2/10 will have the Sony drive, as well as a ten-megabyte inboard hard disk where the top floppy drive used to reside. Tweaks to the operating system and the inboard hard disk should double Lisa's speed.

A later operating system revision should provide additional speed, as well as further flexibility.

The adoption of the Sony drive is a favorable development that gives Lisa and Macintosh the same disk format and allows Lisa to run Mac software. That's particularly important for the Lisa 2 system, which cannot run Lisa's Office System because of the lack of a hard disk.

Apple has priced the Lisa 2/10 aggressively at $5,495. That's well within competitive bounds.

Now Lisa owners can choose to run Mac software, Lisa software, or the total Lisa Office System. That's awesome flexibility.

Apple seems to be making all the right moves to maximize Lisa's attractiveness to the potential buyer. Further word is awaited from the public precincts.

ST.Mac asked Chris Lincoln to provide its readers with an analysis of Lisa. His report follows and sets the background for the changes.

By Chris Lincoln

Of the handful of MC68000-based personal computers on the market, Lisa is perhaps the most distinguished. And Apple's announcement of Macintosh and the Lisa 2 has put thirty-two-bit power and all the other features of Lisa Technology within the reach of the mass market.

What is Lisa Technology? (Yes, capital T.) According to Apple, Lisa Technology is composed of several essential pieces of hardware and software working together to form a specific type of personal computer system—a system both natural and intuitive in its ease of use.

The seminal work on Lisa Technology was done at Xerox PARC, directed by Alan Kay. The influence of the object-oriented Smalltalk language and the Dynabook concepts of Kay are clearly evident in Lisa. Apple has refined and packaged these ideas by asking questions like "What kind of a personal computer would people use as casually as they now use the telephone?" "When personal computers are as common as the telephone and television, what will they look like and how will they act?" These questions seem trivial to some but are fundamental if we assume that the personal computer will have the impact of the telephone and television on our lives.

Essential Hardware

The Lisa hardware specifications are, to use an overworked term, "state of the art." They may be *the* state of the art for personal computers. The hardware essential to Lisa Technology consists of a thirty-two-bit processor, a bit-mapped display, and a mouse.

The central processing unit (CPU) is a five-megahertz Motorola MC68000. The MC68000 is a thirty-two-bit (address and data registers) microprocessor that is fast becoming a standard for desktop computer design. The MC68000 architecture is well suited to the high

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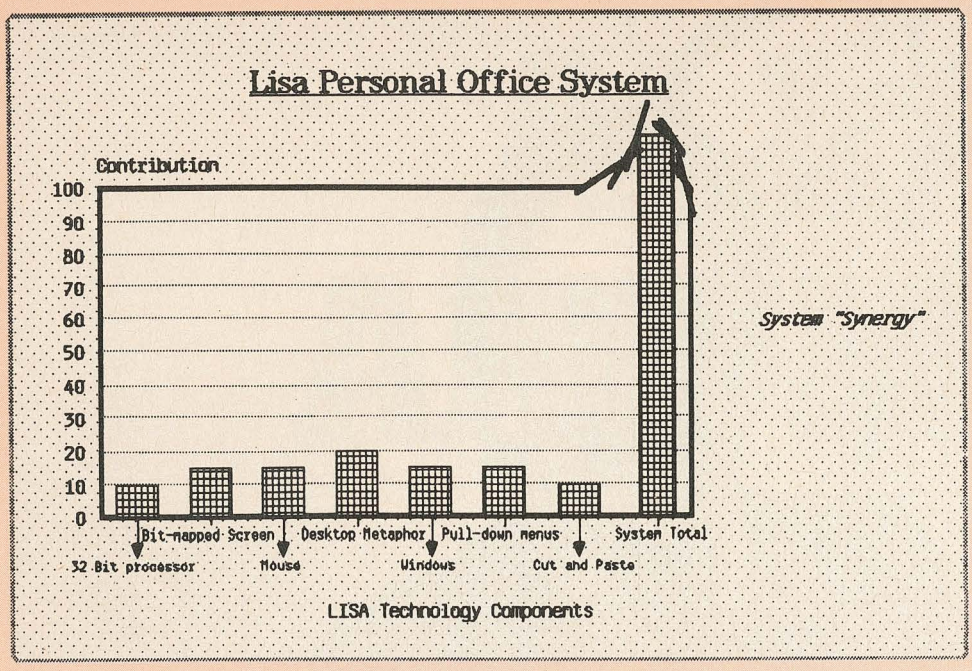
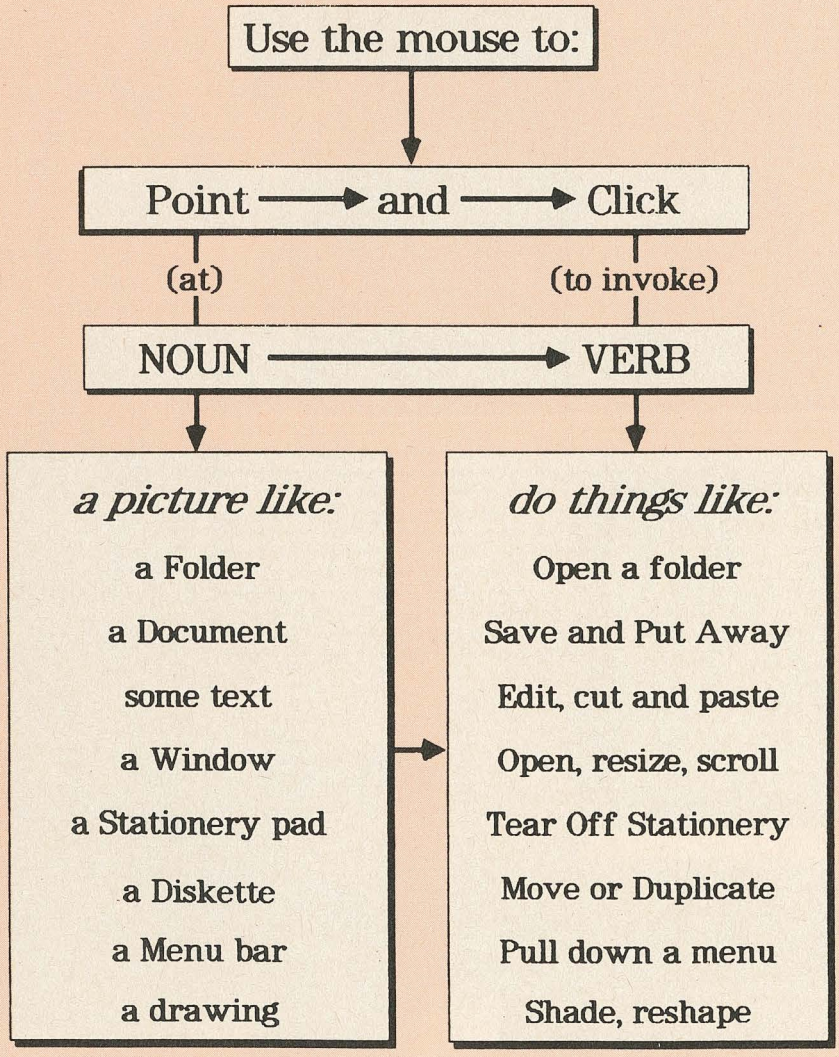
The author, pictured at right with the Lisa 2/10, is sales manager of Computer Plus in Sunnyvale, California. He uses Lisa and the IBM PC daily and has instructed dozens of people in the use of Lisa.





The basic organization of the LISA user interface:
(desktop metaphor, windows, cut and paste integration, pull down menus)

demands of Lisa's high-resolution graphics and multitasking operating system.

The CPU is by no means the only "intelligence" in Lisa. Separate auxiliary processors/controllers handle all input and output including floppies, hard disk, serial and parallel ports, and video. Lisa also features a slave processor with battery backup for detached keyboard and mouse control, a real-time clock, and a soft power switch. The five-megabyte ProFile hard disk has an onboard Z8 processor, and Lisa supports an add-on math coprocessor (AMD9512) for faster floating-point calculations.

The Lisa display is a twelve-inch, black-and-white, 720-by-364 bit map. Many of the illustrations in this article are actual screen dumps of the Lisa screen. All Lisa screen output, including text, is drawn on the bit map. As many as forty-five lines of 144 text characters each can be displayed. Lisa provides for sixty-four levels of contrast, available through software.

The excellent high-resolution graphics screen is one of the distinct pleasures of working with Lisa. The screen, or desktop, often appears as a collage of text and graphics unlike what we've come to expect on traditional computer screens. The black text on a white background seems unusual only at first, and one quickly wonders why white or green on black has been used so often up to now.

Lisa employs a mouse as a desktop pointer to control the position of the cursor on-screen. The Apple mouse has a single button that is simple and elegant to use: *Click the button, don't click the button; click on, click off*. To anyone frustrated by multikey devices—keyboards, calculators, and such—the single-button mouse is a welcome relief. When the mouse is moved, a rubber-coated ball under it turns rollers that strobe small wheels past optical sensors inside the mouse, and the position of the mouse is sent to the computer as screen coordinates. By using the mouse in an area with about a three-inch radius, one can point to anyplace on the screen. The mouse is not sensitive to being picked up and moved, as are strictly optical mice.

These are the essential hardware criteria for Lisa Technology. But what about the rest of the Lisa hardware system?

Memory and Management

Lisa comes standard with one megabyte (one million bytes) of error-detecting random access memory (RAM). Not too long ago, 64K was considered a lot for a microcomputer. Recently, 256K or more has become standard. Lisa's one megabyte of RAM is as much as or more RAM than some minicomputers have today and provides another illustration of how micro-mini-mainframe distinctions continue to blur.

Lisa also has a hardware memory management unit (MMU), now a common addition to the MC68000 microprocessor. The MMU is used in mapping Lisa's one megabyte of RAM and is capable of supporting the full

sixteen-megabyte addressing range of the MC68000 should future configurations require it. With the MMU, Lisa's Office System, the environment in which Lisa's applications software is run, can access, control, and even relocate multiple programs and their data in RAM all at once. Tasks such as printing a document can be accomplished without interrupting other work. Lisa also comes with 16K of startup (boot) ROM, which includes a set of power-on diagnostics as well as internal diagnostics for servicing the machine.

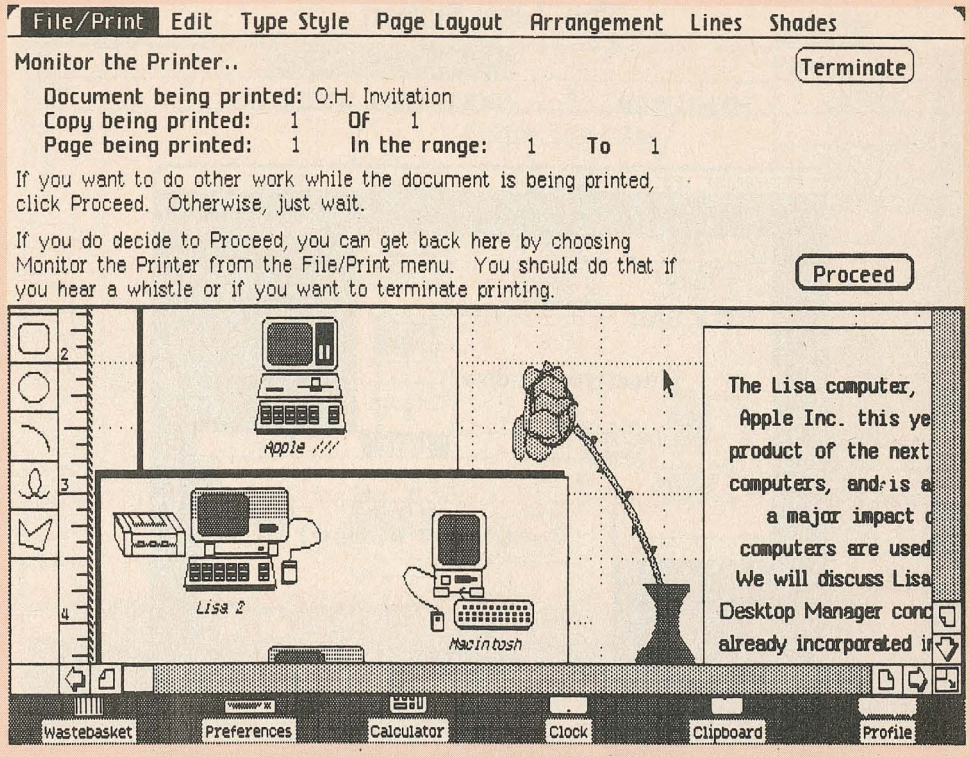
ProFile of Storage

On the original Lisa, storage capacity takes the form of two built-in floppy disk drives and a full five-megabyte hard disk, the Apple ProFile. The "twiggy" drives, as they have been called, have a formatted capacity of 860 kilobytes. This high capacity is achieved by a variable-speed-drive technology that allows data to be stored as densely on the outer tracks of the disk as it is on the inner ones. The twiggies also use an intelligent controller with 4K of ROM and 1K of RAM. The Lisa Fileware disks have two cutouts for the read/write heads positioned 180 degrees from each other. This presents some initial problems for users who are accustomed to handling floppies with the usual single cutout. The twiggy drives were designed and manufactured by Apple and are now the victims of time in a machine only a year old. Apple is committed to the 3 1/2-inch disk technology for future machines in the Lisa family.

The five-megabyte ProFile hard disk is an external unit seen on the Apple III in the past. It has its own power supply and intelligent microprocessor, the Z8. When powered on, the ProFile immediately begins diagnostics that include a surface scan of the disk that maps out suspect areas.

Lisa requires a hard disk because the Office System uses the disk as "virtual" memory to create "scratchpads" for use by the Office System applications programs. In a virtual memory system, the computer considers disk storage part of RAM and interchanges program code and data between disk and RAM as necessary to perform the task at hand. This swapping of data and program modules occurs automatically inside the computer without the user's assistance or awareness.

The Lisa software is installed on the ProFile, where the Office System and the six original applications take up about 1.8 megabytes of disk space. Tutorial examples in the software can be copied to floppies to recover more storage space on the ProFile.



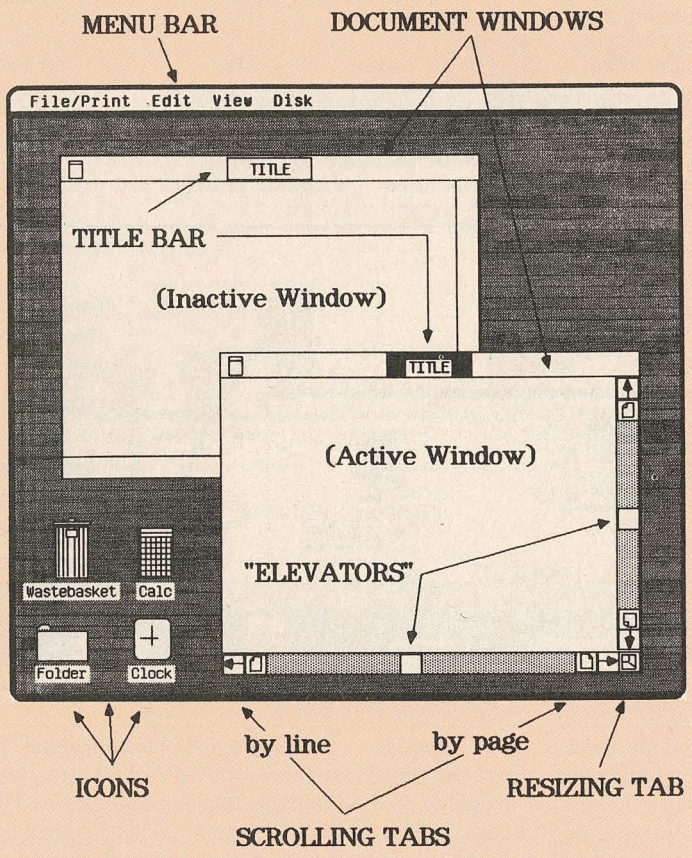
A Lisa screen shows off the versatility of both LisaDraw *and the Office System. While printing a combination of text and graphics, you can continue working on other tasks.*

The process of installing the Office System software on the ProFile "serializes" the programs to that particular Lisa. The user may make as many backup copies of the Office System and application programs as desired. However, the software can't later be installed on another Lisa; it will run only on the Lisa on which it was originally installed. All data, of course, can be stored and retrieved on any Lisa.

Keys to the Systems

Lisa's detached keyboard is a standard typewriter-style with numeric keypad; all keys have auto repeat. The mouse eliminates the

The Lisa Screen



need for function keys, yet the keyboard is fully programmable.

The keyboard permits full use of the ASCII (American Standard Code for Information Interchange) character set adopted as the standard on all major American microcomputers. Additionally, it allows the generation of special characters for foreign languages and scientific notation direct from the keyboard.

The size and height of the keyboard are akin to those of the Apple III keyboard—Apple's best to date, even if it wasn't detached. The keys have a solid, responsive feel. The numeric keypad has Enter and Clear keys as well as cursor controls for the likes of *LisaCalc*.

Like everything else on Lisa, the keyboard is intelligently controlled. A thoughtful feature is provision of a set of quick reference cards that pull out from beneath the keyboard. The cards describe desktop management, windows, text editing, and configuration information quickly and clearly.

Ports and Slots

Lisa has two intelligently controlled and programmable RS-232C serial communication ports. These ports can be configured for standard asynchronous communications to most mainframes and databases, as well as for bisynchronous, SDLC, or HDLC communications. This makes Lisa a natural for communications with most potential host computers, notably IBM mainframes. The serial ports provide the means by which to connect Apple's Letter Quality Printer and the new Imagewriter dot-matrix printer. There is also one built-in parallel port for use in connecting the ProFile hard disk.

Lisa has three expansion slots connected directly to the system bus. Up to now, the slots have been used mostly to install Apple's two-port parallel card for the parallel Dot Matrix Printer or additional ProFiles. A total of six ProFiles can be installed in this way. Connecting the earlier Dot Matrix Printer to the upper port on the parallel card makes possible the screen dumps that accompany this article.

The card slots were designed as zero-force insertion slots, partly to save wear and tear on expansion card pins but mostly to accommodate installation from the rear of the machine rather than from the top. Microsoft is said to be working on a four-port serial card that would allow Lisa to be used in conjunction with several terminals and that company's Xenix multiuser operating system.

Other than Microsoft, no one has yet seized the inherent advantage of the expansion slots to give Lisa attributes not conceived of by its Apple developers. This could be because Lisa has such powerful built-in capacities that no developer has yet been frustrated by stretching the system to its limits. Once applications developers begin exploring the outer boundaries of Lisa's capacity, more expansion options—perhaps in the form of an 8088 card with PC-DOS, an additional memory card, or a voice card—are likely to appear, as happened with the Apple II.

Lisa also has a built-in speaker with tone generator and a programmable real-time clock. The hardware clock is required to generate programmed interrupts for the multitasking Lisa, but it is also a simple desktop fixture with date and time for the Office System.

A Clean Machine

The complete Lisa hardware system weighs fifty-two pounds and occupies a little more than two square feet on a desktop. A look inside discloses a removable four-slot card cage that contains two 512K memory boards, the motherboard that houses the CPU, and the board that contains all the components controlling input/output activities. No fan is needed. The power supply, the card cage, the floppy disks, and just about the entire machine can be taken apart in a few minutes with no tools—a service technician's dream.

A look at the outside rear reveals, in addition to the serial and parallel connectors, a mouse connector, a composite video output jack, and the best concealed reset switch in the industry.

Lisa is remarkably clean inside and out, not the mass of wires and cables seen in and behind many personal computers. Both the Lisa and the ProFile have their own three-pronged power cord. The keyboard's coiled cable plugs in beneath the screen next to the lighted power switch. The glare screen supplied can be installed by snapping off the front bezel to expose the screen and disk drives. The outside connections are all clearly labeled and keyed.

Compared to other personal computers on the market, the Lisa hardware design is a kind of "why not" architecture for a desktop computer. Why not use a thirty-two-bit processor, or a megabyte of memory, or a super-high-resolution screen? Indeed, why not? But its software is what makes Lisa different from the machines that preceded it. The Office System software takes advantage of all of Lisa's advanced hardware features.

The Electronic Desktop

Here, the name *Lisa* takes on its intended meaning: Local Integrated Software Architecture. The Lisa software requirements dictate the hardware requirements. Lisa Technology requires powerful working software—with a good desktop metaphor, cut-and-paste integration, windows, and pull-down menus. And powerful working software requires a thirty-two-bit processor, a bit-mapped display, and a mouse.

What is a desktop metaphor anyway? Actually, computer users have been using office or desktop metaphors for years. How is a computer like your desk or office? In your office and in the computer, information is stored in files; disks are like filing cabinets. The desktop metaphor is part of Lisa's user interface—the result of focusing as much on the *process* of doing work as on the work itself.

Personal computers are increasingly

becoming tools for expression in a multimedia world. They are sieves through which information is filtered, as well as communications channels in a networked nation. Soon AT&T will be asking you to "reach out and touch someone" with your personal computer. (Good grief!) Personal computers could be the unifying principle in the mass-media experience.

But what kind of personal computer technology points in that direction? These are different visions of personal computers than we are used to.

The strength of the Lisa desktop metaphor is, among other things, its striking "visualness." Visual media are all around us. We get 80 percent of our sensory input from our eyes, and we are getting visually—graphically—more sophisticated every day.

The power and simplicity of the Lisa user interface is that things on the desktop are what they appear to be. We know how to manage our own desktops and file cabinets, so we already know how to manage Lisa's. New Lisa users ask, "How do I put my work away?" The reply is the same on Lisa's desk and your own: Pick the work up and put it in a folder; then put the folder in a drawer.

These already familiar actions are performed physically on Lisa's desktop using the mouse. The literal nature of Lisa's desktop metaphor often eludes new users. When told how to put their work away, they routinely reply, "That's too easy." And it's surprising how many current users of personal computers are skeptical of a computer that does not require high payments of time and effort for competence.

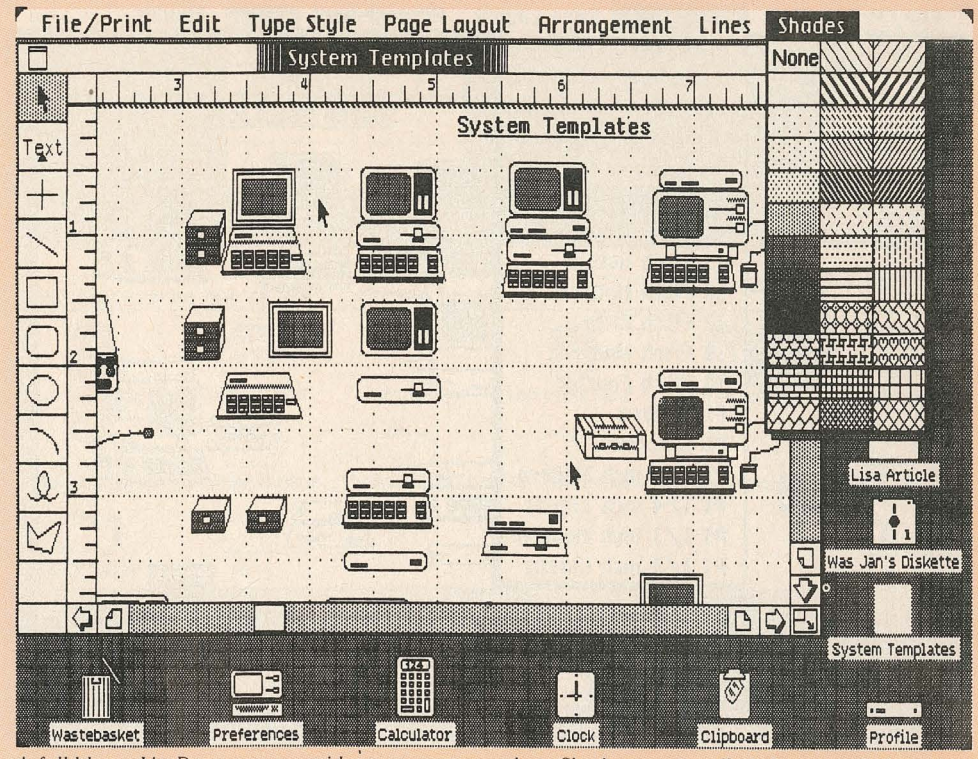
The old saw about a picture being worth a thousand words (or more) has already been applied to Lisa many times, but it bears repeating. The Lisa user interface starts simple and stays simple.

Iconography

In the Lisa Office System, the execution of the desktop metaphor is performed by the Desktop Manager. Folders and their contents are represented as pictures, or *icons*, of folders and documents on the Lisa's electronic desktop. On the desktop reside icons for everything found on most desktops: folders, documents, stationery pads, a clock, a calculator, and a wastebasket.

Work that's no longer wanted can be moved from the desktop to the wastebasket by a physical action of the mouse. All actions of the mouse on the desk—pointing at things; pulling down menus; placing documents inside folders, in the wastebasket, or on disk—are supported by clear visual cues on the Lisa screen. All actions on the desktop are reducible to pointing the cursor and clicking the mouse.

There are only a few mouse tricks, such as a double-click to point *and* open or close an icon. Double and triple mouse clicks may also be used to select words or lines and paragraphs of text, but the clicks are always used consistently from program to program. The fact that the mouse moves on a real desktop strengthens the desktop metaphor.

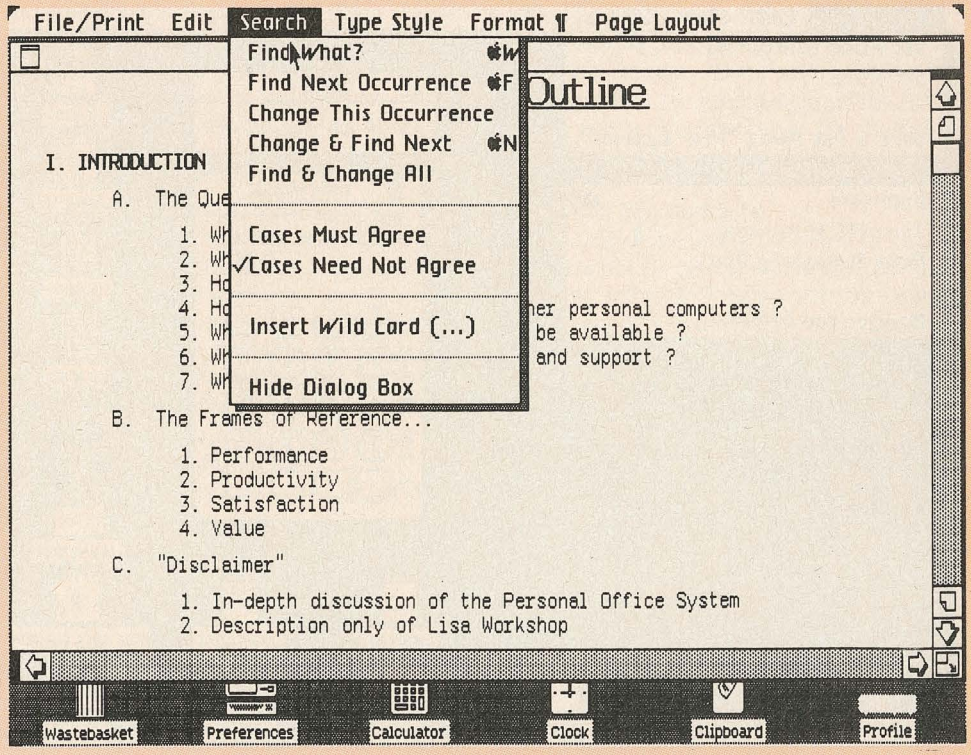


A full-blown LisaDraw *screen: grid paper, custom rulers, Shades menu pulled down ready for selection.*

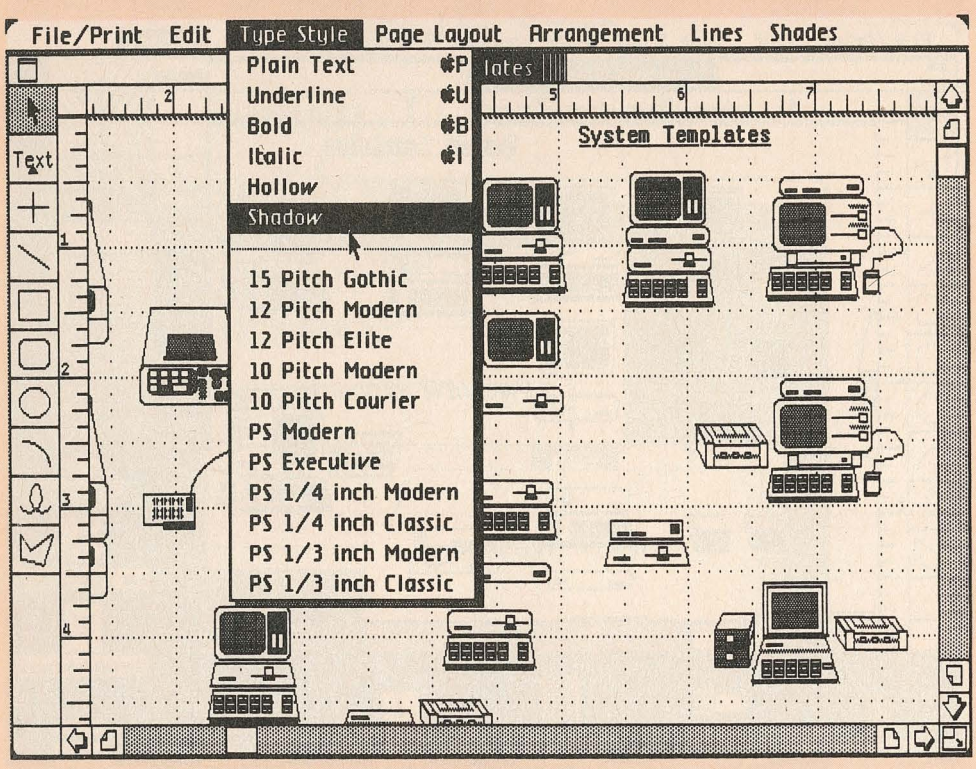
It Does Windows, Too

Lisa Technology also requires windows. Windows on the Lisa screen are large or small areas through which users can see the things they're working on. A window can be opened for each picture on the Lisa desktop simply by pointing and clicking the mouse. In the windows are the contents of folders or the work done using the Lisa Office System applications. The desktop clock and calculator are a bit different from windows, but they behave exactly as a clock and calculator should on a desktop.

All the Lisa windows share the same characteristics. All of them can be opened or closed, moved around the screen, or made larger or smaller with the mouse. A *LisaCalc* window is the same as a *LisaWrite* window and the same as the ProFile window.



In a LisaWrite *window, the Search menu offers a variety of options to find or find and change text. The Wild Card is helpful in locating inconsistent misspellings.*



A pulled-down LisaDraw *Type Style menu illustrates the flexibility of Lisa graphics.*

Up to twenty windows can be opened on the desktop at once, but only one window can be activated at a time. It's always clear to the user which window is active because active windows are always framed in the same way.

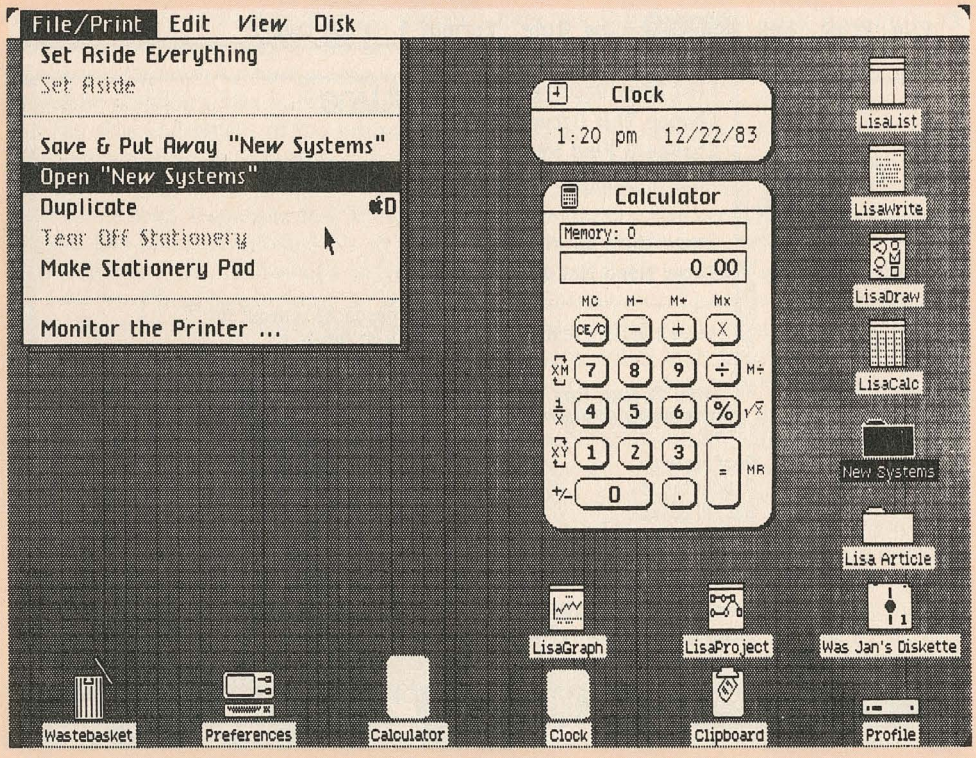
To leave one window, no matter what it is, and activate another, the user *points* with the cursor and *clicks*. Scrolling horizontally or vertically inside Lisa windows is also done with the mouse.

The windows and icons can be arranged on the electronic desktop in the same way we arrange papers and things on our own desks. On the electronic desktop you can actually shuffle paper.

Pull-Down Menus

Pointing with the mouse at Lisa's menu bar and holding the button pulls down a menu. Point to a menu choice, release the mouse button to execute the choice, and the menu is gone. The menu bar on the Lisa screen is always in the same place but its content changes, depending on what was last pointed to. There are File/Print, Edit, Type Style, Page Layout, and Format menus in most of the Lisa applications, as well as other menus specific to each program. Choices in the menus are highlighted or not, depending on their relevance to the last thing pointed at.

But why are pull-down menus necessary? The Lisa menu system has one distinct advantage—it makes Lisa essentially modeless. Certain functions on Lisa's desktop, and on ours, do not change. The need to edit or file things is one example. Most personal computers require that the user invoke an editor or two—that is, change modes of operation—to change text and graphics. On some computers, you must enter a predefined filing system, separate from the job at hand, to file or reorganize your work. On Lisa, editing and filing, changing type styles, and creating graphics are done the same way, just as all windows operate in the same consistent manner throughout the Office System.



This is an example of the desktop environment before applications are used. The Calculator and Clock windows are opened; the highlighted icon New Systems is selected, waiting to be activated.

Sophisticated Software

The Lisa Office System currently consists of seven application programs. Apple originally packaged the entire Lisa, with hardware and six programs, as a one-price bundle. It no longer does this and all software is now available separately. The seven Office System programs are *LisaCalc*, a fully featured financial spreadsheet; *LisaDraw*, a freeform presentation graphics program; *LisaWrite*, a fully featured word processor; *LisaGraph*, a business graphics package with pie, bar, and line chart capabilities; *LisaProject*, a critical path project manager; *LisaList*, a list manager; and *LisaTerminal*, Apple's new communications package.

This is a complete set of programs for most general business needs except accounting. All Office System software functions identically insofar as the mouse, desktop, and menus are concerned.

Using Lisa

Let's destroy a myth: that simplicity and sophistication are opposites or mutually exclusive. Lisa demonstrates that maybe these attributes can complement one another. As simplicity increases, sophistication can increase as well. The concepts underlying Lisa Technology are sophisticated *and* simple. Lisa is simple, yet sophisticated tasks are made easy. Let's take a closer look at how these concepts are integrated into the Lisa Office System and its applications software.

When you first begin a session with Lisa, you'll notice that the screen looks like a gray desktop with a pointer and pictures (icons). The screen is usually dark if the machine has not been used for several minutes, but a touch of the mouse or keyboard returns the screen to a preset brightness. That single feature is utterly charming as well as economical.

Pointing at a folder and clicking the mouse highlights the folder icon. Then, moving to

the menu bar, clicking and holding the mouse button pulls down a menu. Pointing to your selection—for example, Open—and releasing the mouse button opens a window into the folder. Alternatively, two quick clicks of the mouse on a folder also opens a window into that folder. Double-clicking can also save and put away or set aside a folder. Similarly, pulling down the File/Print menu or clicking the mouse twice can activate the calculator and clock on the desktop.

When opening and closing things on Lisa, the process of using the menus, clicking once to point at or select an icon, and then moving the mouse to pull down a menu takes longer than double-clicking, but you get to read what you're doing. Clicking and holding on the icons or title bars of the windows allows you to move them about on the desktop. You can always tell what is active or selected because it is highlighted.

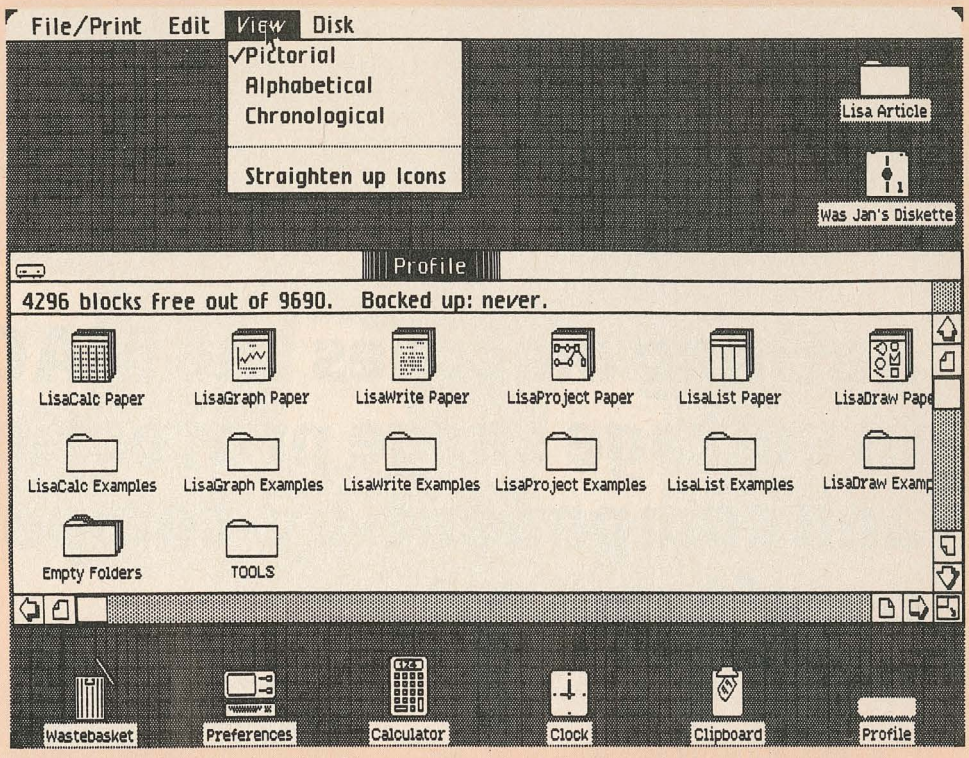
The Lisa applications are invoked by tearing off pieces of stationery—a pad of drawing paper for *LisaDraw*, graph paper for *LisaGraph*, writing paper for *LisaWrite*, and so on. Each stationery pad has a unique icon. A double-click also works to tear off stationery. Two of the choices in the desktop File/Print menu are Tear Off Stationery and Make Stationery Pad. A document or folder can be made into a pad so templates can be torn off again and again. Customized letterhead is a good example of this. First, tear off a blank piece of *LisaWrite* paper and design the letterhead, then make a pad out of the saved document.

Folders can be placed inside folders (hierarchical filing) simply by placing one on top of the other. A View menu allows the contents of the ProFile and floppies to be shown in pictorial, alphabetical, or chronological form. Most users strongly prefer the pictorial listing. There is even a Straighten Up Icons choice in the View menu. Select that option and Lisa tidies up the desktop and folders for you.

Some menu choices can also be selected from the keyboard; the key sequence is shown next to the menu text. For example, Apple-D duplicates a selected icon. Apple-D always means Duplicate; the menu choices available from the keyboard are consistent throughout the applications and on the desktop.

There is a Wastebasket icon for throwing things away. You can open the Wastebasket and retrieve discarded documents, up to a point. A Clipboard icon represents the Cut and Paste buffer; anything cut or copied goes to the Clipboard, and from there it is pasted in the proper place or document. Moving information among the application programs is done this way. The Clipboard can be opened and its contents inspected, but its documents cannot be edited.

There are icons for the ProFile and for each floppy. The floppies appear with a number one or two to designate which floppy drive holds the disk. When opened, the icon called Preferences allows the selection and saving of Lisa's Convenience Settings, Startup Device, and Device Connections. Unfortunately, changing printer connections often requires that the Lisa be powered down so the settings can be saved and recognized. Lisa Preferences is the easiest configuration routine we've seen to date on a personal computer.



The ProFile window is activated and its contents revealed. The View menu allows the contents of the ProFile to be shown in various forms.

Lisa Wins the Spec-Out

Comparisons of Lisa with the IBM PC and PC XT with VisiCorp's *VisiOn* or Lotus's *1-2-3* seem natural. Lisa, along with Lisa Technology in the form of Macintosh, wins the personal computer "Spec-Out at the O.K. Corral" with ease: thirty-two bits versus sixteen, extremely high-resolution display, a mouse; Lisa's one megabyte of memory versus IBM's 640K (only 512K of which seems addressable); higher quality printed output; and the list goes on.

The *VisiOn* desktop system seems to require more computing power than the PC's sixteen-bit 8088 can provide, which impacts on the software's performance. *VisiOn* also suffers in comparison with the Lisa Office System because the Lisa software is the most complete of its kind. There are no *LisaDraw* or *LisaProject* equivalents in *VisiOn*. In fact, the organization of the *VisiOn* interface is fundamentally different from Lisa's.

A mouse and windows do not a Lisa make. Without hardware on a plane with Lisa, developers of mouse-and-window products are finding it easier to produce the form of Lisa rather than the substance.

Lisa's Face-lift

For the most part, this article is concerned with Lisa Version 1.0, released to the public in June 1983. At this writing, Apple's Lisa is being given a face-lift, and Lisa Technology is dramatically evolving in the form of Macintosh and the Lisa Toolkit/32.

Early Lisa owners have expressed concern about improvements and refinements to the Lisa hardware and Office System and about the late emergence of third-party software. Software developers have had limited forms of the Lisa Workshop tools for some time, but most have been waiting for the complete development environment. Third-party Lisa software packages were demonstrated recently at Comdex in Las Vegas, but few were on the desktop and most did not even have a desktop; they ran the Unix operating system instead.

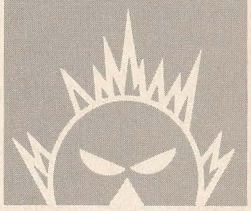
Apple's recent Lisa and Macintosh announcements have helped to define both the Lisa family of products and the direction of Lisa Technology.

The Lisa 2, 2/5, and 2/10

At the top of the line is the Lisa 2/10, capable of running all current and future Lisa and Macintosh software. Features like the twelve-inch bit-mapped screen and mouse have not changed. A new system board accommodates an internal ten-megabyte hard disk that's inherently faster than the ProFile and faster still because it is directly connected to the system, unlike the external ProFile, via a parallel port.

A single 400K, 3 1/2-inch "cartridge" floppy disk provides removable storage. Currently 3 1/2-inch disks come in two flavors—a flexible disk sleeve and a rigid plastic disk sleeve. Apple has chosen the rigid sleeve for durability and believes that the 3 1/2-inch disk technology is mature and reliable. The move to 3 1/2-inch disks also eliminates Apple's cost of manufacturing the lamented twiggy drives. The disk cartridges fit easily into a shirt pocket and are reminiscent of ones seen on the Star-

Get those demons downing your electronic gear!



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MACC-4	7-1/2" x 2-3/4" x 2-3/4"
Shipping Weight	4-1/2 lbs. approximately

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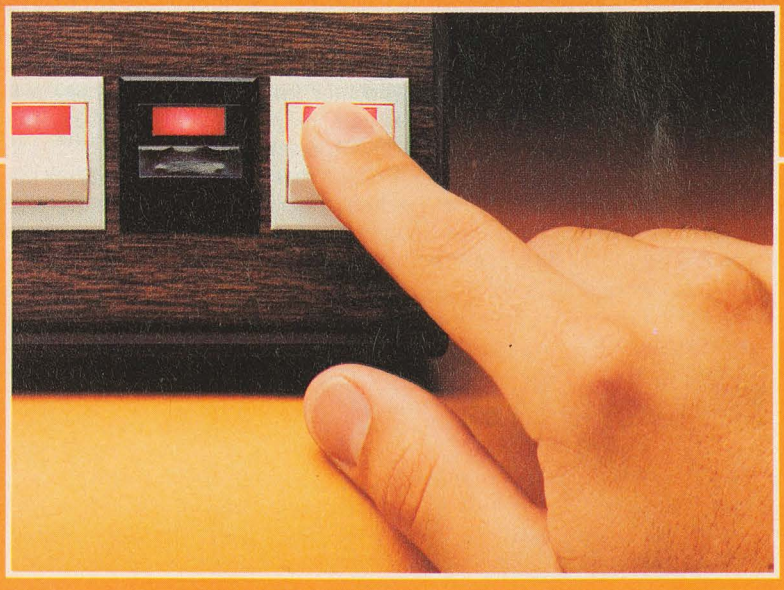

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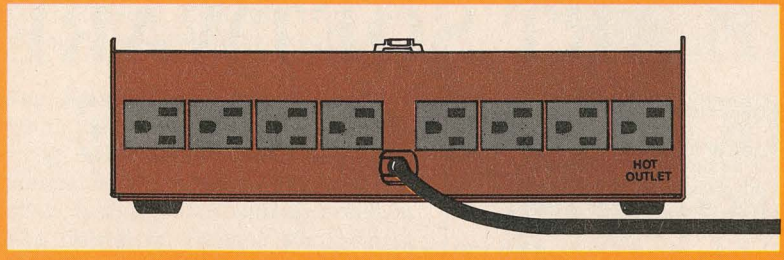

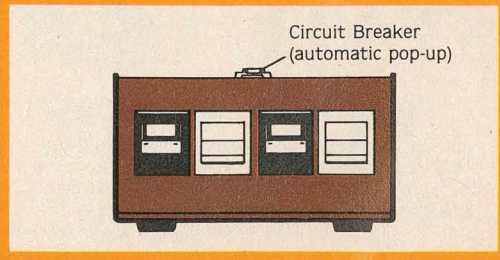

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ship *Enterprise*.

The Lisa 2/10 will come standard with 512K of memory and be upgradable to one megabyte of RAM in the form of 512K add-on boards. The addition of Macintosh ROMs makes the Lisa 2/10 compatible with Macintosh software, though Lisa software will not run on the Macintosh. In Macintosh emulation mode ("Macworks"), the Lisa 2/10 will not support the ProFile, the built-in hard disk, or Apple's daisy-wheel printer.

Apple's announced plans for the Lisa 2 machines do not include bundled software; the software will be priced and sold separately. Apple expects the Lisa 2/10 hardware unit to be priced at $5,495. Current Lisa owners can get a dealer-installed upgrade to a Lisa 2/10 for about the "street price" of the ten-megabyte hard disk ($2,495) and keep their ProFiles for a total of fifteen megabytes of online capacity.

The Lisa 2 (Big Mac?) is identical to the Lisa 2/10 but without the hard disk. In this configuration, the Lisa 2 will run all current and future Macintosh software. Lisa's expandability to one megabyte of RAM, its three expansion slots, and the upgrade to a hard disk make it attractive to those hedging their bets on Macintosh. Apple has priced the Lisa 2 at $3,495.

Additionally, Apple will be offering current Lisa owners a low-cost or no-cost upgrade to Lisa 2 that will include Macintosh ROMs, a 3 1/2-inch disk, and a new front bezel.

The Lisa 2/5 is identical to the Lisa 2 but includes a five-megabyte ProFile. At $4,495, it's an attractive alternative to the 2/10 for users who don't require the extra storage but want the benefits of running Lisa's Office System.

Peripheral Plans

Apple has many peripherals planned in support of Lisa and Macintosh. AppleBus is Apple's peripheral-sharing scheme, designed to connect the entire Apple family of products together to allow them to share resources such as hard disks and printers. The unofficial word is that Apple plans several new peripherals for mid- to late-1984 release, among them an intelligent seventy-megabyte hard disk for the AppleBus costing less than $10,000.

A wide, fifteen-inch-carriage version of the Imagewriter dot-matrix printer will be available shortly (thank goodness). A laser printer priced at less than $5,000 and a color ink jet printer would certainly jazz up Lisa's and Mac's already impressive output; look for them sometime around midyear. Early 1984 availability of the Apple Cluster Controller for IBM host communications will remove a thorn in Lisa's (and Apple's) side, as will a third party's IBM PC/PC-DOS product. Apple will also market its own telephone modems (300 and 1200 baud) this year.

The Lisa Workshop

In the case of software, the future-enhancements question concerns refinements not only to the Personal Office System and the underlying operating system but also to the long-promised development environment for Lisa: the Lisa Workshop. The Workshop, and with it high-level languages like Pascal ($595), Basic ($295), and Cobol ($995), was an announced but unavailable product for most of 1983. Now Apple has put development tools in the hands of many developers, who may have been waiting to see Macintosh before plunging full speed ahead.

Apple-developed programming utilities, the Lisa Workshop and Toolkit/32, are scheduled for early 1984 delivery. The Unix alternatives are available immediately. Pascal continues to be Apple's preferred development language. Pascal allows access to *QuickDraw*. *QuickDraw* is more than forty thousand lines of MC68000 assembly code and defines the fundamental graphics capability of Lisa and Lisa Technology. The *QuickDraw* routines, which will cut across the product line, are used to draw and redraw everything from text and drawings to windows and icons; extensions to support three dimensions and rotation are planned. The *QuickDraw* routines are "callable" in programs developed in Pascal.

Working in the Workshop is like writing programs on a traditional computer. Using the Workshop makes the developer feel as though he can "reach out and touch" Lisa and the Office System.

Apple will release two products aimed at getting programs developed in the Workshop onto the desktop. First, there's *QuickPort*, which will allow any program developed in the Workshop to run in a window on the Lisa

desktop. Such a program will be torn from a stationery pad and have a simple File/Print menu. That's all there is to *QuickPort*, but it's a quick and easy way back to the desktop and Lisa user interface, even in its limited form.

The second and optimum choice is full integration into the Office System using Clascal, the object-oriented language in which the Office System is written, and Toolkit/32. With Toolkit/32, Apple has packaged the Lisa Technology user interface. A developer using Clascal is given "The Generic Application." That means that icons, menus, windows, text editing and printing, desktop management (filing), and cut and paste are already there. All developers have to do is define or *classify* their applications specifically. The general classes already exist.

More Enhancements

What about improvements to the Office System? The Lisa 2 machines will have Version 2.0 of the desktop operating system, which Apple claims will double input/output, specifically disk input/output, speed. If this is true, it will probably dispose of Apple's number one nonissue. Apple never felt that speed was the point of Lisa.

Version 2.0 provides a few cosmetic changes to the View menu on the desktop and the look of the icons, but the real revisions to the Office System applications will have to wait for a projected spring '84 release. At that time, Apple hopes to have completed the Office System cut-and-paste matrix, which will allow freer movement of information between programs. Two examples are the ability to use *LisaList* with *LisaWrite* for form letter production and the ability to paste drawings and graphs within a *LisaWrite* document. Apple also hopes that the spring release of the Office System will provide the capability to upload and download complete spreadsheet models to host computers. Other details are sketchy, but we all have our wish lists. (Frankly, my only wishes for Lisa and Mac are an eight-megahertz MC68000, 256K RAM chips, and maybe a full C compiler in the Workshop.)

Training, Service, and Support

After all that has come before, the issues of training, service, and support may seem unimportant. But these bases are covered too. The Office System comes with an excellent hands-on tutorial on Desktop Management called *LisaGuide*. Typical users will take anywhere from forty-five to ninety minutes to complete *LisaGuide*, and the skills they'll learn will cut across the desktop applications.

Each Office System application begins with a "Getting Started" module. This module, and the tutorial that follows it in each manual, is supported by extensive examples contained in folders on the ProFile. The Lisa Office System manuals are clear and concise—a balanced mix of text and graphics—and are consistently organized.

Apple provides free end user support via an 800 number for three months after a Lisa purchase. The company is currently scheduling classes for software developers that include coverage of Toolkit/32 and one year's support from the Apple Support Center. Lisa and Macintosh have limited Apple warranties and are serviced by authorized Apple dealers.

See Your Dealer

Now that you've heard one side of the story, get some hands-on experience with a Lisa or a Macintosh. No amount of prose can substitute for actual extended use. This is true whether you currently use a personal computer or not. With Lisa, Apple has wrestled with the classic marketing problem: "How do I sell someone something they don't know they need yet?" Apple has a mouse *and* a better mousetrap, and yet it has had to struggle to bring the concepts to market.

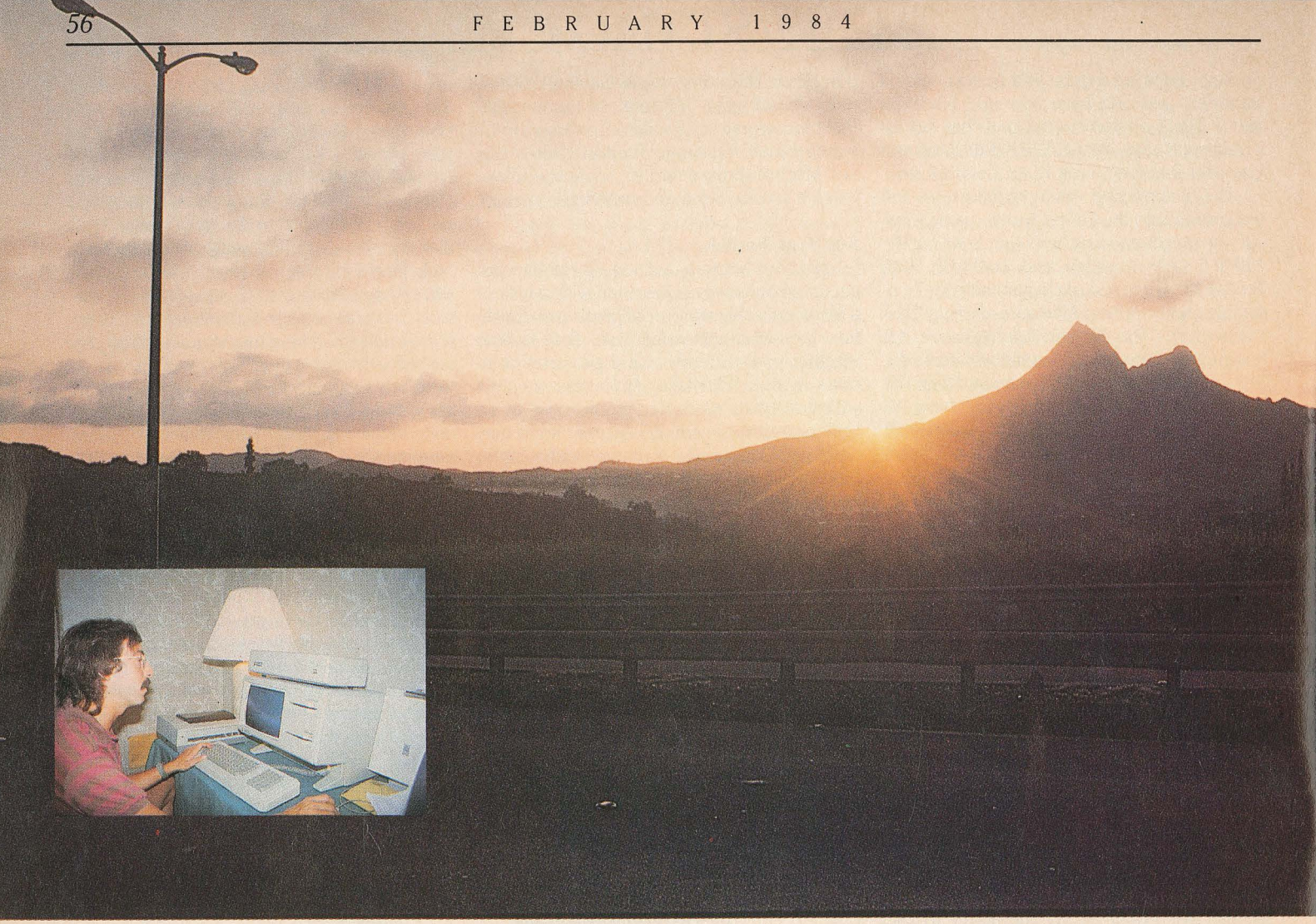
Lisa and Macintosh are different from the picture of personal computers most of us have in our heads. Some education is necessary before the benefits of Lisa Technology become apparent.

Lisa is not just a souped-up Macintosh. Because Lisa is a much more powerful, expandable system, there are things it can do that Macintosh may never do. The differences are not just screen size and memory. Lisa's multitasking Office System and incredible development environment are impossible on Macintosh. Lisa is a *system* and best evaluated as the sum of its parts. Application-by-application "showdown" comparisons are useless when discussing Lisa's real value, as are megabyte-by-megabyte comparisons. With Lisa, the whole is greater than the sum of its parts.

The point of the Lisa Office System is *throughput*: how fast you get your work done, not how fast the CPU or the disk drive is. With the Lisa Office System, throughput is extremely high. First, Lisa really is easy to use. And once you've begun to use it, Lisa shortens the distance between concept and presentation. Ideas are visualized and organized quickly and presented with impact due to Lisa's superb (soon to be better) output side. Real productivity gains are achieved because Lisa is quickly learned and, once learned, acts like a "mental amplifier."

Lisa's throughput would not be possible without the user interface. The user interface comes as close as any current method to making a personal computer as natural and intuitive to use as a telephone. It is not as close as we will come.

Even before the upgrade, Lisa rated an "A" in the areas of performance, productivity, user satisfaction, and value. In Lisa, Apple has designed and implemented one of the best thought-out and best engineered systems ever. Lisa has an elegant, even embracing, user interface and brilliant software for business and development. But Apple's real accomplishment is in bringing Lisa Technology to market, at real world prices, where it can make a difference.



A Day In the Life of a Hawaiian Lisa

By DAVID HUNTER

Dark, like the ocean depths from which the sparkling islands were thrust, the Hawaiian midnight greets the muu-muu and aloha-shirt–clad haoles treading in rubber zoris on the shadowy soft Waikiki Beach sand, the melia-adorned wahines with their yellow and white leis sweetening the Maui night, and the white-domed ka-ma-aina farmers stirring embers from spent luau fires on the Big Island.

Far into the Polynesian night, one day ends and a new one begins.

The forces gathering in and around the islands are strong this December night. There is a feeling of tension, of time's mighty feet straining against the fabric of existence and the human mind, as if fantastically strong fetters could cause history to stand still.

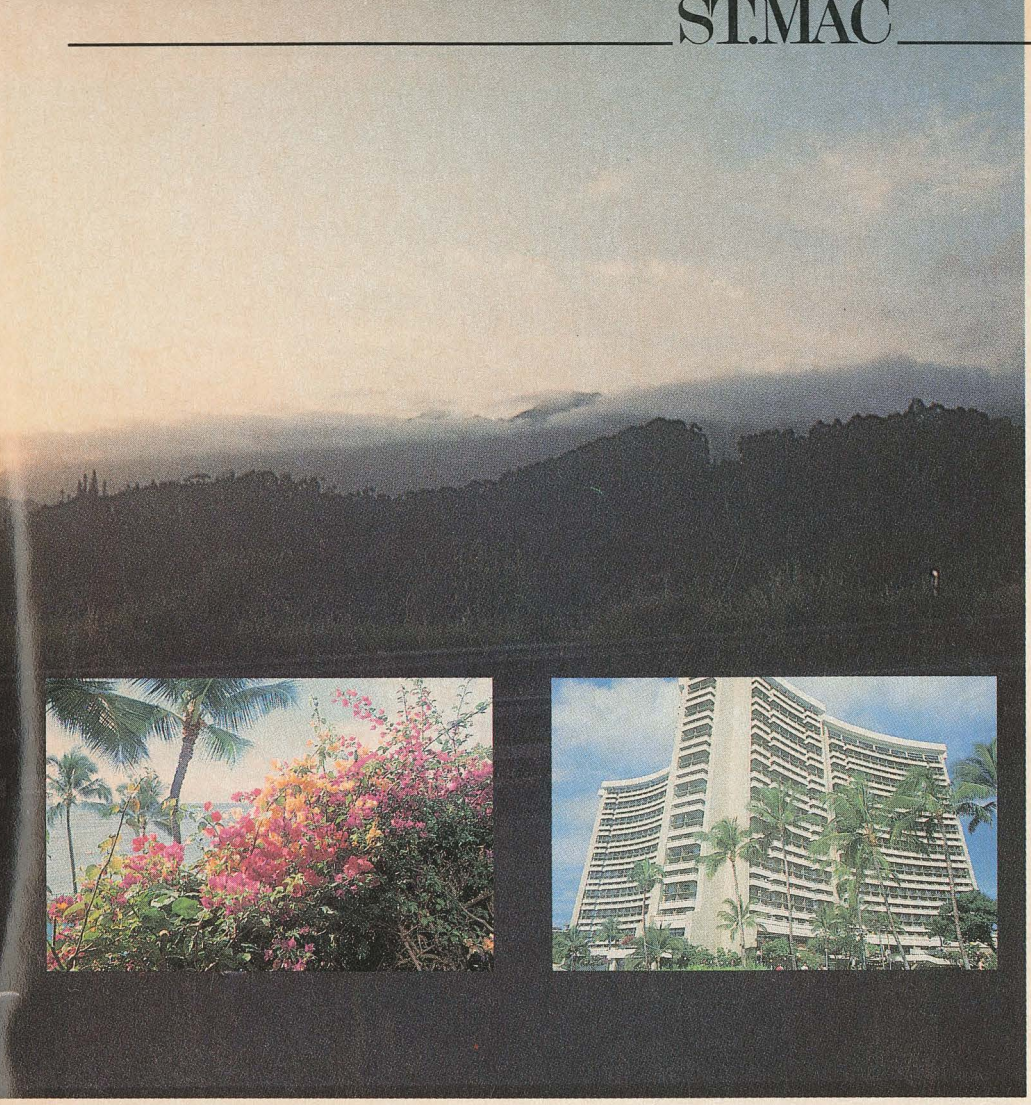
The Hawaiian midnight greets five dozen Pentax, Hasselblad, Cannon, and Nikon-touting haoles, or foreigners, who have just risen for their appointment with the sacred and mysterious acts of photography. These haoles, who have traveled here from the four corners of the world, have been in paradise for a week, preparing for the event that commenced at midnight. They have names like Eddie Adams, Alon Reininger, Neal Ulevich, Jay Meisel, Dirck Halstead, Stephanie Maze, and Donna Ferrato. They call themselves photojournalists. And in the next twenty-four hours they will do battle with gods, people, and the elements, pushing themselves in pursuit of the Picture.

The Never-Ending Day

On December 2, 1983, six of the seven main islands that comprise the state of Hawaii became the sites of an ambitious international artistic project called A Day in the Life of Hawaii (DITLOHA). Intended as a commemoration of the state's twenty-fifth anniversary of statehood, the project called for more than sixty professional photographers to venture out on the same day and record a single twenty-four-hour period in the life of the fiftieth state.

A Day in the Life of Hawaii was the inspiration of professional photographer Rick Smolan, who had headed a similar project three years ago in Australia. Working with companies like BP Australia, Qantas Airlines, Wespac Bank, Apple Computer of Australia, Kodak of Australia, and the Australian Information Service, Smolan and fellow photographer Andy Park brought more than a hundred photographers Down Under on March 6, 1981. A year later the world was treated to the remarkable book *A Day in the Life of Australia.*

Picture editors from *Newsweek*, *Geo* magazine, and the London *Sunday Times* waded through the ninety-six thousand pictures taken on March 6 and chose 367 for *A Day in the Life of Australia*. Brief but illuminating captions, several essays, small maps showing where and when each picture was taken, and biographies of the participants accompanied



Opposite page: Smolan uses LisaWrite *to create a last-minute memo to participants in the Day in the Life of Hawaii project. This page: the view from the Sheraton Waikiki, headquarters of the DITLOHA project, and the hotel itself as seen from Waikiki Beach.*

the photos. The final result—with the pictures arranged chronologically according to the time of day when they were shot—is striking.

Many photographs in *A Day in the Life of Australia* are timeless and beautiful, and the effort to capture the diversity of peoples and lifestyles in Australia was more than successful. But the real wonder and mystery of the book comes through when you realize that all 367 pictures were shot on the same day. The lack of a coherent impression of Australia is made up for by the spontaneous clarity of the visions taken as a whole. Smolan may not have realized his dream of making "the definitive statement about Australia," as promised in the letter sent out to participants, but the book is much more than a collection of beautiful pictures. It has a depth that only one hundred artists working together could achieve. *Time* magazine called *A Day in the Life of Australia* "a Blakean work that allows readers to hold infinity in the palms of their hands and eternity in an hour." *Life* called it, "Something strange and wonderful."

Paradisiac Photography Project

The Day in the Life of Hawaii team plans to produce a large format hardcover book from the photos taken on December 2, as well as a one-hour TV documentary, a calendar including the best photographs from the project, and a traveling exhibition of museum-quality prints. Sponsored by First Hawaiian Bank, the Hawaiian Visitor's Bureau, and many others, the ongoing DITLOHA project has three main purposes: to create a superior photographic document about Hawaii; to generate worldwide publicity, general interest, and increased tourist travel to Hawaii; and to involve Hawaiian citizens in a celebration of their state's twenty-fifth anniversary of statehood.

A Day in the Life of Hawaii was not an easy event to coordinate. A hundred photographers, picture editors, and other participants had to be flown to Hawaii, provided with hotel accommodations, transported around the islands, and flown back to their points of origin. Though the art and science of photography were in the limelight, the event could not have taken place without the technology of computers, particularly Apple's Lisa.

Yes, even paradise has computers, as well as 7-Elevens, struggling factories, and urban sprawl. The Honolulu phone book lists three ComputerLands of Hawaii on the island of Oahu.

But it was not on any of the islands that Smolan acquired the Lisa used in the Hawaiian project. At the time he obtained the machine, it became the only Lisa on the islands, imported from the mainland. It was, in effect, a haole machine.

Neither Smolan nor his partner David Cohen bear much resemblance at first to the typical "Lisa user" that emerges from the multimillion-dollar market research reports. And when one sees them working with the machine—in a Waikiki Beach hotel room, wearing shorts, T-shirts, and sandals, with the balmy, pulsating, hypnotic Polynesian air and light pouring through the open windows—Smolan and Cohen evoke thoughts of marble-tabled, crystal-ashtrayed, high-rise corporate America about as much as Cheech and Chong evoke images of suave, sophisticated movie idols.

There, in a Macadamia-sized nutshell, lies perhaps the most practical reason for the use of the Lisa in this exotic application. The Lisa gave Day in the Life of Hawaii the appearance of a large organization, with lots of resources. This was a glamorous project, and it needed a glamorous computer.

"With Sony, Kodak, and all the other sponsors, we're looking at an investment of about $900,000," Smolan says. "The Lisa makes us look professional, while at the same time allowing us to be spontaneous and creative. It's important how we present ourselves to the sponsors."

At thirty-three, Smolan is a well-known photojournalist. A graduate of Dickinson College, he was *Time*'s chief photographer in Eastern Asia and Australia, where he conceived and produced several major stories. Smolan's photography has appeared in publications as varied as *National Geographic*, *Newsweek*, *Fortune*, the *New York Times*, the London *Sunday Times*, *Stern*, *Paris-Match*, and *Life*, and he's a past member of the international photojournalism agency Contact Press Images. Cohen, who was a coordinator of the Day in the Life of Australia project, was formerly a director and managing editor at Contact Press Images in New York. A graduate of Yale, Cohen once served as an aide to a member of the British House of Commons and to the United States Ambassador to Sierra Leone, West Africa.

Hands-On Down Under

Smolan first became acquainted with microcomputers while working on A Day in the Life of Australia. Once that project began to take shape, Apple Computer of Australia approached the group and donated a II Plus and a III. Smolan, who says he's always enjoyed fooling around with gadgets, felt right at home working with the two machines. In addition, says Smolan, Apple Computer of Australia helped train Smolan and his staff to use the computers.

After the Australian project was over, Smolan was invited to keep the Apples and has

The Day in the Life of Hawaii project demanded extensive preplanning—and a morass of accompanying paperwork. LisaDraw *and* LisaWrite *churned out some of the schedules, memos, and newsletters pictured above. Each photo in the book* A Day in the Life of Australia *was accompanied by a map showing where and when the photo was taken;* A Day in the Life of Hawaii *will follow the same format. In the insert at upper left, Smolan (foreground) and DITLOHA participants relax at a wind-down luau the day after the event. The black-and-white photos were taken by Smolan, DITLOHA's Maggie Steber, and some of the project's participants.*

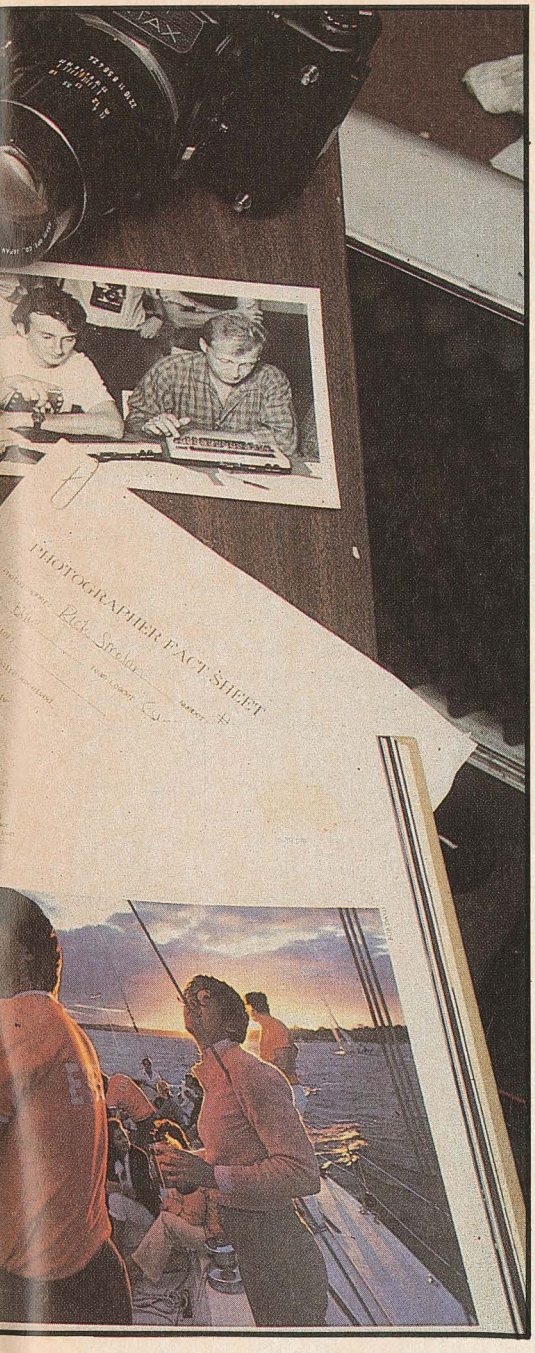
since become involved in many aspects of computing, especially telecommunications. When the time came for Smolan to begin the complicated and lengthy preparation of A Day in the Life of Hawaii, he took his Apples to Oahu and resolved to see if he could get a Lisa. From everything he'd read, Lisa seemed to be a sound investment. He had to travel to Cupertino, California, to get the machine.

Working out of a fourth-floor suite in the Sheraton Waikiki, Smolan and the DITLOHA staff produced bulletins, reports, assignment sheets, and other paperwork in the hectic months before December 1983. The office was equipped with typewriters, three Wang word processors, the Lisa with a dot-matrix printer, an Apple III, and a IIe.

Six software programs came with the Lisa and Smolan's group made use of all but one—*LisaGraph*—relying most on *LisaList*, *LisaDraw*, and *LisaWrite*. If ever there was a situation in which a single computer could make or break an operation, this would seem to have been it. The distinction between simple survival and survival with class, so to speak, is undeniable. A Day in the Life of Hawaii wanted something special, a machine a cut above the class of common working computers.

The task of organizing the myriad bits of information crucial to the successful movement of one hundred people to and from Hawaii fell upon *LisaList*. Smolan appreciated *LisaList*'s ability to allow a practically limitless number of fields. A fact sheet was developed for each participant, photographer, or picture editor totaling some one hundred records—with each record containing fifty-two items of information.

Each participant's fact sheet contained such data as address, employer (if any), phone number, hotel, and airline. Also listed was such particular information as make of camera, type of film, roommate, assigned area, and transportation while on the islands. The database consisted of a total of ten thousand pieces of information, and Smolan was pleased with *LisaList*'s performance in assembling it all into a manageable form.



Polynesian Processing

LisaWrite produced many of the shorter memos, while the Wangs took care of the larger documentation tasks. At one point, DITLOHA supplied newsletters and other paperwork to the participating photographers and their staffs, the press, picture editors, sponsors, and local residents, organizations, and businesses. "We're not a regular publishing company," says Smolan. "We have no overhead and can't afford the time and money to train people." The Lisa, versatile and easy to use, helped DITLOHA keep pace with the demand.

When the project began, only Smolan, Cohen, and DITLOHA office manager Bill Peabody had any experience using computers. Most other staffers got their first hands-on experience with the Lisa. Smolan says the icon-based software appealed to those "who had never seen a computer before. Also, the display is easy on the eyes."

A graphics enthusiast, Smolan often sits a photographer friend down in front of the Lisa and encourages him to play around with *LisaDraw*. Smolan and Cohen used *LisaDraw* to create the graphics on the letterheads of DITLOHA's bulletins and newsletters.

"You know, the big problem with *LisaDraw* is that you can keep changing forever what you're working on," Smolan confesses.

Smolan says the Lisa is his "favorite computer," though some of its features are not entirely to his liking. For example, he assesses *LisaWrite* as "terrible for word processing." Yet, once he has finished entering text and started to use the mouse/pointer and icons to experiment with different typefaces and layouts, Smolan finds the program quite handy.

"There were times," says Smolan, "when people would have to stand in line to use Lisa. We could have used two or three more of them. People tended to gravitate toward it."

With Six You Get LisaRolls

David Cohen used *LisaCalc* to keep track of DITLOHA's finances. *LisaProject* handled planning and coordinating all the various arrangements. Many aspects of the project were interdependent, and *LisaProject* helped A Day in the Life of Hawaii manage its tight schedules.

Everything went as expected until the evening of December 1. An ominous weather forecast, predicting showers, was countered with a solemn ti-leaves-and-gin offering on the roof of the Sheraton Waikiki before midnight.

The sun rose at 6:54 a.m. in Honolulu. By noon the temperature had climbed from the high sixties to the high eighties. The wind during the day was a gentle but persistent ten to twenty miles per hour. Occasional showers materialized and white fluffy clouds filled the sky off and on during the day, but no rain of great consequence fell on December 2, 1983.

For most of the participating photographers, A Day in the Life of Hawaii provided a welcome change from the battlefields of Lebanon, the high courts of the world's leaders, and the glitter of show business. Here was a chance to shoot the very substance of the human experience on Hawaii—the sky, ocean, flesh, and earth of paradise.

The Best-Laid Bombs

Israeli photographer Alon Reininger of Contact Press Images was a victim of one of the afternoon's few major foul-ups. Reininger and several other photographers set up their equipment in the Maqua Valley on Oahu where the army said ten thousand pounds of explosives would be detonated at 2:00. Without warning, the explosives were set off at 1:50. A local KITV crew got shots of a large cloud of smoke rolling up the mountains with an overcast sky in the background. Reininger commented, "There was no color. It was pretty gray anyway."

National Geographic photographer Dan Dry had a minor car accident and found himself in the custody of the Molokai constabulary for a couple of hours. Another photographer, Dirck Halstead, tried to reach the forbidden island of Niihau. This island is privately owned by the royal family of Hawaii and has not been photographed in more than fifty years. Halstead first tried to get an invitation; when that attempt was met with a resounding "no," he tried to rent a helicopter—without success. Niihau truly is forbidden, unless one is invited, and mysterious are the ways that haoles are kept from its shores.

Filmmaker Gordon Parks directed a five-man team—including some photographers-turned-video cameramen—for the TV documentary film.

Two-time Pulitzer Prize–winning still photographer Stan Foreman followed *National Geographic*'s Jodi Cobb into Kapiolani Children's Hospital, where they both recorded the first birth of the day. David Burnett, who has won numerous awards including the Overseas Press Club's Gold Medal for his coverage of the aftermath of the Chilean coup d'etat in 1973, used a Sony Beta-Cam unit to shoot *Black Star*'s Robin Moyer in Makawao on Maui. Florida-based TV cameraman Frank Beecham caught the action at a Waikiki new-wave disco with celebrity photographer Dana Fineman of Sygma Photos.

The project participants weren't the only ones shooting pictures on December 2. Kodak and a local newspaper, the *Honolulu Advertiser*, sponsored the DITLOHA Photo Contest. Ten winners will have their photographs published in *A Day in the Life of Hawaii*. At times the amateurs made it tough for the official DITLOHA photographers. Pulitzer Prize–winner Neal Ulevich showed up at the Honolulu fish market at 5:30 a.m., only to find that he had been scooped by six amateur photographers.

Other than a few minor problems, December 2, 1983, ended with all goals met and most photographers happy and tired. Having spent months looking forward to the project and a week on the islands researching the subject matter, the participants had few complaints about how the appointed day unfolded.

Starting around noon the next day, the photographers congregated at the Sheraton Waikiki to drop off their used rolls of film and go through debriefing sessions. That evening the whole assemblage—photographers, picture editors, and organizers—made their way in groups beyond Diamond Head's fractured crater to Maunalua Bay and a luau—complete with Polynesian-style barbecued chicken, Tahitian dancers, and a blazing open fire. The sight of some of the gathering's better-known participants, such as *Time*'s picture editor Arnold Drapkin, swishing and swooshing with bronze-skinned islanders brought howls of merriment and many flashing cameras.

The impromptu showing of pictures taken by Smolan and other participants during their week in Hawaii typified the warmth of the gathering of friends. Let no one believe that photographers don't have definite ideas about

Photo by Rick Smolan

A Day in the Life of Hawaii's Jennifer Erwitt shoots in the surf at Waikiki.

how the captions under their pictures should read. This somewhat rowdy, mildly tipsy group of exhausted photojournalists savored the hazy Pacific night sky, swapping stories of Hawaii and the wide world beyond.

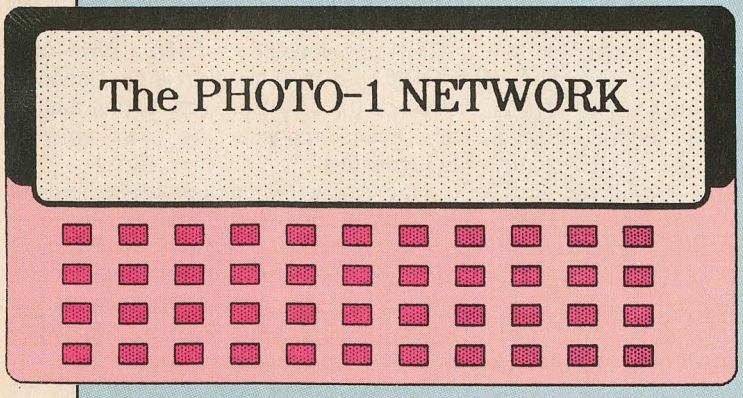
"These people are all good friends and watch out for each other," says Smolan. "Two weeks after they all left Hawaii, we got a phone call from New York. Many of the same group of photographers had gathered at a party and called to say hello. Forty people must have gotten on the line. These people travel eleven months out of the year. When they meet up, they live together."

Midwinter Book Report

As of late December, the first round of picture editing for *A Day in the Life of Hawaii* had resulted in five hundred photographs, from which the final three hundred and fifty or so will be culled. Smolan says the "pics are fantastic." The book will appear in stores in August, published by Workman Publishing in New York. Smolan says the book will follow the same format as the Australian volume. The finished product, like *A Day in the Life of Australia*, will undoubtedly evoke a mixture of responses from those who experience it.

Off the shore of Oahu, the sun set behind a puff of clouds over a dark blue sea. The Hawaiian night came alive in all of its sparkling, then hazy, soothing, invigorating—always changing—mystery. The haoles continued their quest until the clocks chimed midnight. Weary, spent like the once-mighty waves that gently moisten Waikiki Beach, the sea of photographers flowed back to their hotels for much-needed rest.

It had been a magical day and an ordinary day at the same time. In Top's coffee shop on Kalakau Avenue, one could feel the magic. In the faces of the joggers on Kahala Avenue one could see the magic. In Pearl Harbor, on Maui, Molokai, Lanai, Kauai, and the Big Island, in space—where shuttle astronauts took pictures of each other and of the islands as they passed overhead—and in the sea, the mana this day was strong with the native islanders and their haole guests. For a day, time stopped, and the world turned its sleepy head to peer through light and dark glasses into the soul of paradise.



Phoning Photo Friends

Photographer Rick Smolan has found a way to combine his profession and his love of computers. The result is the Photo-1 network project that he and colleague David Cohen originally founded in conjunction with the Washington Post Company. The idea for Photo-1 first occurred to Smolan during the Australia project when he used The Source to communicate with Cohen in New York City. The ability to have access from remote locations to specifically tailored information on photographers struck Smolan as a good idea for a network, and two years later Photo-1 was launched in conjunction with DITLOHA.

The goal of Photo-1 is to provide a ready storehouse of information on individual photographers—their home bases, specialty areas, equipment, past achievements, and much more. Smolan's entry, for example, would include a file of inside tips about countries he's most familiar with, such as Australia. "The file would include information on the best camera stores, hotels, and taxi drivers that are used to working with photographers—the kinds of things I'd only share with another photojournalist," Smolan explains.

Photo-1 has electronic mail capability and includes password protection. This means that someone Smolan didn't know could leave a message asking for a chance to look at the Australian file. Then Smolan could take matters from there. Another feature of Photo-1 is its ability to locate photographers around the world—the network is currently carried in eight countries. This comes in handy when an editor is looking for a photographer to cover a story in Madagascar, for instance. Photo-1 can help locate any photographers close to that location.

Never ones to underutilize a computer, Smolan and crew are using *LisaTerminal* to access Photo-1. This data communications software allows the Lisa to emulate VT100, VT52, and TTY terminals and exchange information via modem with computers supporting asynchronous protocols. Announced the same time as Lisa a year ago, *LisaTerminal* has only become available in the last few months.

So far, fifty or so photographers are on-line with Photo-1. As part of their payment for working on DITLOHA, all the participating photographers were given Radio Shack Model-100 portable computers. At first the reactions were mixed. Smolan says that several of his colleagues were prey to the same phobias about advanced technology exhibited by many first-time computer users. Smolan believes that eventually members of the mostly gadget-oriented group will come around.

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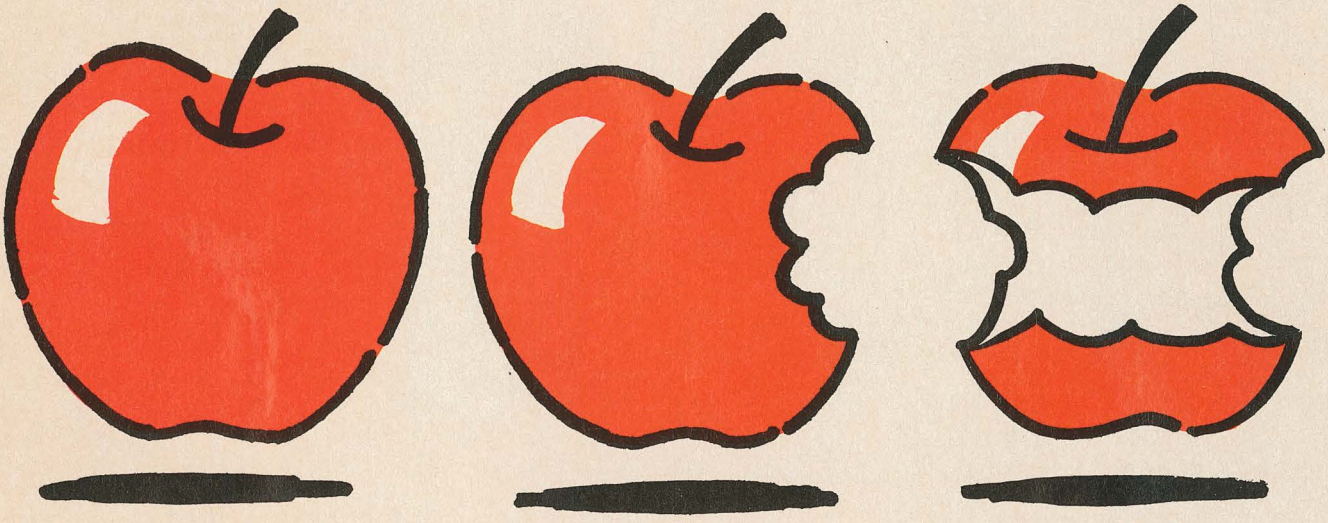

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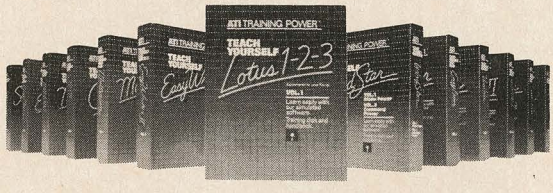

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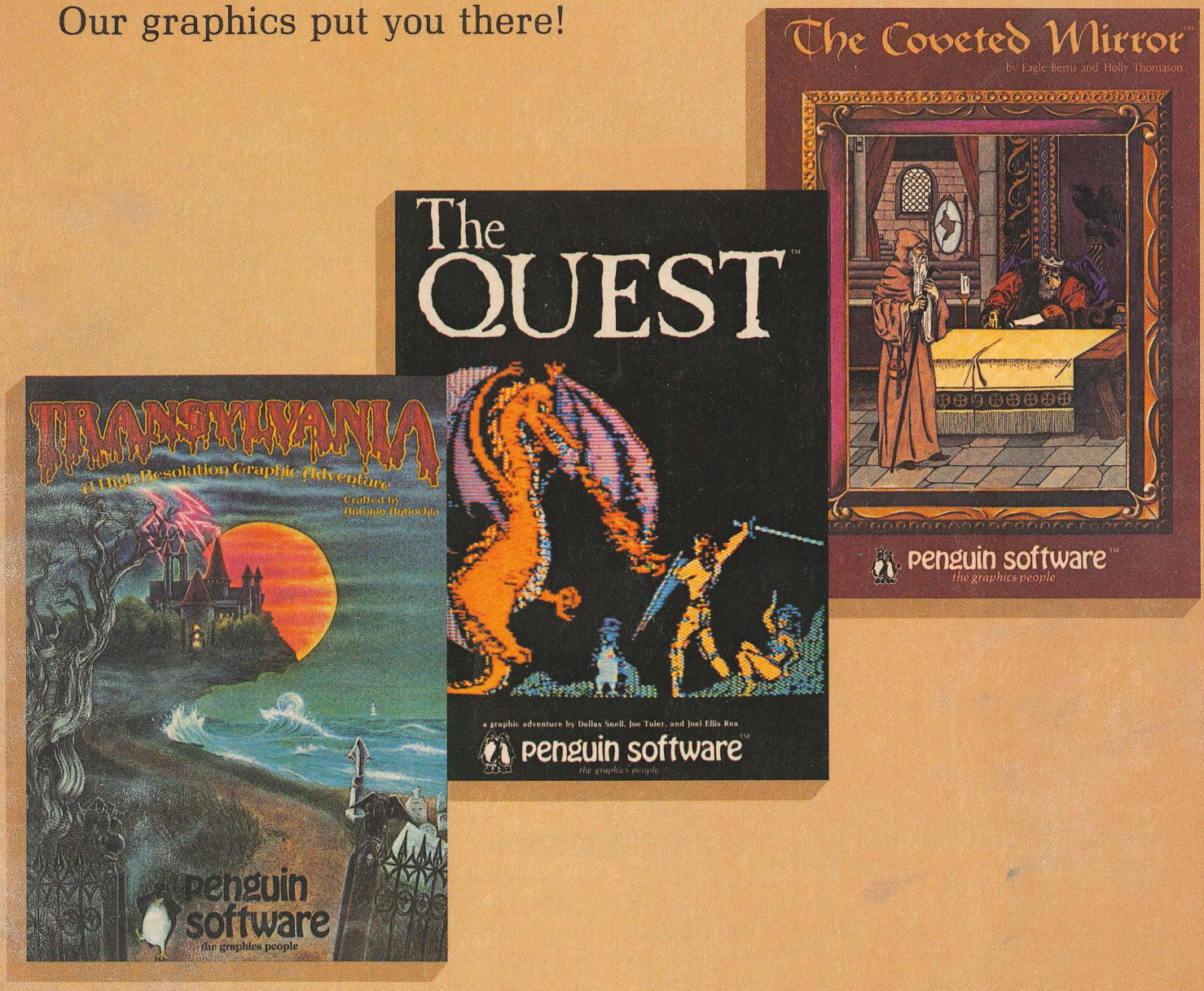

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