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November 1984

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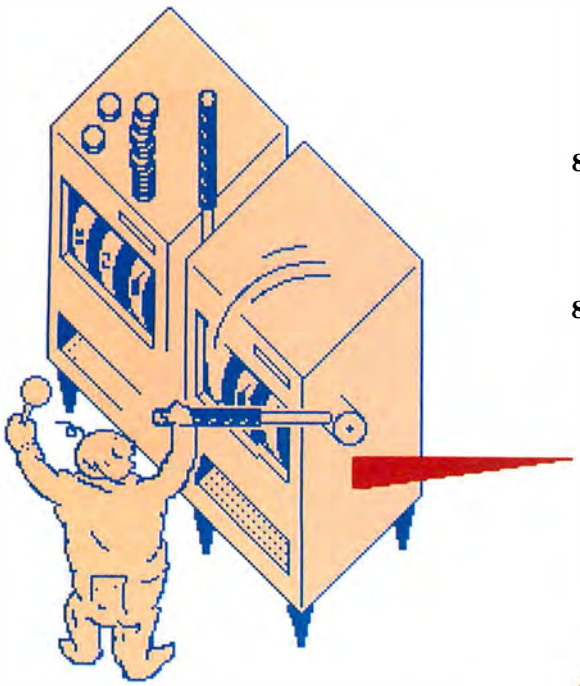
Getting Started

34 Double-Disk Strategies
Daniel Farber
The Mac's external disk drive increases your disk space, eliminates disk juggling, and offers variety in organizing applications and documents.

47 Get Info
Lon Poole
Macworld's tutor answers questions from readers about the Mac.



State of the Art

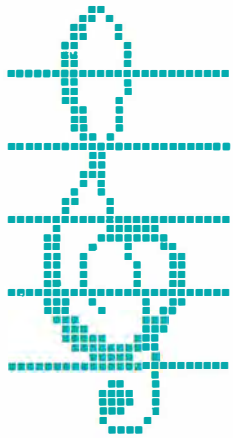
56 The Macintosh Deluxe
Danny Goodman
Announcing the 512K "Fat" Mac, the eagerly anticipated expansion of the Macintosh into a more powerful computer.

Review

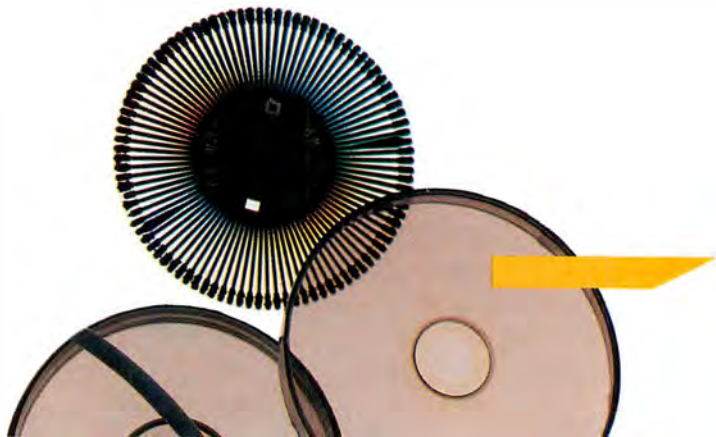
68 The MacFORTH Dimension
Richard Sprague
The inside story on the first programming language that enables you to use the Mac as a stand-alone system for developing marketable applications.

80 The Living-Room Casino
Jeffrey Bartlett and Keith Richard Cook
Two gambling games that come alive with the ringing of a slot machine and the shuffling of cards.

89 Macware News
Edited by Erfert Nielson
Announcements of the latest developments in Macintosh software, hardware, and accessories.



How can you use your Macintosh to write musical scores without purchasing an expensive application program? See this month's Open Window *on page 124.*



Hands On

100 Murder at the Vermilion Hotel
Jeremy Joan Hewes
It's not easy for a writer to keep the many details of a mystery story consistent; try using storyboards created in *MacPaint*.

110 Letter Quality Arrives
Janette Martin
Three printer driver programs that end the wait for letter quality printing on the Mac.

124 Open Window
Edited by Kearney Rietmann
An exchange of Macintosh discoveries.

Community

134 The Macintosh Family Tree
Ted Nace
Tracing the forty-year ancestry of the Mac through many permutations and pioneering ideas.

146 Macworld Gallery
Edited by Erfert Nielson
An exhibition of Macintosh graphics.

Photo/illustration credits

David Bishop, cover, 35, 56-57; John Hersey, 81; Ed Kashi, cover (inset), 137, 139-140; Jeffery Newbury, 100-101; Roy Shigley, 26; George Steinmetz, 9, 15, 47; Fred Stimson, 111; Mick Wiggins, 27, 29.

Columns

9 Travels in the Personal Computer Time Machine
David Bunnell

15 Note Pad
Amanda Hixson
The Serious Side of Creativity

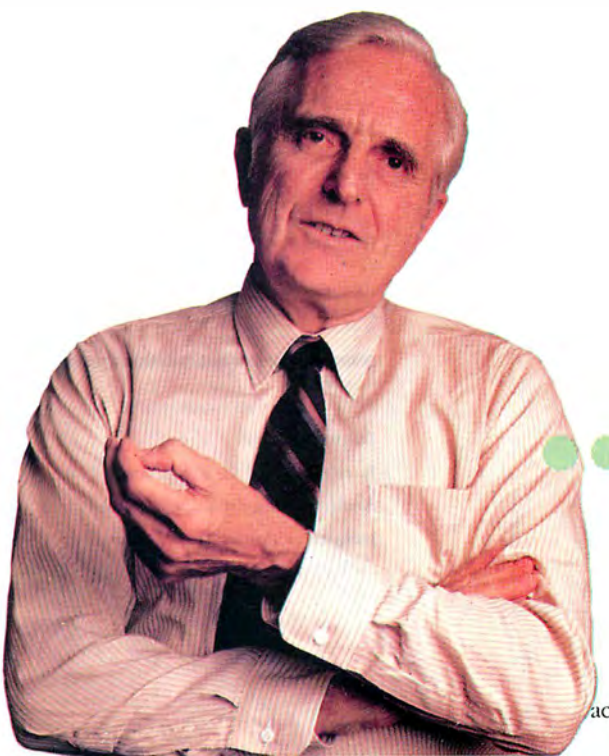
19 Letters

26 Macworld View
Edited by Janet McCandless
News and notes for the Macintosh community.

Indexes

160 Advertisers
160 Products

Find out why computer science researcher Douglas Engelbart (below) tested the length of time it took people to write a sentence using a pencil tied to a brick (above). See "The Macintosh Family Tree" on page 134.



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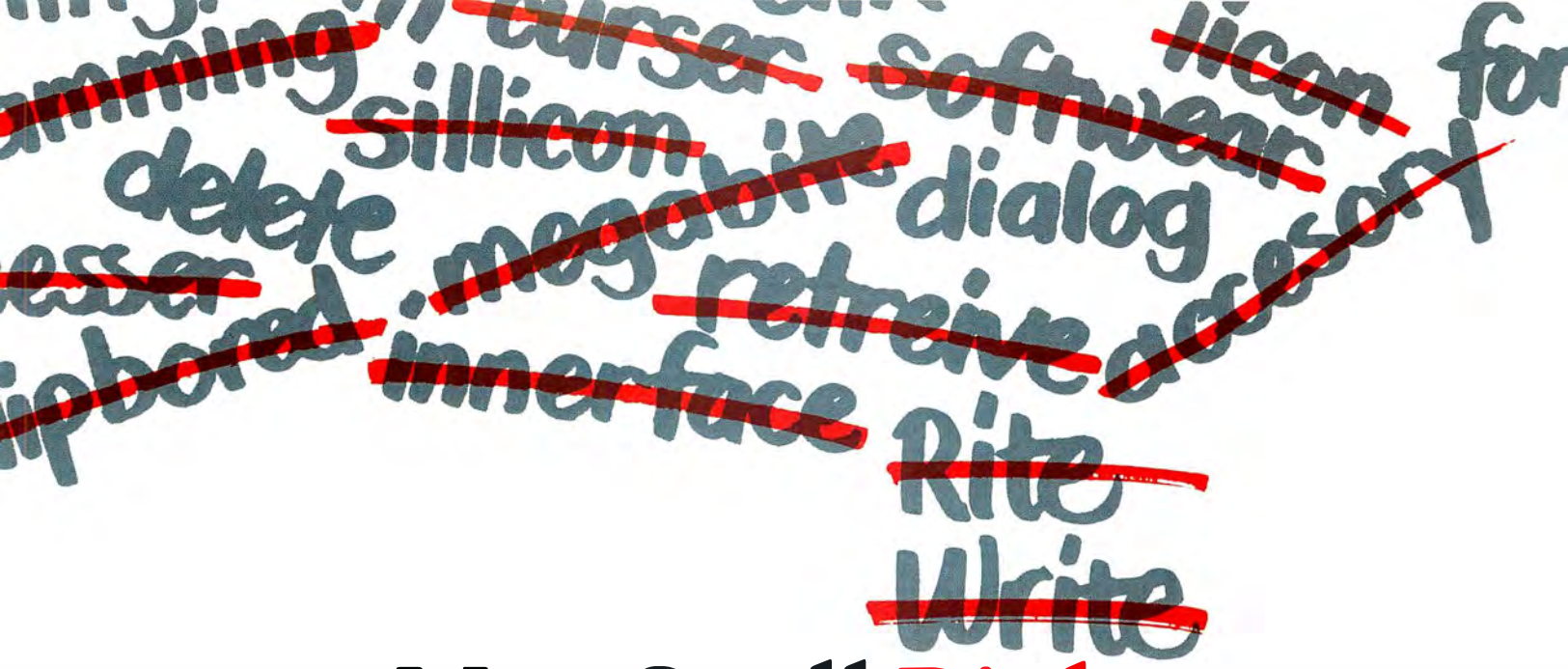

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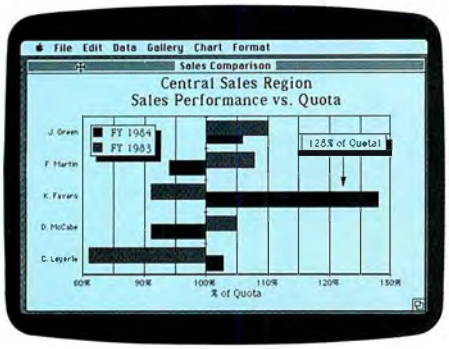
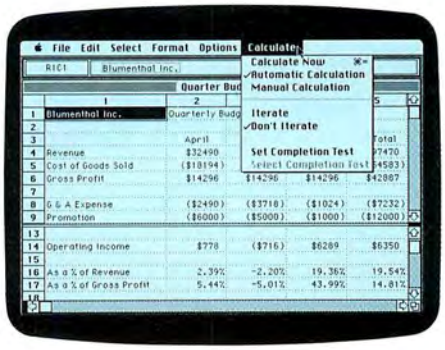
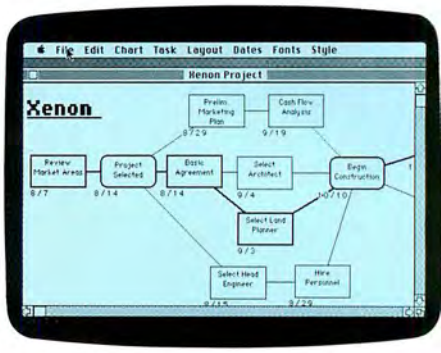


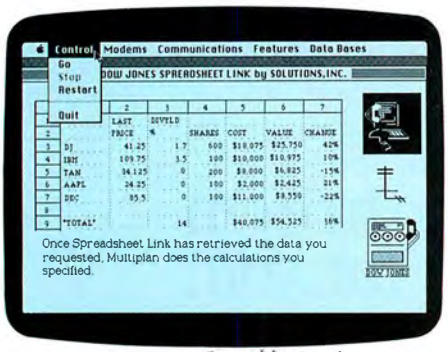
Microsoft Chart,
business graphics.



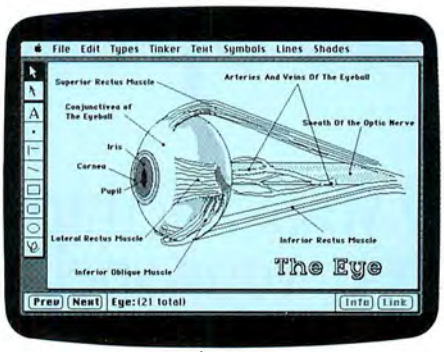
Microsoft Multiplan,
electronic spreadsheet.



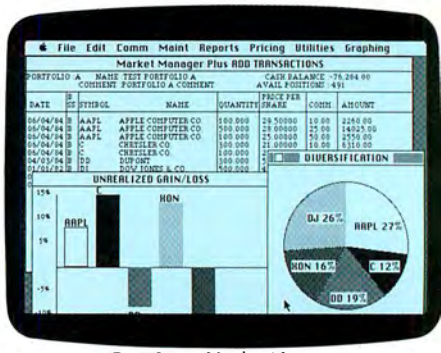
MacProject,
project management.



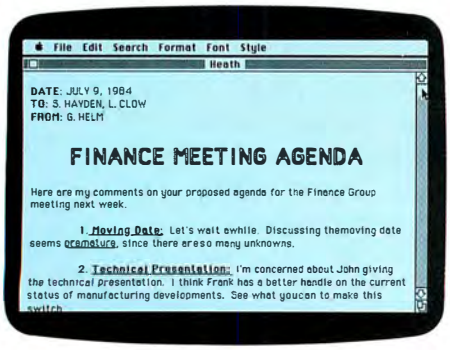
Dow Jones Spreadsheet Link,
stock analysis and communications.



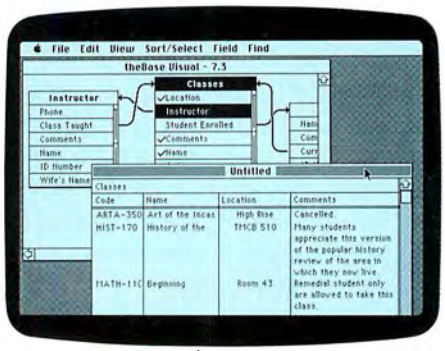
Filevision,
database management.



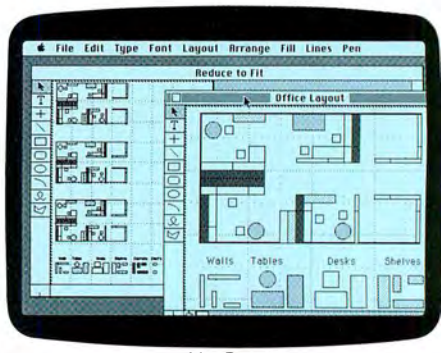
Dow Jones Market Manager,
*stock analysis.**



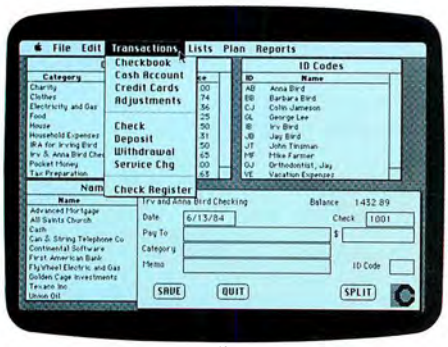
MacWrite,
word processing.



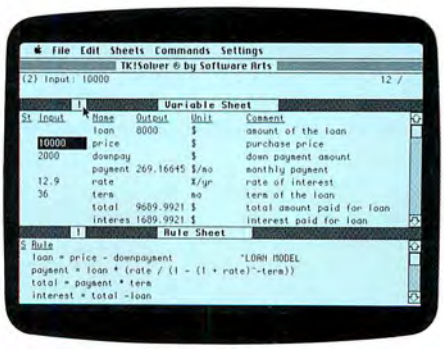
theBase,
database management.



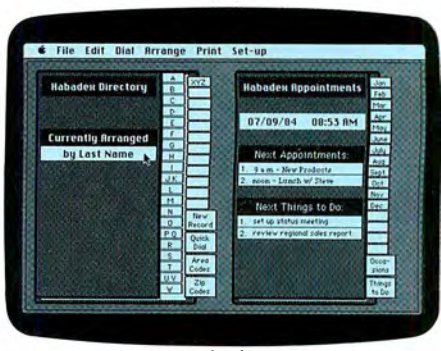
MacDraw,
graphic illustration.



Home "Mac" Accountant,
personal finance.



TK! Solver,
equation processor.



Habadex,
database and communications.

*The programs above are just a few examples of new software for Macintosh. Some are available now; others will be released in the coming weeks. *Available 4th quarter, 1984. **Available 1st quarter, 1985.*
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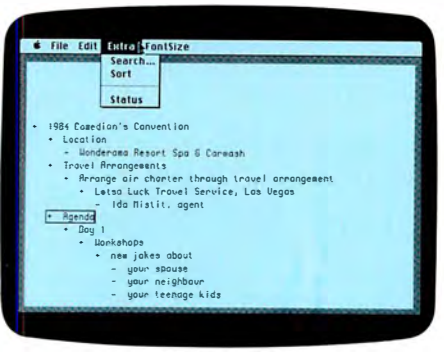
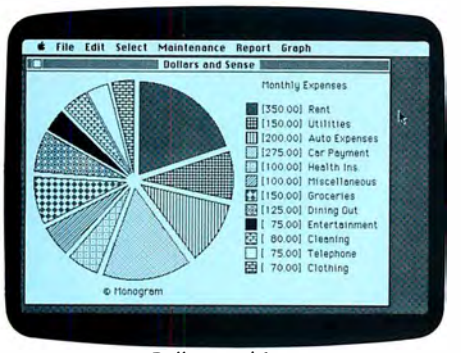
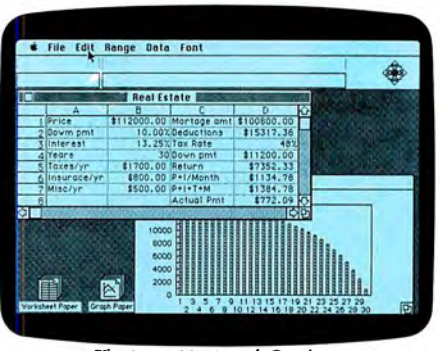
some important programs.



ThinkTank, idea processor.

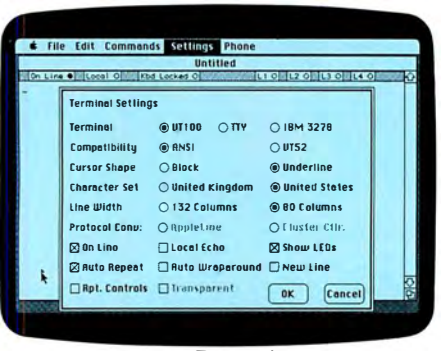


Dollars and $ense, personal finance.

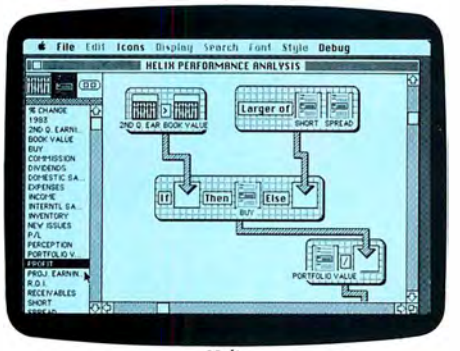


*The Lotus Macintosh Product, integrated business software.***

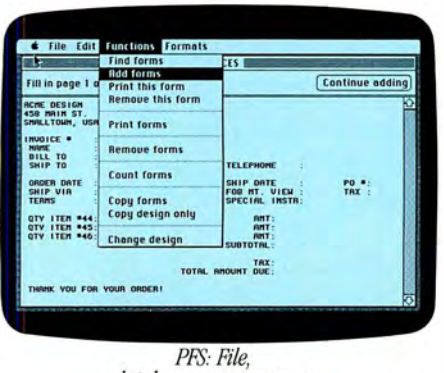
Main Street Filer, database management.



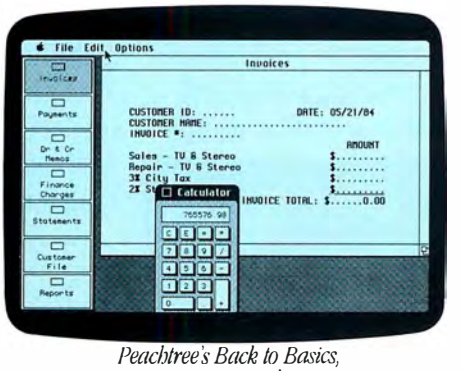
MacTerminal, data communications.



Helix, relational database.



PFS: File, database management.



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David Bunnell

Travels in the Personal Computer Time Machine

The personal computer has come a long way in the past decade, but we haven't seen anything yet

When you work in the personal computer business, time takes on an elusive quality. As one of the few ten-year veterans of personal computing (which began with the introduction of the Altair in December 1974), I am definitely an old guy. Although in the real world I am just 37, in personal computer years I must be well over 100. This is not a complaint. I don't feel like a centenarian, but I probably have had 100 years' worth of experiences.

In 1974 I was one of 15 people trying to hang on to MITS, an electronics company that had been all but wiped out by what were then known as the "calculator wars." Our problem was that kit calculators we sold for $110 suddenly became available already assembled for under $50.

Our salvation lay in a kit computer, the Altair, which we hoped to have featured on the cover of *Popular Electronics* magazine. The question was whether we could keep the company afloat while we waited to see if the magazine article would have enough impact to keep us in business. As I helped Ed Roberts, the company president, draft this article, little did I know that it would set off a frenzy that would become the starting point of the personal computer revolution.

Expecting to sell 500 Altair computers in 1975, we received about 5000 paid orders for the kits within three months of the article's publication. Soon thereafter, many people who bought Altairs were busy setting up their own businesses, which included the first computer retail stores, the first personal computer software companies, and the first personal computer hardware peripheral companies. Before the end of the year there were even two personal computer magazines: *Byte* and *Creative Computing*.

Recently, the Altair days and other personal computer developments, including the founding of Apple Computer, have been extensively reported on and in some ways romanticized by Paul Freiberger and Michael Swaine in their book *Fire in the Valley*. Many readers are amazed to learn of the humble roots of personal computing. For one thing, even though much of the necessary technology for the personal computer's existence was developed in northern California's Silicon Valley, the Altair itself was created in Albuquerque, New Mexico.

By 1977 MITS was recognized as the dominant personal computer manufacturer, and for a brief moment (it seemed like years to me) that southwestern city was the center of the personal computer universe. Microsoft (which grew out of MITS) was also in Albuquerque, as well as *Personal Computing* magazine (started by yours truly) and the United States Robotics Society.

Since then, there have been many spectacular successes and equally grandiose failures as entrepreneurs reached for the gold, launching a multitude of businesses related to personal computers. Some of the most spectacular successes grew out of early failures. For instance, both ComputerLand and MicroPro germinated from the bankruptcy of IMSAI, a computer company that made an Altair lookalike. And sadly, other promising startups turned into enormous collapses.

David Bunnell

Although with my hundred years of experience I confess to being very biased, it seems to me that the personal computer story contains important lessons for everyone. Even if you're not interested in authoring the next *VisiCalc* or designing a new lap-sized or (Heaven forbid) watch-sized computer, the dramatic changes and gyrations that have influenced this business are in many ways precursors of events to come in businesses and institutions worldwide.

This spillover will be created because adopting the personal computer on a mass scale will alter the way we work and the way we access and distribute information. The personal computer, like the automobile, the television, and a few select inventions that preceded it, is what I call a watershed invention. That is, it is an invention that will fundamentally change the structure of our society.

There are many theories about why the personal computer has such a strong and lasting hold on those who use it. Chuck Peddle, a computer pioneer par excellence who designed the original Commodore computer and more recently the Victor Technology computer (which many people consider superior to the IBM PC), recently said that "once you learn computer literacy, computing is like sex—you can't live without it."

He believes that many people were captivated by the Altair computer because they had had a taste of computing in universities, where they used Dartmouth BASIC on mainframe computers. Thus, the poor deprived fools didn't care that it could take weeks to assemble an Altair with a soldering iron and what were admittedly not the friendliest instructions. They cared not that once it was assembled, you had a system with 256 bytes (not kilobytes) of memory that initially could be programmed only by toggling a series of switches on the Altair's front panel. Of course, what really made the Altair sing was Altair BASIC, written by Bill Gates and Paul Allen of Microsoft—that and workable 4K memory boards from a Berkeley, California, company called Processor Technology.

Personally, I'm not sure that I agree with the comparison of computing to sex. However, I do think that humanity is developing a symbiotic relationship with the personal computer that could last for centuries. I think of the computer as an extension of human memory, and I foresee a day when this additional memory will be with us for life. Imagine what it would be like if from birth every time you went to a doctor or a dentist, your personal computer went with you. As well as maintaining office records, the physician could update your medical data base so that you always had your own complete medical history. Whenever you changed doctors or visited a remote location, your medical history would travel with you. Periodically, when you got a new or additional computer, this data base could readily be transferred to the new system.

If this seems farfetched, consider how far personal computing has come in barely ten years: from the Altair, which only a hardware expert could put together, to the Macintosh, with its friendly user interface and exciting graphics. We can look forward to the evolution of personal computer standards, of which the Mac is the latest.

Because computers have the ability to remember accurately an infinite amount of data, they have the potential to become like electronic genies that bestow gifts on the human brain. It is no wonder that once you start using a personal computer, you quickly reach the stage at which to live without a computer would be undesirable or even agonizing.

The main conclusion I draw from my involvement in this industry is that, as dynamic as it is, we haven't seen nothing yet. For the participants in the industry, the last decade may seem like a century, but in relation to the impact it will have on society, the personal computing business is still in its infancy. □

Fire in the Valley: The Making of the Personal Computer
Paul Freiberger and Michael Swaine
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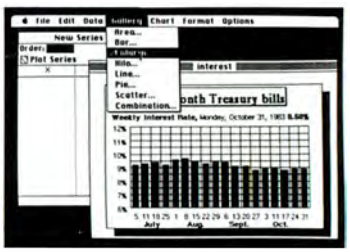

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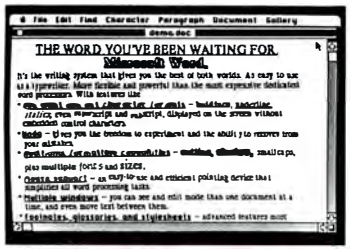

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The Serious Side of Creativity

The Mac's speed and graphics encourage experimentation, but be careful of having too much fun with your work

As an editor for a publishing company, I receive large quantities of mail that I must go through quickly. Recently, after a long absence from my office, I returned to a particularly imposing stack of mail. As I sorted through it, I realized something interesting: I was setting aside letters relating to the Macintosh.

I call mail of this nature Mac Mail. The contents of a pile of Mac Mail are often important to me because some of the letters contain potential book and software projects submitted for publication. This is not to say that I ignore proposals about other computers, but as I stood there looking at my Mac Mail, I realized that I had isolated those items simply because they looked different from the other mail.

Mac Mail appears unusual because, more than any other personal computer available today, the Mac entices you to be imaginative. With its graphics and visual orientation, the Mac opens the door to individual creativity in a way unmatched by its current competitors.

Working with the Mac is so easy that creative results are apparent in almost everything associated with it, even mail. Mac Mail is the product of combining the graphics orientation of the computer with the creative impulses most of us have.

I spend much time on the job reading proposals from potential book and software authors. Before the introduction of the Mac, most of these proposals were produced with standard word processors running on other computers; some were even written on typewriters. Frankly, all the scenarios looked the same. With the emergence of Mac documents, the look of proposals has changed. Now I not only spend my time reading, but I am also entertained by pictures and other graphics that accompany Mac-related submissions.

Proposals created on the Mac often contain interesting, well-placed graphics that help illustrate the points writers attempt to make. For example, a project idea I received recently included a delightful structural map that could be used to learn the relationships among the components of a software program the author wanted to write about. This visual representation supported the proposal's main premise and minimized my need to read additional explanatory text. Another submission contained almost all graphics, which backed up the author's claim of using visual images instead of text.

Such creativity is important because it adds a special quality to our lives and the work we do. The Mac has made it possible to be imaginative in daily work; to me, allowing our creative impulses to run free is essential to enjoying what we do. There is a potential danger here, however—it is possible to let enthusiasm for the Mac's fonts, text sizes, and graphics defeat the purpose of the documents we produce.

For example, a friend told me a humorous story about an author who submitted to a magazine an article that had pages liberally embellished with little rabbits. When asked why he had included them, the writer simply replied, "I couldn't help myself."

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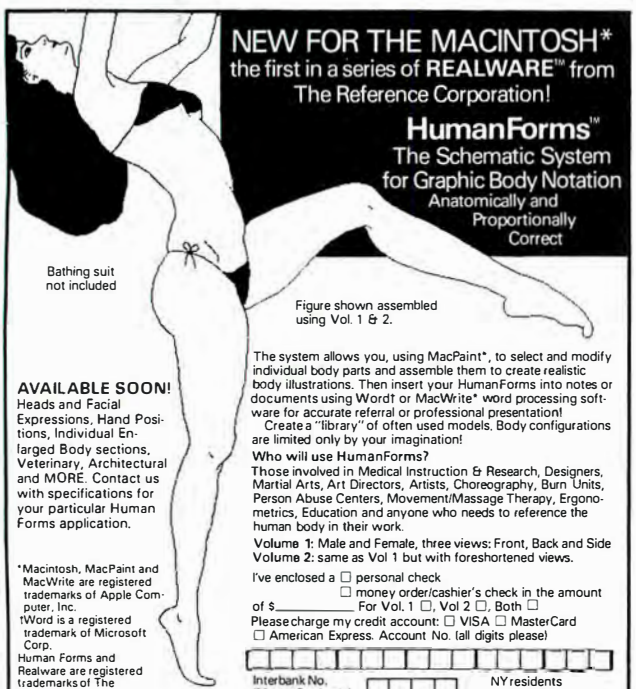

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Excess baggage is not conducive to the best use of computers. I have seen resumes thrown away because the applicants had printed them in Old English or another unusual font. I have heard venture capitalists lament the proliferation of spreadsheets such as *1-2-3* because business plans have expanded to unmanageable lengths as entrepreneurs add unnecessary graphs, charts, and other projections. If people aren't careful, proposals may grow to even larger proportions, due to the ease with which the Mac generates material.

Because the Mac allows people to be artistically creative, potential authors should resist the impulse to add superfluous graphics to articles and proposals. It is important for writers, employees, entrepreneurs, and others who create Macintosh documents to remember that content is at least as important as form. If you include drawings, make sure they add meaning to the document. Don't put in graphics that you can justify only because they look good. Don't obscure an issue with strange fonts or unusual font sizes. If altering a heading or a font makes sense, by all means do it. But don't make changes if you are only avoiding monotony or trying out new Mac features.

The Mac ultimately may impose new standards on the way we prepare documents. I think this is a wonderful idea, but before those standards evolve, we must use the Mac to create better, more understandable documents, rather than documents padded with little real value.

The Macintosh has changed my perceptions of what a computer can do. I own three personal computers and have access to others, but for the first time in a long while, I am excited about playing with one. I can spend hours on the Mac without accomplishing anything more than having a good time. I encourage other people to play with the Mac too. Just remember, if you are going to play, have fun. But if you're going to produce important material, do it seriously. □

Amanda Hixson is an editor for Addison-Wesley Publishing Company and the author of A Buyers' Guide to Microcomputer Business Software: Accounting and Spreadshe ts *and of a Cdex training program,* Advanced Training for Lotus 1-2-3.

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Letters

(P)review Perplexity

I read with interest and anticipation the review of *Microsoft Word* in your July/August issue. I thought, here's a review of the kind of program that I bought a Mac in order to use. The review was detailed and favorable, and confirmed that *Word* would suit my needs. But when I phoned Microsoft to check on availability, I was surprised to hear that *Word* would not be available until "December at the earliest." I called my dealer, who had told me, "the end of June at the latest." All she had was a prerelease copy full of bugs. I assume that your reviewer used the same prerelease version. If it was a "review," why no mention of the bugs?

The question I want to raise concerns the editorial policy of your reviews. Granted that the Mac has experienced hard times in software development, that a bimonthly magazine suffers from time lag even more than a monthly does, and that you need to publish something about Mac software. But why term what you published on *Word* a "review"? Wouldn't it be more honest to call it a "preview" and to state clearly that the program was in prerelease form and still had bugs?

Thomas A. Davis
Nashville, Tennessee

Our goal is to review hardware and software in final form only and to publish the reviews in Macworld *at the same time as the products are released to the public. However, because manufacturers make last-minute changes to their products which affect release dates, an article covering a product may appear in* Macworld *before the product makes its way to the market. To avoid confusion, we will try as fully as possible to indicate whether we are reviewing a released product in final form or previewing an earlier version. In the case of previews, we will publish an estimated release date.—Ed.*

A Happy Reader

I admit that I was a little worried after reading your first issues. There didn't seem to be enough information available on the Mac and related products to fill an entire magazine—especially one with your large format. You had quite a bit of empty white space and your multitudinous editorials ran a little too long.

However, your July/August issue is fantastic! Nothing makes me happier than to see the large Macware News section. Yours is the only magazine that I read and still wish for more advertisements. To be specific: this issue's Open Window, Get Info, and Macware News departments were particularly pleasing. "Stepping Into the Paint Bucket" and "The MacWrite Sleuth" were very useful articles. I treat the issue as if it were part of the documentation that I should have received (but didn't) for software such as Microsoft BASIC and *MacPaint*.

In closing, let me congratulate you on your entrance at last into the world of "real" magazines! Keep up the good work! Bring us more news on new products, more special tips, and perhaps a little less filler.

Dan J. Samuel
Mountain View, California

The Hacker Lobby Speaks

I'd like to commend you on a superlative job. Both the look and content of your Premier issue were excellent. It was full of useful information. In fact, I've read my copy so many times it's getting a bit ragged. If I could make any improvement, I would add a monthly column about the more advanced uses of the Mac.

As the chief programmer for a start-up Mac software company and a Certified Macintosh Developer, I'd like to see *Macworld* support both serious and casual Mac hackers. While I realize that your magazine is not aimed at a technically oriented audience, I do believe the Mac will attract many such people, as well as others who have no intention of programming but simply "fall into it." Also, the languages MBASIC, MacPascal, and Modula 2 are coming soon for the Mac. I'm sure that even many of your non-technical readers will be interested in reading about them—if not in your pages, in someone else's.

Erik D. Barnes
Santa Rosa, California

Software Worries

I looked at computers for several months before deciding to buy a Macintosh. I could not make an absolute decision, so I plunged in. I was influenced by a friend whose company has the Lisa in their offices and who assured me that the Mac's format is the thing of the future.

I am not a business person, and I use my machine at home with some applications for my work. I teach high school Biology and do my grades on our school computers as well as statistics for my basketball team. I would like to do personal accounting and record keeping, as well as have something that my children could benefit from—that is, educational soft-

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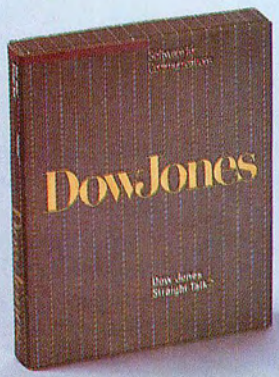

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ware for math tutoring, enhancing English skills, and the like. I've just about word processed myself out and really need other kinds of software.

Like most Mac users, I like my machine but am very discouraged by the lack of software. I wonder if I made an expensive mistake in purchasing the Mac. Most of the articles that I read lean toward using the Mac for business, with little or no mention of packages for home use. I hope that Apple does not leave us non-business users stranded with a nice machine and nothing to use it for. At present I am disenchanted.

Henry Felix
El Paso, Texas

Barbara Koalkin, Apple 32 product marketing manager, reminds us that the Mac is intended to be primarily a business machine, not a home computer like the Apple II. Therefore, software developers have been encouraged in that direction. Educational programs in particular will be few in number and slow to arrive; some courseware being developed by members of the University Consortium may reach the high-school level.

However, this doesn't mean that home users like you will be out in the cold. Although there are no personal financial programs in the stores as of this writing, several have been announced for release this year; among them are Personal Tax Planner *(Aardvark/McGraw-Hill),* Back to Basics Accounting System *(Peachtree Software),* Home "Mac" Accountant *(Arrays/Continental Software),* Dollars and Sense *(Monogram), and the* Personal Financial Planning *series (Apropos Software; used with* Multiplan *). Stay tuned to "Macware News" for announcements of upcoming product releases. –Ed.*

More Internationalism

I read your article "The International Macintosh" [May/June] and am interested in the French keyboard and the French *MacWrite* program. I have already spoken with people at Apple Computer, who told me that I could not buy them because they are not sold in the United States. I am a freshman in college this fall; I plan to take French for the first time and think that the French materials would help me tremendously. I will appreciate any information you can give me about how to purchase them.

Katherine Cowden
Houston, Texas

Joanna Hoffman, international marketing manager for the Mac, says that Apple is still considering whether to sell international machines and software in the United States. If a large demand develops, they will try to accommodate it. Apple is keeping in close touch with members of the University Consortium to monitor needs on campus for foreign-language Mac products. Hoffman suggests that for now you use the optional characters shown in Key Caps in the Apple menu. That way you can type in French without the French keyboard.–Ed.

Credit to the Team

As a member of the Macintosh development team, I was interviewed for your Premier issue ["The Making of the Macintosh"]. I was quoted as saying, "I essentially did all the drawings for the Macintosh, from the layout to original models to final production drawings." This statement is flattering but, alas, inaccurate. As the manager of product design, I was responsible for the output of my group. To let this quote stand uncorrected would be unfair to my friends whose work was also critical to the successful introduction of the

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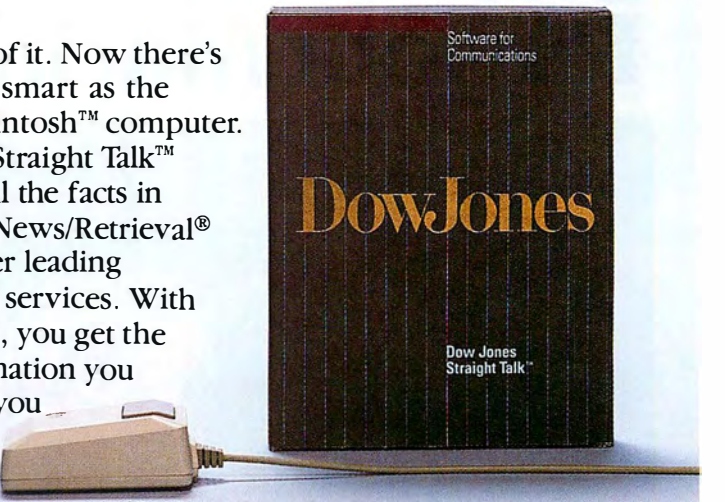

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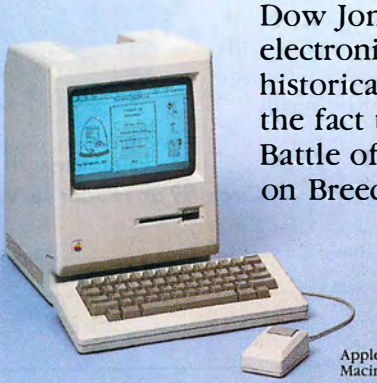

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Mac. They deserve public recognition for their dedication to our project.

Terry Oyama did early conceptualization on the housing's form. He did the bezel drawing and saw it through its changes. He did considerable analysis on the fit of the two-part housing and came up with the concept of the two top vent inserts.

Dave Roots executed the design of the keyboard and the many different options for Key Caps required by the international nature of our product. He also did the product design for the keypad and the external disk-drive housing.

Ben Pang was in charge of updating the group's drawing and material lists. He worked on speaker mounting and designed the analog board shield. His greatest contribution was taking on the responsibility of mechanical design and documentation for all internal foam packing and cardboard boxes.

Laszlo Zsidek contributed his expertise in the early stages of tool procurement. Steve Balog continued where Laszlo left off and made significant contributions to tool design. Steve's records could always be counted upon for quickly determining the status of the many Mac tools.

Bill Bull conducted many nights of tedious temperature experiments to arrive at a reliable thermal management plan for the Mac. He specialized in picking up loose ends, including liaison with the cable vendors.

The mechanical product design of the Macintosh should be remembered as a team effort in the truest sense.

Jerrold C. Manock
Palo Alto, California

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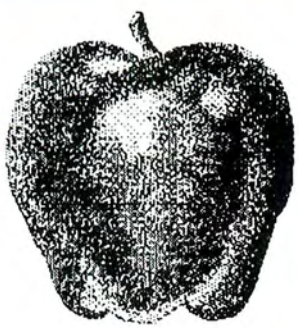

Actual rendering made using **PaintMate** with MacPaint

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Multiplan and Cairo Revisions

Macworld is beautifully designed, gives accurate reports, and in general is a joy to read. But I'd like to offer a few corrections. In your Letters for both the May/June and July/August issues, you referred to the updated version of *Multiplan* as 1.01. Shouldn't it be 1.02? That's the update I received.

Concerning Andrew Koran's letter ["One Man's Boycott" in "Letters," July/August] about his discontentment with *Multiplan*'s copy-protection: Microsoft now offers a backup disk for $10 to cover duplicating and handling expenses. I have found that it is not necessary to reinsert the master disk to start the copy; it functions as if it were the original.

Lastly, the Cairo font you showed ["Macworld View," July/August] does not correspond to the version I got from my dealer. Can there be two Cairos?

John Yeh
Honolulu, Hawaii

You're right that the latest version of Multiplan *is 1.02. However, the backup disk you received from Microsoft is in effect a second master disk; if you copy this disk, the Mac will still prompt you to insert your backup master to open a file.*

The key correspondences in your Cairo font are accurate; the ones we showed were in a prerelease version that has been changed. –Ed.

Letters should be mailed to Letters, Macworld, *555 De Haro St., San Francisco, CA 94107, or sent electronically to CompuServe 74055,412 or Source STE908.* □

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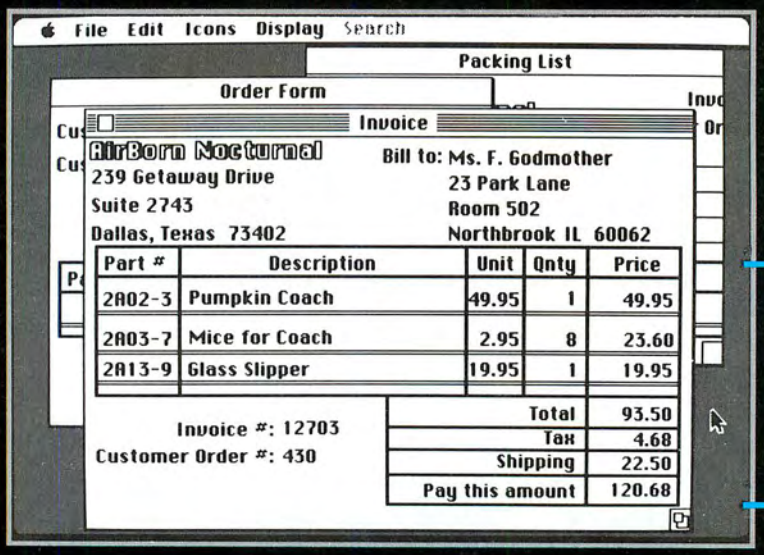

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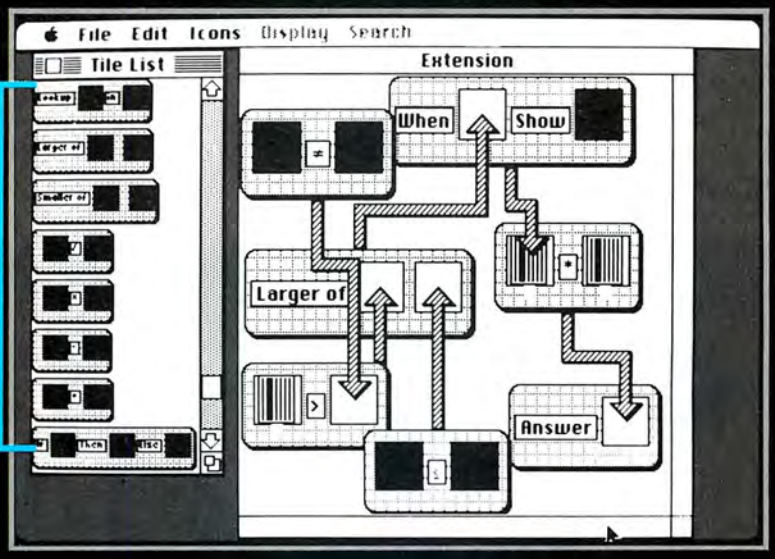
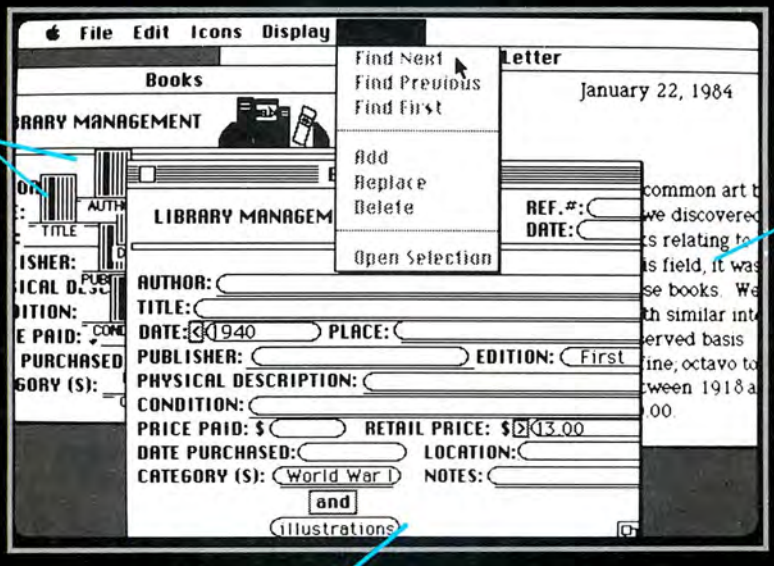


Visual building blocks let you set up even the most complicated statement or calculation and use it whenever you want to. You "flow" the information from one block into another – just by pointing. Each "diagram" shrinks down to become an icon that can be used in any form or even embedded in another "tile". This lets you shape conditions and relationships naturally – without having to use a programming language. The magic of the tiles and arrows has to be seen to be believed – ask your dealer for a demonstration.

Odesta Helix uses icons to represent every piece of your information. Make them appear if you wish, and rearrange them within or between forms. Define and restrict them if you wish, for data checking and security. But most of the time, just let them stay hidden "behind" the form.



Write a letter, enter a memo, or log in your research – all within **Odesta Helix**. You don't need another program to work your text. Cut, copy, paste, search and replace within or between any of your forms and reports. Or combine information with a letter and do a "mail merge".

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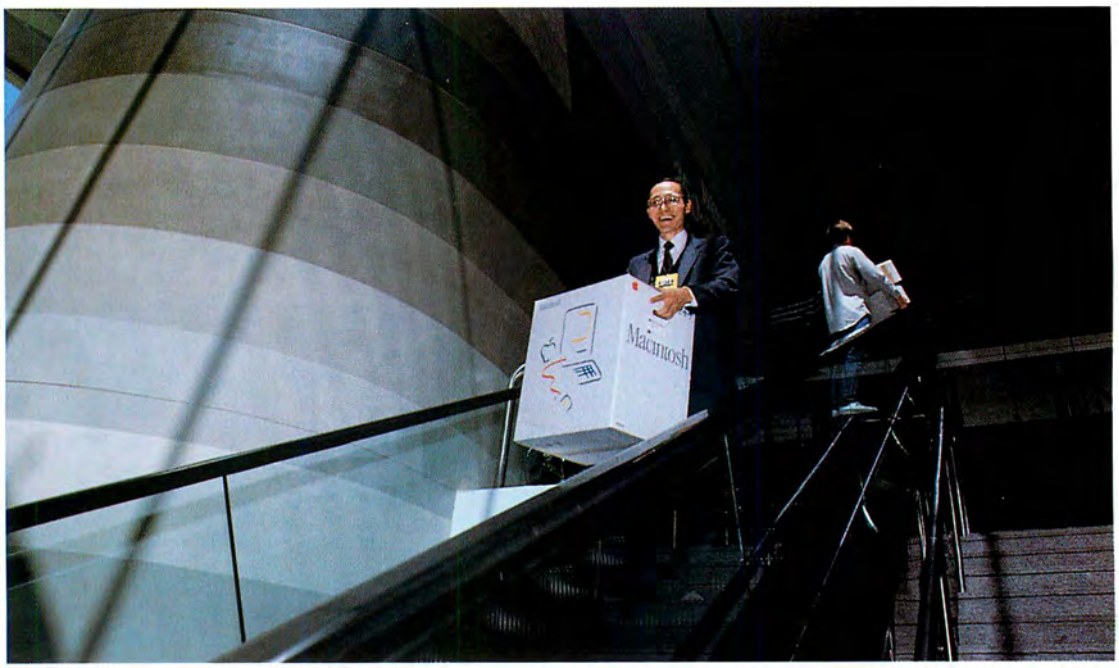
Macworld View

News and notes for the Macintosh community

Edited by Janet McCandless

Macworld View *reports on new products and developments in Macintosh technology. We will cover items of interest to Mac users and comment on industry trends. We welcome contributions from readers and pay up to $50 for the items we use. Please include your name, address, and phone number with your contributions; send them to* Macworld View, *555 De Haro St., San Francisco, CA 94107.*



Above, computer system consultant Tim Sammons carries a Macintosh into the Democratic convention. Below, two posters designed and executed on the Mac that were exhibited in San Francisco during the convention. The posters display political statements made by famous Americans; they are part of a series by Michael Mallery.

The Mac Meets the Democrats

Correspondent Roy Shigley of San Francisco reports that with $1.25 million worth of computer technology at its fingertips, the Democratic National Convention put the Macintosh to work on several critical tasks. Tim Sammons, a computer systems consultant for the convention, claims that the Mac performed better than the IBM PC at facility management, project management, and maintaining the electronic calendar. Specific organizing tasks for the Mac included equipment inventories, transportation schedules, and revisions of floor plans. Copy printed in the large font sizes was shown on teleprompters used on the podium, and directional signs printed on the Mac were used in the maze of walkways in San Francisco's Moscone Center.

The Mac was patched into a larger network at the convention that handled the flow of information among the convention hall, hotels, and other strategic locations. Sammons calls the gathering of Democrats "the first truly electronic convention. I believe we have set a new standard for large media event gatherings. Now everybody knows the practical value of the personal computer."

The Macs Multiply

Apple has announced that it will double production of Macintoshes from 40,000 to 80,000 units per month at its factory in Fremont, California, by December 1984. The factory's maximum production capacity is approximately 100,000 units a month.

To achieve this doubled volume, Apple is enhancing its current manufacturing system rather than doubling floor space, equipment, and personnel. The automatic component insertion (ACI) area will be expanded by four additional insertion machines that install chips on the digital boards. Robotics will be introduced in the manual ACI line and workstations will be monitored by individual operators. An additional final assembly line will be installed for putting together bulk parts.

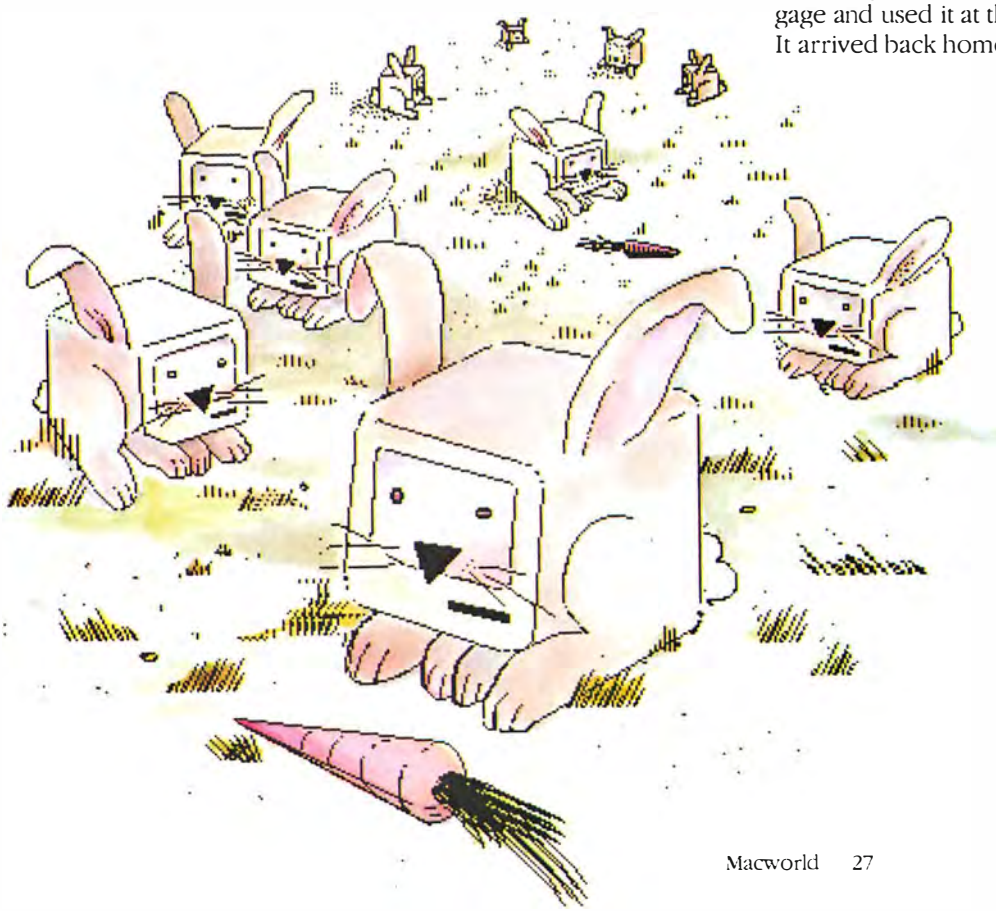
Although the factory is only a year old and is the third most automated factory in the nation, technology has advanced so much that the additional assembly lines and the new burn-in towers will occupy only two-thirds of the space taken up by the same number of existing assembly and burn-in lines.

By streamlining the factory, Apple estimates that it will have to hire 200 additional people for the two shifts, which will bring the total number of factory employees to 540 from 340. Apple has involved its employees in the expansion through factory expansion teams and retraining. Employees also participate in project assistance teams that analyze a process in a specific area such as the ACI area, and failure analysis teams that focus on a particular problem. They succeeded recently in reducing the failure rate of the digital boards from 10 percent to 7 percent.

Apple also plans to lease two additional buildings that production manager John Otterstedt says will accommodate ongoing research and development, disk duplication administrative offices, and the manufacture of an as-yet-unannounced product.

A Closet Discovery

Without realizing it, you may be the owner of a sturdy carrying case for your Imagewriter printer. One of our staff members discovered, before leaving for the airport, an old Samsonite overnight suitcase that she'd left in the trunk of her car. She held her breath and tried to fit the printer into the suitcase. To her amazement, the Imagewriter fit snugly. She sent the printer through as luggage and used it at the meeting. It arrived back home intact.



The MacColby case repackages the Macintosh and its accessories. It is designed to increase the ease of transporting the Mac, and can be used by businesspeople and other Mac users who transport their computers frequently.

Dense Pack Mac

Portable computer manufacturer Charles Colby has invented a product for Macintosh owners who must transport their computers daily, or who work in an environment where heat and dust can cause system errors. The MacColby case is designed for industrial and military markets, as well as businesses in which sales personnel or managers transport their Macs to outside meetings. Colby Computer strips the Mac, its keyboard, its modem, and its disk drive from their plastic casings and encloses them in an aluminum box with a hard plastic exterior (similar to the plastic used in professional football helmets). The mouse is kept in its original housing and is stored inside the unit. The keyboard is encased in die-cast magnesium and snaps onto the front of the unit.

A built-in fan provides pressurized, filtered air that circulates from the back of the disk drive and out the front. An antiglare filter improves screen contrast. The only external cable or connection is the power cord. The unit has a handle that functions as a stand and locks in six positions for tilting the screen.

The company offers several additional options including purchase and installation of a second disk drive ($399), a video output board ($199) that gives you the capability of connecting the Mac to a standard monitor, and a DC converter ($199) that enables you to plug the Mac into a 12-volt outlet. Colby told us that Colby Computer's own 512K upgrade will be available for the Mac, as well as the option to install a hard disk.

The repackaged Mac weighs approximately 1½ pounds less than the equivalent Mac components. An optional carrying case ($139) is foam lined and water resistant, and designed to fit under airplane seats. According to Colby, one of the first prototypes will go to John Sculley, president of Apple Computer. The conversion kit can be purchased directly from Colby Computer or through Apple dealers (list price $599, introductory price $499). For further information, contact Colby Computer, 849 Independence Ave., Mountain View, CA 94043.

Font Fabrications

In response to the public's demand for more fonts and larger font sizes, three software companies have developed font disks. A Florida-based software company, Dreams of the Phoenix, offers a Macintosh fonts disk that contains new sizes for Chicago (18 and 24), Venice (36), London (36), and New York (72). Christopher Allen, president of Dreams, comments that, due to the square shape of each dot that appears on the screen, some fonts that look attractive when typeset do not work as well in computerized versions. (A look at the text characters in *MacPaint* reveals the square dots that make up each character.) Font designers must also take into account the amount of memory required to use a font. For example, New York 72 can be useful for posters, but you may run out of disk space if you load two or three other fonts of its size into memory.

Dreams plans to introduce Greek and Hebrew language fonts and is also at work on a Cyrillic alphabet. Linguists' Software of Mt. Hermon, California, has developed three alphabets: Greek, Hebrew, and Japanese (including all *hiragana* and *katakana* characters and a selection of common *kanji* characters). A clip-art manufacturer, Miles Computing, plans a Tokyo font that will include Japanese calligraphy.

Miles Computing has combined clip art and fonts in a two-volume set called *Mac the Knife*. The first volume includes three fonts (Manhattan, Hollywood, and Mos Eisley) and the second volume approximately 25 fonts. Most of the fonts come in at least three sizes and offer additional graphics and "hidden goodies." All the fonts include foreign characters and a set of fractions. The font images vary from brushstrokes to stencils (see "Macware News" in this issue for further information).

Voice of the Future

As fast as you can press the Return key, the Mac can now turn your typewritten words into spoken words. Written by First Byte of Long Beach, California, *Smoothtalker* is a software program available in two versions, one licensed to developers and the other sold in retail stores. *Smoothtalker* currently generates an adult male voice; additional voices will be added to future versions. The program requires no additional hardware and uses approximately 32K, which lets you copy the program onto application disks. The program interprets common English symbols and abbreviations such as $, Dr., and Ms. and provides a dictionary that lets you customize vocabulary and pronunciation. The dictionary allows you to type acronyms or code letters or words that the Mac will interpret and speak as complete words. *Smoothtalker* can read any *MacWrite* file or

ASCII file. Programmers can call *Smoothtalker* as a routine and insert it into their BASIC or Pascal programs.

David Fradin, president of First Byte, anticipates applications for *Smoothtalker* in education, training programs, and games. As a sales tool, a talking Mac could tirelessly demonstrate new products to potential customers. Audio disks could be packaged with other products, such as a hard disk, to guide new owners through installation procedures. Speech offers a third dimension to the Mac that is as yet unexplored (see "Macware News" in this issue for address information).

Software Across the Sea

Apple is exporting international Macs equipped with keyboards and manuals localized for the French, German, Italian, British, Spanish, French Canadian, Dutch, Swedish, and Japanese markets. Apple is taking on the role of "matchmaker" to bring certified developers together with managers and overseas distributors. As the international software market opens up, this role will be taken over by companies such as International Solutions of Saratoga, California, which handles translation and production of manuals, packaging, duplication of disks, mail orders, financial letters of credit, import and export arrangements, and marketing and distribution channels. Currently, International Solutions is translating *Habadex* (Haba Systems) and *Mac Daisywheel Connection* (Assimilation Process) for the French and German markets.

Mark Kvamme, chief executive officer of International Solutions, considers the Mac the "first truly international computer because of the icons and other features in its user interface." The Mac's resource files allow software companies to separate text from program code, so text used in menus, windows, and dialog boxes can be translated without having to recompile a program. Kvamme considers the market for American products overseas to be stronger than the market here for overseas software.

What Lies Beneath the Label?

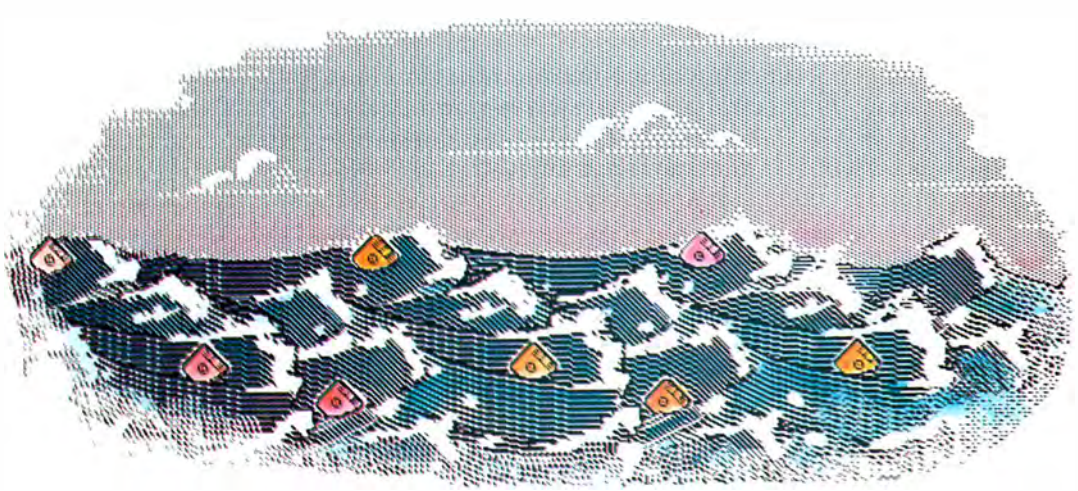
You may be surprised to find out that the Imagewriter printer you bought to go with your Macintosh is actually manufactured by Tokyo Electric, which based its design on the C. Itoh Prowriter. And the Hot Dot, a dot matrix printer from Leading Edge, is another version of the Prowriter. But the C. Itoh Starwriter is manufactured by Tokyo Electric, as is the Apple Scribe printer. On the other hand, the Apple Daisy Wheel printer is manufactured by Qume, but Qume's LetterPro daisy wheel printer is manufactured by Ricoh.

According to Lauryn Jones, president of Assimilation Process, the reason for this seemingly confusing story of manufacturing and marketing is economics. It is often more economical for companies to buy a printer and customize it than to assume the manufacturing costs of a printer that will broaden a product line but may not command significant sales on its own.

In Japan the practice of distributing a product under various labels is widely accepted because companies specialize in different phases of production and marketing. C. Itoh is the trading company for many Japanese manufacturers. Tokyo Electric manufactures printers in large volume but doesn't have access to as many distribution outlets as C. Itoh, nor does it provide as extensive retail support.

In the United States, manufacturers such as U. S. Data Products, Diablo, Qume, and Centronics supply printers for mini and mainframe systems but not for the personal computer market. Personal computer peripherals have lower profit margins for the hardware manufacturers. By purchasing printers made overseas, hardware distributors such as Qume can satisfy their customers' demand for a wide selection of printers. This method of customizing and repackaging printers is cheaper for distributors than setting up their own production facilities.

Manufacturing information can be useful to end users. For example, Silver Reed letter quality printers use the Diablo command set, which means that you can use a Silver Reed printer with software that supports a Diablo printer. Mac owners who purchase a Dynax or Comrex letter quality printer will be able to use software that runs with Brother printers, because both printers have the same mechanism used by the Brother HR series. For information on hooking up your Mac to a letter quality printer, see "Letter Quality Arrives" in this issue. □



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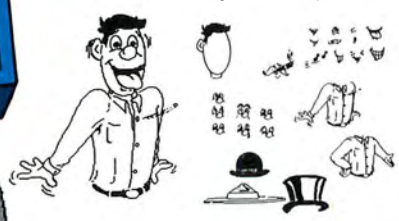

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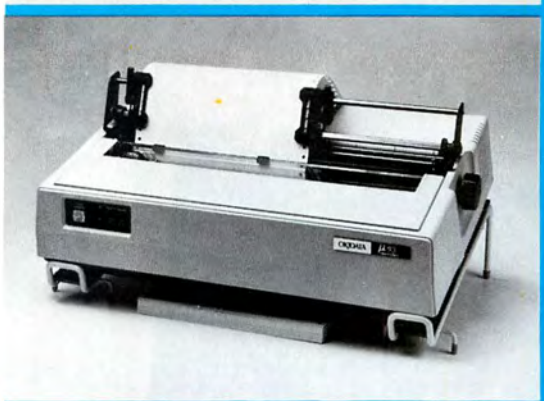
Introducing the Universal Printer Stand.



At last, a printer stand that fits practically *all* dot matrix printers, short carriage *or* wide. It accommodates everything from the Apple® Imagewriter™ to printers from Epson,® Okidata,® C. Itoh® and others.

It's so versatile, you may never have to carry any other printer stand.

And it's not a hog for shelf space. Constructed from durable metal tubing, the Universal Printer Stand fits in a box so compact, you can store a half dozen of them where you used to have just one conventional printer stand.

The Universal Printer Stand raises a printer 1½" from the desk at the front and 4½" at the back, allowing the user to monitor its performance more easily.

And by raising a printer a few inches from the desk, the Universal Printer Stand solves the problem of where to store paper. It gives you plenty of room to store several hundred sheets of paper, eliminating paper feed problems.

The Maccessories Universal Printer Stand is also very affordable: $24.95

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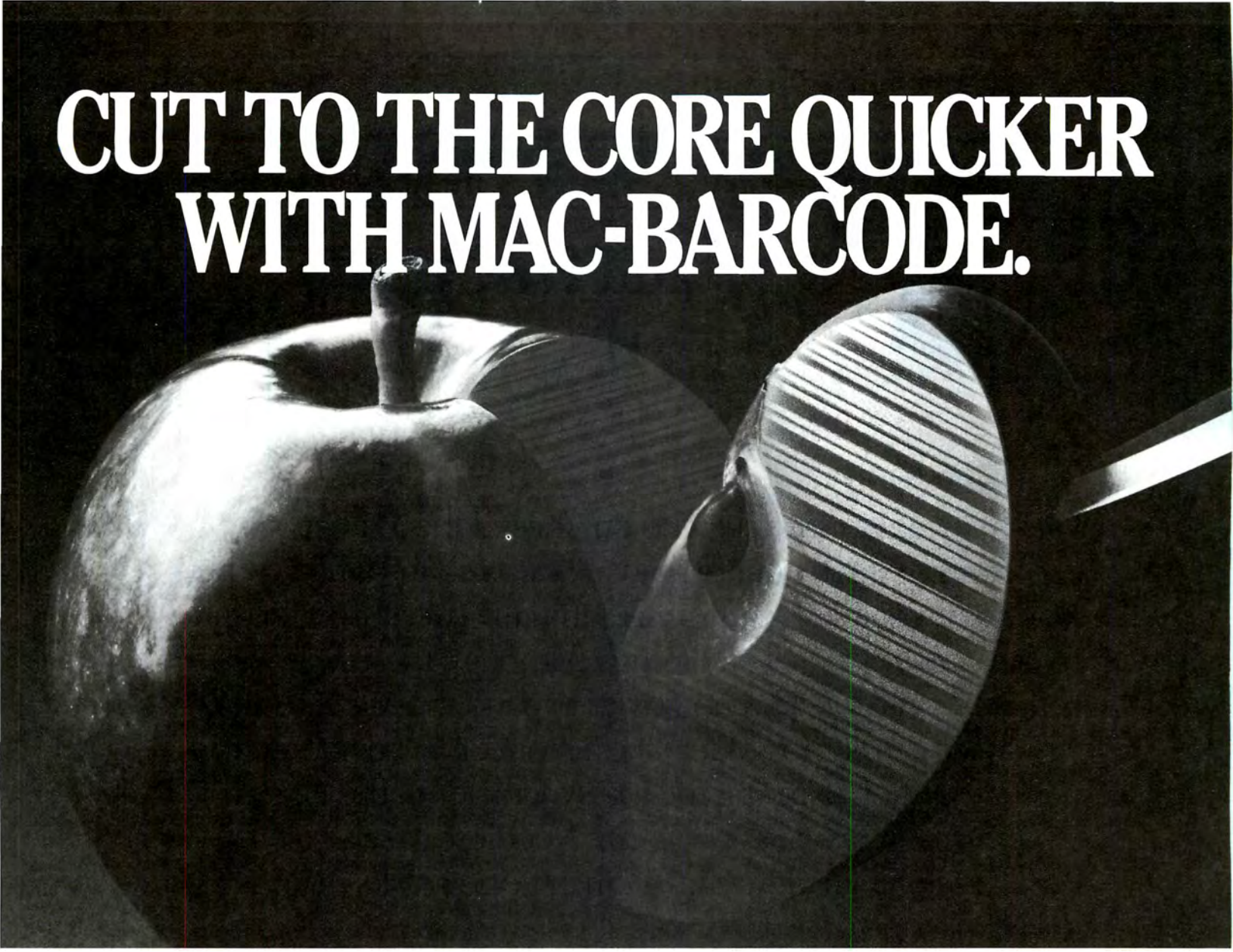
CUT TO THE CORE QUICKER WITH MAC-BARCODE.



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Circle 89 on reader service card

Double-Disk Strategies

Daniel Farber

Like many other people who purchased the Macintosh shortly after its debut last January, I was so intrigued by the Mac's remarkable features that I initially overlooked or ignored some of its shortcomings. Although there was little software available and no way to expand the Mac's disk storage space or memory, I felt like a pioneer as I explored the new computer, learning the idiosyncracies of the Finder, *MacWrite*, *MacPaint*, and *Multiplan*. Needless to say, I also became adept at juggling the 3½-inch floppy disks in and out of the Mac's lone internal drive.

For many Mac owners, the 400K storage capacity of a single-drive Mac is a serious limitation. When I started using the Mac to write articles and to create *MacPaint* documents for the Premier issue of *Macworld*, the dreaded "disk full" message and the drudgery of disk juggling became the bane of my existence. Added together, many hours of my time passed in shuffling disks in and out of the disk drive to make backup copies of documents and to transfer information between documents residing on different disks. What I needed to save me from the time-consuming task of disk juggling was an external disk drive to give me another 400K of disk space.

Edit View Special
zh
280K in disk
119K available
American Novel
Size Name Kind
A Fan's Notes document
For Whom the Be... document
Great Gatsby document
McTeague document
Miss Lonelyhearts document
Moby Dick document
Roughing It document
Scarlet Letter document
Sister Carrie document
Trash

Last February I would have traded my car for an external drive. I finally got one (without sacrificing my car), and it has proved to be this Mac owner's best friend. I still look forward to upgrading my Mac from 128K to 512K of memory (see "The Macintosh Deluxe" in this issue). But for now the external drive satisfies my needs for increased disk space, different strategies for organizing applications and documents, and an efficient way to back up my documents (see "Protecting Your Information").

The Outside Drive

At the moment, only Apple is manufacturing Mac external drives. John Rizzo, Macintosh product manager, reports that 50 to 60 percent of Mac owners are buying external disk drives. This figure indicates that, despite the $495 price, many Mac owners are investing in anti-disk-juggling devices.

The purpose of any disk drive is to provide a way to store information, so that when the computer is turned off the information is not lost. The drive changes the electronic information held in the computer's memory into the magnetic form held on the surface of a floppy disk. When you want to resume working on the information, the drive changes it back into electronic form and sends it to the computer's memory. By shuttling information into and out of memory, a disk drive also serves as a temporary holding area to compensate for the fact that the Mac's memory cannot contain all the information stored on a disk at once.

The Mac's external drive is identical to the Sony-built drive inside the Mac, except for being housed in its own cabinet. The drive is about the same size and weight as a quality paperback edition of *War and Peace*. Its physical characteristics reflect the design principles of the Mac. The drive is easy to attach, takes up little room, and can go wherever your Mac goes. You attach the external drive to the Mac simply by plugging the drive cable into the serial port marked with the icon of an external disk drive.

If you bought the Mac for its diminutive size and hesitate to give up desk space to another piece of hardware, you can turn the drive on its side. Apple hardware engineer Dan Kottke assures me that rotating the drive sideways won't damage either your disks or the drive itself. The external drive also fits on top of the Mac, but place it on the right side of the computer to avoid the heat generated on the left side of the system unit by the analog board.

Each additional piece of hardware you add to the Mac enhances its performance but may also interfere with one of the Mac's chief virtues—transportability. Other than the addition of a few pounds, the external drive is no obstacle to transportability because it fits into the Mac's carrying case. (I have tested only Apple's carrying case; if you plan to purchase another Mac carrying case, test it to make sure it has enough room for the drive.)

An antistatic shielding bag comes with the external drive. Placing this bag over the disk drive's connector protects the drive from potential electrostatic damage when it is not connected to the Mac. If you pick up some static and inadvertently touch the connector pins, you may damage the drive's integrated circuit. Use a rubber band or tape to secure the bag over the head of the connector cable.

You may wonder how, once the external drive is attached, the Mac knows that two devices are storing information instead of one. Whenever you turn the Mac on, the Finder (the set of programs that keeps track of all applications and documents on your disks) automatically looks to see if an external drive is being used. If so, the Finder updates its desktop files to include information about the second disk. Whether you have a disk in the external drive or not, the Finder checks for the directory of any disk in that drive. When you aren't using the external drive, you can make your Mac run a little faster by unplugging the drive to save the Finder the trouble of looking for nonexistent files.

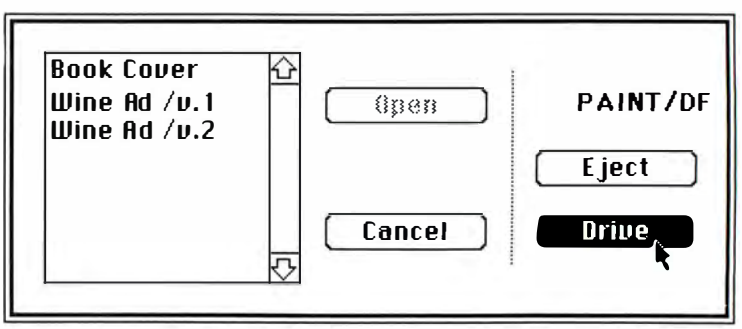


Figure 1

This dialog box, also known as the Mini-Finder, lists the names of documents created with the current application. In this example, the Mini-Finder lists the names of the documents on the MacPaint *disk in the internal drive. Clicking on the Drive button automatically lists the names of the documents on the disk in the external drive. With the Mini-Finder, you don't have to quit the application or juggle disks to open a document located on the disk in the second drive, as long as the document was created using the same application as the startup application.*

From One Disk to Another

Adding a second disk drive not only doubles the amount of information you have on hand at one time, it virtually eliminates the inconvenience of disk juggling and often increases the speed of information transfer. An external disk drive improves the efficiency of three inter-disk operations: copying entire disks, copying programs and documents from one disk to another, and cutting and pasting between documents on separate disks.

Surprisingly, an external disk drive doesn't save any time when you copy entire disks, but the process is less tiring. Using one drive to copy a Write/Paint disk with the Disk Copy utility takes about two minutes. Copying the same disk with a two-drive Mac is no faster, but it is automatic. To copy a disk using an external drive, you drag the icon of the disk to copy onto the icon of the destination disk, and the Mac carries out the procedure for you. You won't see any "please insert the disk" messages unless you have been working with more than two disks and the disk you want to copy from or to is not in one of the drives (such a disk icon appears dimmed on the desktop).

Compared to a single-drive Mac, an external drive reduces the time for copying files from one disk to another by more than half. Copying time depends on the number and the size of files. Copying a 15K *MacWrite* document with a two-drive Mac, for example, takes about 25 seconds. Copying a folder with three documents totaling 33K takes about 35 seconds. Copying files with a second disk drive isn't lightning fast, but after you have juggled disks for a few months it's a relief.

Cutting and pasting information between disks or documents with an external drive is less time consuming than with a single-drive Mac. Suppose you are designing an advertisement with *MacPaint* and want to include a logo you created earlier. In this case, the disk in the internal drive contains the *MacPaint* program and some *MacPaint* documents (as well as the Finder and the System file that the Mac uses to launch and run the application). The disk containing the document that has the logo is in the external drive. You can use either the Clipboard or the Scrapbook to copy the logo into the *MacPaint* document you are working on. Either the Clipboard or the Scrapbook copy procedure can be used from within *MacPaint* as follows:

- Close the *MacPaint* document you are working on (by clicking on the close box or choosing Close from the File menu).
- Choose Open from the File menu. In the scroll window, the Mini-Finder lists the names of the *MacPaint* documents on the *MacPaint* disk in the internal drive (see Figure 1). Or, if the document you are working on is on the disk in the external drive, the names of the *MacPaint* documents on this disk are displayed in the Mini-Finder scroll window.
- On the right side of the Mini-Finder, click on the Drive button, and the *MacPaint* documents on the disk holding the logo document appear in the scroll window (see Figure 2).
- Double-click on the file labeled "Logo," and the document appears on the screen.
- Cut or copy the logo you want to the Clipboard or the Scrapbook.
- Close the document window and follow the procedure again to get back to your original document on the *MacPaint* disk. When you return to the document, the logo will be in the Clipboard or the Scrapbook, ready to be pasted.

While the Clipboard is sufficient for transferring single items, you can use the Scrapbook to save time when you transfer several items at once. If you need to place several illustrations, charts, tables, or portions of text stored on one disk into a document on another disk, for instance, you can copy the information into the Scrapbook file of the application disk in the internal drive. Because documents are bound to the System file of the startup application disk, the text or graphics you put in the Scrapbook are stored automatically on the same disk as the System file used by the application.

(continued on page 40)

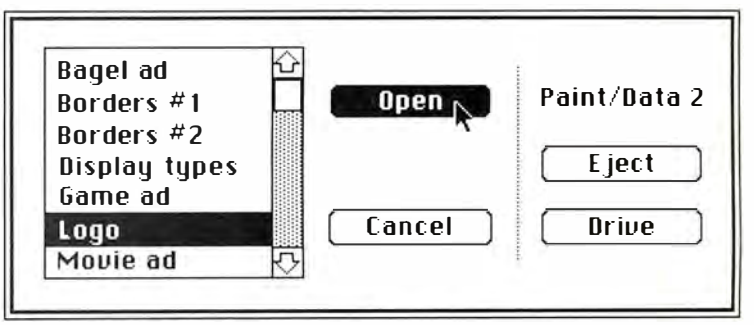


Figure 2

Double-clicking on an item (or selecting an item and clicking on the Open button) opens a document. If you have a long list of MacPaint *or* MacWrite *documents, for example, you can also use the "auto-scrolling" technique. Type the first letter of the name of the document you want to open, and the Mini-Finder automatically scrolls to the first document that begins with that letter.*

Protecting Your Information

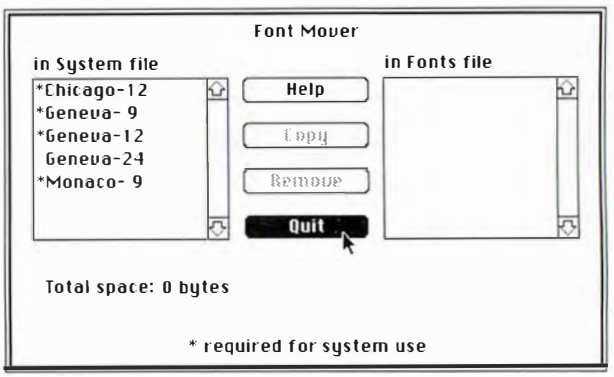
Backing up your documents on data disks is essential if you want to protect your information. Because a computer is a machine, it sometimes has mechanical failures that can send your documents irretrievably into the ozone. A two-drive Mac makes it easier to back up documents than does a one-drive system.

A simple way to back up documents with a two-drive system is to use your application disk as a temporary transfer area. You can move the documents you want to back up from the data disk to the application disk and then transfer the documents to a backup data disk. This technique is practical if you need to back up only a few documents that you have recently created or modified. It is impractical if your application disk (such as a Write/Paint disk with a fully loaded System file) doesn't have sufficient disk space to hold your documents temporarily. Here's a step-by-step description of the temporary transfer technique:

- Copy the documents you want to back up from the data disk onto the application disk.
- Eject the data disk and insert a backup data disk in the external drive.
- Copy the documents from the application disk to the backup data disk.
- Finally, drag the copies of the documents on your application disk into the Trash to clean up your application disk and reinsert the original data disk to continue your work.

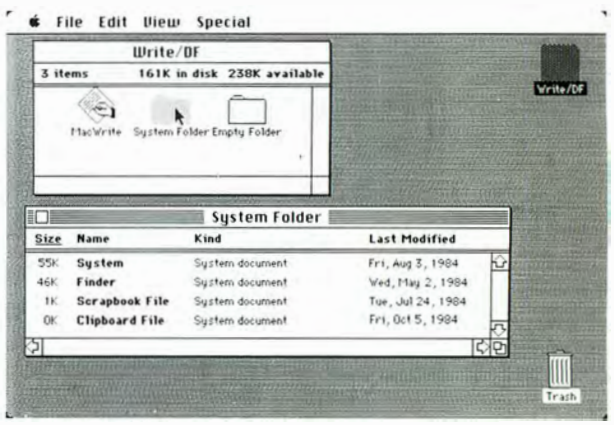
Backing up files is easy when your documents are stored on the startup disk. You insert a data disk in the vacant drive, select the documents you want to back up, and drag them into the data disk window.

Backing up entire data disks requires a little disk juggling. Because data disks can't start up the Mac, you must have a disk that contains the Finder and the System file in one of the drives. To back up an entire data disk, use the following procedure:



Write Fonts

The Font Mover allows you to create more disk space for documents by removing fonts from the System file. The fonts in the System file in this figure take up about 17K. The only non-System font, Geneva-24, is included because the Font Manager scales down 24-point to 12-point for printing in high resolution. You can remove 24-point Geneva (7K) if you don't print in high resolution. The System fonts, which are used to create the text in dialog boxes and menus, are quite readable on the screen as well as on paper.



Write 238

By removing unneeded fonts and desk accessories, you can free up a substantial amount of disk space. This "stripped" System setup is especially convenient for using an external drive for backup purposes or for working on a single-drive Mac. You can also remove the Imagewriter file (17K) if you don't print in standard or high-resolution mode. This strategy isn't practical for all application programs: most programs take up more disk space than MacWrite *and require more fully featured System files.*

- Insert your application disk or any startup disk that has the Finder and System file into the internal drive and insert the data disk you want to back up into the external drive.
- Eject the startup disk in the internal drive and replace it with the data disk you want to use for backing up your documents in the internal drive.
- Drag the icon of the data disk onto the icon of the backup data disk.
- Click on OK when the Mac asks if you want to replace the contents of the disk in the internal drive with the contents of the disk in the external drive. The Mac reads the information on your data disk and writes it onto the backup data disk.
- Insert the startup disk that was originally in the internal drive, after the Mac has completed the copy procedure and ejected the backup data disk. Then the Mac updates the Finder about the locations and names of your applications and documents.

Quick Backup Disks

Backing up documents usually requires some disk juggling, even with a second disk drive. If backing up your documents is the key concern, there is a way to set up your disks so that you can use the second drive for backup purposes only. This strategy, however, may not be practical for some applications because of the amount of disk space taken up by the application and the System Folder. You can use the second drive for backup, but you won't have much space to create documents. A *MacPaint* system disk, for example, has about 137K available for documents—enough space for only a few complex drawings.

You can create a *MacWrite* system disk, on the other hand, that has 238K of document space. Using the Font Mover, you can remove fonts you don't need. My *MacWrite* workdisks have only Geneva-12 and -24 and the System fonts (which you cannot remove) in the System file (see the figure labeled "Write Fonts"). You need the Geneva fonts because the Mac's Font Manager uses those sizes for printing. It scales down the larger size by 50 percent to enhance the characters' image on paper. The desk accessories are especially useful because they are accessible from the desktop or from within an application. However, I find that I rarely use them when I'm writing. I used the Desk Accessory Mover (available from CE Software, 801 73rd St., Des Moines, IA 50312) to remove the unneeded desk accessories from my *MacWrite* disk's System file. This utility allows you to delete or add desk accessories and to save them in a file that you can store on a separate disk. As new desk accessories become available, such as a Rolodex-type appointment calendar, you can use the Desk Accessory Mover to move them into the System file so you can select them from the Apple menu.

With a few other tweaks such as emptying the Scrapbook, you can obtain 238K of disk space for creating and storing documents. If you can get by with printing in draft mode only, you can pick up an additional 17K by removing the Imagewriter file (see the figure labeled "Write 238").

Every time you return to the desktop, you can replace the older versions of your documents on the data disk or transfer copies of newly created documents to the data disk. You can also create backup copies of documents from within an application by using the following technique:

- Save the document on the application disk by choosing Save from the File menu and clicking on the Yes button in the dialog box.
- Choose Save As from the File menu and click on the Drive button before clicking on the Save button. You can even rename the document to reflect its backup status.

To transfer a document from another disk or a different application to your *MacWrite* disk, you eject the data disk and insert the disk you need to use. After you finish the file transfer or the cut-and-paste operation, eject the disk in the external drive and replace it with a data disk. Then transfer copies of the modified or new documents to the data disk to keep your backup files up to date.

(continued from page 37)

You can also replace the Scrapbook file on one disk with the Scrapbook file from another disk. For example, you may have 15 documents on a *Microsoft Chart* disk that you want to insert in a *MacWrite* business report. You can copy the *Chart* documents to the program's Scrapbook file. Then you can replace the Scrapbook file on the *MacWrite* disk with *Chart*'s Scrapbook file (see Figure 3). To exchange Scrapbooks, follow this procedure:

- Insert *MacWrite* in the internal drive and *Chart* in the external drive.
- Open the System Folder on the *MacWrite* disk. If the *MacWrite* Scrapbook file contains items you want to preserve, rename the file (the Mac has a rule that every object must have a unique name). If the contents of the Scrapbook file are expendable, drag it into the Trash.
- Drag the Scrapbook file from the *Chart* disk window into the *MacWrite* disk window.

You can use the Clipboard and the Scrapbook to transfer information between any application programs, whether you have one or two disk drives. That transfer process is somewhat time consuming because you must always quit the current application and return to the desktop before starting up another application. Each time you quit or open an application, the Finder looks through the directory of each disk to update its Desktop file. This survey accounts for most of the time you spend watching the wristwatch icon as you wait for an application to appear on the screen.

Transferring control from one program to another would be much faster if a Mini-Finder existed that allowed you to switch applications without going back to the desktop. A directory of programs available on disk would appear in a scroll window similar to the one that lists the names of documents within a particular application. When you clicked on the name of an application program, the Mac would automatically switch control of the system to that application, and the application's document window would appear on the screen in a few seconds. Perhaps a future version of the Finder will include this feature.

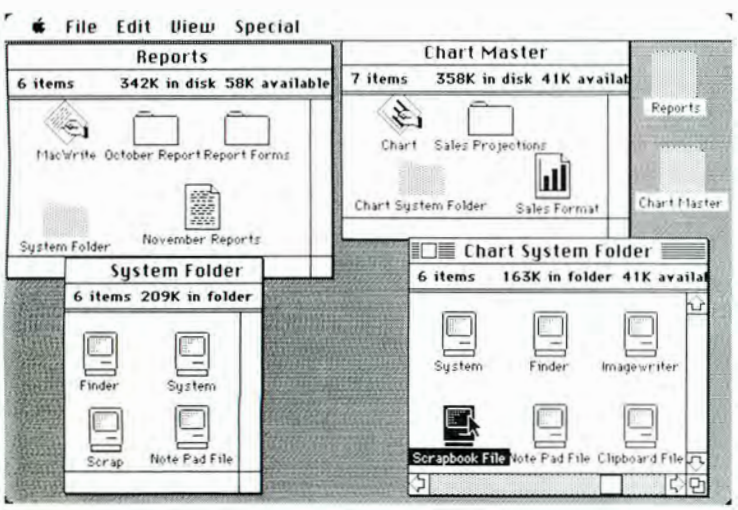


Figure 3

In this example, the Scrapbook file in the Chart *System Folder contains a number of charts to be inserted in a business report. Without exchanging Scrapbook files, you would have to quit* MacWrite, *open* Chart, *copy a chart from the Scrapbook to the Clipboard, quit* Chart, *open the* MacWrite *document, and paste in the chart. An application uses only the Scrapbook file of the startup disk. Having the charts available on the* MacWrite *disk enables you to copy and paste the charts from within* MacWrite. *Note that the Reports disk Scrapbook file has been renamed Scrap.*

On-Line Data Disks

The additional 400K of on-line disk space provided by a second disk drive gives you more flexibility in the way you organize your applications and documents. If you work with more than just a few disks, you must devise sensible ways of organizing which kind of files you place on which disks.

One way of working with a two-drive Mac is to keep your application as the startup disk in the internal drive and to store your documents in the external drive. This strategy is ideal for working with long documents or several documents at a time. For example, by keeping *MacPaint* and the System Folder on one disk, you can use the second drive to store and work on *MacPaint* documents without worrying about running out of disk space.

You can also store documents created with different applications on the same data disk. Rather than switching both application and data disks when you change to a different application, you can use the same data disk for more than one application. This technique allows you to cut down on the number of disks required for your work. However, consolidating your documents onto one data disk requires careful organization. Using folders to arrange your documents prevents your data disk from becoming cluttered and disorganized (see "Clean Up Your Electronic Desktop," May/June).

Multiple Application Disks

Keeping your documents on data disks also allows you to create application disks that contain more than one application. Since documents aren't stored on the application disk in this setup, you can use the remaining disk space to store one or two other programs. This strategy is useful if you are involved in a project that requires you to integrate applications. Having all the documents that relate to a particular project on the same data disk makes it easier to keep track of information.

For instance, if you are working on a botany paper and want to use several *MacPaint* drawings to illustrate the text, you can keep both *MacPaint* and *MacWrite* on the same disk in the internal drive, and your text and illustrations on the disk in the external drive (see Figure 4). Of course, the applications share the same System file, so you must make sure that the System file has the fonts you need to work in both programs.

Another way of working with a two-drive system is to put an application and its associated documents in each drive (see Figure 5). This strategy is convenient if you don't need a lot of document space for each application, because each application disk has a System Folder that takes up from 110K to 210K of disk space, depending on how many fonts and desk accessories are stored in the System file. A benefit of this setup is that each application can have its own customized System file.

For example, you can put a *MacWrite* disk in one drive with the System file stripped of most fonts to clear more space for documents. In the other drive, you can insert a *MacPaint* disk containing many special fonts in the System file but little document space. Changing applications and transferring information between applications is efficient because the data and the applications are stored on the same disk.

If you use mostly one application, such as *MacWrite,* the application disk in the external drive doesn't need a System Folder unless it needs special fonts or other resources not located in the System file of the startup disk. This setup allows you to conserve document space on the application disk in the second drive. For instance, if you have the System Folder on a *MacWrite* disk in the internal drive and *MacPaint* in the external drive without a System Folder, the *MacPaint* disk will have 339K available for document storage.

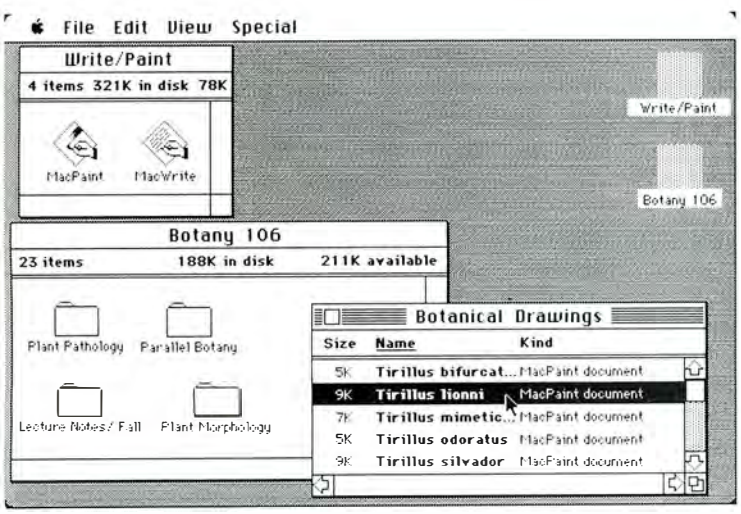


Figure 4
Keeping your documents on data disks gives you the option of creating application disks that contain more than one program.

System/Data Disks

If you use several applications during a work session but don't create a great deal of data, the ideal way to set up your disks is to place all the applications on one disk. Because you have 400K of disk space available for application programs, you don't have to change disks every time you switch applications. Store the System Folder and your documents on the other disk, which gives you about 200K for creating and storing documents. If you frequently write business reports, for example, you might use *Multiplan, Chart, MacWrite,* and *MacTerminal* to produce one report (see Figure 6). You'll find that together these applications take up most of the space on a single disk. Putting the System Folder and documents on the same disk creates a "System/data" disk.

On the second disk, you have the applications you need to write the report in *MacWrite* and include various charts and spreadsheet information, and also the ability to send or receive information over telephone lines. When you use this strategy, keep the following rule in mind: if you want to print a document in standard or high resolution, the Imagewriter file must reside on the application disk.

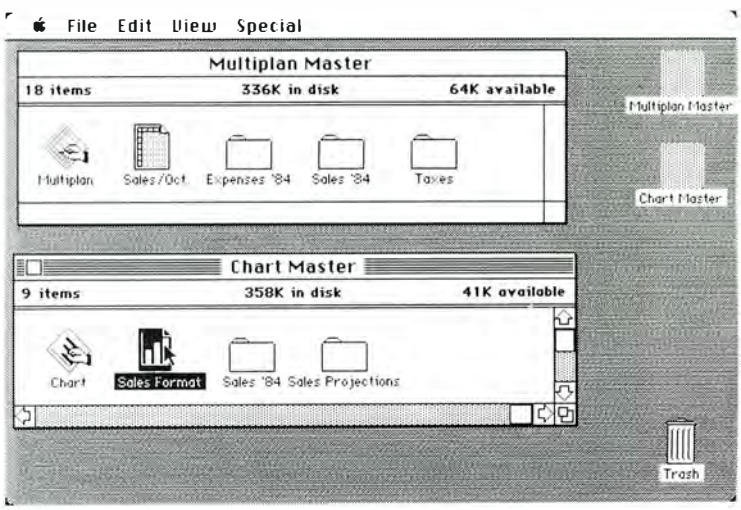


Figure 5
If you change applications frequently during a work session and don't create many documents, it's convenient to have an application with its own System file in each drive. For example, if you are using Multiplan, *you can transfer spreadsheet information to* Chart *to create a chart, then eject* Multiplan *and insert* MacWrite *to include the chart in a report. This method enables each application to have its own customized System files.*

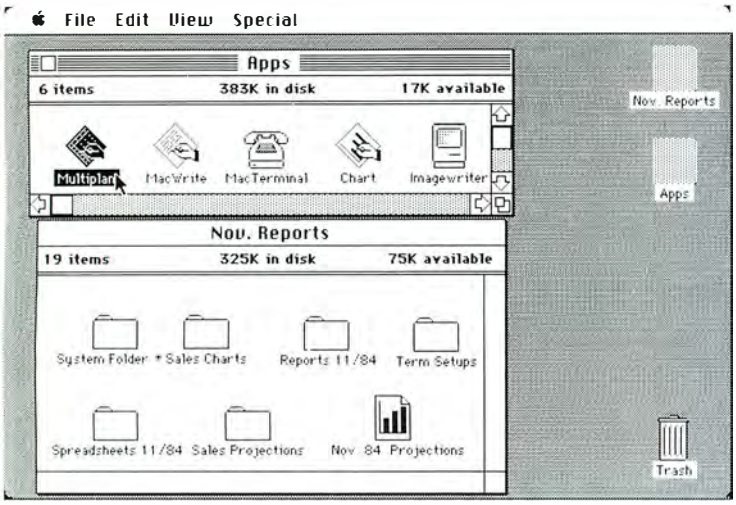


Figure 6

Having a second disk drive gives you the option of creating workdisks with several applications. The System Folder and folders containing documents created with the various applications are on the disk in the internal drive, and the applications are on the disk in the external drive. Note that the Imagewriter file must also be on the application disk. Because all the applications must share the same System file, make sure all the fonts and desk accessories needed for each application are available.

One benefit of placing several applications on one disk is that you can configure separate System/data disks for different projects. However, you must restart the system each time you insert a new System/data disk. If you don't, the Mac will continually ask you for the original disk because the applications are bound to the startup System file and the Finder.

Since all the programs on the application disk share the same System file, you need to make sure that the System file you use on the data disk has all the fonts and other resources necessary for each application to function correctly.

When you start a work session, make sure that you insert the System/data disk first. If you insert the application disk first, the Mac will eject the disk because it doesn't contain the Finder or System file necessary to start an application. You can put the application disk in either drive as long as you let the Mac start up from the disk that has the System file and the Finder on it.

Copy-protected programs such as *Multiplan, Filevision,* and *Habadex* require you to insert the master disk when you start up the program, but you only have to do it once during a work session unless you turn off the computer. When you insert the master disk of a copy-protected program, the Mac transfers control of the system from the System/data disk to the master disk. When you save a document that you have just created, the Mac stores it on the application disk, which you may not have intended for storing documents.

When you save documents in *Multiplan,* they are automatically stored on the application disk. To avoid the "disk full" message when you save documents, use the Save As option. Click on the Drive button in the Save As dialog box before you click on the Save button to save documents to the System/data disk.

If you start up a work session by clicking on an application's icon (rather than a document icon in the System/data disk window), the Mac will automatically save the document to the application disk. Again, click on the Drive button in the Save As dialog box before saving, to store the document on the System/data disk. Subsequent documents you create or open during the work session with programs that aren't copy protected, such as *MacWrite* or *MacPaint,* are saved automatically to the System/data disk.

Usually it doesn't matter in which drive you put the application disk, but at least one copy-protected program—*Think Tank,* an outlining program from Living Videotext—insists that the application reside in the internal drive. If you use *Think Tank* in setting up an application workdisk, be sure to put the System/data disk in the external drive. Check out the behavior of any new program before setting up your workdisks.

Alternate Paths

An external disk drive is not the only way to get around the disk space limitations of a single-drive Mac. A hard disk system can provide at least 5 megabytes of storage space—that's 12½ times the capacity of an external disk drive—but at the cost of a few thousand dollars. When a RAM disk program becomes available for the 512K Mac, you'll be able to create the effect of having a second disk drive by using the Mac's memory to store application programs, the Finder, and the System file, and using the disk in the internal drive to store documents. Double-sided disk drives that store 800K of information on a single disk are not yet available, but they may be on the market sometime next year.

Like many owners of a single-drive Macintosh, you may need more disk space for your programs and data. If you're tired of juggling disks, adding an external disk drive is a practical, economical way to manage your information. □

■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ *Daniel Farber is the Associate Editor of* Macworld.

■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■

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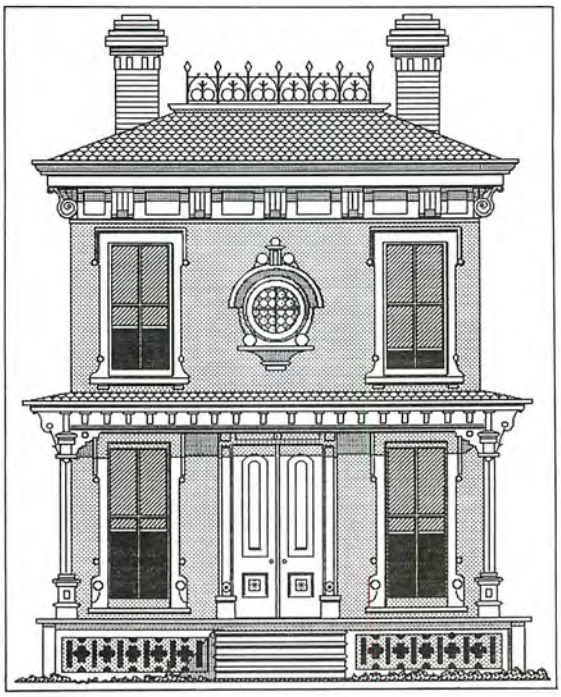

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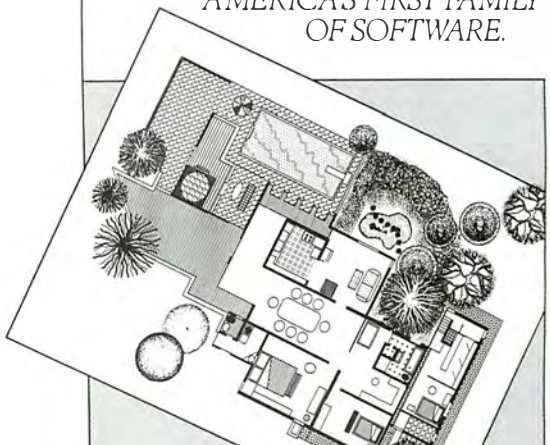

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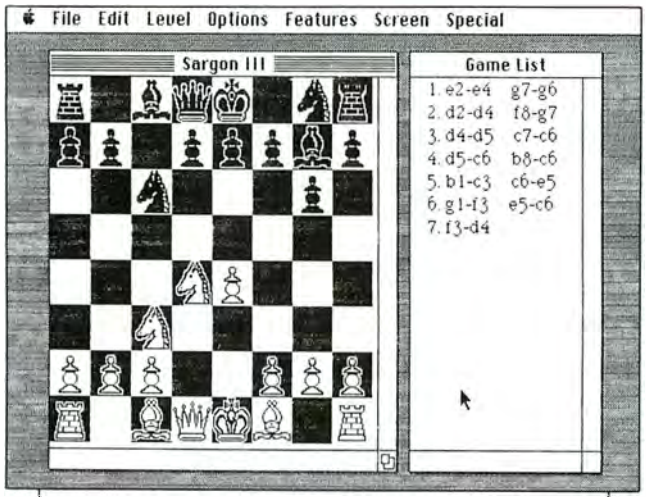

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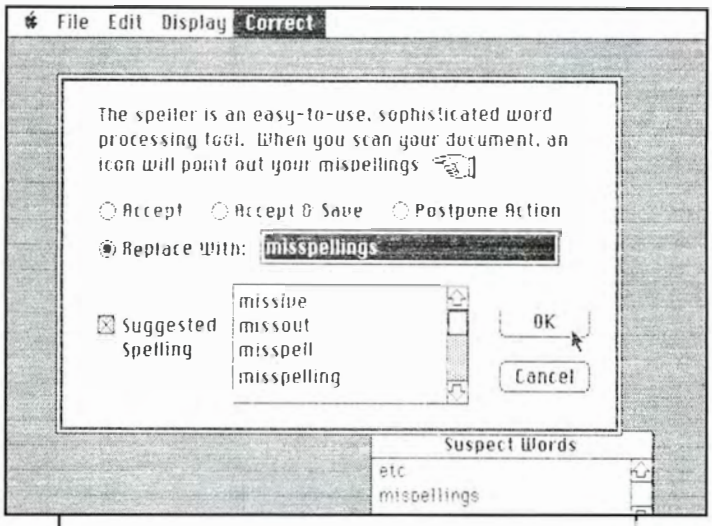

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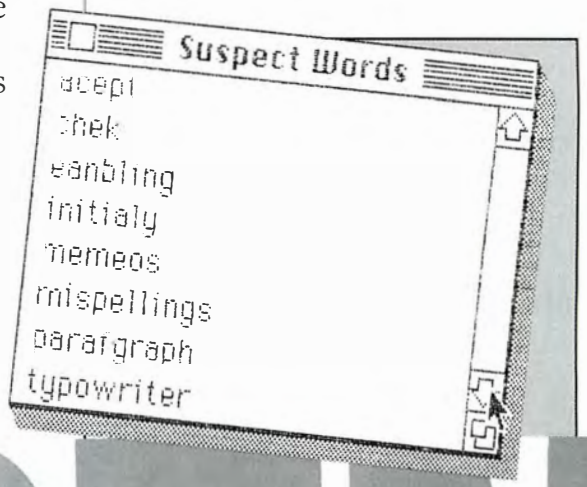

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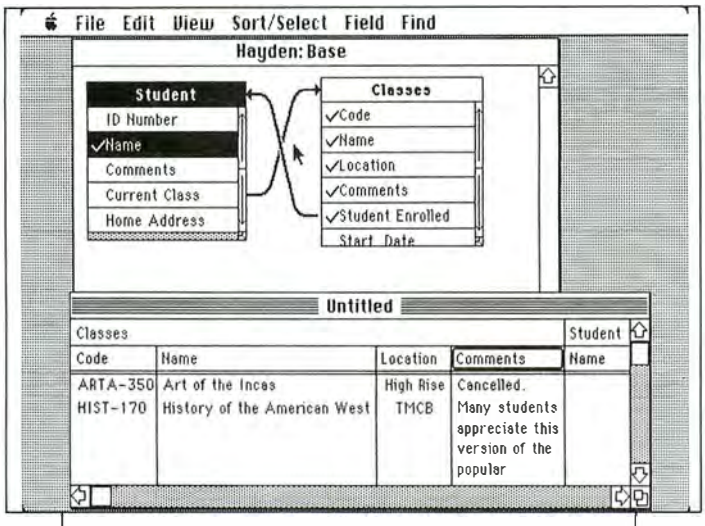

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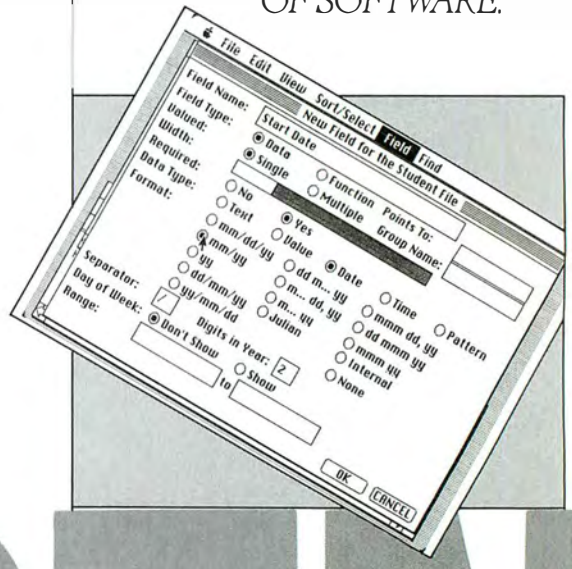

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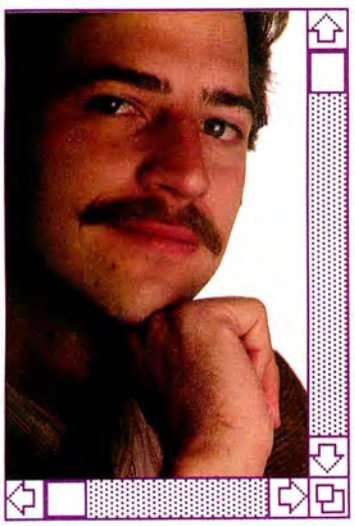
Get Info

Macworld's tutor answers questions about using the Mac

Lon Poole



Get Info answers questions about the Macintosh and how it works. Most inquiries will deal with application programs, but no topic is too elementary or too advanced. Discussions will range from setting up the Mac to programming in BASIC and Pascal. When you need advice about using the Mac, drop me a line. I cannot respond to individual letters, but I will answer the most representative questions.

This month's *Get Info* responds to a variety of questions. One person wants to know who did the music for the Macintosh Guided Tour tapes. Another wants to print pages from the Note Pad desk accessory. A couple of people wonder why *MacWrite* saves a document before printing but *MacPaint* doesn't. One reader isn't sure she is using the ⌘ and Option keys correctly to duplicate a selected object several times. Another reader wants a longer keyboard cable. Someone else asks a question that must be lurking in the minds of many Mac owners: what happens if you turn the Mac off when a disk is in the drive? And the inevitable question about disk-drive head cleaning has come up. Finally, I will address the many programmers who have written to ask how they can create Microsoft BASIC (MBASIC) programs that maximize use of unique Mac features such as sound and graphics.

Easy Listening

Q. Who are the Windham Hill musical performers on the Guided Tour of Macintosh and Guided Tour of MacWrite/MacPaint cassettes? I recognized some of the piano playing as George Winston's, but who are the guitar players?
Angus MacDonald

A. According to Jim Callahan of Windham Hill Records, quite a few artists participated in the Guided Tour recordings. Barbara Higbie, Liz Story, and George Winston played piano. The guitarists were William Ackerman, Alex de Grassi, and Michael Hedges. Darol Anger played the violin and Russel Walder played the oboe.

Windham Hill also did the music for the Mac television commercials. Steve Miller (not the rock-and-roll performer) and Andy Narell produced and played along with the performers mentioned above.

Note Pad Printing

Q. I often jot down important notes and memos in the Note Pad, and sometimes I want to print out several memos for reference. What procedure should I follow to print my memos?
Annette Brown
Rapid City, South Dakota

A. While using the Note Pad, you can print the currently displayed page by pressing ⌘-Shift-4. You can also copy or cut text from the Note Pad to a *MacWrite* document and print the document. First, select the text you want to print and choose Cut or Copy from the Edit menu to put the selection in the Clipboard. Then start up

MacWrite (if you are not already in the program) and choose Paste from the Edit menu to put the text from the Clipboard into a *MacWrite* document at the insertion point. If you wish to copy several text selections from the Note Pad (from more than one page), you can cut or copy them one at a time and paste them into the Scrapbook. Then, after opening *MacWrite,* you can cut and paste each selection from the Scrapbook into a document. If you want, you can enhance any of the pasted text with features from the Format, Font, and Style menus or add more spice by pasting the text into a *MacPaint* document and adding some illustrations before printing.

MacWrite Printing

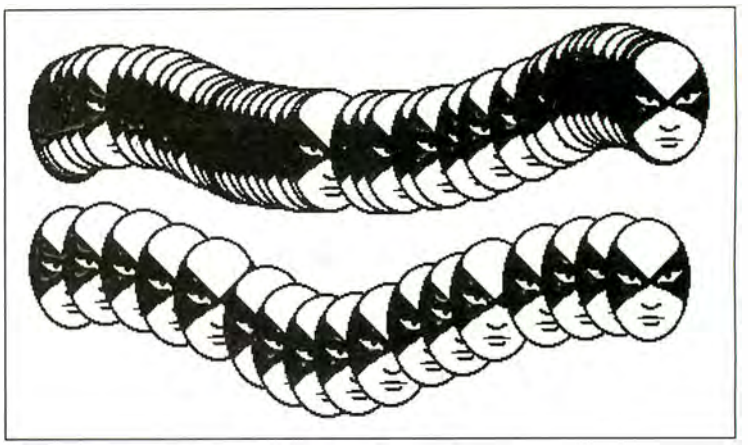
Q. Why does *MacWrite* always save a document to the disk before printing it? *MacPaint* doesn't do that.
Sam Krell
Boulder, Colorado

A. The instructions that tell *MacWrite* how to print a document are normally kept on disk, not in memory. This scheme leaves room in memory for a longer document. (The maximum length of a *MacWrite* document is limited by the amount of available memory, since the whole document is kept in memory while you enter and edit it.) When you decide to print, *MacWrite* saves the document on disk to make space available in memory for the additional instructions required for printing. It saves the document in a temporary file in a separate (*scratch*) area of the disk, to avoid disturbing any of your documents on disk. When the printing is finished, *MacWrite* reloads the temporary file from the disk into memory (replacing the printing instructions in memory) so you can do more editing.

MacPaint takes a different approach. It always keeps the drawing on disk in a scratch area. It only keeps part of the drawing in memory at one time: the part you can see and work on in the drawing window. Perhaps you have noticed that when you move a different part of a drawing into view with the grabber (hand) tool or the Show Page feature, the disk drive spins as different parts of the drawing page are swapped between memory and disk. Thus *MacPaint* doesn't need to save the drawing on disk before printing—it's already there. Printing starts at once after you choose Print from the File menu.

Multiplying with MacPaint

Q. *MacPaint* indicates that if you hold down the Option and ⌘ keys and then drag a selected object across the screen, multiple copies of the object should be reproduced. All I get are sporadic, out-of-sequence fragments of the selection. How does this feature work? Is there a specific rate at which I must drag the selection across the screen?
Michael Crelinsten
Montreal, Quebec



MacPaint Multiples
Dragging an object while holding down the ⌘ and Option keys creates continuous multiple copies of the object. The speed at which you drag the object controls the amount of overlap between copies.

A. Duplicating a selected object in *MacPaint* by dragging while holding down the ⌘ and Option keys creates continuous multiple copies of the selected object. The essential word here is *continuous.* If you drag the selected object slowly, each new copy overlaps most of the previous copy. If you drag the selected object faster, the copies overlap less. In addition, if you selected the object with the marquee, rather than the lasso, the white space surrounding the object is also duplicated, covering up portions of adjacent copies.

The line width box in the lower-left corner of the screen also affects the amount of overlap. Less overlap occurs when you select a thicker line width.

If you want to make several separate and complete copies of an object, use the Option key alone (without the ⌘ key) as you drag. Select the object with the lasso or the marquee, hold down the Option key, and drag a copy. When you release the mouse button after dragging, the copy will be selected instead of the original. You can make another copy by again holding down the Option key and dragging the selected object.

Longer Keyboard Cable

Q. Can you use a telephone extension cord with the Mac keyboard so it can be placed farther away from the console?
Andy Potter
Darien, Connecticut

A. The standard keyboard cable extends 6 feet. Any farther away than that and you'd need binoculars to read the screen. However, there are circumstances in which a long cord comes in handy. For example, you might work at a table with a pull-out shelf set a few inches below the working surface for more comfortable typing. The standard keyboard cable isn't

long enough to stretch around the tabletop, from the Mac on top of the table, to the back of the table, and then forward again to the keyboard on the shelf underneath.

The connectors on the standard keyboard cable are the same as the connectors on a telephone handset cable, but you can't simply replace the standard keyboard extension cable with a 12- or 25-foot telephone handset cable. If you do, the keyboard won't work.

Dan Kottke, the engineer at Apple who was responsible for the design of the Mac keyboard and keypad, explains why. It seems that the wires in the Mac cable connect straight through from the connector on one end to the connector on the other end, but the wires in a telephone cable cross.

The solution would be simple if handset couplers were available; you'd connect two cables back-to-back, double-crossing the wires. Unfortunately, only line cord couplers are available, and they have larger sockets. To use a handset cable, you have to open the keyboard and rewire its socket, a task not recommended for the fumble-fingered or the faint-hearted.

Kottke also mentions that you may encounter problems if you use a telephone handset cable more than 12 or 18 feet in total length. Long cables resist the flow of electrical signals more than short cables. What's more, most telephone handset cables use a type of wire that resists electrical signals more than a standard Mac keyboard cable. An extra-long telephone cable might have more resistance than the keyboard signals could overcome.

Disk Insert

Q. Is it all right to have a disk in the drive when turning the Mac on and off, or will I damage the disk or the disk drive that way? I thought it would be a good idea to leave a disk fully or at least halfway in the drive when the computer is off to prevent dust from contaminating the disk-drive mechanism. What do you recommend?
Kevin Williams
Moore, Oklahoma

A. Leaving a disk in the disk drive when you switch off the Mac affects the disk, the disk drive, and the contents of the disk. Neither the disk nor the disk drive benefits from leaving a disk fully inserted with the power off. A partially inserted disk will keep as much dust out as a fully inserted disk, and a Mac cover will keep out much more dust than a disk in any position.

Apple hardware engineer Dan Kottke points out that when a disk is fully inserted, the disk surface touches the disk head. This arrangement may do some harm over a very long period of time. Microscopic particles of dirt on the disk surface have a chance to stick to the head, leading to the possibility of disk damage upon startup. It's remotely possible that the head could become partially magnetized by the disk and rendered unreliable.

But the disk contents are far more vulnerable than the disk or the disk drive. If you switch off the machine while a desk accessory or an application is open, you risk losing information on the disk. Don't even think about intentionally switching off the power without first closing all desk accessories and quitting whatever application you are using. It probably goes without saying, but remember that you're asking for trouble if you switch off the Mac when the disk is spinning or ejecting.

MBASIC Capabilities

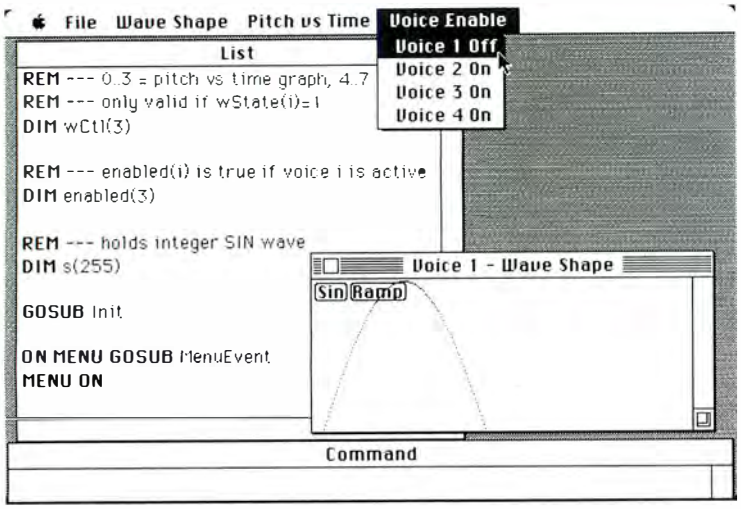
In searching for answers to questions from MBASIC programmers, I spoke with Tandy Trower, marketing manager of language products for Microsoft. He gave me a preview of the improved version of the language, MBASIC 2.0, which is due to be released this fall (it may be available by the time you read this column). MBASIC 2.0 has new statements and functions that provide access to more of the Mac's special features than version 1.0 does.

For example, version 2.0 has a SOUND statement that you can use to program music and sound effects. The SOUND statement has four parameters: frequency (pitch), duration, volume (loudness), and voice number (from channels 1 to 4). You execute a SOUND statement to initiate sound on one of the four voices or to change the frequency of the voice. With another SOUND statement, you can turn off the sound on any of the four voices.

There is also a WAVE statement that lets you define the waveform of each voice. It has three parameters: voice number, shape definition, and phase. For shape definition, you can specify SIN for a regular sine wave or the name of a 256-element integer array that you have prepared with a waveform definition. The phase parameter is the subscript number of the definition array at which you want MBASIC to begin.

Among the other new features MBASIC 2.0 provides are the abilities to:

- Redirect input and output to the screen, the printer, the Clipboard, the communications port, or a disk file. This feature enables you to output pictures and enhanced text to any of those destinations.
- Add or replace menus on the standard MBASIC menu bar. You specify the items listed on your menus and control whether they're highlighted, checked, or dimmed.
- Open or close windows that you create in MBASIC.
- Accept keyboard input in so-called edit fields, with full cut-and-paste editing capabilities.
- Set up displayed buttons—either push buttons such as the standard OK button, round radio-style buttons such as the Partial Word button in the *MacWrite* Find window, or check boxes such as the Lock box in Get Info windows.
- Record screen events in sequence, enabling you to regenerate a window that has been overlayed by another window.
- Trap events with a single BASIC statement on the basis of menu selection, window click (for activation), button click, text entry, time, mouse activity, and keyboard break signal (press ⌘-period).
- Force any string of characters into uppercase format.



MBASIC

Microsoft BASIC version 2.0 has many new features including a SOUND statement that allows you to program music and sound effects. The language also gives you the ability to write your own Mac-style applications as in this screen shot.

- Double-click on the title bar of any window to automatically expand the window to full size; double-click on the title bar again to shrink the window to its previous size.
- Choose between two styles of internal number representation: one style similar to that of version 1.0 for reliable financial calculations, and the other with faster calculation speed but less reliable financial calculations.
- Choose files to open from a Mini-Finder dialog box.
- Use subprograms with shared or static (global or local) variables and with parameter passing.
- Enter and edit programs directly into the listing window, using the command window for direct-mode commands only.
- Trace program execution in the listing window as MBASIC draws a box around the statement currently being executed.
- Execute your program one statement at a time (single-step).
- Eliminate line numbers except those needed for program control (by GOSUB, GOTO, and so forth).
- Spot reserved words easily, since MBASIC automatically makes them boldface when you press Return after entering or editing a program line.

Clearly, these new features enable you to write your own Mac-style applications. According to Trower, your application will run at a respectable speed, too. Furthermore, he claims that there is no significant change in the amount of memory available for your program, because parts of the MBASIC interpreter such as error message text and program editing are kept on the disk (not in memory) unless needed. If you get a 512K Mac when it becomes available or use a Lisa with *MacWorks,* MBASIC will take advantage of the additional memory to reduce or eliminate swapping between disk and memory.

If you're ambitious and energetic, you can do just about anything in version 1.0 with the CALL statement and some machine language programming. Generally, this task involves writing a short program in 68000 assembly language to call one or more routines in the Mac's 64K User Interface Toolbox. Unless you have Apple's Mac Assembler/Debugger (which was not available at the time of this writing but is scheduled for release during the fall) or access to an assembler on a Lisa or another computer, you must next translate the assembly language program to machine language yourself. Then you can integrate the machine language code into your BASIC program.

If you need help in writing the assembly language program and in translating it to machine language, consult one of the many books on the subject. *68000 Assembly Language Programming* by Gerry Kane, Doug Hawkins, and Lance Leventhal (Osborne/McGraw-Hill, Berkeley, 1981) is a complete tutorial and reference, but it's not for beginners. For an example of how to integrate a machine language program with a BASIC program, see the discussion of the CALL statement on pages 52 and 53 of the MBASIC manual. Of course, you also need documentation for the myriad routines in the Toolbox, such as starting address, number and type of arguments, and calling conventions. The only source I know for that information is Apple Computer's publication, *Inside Macintosh,* which is available for $150 plus applicable California sales tax. Write to: Apple Computer, Attn: Inside Macintosh, 467 Saratoga Ave. #621, San Jose, CA 95129.

The $150 buys you an 800-page draft of a manual that describes the Toolbox ROM routines. For another $100 plus tax (sent to the same address) you can also get a *Software Supplement,* which includes updates to *Inside Macintosh*, the *MacWorks* program that enables a Lisa to run Mac software, and Lisa development software. The development software, which allows Lisa owners to develop Mac applications using Lisa Pascal, includes Mac libraries, utilities, supplements, and examples.

Send your questions to Get Info, Macworld, 555 *De Haro St., San Francisco, CA 94107.* □

Jon Poole is a Contributing Editor of Macworld *and the author of several computer books including* The Apple II Users Guide *and* MacWork/MacPlay.

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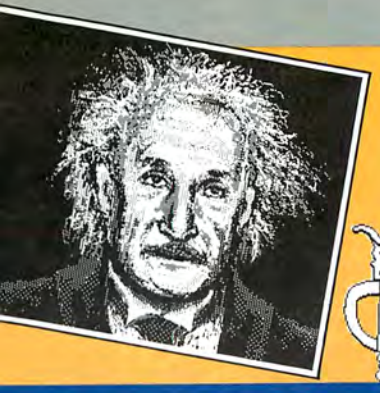

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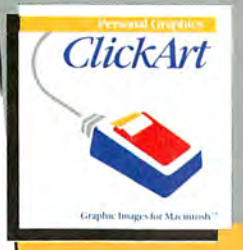

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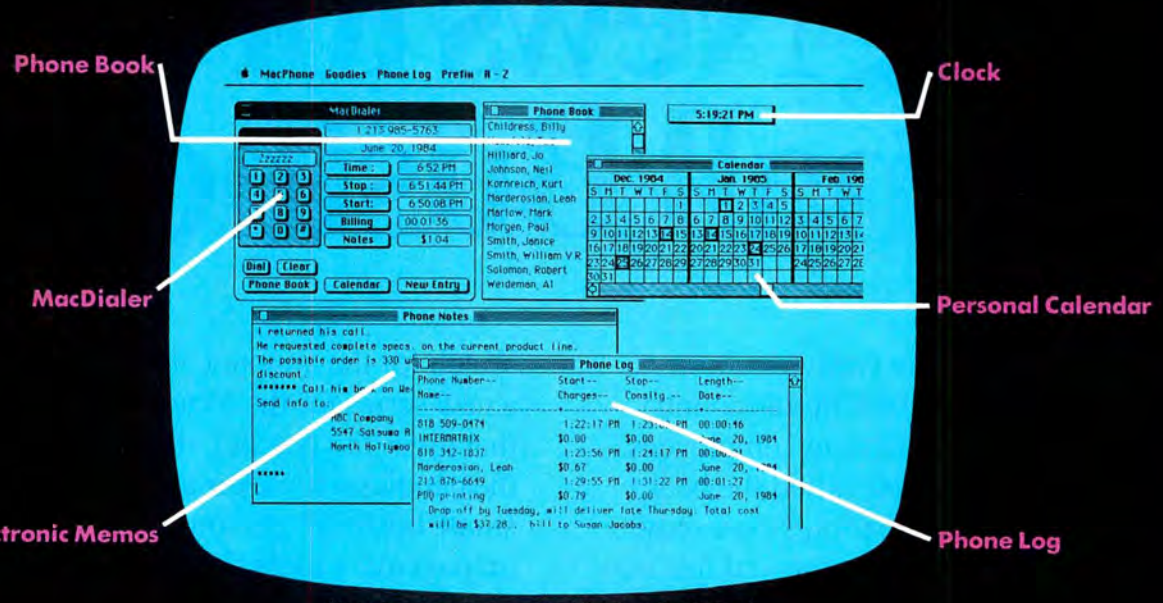

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The Macintosh Deluxe

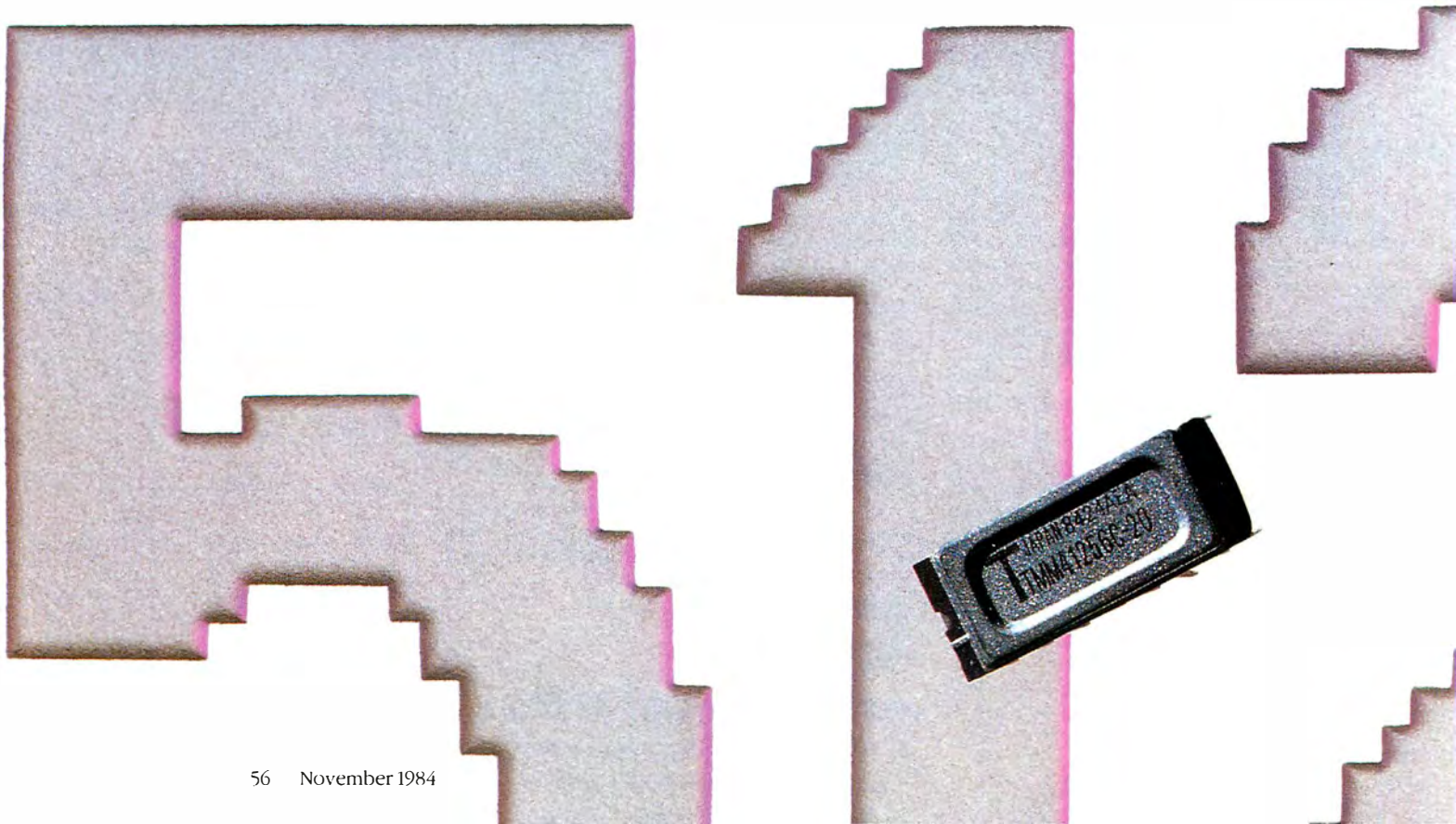
Danny Goodman

Apple's promised expansion of the Mac quadruples its memory and speeds up its processing. You can purchase the 512K model or have your 128K Mac upgraded. In addition, new versions of MacWrite *and* MacPaint *add to the "Fat" Mac's attraction.*

Only a few months after the Macintosh arrived in the stores, the trade press began citing the machine's limited memory as a major reason businesspeople were shying away from the Mac. Since 256K IBM Personal Computers are de rigueur in the business community, many people believe that the Mac's 128K of memory is too small to run the sophisticated software they demand. This sentiment may have motivated Apple to push up its release of the promised Macintosh memory expansion from early 1985 to fall 1984. We checked out a prerelease model of the 512K Mac as well as the updated versions of *MacWrite* and *MacPaint*–all to see if quadrupling the Mac's memory will silence its critics.

The Two-Model Strategy

Apple is not abandoning the original 128K Macintosh now that its bigger sibling (often called "Fat Mac" around the cubicles of the Apple 32 group) is ready for the shelves. Customers can start out with a 128K Mac and later upgrade to 512K if they desire, or they can buy a Mac factory-equipped with 512K. Apple reports that a 512K Mac costs $1000 more than the 128K model. An upgrade to a 512K Mac costs $1000 including installation, so there is no price difference between the upgraded and the factory original 512K model.

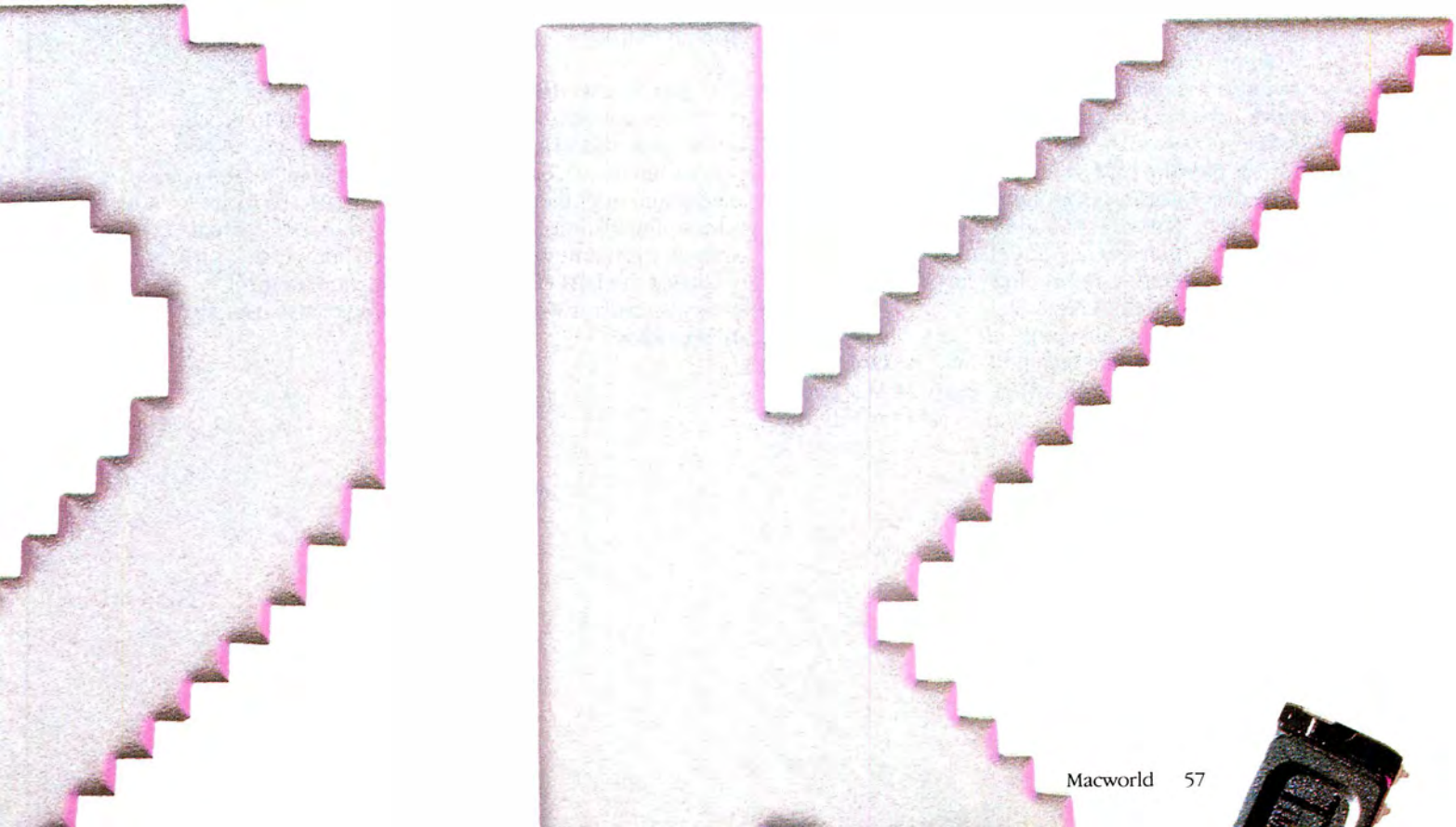


The logic board of the new Macintosh contains sixteen powerful 256-kilobit chips, which enable it to store 512 kilobytes of information. Upgrading your 128K Mac is a simple matter of having your dealer install a new board.

From the outside, both Macs look identical except for an identifying mark on the rear panel. Inside the computer, the only difference between the two machines is the kind of RAM (random access memory) chip used on the logic board (see Figure 1). A 128K Mac board contains sixteen 64-kilobit chips, while the 512K Mac contains sixteen 256-kilobit chips.

To understand why 16 chips are required, it helps to recognize the difference between a *kilobit* (the unit of measure for RAM chips) and a *kilobyte* (the traditional measure of available memory in a personal computer). A byte (a unique character, like a letter or punctuation mark) actually consists of 8 bits, each of which is either an "on" or an "off" pulse (represented by "1" and "0," respectively) flowing through a computer. The precise 8-digit sequence of 1's and 0's is a unique identification number for a character. Therefore, to store one byte of information, you need 8 bits of chip space to store that ID number; for 512 kilobytes of RAM, you need a total of 4096 (8 × 512) kilobits of chip memory. Currently, the largest RAM chip available in mass quantities holds 256 kilobits; 16 of these chips are necessary for the 512-kilobyte Mac.

For owners of 128K Macs, however, upgrading memory to 512K is more involved than simply swapping chips. The 64K RAM chips already in the computer are soldered in place. Unsoldering and soldering RAM chips can be tricky, since they are very sensitive to heat and static electricity. Also, some other changes to the logic board are necessary to complete the up-



grade. To simplify the procedure, Apple says it will supply dealers with replacement boards, which the dealers will install if you elect to upgrade your Mac. The installation will take about 15 minutes. Recently, Apple made a minor change in the logic board design, which allows the factory to manufacture a logic board for either a 128K or a 512K Mac by soldering in the appropriate RAM chips. This design change, however, is strictly for streamlining Mac assembly and does not make a newer 128K Mac operate at all differently from the original.

✦✦✦✦ *The new* MacWrite *gives the 128K Mac a maximum document size of slightly more than 50 typical double-spaced pages.*

One-Swap Disk Copying

The real differences between the 128K and the 512K Mac are apparent when you compare the two in day-to-day work. From an operational point of view, a 512K Mac reduces the number of disk swaps (on a single-drive Mac system) when you copy individual files. As a test, I copied a 198K System Folder from one disk to another on each machine. First, I started up the Mac with the source disk and ejected it immediately. I then inserted the target disk, opened the source disk icon, and, finally, dragged the System Folder icon onto the target disk icon.

On the 128K Mac, the copy process takes four swaps, plus the final swap of the source disk into the internal drive, or a total of nine disk insertions. On the 512K Mac, however, the entire folder was copied in one swap, plus the final swap of the source disk—a total of three disk insertions, or one-third that required for the 128K Mac. This disk-handling enhancement is possible because more of the 512K Mac's memory can be allocated as a temporary holding place for copied data than is possible in the 128K Mac.

The 512K Mac is also more efficient when you copy entire disks. While on a 128K Mac the Disk Copy utility copies a disk in four swaps, the 512K Mac effects a complete copy in only one swap. In other words, the entire contents of the disk are loaded temporarily into memory until they are written to the new disk. Of course, many 128K Mac owners have second disk drives, so this copy enhancement may not be too valuable.

Fast MacPaint

Besides disk-swapping efficiency, the difference between the 128K and the 512K Mac becomes apparent when you work with an application program such as *MacWrite* or *MacPaint*. When Apple unveiled the 512K Mac, it also announced new versions of *MacWrite* and *MacPaint*. If you already have a Mac, you can (as with the previous software update) bring in your old program disks to a dealer and copy the new programs from the dealer's updated disks. With a second disk drive the procedure takes only a few minutes. If you purchase a new 128K or 512K Mac, both *MacWrite* and *MacPaint* are bundled with the system at no charge.

MacPaint's update affects only 512K Mac owners. With 512K of memory, plenty of RAM is available for the Mac to keep an entire *MacPaint* drawing in memory. In contrast, the 128K Mac can store in memory only the portion of a drawing that can be displayed in one window. The rest is stored in a temporary file on the *MacPaint* program disk.

The difference between using *MacPaint* on the two machines is most noticeable when you use the "grabber" to bring an adjacent part of a drawing into the *MacPaint* window. With a 128K Mac, you experience a delay as the disk drive fetches the information to fill in the rest of the drawing. With the entire drawing in the 512K memory, however, you see the rest of the drawing immediately. Additionally, the Show Page command, which paints a miniature replica of the entire drawing on the screen, is executed instantly—the program doesn't have to bring the image into memory from the disk.

Fat MacWrite

The new *MacWrite* has some significant improvements that affect both 128K and 512K Macs. The most important improvement is a considerable increase in maximum document size, which is created by a programming technique called *virtual memory*. Virtual memory is not new; *WordStar,* a word-processing program for the IBM PC, has been using it for several years. *Microsoft Word* for the Macintosh also uses virtual memory.

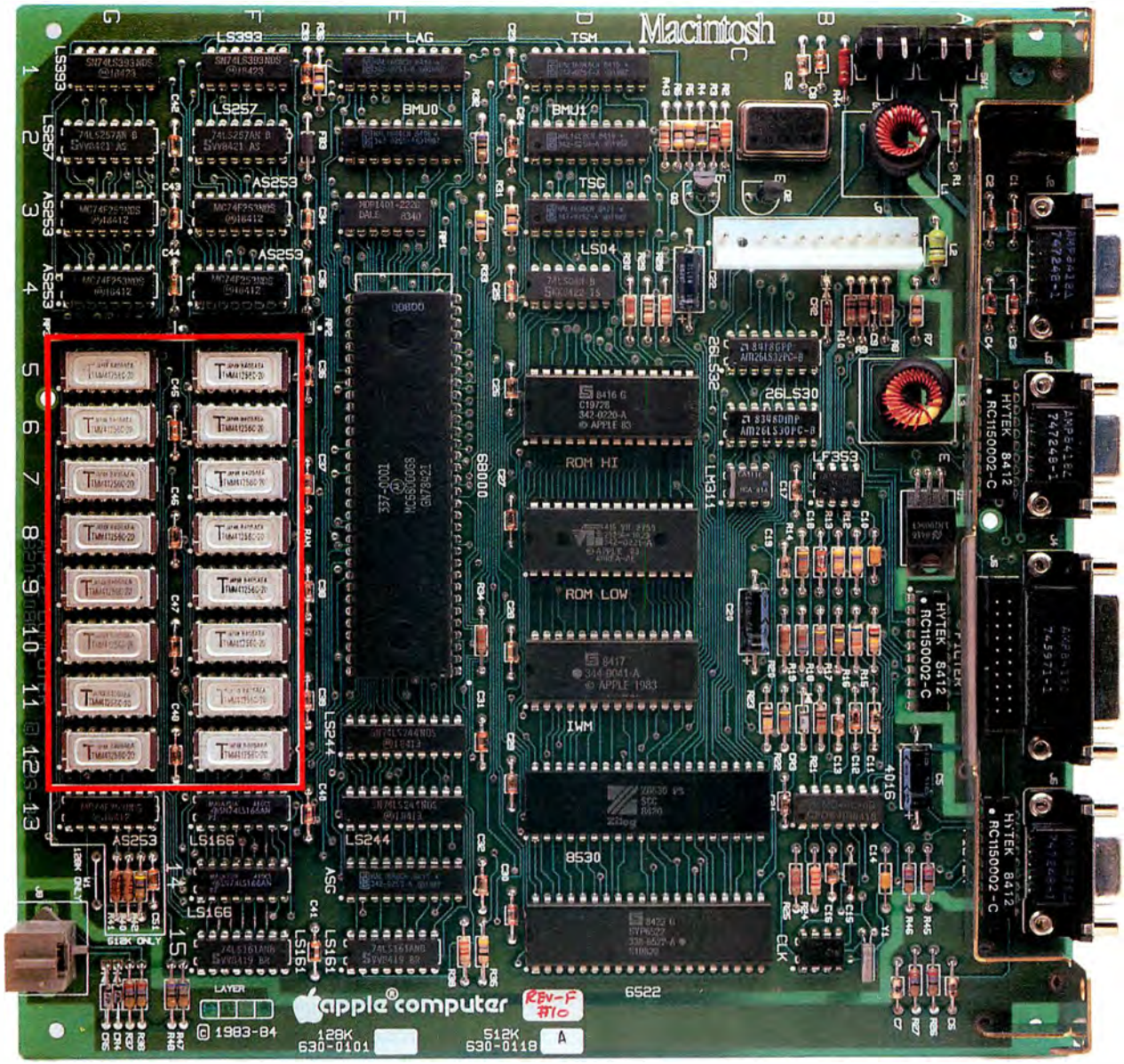


Figure 1

The 512K logic board is similar to the 128K board except that the 16 RAM chips within the red border are of the 256-kilobit variety, rather than the 64-kilobit chips used on the 128K board. Some of the circuitry has also been slightly modified to accommodate the new chips. Many programs that run on a 128K Mac will perform better on the 512K Mac. Sophisticated business and educational software that needs more memory than the 128K Mac provides will undoubtedly be developed.

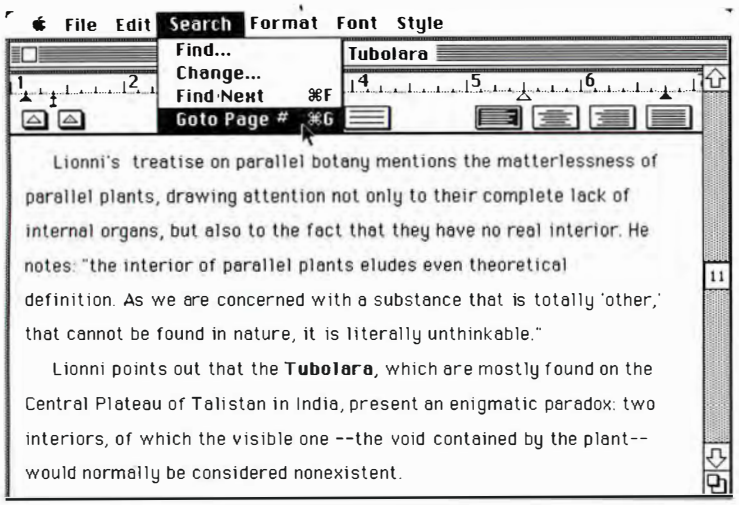


Figure 2

With the new disk-based version of MacWrite *you can create documents of more than 50 pages on a 128K Mac, and of about 250 pages on a 512K Mac. Among the other enhancements are a dynamic page number display, a Go to Page # feature, and a Find Next feature that allows you to close the Find dialog box and use the ⌘-F keyboard combination to search for a word or phrase.*

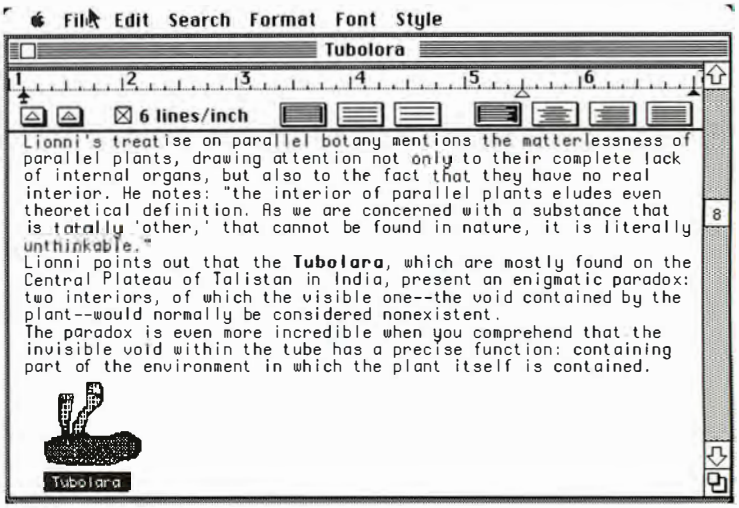


Figure 3

The MacWrite *ruler has a new button that lets you set the line spacing at six lines per inch (or three lines per inch double-spaced). This feature formats* MacWrite *text so that it conforms to the standard dimensions of preprinted forms. It also allows you to use superscripts and subscripts, and to change font sizes without affecting line spacing.*

Previously, a *MacWrite* document could be no larger than about 23K of the available RAM in a 128K Mac—roughly 15 pages of double-spaced text. Document size is limited to 23K because the entire document must reside in memory at once. An advantage to this original scheme is that with the entire document resident in memory, you can scroll the document from top to bottom almost instantly.

A program that uses virtual memory, however, stores on disk (rather than in memory) parts of the document that aren't being worked on, so that much larger documents can be accommodated. As you scroll through a document, the program automatically loads new sections of the document into RAM, while temporarily saving sections from the beginning of the document on disk. When you finally save the entire document, the program reassembles the pieces into one master file, which you see as a *MacWrite* document icon on the desktop. The new *MacWrite*'s document management scheme gives the 128K Mac a maximum document size of slightly more than 50 typical double-spaced pages. With a 512K Mac, you can create a document literally as large as a storage disk—over 250 double-spaced pages.

The second most important improvement made to *MacWrite* is the addition of a page number display in the white box in the scroll bar (see Figure 2). This feature gives you feedback about your location in a document. As you scroll, the current page number is displayed in the box. Similarly, if you drag the box to speed your way to a distant location in the document, the page number changes as you move the box up or down the scroll bar. Additionally, the new *MacWrite* Search menu includes a Go to Page # option to help you zip to a particular page in your document. Alternatively, you can type ⌘-G to display the Go to Page # dialog box.

Another addition to the Search menu is that Find Next is a separate menu option, complete with its own keyboard command equivalent. You can close the Find dialog box and continue to search for occurrences of a particular word or phrase by pressing ⌘-F. This feature should help your keyboard work flow more easily, since you don't have to use the mouse.

You'll also notice a new button in the *MacWrite* ruler. Clicking on this button formats the text at six lines per inch, or three lines double-spaced (see Figures 3 and 4). This feature is useful for fitting text on preprinted standard forms. Also, when you write in

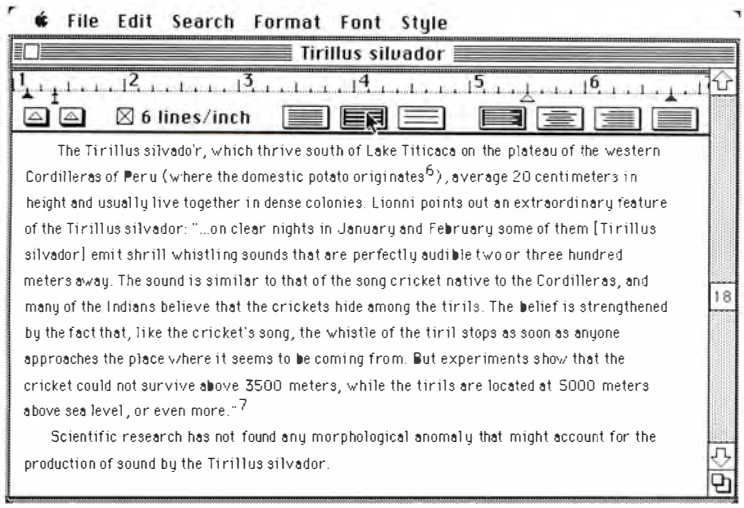


Figure 4

This document was created using 10-point Geneva and 1½-inch line spacing at 6 lines/inch. At 6 lines/inch, single-spaced, the top portion of characters in font sizes greater than 12-point will be clipped off at the top. You can use larger font sizes with the 6 lines/inch feature if you change the line spacing to 1½-inch or double-spacing.

the six-line-per-inch mode, superscripts, subscripts, and changes in font sizes do not affect the line spacing as they do in the default setting. Other changes in *MacWrite* include a new printing dialog box that adds an option to pause (and continue) printing (see Figure 5).

Apple reports that its software engineers will not change the System Disk for either the new 512K Macs or for software upgrades. And, even though the 512K model contains a new logic board, the new board uses the same ROM (read-only memory) as the original Mac.

The RAM Disk Potential

If you are familiar with other high-powered personal computers, such as the IBM PC and compatible machines, you may know about a productive way to put the extra memory these computers can handle to use. A special program, called an electronic disk or RAM disk, configures a portion of the computer's memory so that the computer views the memory as a floppy disk.

Although Apple has not mentioned any plans to market RAM disk software for the Mac, it is very likely that a third-party supplier will offer such a product. I tested a RAM disk prototype and found that it markedly enhances the performance of the Mac. Because all of the information the Mac needs to run an application exists in the computer's RAM, the delays you experience as the Mac transfers (reads) information into memory from the disk or transfers (writes) information from memory to the disk are eliminated. Changing fonts in *MacPaint* with a RAM disk is virtually instantaneous. Ideally, you want to put on a RAM disk those programs that frequently swap information between the disk and memory. By putting an application and the System Folder on a Mac RAM disk, you glide in and out of applications in about two seconds.

A RAM disk is only temporary storage, however. As soon as you turn off the Mac, the contents of the RAM disk disappear, as does everything else in the computer's RAM. Consequently, you must remember to save your data on disk as you work and before you turn off the computer.

Do You Need 512K?

In asking yourself which Macintosh model is the right one for you, you have many factors to consider. Perhaps cost is of prime importance. The premium price you pay for a half-megabyte Mac is in the same range as the basic Lisa 2 computer. The Lisa 2 comes with 512K of memory and can be upgraded to accept either an external 5-megabyte or an internal 10-megabyte hard disk and up to one megabyte of RAM. With an Apple program called *MacWorks*, the Lisa is capable of running most Macintosh software in addition to its own library of impressive productivity software, such as the Lisa 7/7 package. But you get three things with the Mac that you don't get with the Lisa: easy transportability, a small footprint on your physical desktop, and advanced sound circuitry.

Figure 5

In the original version of MacWrite, *when you print a document, the program displays the message, "Now printing. To cancel, hold down the ⌘ key and type a period (.)." When you print with the new version of* MacWrite, *the program gives you an interactive dialog box that allows you to cancel, pause, or continue printing. The Pause option allows you to adjust the printer during the printing process without aborting the Print command.*

Of course, you don't have to begin your Mac life with a 512K machine. You can start out with a 128K Mac to get a taste of computing Macintosh style. If you then discover that software you want to run requires additional memory, you can upgrade your Mac.

But one effect the 512K Mac will likely have is to spawn the development of business-oriented software that functions well with lots of memory. Apple has provided more than 50 third-party developers with 512K Macs to help speed up development of 512K programs. Many current and prospective Macintosh owners are waiting for a program from Lotus Development, the company that designed and markets *1-2-3*, perhaps the most popular program for the IBM PC. *Symphony*, Lotus' newest program for the PC, integrates five productivity tools—financial modeling, data base management, word processing, telecommunications, and presentation graphics. It will now be possible to run such programs on a 512K Mac.

✦✦✦✦ *If you now own a standard 128K Mac, don't believe for an instant that your computer is obsolete.*

Some programs already running on the 128K Mac will be released in 512K versions. We may also see a rash of programs for the 512K Mac that have been long promised for the 128K model. Many of the delays in releasing software for the Mac have been caused by the difficulty developers have experienced in trying to compress their programs into the relatively small space available on a 128K Mac. But that's not to say that the 128K machine will be abandoned.

Apple maintains that every one of its Macintosh software products will be usable on the 128K as well as the 512K Mac. Many of the programs will perform better on the larger-memory machine. For instance, the new *MacWrite* will allow increased document size, the new *MacPaint* will facilitate quick scrolling, and *MacDraw* and *MacProject* documents can contain more objects and information. Another point to keep in mind is that Apple expects 60 to 70 percent of the Macs going out store doors to be 128K Macs. Therefore, software developers will be eager to supply programs for the most widely sold machine—the 128K Mac.

If you now own a standard 128K Mac, don't believe for an instant that your computer is obsolete. You may discover that you don't need the deluxe model. You may only need a second disk drive and software that uses techniques such as virtual memory to take advantage of the memory your Mac has.

If, on the other hand, you're now looking into the Macintosh for the first time, consider what software your work demands. If the software requires 512K, then by all means the transportable 512K Mac or desk-bound Lisa (equipped with *MacWorks*) is the way to go. When software that turns the extra memory into RAM disk becomes available, you'll have a superfast, state-of-the-art personal computer at your fingertips. □

✦✦✦✦✦✦✦✦✦✦ *Danny Goodman is the author of several personal computing books, including* Going Places With the New Apple IIc, Word Processing on the IBM Personal Computer, A Parents' Guide to Computers and Software, How to Buy an IBM PC, *and the* Simon & Schuster Guide to the TRS-80 Model 100. *He has appeared as a product reviewer and commentator on the Public Broadcasting television series* The New Tech Times.

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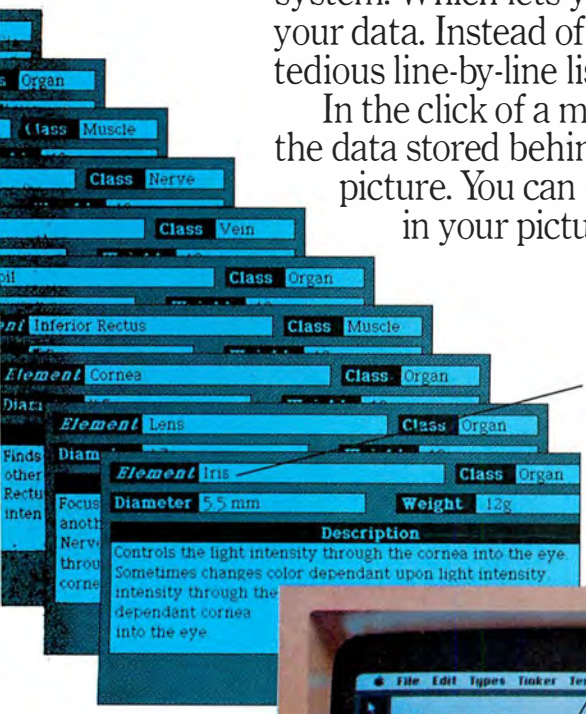
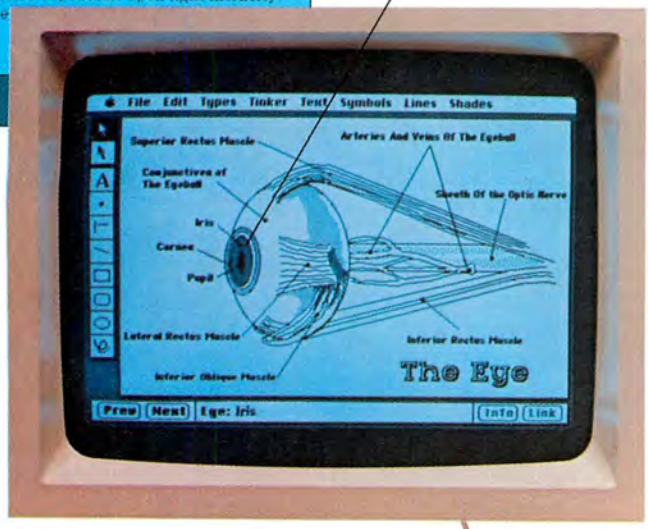
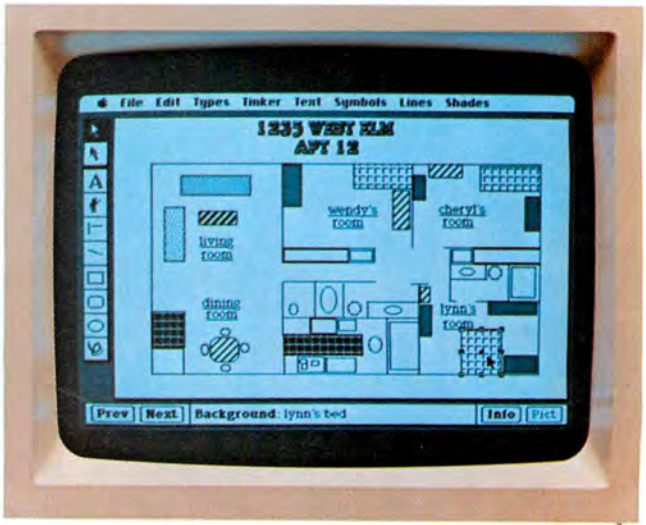
Whether you're an entrepreneur, a businessperson, or someone who collects things at home; if your data relates to



Each object in your picture is automatically connected to the information about that object.



Create technical illustrations or pictures of science class projects, with ease. Whatever you need to remember about your picture, Filevision lets you store on forms connected to it. And retrieve in the click of a mouse.



Organize office space by department. Diagram a summer home. Even create a play book for your football team. It's a breeze with Filevision.

something you can see, you can file it visually with Filevision. And retrieve it visually, too.

You simply place objects in a picture, or select symbols from Filevision's ready-made symbol menu to represent pieces of the information you wish to file.

Then there's Filevision's flexible way of handling alphanumeric data. Each object in your picture is automatically connected to a data form. Which you custom design, quick as a click.

"For a change, it's simple to modify my files."

Updating your files is just as easy. Whenever the best-laid plans of mouse and man need a little replanning, remember you're just a click or two away from reperfecting your files. Create new symbols and objects, and add them to your picture.

Make a data form for any new object, and all objects of that type will have the same form. Automatically.

Modify a symbol and all matching symbols in your picture will be modified. Automatically.

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"Picture the potential."

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Filevision can help you quickly make maps, and dawdle over the demographics. Assemble anatomical drawings and look up the names of the ligaments. Separate a plan of Bar Mitzvah guests into those who do and those who don't eat Kosher food and actually see who you seat them next to. Pinpoint places and connect them to faces. Control your inventory by depicting your entire shelf space. And map out geography lessons, sales territories and direct-mail ad targets ad infinitum.

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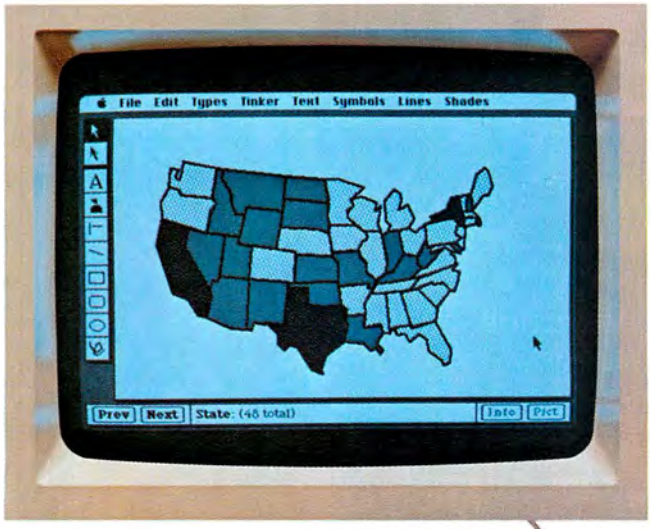
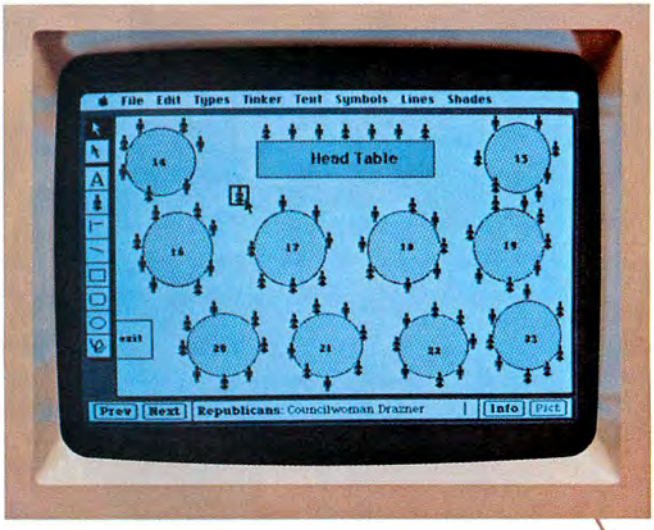


Map out sales territories. Sift out subdivisions for direct-mailings. Or search out the states that participated in the French and Indian Wars. Filevision makes your requests pop off the screen. In the click of a mouse.



Plan a political fund-raiser with Filevision, and seat the non-smoking Independents away from the smoking Republicans. Or, click to see which blocks of seats have been reserved at your dinner theater.

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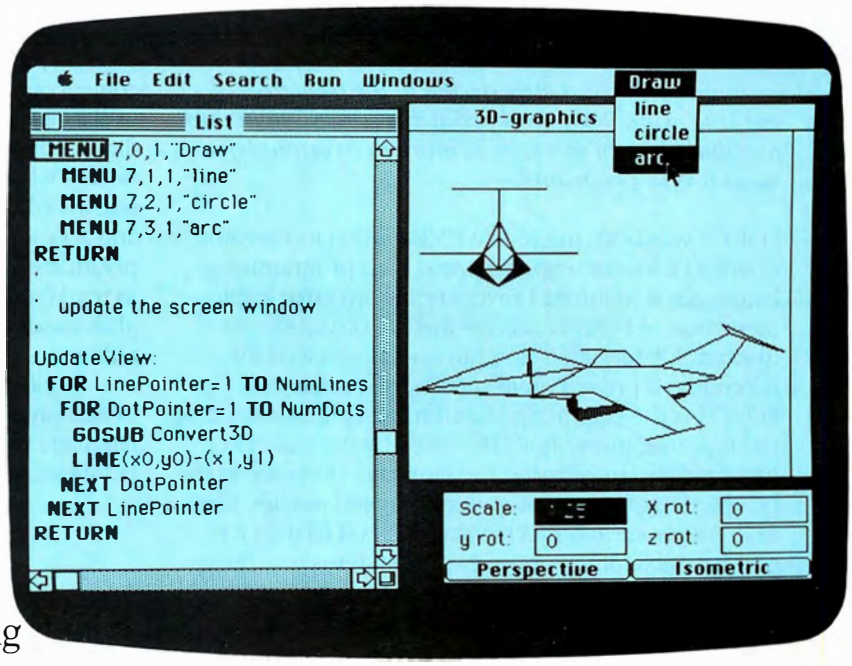
It makes editing programs as easy as cutting and pasting and pointing and clicking. Debugging is easier than ever with the advanced trace command.

It's no wonder Microsoft is the most logical choice for the Macintosh.



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The MacFORTH Dimension

Richard Sprague

While other software companies were readying their full-blown "traditional" programming languages for expectant Macintosh programmers, one very powerful but relatively unknown language was already available in April—MacFORTH. It gives programmers full and easy access to the treasures of the Mac's 64K ROM, and produces code so tight and fast that 128K of memory is more than enough for most useful programs.

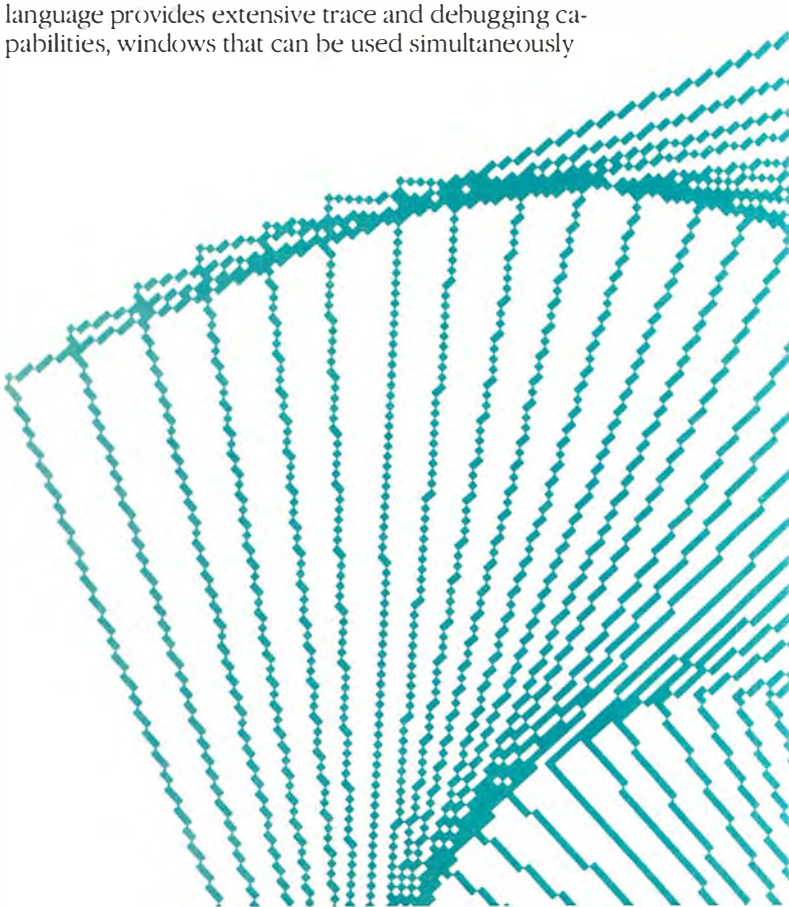
FORTH was born in the late 1960s, when its inventor, Charles H. Moore, experimented with programming languages at Stanford University. Moore's first implementation of FORTH was for the National Radio Astronomy Observatory and ran on a Honeywell 316 computer. It proved quite successful; even today, FORTH is the premier programming language used by radio astronomers. FORTH is used by the makers of many video games and is the language of choice in the production of many computer-animated movies. General Telephone and Electronics, Inc. (GTE) uses it to build artificial-intelligence expert systems.

In 1973, Moore formed FORTH, Inc. to license commercial versions of FORTH, and in 1978 the FORTH Interest Group (FIG) was formed by a small but devoted band of FORTH enthusiasts. The FIG people wrote a generic FORTH for all the important microprocessors at the time and gave away the system to anyone who asked. It's mostly through the group's efforts that FORTH is known at all today, and their spirit of turning FORTH into "a language for the people" is still important in the FORTH community.

Many versions of FORTH are available, running on almost every kind of computer, but because the nature of the language makes standardization difficult, it hasn't been possible to designate a "typical" FORTH system. Fortunately, most implementations are descended from the two most popular FORTHs: FIG-FORTH and an early attempt at a standard called FORTH-79. One of the best versions of FORTH-79 that runs on the 68000 microprocessor is Multi-FORTH, available from Creative Solutions, Inc. (CSI) since 1979. This version forms the basis of MacFORTH.

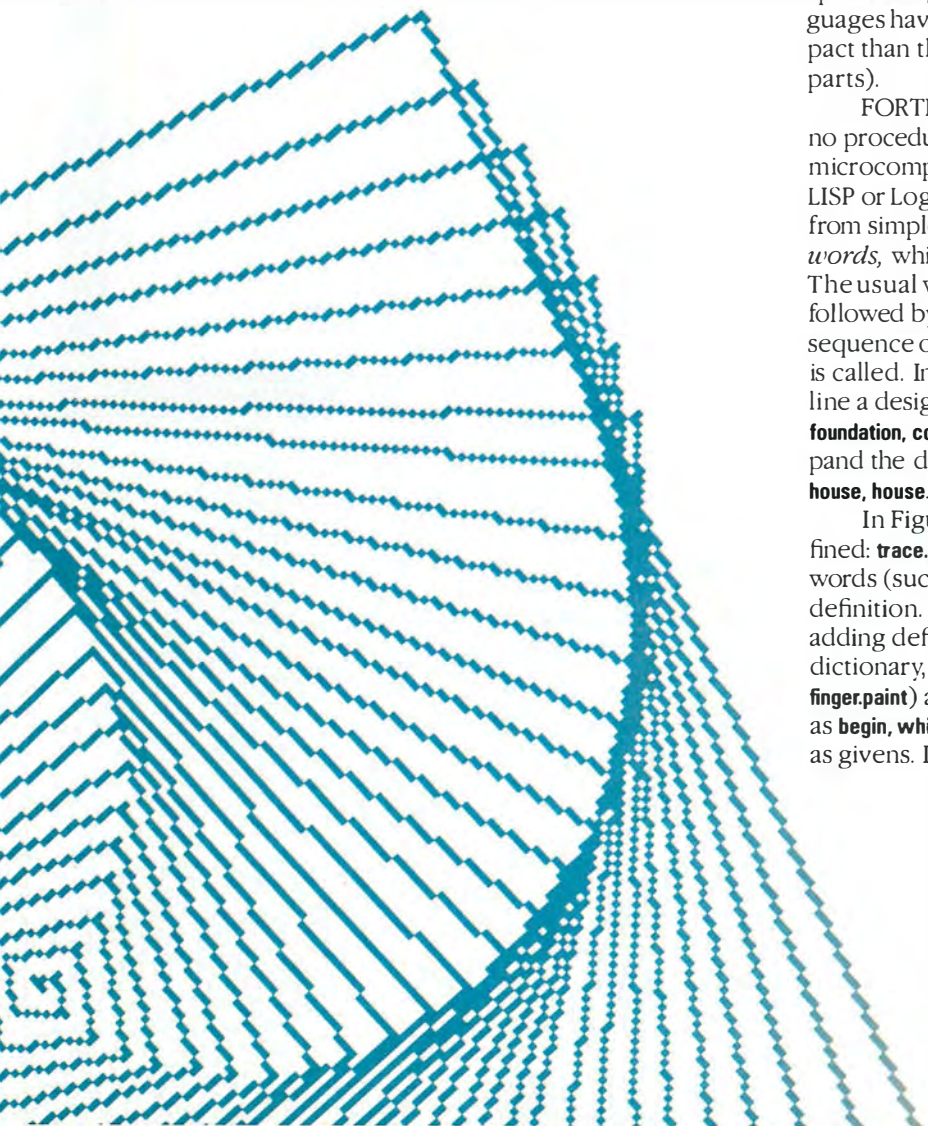
Programmers seem to have two sharply divided opinions about FORTH. There is an almost cultic following of devotees who believe that FORTH's programming environment operates much like the human thought process. These programmers like the direct control of the hardware that FORTH gives them, as well as its speed, compactness, and portability. A conflicting opinion comes from some computer professionals who still see FORTH as a "hacker's" language, useful only in situations in which memory efficiency and access to the computer's hardware are the highest priorities. They point out that FORTH code is difficult to read (unlike BASIC or Pascal, it barely resembles English) and that this characteristic makes debugging tedious.

Some of the features included in MacFORTH would surprise FORTH skeptics. This version of the language provides extensive trace and debugging capabilities, windows that can be used simultaneously



The name FORTH is derived from Charles Moore's belief that his creation is a "fourth-generation" computer language. Moore changed fourth *to* FORTH *because the IBM 1130 he was using accepted names no longer than five characters. The spiral below is an example of graphics that can be created using MacFORTH.*

for editing and executing code, user-definable menus, access to almost all of the Mac's User Interface Toolbox, and access to all the QuickDraw routines for creating fast graphics. MacFORTH has an additional advantage that is already being exploited: it is the only current alternative to the Lisa Pascal development system for Mac programmers. You can develop commercial-quality applications in MacFORTH, using the Mac as a stand-alone development system.



The Power of FORTH

Just about every aspect of programming in FORTH is different from other languages. First, it's an interactive language; programs are *compiled* as you write them, and *interpreted* as they are run. The FORTH interpreter is a simple program that translates FORTH code into an "abstract" assembly language. The resulting code is then ready for interactive execution. This design results in much faster execution speed and greater memory efficiency than most languages have (some FORTH programs are more compact than their equivalent assembly-language counterparts).

FORTH has no line numbers as BASIC does and no procedures as in Pascal. If you compare it to other microcomputer languages, FORTH most resembles LISP or Logo, in that its programs are objects built up from simpler objects. The objects of FORTH are called *words,* which are "defined" in terms of other words. The usual way to define a new word is to type a colon followed by the name of the new word followed by the sequence of words to be executed when the new word is called. In this kind of programming syntax, to outline a design for a house, you would say **:house, construct foundation, construct frame, construct walls,** and so on. To expand the design into a city, you would simply say **house, house, house**.

In Figure 1, for example, two words are being defined: **trace.finger** and **finger.paint**. Each word calls other words (such as **hide.cursor, begin, @mousexy**) as part of its definition. Thus, programming becomes a process of adding definitions to the FORTH "dictionary." As in any dictionary, the more complex words (**trace.finger** and **finger.paint**) are defined in terms of simpler words (such as **begin, while, if**), and the simplest words must be taken as givens. In FORTH the simplest words are called

primitives, and MacFORTH also comes with a large set of predefined words (for graphics and other Mac-specific commands) defined in terms of the primitives. The whole structure forms the *nucleus,* or *kernel,* that you get when you buy the system.

FORTH's extensibility (the ability to define more words and add them to the dictionary) comes in handy immediately because each programmer soon builds a library of commonly used routines. For example, you may often need a routine to draw a fancy shape or a company logo. In BASIC, you must retype this routine in each program that uses it, perhaps modifying it slightly to prevent conflicts of global variables and

MacFORTH adds many features to the basic FORTH system, taking advantage of the Mac's unique capabilities.

other problems that arise in unstructured programming languages. In Pascal, you must compile the routine and include it explicitly as a library procedure in every program. But in FORTH, the new routine can become part of the system, indistinguishable from the kernel words that were in the dictionary from the beginning.

Another major difference between FORTH and other languages is the *stack,* a "last-in, first-out" (LIFO) portion of memory used to store and retrieve information. Similar to the way plates are stacked in a cafeteria, the newest piece of data is positioned on top of the stack. Data items in the stack can be accessed only by removing the items on top of them. Whenever a word requires information from another word, it pulls the information off the stack; whenever a word is ready to send information, it places the information on the stack. FORTH has several words that are used to move items around on the stack. The stack usually contains only a few items, just enough to process the information needed for the current task.

All FORTH parameters are passed in a backward manner called *Reverse Polish Notation (RPN).* If you're familiar with Hewlett-Packard calculators, this sequence won't seem strange, but it means that almost all FORTH operations seem to be in reverse order. For example, 1 + 2 in BASIC or Pascal comes out as 1 2 + in FORTH. Usually, fewer steps are required to complete an operation using RPN logic than standard notation. This way of programming seems awkward at first and takes some getting used to, but it soon becomes natural and even preferable once you realize that you gain time and efficiency.

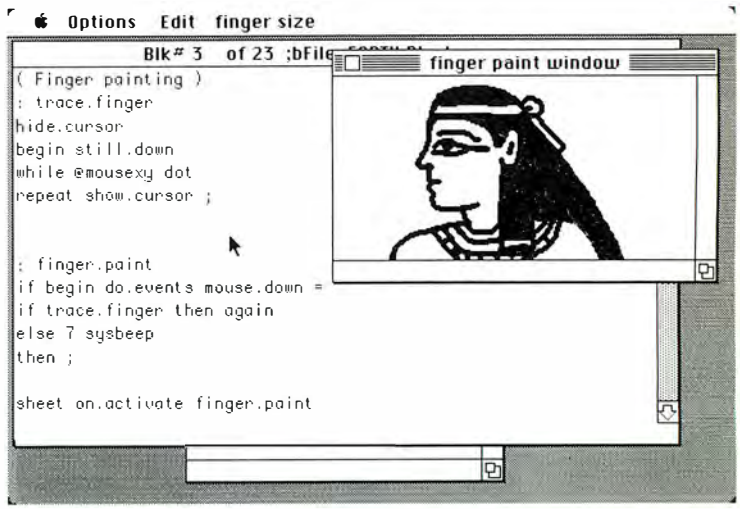


Figure 1

You can define as many windows as you like, and each can be set to run its own program independently. This window is referenced by the word **sheet**, *which activates the word* **finger.paint** *when* **sheet** *becomes the active window, as specified in the last line.*

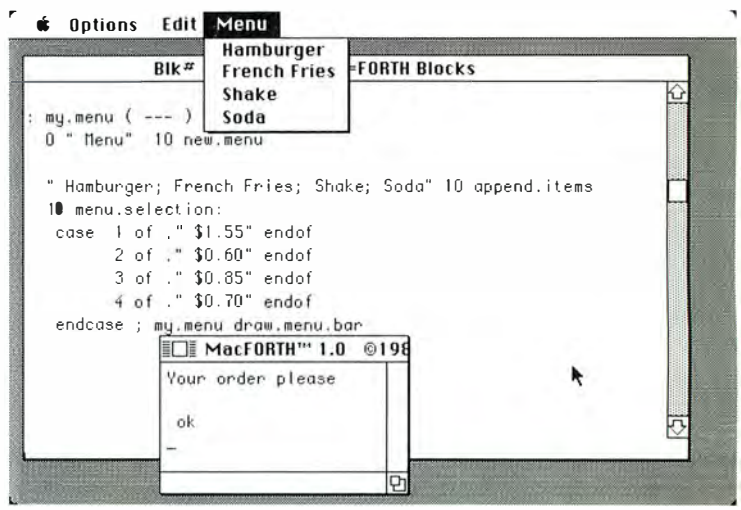


Figure 2

Macintosh-style menus are easy to create in MacFORTH. This FORTH block window contains the only code needed to make a four-item menu and have it execute a word of your choice when selected. The menu is created and given a title by the word **new.menu**. *Further calls access the menu by its number (in this case, 10).* **Menu.selection** *lets the programmer decide what will happen when the mouse pointer selects each menu option, and the menu is displayed by the word* **draw.menu.bar**.

MacFORTH Styles

CSI sells three versions of MacFORTH, and each is targeted at the needs of different Mac users. Level 1 ($149 and available since April) is all that most programmers will need. It allows access to the most common of the Mac's important ROM routines, has an editor that uses the same commands as *MacWrite,* and contains all the FORTH commands found in a good implementation of FORTH-79.

MacFORTH Level 2 ($249) is designed for people who want more control of their Macs. It's probably best suited to technically oriented programmers and people who want to dig deeper into the software of their computers. It includes a built-in assembler (again, in FORTH's RPN syntax) that can be patched directly into normal FORTH code for speeding up programs. It also includes many advanced graphics commands like **picture** and **region construction**.

Level 2 provides virtually every QuickDraw primitive and gives you complete access to the two serial ports, allowing you to connect to most serial printers or other external hardware. As an added bonus, you can control the Mac's speaker and create many dazzling sound effects. (Level 1 lets you control only the duration of a monotone beep.)

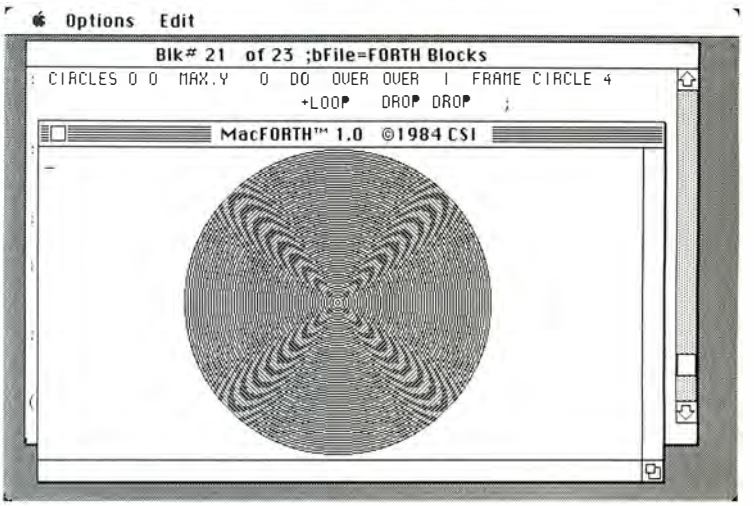
MacFORTH Level 3 is the ultimate version. Because Level 3 costs $2500, it is for serious program developers only. The version includes CSI support with a more comprehensive manual than the other versions have and service if you need it. Its main extension from Level 2 is a Snapshot routine that lets you freeze everything in the application program so users don't need MacFORTH to run an application. This capability lets you generate commercial-quality application programs. If you're planning to market any of your programs, you'll need Level 3. It comes with a right to execute licenses for 250 copies of your program, but you have to pay royalties to CSI on all software you sell.

The Power of MacFORTH

Each version of MacFORTH includes the FORTH kernel, an editor, documentation, a short introduction to FORTH, and several demonstration programs. MacFORTH adds many features to the basic FORTH system, taking advantage of the Mac's unique capabilities. A series of simple words and data structures allows use of menus, windows, QuickDraw graphics, and the mouse.

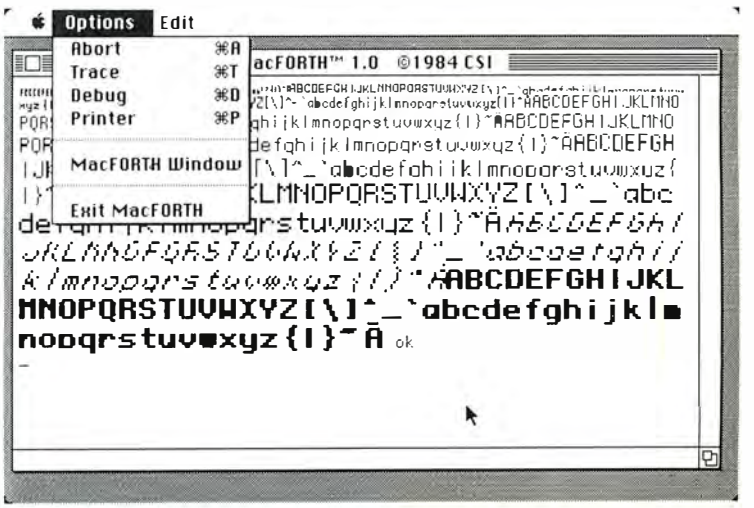
To create your own menu, for example, just specify the text for the menu and each of its items, as well as the action to take for each selected item. Then you can enable/disable, insert/delete, associate, and modify each menu item any way your program requires (see Figure 2 for an example of setting up menus).

Windows are easy to create with MacFORTH. You can define as many windows as you like, giving each its own attributes such as size, initial position, and



Circle Medallion

Simple calls to the QuickDraw routines in ROM make it possible to draw this medallion in two lines. The words **OVER** *and* **DROP** *manipulate the FORTH stack, in preparation for the other commands.* **DO** *and* **+LOOP**, *like* **FOR**...**NEXT** *in BASIC, set up a simple interaction on* **CIRCLE**, *the MacFORTH word that draws a circle with a given radius and position.* **MAX.Y** *keeps the circles within the bounds of the current window.*



Font Demo

MacFORTH lets you choose any of the Mac fonts or styles for screen or printer output. Any font size can be selected by the command TEXTSIZE, which causes further text to be displayed in the specific font size. This feature can be useful, for example, when you need to show more than 80 characters on a line.

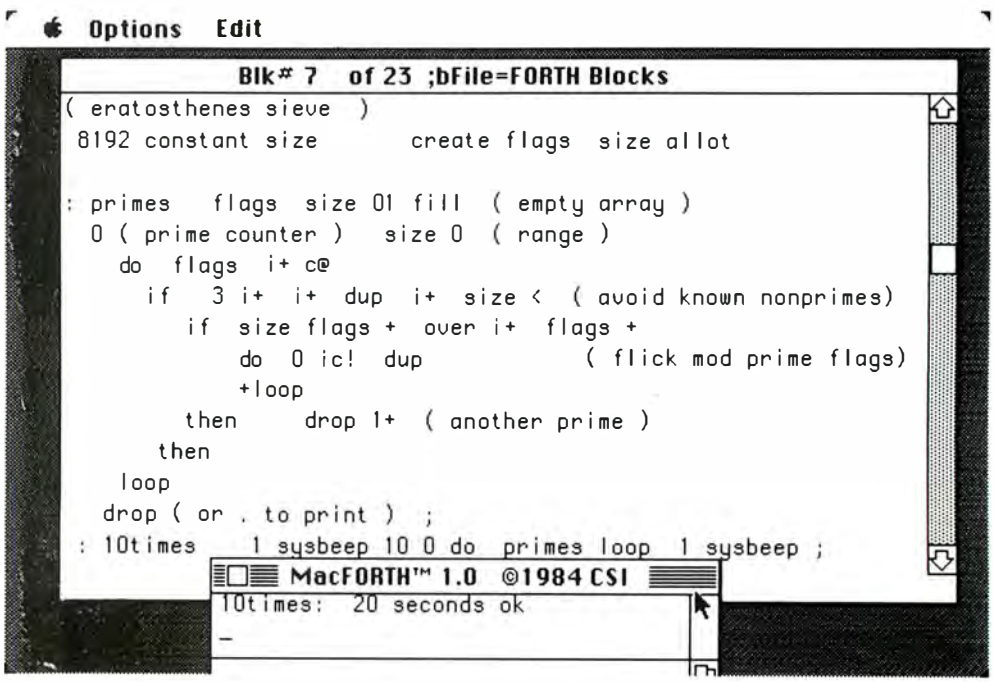
MacFORTH for Experts

If you're already familiar with the world of FORTH programming, you'll be curious about some of the technical aspects of MacFORTH and how the language is integrated with the Mac's special hardware. MacFORTH was written by CSI's president, Don Colburn. CSI has been making the 68000 microprocessor FORTH system for Hewlett-Packard Series 200 Desktop computers since 1979. That version, called Multi-FORTH, has multitasking capabilities, floating-point packages, debugging tools, and other necessary programming features. MacFORTH is the little brother of Multi-FORTH, specially tuned for Macintosh users.

Most microcomputer FORTHs were designed for a 16-bit FORTH word, but since the Mac has 32-bit words, one difference you'll notice is that there are no unsigned arithmetic instructions. All FORTH addresses are 32 bits long.

MacFORTH also takes advantage of the 68000's rich instruction set: the CMOVE and CMOVE> instructions have been optimized for blindingly fast block moves. There are special words for 1+, 2+, 3−, etc., for incrementing and decrementing from −9 to +9, which is a handy way to increase program execution speed. Inside DO LOOPS are special instructions that make it quick and easy to store or fetch items from memory as you iterate. MacFORTH's compiling speed is amazing. You can compile several dozen blocks a minute, making programming even more interactive than with other FORTH systems.

Even Level 1 MacFORTH comes with a series of words that form part of the "Toolbox Interface," but most are undocumented until you move up to Level 2. CSI claims that these words allow you to access virtually every primitive in the Mac's 64K ROM with a minimum of programming.



Sieve of Eratosthenes

A simple FORTH program can look unreadable to a novice, but with experience it becomes easy to read. In this example, the program computes the first 2000 prime numbers ten times in 20 seconds using the popular Sieve of Eratosthenes benchmark created by Jim Gilbreath. A typical FORTH running on another computer may take ten times as long as MacFORTH to run the program, and a version of BASIC or Pascal wouldn't come close to the speed of FORTH.

Plenty of interface words are provided too, including all you need to create a simple terminal emulator. In fact, the reference manual gives instructions for interfacing MacFORTH programs with Pascal programs.

For displaying text on the screen, you can choose any font or style (including automatic scaling for point sizes that aren't built into the system). This capability complements the Mac's excellent bit-mapped display, but unfortunately it makes screen output painfully slow. Text display is probably MacFORTH's only slow operation.

An elaborate system of separate headers leaves the name field of each word in a different part of memory from the body of the definition. The process increases execution speed, and makes it easy to generate "headerless code" for application programs. This intricate memory arrangement is complemented by a combination of direct and indirect threaded code for maximum-speed performance.

MacFORTH programs can control the amount of memory allocated to object and vocabulary data structures. When MacFORTH is loaded from the disk, the Memory Manager places it at the base of the Mac applications heap. Then MacFORTH instructs the Memory Manager to allocate a block of memory for storing your programs and data. A series of words, such as ROOM and RESIZE.OBJECT, makes it possible to rearrange chunks of memory after they've been allocated.

CSI went to extraordinary lengths in making their system fast, and the work has paid off. For example, MacFORTH can do Jim Gilbreath's Sieve of Eratosthenes, a well-known benchmark in the FORTH community, in a zippy two seconds (see the figure labeled "Sieve of Eratosthenes"). Except when displaying text, MacFORTH is undoubtedly the fastest FORTH available for a personal computer.

whether it will have Mac features such as a scroll bar, a close box, and a size box (see Figure 1). Text output to a window is automatically scrolled within your defined regions.

All windows and menus can be treated independently and can be set to execute a given command (a FORTH word) depending on the actions of the mouse pointer. This feature makes it possible, for example, for a clever programmer to build a multitasking environment on the Mac that has several windows on the screen, each executing its own program when clicked on by the mouse pointer.

Because MacFORTH enables you to get closer to the machine's hardware and software than any other language now available, it is an ideal language for enthusiastic Mac programmers who want to squeeze extra power from their computers.

Documentation Problems

Because in the past FORTH has been used mostly by people who have strong technical backgrounds, good documentation hasn't been very important. The documentation supplied with MacFORTH is thorough by previous FORTH standards, but it's not up to the standards of polish and sophistication that other Mac products have established.

The documentation is acceptable, when you can find the item you're looking for in the index. A 118-page glossary of FORTH words in the system is provided, but almost all entries have sketchy descriptions and no examples. Useful examples are included elsewhere in the manual, but you have to thumb through it each time to find the word you're looking for.

Although the documentation (which includes a computer-aided instruction program you can run from FORTH) is good enough to familiarize most people with the basics of FORTH, you'll need other references to help you appreciate the power of the language (see "FORTH Bibliography").

Other Worries

You might have problems caused by the FORTH language itself, though MacFORTH does its best to minimize them. Think of FORTH as a power saw: it can do amazing things when it's in the right hands, but for the uninitiated it can make a mess. FORTH gives you unlimited access to the Mac's memory, but novices may modify the wrong memory location, which can cause the system to crash. Of course, this mistake won't hurt your Mac or the software, but you'll see the "system bomb" message more often in FORTH than in other languages. As you gain experience, this situation will occur less often, but it's something to keep in mind at the beginning.

Another frustration you may face is the fact that FORTH does its arithmetic entirely in integers, which is one reason that the language is so fast. If you need floating-point numbers, be warned that creating them isn't as convenient as in other programming lan-

FORTH Bibliography

If you've never used FORTH before, you'll find MacFORTH difficult to learn with only CSI's documentation. You'll need to buy other FORTH publications written for novices. A computer-aided instruction course comes with the CSI system, and though you'll find it interesting, it probably won't be very helpful. If MacFORTH is your first FORTH system, some of the following books and articles probably will be as necessary as the MacFORTH manual.

Starting FORTH

Leo Brodie
FORTH, Inc.
Hermosa Beach, California, 1981
366 pages; $18.95

Generally considered the best introductory FORTH text and recommended by CSI, this book provides a thorough, humorous introduction that is suitable for people new to FORTH, including those who have never programmed before.

Discover FORTH

Thom Hogan
Osborne/McGraw-Hill, Inc.
Berkeley, California, 1982
145 pages; $16.95

This is another good book, even less technical than the previous one and a good alternative for those who find Brodie's humor distracting. It's also a good introduction to FORTH-79 and FIG-FORTH.

The FORTH Encyclopedia

Mitch Derrick and Linda Baker
Mountain View Press
Mountain View, California, 1982
344 pages; $25

This is the most valuable reference book a FORTH programmer can have, but it's written specifically for FIG-FORTH. Beginners will probably be confused by some of the differences between FIG and MacFORTH. The publisher is an excellent resource for FORTH software and utilities.

FORTH Dimensions

Journal published by the FORTH Interest Group
P. O. Box 1105
San Carlos, CA 94070

If you really want to get acquainted with the mystic society of FORTH users, this bimonthly journal will become your source of enlightenment. It is written strictly for advanced FORTH users.

guages. After you get used to "thinking in FORTH," however, you probably won't mind having to work with integer arithmetic. Of course, since FORTH is extensible, you can always add a floating-point package to your system when you need it, for a small price in memory and execution speed.

FORTH might seem intimidating at first to programmers who have only begun to explore the abilities of their computers. The "backward" (RPN) notation, the stack data structure, and other FORTH concepts demand familiarity. But the initial frustrations are well worth overcoming, as any FORTH veteran will insist. As late as 1980, it was estimated that there were only a few thousand FORTH programmers in the world. But just as the Mac is revolutionary in bringing the power of computers to the masses, MacFORTH may reveal this remarkable language to a whole new audience. □

Richard Sprague is a freelance writer who has been programming in FORTH for two years. He also studies formal linguistics at Stanford University.

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List price: Level 1 $149, Level 2 $249, Level 3 $2500

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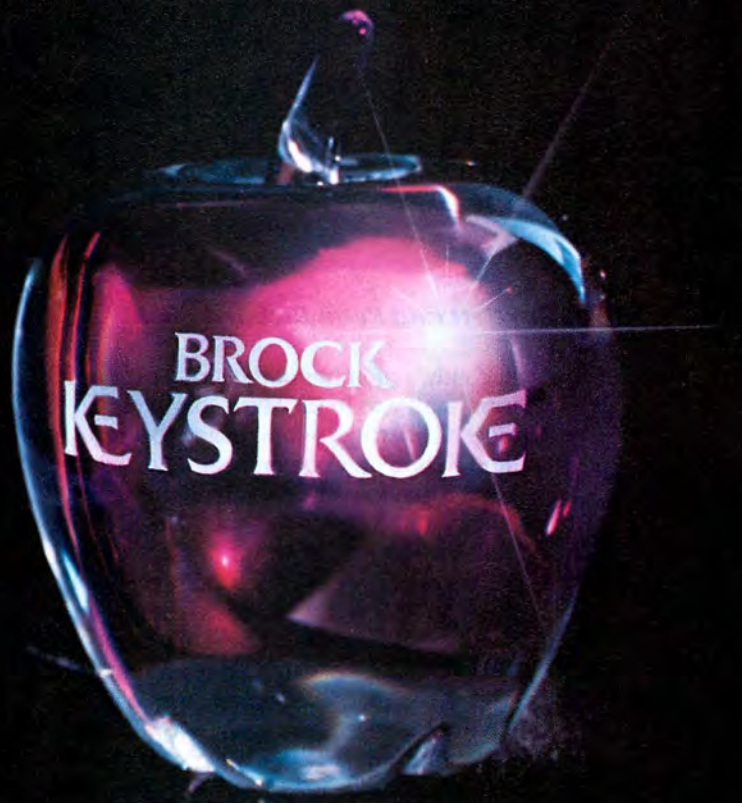

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The Living-Room Casino

Two games among the first released for the Mac bring fast-paced gambling action into your home

Jeffrey Bartlett and Keith Richard Cook

With Mac-Slots, *you can enjoy the excitement of playing keno or the satisfaction of beating a slot machine. The realism of* Mac-Slots *is enhanced by the Mac's sound capabilities and high-resolution graphics.* Mac-Jack *challenges you to play blackjack against the computer. Like a real dealer,* Mac-Jack *is hard to beat. With both games, you can win or lose a fortune without risking a cent of your own money.*

Recently, a member of the *Macworld* editorial staff was in Las Vegas, our national Mecca of betting, winning, and losing, to attend a computer conference. To go from hotel room to convention hall, the staffer had to pass through the hotel's huge casino with its flashing lights, surging noise, and clamoring crowd. At the conference itself, the editor toured the various exhibits, naturally spending a good deal of time at Apple Computer's booth. Our representative discovered that, like a microcosm of their environment, two new games for the Macintosh drew a particularly large crowd—the gambling simulations *Mac-Slots* and *Mac-Jack*.

Mac-Slots *duplicates the action of a slot machine as realistically as possible.*

These programs present an opportunity to test the Mac's success as a game-playing machine despite the lack of color graphics (for an overview of games on the Mac, see "The Wizards Behind the Screen," September/October). Both games rely on the mouse to play and on the Mac's graphics to stimulate players' interest. (*Mac-Slots* is actually two games, duplicating the action of a slot machine and of keno.) Although neither conveys the smoky, turbulent atmosphere of a real casino, how often do you get the chance to gain or lose a fortune without risking a cent of your own money?

Gambling Fever

Both *Mac-Slots* and *Mac-Jack* are played entirely with the mouse except when you sign a credit voucher after starting up the disk. The voucher agreement for *Slots* informs you in fine print that failure to pay your debt will bring a visit from two tough guys. In addition to several such humorous touches, *Mac-Slots* duplicates the action of a slot machine as realistically as possible. The major portion of the screen shows a nicely detailed representation of a slot machine, complete with the arm you pull and three wheels adorned with images such as cherries, bells, bars—and, in this case, Macs. After the wheels are spun and have rolled to a halt, each displays a single image; when the order of the three images makes a winning combination, coins drop into a trough at the bottom of the machine.

The right side of the screen holds your "bankroll"—four stacks of coins to begin with (see Figure 1). By clicking the mouse pointer on the bottom coin of the precise amount you want to bet (up to your limit), you can select and drag them over to the machine's slot. As you grab some coins, the pointer is transformed into a small hand holding a transparent outline of the coins you chose. When you have positioned the coins over the coin slot, drop them in by releasing the mouse button.

Once you've placed a bet, you're ready to try your luck. Move the pointer up to the knob at the end of the slot machine's handle and drag the knob downward until it stops. Release the button and the handle

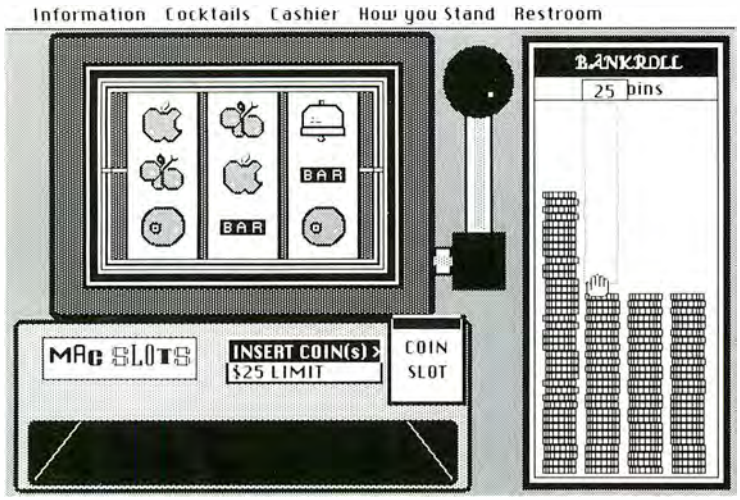


Figure 1
The Slots portion of Mac-Slots. *To deposit coins, you select and drag them with the mouse (the pointer becomes the small hand shown here). To play, use the hand to pull down the machine's handle, and then release the mouse button.*

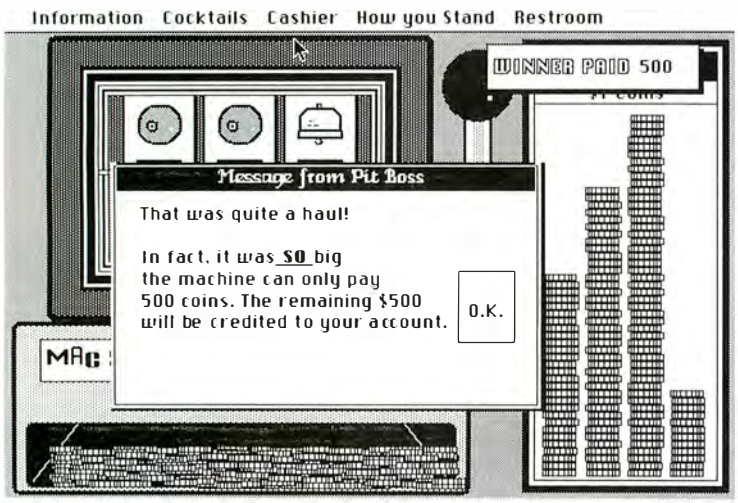


Figure 2
Only a very lucky player will encounter this message from the Pit Boss. The slot machine's capacity to hold coins in the bankroll and its supplementary buckets has been exceeded, so your vast winnings are held in memory by the program. This dialog box was generated when three Macs came up on the machine.

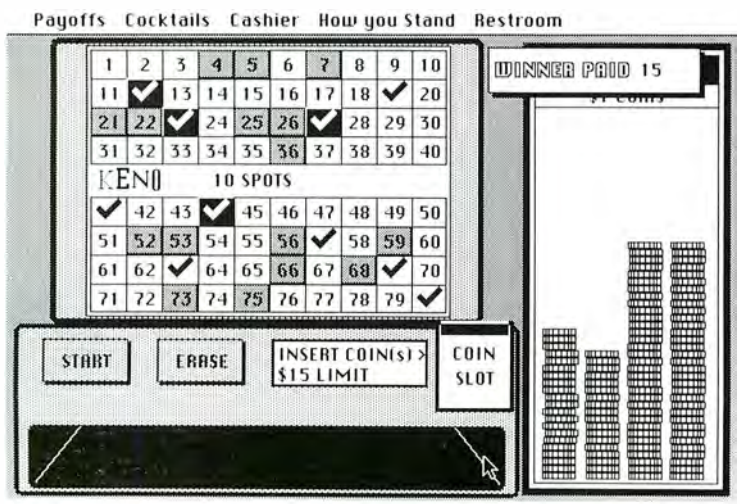


Figure 3
Mac-Slots' *Keno game. This figure shows a basic winning combination. The highlighted white arrows denote numbers where the player matched the game's random selection, and black arrows show the player's wrong choices. Darkened squares show the game's other selections, and white squares are unchosen.*

flies up, starting the slot wheels spinning. If you get a winning combination, coins drop into the coin trough and are automatically transferred to your bankroll.

Sound effects add to the game's fun and realism. Each time a slot wheel stops spinning, you hear a metallic click; a payoff is accompanied by the clink of money falling into the coin trough. Two tones that imitate a public address system precede a message on the screen from an unseen "Slot Mechanic" when you win more coins than your bankroll can hold.

The Slot Mechanic puts the excess coins into small buckets at the base of the slot machine (or the keno board). By dragging a bucket back into the bankroll area of the screen, you can replenish your supply of coins. You hit the jackpot when you score three Macs, which is the rarest combination in the game. Then you may win so much money the machine can't pay it all, and you receive a message from the Pit Boss (see Figure 2).

Keen on Keno

Keno is a number-matching game in which players pick from one to ten numbers that they hope will match some of twenty numbers drawn by the casino operators or a machine. The *Mac-Slots* version of Keno simulates the game well. The graphics in Keno are not as impressive as the ones in Slots, but the action is just as exciting as in real keno.

As in Slots, you place bets by dragging coins from the bankroll and dropping them into the coin slot. You then select from one to ten of the 80 numbers (called *spots*) on the keno board and click on Start. The game randomly selects 20 numbers and produces two tones as the numbers appear—one tone for a miss, the other for a hit. If you match four numbers out of ten with the game's random selection, you win your bet back; match more than four and your winnings increase (see Figure 3). You can continue to bet on the same numbers without reentering them, or click on Erase and select a new set of numbers.

At the top of the Keno screen are five menus titled Payoffs, Cocktails, Cashier, How you Stand, and Restroom. Slots and Keno share the same menus, with the exception of Keno's Payoffs menu, which shows payoffs for the number of success-

fully matched spots. In Slots, a similar menu labeled Information shows winning slot-wheel combinations. The Cashier menu in each game lets you buy more chips, pay back borrowed markers, change coin amounts, and cash in and quit. How you Stand shows how much you've won or lost and how much you owe the house.

Two menus, Cocktails and Restroom, reveal the *Mac-Slots* programmer's sense of humor. Cocktails has a sliding scale of drinks that range in alcoholic content from coffee to bourbon. As in a real casino, the stronger your drink is, the more money you are encouraged to bet. Regardless of how much you bet, your betting limit gradually goes up as you play the game. The Restroom menu duplicates a scenario in which you duck into the restroom to avoid being seen by your boss, who has just entered the casino. This menu's options allow you to turn the game's sound off or on or make the screen go blank.

Cashing In

Mac-Slots is enjoyable to play when you want to have fun without expending much mental effort. Unlike games that demand concentration to solve one brain-teaser after another, *Mac-Slots* requires nothing more challenging than placing bets by sliding the mouse across your tabletop. This simplicity can be a limitation, however, because games of chance don't necessarily appeal to people who like games of skill.

Mac-Slots is an example of how successfully a game can take advantage of the Mac's high-resolution graphics. The sight of coins spinning and falling as they are dropped into the coin slot is an impressive visual effect. By imitating the way a gambler physically drops coins into a slot machine and pulls the handle, you become involved in the game to a degree that wouldn't be possible if you typed each bet.

There is one obvious flaw that may puzzle players at first—the program includes no way to eject the disk. You have to eject by pressing ⌘-Shift-1 or by holding down the mouse button and switching the Mac off and on.

Shut Up and Deal

The card game *Mac-Jack* looks very much like *Mac-Slots*; in fact, even though the programs are sold by different distributors, both were written by the same programmer, Gary Crandall. The games' bankrolls are identical and they display the same type fonts. Their menus are also alike except that *Slots* has its comical Restroom menu, and *Jack* splits the Information menu into Rules and Help.

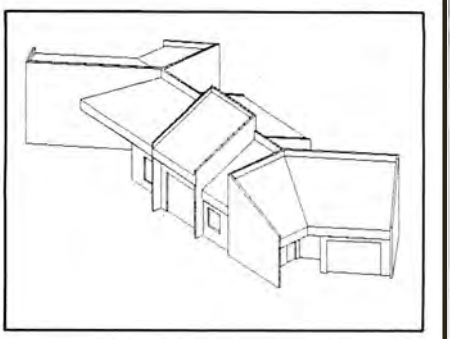
Like the other games, *Mac-Jack* attempts to duplicate as realistically as possible the play of the actual casino game it imitates. Cards appear to be shuffled and dealt by a pair of disembodied hands, which also removes the cards after the play. And like real blackjack, the game is not easy to beat. You may even suspect it of cheating, especially when your 20 is beaten by a surprise 21, as exactly the right card comes up for the dealer. (The object, of course, is to get as close to 21 points as possible without going over it.)

If you try to count cards like serious blackjack players do, *Mac-Jack* will thwart you. According to Bud Munson, one of DataPak's sales and marketing managers, after 32 cards or a few more have been dealt, the program stops all play to reshuffle randomly, which makes it hard to predict your chances of winning. However, it is a good rule of thumb to increase bets later in a round. You seem to see more tens and face cards in the earlier hands, and they can be killers when you take a hit.

Order of Play

When you start up *Mac-Jack,* the screen displays an application for credit on the left side and a list of up to 14 high scores on the right. To begin, you type your name (or an alias) in one box (this is the only time you use the keyboard during the game) and click the mouse pointer on the other box. The blackjack screen appears, with your bankroll ($100 in one-dollar chips for starters) at the right. A deck of cards and a box to place your bet in, pointed to by a hand, appear next to the bankroll.

You place a bet by choosing a number of coins with the mouse pointer and dragging them into the box. A flashing box labeled Shuffle-Up! appears and the dealer's hands do just that. After shuffling, the hands deal the cards—one face up to you, one down to the house, one up to each of you.



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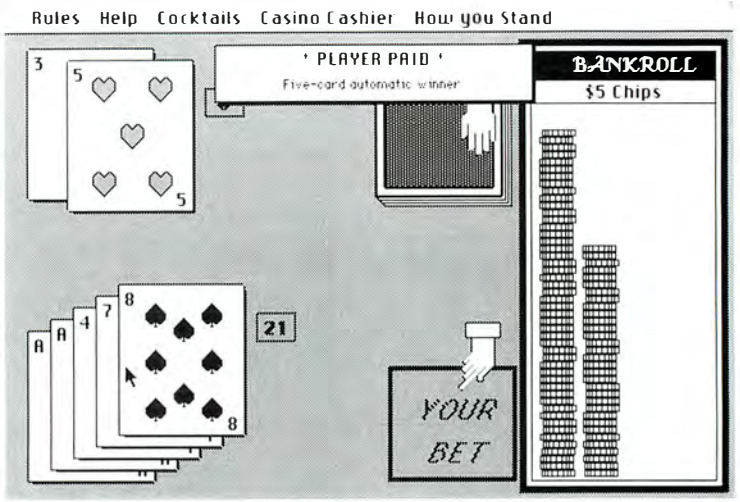

Figure 4
Mac-Jack *has just paid a winner. The disembodied hands that shuffle, deal, and clear the board also handle cash transactions, in this case by placing your bet and the amount won (which equals the bet) into the bankroll.*

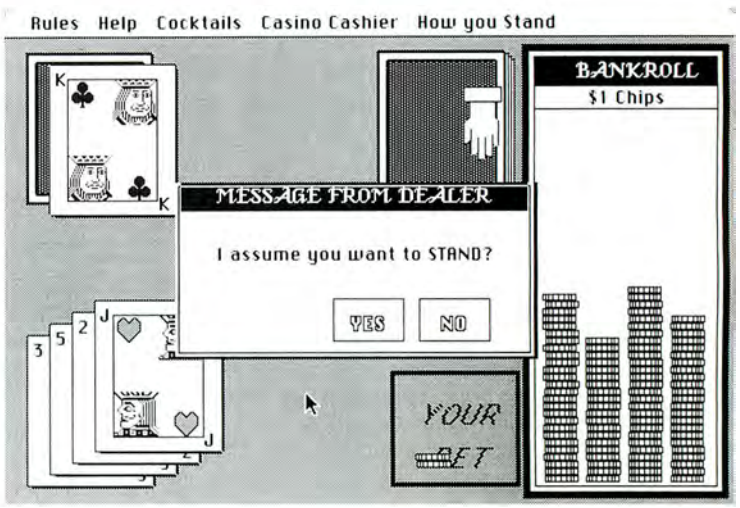

Figure 5
Another lucky Mac-Jack *hand. When you call for a hit by clicking on your topmost card, the game deals you another card. When your hit adds up to 20 or 21, this dialog box appears. Always answer yes to this question.*

At this point, you have two choices: *Hit* (take another card) or *Stand* (stick with the cards you have). To hit, you click on your top card; it is highlighted briefly, and another card is dealt to you face up. To stand, drag the stack of coins you bet onto your top card. You may take a second or even a third hit—five cards at or under 21 make an automatic winner (see Figure 4). Once you indicate that you wish to stand, the dealer plays. The dealer's hole (bottom) card is turned face up, and the house either hits or stands. The dealer must always stand on 17 (or more), even if your cards show a higher total.

If you tie, the game returns your bet to the bankroll. The two hands are compared by the program, which either takes your bet or places your winnings in your bet box and then returns both stacks to your bankroll. When you place another bet, the cards just played are pulled off the top of the screen by the hands.

Mac-Jack includes other options found in real 21. If the total on your cards exceeds 21, you *bust* and lose regardless of what the dealer holds. Any time you are dealt a pair in your first two cards, you can *split* them and play two hands at once. You can *double-down* by placing another bet in your bet box. In this case, another card is dealt to you face down, and the dealer plays. If the house busts and you have not, you win; otherwise, the usual showdown occurs. When the dealer's up card is an ace, *Jack* offers you insurance that lets you protect your bet in case the house has a natural blackjack. If you get a natural blackjack with your first two cards, you win no matter what the dealer has.

Perusing the Menus

Mac-Jack's first two menus (from the left) are Rules and Help. Once you become familiar with the game, you won't consult these menus often. The Cocktails menu, like its counterpart in *Mac-Slots,* allows you to order drinks and simultaneously raise your betting limit. The Casino Cashier, in addition to enabling you to get more chips or pay back markers, holds the menu option that lets you quit the game. Your winnings or losses are saved automatically under your name and, if appropriate, are displayed in the High Games list.

Mac-Jack has a few more features that engage the player, such as wisecracks that appear on the screen when you bust or when you dare to double-down. When you hit and the new card gives you 20 or 21, the program opens a Message from the Dealer dialog box that asks, "I assume you want to stand?," which you answer Yes (or No) by clicking on a button (you'd be crazy not to stand; see Figure 5). The program then moves your bet onto your top card.

Jack Drawbacks

Compared to *Mac-Slots, Mac-Jack* comes out second best in terms of visual and sound effects. Of greatest importance is the fact that *Jack* has no sound whatsoever–an aspect that gives *Slots* a substantial portion of its attractiveness. Apparently the programmer thought that blackjack lacks enough opportunities for sound simulation to make including it worthwhile. In a computer game that tries to simulate a real-life game, graphics are crucial, but *Jack*'s are not the best. For example, the shuffle-up routine, which appears every six to eight hands or so, is visually uninteresting and slow moving, and does not imitate actual shuffling effectively. Instead of miming two stacks of cards flipping together–here a shuffling sound would be a big plus–the program merely shows two piles of cards, each held by a hand, coming together and separating horizontally with no change in their appearance. After a few rounds, you may tire of watching this routine and become impatient waiting for it to finish. Again, attractive, cleverly designed graphics are imperative to keep the player's attention during such dead time.

Ultimately, people may lose interest in this game because of the limited imagination applied to it. To habitual computer games players, the program may seem too slow; to experienced blackjack players, it may seem too tame (because nothing is really at stake). *Mac-Jack* employs the Mac keyboard hardly at all, nor does it demonstrate much variety in the routine, repetitious ways it asks you to use the mouse.

Mac-Jack improves upon *Mac-Slots* in a couple of minor ways, for example in providing an eject button that you click on to exit the program, and the game has the advantage of being considerably harder to beat. In fact, Bud Munson reports that some people complain that *Mac-Jack* is too difficult. (Keno also is harder to beat than the Slots portion of the game.) Overall, the nod goes to *Mac-Slots* as more complex both visually and aurally, and therefore more entertaining in the long run. However, priced at $77.77, *Slots* is one of the most expensive computer games around.

Although neither *Mac-Slots* nor *Mac-Jack* requires much thinking, both provide a pleasant diversion from the cares of the day and from the more serious work you may do on your Mac. If you dream of breaking the bank at Monte Carlo, these games let you indulge that fantasy without facing the consequences if you lose. □

◢◢◢◢◢◢◢◢◢◢◢ *Jeffrey Bartlett is the Copy Editor of* Macworld.

◢◢◢◢◢◢◢◢◢◢◢ *Keith Richard Cook is a freelance writer in San Francisco and a Contributing Editor of* PC World.

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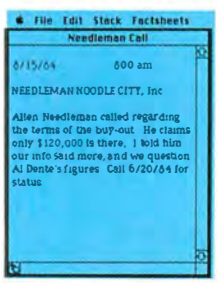

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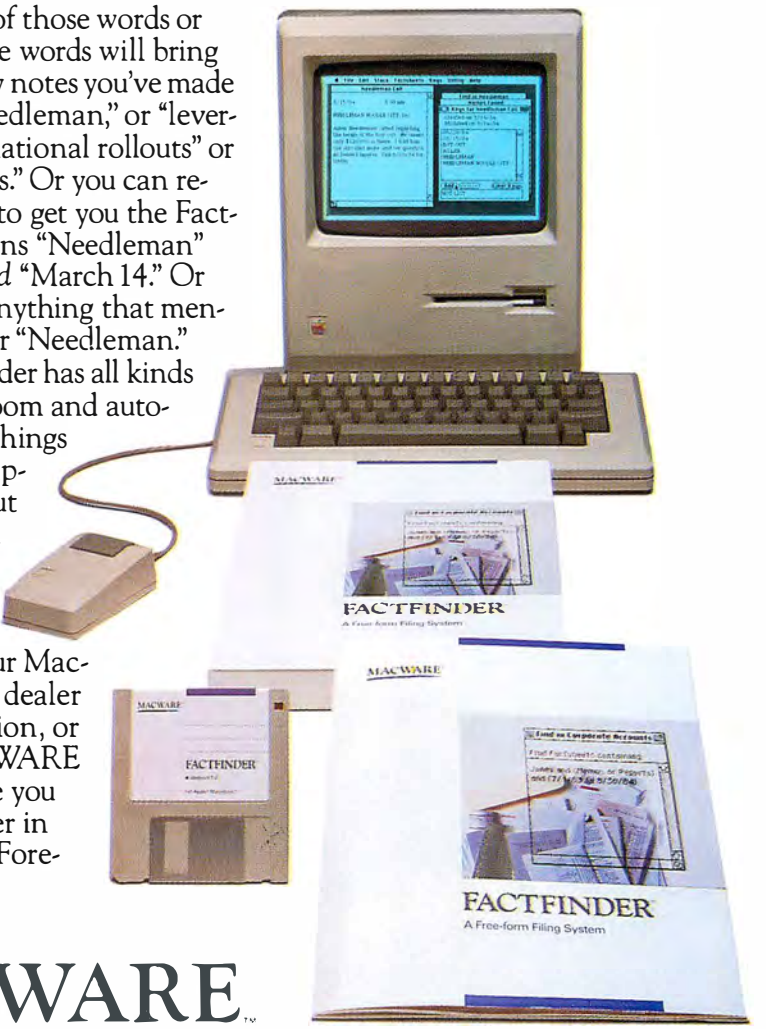

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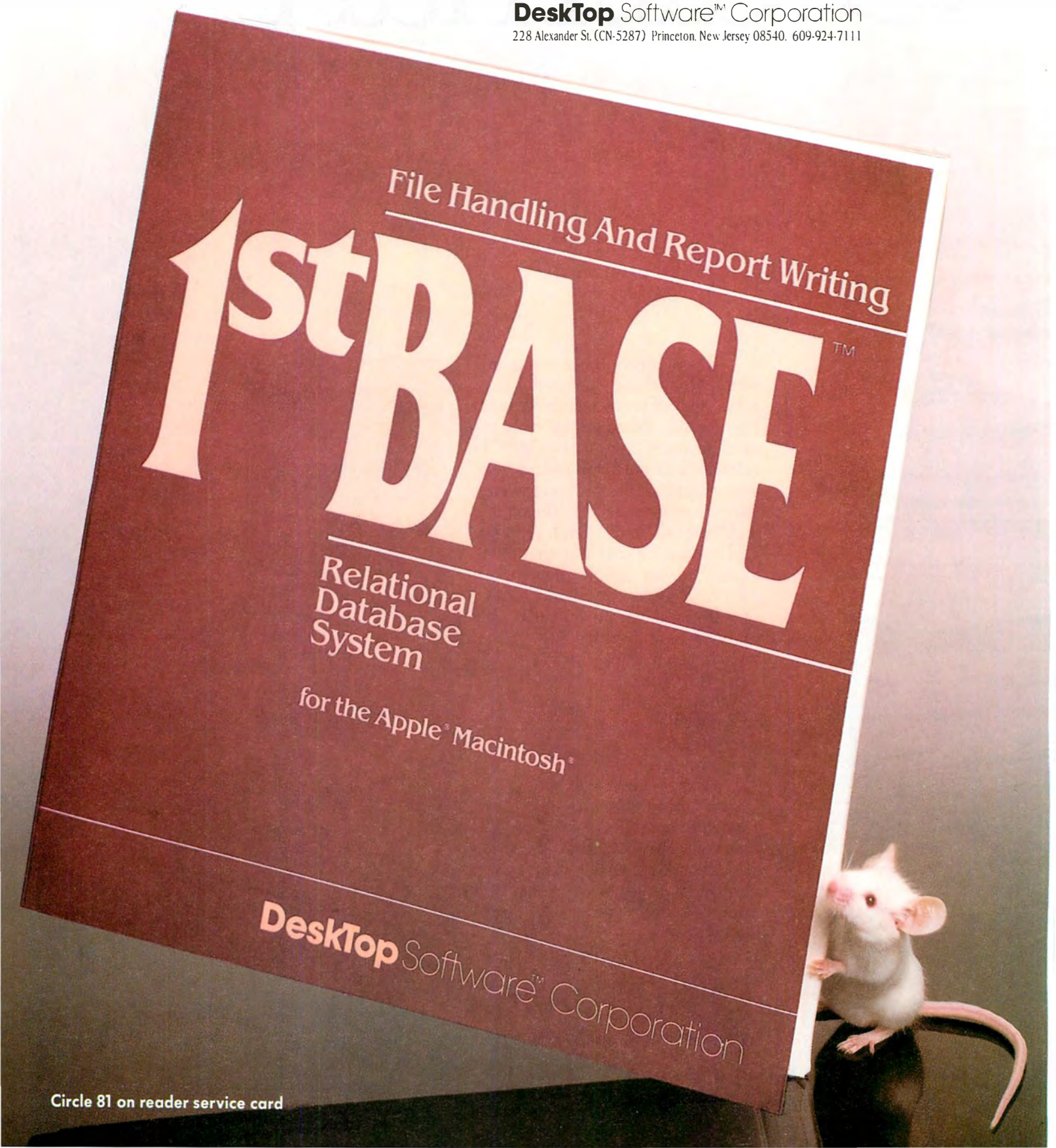
Yes! 1stBASE is just as friendly as your Macintosh.® Not only does it use your Mac's mouse, windows and wealth of features to their fullest, but it's relational as well. Meet your data management needs with unprecedented ease and speed. Design and create files. Enter and edit data. Sort on multiple fields and produce reports from single or joined files—just by pointing and clicking your mouse. Make the most of every byte of your Macintosh with 1stBASE, The Relational Database System. It's a piece of cheesecake!

DeskTop Software™ Corporation
228 Alexander St. (CN-5287) Princeton, New Jersey 08540. 609-924-7111



Circle 81 on reader service card

Macware News

The latest developments in Macintosh software, hardware, and accessories

Edited by Erfert Nielson

Macware News *announces new Macintosh products. Those listed here are available now or will be in the near future. We will keep you informed of developments as the number of products for the Mac increases.*

Software

■ *Axlon, Inc.*

1287 Lawrence Station Rd.
Sunnyvale, CA 94089
408/747-1900

Art Portfolio
A disk containing drawings in 12 categories: Amenities, Borders, Buildings, Critters, Hands, Office Items, Plants, Seasons/Holidays, Sports, Symbols, Travel, and Vehicles. The package includes a manual and instructions for creating greeting cards. List price: $59.95.

■ *Challenger Software*

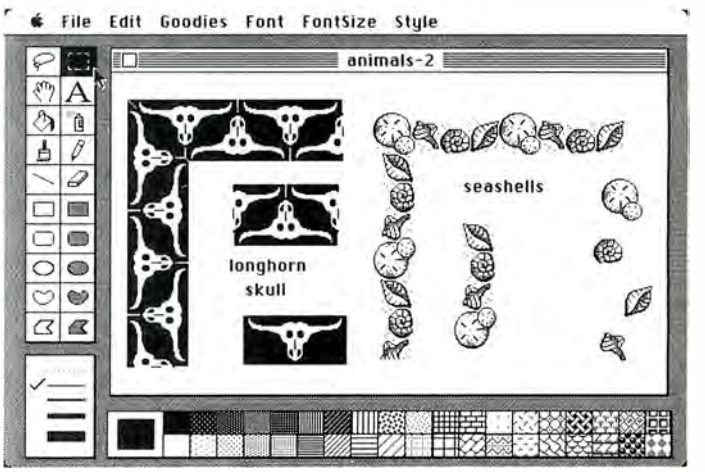
18350 Kedzie
Homewood, IL 60430
312/957-3475

Legacy
A two-disk text adventure game that features graphics, provides detailed descriptions of your location, and accepts full sentences as commands. The wizard Arkimar assigns you the task of finding the fabled Drab Castle, located deep in the dangerous Sechryll Forest. List price: $39.95.

■ *Consulair Corp.*

140 Campo Dr.
Portola Valley, CA 94025
415/851-3849

Mac C/Mac C Toolkit
A developers' C compiler, written specifically for the Macintosh, that is compatible with Apple's Macintosh 68000 Development System. Mac C runs on a standard 128K Macintosh or on a Lisa with *MacWorks*. It gives developers access to all Macintosh operating system calls. The Mac C Toolkit provides a high-level interface to certain Mac features such as dialog boxes and desk accessories. The Toolkit provides a byte-oriented, asynchronous, buffered I/O system, and includes a starter program that implements the Mac's basic user interface features. Mac C requires the Macintosh 68000 Development System to run. List price: Mac C $295, Toolkit $175 (Mac C and Toolkit $425 together), Corporate Site License $1200.



Soft Palette, Decision Science Software

■ *Creighton Development, Inc.*

4931 Birch St.
Newport Beach, CA 92660
714/476-1973

ProPrint
A program that lets you print *MacWrite* documents on many letter quality printers. *MacWrite* features such as boldface and underlining can be produced if the printer can execute them. Choosing Italic from *MacWrite*'s Style menu causes text to print in a different color if the printer allows dual ribbons. Text formatted with a *MacWrite* ruler is printed as closely as possible to the *MacWrite* format. *ProPrint* prints up to 50 queued documents and allows you to use desk accessories and select additional files to print while printing is in progress. List price: *ProPrint* disk $74; disk plus cable $99; disk, two cables, and A/B switch $225.

■ *Decision Science Software, Inc.*

P.O. Box 7876
Austin, TX 78713
512/926-4527

Soft Palette
A series of disks containing *MacPaint* documents including borders, animals, cartoons, and decorative designs. The series consists of *Borders* (Volumes 1 and 2), *Clip Art* (Volumes 1 and 2), *Interior and Architectural Designs,* and *New Alphabets,* a disk containing fonts that can be typed on the keyboard. List price: $35 each.

■ *dilithium Press*

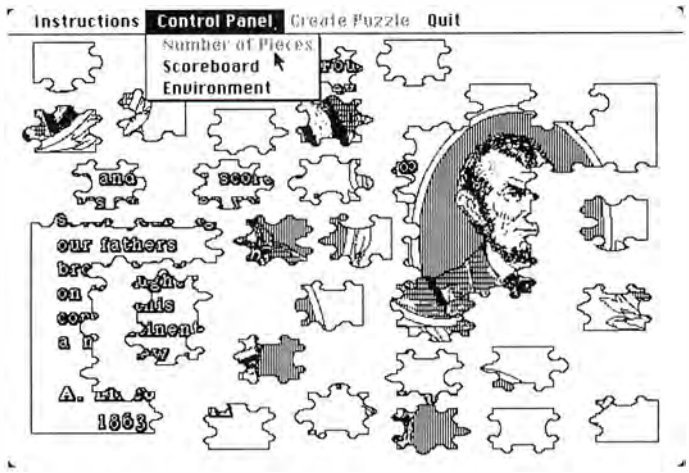
8285 S.W. Nimbus #151
Beaverton, OR 97005-6401
800/547-1842, 503/646-2713

PC to Mac and Back
A communications package that links the Macintosh and the IBM PC, allowing the two computers to exchange text or binary files as well as access online information services such as CompuServe and The Source. *PC to Mac and Back* can also transfer files between two Macs, two IBM PCs, or between the Mac and virtually any other computer that has an RS-232 serial port and its own communications software. The program allows direct communication using a null modem or remote communication using a modem and phone lines. The package includes an instruction book, an IBM PC disk, and a Macintosh disk and is compatible with Microsoft's mouse for the IBM PC. List price: $99.95.

■ *First Byte, Inc.*

2845 Temple Ave.
Long Beach, CA 90806
800/523-8070, in California
800/624-2692, 213/595-7006

Smoothtalker
A program for converting English text to synthesized speech that comes from the Mac's built-in speaker. Both an adult female and an adult male voice are provided. The text may be entered from the keyboard or read from *MacWrite* documents. *Smoothtalker* is available in two forms: as a software module that can be incorporated by software developers into other programs and as a complete software package for end users. The program can pronounce common symbols such as $, +, %, and @, as well as numbers and standard abbreviations like Dr. and Ms. A user-defined dictionary allows you to enter pronunciation for terms you specify, such as proper names. Applications include educational programs, entertainment, verbal electronic mail, and self-running demonstrations or tutorials. List price: $149.95.



MacPuzzle, Industrial Computations

■ *Industrial Computations, Inc.*

40 Washington St.
Wellesley Hills, MA 02181
617/235-5080

MacPuzzle
A program that makes a *MacPaint* document into a jigsaw puzzle that can be assembled on the screen with the mouse. You can use the pictures supplied on the disk or your own *MacPaint* drawings. The game lets you select the number of pieces and the difficulty level of the puzzle. You can save the puzzle at any time and return to it later. List price: $47.50.

■ *Linguists' Software*

P.O. Box 28
Mount Hermon, CA 95041
408/335-2577

MacGreek
A 12-point Greek font that includes upper- and lowercase letters, breathing marks, accents, punctuation marks, transliteration symbols, iota subscripts, and Greek mathematical symbols. The font can be installed in *MacWrite* or *MacPaint* using the Font Mover utility. Style variations include boldface, italic, underline, outline, shadow, superscript, and subscript. The font occupies about 3K of RAM. List price: $99.95.

MacHebrew
A 12-point Hebrew font that includes transliteration symbols, vowel points, doubling dots, punctuation marks, and 19 accent symbols. The text appears on the screen from left to right when typed. You can precisely position accents and vowel points on the line below consonants by means of a "mini-space" key. Style variations include boldface, italic, underline, outline, shadow, superscript, and subscript. The font occupies about 3K of RAM. List price: $99.95.

MacKana/Basic Kanji
A 12-point Japanese font that includes *hiragana, katakana,* punctuation marks, and approximately 70 of the most common *kanji.* Style variations include boldface, italic, underline, outline, shadow, superscript, and subscript. The font occupies about 7K of RAM. List price: $99.95.

■ *Manx Software Systems*

P.O. Box 55
Shrewsbury, NJ 07701
800/221-0440, 201/780-4004

Aztec C Compiler
A software development system available as either a personal system (Aztec C68K-p) or a commercial system (Aztec C68K-c). A set of development utilities called the Aztec C68K Toolbox is also available. The Aztec C68K-p system consists of a full C compiler, a 68000 relocating macro assembler, a UNIX system library, an editor, and a shell command environment. Aztec C68K-c includes all of the features of Aztec C68K-p plus support for the full Macintosh Toolbox, an overlay linkage editor, a resource editor, and dynamically relocatable code. The development software is also available as a cross-development system from PC-DOS, MS-DOS, CP/M-86, PDP-11, VAX, and Lisa. The Macintosh C compiler is compatible with other C compilers available from Manx Software Systems. List price: Aztec C68K-p $199, Aztec C68K-c $500.

MacGreek/MacHebrew/MacKanji, Linguists' Software

■ *Megahaus Corporation*

5703 Oberlin Dr.
San Diego, CA 92121
619/450-1230

MegaFiler
A file management system that lets you store information in a library of ready-made or personally designed files. You can print lists, tables, mailing labels, and *MegaMerge* mailing lists, as well as incorporate information into *MacWrite* and other Macintosh applications, including Megahaus's *MegaForm* forms designer. You can sort information on any field, find forms based on any criteria you enter, manage several files at the same time, and cut and paste information between files. List price: $195.

■ *Megamax, Inc.*

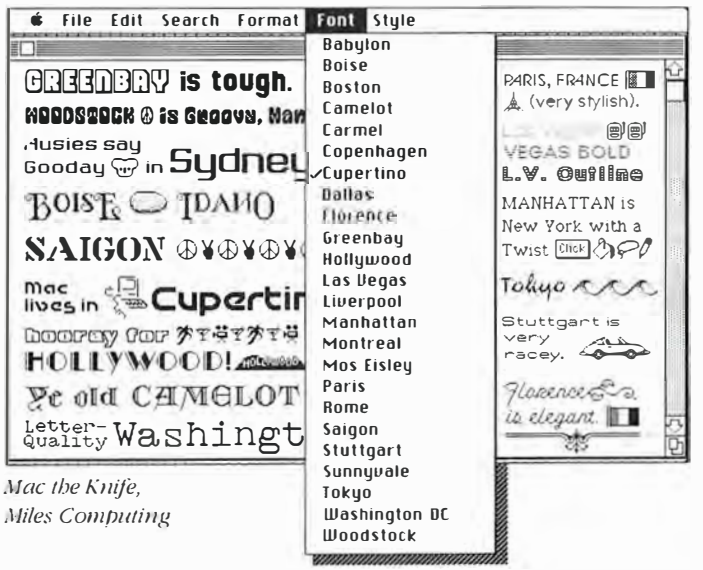
P.O. Box 6015
Waco, TX 76706
214/987-4931

C Compiler
A software development system that gives programmers full access to the Macintosh Toolbox routines. The system includes a full-scale implementation (K & R) C compiler, the standard C library, a ROM routines library, a linker, and a librarian. The compiler supports overlays. Full support is available optionally from Megamax. Each package includes one free update if purchased before December 31, 1984. List price: $299.95.

■ *Microcomputer Service Corp.*

8208 N. University
Peoria, IL 61615
309/692-7786

31 Programs
A collection of 31 programs written in Microsoft BASIC. Programs include *Home Data Base, Checkbook Balancer, Hex-Decimal Converter, Interest Table, Math Quiz, Metric Converter, Prime Factors, Hangman, Alphabetize, Slot Machine, French Quiz,* and *Shape Maker.* The programs can be modified to meet users' requirements and require Microsoft BASIC to run. List price: $29.95.



Mac the Knife, Miles Computing

■ *Micromax Systems, Inc.*

6868 Nancy Ridge Dr.
San Diego, CA 92121
619/457-3131

Gallery
An accounting and business management package for the Macintosh and the Lisa. In its minimum configuration, *Gallery* consists of a core module that includes Accounts Receivable, Accounts Payable, General Ledger, Balance Sheet, and Profit and Loss Statements. The package can be used in a variety of businesses and professions, including hospitals, nursing homes, law offices, restaurants, auto dealerships, and construction companies. *Gallery*'s display emulates the manual pegboard bookkeeping system; multiple windows display separate ledger sheets on the screen. Future modules will include Payroll/Personnel, Order Entry/Invoicing, Inventory Control, Material Resource Planning, Job Costing/Project Control, and others. List price: core module $795.

■ *Micro Planning Software USA*

211 Sutter St., Third Floor
San Francisco, CA 94108
415/788-3324

MicroPlanner
A project management critical path analysis system that enables you to coordinate interdependent operations in a project. Time analysis establishes the earliest and latest dates throughout a project. Resource analysis allows you to level out project resources (personnel, money, and equipment) for increased efficiency. Up to six calendars can be maintained on each project, specifying normal shifts, holidays, and planned overtime. A variety of printed formats, including bar charts and resource histograms, are available, and networks can be drawn using a plotter. The program allows up to 500 activities, 35 resources per project, 20 resources per activity, and descriptions of up to 254 characters. *MicroPlanner* is distributed through VisiCorp. List price: $395.

■ *Miles Computing, Inc.*

7136 Haskell Ave. #300
Van Nuys, CA 91406
818/994-7901

Mac the Knife
Volume 1 of *Mac the Knife* contains symbols, borders, and decorative illustrations that can be pasted into *MacWrite* or *MacPaint* documents, as well

as three fonts that can be installed in the *MacWrite* or *MacPaint* Font menu and typed from the keyboard. Volume 2 contains approximately 25 fonts, including Babylon, a 6-point font; Tokyo, a font that resembles brush calligraphy; Florence, which looks like longhand script; and Hollywood, an Art Deco style. Most of the fonts contain several decorative elements as well as letters, and most are available in at least three sizes. List price: Volume 1 $39, Volume 2 $49.

■ *Mirage Concepts, Inc.*

4055 W. Shaw #108
Fresno, CA 93711
800/641-1441, in California
800/641-1442

Trivia

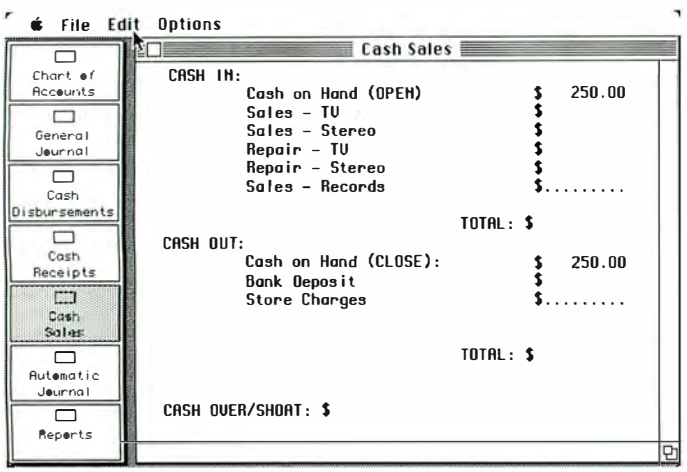
A disk containing more than 5000 questions in the categories of Entertainment, Sports, History, Geography, and Literature. The game can be played using either the mouse or keyboard commands. Up to six individuals or teams can play. Questions are arranged by category and level of difficulty (Novice, Standard, Expert, and Genius); you are awarded more points for correctly answering more difficult questions. List price: $49.95.

■ *Peachtree Software*

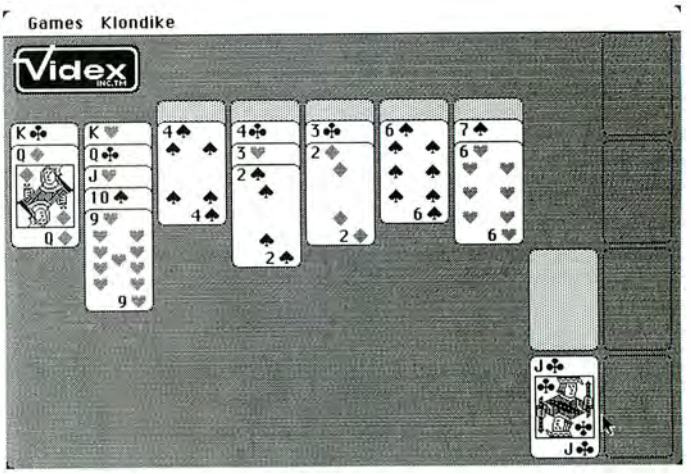
3445 Peachtree Rd. NE
Atlanta, GA 30326
800/554-8900

Back to Basics Accounting System

An entry-level accounting package for small businesses that includes General Ledger, Accounts Receivable, and Accounts Payable modules. You can use the modules separately, or together as an integrated system. The package also includes a manual that provides an overview of accounting principles, operations of a sample company using the system, and a reference section. *Back to Basics* allows you to print reports, checks, mailing labels, and customer statements with dunning notices. The system reconciles cash register sales, has a modifiable income statement and balance sheet, and can handle partial payments. List price: $95 per module, all three $195.



Back to Basics Accounting, Peachtree Software



FunPak, Videx

■ *ProVUE Development*

222 22nd St.
Huntington Beach, CA 92648
714/738-0746

OverVUE

A data base program and report generator that presents a spreadsheet-like display. Each cell can contain up to 62 characters, with up to 64 cells per record. You can insert or delete columns at any time without affecting other data, as well as sort and select on any number of columns. The program conserves disk space by not storing blanks. Math operations include totals, counts, averages, minimums, and maximums; these operations can be applied to the entire data sheet or to subgroups. *OverVUE* supports Microsoft's SYLK format, so data may be exchanged between *OverVUE* and Microsoft *Chart* or *Multiplan*. List price: $295.

■ *Pryority Software, Inc.*

P.O. Box 221959
Carmel, CA 93922
408/625-0125

Forbidden Quest

A text adventure game that provides additional clues in the form of five printed illustrations depicting different locations in the adventure. The game spans more than 100 locations on two starships and three planets. Up to six pages of text can be saved and viewed using the scroll bar. The program includes a Help menu that offers three levels of hints. List price: $44.95.

■ *Videx Inc.*

1105 N.E. Circle Blvd.
Corvallis, OR 97330
503/758-0521

Desktop Calendar

A calendar and appointment book that can be installed as a Macintosh desk accessory. As the time for an appointment nears, the program makes the Mac's speaker beep and flashes the apple in the menu bar to remind you. You can write notes on *Desktop Calendar*'s notepad, then scroll through each month of the displayed calendar to see which days contain notes. List price: $89.

FunPak

A disk containing four games: *Klondike Solitaire, King Albert Solitaire, Sevens,* and *Four in a Row.* You use the mouse to move playing cards (or game pieces in *Four in a Row*) across the playing surface. List price: $39.

Hardware

■ *Alphacom Inc.*

2323 S. Bascom Ave.
Campbell, CA 95008
408/559-8000

Cable Interface
An intelligent cable interface that links the 80-column Alphacom 81 dot matrix printer to the Macintosh. The Alphacom 81 uses thermal technology to print 100 characters per second. A cable that links the Alphapro daisy wheel printer to the Mac is also available. List price: Alphacom 81 $169.95, Alphapro $399.95, interface cable $49.95.

■ *Anchor Automation, Inc.*

6913 Valjean Ave.
Van Nuys, CA 91406
818/997-6493

G Cable
An adapter cable that connects Anchor's Volksmodem to the Mac's telecommunications port. The 300-baud Volksmodem has a full/half duplex switch, a voice/data switch, and automatic selection of originate/answer mode. The modem operates on the power from the phone line with a 9-volt battery backup. List price: G Cable and 6-foot telephone cable $12.95, Volksmodem $79.95.

■ *Corvus Systems, Inc.*

2100 Corvus Dr.
San Jose, CA 95124
408/559-7000

OmniDrive
A hard disk drive available in 5-, 11-, 16-, and 45-megabyte (M) capacities. The software necessary for communicating with the Macintosh is built into the

OmniDrive, Corvus Systems

drive. A mount manager utility allows you to organize storage space into smaller volumes; this system permits more files to be stored on disk because the Finder does not have to keep track of files for the entire disk at once. You can place the Mac on top of the drive or up to 15 feet away with the included cable. List price: 5M $1795, 11M $2495, 16M $3195, 45M $4995.

■ *Micron Technology, Inc.*

Vision Systems Group
2805 E. Columbia Rd.
Boise, ID 83706
208/383-4106

MicronEye, Micron Technologies

MicronEye
A camera, an interface box, a cable, and software that enable you to display digitized images on the Macintosh screen. Images can be printed on the Imagewriter or saved as *MacPaint* documents, modified with *MacPaint,* and then printed. The *Camera* software included with the package displays pull-down menus with options that allow you to adjust the picture in several ways. You can vary the shading, adjust the exposure time and focus, display an image on the upper or lower part of the screen, display a negative image, smooth a picture's edges, or fill areas with black or white. List price: $395.

■ *Sunol Systems*

1187 Quarry Ln.
Pleasanton, CA 94566
415/484-3322

Sun*Mac
A local area network that uses Apple's AppleBus networking protocol to allow up to 32 Macintoshes or other personal computers to communicate with each other and share a single Sunol Sun*Disk drive by means of a simple twisted pair cable. Sun*Mac provides data transfer rates of 230,000 bits per second and handles queuing of drive requests from as many as eight AppleBus users. Sun*Disk accommodates up to seven different operating systems at once and comes in capacities of 8, 16, 25, 40, 65, and 92 megabytes. A 21.5-megabyte tape unit for storage or file-by-file transfer is also available for all drives. List price: Sun*Mac $695 per network, Sun*Disk $1995 to $6695, tape unit $1350.

■ *Thunderware, Inc.*

19-G Orinda Way
Orinda, CA 94563
415/254-6581

High-Resolution Digitizer
A digitizer that records printed material (e.g., documents, drawings, photographs) that you feed through the Imagewriter printer. To produce a digitized image, you remove the Imagewriter's ribbon cartridge and replace it with Thunderware's optical sensor, which scans the document beneath it and displays an image on the Mac's screen. The image can be saved as a *MacPaint* document and modified using *MacPaint*'s tools. Full-page documents can be digitized with resolutions exceeding 144 dots per inch both horizontally and vertically, in 256 levels of gray. Application software gives you control over the area to be scanned, as well as contrast and brightness. A zoom feature allows you to enlarge or reduce parts of an image. The digitizer shares the Mac's printer port. List price: approximately $200.

■ *TTX Incorporated*

3420 E. Third Ave.
Foster City, CA 94404
415/341-1300

MACpac
A 64K buffer and printer/buffer cable that enable you to use the TTX 1014 daisy wheel printer with the Macintosh. Both the TTX 1014 and the Imagewriter can be connected to the Mac at the same time. The MACbuf buffer enables you to switch between printers and provides either parallel (TTX 1014) or serial (Imagewriter) output, depending on which printer you select. The buffer allows you to print multiple copies while the Mac goes on to other tasks. List price: printer, buffer, and cable $895.

Accessories

■ *Applied Technologies*

806 Forest
Olathe, KS 66061
913/782-1249

Computer Color
A package containing color-coated sheets that enable you to make color printouts using a dot matrix printer. Computer Color paper is used much like carbon paper: you place a sheet over a sheet of paper in the printer, remove the printer ribbon, and print a file. The print head strikes the Computer Color paper and transfers the ink to the printer paper beneath it. You can create multi-

colored drawings by separating a *MacPaint* document into several files–one section for each color–rolling back the paper in the printer, and inserting a different Computer Color sheet for each pass. Colors can overlap to produce 25 different shades. Each package contains four sheets each of red, yellow, blue, and white. List price: $5.75.

■ *Ergotron Inc.*

5637 Woodlawn Blvd.
Minneapolis, MN 55417
612/724-4952, 612/722-9299

MacTilt
An adjustable computer stand that helps reduce glare and improve the viewing comfort of Macintosh users. The Mac sits directly on the MacTilt stand and can be lifted off easily. Features include 30-degree tilt and 360-degree rotation. List price: $99.95.

■ *M & M Micro Accessories*

1533 Ralston Ave.
Burlingame, CA 94010
415/342-2591

Executive Micro Floppy File
A solid oak disk holder with index tabs, available in either light or dark stain. The Executive I holds 25 micro floppy disks, and the Executive II holds 50 disks. List price: Executive I $24.95 through Dec. 1, 1984, $29.95 thereafter; Executive II $34.95 through Dec. 1, 1984, $39.95 thereafter.

MacTilt, Ergotron

■ *Optimum Computer Luggage*

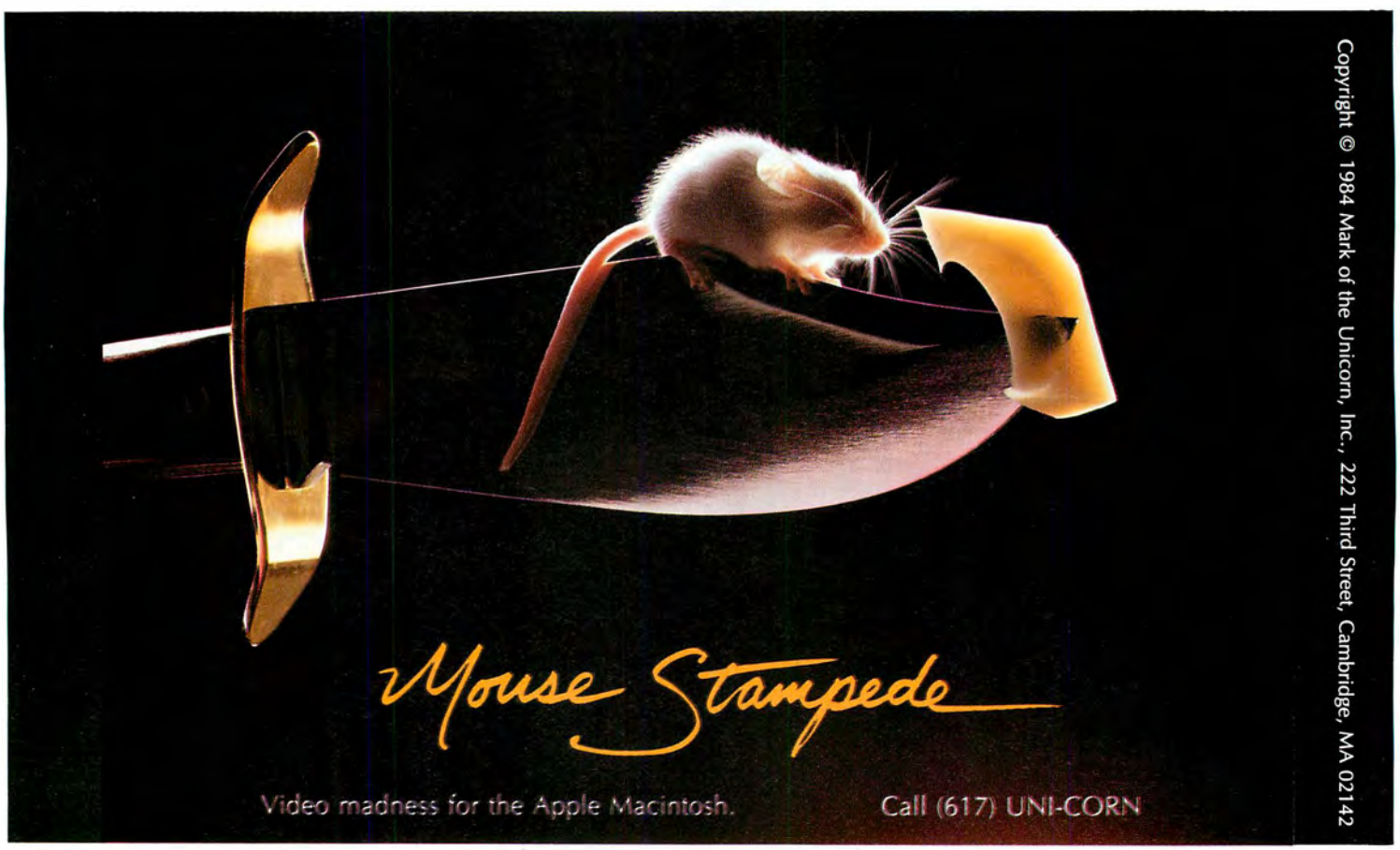
4445 50th St.
San Diego, CA 92115
800/447-0300, in California
800/632-4200

MacTote, Optimum Computer Luggage

MacTote
A carrying case with an adjustable shoulder strap and a padded handle that fastens with Velcro. The case has padded pouches for the mouse, the keyboard, and an external disk drive. On the exterior of the case are two zippered pouches for disks and accessories, an open pouch for manuals or notes, and a zippered pouch for cords, modem, and accessories. The case weighs less than 2 pounds. List price: $99.95.

The address for Basic Business Software was listed incorrectly in the September/October issue's Macware News. *The correct address is P.O. Box 26311, Las Vegas, NV 89126.*

Macware News *uses information provided by manufacturers; it does not evaluate products or corroborate manufacturers' claims. Send a description and a photograph of your new product to* Macware News, Macworld, *555 De Haro St., San Francisco, CA 94107, 415/861-3861.* □



Circle 31 on reader service card

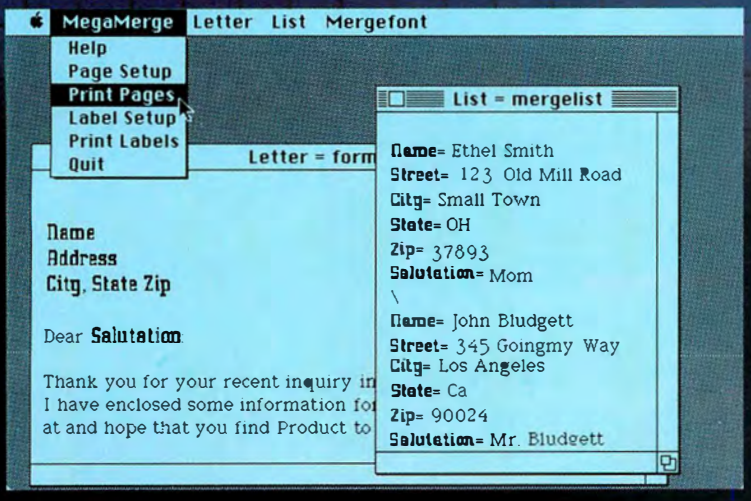
MegaMerge is here!

Megahaus proudly introduces MegaMerge...one of their many software products for the Macintosh that's available right now!

MegaMerge works hand-in-hand with Apple's MacWrite to:

- Create full mail list merging
- Print your mailing labels
- "Chain" your documents together so they print as one long document

With MegaMerge and MacWrite working hand-in-hand, you'll also be able to print hundreds of form letters to everyone on your mailing list and include standard "boilerplate" in all your contracts, letters, reports and other documents.



Chances are, if you now own Apple's Macintosh, you'll already have MacWrite. So why not take full advantage of Macintosh's technology with MegaMerge right now?

MegaMerge will work wonders for the Macintosh... and your business.

We'll even shake on it.

Megahaus has an entire family of software products for the Macintosh!

megahaus™

WE MAKE COMPUTERS WORK HARDER. Easier.

5703 Oberlin Drive, San Diego, CA 92121/Phone (619) 450-1230

Circle 86 on reader service card

The sky's the limit

Here's the book you've been waiting for!

Introduction to Macintosh™ BASIC opens up a world of programming potentials that Macintosh BASIC now makes possible.

Scot Kamins has been affiliated with Apple computers since the earliest days and worked most recently as a key member of the Macintosh BASIC Language Design Team. With this indispensable new book, he leads you into the wide-open environment of Apple Macintosh BASIC complete with many built-in programming tools, unique commands and coding instructions, the powerful Macintosh Editor, Macintosh graphics and animation, and special accessories for developing, testing, and debugging.

With *Introduction to Macintosh™ BASIC* you will quickly learn both the concepts and the practice of solid programming including how and where to use variables, loops, subroutines, random numbers, and arrays. You will develop and refine your programming skills through the exercises and pop quizzes in each of the twelve sessions. And you'll discover creative techniques and hints to improve your programming style as you create your own MacBASIC masterpieces.

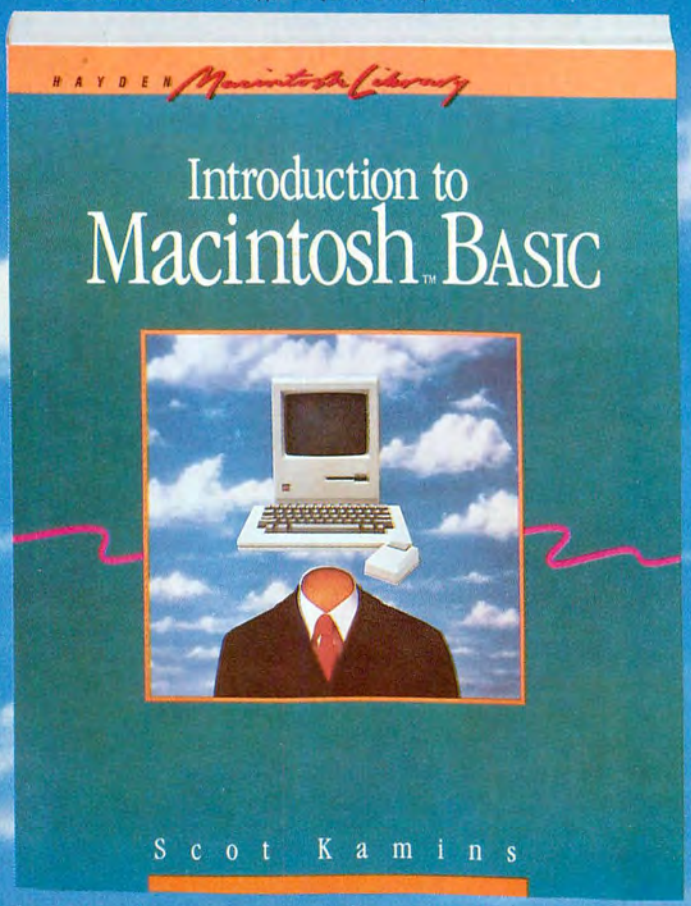
$18.95 at bookstores and from computer dealers everywhere, or order by phone today, 800-631-0856 or 201-393-6300.

Introduction to Macintosh BASIC is the first book in the new HAYDEN Macintosh Library

These other new titles will be ready soon: MASTERING MACINTOSH™ BASIC: THE PROGRAMMER'S HANDBOOK by Scot Kamins • WORKING WITH MACINTOSH™ BASIC: AN EXPERIENCED PROGRAMMER'S GUIDE by Scot Kamins • MACINTOSH™ MULTIPLAN™ by Carol Ramsay and Joan Lasselle • MACINTOSH™ REVEALED: PROGRAMMING WITH THE MACINTOSH™ TOOLBOX by Steve Chernicoff

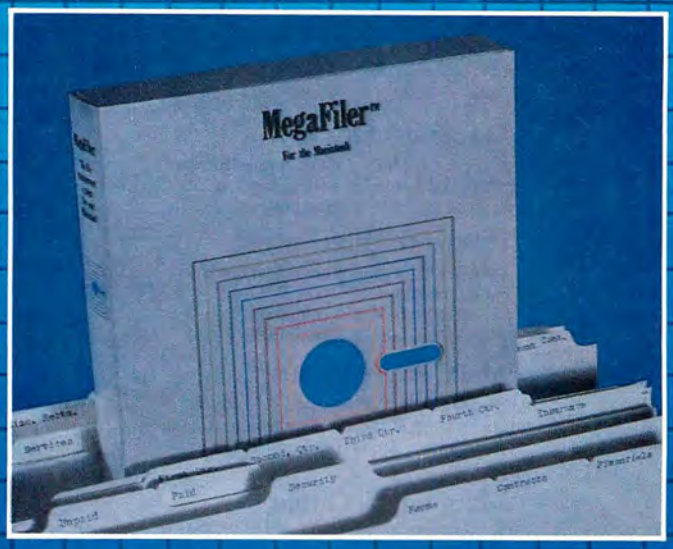
HAYDEN BOOK COMPANY *10 Mulholland Drive, Hasbrouck Heights, New Jersey 07604*

Macintosh is a trademark of Apple Computer, Inc. Multiplan is a trademark of Microsoft.



Circle 9 on reader service card

MegaFiler is here!



If you own, or are about to purchase an Apple Macintosh, then you'll definitely want MegaFiler from Megahaus Corp.

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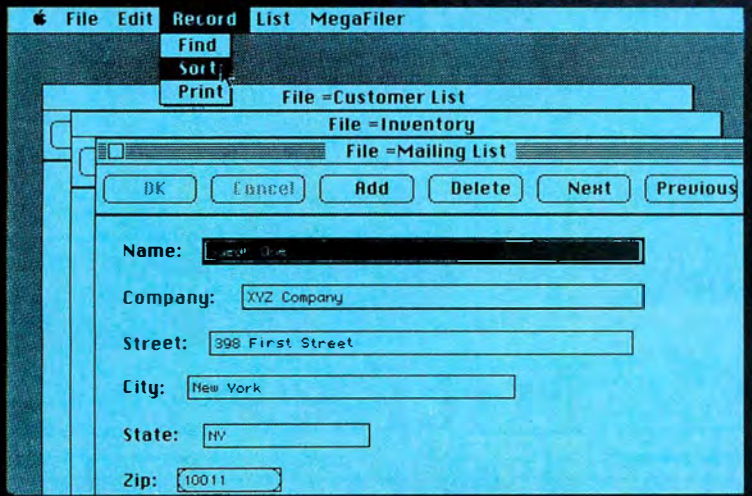

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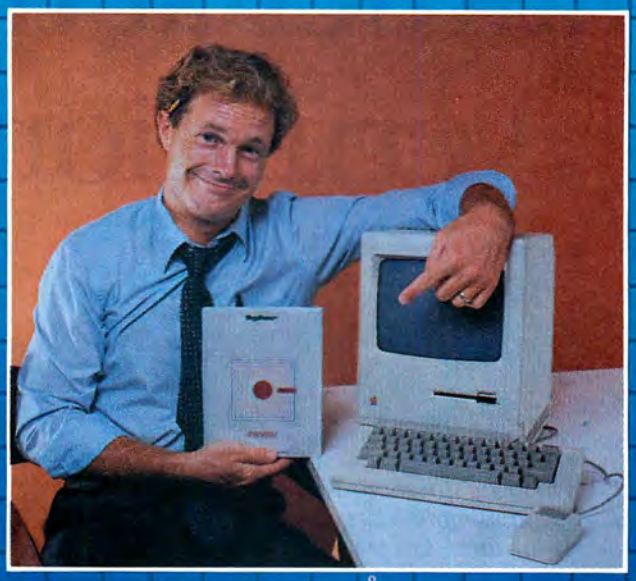

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Murder at the Vermilion Hotel

Jeremy Joan Hewes

A mystery writer uses MacPaint *to draw storyboards that help set a scene, plot a crime, and move a detective through the case. It's a dirty business, but the Mac can give creativity a clean start.*

Like other journalists and nonfiction writers, I've told myself for years that one day I will sit down and write a novel. Now that I use a computer as my primary writing tool, getting on with the novel should be easier than with a typewriter or a pen and a yellow pad. But it's still quite a challenge to make up stories about people and places, and one of the chief barriers for me is visual.

When I write, my mind works in patterns of words and their sounds; it seldom operates by images. Yet images, descriptions, and precise details are essential to good storytelling, and many writers want to create fiction so visual that the story is an obvious choice for a movie.

Planning with Storyboards

Fortunately for us writers who don't naturally think in images, the Macintosh goes a long way toward filling the visual gap. The Mac accommodates graphics handily, and *MacPaint* gives writers an easy way to construct *storyboards,* which are drawings that block out a series of visually oriented scenes and actions.

Storyboards are commonly used by people who devise movie scripts, television commercials, and similar works. The purpose of such storyboards is to determine what will be shown on the screen. These illustrations can range from rough sketches to detailed portraits, but they are almost always created by a bona fide artist, or at least by someone who can draw freehand.

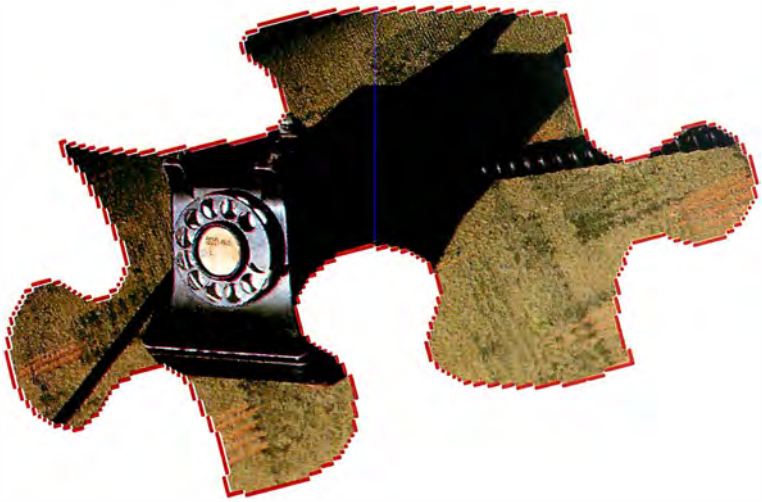
My storyboards, in contrast, are made by a mouse-wielding klutz. I cannot draw freehand, so I use *MacPaint*'s shapes and patterns exclusively, and I retrofit frequently with FatBits. Undo is my middle name.

The purpose of my kind of storyboards is to stimulate the writer's visual sensibility and to help get some images into words on a page. The only screen these storyboards will ever see is the Mac's, so they can be as quick and unartistic as you choose to make them.

Drawing Is Thinking

There are three good reasons for creating *MacPaint* storyboards as part of the writing process. First, having to draw a place, a character's clothing, or any other such detail shifts your mind into a visual gear. Suddenly you must think in terms of objects instead of words, with the result that your writing–the descriptions of what you've drawn–becomes more concrete.

Second, once you begin drawing, you'll find that the picture on your screen gives you ideas. In the case of the mystery story featured in this article, in fact, the drawing process suggested two key elements of the plot that I had not thought of before. Third, using storyboards can prevent you from making embarrassing mistakes. I recently read a mystery novel by one of my favorite authors, who committed an error that would never have occurred if she had used storyboards to show the lay of the land. The main character in this novel is looking for someone's room in a motel and finds it on the ground floor. In the next paragraph, the character tells us that the room has a balcony, and four pages later she leaves the room and goes down in an elevator. A few minutes with *MacPaint* would have saved the author from appending a balcony and an elevator to a ground-floor apartment.



In One Eye and Out the Other

To implement my storyboard theory, I created five illustrations for a mystery. The only decisions I made about the story before taking mouse in hand were that somebody would be shot in a seedy hotel and that I would draw the room where the shooting took place and a hallway outside that room.

I wanted to postpone the bloody part, so I started with the hallway. This was a fairly simple drawing (see Figure 1); the biggest problem was to show the walls and the doors in a reasonable facsimile of perspective. I drew one room door, then duplicated it to make a second on the right side of the hall. To give the drawing some variety, I made the wall angle slightly different on the left side of the hall and put only one room there.

The elevator probably occurred to me because I was thinking about the mystery writer's mistake and because it was easier to draw than a staircase. (The murderer had to have some avenue of escape.) I experimented with various patterns for the carpeting and was able to indicate a crossing hallway by choosing a different horizontal pattern for its carpet.

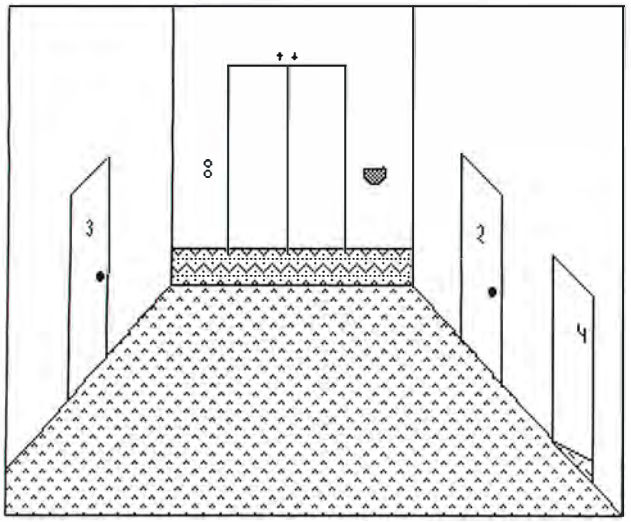


Figure 1
The hallway outside Room 4 of the Vermilion Hotel was created in MacPaint *and touched up in FatBits.*

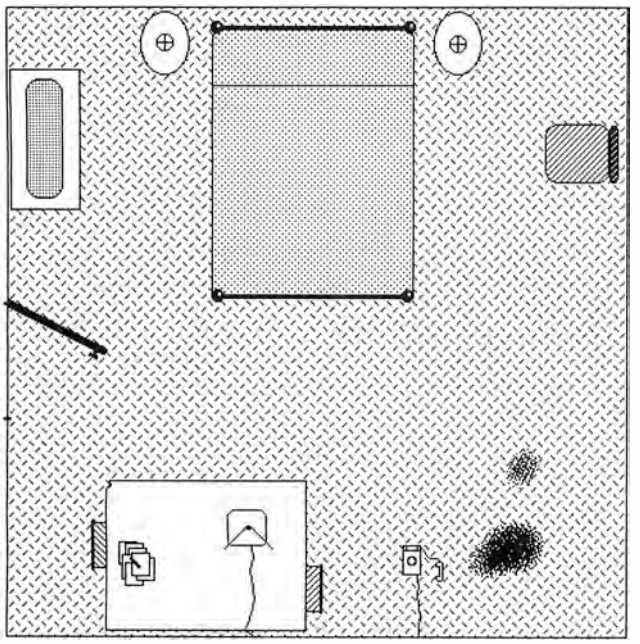


Figure 2
An interior view of Room 4, from above. An overview like this one avoids problems of perspective while showing the relationship of objects and vacant spaces.

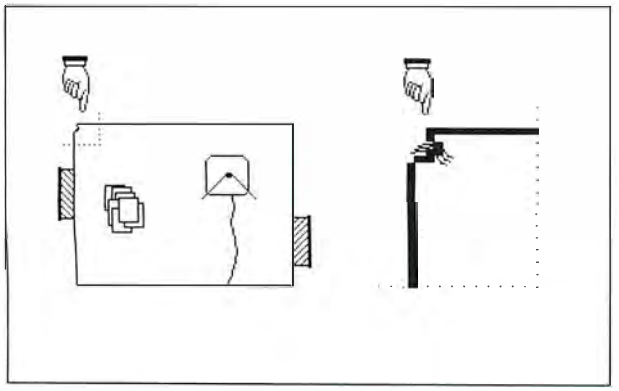


Figure 3
A detail of Room 4, showing a possible clue to the killer's identity. On the left is the table with a broken edge; on the right is a detail of the table corner with fibers caught in the jagged edge.

All the details were accomplished with the invaluable FatBits. I propped open the door to Room 4, put doorknobs on Rooms 2 and 3, added buttons and arrows to the elevator, constructed door numbers (single digits were simplest) and stuck an old-fashioned ashtray on the wall. The ashtray is an odd bit of visual thinking: I have no recollection of ever seeing such a device, yet I knew that it belonged in exactly that spot in the seedy hotel. It may be the legacy of watching too many episodes of *Perry Mason*.

When the hallway was completed, I started a large picture of the interior of Room 4 (see Figure 2). I chose to view it from above for this scene, because I wanted to be able to chart the movements of suspects and maybe draw that fatal chalk outline of a body. Although I gave up on showing the chalk or the body, I stuck with the overview, which provided a much easier way to represent objects and still told me what I needed to know for the story.

This picture is also made entirely of shapes, patterns, and FatBits. The only fancy moves I tried were using spray paint for the blood stains, leaving out a few dots to suggest roundness on the bedposts, and reversing the pattern on the upholstery of one chair. The patterns were chosen by trial and error, and I ended up with a rug that was different from the original pattern I'd used for the part of Room 4's rug that is visible in the hallway drawing. I went back to that figure and changed to the new pattern.

In my attempt to make this room truly seedy, I added a few creative touches, such as the antiquated TV set and one broken corner on the table. The only clue I added consciously was the pile of papers on the table. When I'd finished both storyboards, I printed them out and stared at them.

Show and Tell

At this point, the storyboards told me two important additions to the plot. I had some notion that the arrangement of furniture in Room 4 should trap the murderer, but I hadn't worked out how to do it. Then I spotted the table's jagged corner and decided that the killer could easily snag his or her clothing on it, so I isolated that part of the drawing (see Figure 3A) and enlarged the table corner to show some strands of fabric (see Figure 3B).

Next, I thought about the killer's escape route. The elevator seemed handy, and that big ashtray was just waiting for someone to dispose of a weapon in it. So I took a closer look at it (see Figure 4) and concluded that a murderer in a hurry might see the same opportunity I saw (see Figure 5).

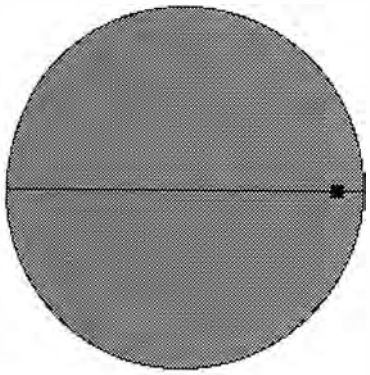


Figure 4
It was easy to draw this ashtray, viewed from above, in order to think about how to use it in the story's plot.

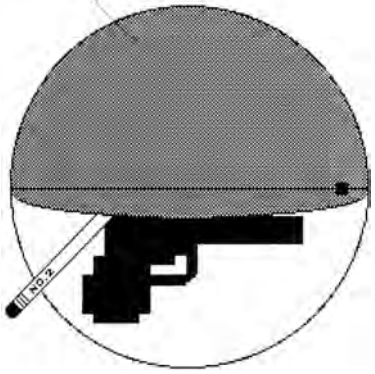


Figure 5
The result of brainstorming is this picture of the ashtray with a pencil propping its cover partway open, revealing the pistol.

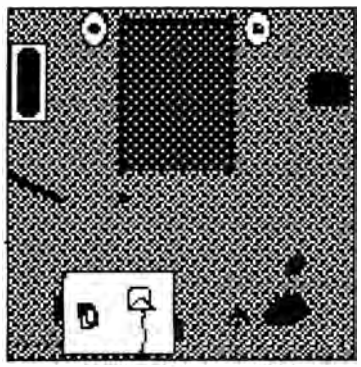
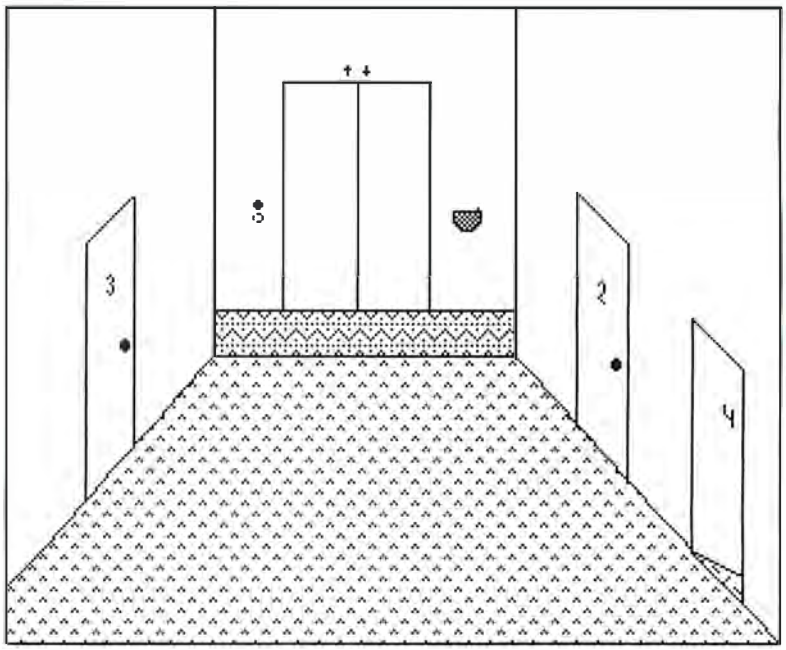


Figure 6
This compressed version of the Room 4 storyboard fits in MacWrite's *Scrapbook window and is ready for quick viewing.*

I dashed back up the stairs. At first glance, nothing in the hallway seemed different: the door to Room 4 was still ajar and the other doors were closed; the elevator doors were closed and neither the Up nor Down button was lit; and nothing moved or made a sound. I stuck my head into number 4, verified that Hanks and the crew were gone, and moved toward the elevator and the wall-mounted ashtray.



When I got within range of my past-50 astigmatism, I saw that my pencil was gone and the ashtray's lid was closed. Without worrying about fingerprints, I punched the button on top of the ashtray and the cover opened to reveal nothing. The gun was gone, so were the police, and I didn't know who had taken what.

Figure 7
A MacWrite *file into which a storyboard has been pasted from the Scrapbook. This technique allows you to view the storyboard along with the description made from it.*

The Private Eye Sees All

MacPaint *reveals the scene of the crime, the murder weapon, and a promising clue. Let's find out what ace investigator Tom Connor can do with them. Any resemblance to persons living or dead is purely coincidental.*

Room 4 was not the honeymoon suite. It had the minimum in furnishings: a tired rug with an indifferent pattern; a rather scanty double bed, neatly made; two night tables with small lamps; an ancient dresser with scarred brass fittings and a surprisingly elegant doily on top; an armless easy chair; a shaky-looking wooden table that held an old television (complete with rabbit ears) and a small sheaf of papers; and two badly upholstered straight-back chairs. A telephone, with the receiver off the hook, lay on the floor beside the table. There was a closed door in the far corner near the bed.

Hanks must've read my mind, for he muttered, "That's a closet. Nothing inside." So the lady used the bath down the hall.

The only light in the room came from a small window next to the easy chair, but that was enough for me to distinguish two dark patches of blood on the rug. They were within a few feet of the fallen telephone.

I walked over to the place where the blood had soaked the carpet and the telephone lay askew, as if by studying them I'd find some clue to the phone call and the shooting. Nothing surfaced, so I moved to the table and leaned over it to look at the stack of papers. They were onion skin, the kind of paper you use when you want to send lots of pages with one stamp. From what I could see, the victim—or someone else—had made several false starts at a letter to a person named Frank. Except for the salutation, the letter appeared to be a "Dear John."

So the lady was trying to end something, but the end that looked all too close was her own.

As I straightened up, one edge of the table attracted my eye. The corner closest to the door had been broken off, and several strands of fabric were caught on its jagged edge. "Hey, Hanks, did you see this?"

"Yeah, Connor, I saw the cloth, and the lab boys will deal with it. In fact, they've just arrived, so why don't you make a fast exit and let them do their work?"

I took one more quick inventory before leaving, and it struck me that the only personal object in this room was the abandoned attempt at a goodbye letter. Hanks read my mind again, saying, "We sent her purse with her in the ambulance."

Puzzled and uneasy, I backed out into the hall. The "lab boys"—two men and a woman—had set up a small table in the hall and the two men were laying out an assortment of brushes, jars, and other tools. The woman was stringing yellow police tape from one side of the hall to the other, first on one side of the door to Room 4 and then on the other side. When she finished, access to the room was effectively blocked from both the stairs and the elevator.

I ducked under the tape on the elevator side, thinking that I might as well hike back to my office. Hanks wasn't going to let me poke around the crime scene, and there were no clues about the mystery woman to be found in her room. On the way out I'd see what I could get out of the desk clerk, but he'd probably already been told to keep quiet.

I walked to the elevator and punched the down button, and the lift creaked into motion somewhere above me. "No useful information, no identity for the stranger who called me and announced she'd been shot," I thought. "What a worthless way to spend an afternoon and what a poor excuse for a hotel."

My eyes fell on another odd feature of the Vermilion: an oversized metal ashtray mounted on the wall next to the elevator. It was obviously a vestige of earlier decades, when most people smoked and public spaces like this one needed containers that would hold half a gallon of cigar butts and discarded cigarettes. Today, no self-respecting hotel would have an ashtray this big.

The elevator arrived and the doors opened, but something kept me in the hall, staring at the ashtray. I didn't move as the doors closed; I had to know what was inside that metal bowl on the wall.

The ashtray had the kind of hinged top that flips open when you push down a lever in the center. I reached for the lever, then thought, "No, Tommy, if your improbable hunch is right, there might be a fingerprint on that button." So I reached in my jacket pocket for something to use to lift the cover and found a pencil, which would do nicely.

I carefully slid the point under the front half of the ashtray's lid, pushed the pencil about halfway down, then gently lifted on the eraser end to pry open the cover. Somehow I wasn't surprised at the contents: no ashes, cigar butts, or cigarettes, but a palm-sized black pistol.

I left the pencil in place and went for Hanks.

The gun came from the new Cairo font in the updated *MacWrite*. I typed it in 72 point, enlarged it (using the marquee) to fit into the ashtray, augmented it with FatBits, and added the partially open cover and the pencil. When I'd finished with these new plot details, I printed them and taped them on the wall near my Mac, along with the room and hallway storyboards.

Quick Looks

Printed copies of storyboards provide the easiest source for review, but you may keep revising the images and not want to print them each time you make a minor change. For quick on-screen review you can paste pictures into the Scrapbook and consult them at any time. The Scrapbook window is smaller than the *MacPaint* screen, however, so you may want to make compressed versions of some storyboards to be able to view the entire image in the Scrapbook (see Figure 6). (For a discussion of several methods of enlarging and compressing images, see "Stepping Into the Paint Bucket," July/August.)

An alternate method for viewing is to copy a storyboard into the Scrapbook and later paste it into a *MacWrite* file for reference when you are writing (see Figure 7). This strategy is especially useful for images that are larger than the *MacPaint* screen or too detailed to be viewed clearly in compressed form. When you have verified the necessary details in the storyboard, you can easily select it with the mouse, press Backspace, and the image will vanish.

No Talent Required

As the pictures here suggest, I'm not much of an artist. But creating the storyboards gave me a clear vantage point on my story and a fresh crop of ideas. They really helped me put ace detective Tom Connor (see "The Private Eye Sees All") through his paces.

MacPaint storyboards are not only for fiction, of course. People whose work involves visiting a number of clients could draw customized maps to plan their travel, for example, and store owners could preview a variety of window displays with storyboards. Whatever the application, the real value of the Mac's graphics is the thinking they inspire.

Which reminds me that I'd better start another storyboard. I don't know how the gun got there, where Hanks and his lab crew went, who the victim was, or how Frank figures in all this. Get busy, Connor. □

Jeremy Joan Hewes is the Editor of PC World Books and Macworld Books. She is a coauthor of Writing in the Computer Age *and* Word Processing With the IBM PC.

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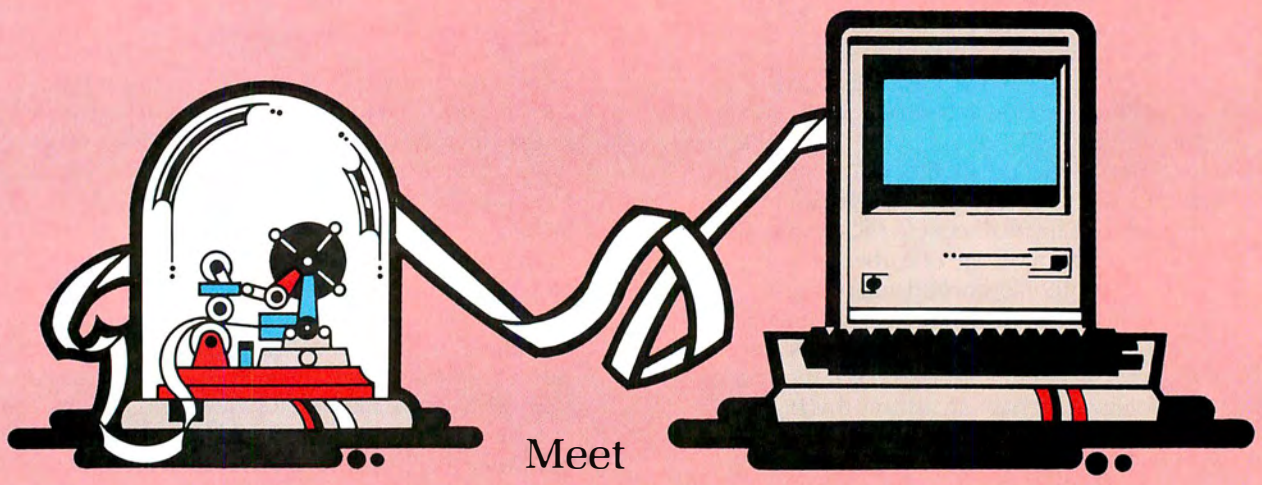

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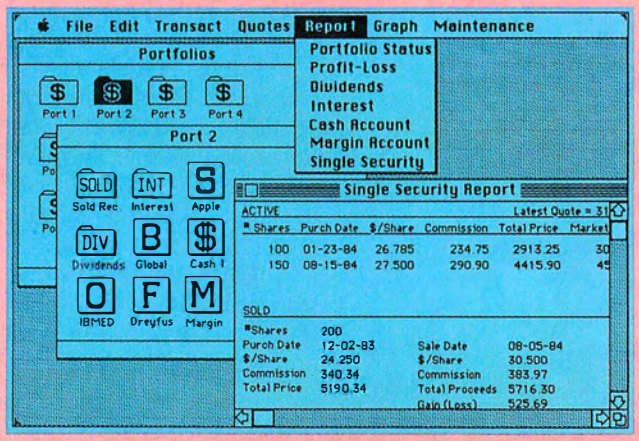

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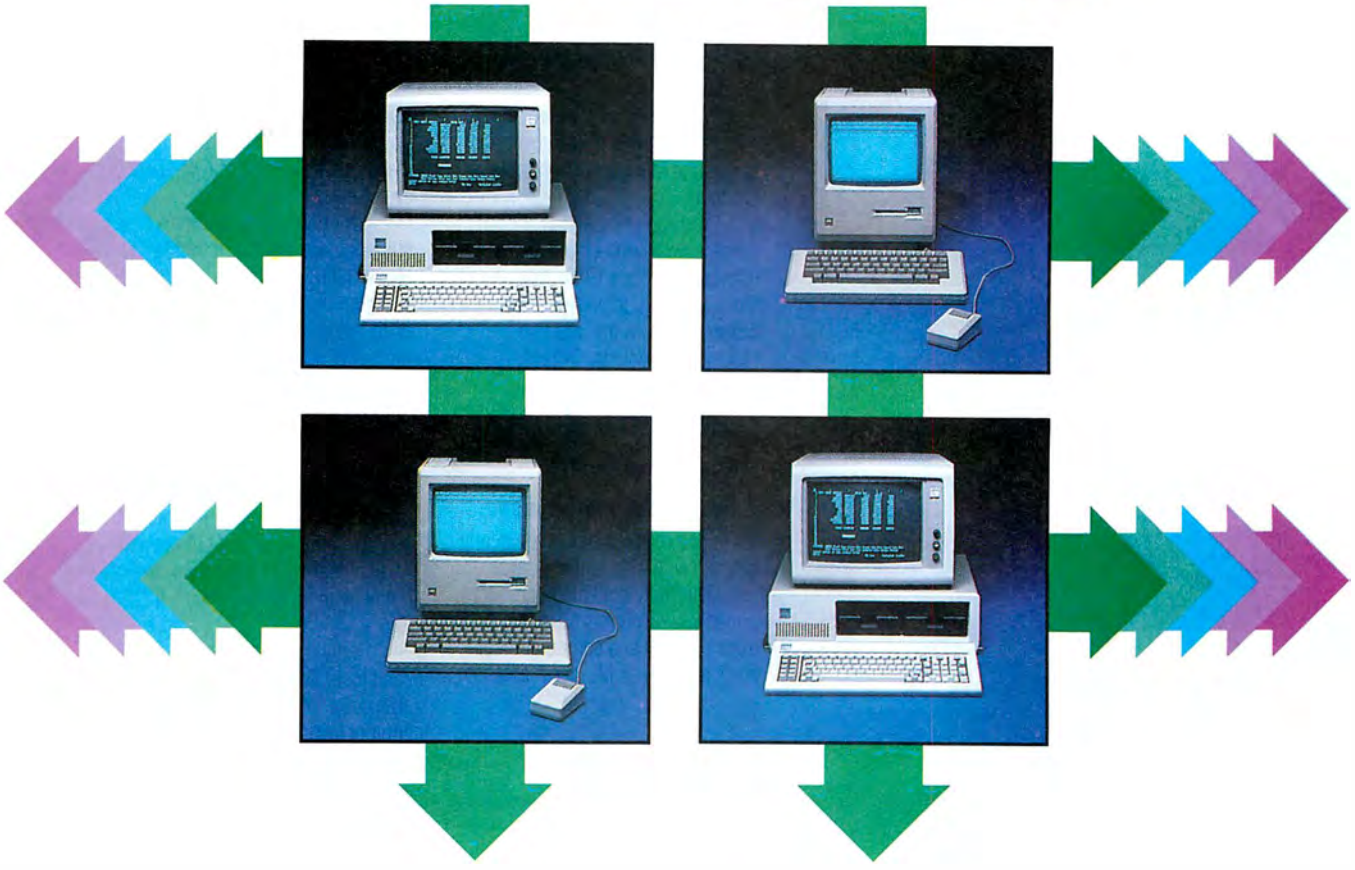

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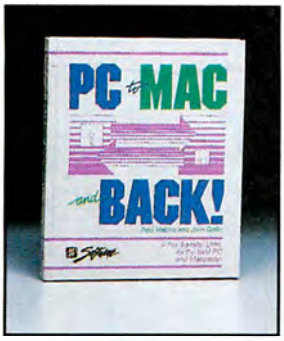

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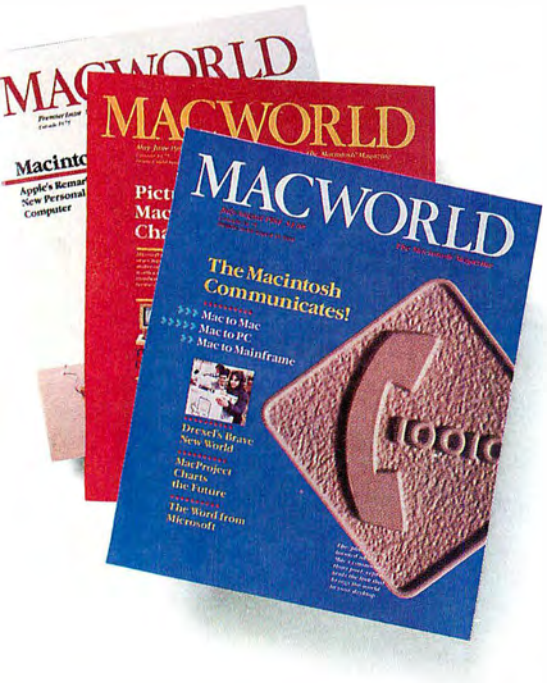

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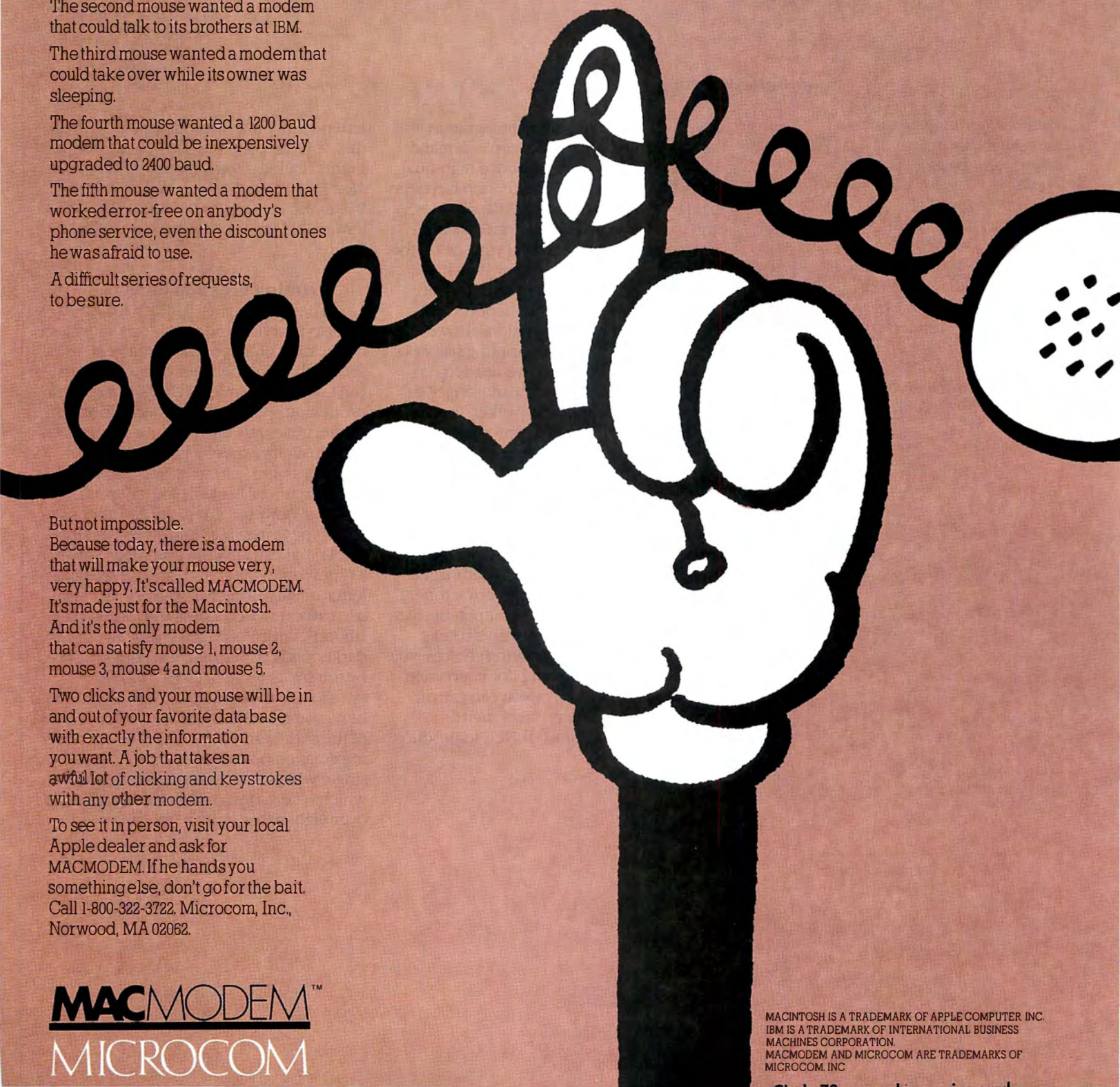

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Letter Quality Arrives

If you've been waiting to print written documents on a letter quality printer, three new options give you that chance

Janette Martin

The initial enthusiasm with which the business community greeted the Mac was tempered by a concern for the computer's inability to produce letter quality print. Just as businesspeople have generally resisted wearing casual attire to the office, they have resisted dressing correspondence and reports in the less conventional print of the Imagewriter. But now that the Mac can be attached to letter quality printers, it's business as usual.

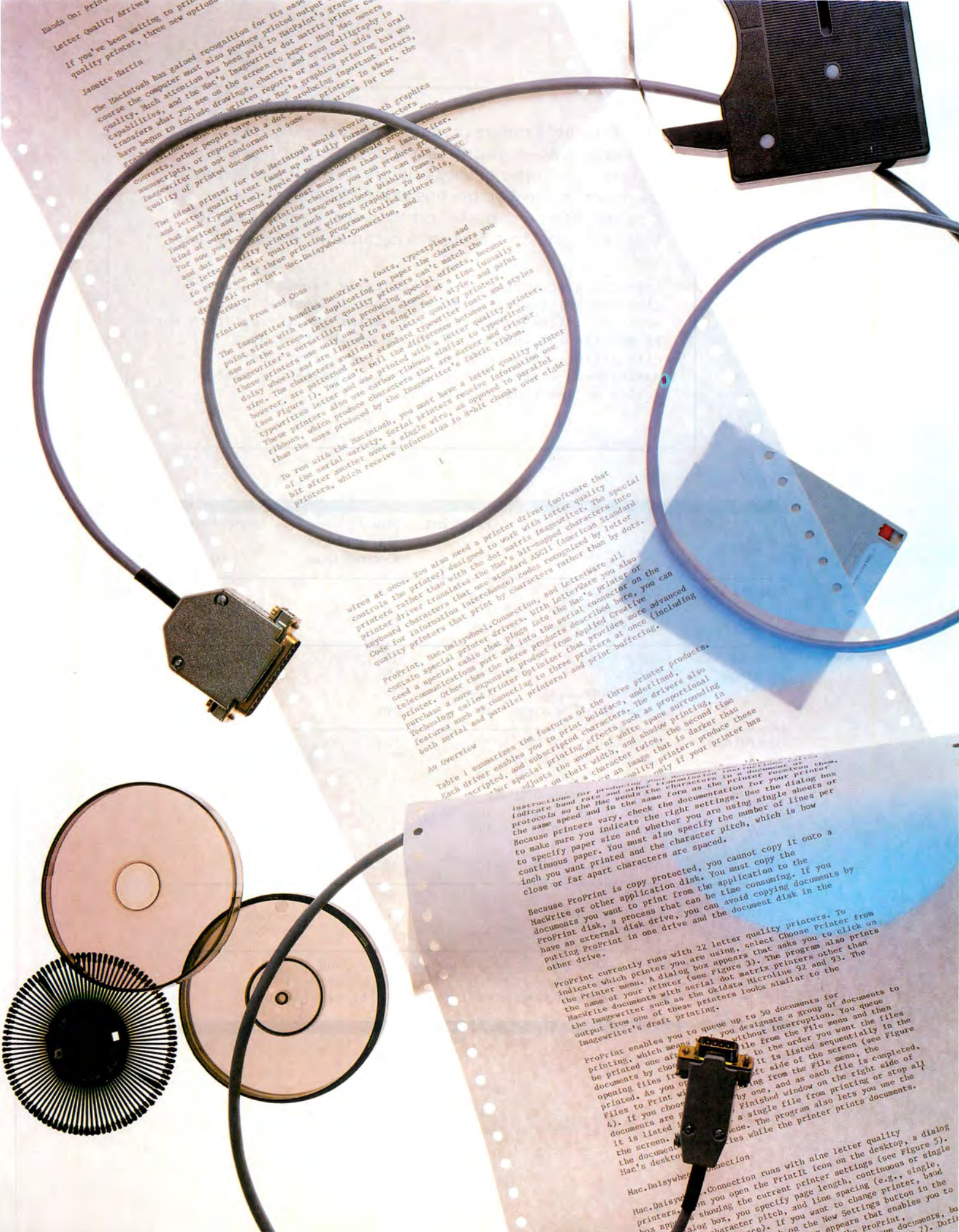
The Macintosh has gained recognition for its ease of use, but many people demand that the computer also produce high-quality printed output. Much attention has been paid to *MacPaint*'s graphics capabilities, and the Mac's Imagewriter dot matrix printer easily transfers what you see on the screen to paper. Many Mac owners have begun to include drawings, charts, and even calligraphy in written reports or as visual aids to oral presentations. However, while the Mac's graphics printing has won converts, other people have resisted producing important letters, manuscripts, or reports with a dot matrix printer. In short, the Imagewriter has not conformed to some expectations for the quality of printed documents.

The ideal printer for the Macintosh would provide both graphics and *letter quality* text (made up of fully formed characters that look typewritten). Apple's rumored laser printer (see "The Imagewriter and Beyond," September/October) would produce this kind of output, but at a cost much more than the Imagewriter's. For now you have two printing choices: you can produce graphics and dot matrix text with the Imagewriter, or you can gain access to letter quality printers such as Brother, Diablo, Qume, or NEC to produce letter quality text without graphics. To do this, you can pick one of three printing programs (called *printer drivers*): *ProPrint, Mac Daisywheel Connection,* and *LetterWare*. You can expect to see additional letter quality printer programs in the near future.

Printing Pros and Cons

The Imagewriter handles *MacWrite*'s fonts, typestyles, and point sizes with ease, duplicating on paper the characters you see on the screen. Letter quality printers can't match the Imagewriter's versatility in producing special effects, because these printers use only one printing element at a time (usually a daisy wheel) and are limited to a single font, style, and point size. The characters available for letter quality printers, however, are patterned after standard typewriter fonts and styles (see Figure 1). You can't tell the difference between a typewritten letter and one printed with a letter quality printer. These printers also use carbon ribbons similar to typewriter ribbons, which produce characters that are darker and crisper than the ones produced by the Imagewriter's fabric ribbon.

To use the three programs described here, you must have a letter quality printer of the serial variety. Serial printers receive information one bit after another over a single wire, as opposed to parallel printers, which receive information in 8-bit chunks over eight wires at once. You also need a



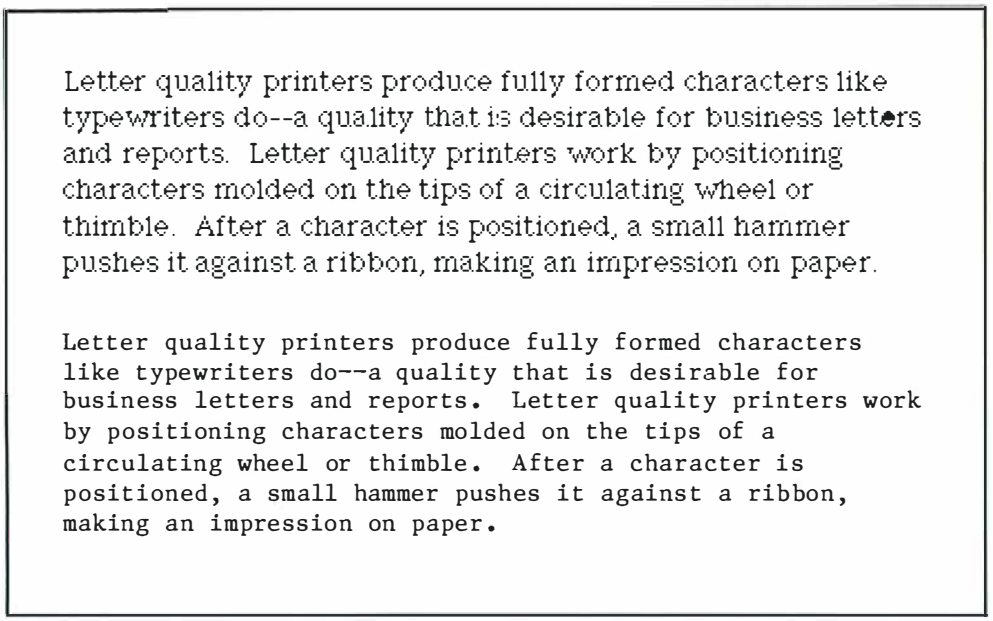


Figure 1
Printed output from the Imagewriter using 12-point New York in high resolution (above) is compared with output from the Qume LetterPro 20S letter quality printer (below).

Features		ProPrint	Mac Daisywheel Connection	LetterWare
Setting Up	Copy Protected	Yes	No	No
	Uses Printer Port	Yes	Yes	Yes
	Uses Phone Port	Yes	Yes	No
Special Printing	Underlining	Yes	Yes	Yes
	Boldface	Yes	Yes	Yes
	Super-/Subscripts	Yes	Yes	Yes
	Proportional Spacing	Yes	Yes	No
Operation	Must modify font in documents to print	No	No	Yes[1]
	Number of documents that can be queued	50	1	1
	Single-sheet Printing	Yes	Yes	Yes
	Temporary Printing Pause	No	Yes	No
	Abort Printing File	Yes	Yes	Yes
Software Compatibility	*MacWrite*	Yes	Yes	Yes
	ASCII text files	Yes	Yes	Yes
	Multiplan	No	Yes[2]	No[3]

1 Documents must be converted to Monaco 12-point before printing
2 Any software using Imagewriter driver
3 Any software using Imagewriter driver with document in Monaco 12-point

Table 1
A summary of the features provided by ProPrint, Mac.Daisywheel Connection, *and* LetterWare.

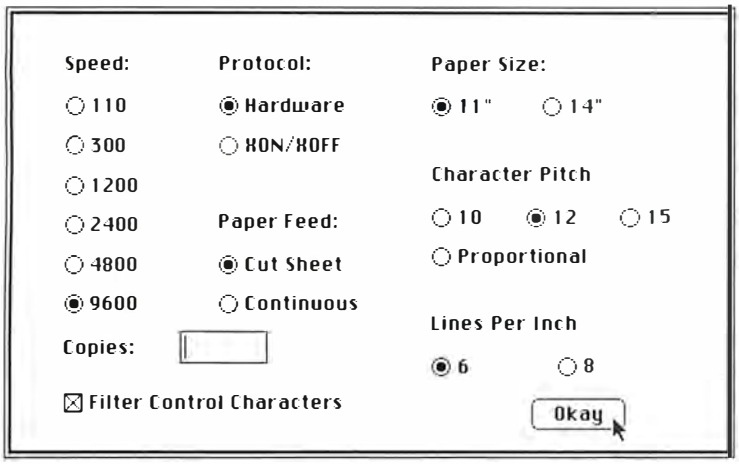


Figure 2
When you choose Set Options from ProPrint's *Printer menu, a dialog box appears that helps you control the way information is sent to a letter quality printer. The dialog box also allows you to adjust the paper size, the feed method, and character and line spacing.*

printer driver (software that controls the printer) designed to work with letter quality printers rather than with the dot matrix Imagewriter. The special printer driver translates the Mac's bit-mapped characters into keyboard characters that use standard ASCII (American Standard Code for Information Interchange) codes recognized by letter quality printers that print by characters rather than by dots.

ProPrint, Mac Daisywheel Connection, and *LetterWare* all contain special printer drivers. All three packages include a cable that plugs into the Mac's printer or telecommunications port and into the serial connector on the printer. Alternatively, you can purchase a more expensive product from Applied Creative Technology called Printer Optimizer, which provides features such as connecting to three printers at once (including both serial and parallel printers) and print buffering.

An Overview

Table 1 summarizes the features of the three printer products. Each driver enables you to print boldface, underlined, superscripted, and subscripted characters. The drivers also produce other special printing effects such as *proportional spacing,* which adjusts the amount of white space surrounding characters depending on their width, and *shadow printing,* in which the carriage strikes a character twice, the second time slightly to the right to produce an image that is darker than boldface. However, not all letter quality printers produce these effects; you'll be able to produce them only if your printer has the features.

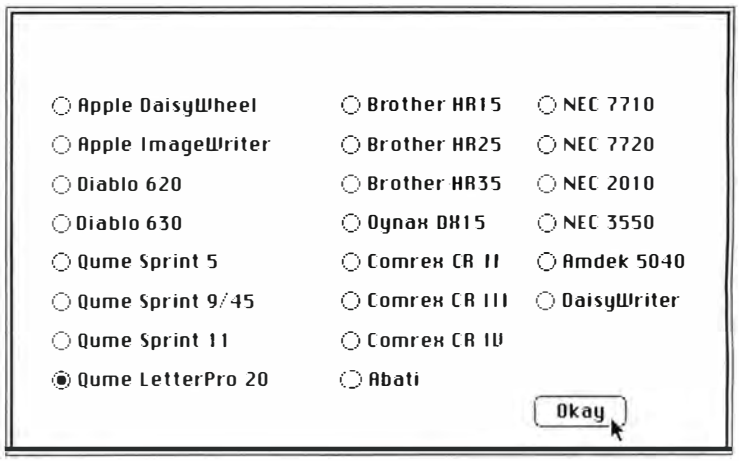


Figure 3
ProPrint *enables you to choose among 33 serial printers by selecting Choose Printer from the File menu.*

Both *ProPrint* and *Mac Daisywheel Connection* translate *MacWrite* characters along with their particular font, style, and point size characteristics to standard ASCII characters during letter quality printing. The font, style, and point size specifications remain in the document, so if later you decide to print a version with the special effects showing, you can use the Imagewriter. *LetterWare,* on the other hand, requires you to convert *MacWrite* text to 12-point Monaco before you print in letter quality. Converting the text isn't difficult, but it is a nuisance with long documents.

All three printer drivers print *MacWrite* documents and ASCII text files (ASCII files contain text without enhancements or formatting). To save a *MacWrite* document in ASCII, choose Save As from the File menu and click on Text Only. *Mac Daisywheel Connection* prints documents from any application program that the Imagewriter driver prints. *LetterWare* prints documents from any application software that lets you format text in 12-point Monaco.

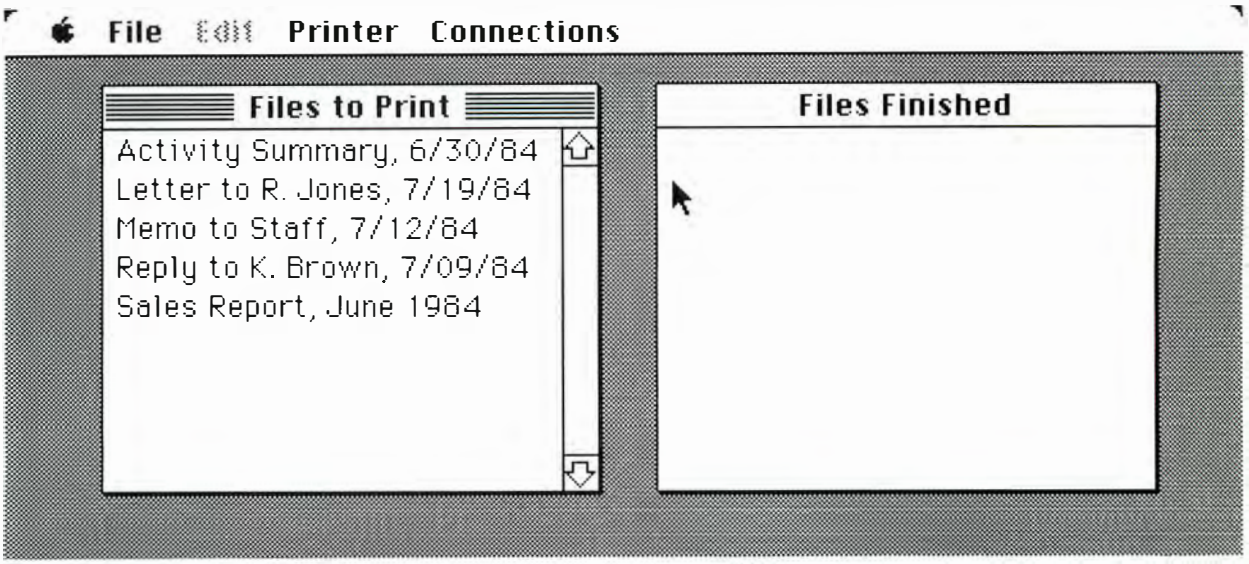


Figure 4
ProPrint *allows you to queue up to 50 documents for printing. When you open files, they are listed sequentially in the Files to Print window on the left side of the screen. As the printing of each file is completed, it is listed in the Files Finished window on the right side of the screen.*

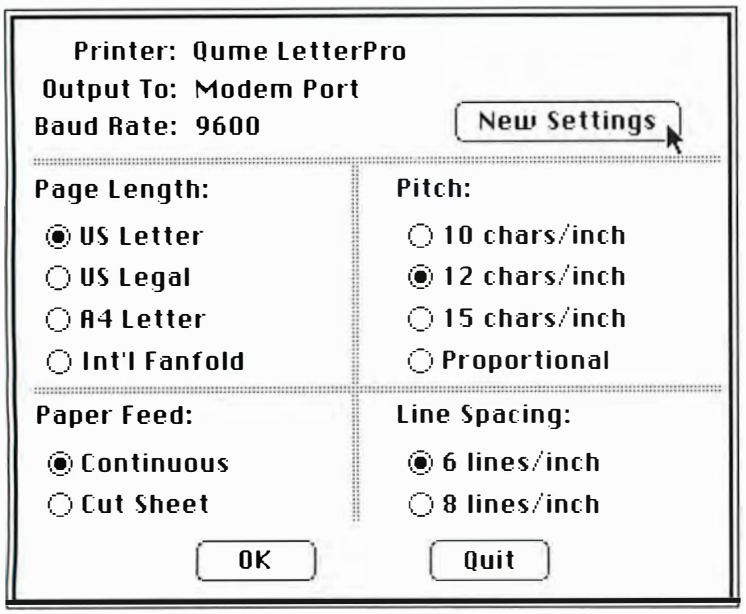


Figure 5
Mac Daisywheel Connection *shows the current printer settings in a dialog box that appears after you open the* Daisywheel Connection *icon on the desktop. The dialog box allows you to set page length, character pitch, line spacing, and paper feed.*

ProPrint

ProPrint requires you to use a dialog box to give the printer instructions for producing your document (see Figure 2). You indicate baud rate and other transmission instructions called *protocols* so the Mac sends the characters in a document at the same speed and in the same form as the printer receives them. Because printers vary, check the documentation for your printer to make sure you indicate the right settings. Use the dialog box to specify paper size and whether you are using single sheets or continuous paper. You must also specify the number of lines per inch you want printed and the character *pitch,* which is how close or far apart characters are spaced.

Because *ProPrint* is copy protected, you cannot copy it onto a *MacWrite* or other application disk. You must copy the documents you want to print from the application to the *ProPrint* disk, a process that can be time consuming. If you have an external disk drive, you can avoid copying documents by putting *ProPrint* in one drive and the document disk in the other drive.

ProPrint currently runs with 33 letter quality printers. To indicate which printer you are using, select Choose Printer from the Printer menu. A dialog box appears that asks you to click on the name of your printer (see Figure 3).

ProPrint enables you to queue up to 50 documents for printing, which means that you designate a group of documents to be printed one after another without interruption. You queue documents by choosing Select File from the File menu and then opening files from a dialog box in the order you want the files printed. As you open each file, it is listed sequentially in the Files to Print window on the left side of the screen (see Figure 4). If you choose Start Printing from the File menu, the documents are printed one by one, and as each file is completed, it is listed in the Files Finished window on the right side of the screen. You can stop a single file from printing or stop all the documents in the queue. The program also lets you use the Mac's desk accessories while the printer prints documents.

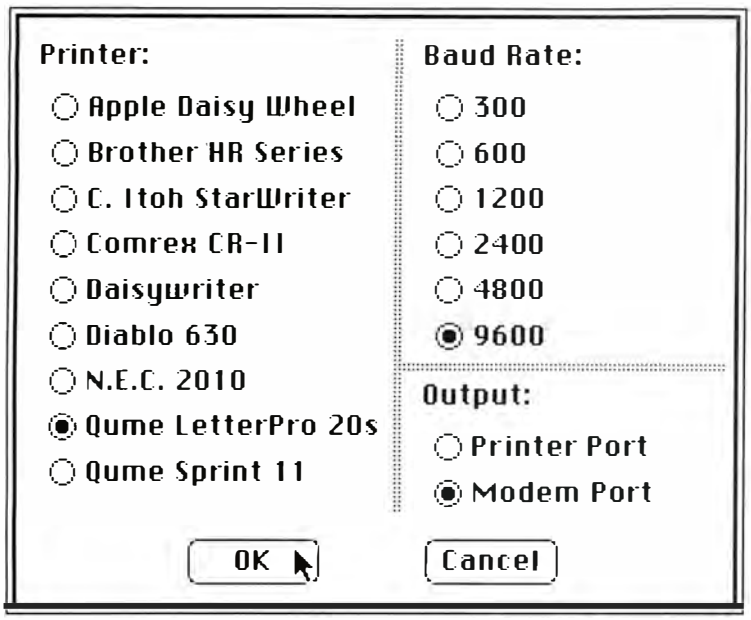


Figure 6
Mac Daisywheel Connection *generates a second dialog box when you click on the New Settings button in the dialog box shown in Figure 5. The second dialog box permits you to change printers and set the transmission speed and the output port.*

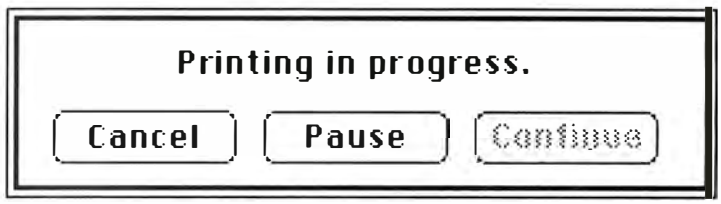


Figure 7
During printing, Mac Daisywheel Connection *presents a dialog box that allows you to change print wheels so that you can use different character sets in a single document. To stop the printer temporarily, you click on Pause; to resume printing, click on Continue.*

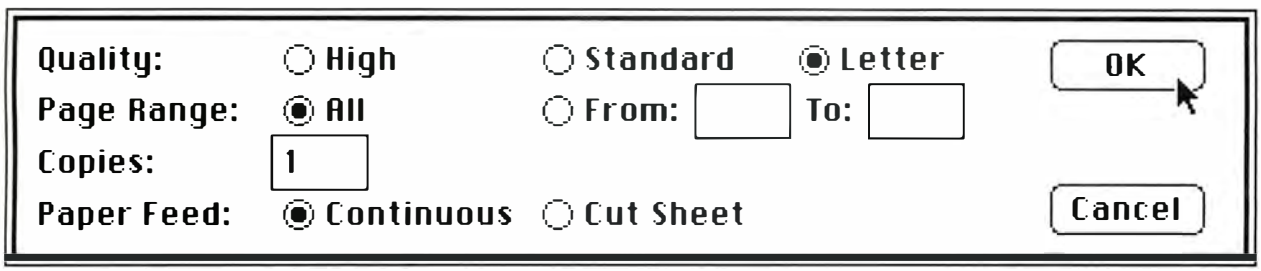


Figure 8
LetterWare's *Print dialog box is identical to the Imagewriter's Print dialog box except that the Draft quality selection is replaced by Letter quality.*

Mac Daisywheel Connection

Mac Daisywheel Connection runs with 15 letter quality printers. When you open the Daisywheel Connection icon on the desktop, a dialog box appears showing the current printer settings (see Figure 5). In the dialog box, you specify page length, continuous or single sheet paper, character pitch, and line spacing (e.g., single, double, or triple space). If you want to change printer, baud rate, or output port, click on the New Settings button in the dialog box, and another dialog box appears that enables you to make these changes (see Figure 6). Unlike *ProPrint, Mac Daisywheel Connection* does not let you queue documents, but you can pause temporarily while printing (see Figure 7). During the pause, you can change daisy wheels on your printer to produce different kinds of type in the text.

The best feature of *Mac Daisywheel Connection* is its ability to print any document created with application software compatible with the Imagewriter printer driver. In effect, *Mac Daisywheel Connection* prints the text from any document that the Imagewriter prints. The program also allows you to print lines up to 14 inches wide. If the printer you use has a wide enough carriage, this capability is useful for printing large spreadsheets like those created with *Multiplan.*

LetterWare

LetterWare can be difficult to install, but once that is done the program works well. To install it, you must replace the Imagewriter printer file in *MacWrite*'s (or another application program's) System Folder with *LetterWare*'s own printer file, which is also called Imagewriter. As described in the documentation, the replacement process is a little confusing. In fact, I accidentally replaced the *LetterWare* printer file with the *MacWrite* printer file. Before you replace the printer file, I suggest that you make a backup copy of the *LetterWare* disk.

To replace the file, first insert an application disk such as *MacWrite.* Leave the icon closed and eject the disk. Don't turn off the computer, because you want the ap-

plication icon to show on the screen. Next, insert the *LetterWare* disk and double-click to open it. Drag the *LetterWare* Imagewriter file from the desktop to the dimmed application icon. When you move the file onto the icon, a dialog box appears that asks whether you want to replace the printer file in the application with the printer file from *LetterWare*. Click on OK. You now have to exchange the *LetterWare* and application disks several times as the file is copied. Dialog boxes prompt you through the procedure. When you finish, the Imagewriter file shows up on the application desktop.

LetterWare requires you to connect your printer to the Mac by a special cable that comes with the software. The program drives the Brother HR series (15, 25, and 35) printers and Dynax's DX-15 (which is essentially the same printer as the Brother HR-15 or the Juki 61000). If you plan to use *LetterWare,* be sure to have one of these printers.

As mentioned earlier, to use *LetterWare* you have to convert the text in your documents to 12-point Monaco before you can print. This process is annoying for long documents. To save time, you might enter all text in 12-point Monaco; this font looks good on the screen, so you don't have to sacrifice the quality of screen output. If you use a two-color ribbon, you can produce characters in the ribbon's alternate color by selecting Italic from *MacWrite*'s Style menu. If you think you may want to print one version of a document in letter quality and another version with the Imagewriter's special printing effects, copy the document and convert the copy to 12-point Monaco so you don't lose the fonts and styles for good.

Once your text is in the right font and size, you're ready to print. *LetterWare*'s dialog boxes look just like the Imagewriter's, except that Letter appears as a printing selection (instead of Draft) along with Standard and High (see Figure 8). Select Letter to print with a letter quality printer.

Your Choice

People who have access to a serial letter quality printer now have an alternative to the Imagewriter's dot matrix text. You still can't print all the available text styles and graphics in one document with a single printer, although you can include Macintosh graphics in letter quality text by running the same sheet through both the letter quality printer and the Imagewriter. In its first year, Macintosh product developers have brought the computer a long way toward printing both graphics and high-quality text. Ideally, in the near future people will be able to print the Mac's unique graphics, special text features, and letter quality text with the same printer. □

Janette Martin is a freelance writer and a Contributing Editor of PC World.

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List price: $99

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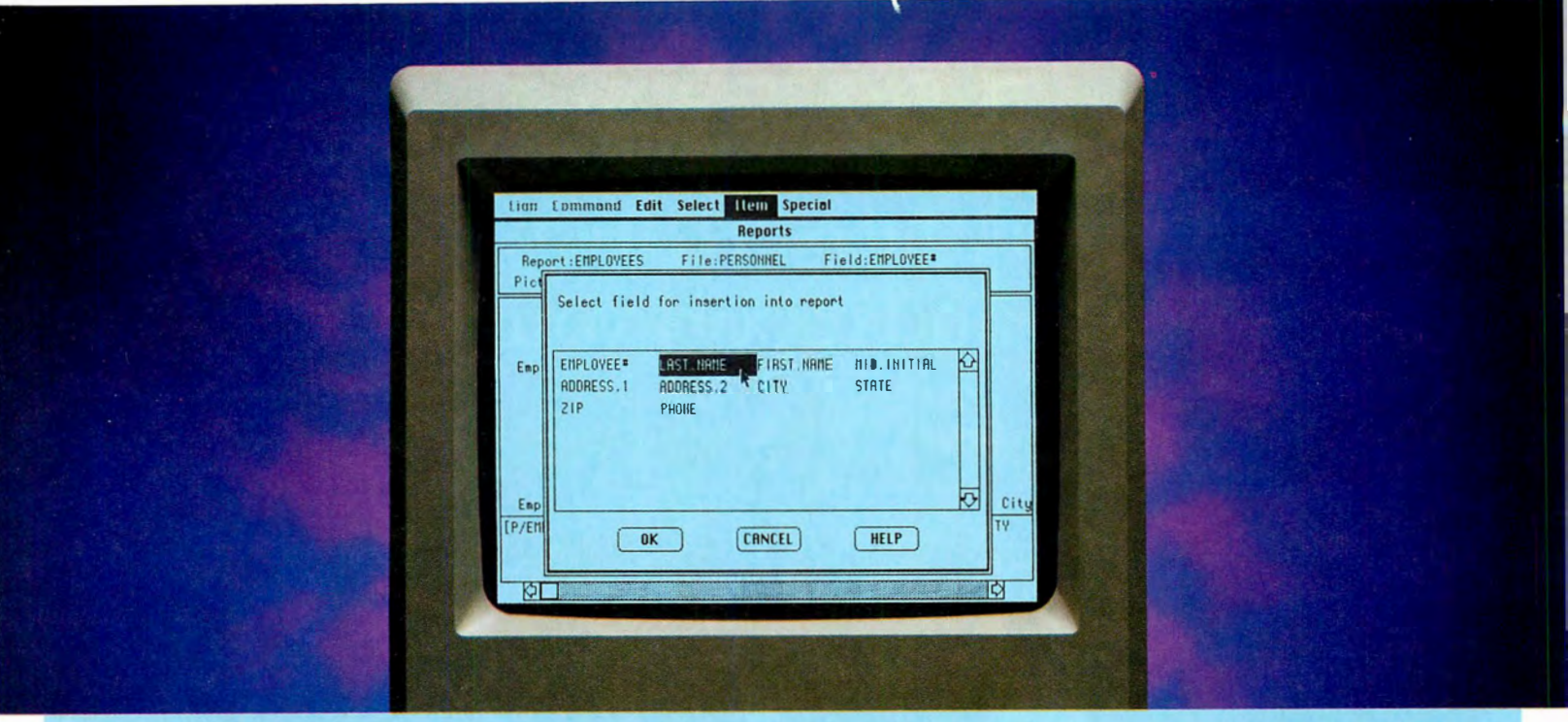

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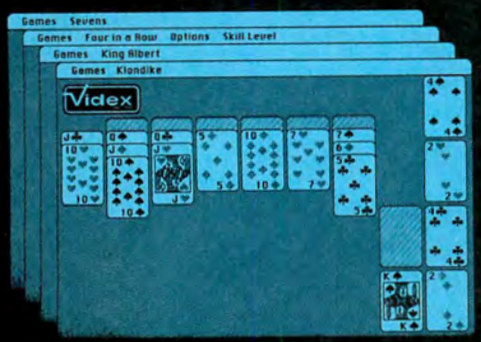

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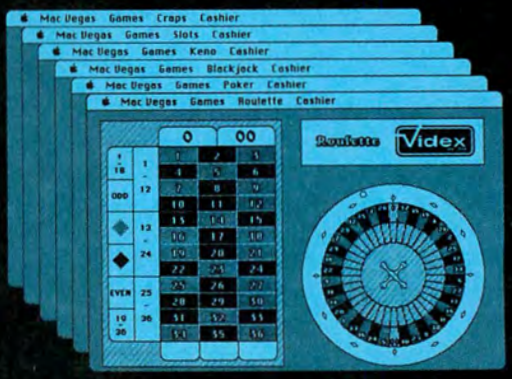

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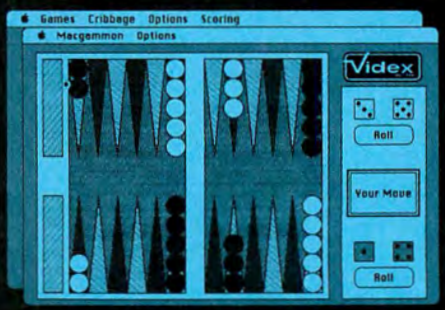

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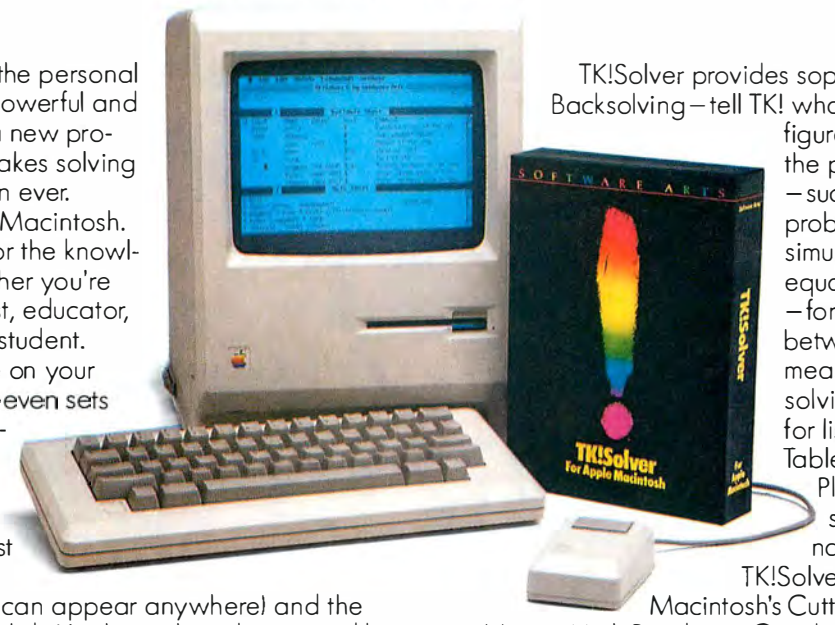

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Open Window

An exchange of Macintosh discoveries

Edited by Kearney Rietmann

Open Window *offers tips to help you use your Macintosh more efficiently. Submitted by readers, industry experts, and the* Macworld *staff, items in this department address all facets of Mac work, from applications to programming routines to capabilities of the Mac and software not covered in the documentation.*

This month's Open Window *features a clever application that shows what you can do with* MacPaint *and a little ingenuity. Richard Dlugo, who teaches music and computer education at the elementary school level in Western Springs, Illinois, has devised a simple way to write music scores on the Macintosh. You can use the Mac as a kind of "music typewriter" by drawing music staffs, notes, and other symbols in* MacPaint, *saving them in the Scrapbook or as documents, and then combining them in different ways to create the scores. Although application programs specifically designed for writing complex scores in musical notation, such as* Professional Composer *from Mark of the Unicorn, are or soon will be available for the Mac, this way of writing music is adequate for composers who don't want to invest several hundred dollars in a sophisticated program. Mr. Dlugo's application also provides insight into how you can use* MacPaint *to develop your own custom applications that use a preformatted library of symbols or objects.*

Music Symbols

You need two basic items to use *MacPaint* for composing music masterpieces: a set of music symbols and blank music staff paper. You should start by creating music staffs of different sizes and saving them in a symbols library. You can space the lines anywhere from five to nine dots apart to get the best-looking results. (FatBits can help you determine exactly how many dots apart to draw the lines.) Use the straight line tool to make five parallel lines across the width of the screen (see Figure 1).

When you have finished the staffs, it's time to create the music symbols for the symbols library. The patterns included here show the notation for a staff with lines that are seven dots apart. Use FatBits to create the notes and rests (see Figure 2). Draw all the notes on the staff to get the proper proportions. Be sure the stems extend the right length.

Don't forget to make both a right-side-up and an upside-down version of each note so you will have notes to place in both the upper and lower parts of a staff. Use the vertical and horizontal flips to do this. Include all the items you think you will need, such as notes and rests of different values. Next, erase the unwanted staff lines around each symbol.

When you have finished drawing all the notes and rests, create treble and bass clefs, repeat bars, sharps, flats, and other necessary symbols.

After you have drawn all the symbols, store them with the music staffs in your symbols library. Try to keep the library as small as possible from top to

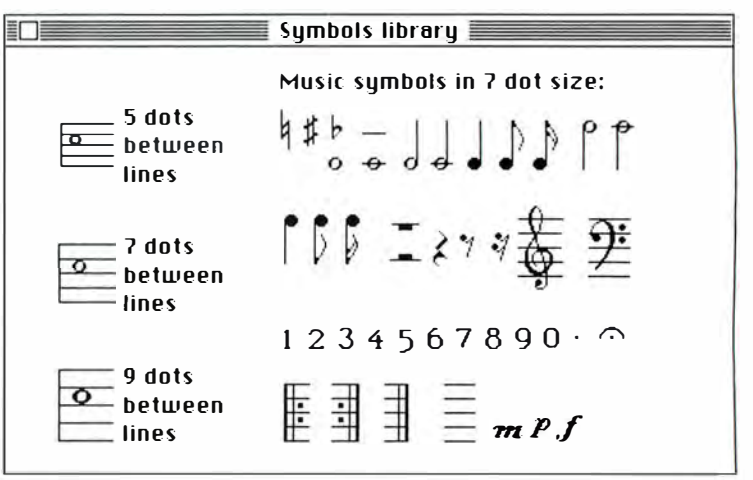

Figure 1
The symbols library contains staffs and other music symbols of different sizes. You create music staffs and symbols and save them in the library either in the Scrapbook or as a MacPaint *document. As you create music scores, you copy the symbols from the library.*

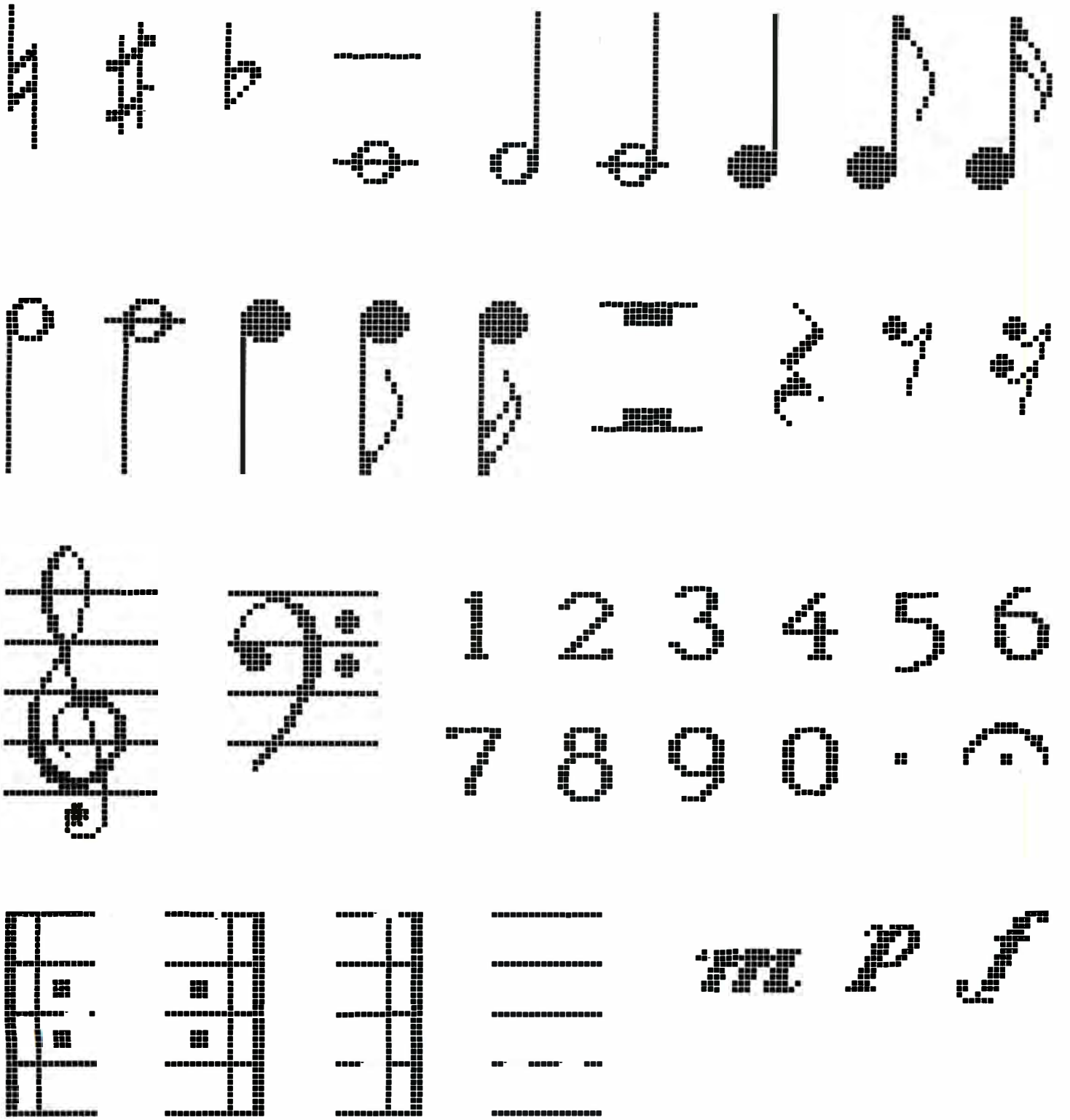

Figure 2
Refer to this chart as you create the symbols library. The notes, rests, staff, and other symbols are shown in FatBits to help you draw them in the right size and proportions.

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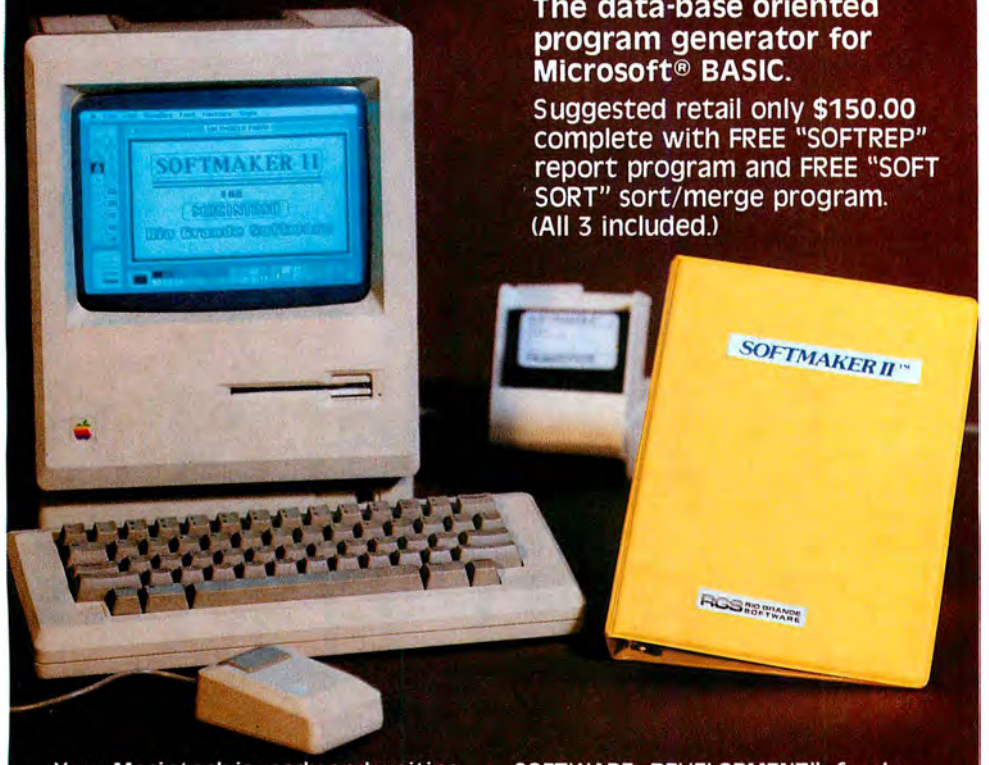

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bottom so it doesn't take up too much space on the screen; it should be small enough to leave room for at least two music staffs, particularly if you're writing piano, organ, or choral music. However, make sure you place your items far enough apart to make it easy to lasso the notes that you want to copy from the library to a staff. Copy the library into the Scrapbook or into a *MacPaint* document.

Blank Staff Paper

Now it's time to create a full sheet of blank staff paper. Make a section of music staff and extend it left and right to the ends of the screen. To extend the staff, you select the right-hand portion with the marquee (selection rectangle) and press ⌘-Shift-Option while you drag the staff to the right with the mouse. Use the marquee again to copy the entire staff to the Clipboard. Move the screen up with the grabber and paste in the staff at regular intervals. While you're at it, paste in appropriate clef signs from the symbols library. You can have a blank sheet with all treble clefs, or if you play the trombone or another low-pitched instrument, you might want all bass clefs. Keyboard players can make the Grand Staff with both treble and bass clefs. Save your blank staff paper on disk as a *MacPaint* document. Use a name like "staff.treb.7" to indicate the type of staff paper you have stored. In this example, the document name indicates that the staff paper has all treble clef staffs and the lines are spaced seven dots apart.

With the symbols library from the Scrapbook and a sheet of blank staff paper on your screen, you can begin placing notes on the staff. Set the window to show the upper-

left corner of the page. Copy your library to the Clipboard and paste it onto the bottom of the screen. Don't worry about destroying any part of the staff with the library; you can replace it with a blank portion of staff. For songs with words, I suggest that you type in the words first so you can see where to insert the notes.

Symbols on Paper

Now you are ready to place the notes and other symbols on the music staff (see Figure 3). Use the lasso to surround the item you want to put on the staff. Copy the item to the staff by holding down the Option key. (Leave the original version of the item in the library to use later.) Space your notes according to their note value. Notes on or above the middle line usually have their stems pointing down rather than up. You can make eighth and sixteenth notes from quarter notes: place the quarter notes on the staff and then use the straight line tool to connect the tips of the stems.

To make ties and slurs, use the oval tool or the rounded-corner rectangle to draw an ellipse of the size you need on a blank part of the screen. Erase the unwanted portion, then lasso the remaining portion and drag it to its proper place (see Figure 4).

Correcting errors is easy because *MacPaint* lets you move objects around the screen. If you put a note in the wrong place, just use the marquee to select a section of staff from the library. Hold down the Option key, drag the selection to the place where the wrong note is, and the blank staff replaces the note. You can also create measures that repeat themselves by using the marquee to outline the measures you want to move and then pressing Option and dragging them into position.

As you move down the blank staff paper, replace areas you have erased accidentally by selecting a piece of "clean" staff and dragging it from the library to the staff area. Move the screen up so your next staff is at the top and then repaste the selection from the library at the bottom of the screen. Now you're ready to put notes on the next staff. Continue the procedure until your opus is finished. You can erase sections of staff you don't need. If you teach young children, as I do, you might want to include a picture for your song in an unused area of the page.

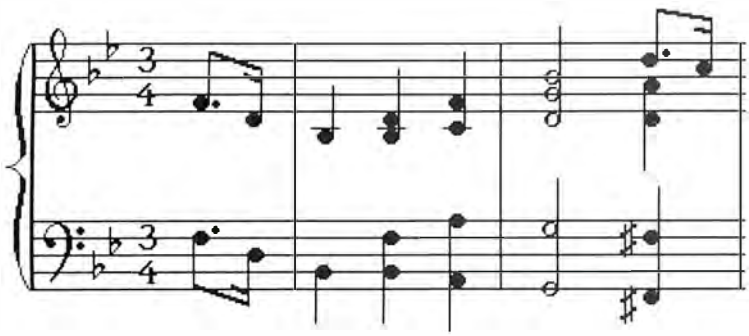

Figure 3
Use the lasso to select notes. Hold down the Option key as you drag them into position so a copy is left in the library for later use.

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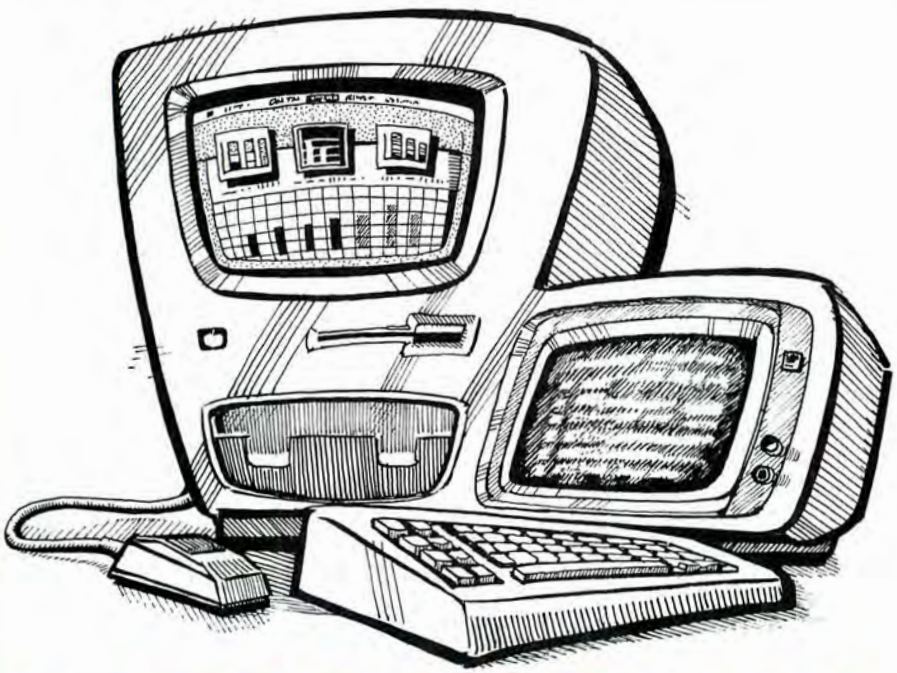

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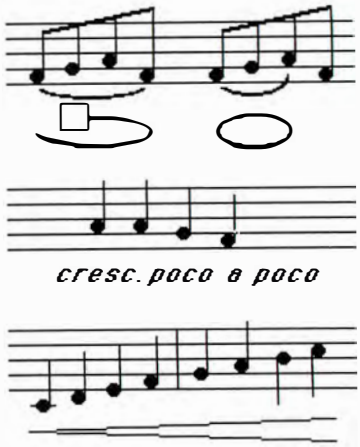

Figure 4
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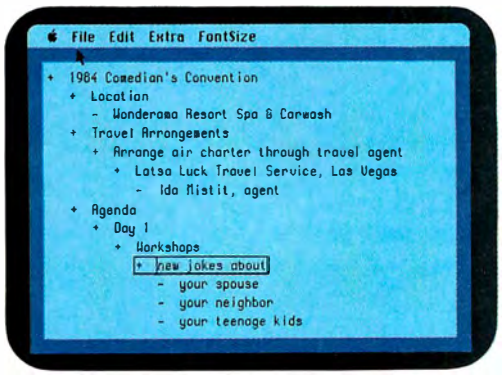

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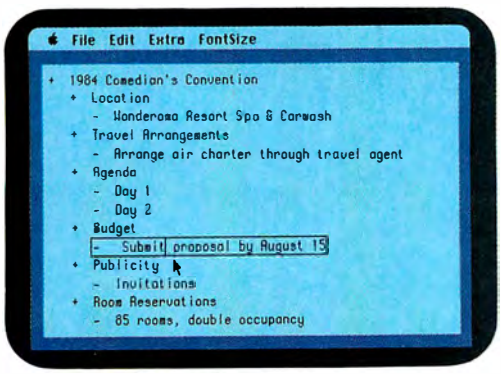

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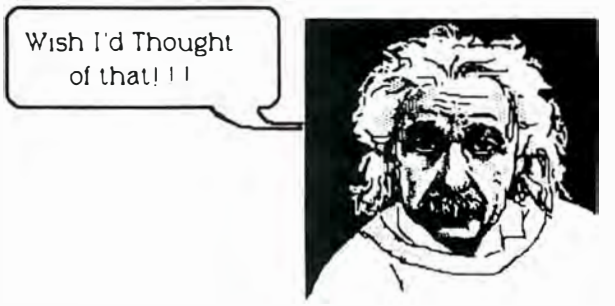

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The Macintosh Family Tree

Ted Nace

A complex chain of ideas and technology stretching back to the end of World War II ultimately produced the revolutionary Macintosh. Meet some of the thinkers whose dreams and inventions forged the links in this historic development.

The ancestry of the Macintosh derives from two sources. One line of descent is well known, going back to early hobby computers that were designed to put computing power into desktop-sized machines. Computers like the Apple II, the IBM PC, and the Macintosh are part of the technological and commercial phenomenon known as personal computing.

But unlike other computers designed for business, education, or home use, the Mac marks a juncture where an entirely different stream of technology enters personal computing. This computer science is older and in many ways more sophisticated than the technology employed until now in personal computers. Its origins and development, however, are largely unrecognized.

The unknown branch of the Mac family tree is responsible for the most innovative aspects of the computer—mouse, windows, icons, and pull-down menus, which form the ensemble known as the *user interface*. This limb of the tree has grown within computer science since the birth of modern computers during World War II. Over several decades, this area of research has survived due to the efforts of computer scientists who wanted to design computer systems that could be used as personal, interactive information tools. For these researchers, the quality of the user interface was a central concern.

Lisa Technology

A bit of magic—a disappearing act—underlies the design of any user interface. A good one seems so natural that it becomes transparent; people forget about the computer itself and concentrate on doing a job. As with any magician's trick, however, a great deal goes on behind the scenes to make the visual effects pos-

1957 Sputnik launch spurs U.S. to form Advanced Research Projects Agency (ARPA).

1960 J. C. R. Licklider formulates the goal of interactive computing in his "Man-Computer Symbiosis" paper.

1962 Sketchpad, the first interactive graphics program, is designed by Ivan Sutherland.

1964 Douglas Englebart invents the mouse at the Stanford Research Institute.

1967-69 Alan Kay and Ed Cheadle develop the FLEX computer.

1970 Xerox establishes the Palo Alto Research Center (PARC).

1973 Xerox PARC researchers first implement overlapping windows.

1976 The "desktop" metaphor is first used in Xerox PARC's Officetalk software.

1981 Xerox releases the Star office computer.

1983 Lisa is introduced.

1984 Macintosh is introduced.

Personal Computing Movement

1969 Intel begins work on the 4004, the first microprocessor.

1972 Alan Kay develops Smalltalk, a programming language for personal computers.

1975 MITS's Altair, the first hobby computer, is introduced.

1977 Apple II is introduced.

1981 IBM PC is introduced.

sible. Apple refers to the magic of the Macintosh user interface as Lisa technology, because it was first shown to the world on the Lisa 1, introduced in early 1983.

The Lisa's designers acknowledge the computer's resemblance to machines developed at Xerox Corporation's Palo Alto Research Center (PARC). It's no secret that in 1980 Apple lured a number of researchers away from PARC to help create the Lisa. As a result, much of Lisa technology is actually PARC technology.

For years at PARC, many of the world's best computer scientists worked unfettered in developing personal computer technology. In 1971, three years before the simplest hobby computers appeared on the market, PARC's computer scientists had envisioned a notebook-sized computer and had begun writing software for it. But to trace the genealogy of the Macintosh, we must travel even further back in time.

The Memex

In July 1945, as World War II drew to a close, a science advisor to President Roosevelt named Vannevar Bush published a futuristic article entitled "As We May Think" in the *Atlantic Monthly*. Bush outlined his knowledge of electronics and speculated about where the field was headed. "The world has arrived at an age of cheap complex devices of great reliability," he declared, "and something is bound to come of it."

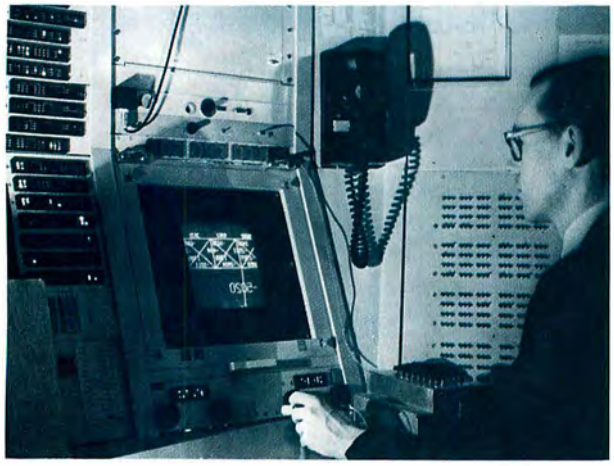


Figure 1
Ivan Sutherland operating the Sketchpad *program in approximately 1963. Sutherland designed the innovative program for his Ph.D. thesis.*

Bush had invented the fastest calculating device used in his day, but he envisioned computers that would store and manipulate words and pictures, not numbers. He wanted a small machine, a "device for individual use" that would, he predicted, "consist of a desk, and while it can presumably be operated from a distance, it is primarily the piece of furniture at which [a person] works. On the top are slanting translucent screens on which material can be projected for convenient reading. There is a keyboard, and sets of buttons and levers. Otherwise it looks like an ordinary desk."

Bush never tried to build his device, which he called the "memex." In the following years, the idea of an easy-to-use tool to enhance the productivity of individual workers was overwhelmed by a push in the opposite direction, toward large, fast, number-crunching computers. In the 1950s computers became, almost by definition, arithmetic machines. The first deviation from that concept had to wait for a forceful jolt from outside and for the initiative of a handful of remarkable people.

The ARPA researchers asked an unusual question: how might computers be shaped to the needs of individual users?

The Sputnik "Crisis"

The jolt came in 1957 from an unlikely place–a launching pad in the Soviet Union. When the Russians surprised the world by sending Sputnik into orbit, the United States decided that it had to catch up technologically. The result was an infusion of funds for research in virtually every area of science and technology.

In computer science, the Advanced Research Projects Agency (ARPA) began putting millions of dollars into "blue-sky" research projects without immediate commercial payoffs. ARPA became a haven for researchers who had somewhat offbeat notions about what computer science should do. In the midst of the drive for more powerful computational engines, the ARPA researchers asked an unusual question: how might computers be shaped to the needs of individual users?

Man-Computer Symbiosis

The first head of the Information Processing Techniques division of ARPA was a computer scientist named J. C. R. Licklider. In 1960, shortly before assuming his post at ARPA, Licklider wrote a paper entitled "Man-Computer Symbiosis," which contained ideas similar to those expressed 15 years earlier by Vannevar Bush. Licklider proposed not a new device, but a new relationship between people and computers. What was needed, he wrote, was a setup that would allow an individual to "think in interaction with a computer in the same way that you think with a colleague whose competence supplements your own."

Licklider's ideas resembled Bush's, but Licklider was given the chance to bring his vision to life. He and his successors at ARPA, Ivan Sutherland and Bob Taylor, channeled the agency's research dollars into projects aimed at making interactive computing a reality.

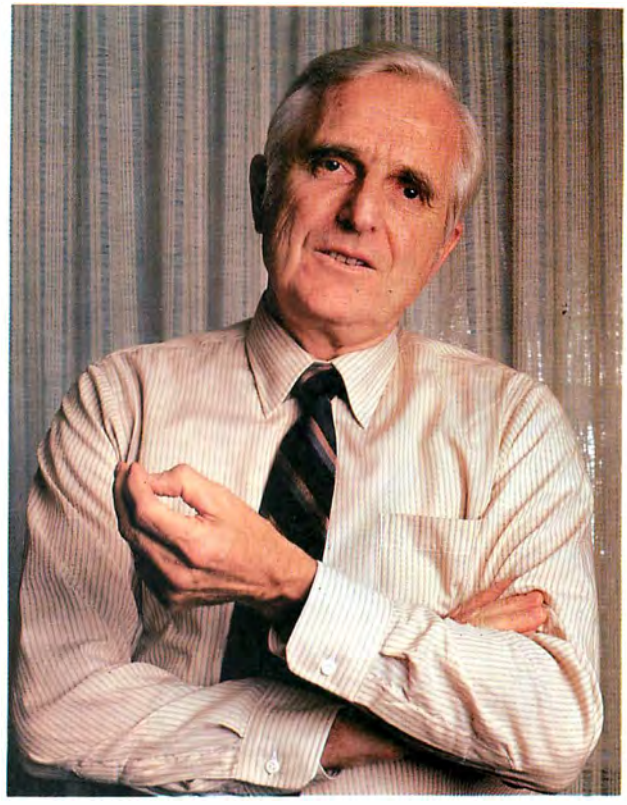
The first major initiative was to develop *timesharing,* a method of enabling one large computer to be used jointly by a number of people. With timesharing, someone could sit at a terminal and work interactively with a multimillion-dollar computer. Although this was only a short step on the long road from the mainframes of the 1960s to the Macintosh, it was a critical one.

Spacewar and Sketchpad

How did the researchers at projects funded by ARPA spend their free time? It wasn't long before someone hooked up a cathode-ray tube to a PDP-1 minicomputer, programmed a little blob to fly around the screen, then another, and added torpedoes and gravity. Thus in 1962 the first computer game appeared: *Spacewar.* The game was never officially acknowledged by ARPA, but it was popular wherever a computer and a cathode-ray tube were connected.

The combination of display screens and interactive computing was a powerful one. At about the same time that *Spacewar* appeared in laboratories, an MIT graduate student named Ivan Sutherland created *Sketchpad,* a graphics program that still inspires awe among computer scientists (see Figure 1). Larry Tesler, one of the Lisa's chief designers, says, "*Sketchpad* was really the ancestor of systems such as the Lisa and the Mac."

Basically, *Sketchpad* enabled a person to create lines, circles, and other geometrical figures directly on the screen using an input device called a light pen. Once you had drawn a figure, you could shrink or expand it far beyond its original size. Most remarkably, with *Sketchpad* you could not only create geometrical figures, but move them around and attach them to other figures, as if the figures were real objects. Figures could be stored in memory and duplicated anywhere on the screen. If you altered the stored figure, the program automatically made that change in all copies of the figure.



Douglas Engelbart, an innovative researcher dedicated to developing tools to augment human mental power. In 1964 he invented the first-generation mouse.

Brick, Pencil, and Mouse

Sketchpad was a powerful, easy-to-use graphics tool. It is no wonder that when Ivan Sutherland, its creator, succeeded J. C. R. Licklider as head of ARPA's funding program in computer research, he supported the agency's penchant for interactive systems. ARPA's next director, psychologist Bob Taylor, was also interested in interactive systems. During his tenure from 1964 to 1969, Taylor successfully moved timesharing technology into the commercial market. He also backed the work of a remarkable man named Douglas Engelbart.

Engelbart is the quintessential blue-sky thinker, whose goals extend far beyond the boundaries of ordinary computer science. "We spend great sums for disciplines aimed at understanding and harnessing nuclear power," he wrote in 1962. "Why not consider developing a discipline aimed at understanding and harnessing 'neural power'? In the long run, the power of the human intellect is really much the more important of the two." Engelbart proposed that the tools we use to enhance our mental capabilities are entirely inadequate, and that we don't recognize flaws in our tools because we've become accustomed to them.

Figure 2
Douglas Engelbart's "de-augmented pencil": a tongue-in-cheek invention intended to illustrate the concept of augmentation.

Engelbart argued that better ways of augmenting people were needed. To illustrate what he meant by *augment,* he published the results of a counterexample, "Experimental Results of Tying a Brick to a Pencil to 'De-Augment' the Individual." He recorded how long it took people to write a seven-word sentence using a typewriter, a pencil, and finally a pencil tied to a brick (see Figure 2). Perhaps, Engelbart reasoned, technological innovations may be possible that will make our use of the typewriter or the pencil appear as cumbersome as attempting to write with a pencil tied to a brick.

Computer trivia buffs may recognize Engelbart as the man who in 1964 invented the mouse, or "X-Y Position Indicator for a Display System," Patent #3,541,541 (see Figures 3 and 4). The researchers working under Engelbart's direction at the Stanford Research Institute (now SRI International) had experimented with a number of pointing devices before settling on the mouse, but research on pointing devices was merely a small part of the vision of computing that unfolded at SRI. The project was called NLS (a sort of acronym for On-Line System), which might be classified as "office automation" product research. The ideas that the work encompassed, however, went far beyond word processing or electronic mail.

Flying a Computer

One fall day in 1968, Engelbart conducted a live demonstration of NLS for an audience of several thousand people gathered in San Francisco for the Fall Joint Computer Conference–the predecessor of today's National Computer Conference (see Figure 5). Behind him a large screen showed his face superimposed on a

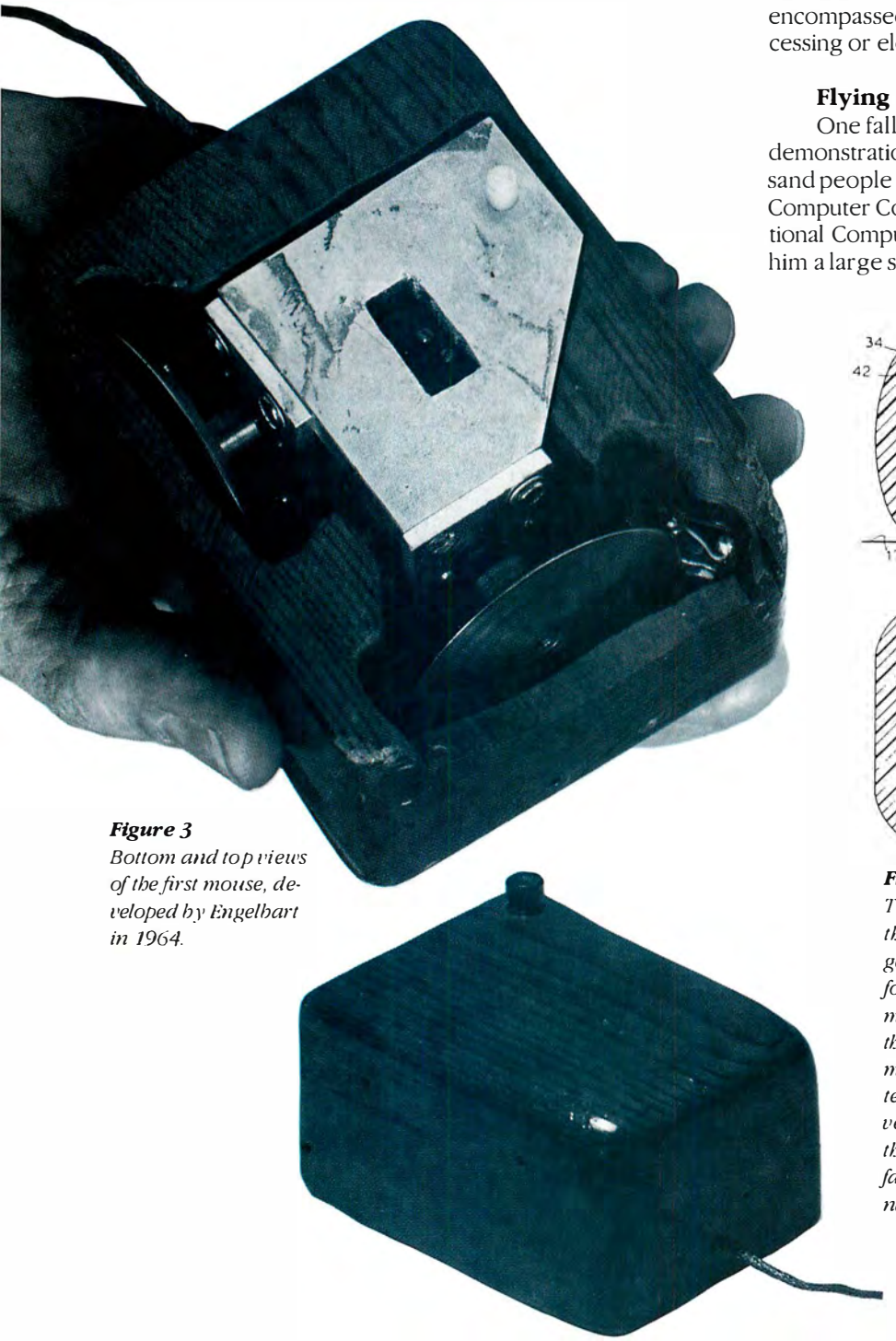


Figure 3
Bottom and top views of the first mouse, developed by Engelbart in 1964.

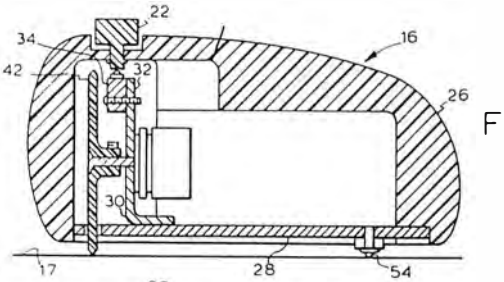


FIG. 2

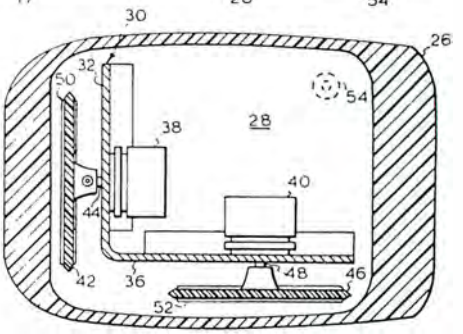


FIG. 3

Figure 4
The main diagram that accompanied Engelbart's application for a patent for the mouse. The wheels on this first-generation mouse control two potentiometers that convert the movement of the mouse on a surface into electrical signals to the computer.

picture of the computer display. At times the camera moved to show his hands, which rested on two unusual devices that enabled him to enter information rapidly without using a keyboard (see Figure 6).

One of these devices was the mouse. The other, called a *chord keyset,* looked like a five-key piano (see Figure 7). By pressing various combinations of keys with one hand, Engelbart typed letters and numbers. With surprising ease, he zoomed in and out of various files, making alterations, editing text, creating flowcharts, and then passing control to his fellow researchers 40 miles away in Menlo Park, who appeared on the giant auditorium screen and continued demonstrating the system.

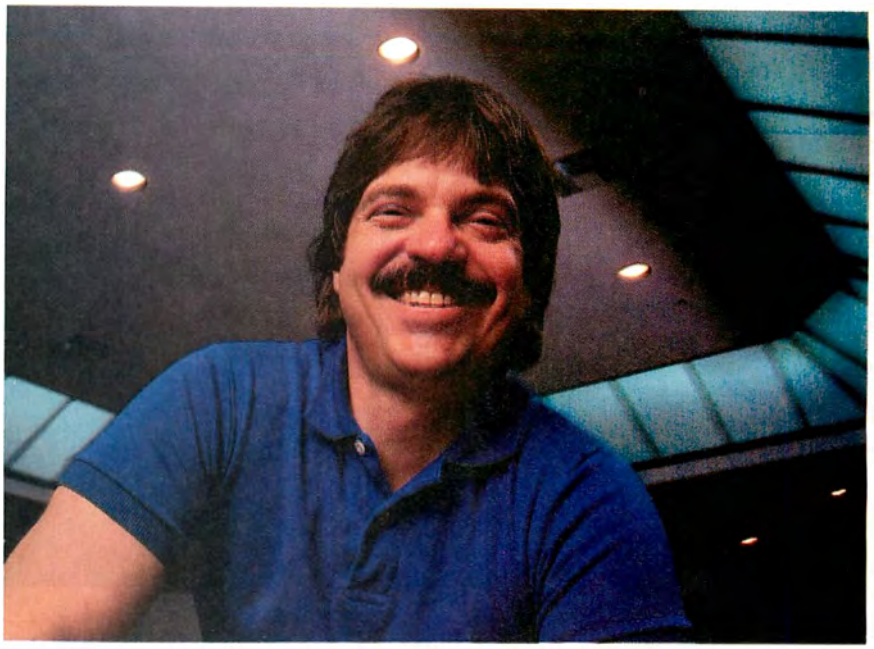
The Dynabook

One of the many people who were impressed by Engelbart's demonstration at the conference was Alan Kay, a young artist, musician, and computer science student who was completing graduate studies at the University of Utah. Like Engelbart, Kay was interested in changing people's ideas about the use of computers. Kay's vision was to make available to any person, for less than $1000, a computer the size of a large book with the power of a mainframe. He called his concept the Dynabook. Between 1967 and 1969 he and Edward Cheadle (whom Kay calls "a raving hardware genius") had built a stand-alone personal computer called the FLEX machine (see Figure 8). FLEX had multiple windowing and good graphics capabilities, but it proved difficult to use. In creating the Dynabook, Kay aimed for a computer that was not only small and powerful, but so well designed that it would satisfy even the most demanding computer users: children.

In 1970, Xerox Corporation formed its Palo Alto Research Center. The company hired Bob Taylor, the ARPA administrator, to head the Computer Sciences Lab within PARC. Taylor put together a top-notch team of computer scientists that included Alan Kay, Butler Lampson (a pioneer of timesharing technology), and Chuck Thacker (who later conceived and designed Xerox's Ethernet communications system). Says Kay, "I made a list of the world's 100 best computer scientists, and we had 58 of them under one roof."

Kay realized that the hardware technologies necessary to make Dynabook a reality were ten years away. Nevertheless, in accord with his belief that "a personal computer is 90 percent software," he convinced his fellow researchers that the project was worth pursuing in 1971.

Kay's group at PARC was never large, usually ten to twelve people, and was called the Learning Research Group (LRG). As its name indicates, the group's emphasis was on making computers more useful to people. Kay later vowed "never to design a programming system that children can't use."



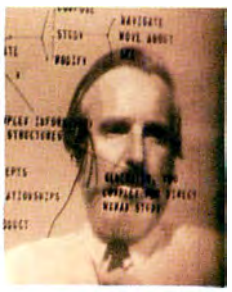
Alan Kay, the visionary developer of Smalltalk.

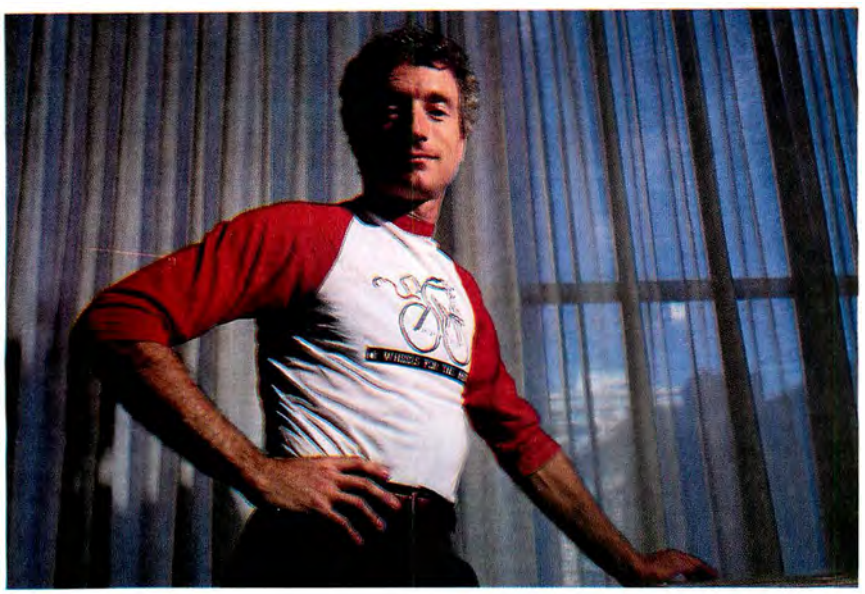
In 1972, Kay created a new programming language, Smalltalk, designed specifically for a personal computer with a keyboard, a pointing device like a mouse, and a high-resolution display (see Figure 9). LRG implemented the language on an experimental personal computer and began working with children on software projects such as cartoon animation and music composition.

Tesler's Crusade

Meanwhile, other research was getting underway at PARC to develop office systems for secretaries. Upon beginning work at PARC, Larry Tesler's first assignment was to implement the state-of-the-art office system of that time– Engelbart's NLS–on a PARC computer. Tesler had difficulty learning to use the system and found that other people did too. The problem with NLS, he discovered, was that it was designed for high performance, with many features and fast processing speed, but not for ease of learning. The requirement to remember a large number of abbreviated commands proved to be the principal source of difficulty.

Figure 5
Douglas Engelbart superimposed on a demonstration of the NLS system. Live multimedia demonstrations of the system at computer conferences in 1968 and 1969 convinced many people of the potential of interactive systems such as NLS.





Larry Tesler, an early believer in making the personal computer available to everyone. He worked with Alan Kay on Smalltalk and was one of the Lisa's chief designers.

For example, to delete a word, you typed **DW** to enter "word delete" mode, then selected the word with the mouse, and finally pressed a button on the mouse to confirm the command. Tesler's solution was to reverse the procedure: first you pointed at the word. The program responded with a list of command options, and then you had only to select the delete command.

The Alto

For the kind of software research they wanted to do, the scientists at PARC needed a state-of-the-art computer. Their dream machine was called the Alto. Chuck Thacker and one other technician designed and built it in the astonishingly short time of four months. One important feature of the Alto was that its design called for a high-resolution screen specially suited for graphics. In addition, unlike previous computers, the Alto's user interface was not built into the hardware but could be changed according to the software written for it.

In attempting to create an environment on the screen that would be self-explanatory, Alan Kay planned to use objects and activities familiar to an office setting. Several versions of this notion were implemented at PARC, some quite literal. For example, in Officetalk, a research prototype for an office computer, a person began by getting a "file folder" out of a "desk drawer" and taking a "blank sheet of paper" out of the folder. The result was a system that secretaries could learn in an hour with a twelve-page manual.

Winds of Change

By 1976, researchers at PARC had developed software techniques to support a variety of advanced user interface concepts, including pop-up menus, overlapping windows, and icons. Meanwhile, scarcely noticed by workers inside this ivory tower of computer science, the hobby computer movement was growing.

One day Larry Tesler's next-door neighbor in Palo Alto dragged him to a meeting of the Homebrew Computer Club. Tesler recalls, "I watched guys carrying around boxes of wires and showing programs that generated flashing lights. My neighbor said, 'This is the future! Everybody is going to make their own computers at home.' I told him, 'Forget it!'"

By September 1976, Tesler had changed his mind. Other people at PARC, however, believed that hobby computer companies would never sell many machines. As a result, Xerox missed the chance to take advantage of its huge technological lead and dominate the fledgling personal computer industry. Tesler remembers, "Here was the fatal flaw. Alan Kay had convinced us that a personal computer would be uninteresting unless it were very powerful. He said, 'We've got to come out with a computer that looks as good as paper and works better. [The Dynabook] will replace notebooks, textbooks, telephones, and typewriters.'" Kay himself admits, "What I completely misunderstood about the microcomputer industry was the hunger people had for any kind of computer."

Figure 6
Engelbart operating a prototype of the NLS system developed by his team at the Stanford Research Institute. He enters letters, numbers, and symbols with his left hand via a five-fingered chord keyset *while his right hand manipulates a cursor with a mouse.*

Figure 7
The controls for Engelbart's NLS workstation, from left to right: a chord keyset, a standard keyboard, and a mouse. Combinations of keys are pressed on the keyset to enter short commands. The keyboard is used for typing longer passages.

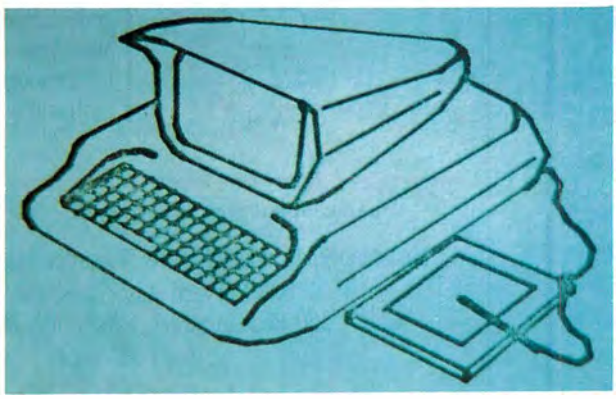


Figure 8
The FLEX machine, drawn on its own screen. FLEX was developed by Alan Kay and Ed Cheadle. It featured windowing capabilities and graphics.

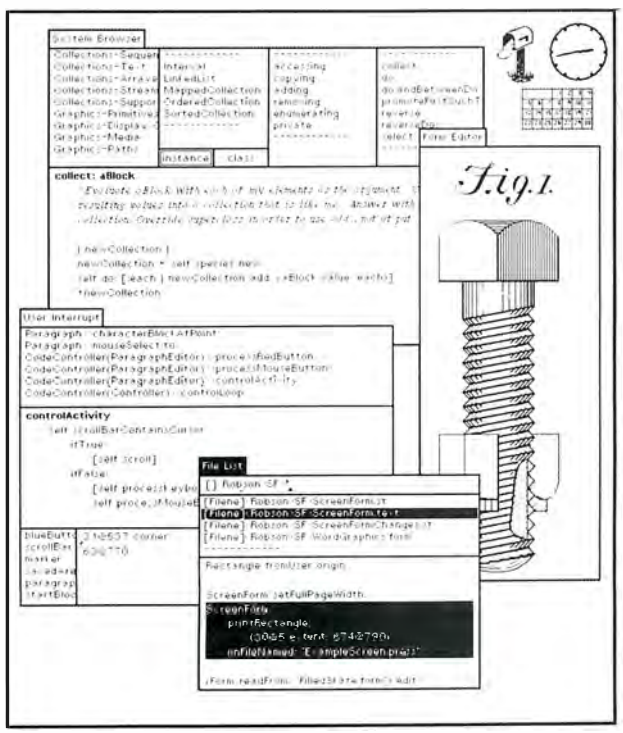


Figure 9
A typical Smalltalk display. The pictures show both the overlapping windows and the icon symbols for files developed at PARC.

A Visit From Apple

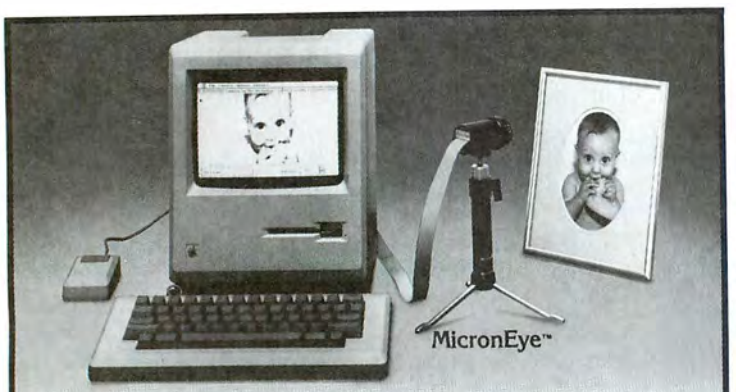
PARC had a commercial computer in the works, but it was a high-priced office system, the Star, not introduced until 1981. In 1977, Tesler, who had immersed himself in studying the hobby computer boom, decided that "if PARC didn't get into the personal computer business I was going to leave."

Toward the end of 1979, Steve Jobs, Bill Atkinson, and a group from Apple came to PARC for a demonstration of Smalltalk. As Tesler recalls, "I happened to give the demo because I worked on Smalltalk and I was the 'personal computer expert.' I found these guys to be really sharp and decided I wanted to work with them."

Just as many researchers who had worked on NLS under Doug Engelbart took their ideas to PARC in the early 1970s, a small migration of talent now began from PARC to Apple, where work was beginning on the Lisa and the Macintosh. The designers of these computers did not simply adopt PARC ideas for the user interface; they recrafted the ideas completely. However, the legacy of previous user interface ideas is apparent in Lisa technology, as well as in products from other companies, such as *Microsoft Windows* and Ashton-Tate's *Framework*.

Today's state-of-the-art computer, of course, will be tomorrow's antique. Personal computers will continue to become cheaper, more compact, and increasingly powerful. User interfaces will gradually improve, as systems incorporate features such as speech recognition and voice synthesis. Characteristically, both Alan Kay and Doug Engelbart argue that the Mac is not the fulfillment of their dreams. It's a teaser, they say, a hint of greater advances in personal computing that are still to come. □

Ted Nace, a freelance writer in the San Francisco Bay Area, is writing a book on software marketing for Microsoft Press.



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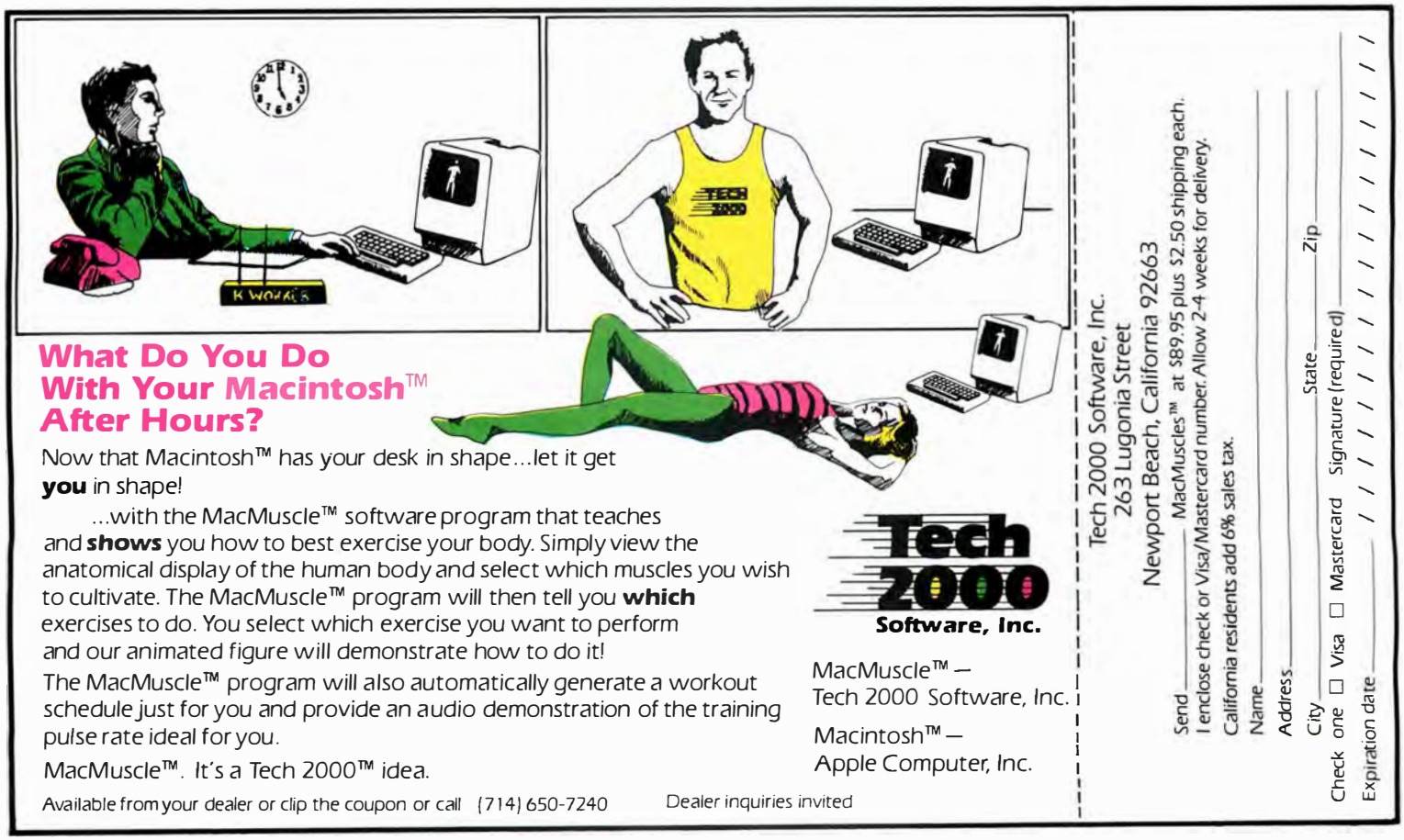

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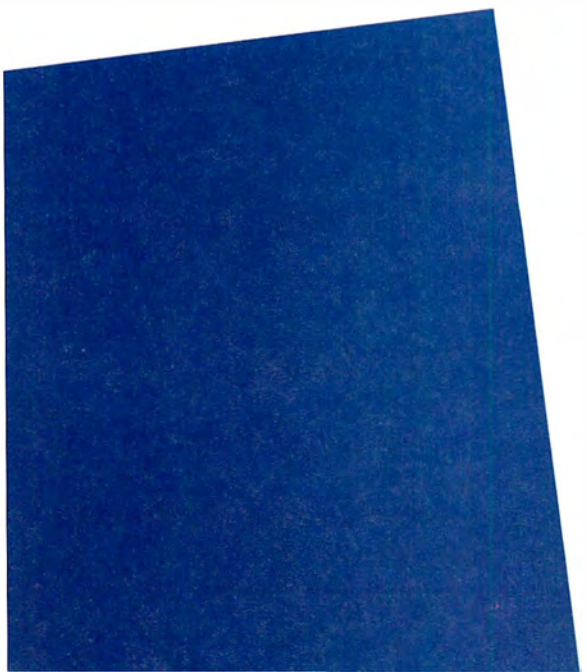

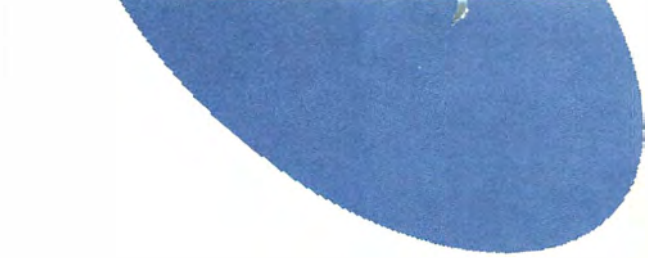

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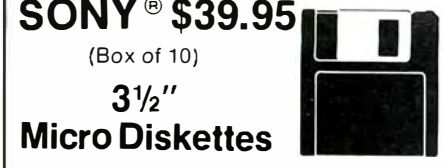

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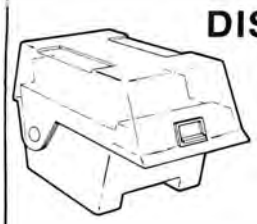

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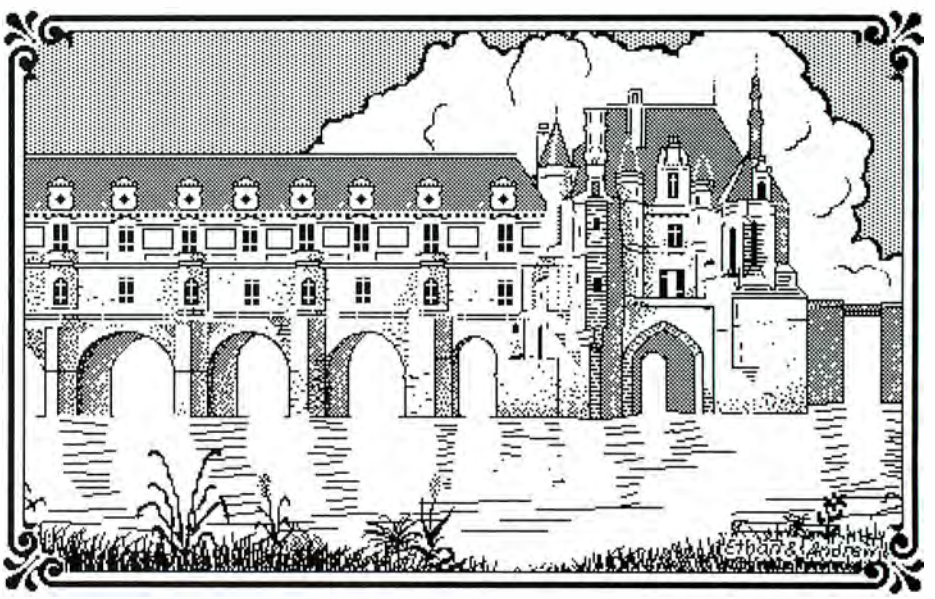
Macworld Gallery

An exhibition of Macintosh graphics

Edited by Erfert Nielson

Although the quality of the drawings submitted to Macworld Gallery *has improved over the months, it is surprising how many drawings, though impressive, are copies of photographs or existing drawings. It is traditional for novice artists to learn techniques by copying works of the masters, so perhaps Mac artists also will see this as a step in the learning process. Since the* MacPaint *tools are similar to traditional artists' tools—the pencil, paintbrush, and eraser—we hope that Mac artists will come to treat the Mac's screen as a blank piece of paper. An important part of art is, after all, imagination.*

To be considered for exhibition in Macworld Gallery, *send a paper copy of your drawing and a detailed description of the techniques you used to create it to* Macworld Gallery, *555 De Haro St., San Francisco, CA 94107. Please include your phone number with your entry. If your drawing is selected, we will ask you to send a copy of it on disk. All disks become the property of* Macworld. *See the September/October issue for details on the art contest sponsored by* Macworld *and Apple Computer.*



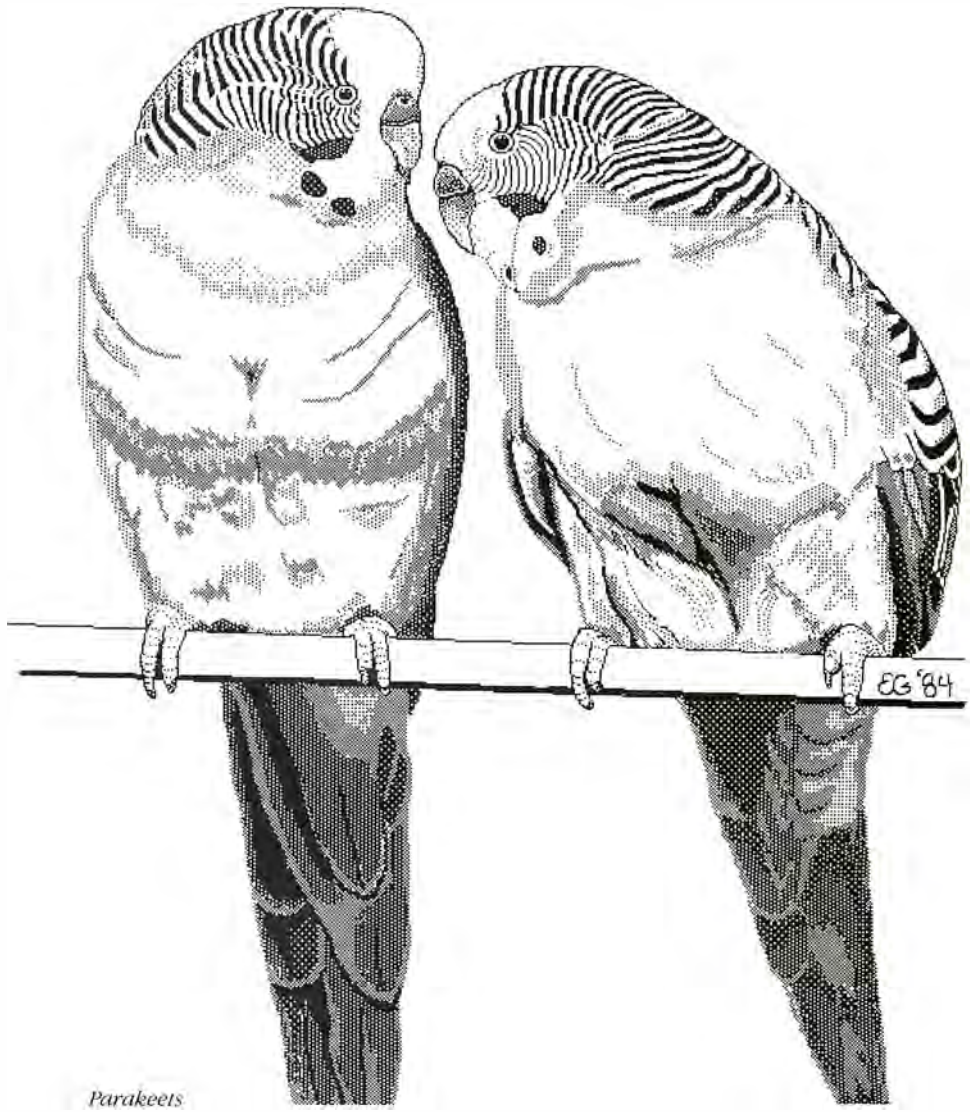
Chenonceau Castle

Chenonceau Castle
This picture of the magnificent French castle Chenonceau was recreated freehand from a brochure drawing, using many of *MacPaint*'s features. We copied each dormer and window from a single original, but added or subtracted a few dots here and there to give each copy its own look. The plants were done using Brush Mirrors. *MacPaint*'s constraining features (the Grid option and pressing the Shift key when moving a selection) were helpful when it came to lining up different sections of the castle.

Andrew and Ethan Diamond
(ages 12 and 14)
Lexington, Kentucky

Parakeets
This drawing was copied from a photograph. I drew the birds' heads first, entirely in FatBits. I shaded the bodies and the tails with the medium-sized round brush using several of the standard *MacPaint* patterns. I drew the perch with the straight line tool, which makes a slightly ragged line when drawn at an angle. The feet, like the heads, were drawn in FatBits.

Elliot Gould
South Burlington, Vermont



Parakeets

Mountains Before Summer Rain

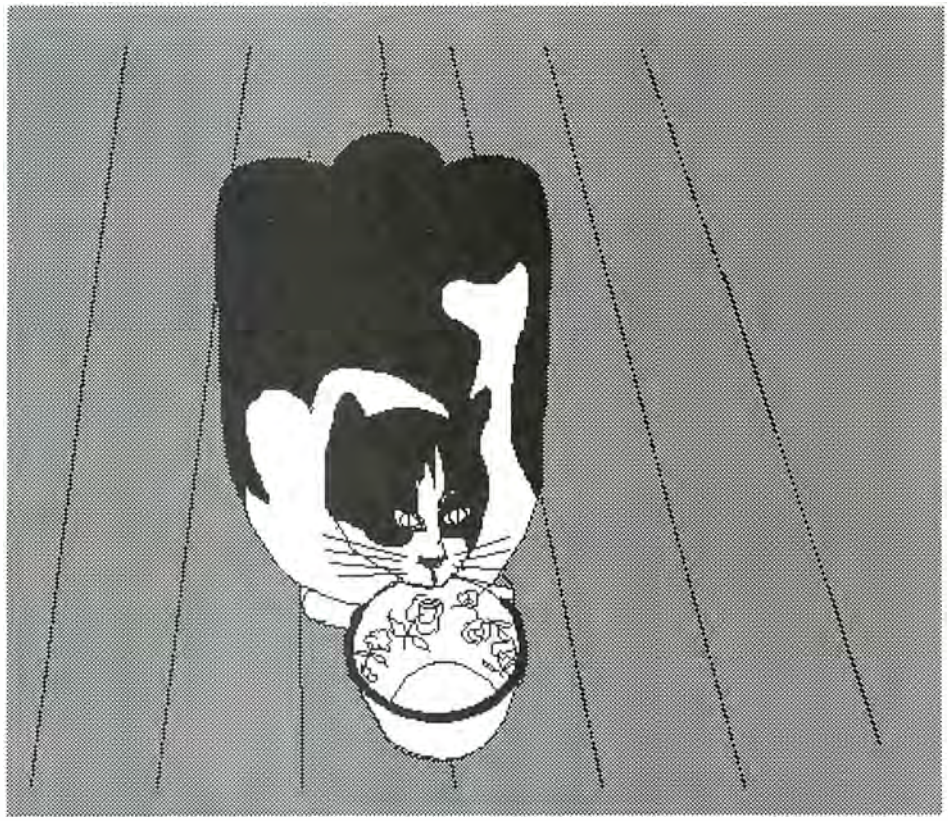
This painting was inspired both by some pictures I took in Yosemite National Park and by the Chinese brush painting in my living room. Because most natural objects have irregular shapes, I found myself using the paintbrush rather than any of *MacPaint*'s ready-made shapes. I started with the tree branches and the rocks in the upper right-hand corner. I had just gotten my *MacPaint* upgrade (version 1.3), so I used the transparent paint feature (holding down the ⌘ key while applying a pattern) to add leaves to the trees. I created the foggy effect with the spray can and white paint. I drew the man in the lower-left corner and the building on the mountain in FatBits. I also used FatBits to write the title of the painting in Chinese characters and to make the stamp with my name. The frame is filled with a custom-designed pattern.

Pai-hsiang Chou
Alamo, California

Mountains Before Summer Rain

Contemplative Cat
I drew three hollow circles for the cat's hindquarters, then erased the lower portions of them and sketched the rest of the body with the single-dot paintbrush. I used other hollow circles to block out the head, the eyes, and the bowl. The straight line tool took care of the cat's whiskers and the lines in the floorboards. I used FatBits to check for openings in the outline before pouring in the black and then the gray pattern. As a final touch, I drew the flowers inside the bowl with the single-dot brush.

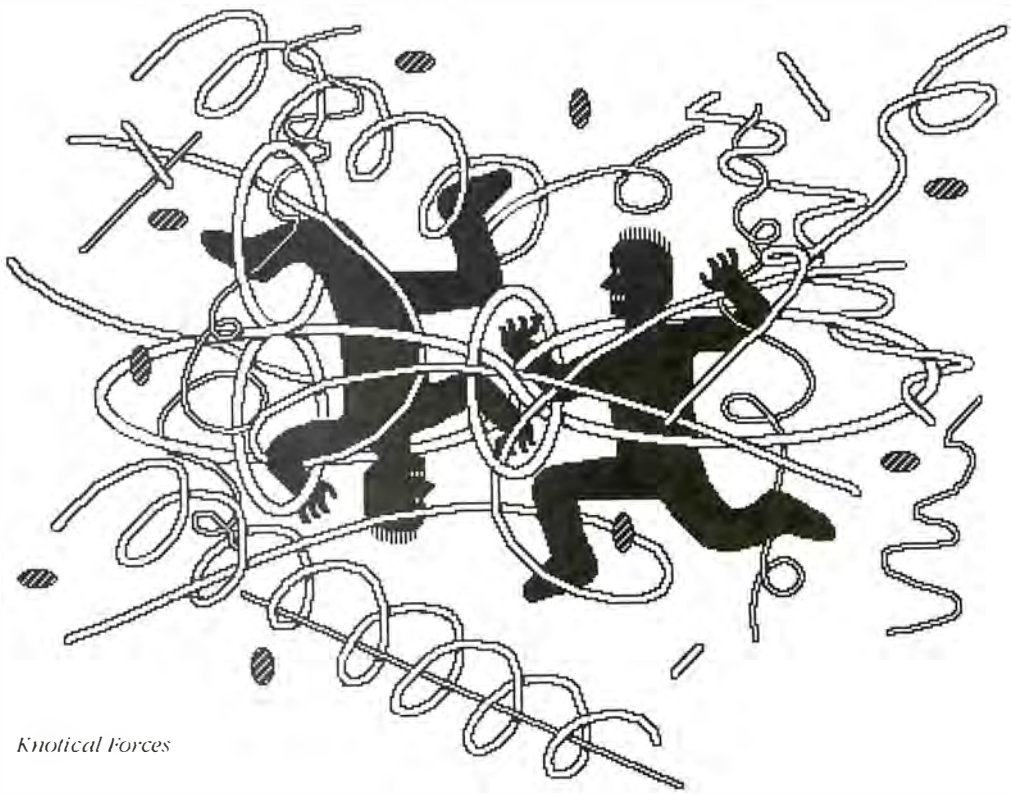
Patricia Zuccato
Northville, Michigan



Contemplative Cat

Knotical Forces
I started with a freehand drawing of the little man on the right, then made a copy of him using the marquee (selection rectangle) and the Option key, and flipped it vertically. That was the easy part. I made the intertwined loops by drawing each section with the oval tool, then surrounding it with the marquee and choosing Trace Edges twice. This produced three concentric ovals. I went into FatBits and erased the middle oval. After creating a number of these shapes, I used the lasso to select and join them, and touched up the connections with the pencil.

Anthony Rizzo
Secaucus, New Jersey



Knotical Forces

Hail to the Chief

After reading Jeffrey Young's article in the July/August issue of *Macworld*, I wanted to try expanding a drawing to fill an entire page. I drew a small caricature of President Reagan using the pencil and a couple of the standard *MacPaint* patterns. Then I made a copy of the drawing and divided it into four parts with the marquee, cutting each section to the Clipboard and pasting it into a full-sized screen. I used Show Page to align the four sections. To avoid distorting the subject, I pasted in each portion and then stretched it to size using the ⌘ and Shift keys together. I used Edit Pattern to make the background and FatBits to fine-tune the finished drawing.

John Wilhelmi
Portland, Oregon □

Hail to the Chief

Macworld Art Contest

Macworld and Apple Computer are sponsoring an art contest for *MacPaint* artists. Beginning in the November issue of *Macworld,* each month we will award a first prize of $500 and two runner-up prizes of $250 for original artwork created with *MacPaint.* A committee of five judges–members of *Macworld*'s editorial and art departments, as well as Susan Kare, Apple's resident artist–will view the entries and select the winners. Gallery exhibitors who do not win a prize will receive the standard $25 payment for each drawing used.

Once a year the first-place entries from each issue will again be judged, and a grand prize of $5000 and two runner-up prizes of $2500 will be awarded. The first grand prize will be announced in the October 1985 issue of *Macworld.*

To enter the contest, send a paper copy of your artwork and a detailed description of the techniques you used to create it to *Macworld Gallery,* 555 De Haro St., San Francisco, CA 94107. Please include your address and phone number with each submission. If your drawing is selected, we will ask you to send a copy of it on disk. All disks become the property of *Macworld.*

The art contest is co-sponsored by Macworld *magazine and Apple Computer, Inc. Employees of CW Communications and Apple Computer and their families may not enter the contest. Winning drawings become the property of Apple Computer.*

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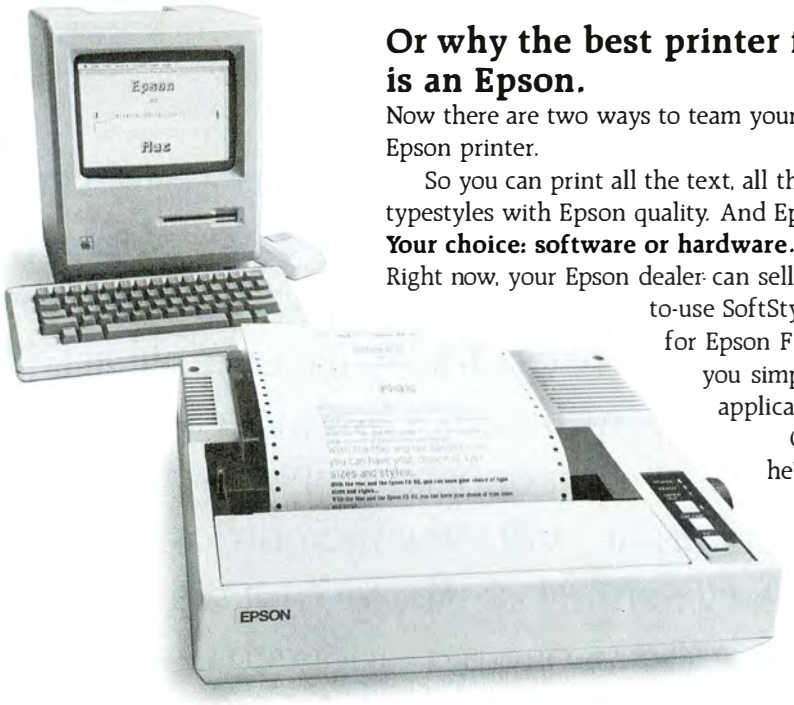

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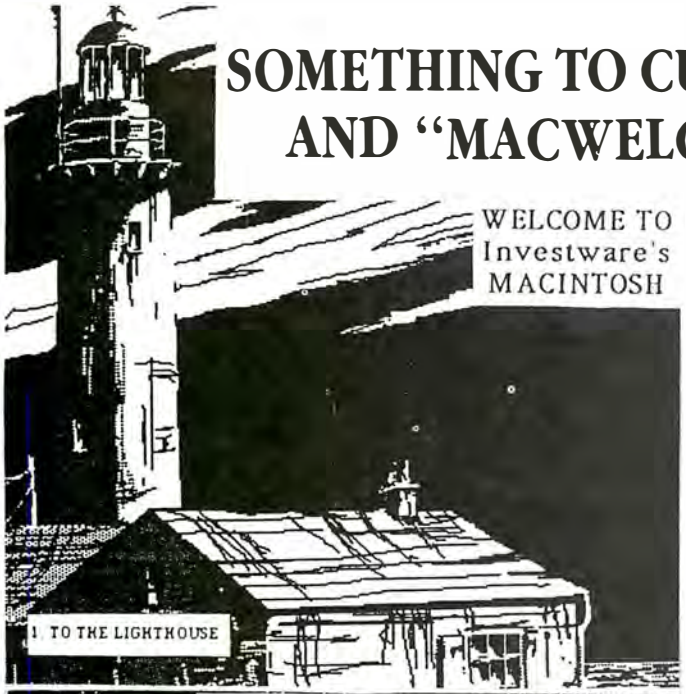

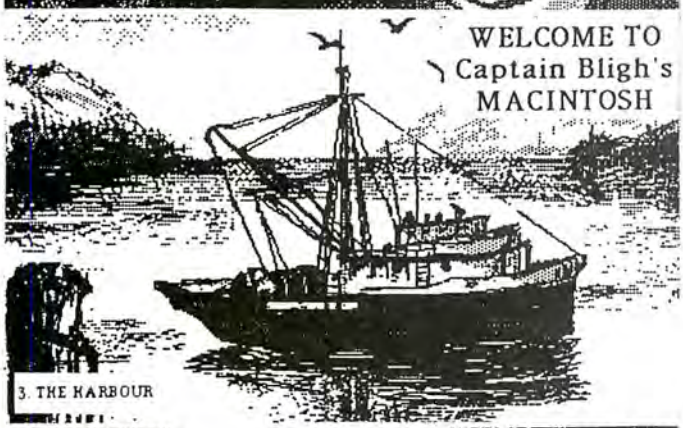

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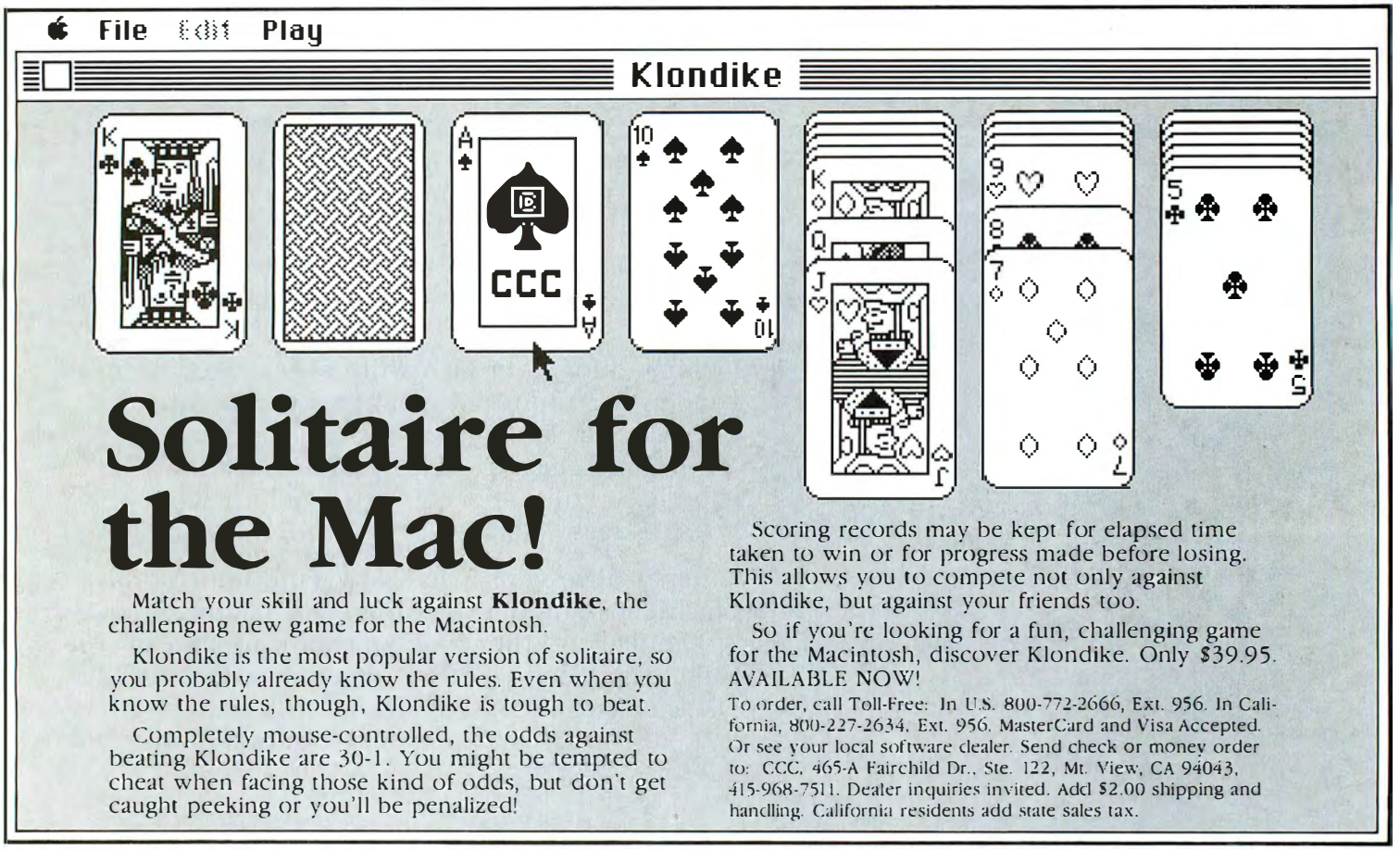

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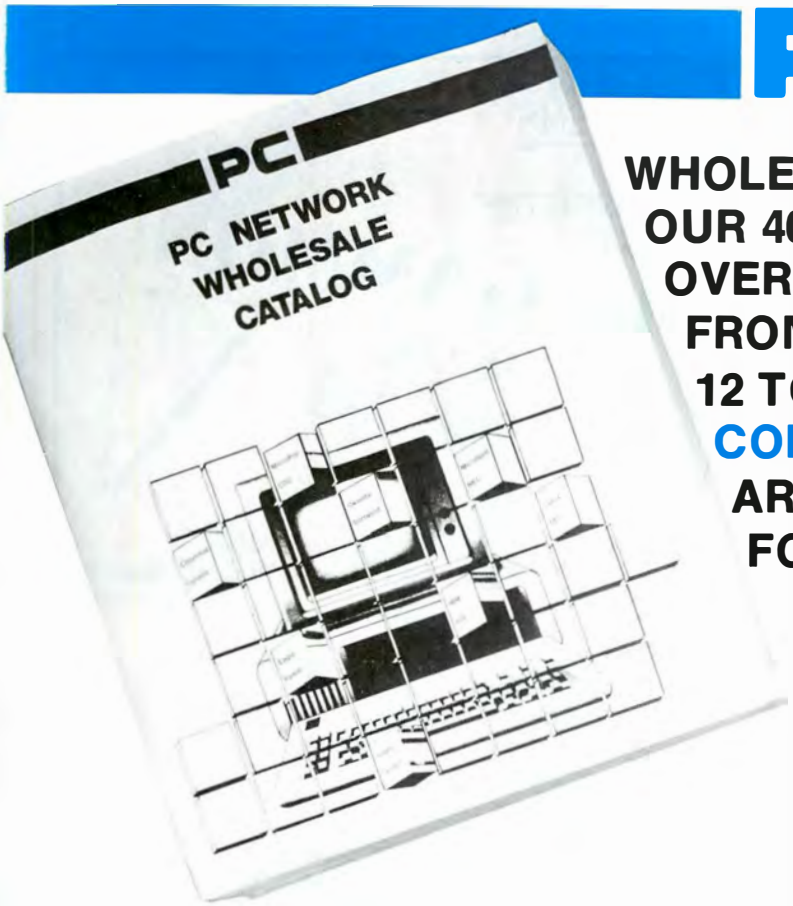

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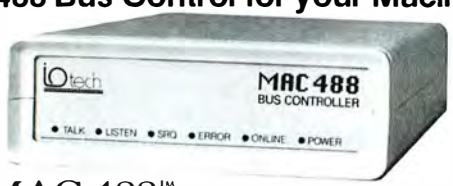

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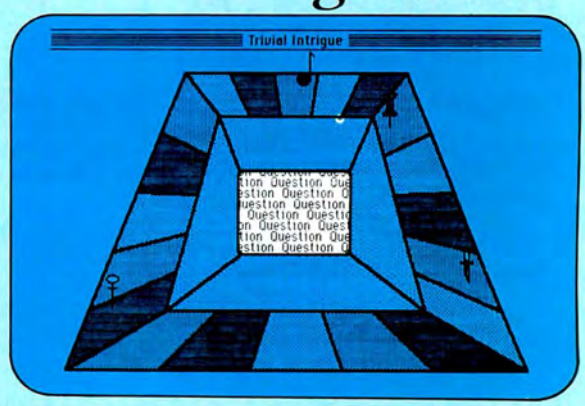

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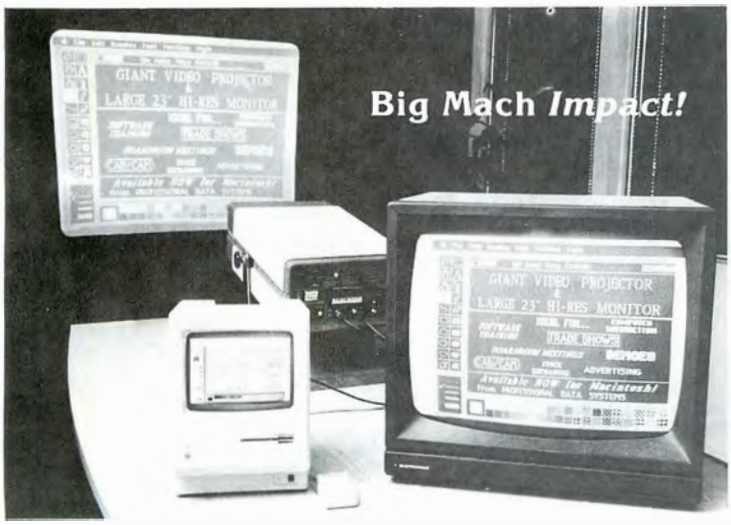

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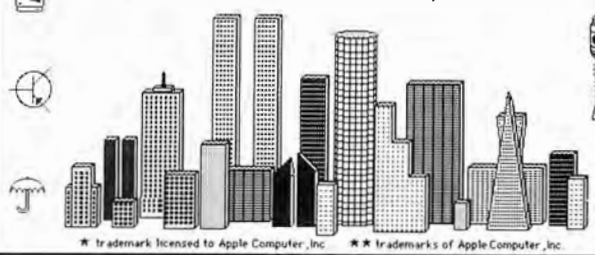

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Reader Service Number		Reader Service Number		Reader Service Number	
—	Apple Computer, 6,7	81	Desktop Software Corp., 88	112	Manx Software Systems, 23
68	Assimilation Process, 4	96	Dilithium Press, 107	31	Mark of the Unicorn, 94
110	Assimilation Process, 5	52	DNA, Inc., 159	86	Megahaus, 95
93	Axlon, Inc., 133	82	DNA, Inc., 159	87	Megahaus, 97
21	BASF, 119	69	Dow Jones, 20-21	88	Megahaus, 99
106	B K Enterprises, 145	—	Epson America, Inc., 152	109	Megamax, Inc., 145
59	Boston Telecomputer, Inc., 151	83	Ergotron, Inc., 8	97	Mesa Graphics, 83
33	The Bottom Line, 142	60	Expert Systems L.T.D., 158	72	Microcom, Inc., 109
46	Brock Software Products, 79	56	ExperTelligence, Inc., 143	3	Micro Flash Computer Systems, 127
105	Building Technology, Inc., 145	114	Forethought, Inc., 86-87	63	Micron Technology, Inc., 142
12	Chang Labs, 54	76	Harvard Associates, 142	—	Microsoft, 12-13, 67
103	Cogitate, Inc., 128	9	Hayden Publishing, 96	37	Miles Computing, Inc., 14
89	Computer Identics, 33	—	Hayden Software Company, 43-46	117	Monogram, Inc., 78
66	Computer Software Design, 118	99	Hoglund-Tri-Ordinate, 22	13	Odesta, 24-25
—	Computing Capabilities Corporation, 156	43	Infocom, 75	85	O.E.I., 145
64	Creighton Development, Inc., 11	8	Intermatrix, Inc., 52-53	34	Optimum Computer Luggage, 131
95	Creighton Development, Inc., 17	107	International Apple Core, 108	38	Organizational Software Corp., 117
1	Cuesta Systems, 160	116	Investware Corporation, 155	74	Palantir, 153
101	Data Food, 156, 159	73	I-O Tech, 158	4	PC Connection, 122-23
15	Davong Systems, IBC	11	Kensington Microware, 18	45	PC Network, 157
		78	Kensington Microware, 31	115	Professional Data Systems, 159
		50	Living Videotext, 129	—	ProVUE Development Corporation, 76-77
		4	MacConnection, 122-23	92	P ³, Inc., 106
		28	MACPACK, 98	44	RAEX Enterprises, 84
		51	Magnum Software, 30	49	Real Data, Inc., 16
		2	Manhattan Graphics Corporation, 154	36	Reference Corporation, 16
				39	Replitek, 158
				26	Rio Grande Software, 126
				118	Screenplay, 66
				94	Softdesign, 55
				84	SofTech Microsystems, Inc., 130
				22	Soft-Life Corp., 132
				79	Software Arts, Inc., 121
				29	T/Maker Graphics, 51
				—	Tech 2000 Software, Inc., 143
				14	Tecmar, Inc., 1, BC
				55	Telasoft, 116
				54	Telos Software Products, 63-65
				10	Think Educational Software, 158
				58	Totem, Inc., 156
				42	Videx, Inc., 120

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1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49	50	51	52
53	54	55	56	57	58	59	60	61	62	63	64	65
66	67	68	69	70	71	72	73	74	75	76	77	78
79	80	81	82	83	84	85	86	87	88	89	90	91
92	93	94	95	96	97	98	99	100	101	102	103	104
105	106	107	108	109	110	111	112	113	114	115	116	117
118	119	120	121	122	123	124	125	126	127	128	129	130

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1/5

Survey

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The Macintosh Magazine

Will you please take a few minutes to answer the following questions? Your answers will be kept in *strict confidence* and used only in combination with others to develop a profile that we will use to learn more about our readers.

A. Please check whether you are:
☐ Male ☐ Female

B. What is your age?
1. ☐ 18–24 2. ☐ 25–34 3. ☐ 35–44
4. ☐ 45–54 5. ☐ 55+

C. Please state your title and industry:
_____

D. What was the last level of education you completed?
1. ☐ Completed high school
2. ☐ Some college
3. ☐ Completed college
4. ☐ Post-graduate work
5. ☐ Post-graduate degree

E. What category best describes your family's total annual income before taxes?
1. ☐ Under $15,000 2. ☐ $15,000–$24,999
3. ☐ $25,000–$34,999 4. ☐ $35,000–$49,999
5. ☐ $50,000–$74,999 6. ☐ $75,000 or more

F. Do you currently own a Macintosh? ☐ Yes ☐ No
Are you thinking of purchasing one? ☐ Yes ☐ No
If yes: ☐ For your home ☐ For your business ☐ For use in both

G. Do you own another computer or use one at work? Please indicate the system(s):
_____

H. Computer experience:
☐ less than a year ☐ 2–3 years ☐ 4 or more years

I. What kind of software programs do you find most useful?
☐ Word processing ☐ Spreadsheets ☐ Integrated packages
☐ Graphics ☐ Accounting ☐ Other _____
☐ Data base management ☐ Games/entertainment

J. Programming: ☐ BASIC ☐ PASCAL ☐ FORTRAN
☐ FORTH ☐ COBOL ☐ OTHER(s)

K. What kind of articles interest you?
☐ 1. Software reviews ☐ 2. Hardware reviews
☐ 3. Personal/Home management ☐ 4. Games/entertainment
☐ 5. Education ☐ 6. Communications
☐ 7. New product news

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