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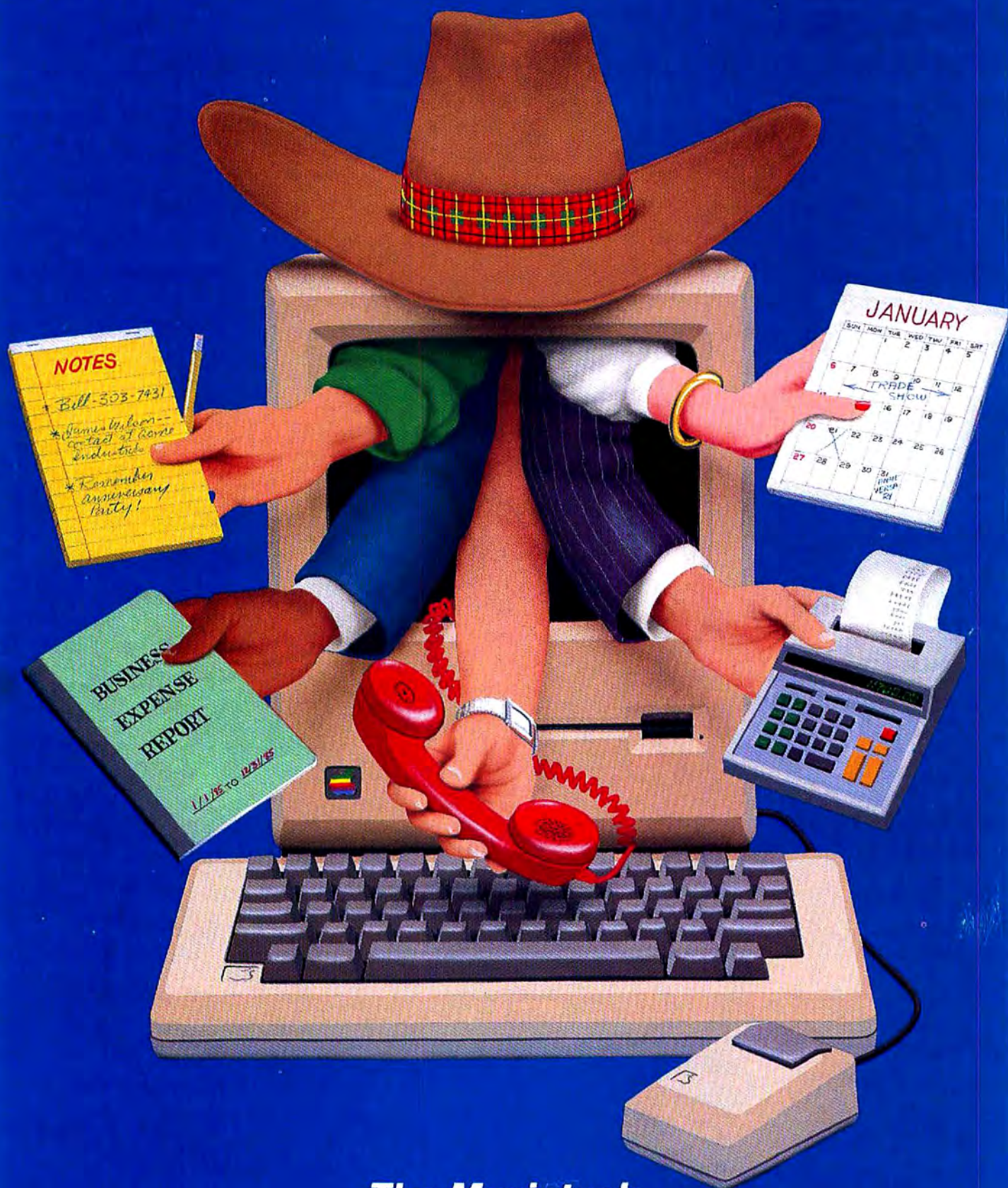
The Macintosh Magazine

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MACWORLD

February 1986

The Macintosh™ Magazine

Getting Started

92 Musical Wares

Jim Heid

Music hardware and software that can be used with the Macintosh is entering the marketplace at an allegro tempo. This beginners' guide to Mac music concepts and products can help you stay in tune with the times.

State of the Art

100 Lighting a Path to the Future

Ted Nace

The glow on today's personal computer horizon is coming from laser optics. A look at the revolutionary new applications that this technology—which puts thousands of megabytes on a single disk—makes possible.

Build a unique typeface with the help of "A Font of One's Own," on page 126.

Review

108 They're Playing Our Song

Rob Swigart

Give a listen to two new music programs, *Professional Composer* and *Deluxe Music Construction Set*. They both set the tone for tools that handle complex compositions and produce high-quality scores, but one is priced for professionals, while the other sells for a song.

114 Megabytes and Beyond

David L. Foster and David Ushijima

If 512K cramps your style, a RAM upgrade of a megabyte—or two—should give you the memory you need. Reviews of five boards that let you break the Macintosh's 512K barrier.

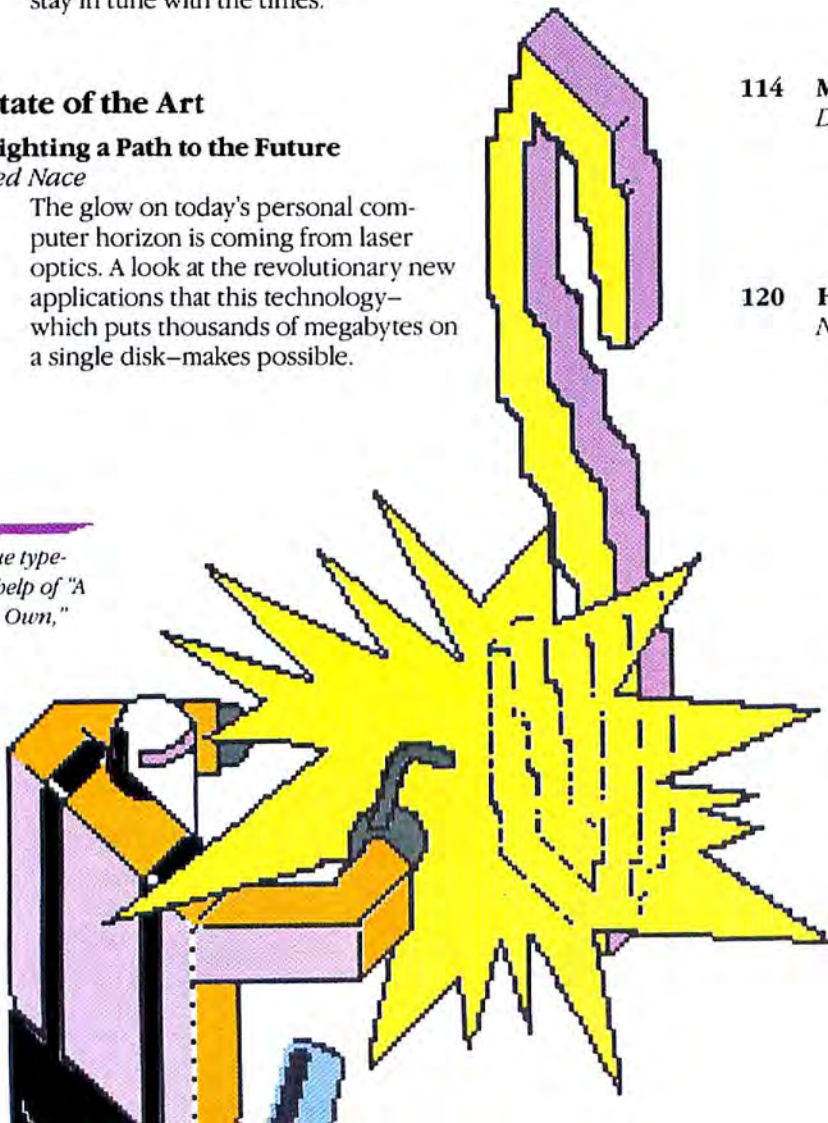
120 Here's Charlie

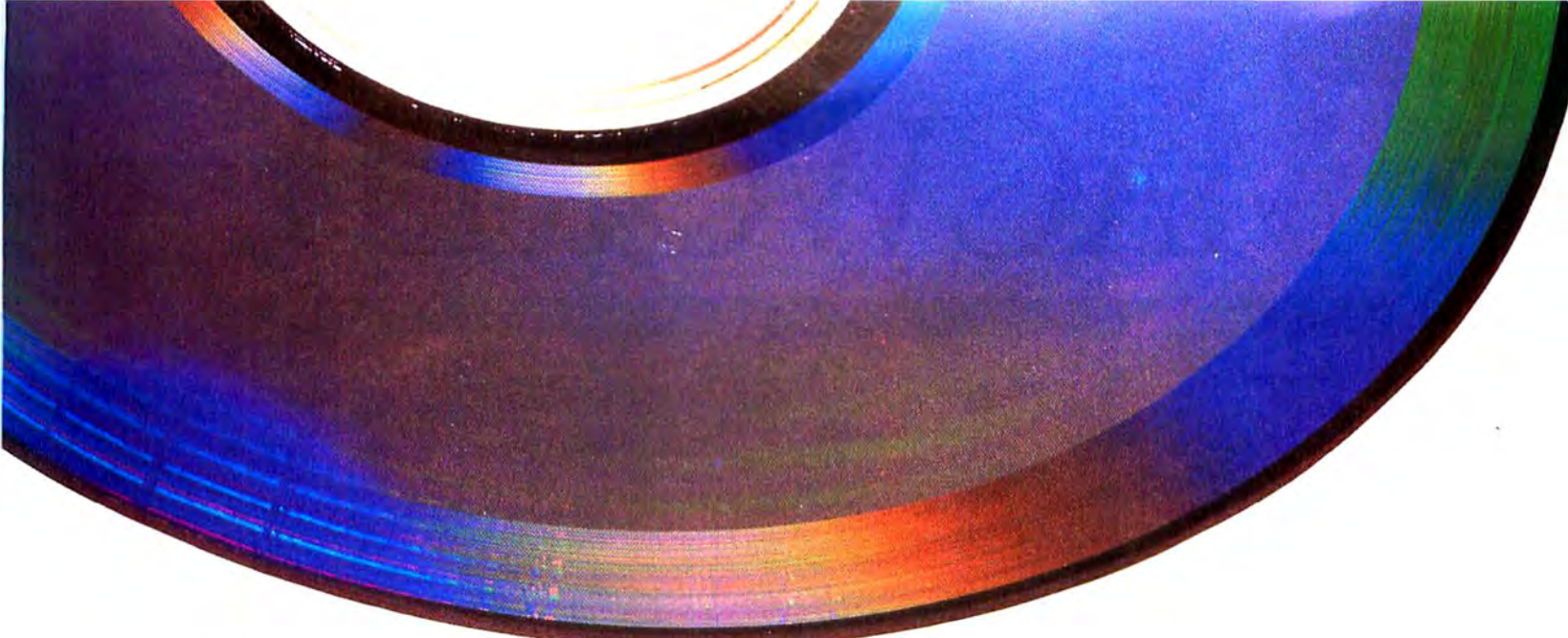
Nicholas Lavroff

Introducing Dayna Communications' MacCharlie, a Macintosh add-on that bridges the gap between the Mac and the IBM PC and raises the question of whether two computers are better than one.

Photo/illustration credits

David Bishop, 92; Walt Disney Productions © 1985, 102; Mark Hanauer, 55, 59 (left); John Hersey, 127; Ed Kasbi, 57, 61; The Media Laboratory, MIT, 104, 106; Mark Pierce, 115; Norman Seeff, 132-137; George Steinmetz, 13, 29, 67; Fred Stimson, cover, 59 (right), 101, 121-125; Rudy VanderLans, 63; Mick Wiggins, 37, 143, 153, 163.





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Robert C. Eckhardt

Use *FON'Tastic* and a digitizer to personalize your word processing with a font that's just your type.

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Jeffrey S. Young

A man, a plan, the Macintosh. The remarkable story behind the creation of a remarkable machine.

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55 Macworld View

Edited by Herschel Schmedick

Color Mac displays, new developments in electronic publishing, a newspaper network, and other news and notes for the Macintosh community.

67 Get Info

Lon Poole

Macworld's tutor answers questions about LaserWriter formatting, the effects of a 512K upgrade, how to avoid Imagewriter print head breakdown, and other Macintosh concerns.

143 Macware Reviews

Edited by Erfert Nielson

Short but straight-shooting assessments of *My Office*, the DASCH external RAM drive, *Sierra Championship Boxing*, *Speed Reader II*, *Quick and Dirty Utilities Volume One*, *Exodus: Ultima III*, *Battery Pak*, and *Pinball Construction Set*.

195 Open Window

Edited by Jim Heid

An exchange of Macintosh discoveries, including tips on BASIC *ThinkTank* to *Microsoft Word* conversions, advice on how to handle tired mouse feet, and HyperDrive keyboard shortcuts.

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Plug into the computer music scene with an introduction to the concepts and products that make it possible to sound the right note on the Mac. See "Musical Wares," starting on page 92.

MACWORLD

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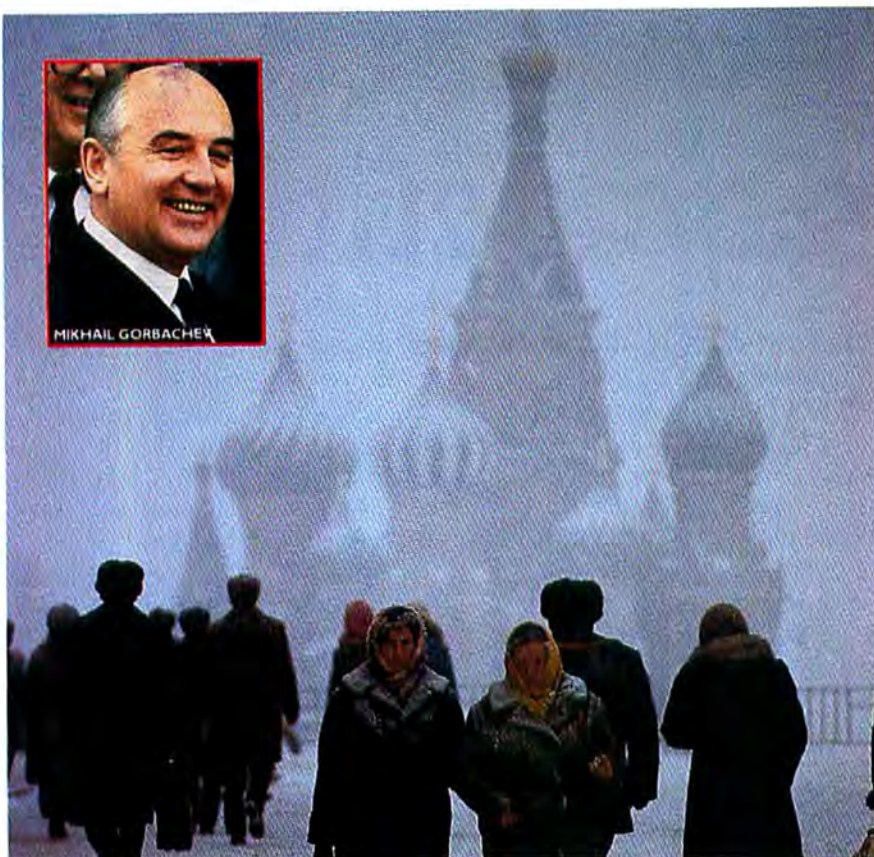
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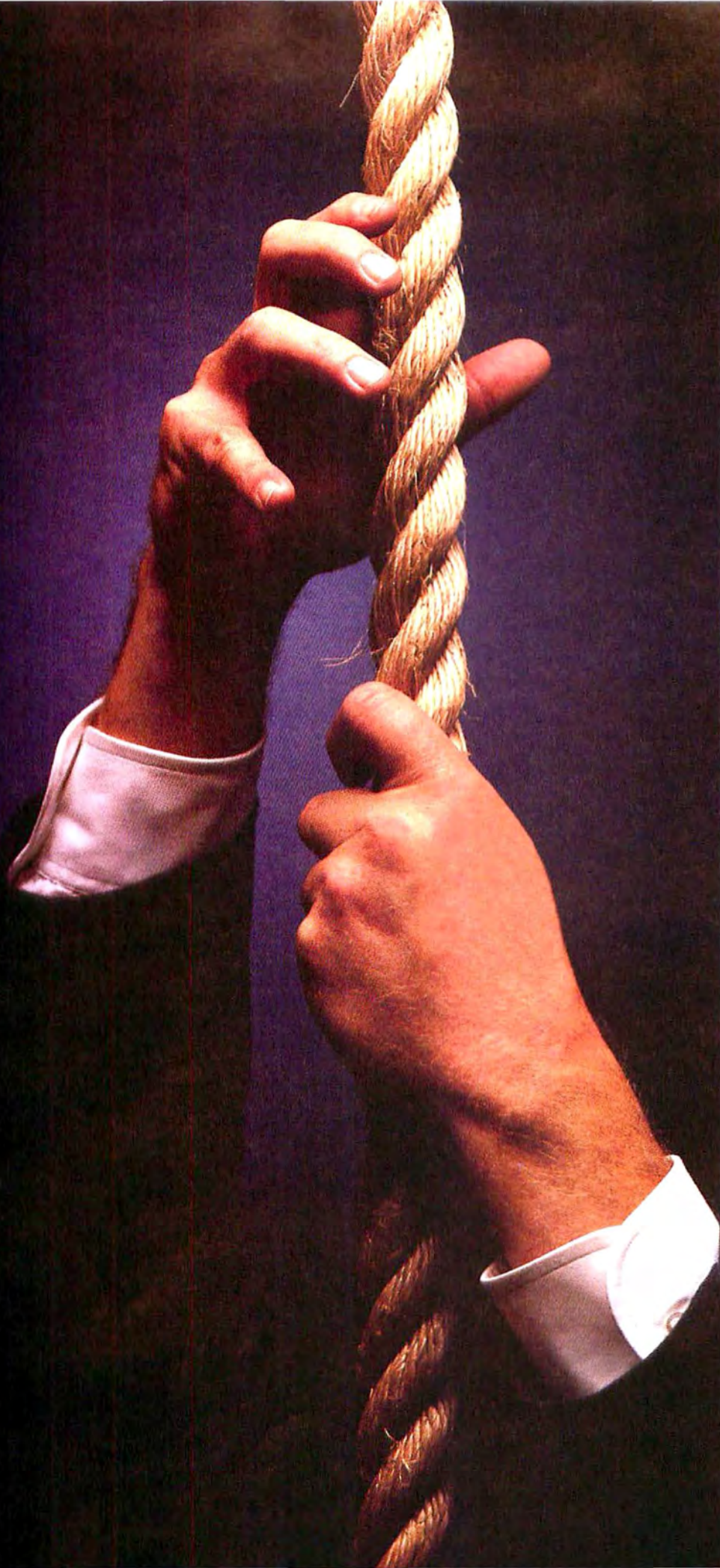
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The China Interface

The People's Republic of China joins the information revolution



For a long time I've been an observer of the impact of personal computers on American culture. Recently, I had the opportunity to visit China and see the effect of computer technology on a culture that is completely different from ours.

China is about the same size as the United States, but its population is about 15 times our own. It's a Third World culture that is still largely agrarian. The process of modernization began only recently—virtually leapfrogging over the industrial age right into the information age.

Yet China holds a very prominent place in the history of technology. It's a nation where not only gunpowder but also silk, paper, and movable type were first invented.

When I was in China, I found that the country is genuinely opening up to new ideas—and that it's becoming a socialist state with capitalist tendencies. For the first time since the Communist revolution in 1949, private street vendors are selling their wares. I saw many other dramatic examples of Chinese entrepreneurship—at a low level compared to Silicon Valley perhaps, but still very much in evidence.

This new entrepreneurial initiative seems to be a factor even inside the Chinese government and in large organizations where individuals are now encouraged to develop new projects and take them to completion.

The Chinese people I met were really interested in the concept of entrepreneurship. In fact, there's even a magazine about entrepreneurs published by the same company that produces the *Chinese Economic Daily*, the *Wall Street Journal* of China. It's called *Chinese Entrepreneur*.

It was interesting to see that this old culture, which in so many ways is behind the technologically advanced culture I'm used to, has a chance to actually leap ahead of many industrialized countries.

However, in examining the state of the computer industry in China, I found that the country needs to face many problems and challenges before this high-tech dream can come true. One of the biggest problems, of course, is the general economic plight of the Chinese people.

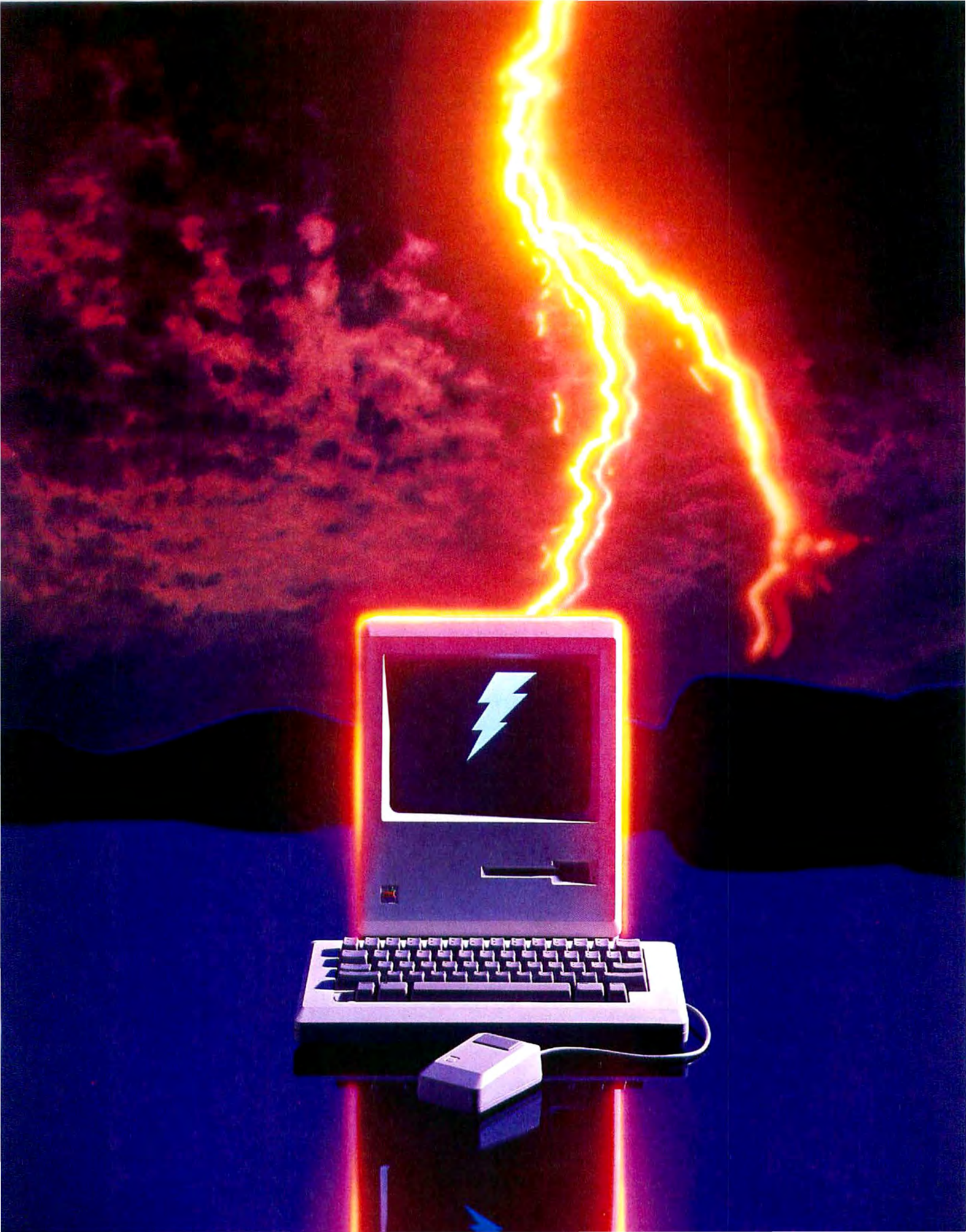
In China the average worker makes \$500 to \$600 a year. So most people are hardly in a position to buy an Atari home computer or to purchase video games for educating their children. They're lucky if they have electricity, and most likely they live in a house that's not very well heated in the winter. All the buildings I went into in Beijing were cold, with temperatures ranging from about 45 to 50 degrees. The level of heating was minimal compared to what Americans are used to.

I jokingly remarked to one of the Chinese people I met that there could be one computer on every bicycle. He thought for a moment, then suggested that it might be better to first put a generator on every bicycle to make it more like a motorcycle.

As part of their modernization drive, the Chinese began buying microcomputers from the West in 1976. First they bought about 500 Cromenco S-100s. Since then they have acquired more than 150 models of microcomputers, including 60,000 to 70,000 IBM XTs and XT compatibles.

(continues on page 16)

China has a chance to leapfrog over the industrial age right into the information age.



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Don't forget ease of installation. The Three to One Touch Board opens the Macintosh architecture without the need to solder, wire, or alter the inside of your Macintosh in any way. Tell your dealer to give us a call for further information.

Finally, there's action. This is the only part of the Three to One Touch Board program we've left up to you. Get on board . . . when it comes to your Macintosh, the Three to One Touch Board gives a whole new meaning to being alive.

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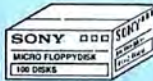
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Circle 134 on reader service card



On the one-time frontier. Constructed to protect China's northern border from invaders, the Great Wall stretches some 4000 miles, making it the longest structure ever built.

(continued from page 13)

Unfortunately, the Chinese were led to believe by unscrupulous dealers in Hong Kong and in other gray-unauthorized-markets around the world that the key to using computers in a modern society is simply to buy them. So the Chinese bought lots of computers without really thinking about what they should be used for.

Consequently, many personal computers are still locked up in storage for the simple reason that the Chinese have no idea what to do with them.

However, I found that the Chinese are now learning how to cope with their problems, gradually making the necessary changes within their system. When I visited the Ministry of Electronics, I learned that they very much want to learn more about computer applications. The Chinese see that if they study how the personal computer is used in the West, they can learn how to use it in the East, even though there will no doubt be variations in its usage.

They have a lot of interest in office automation, in the use of the personal computer for graphic design and computer-aided design and manufacturing, as well as for managing projects and inventories.

I also discovered that IBM and Apple both have interesting problems in China.

One of IBM's problems is that China bought many of its IBM PCs on the gray market, so IBM will not support them. When these PCs break down, there's nowhere for the Chinese to turn for repairs. And they're not always able to fix the machines themselves.

This lack of support makes many people angry with IBM because they don't really understand what it means when computers come from the gray market. As

far as the Chinese are concerned, IBM is IBM. Chinese institutions also bought many IBM XT compatibles of various stripes, and when those machines break down, the purchasers tend to place the blame on IBM. Because, to the Chinese, there is no difference between an IBM machine and an IBM look-alike.

IBM has made some inroads convincing people in the Chinese government and the Ministry of Electronics about the importance of watching where you purchase equipment and making sure that you've bought a proper application to make use of it. IBM has also arranged to get a bulk importer license from the U.S. Department of Commerce so China can import PCs almost at will, without having to license each machine individually.

These measures should help improve IBM's situation in China.

However, Big Blue realizes that the Chinese are making their own IBM compatibles—particularly the Great Wall 0520, an XT look-alike—and that the Chinese ultimately don't care whether they buy computers from IBM or some other source. What they want is to understand the technology and design so they can build their own machines.

After all, in a cash-poor country, you want to make sure that you maximize the return on any import purchases—so you make as few as possible.

(continues on page 18)



In the Beijing Wire Communications Factory, home of the Great Wall 0520 personal computer, the Chinese explore today's technological frontiers. The Chinese look to their new Great Wall to check the inroads of foreign computer companies into their home market.

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18 February 1986



A little bit of home. In the offices of China Computerworld, Bunnell finds Macworld on a map of our sister publications around the globe. Although it has only 60,000 paid subscribers, China Computerworld's pass-along rate of 18 people per copy gives it a readership of over a million.

(continued from page 16)

Apple Computer has had some success in China, too—particularly with its Apple II, which numbers about 50,000 in China. Actually, I'm not certain how many of those machines are in fact Apples and how many are look-alikes. Most so-called look-alikes are very blatant rip-offs, produced in Hong Kong, Singapore, or Taiwan, and clearly violate Apple's copyright.

One "Apple" I saw was green instead of cream-colored; otherwise, it looked just like the real thing.

As for the Macintosh, 1000 Macs have been sold in China so far. One problem facing the Mac is the lack of Chinese-character software. However, I was told that software for the Mac using Chinese characters would be available within the year.

Chinese character generation is perhaps one of the biggest problems facing the Chinese personal computer user. There are about 500 different ways to input and output Chinese characters with a personal computer. Already there is a Chinese language *WordStar*; and soon there will be a Chinese *Lotus 1-2-3*. I even visited a factory in Beijing where they were working on a Chinese version of the Wang operating system.

Over time, the Chinese will probably settle on a standard form of inputting and outputting Chinese characters, probably using laser printers because dot matrix printers cannot satisfactorily produce the intricate characters.

(continues on page 20)

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If you've been waiting to buy a hard disk for your Mac till Apple introduced their version, the long wait is over.

And look what they've given you. A disk drive that has the same footprint as your Mac. Makes it 3½" taller. And does who-knows-what to its carefully thought-out ergonomics.

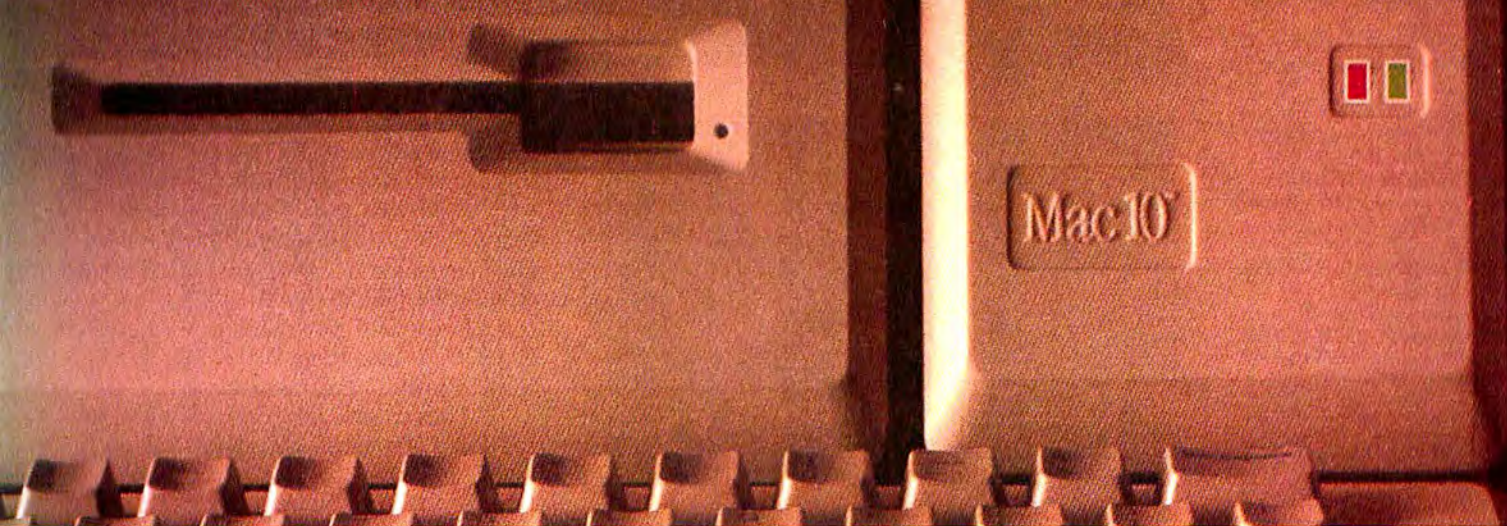
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PARADISE
S Y S T E M S , I N C

(continued from page 18)

FULL SPEED MAC PERFORMANCE FROM WESTERN AUTOMATION



Western Automation introduces the DASCH (Disk Acceleration/Storage Control Hardware)—the first and only external RAMdisk for the Macintosh and Macintosh XL computers. The DASCH is available in 500K, 1000K, and 2000K sizes and accelerates disk operations by up to 700%. The DASCH achieves this speed with a reliable solid-state design that eliminates delays. You can perform all disk operations on the DASCH, such as opening, editing, and copying files. Each DASCH is factory upgradeable, and DASCH units may be daisy-chained for maximum RAMdisk storage.

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Another problem I found in China is that although it has a patent law covering inventions, there's no such thing as a copyright law protecting either software or written material. Yet the Chinese don't want to get a reputation for piracy like Hong Kong's or Taiwan's, so in many cases Chinese purchasers are willing to sign separate agreements not to make illicit copies of software. Nonetheless, some American software companies are nervous about doing business with China.

Officials in the Ministry of Electronics, and indeed members of the Chinese electronics industry in general, understand the piracy problem and are working to have their government pass a software-protection law.

We'll soon see more Chinese software and more absorption of personal computers into Chinese culture. 1985 was the year to figure out what to do with personal computers in China. 1986 will be the first year of really using them. And 1987 should be a boom year for the PC in the PRC; by then the Chinese will have established their own applications, which will rapidly be put to use in industries, schools, and many businesses and government agencies throughout the country.

In an interview with the *Chinese Economic Daily*, I predicted that China and the United States would lead the world in personal computers by the year 2000, with Japan coming in third. This idea was received with a great deal of enthusiasm in China, and I suspect it will also be warmly received in the U.S.

I also predicted that by the year 2000, every Chinese student will have a personal computer. The interviewers asked me why I thought this would happen. I told them that by then, affordable lap-size computers will be on the market. They will be so powerful and so cheap that it will make complete sense for students to have them. The Chinese found this idea very intriguing. I am convinced it can be implemented.

A line from an old Chinese poem reads, "Ghosts wailed at night when the ancients invented words." That was before the dawn of early Chinese civilization. Just think how those ghosts will wail when the Chinese develop their own word processing and communications technology.

That's when a new era of Chinese civilization will begin—perhaps to rival the brilliance of the Tang dynasty at some point in the third millennium. □

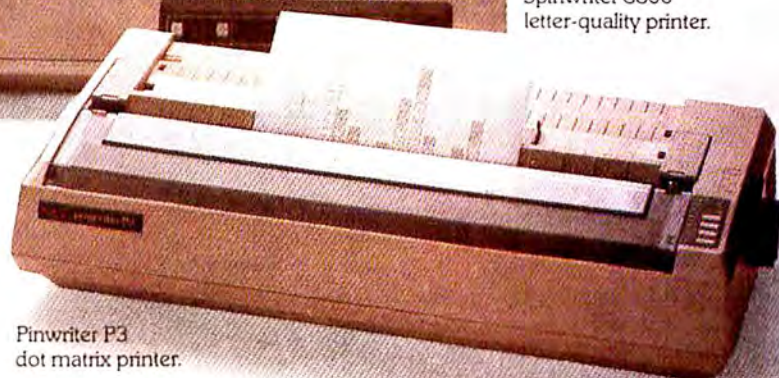
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Net income	\$114,452	\$1,752,452	\$651,344
Earnings per share	\$1.72	\$1.75	\$1.02
Pretax profit margin	9.1%	43.1%	5.2%
Income tax rate	5.2%	7.2%	45.7%
Return on net sales	\$813	\$1,015	\$1,015
Working capital	\$1,015	\$1,015	\$1,015
Total assets	\$1,015	\$1,015	\$1,015
Shareholders' equity	\$1,015	\$1,015	\$1,015
Return on equity	5.2%	7.2%	45.7%
Return on assets	5.2%	7.2%	45.7%
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In fact, if you've ever needed to combine information from old files in a new one, or if you've ever had to shut down one file just to look at another—then you're ripe for Word.

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For people who've gotten used to the tedium of closing one job before they could open the next, Word's windows are a real eye-opener.

Because this feature—an exclusive, we must add—lets you display four

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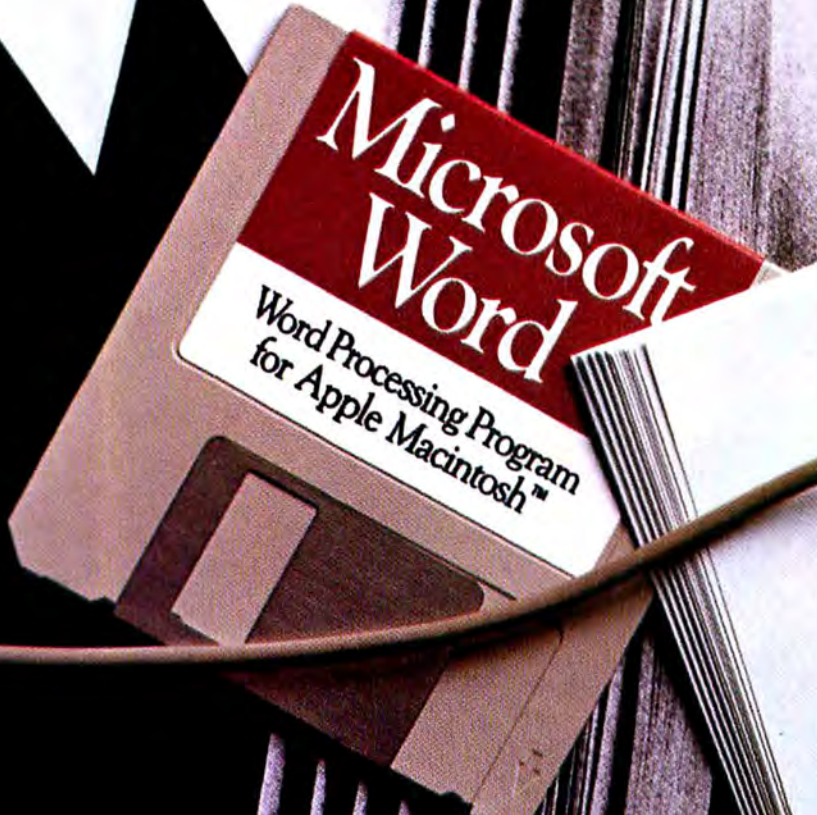
A real time saver, even if you're only composing a memo. If, say, you needed to combine material from your three previous memos into a fourth new one.

The training wheels aren't welded on.

Some things *are* best done with mouse and menus. But once you've worked with a Macintosh for a while, you'll want the option to run commands from the keyboard as well. A faster way to order up everything from opening and closing files and starting a new file, to printing and saving, to changing font styles or page formats. It's an option only Word gives you.

Avoid the risk of repeating yourself.

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Dear Gary:

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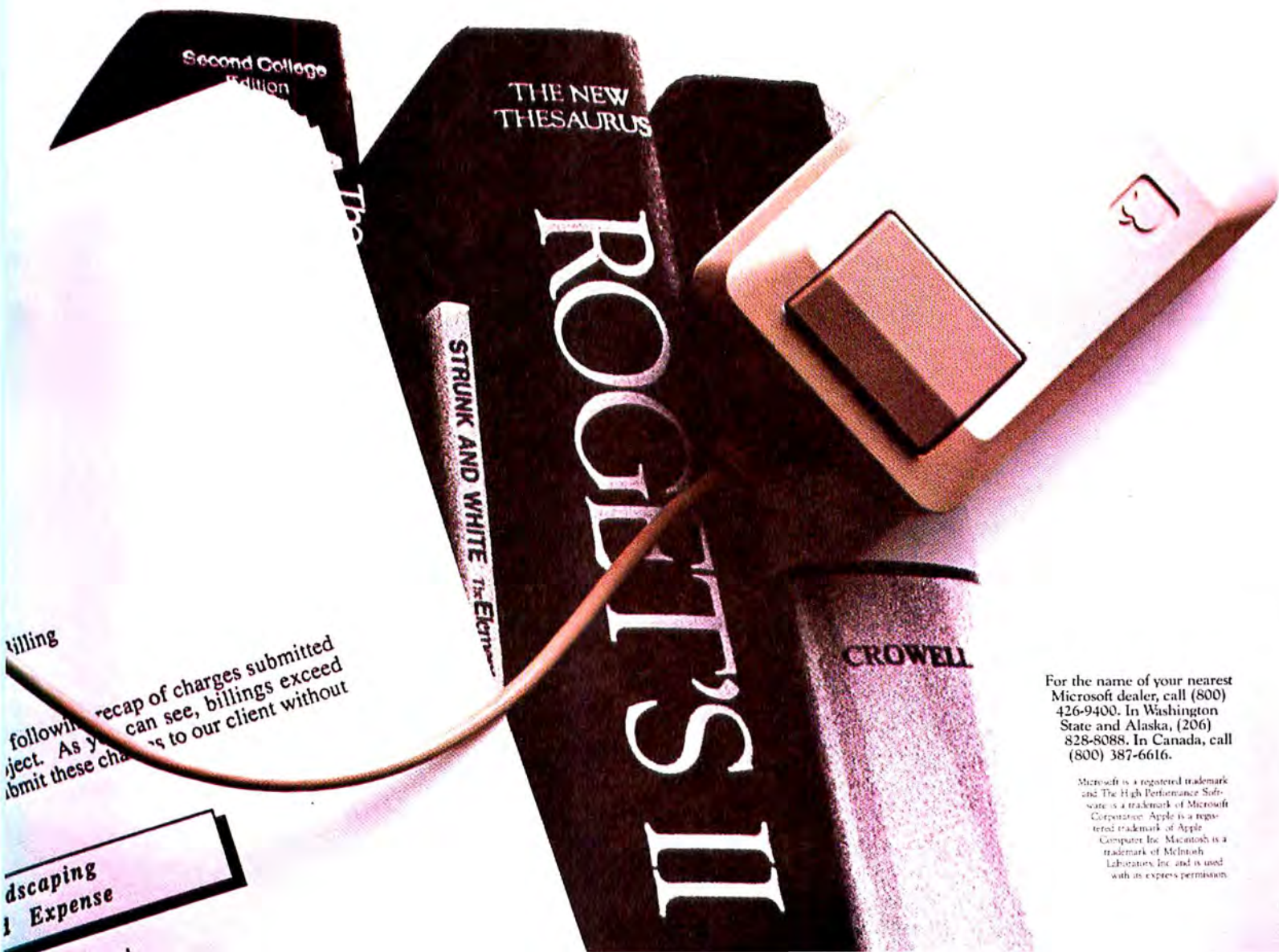
As the designers of more Macintosh applications than anyone else, we give Word the benefit of our unmatched experience. Along with a very comprehensive on-line Help feature. Making Word a very quick study.

And if you should ever have a question you can't work out on your own, our telephone support people will walk you through it.

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If you're going to change your mind, don't waste time.

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And speaking of changing your mind, how would your decision-making process change if you could store individual



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change their minds.

pictures in your data file? Side by side with the rest of your data. Never considered it?

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Already, enterprising File aficionados have reproduced pre-printed forms and reports on screen. Complete with individual graphics, logos and the Mac's wide variety of type fonts, formats and styles.

Others have gone on to add floor plans of homes, diagrams of circuits, even pictures of employees to their File databases. Anything that can be cut, pasted or grabbed from MacPaint,[™] Microsoft Chart, or similar programs.

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Share File with the family.

Not surprisingly, Microsoft File works exceedingly well in partnership with other Microsoft programs.

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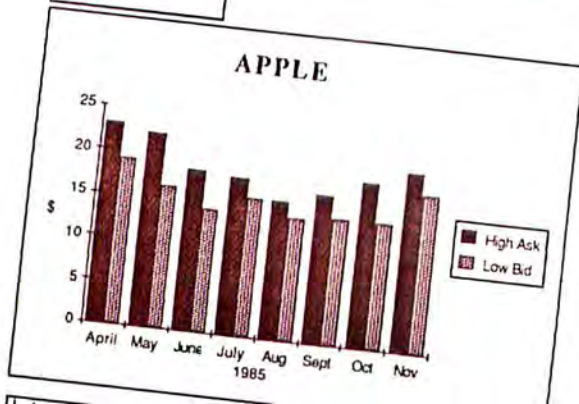
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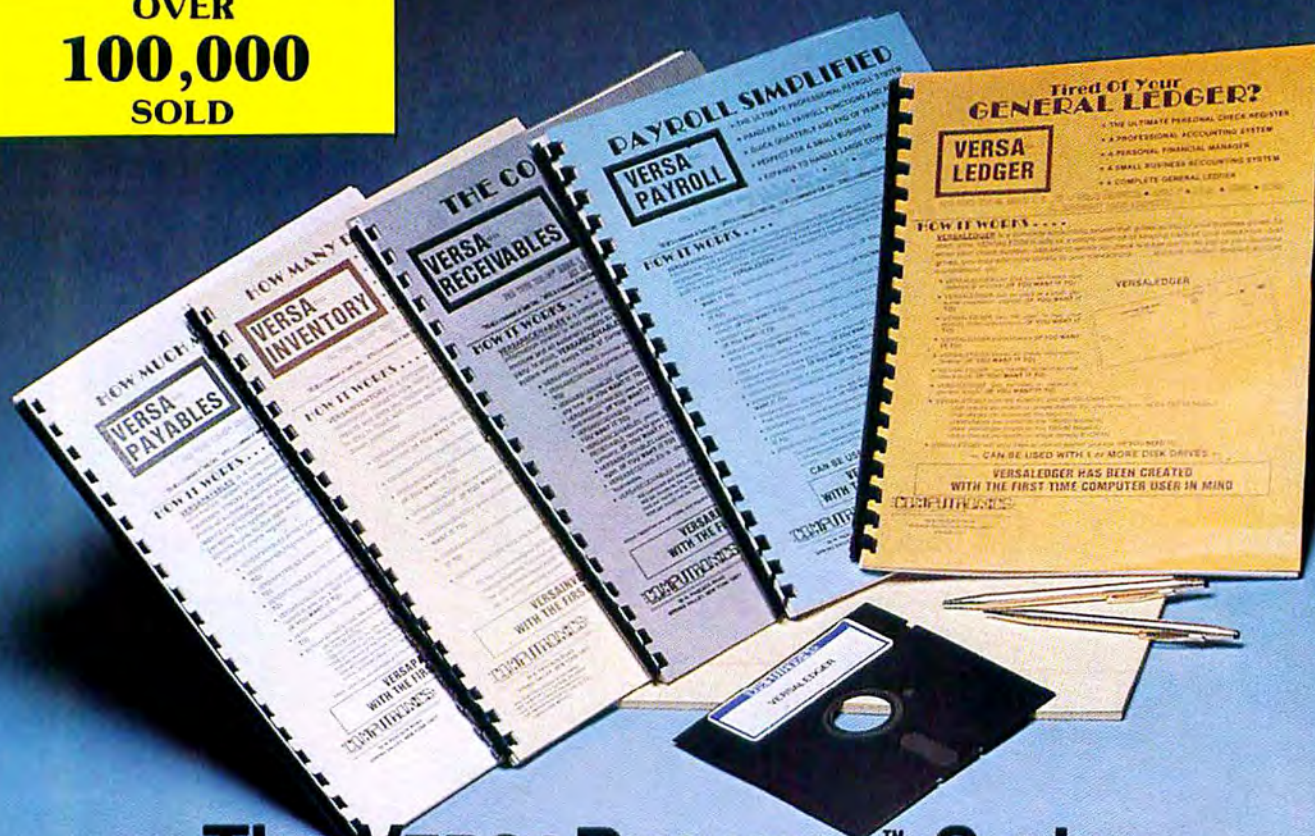


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Experts on Disk

Artificial intelligence may not make computers think, but it may make for some real improvements in Macintosh software



As the Macintosh moves toward one megabyte or more, Mac programs perform faster and offer more features. But increasing speed and adding options aren't the only ways to enhance software as hardware becomes more sophisticated. Developers are beginning to build "smarts" into programs in the form of new capabilities based on artificial intelligence (AI) research.

In recent years AI research has demonstrated that some aspects of human intelligence can be simulated by computers. Macintosh chess programs like Hayden's *Sargon III* or *Chess*, from Psion, are capable of beating most human opponents. The programs play well because they can make complex calculations with exceptional speed. But compared to genuine chess masters, whose experience and understanding of the game AI researchers haven't been able to quantify, computer chess programs are closer in intelligence to a fly.

Whether or not software ever becomes truly intelligent, AI programming concepts are leading to the next major advance in applications software for personal computers. Expert systems, a branch of AI research, will make the initial impact. Expert systems are basically programs that simulate a human's expertise in a limited area of knowledge. The concept was developed in the mid-sixties by AI researchers who wanted to use computers to simulate scientific expertise. They found that the activities most suitable for expert systems are those that can be reduced to a rigid set of rules.

Currently, expert systems have been developed for use in many fields, including education, manufacturing, marketing, law, medicine, finance, and engineering. Until recently expert systems required massive

amounts of memory and ran only on mainframes or minicomputers that cost up to \$100,000. But as the processing power and memory capacity of personal computers continues to increase dramatically, expert systems are becoming available for computers like the Macintosh and the IBM PC.

Basic Knowledge

The foundation of an expert system is the knowledge base, a set of rules in the form of IF... THEN statements. One of the first expert systems, *Mycin*, was designed to diagnose a small class of brain infections and suggest therapies. The program was developed by AI research pioneer Edward Feigenbaum in collaboration with Edward Schortliffe, a physician. To create *Mycin*, a specialist's knowledge of a specific class of infectious disease was reduced to a set of 475 rules.

To formulate a diagnosis, *Mycin* first interviews the diagnosing physician to obtain relevant facts about the case. After those facts have been entered, *Mycin* asks specific questions, in plain English, about the patient's condition. Based on the facts derived from the interview, *Mycin* lists possible diagnoses.

Mycin reaches its diagnoses by a reasoning technique called *backward chaining*. The program starts with a hypothesis and then searches its knowledge base for applicable rules and available facts that support the premise. If no facts are found to support the hypothesis, the program searches for a rule that can be used to infer such a fact. In a limited way, *Mycin* can explain its line of reasoning, allowing human

(continues on page 32)

You'll be able to ask an expert word processing program to correct the syntax of a letter.

DATA INDEPENDENCE: FREEDOM OF MACINTOSH™ AND T



The Macintosh is a computer of great promise. Its enormous capabilities, compact size, and user friendliness make it a standout among microcomputers. Yet the marvelous Mac has mass storage limitations, including the file serving capabilities necessary to

make The Macintosh Office live up to its full potential. Until now.

Because The Bernoulli Box,® a cartridge-based data storage system, now brings infinite storage capacity and unheard of data management versatility to the Macintosh.

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Besides all the amazing things The Bernoulli Box does for the Macintosh, it does something pretty amazing for Macintosh users too. It gives them something we call data independence. And what's that? Well, mostly it's freedom. Freedom from a whole lot of data-related constraints and worries. It's freedom that can best be described in the following ways:



PERFORMANCE.

The amazing speed of The Bernoulli Box—with access times and transfer rates that rival and often surpass hard disk drives—translates into the best freedom of all: the freedom of time. The freedom that comes from getting the job done quickly and moving on to other things.



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Incredible resistance to shock and vibration combined with its rugged cartridge format frees you from concern about equipment failure, head crash, or data loss.

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(continued from page 29)

experts to verify the program's logic and modify its knowledge base if necessary.

Expert systems like *Mycin* don't eliminate the need for human experts. A computer can be an infallible reasoning machine—unclouded by fatigue, distractions, or foul moods—but it doesn't have the gut feelings that play such an important role in the decision-making process. Expert systems are merely problem-solving tools that suggest solutions, augmenting human intelligence and letting human experts devote more intellectual energy to tasks beyond the computer's comprehension.

Shells for Smarts

Expert system applications like *Mycin* aren't yet running on the Macintosh, but software tools for developing expert systems—called expert system shells—are becoming available. Shells speed up expert system development by providing a framework that doesn't require fluency in a programming language such as LISP or Prolog.

One of the first expert system shells designed for the Macintosh is *ExperOPS5*, from ExperTelligence. The \$325 shell is derived from *OPS5*, a widely used AI program developed at Carnegie-Mellon University, and must be run with *ExperLisp*. The program uses Macintosh-style menus and editing features to help you formulate the set of rules that make up an expert system's knowledge base. *OPS5* has been used for applications such as stock market analysis, natural language processing systems, and building materials selection.

Another Macintosh expert system shell is *MacKIT Level 1*, from Knowledge System Environments. To create an expert system with *MacKIT*, you first write the set of IF... THEN rules in a word processor, such as *MacWrite*, and then transfer the rules to *MacKIT*. The \$149 shell, written in MacFORTH, also takes advantage of the Macintosh user interface. Among its sample applications is a program that helps you choose the family dog by suggesting a breed.

By far the most sophisticated shell available on the Mac is *Nexpert*, a \$5000 product from Neuron Data Corporation. *Nexpert* has the editing features of a

\$100,000 system and makes full use of the Macintosh user interface. The program lets you develop a knowledge base of up to 500 rules on a 512K Mac. *Nexpert* can graphically represent the significance of a rule and the relationship between rules.

Capturing expertise on disk, however, is more difficult than you might be led to believe by product advertisements, no matter how hospitable the system shell. Developing a set of rules for automotive troubleshooting or production scheduling is a difficult, time-consuming process. It's not easy, even for an expert, to clearly articulate the set of rules that constitute his or her expertise. In addition, an entire knowledge base can be invalidated if an expert or programmer enters an erroneous bit of information into the system.

Applied Artificial Intelligence

Insight, a Macintosh accounting package, gives an inkling of how software developers will incorporate expert system technology into application programs. The

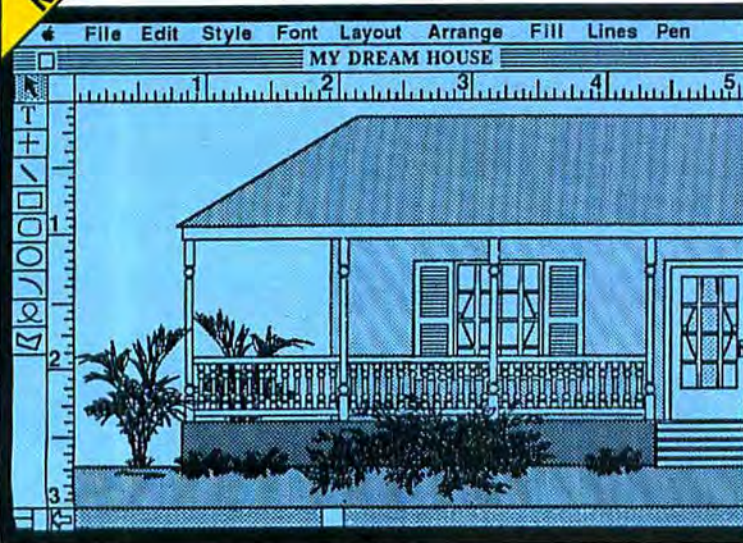
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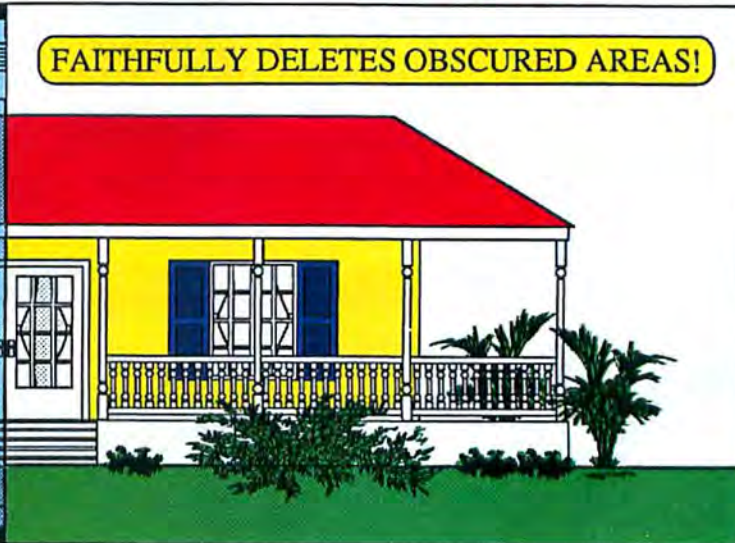
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(continued from page 32)

program includes an Expert Report feature that interprets data in areas such as cash flow management, break even analysis, fixed asset acquisition, and inventory management. *Insight* uses a rudimentary knowledge base consisting of standard financial management techniques and industry-specific data that enables it not only to record transactions and do arithmetic but to give you financial advice.

For example, the manager of a small manufacturing firm views a bar chart showing cash receipts versus cash disbursements. *Insight* analyzes the accumulation of capital to determine the appropriate level of interest income and compares that with reported interest. Then *Insight* recommends a course of action based on its findings. The program cannot explain its line of reasoning, however, nor can you change its rules.

In a few years today's software will seem primitive. Of course, spreadsheets will still have columns and rows, and data-

bases fields and records. The difference will be the expert system capabilities programmed into tomorrow's software. The mechanisms that underlie those "intelligent" features will be invisible to people using the programs. In plain English, a spreadsheet will be able to suggest ways to reduce your taxes, give advice on investments, or figure out insurance needs. Or you will be able to ask an expert word processing program to determine the correct syntax in an important letter. With expert systems serving as strategic advisors, you'll have more time to deal with problems that only the human mind can fathom.

■■■■■■■■■■ Daniel Farber is an Associate Editor of Macworld.

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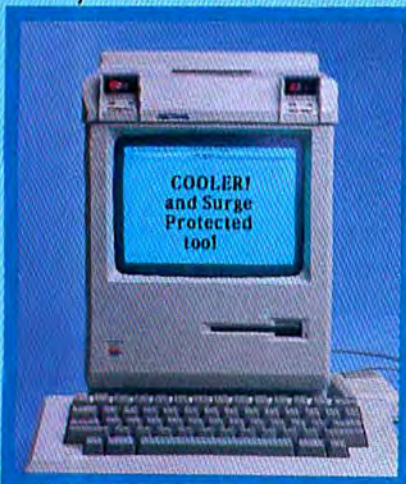
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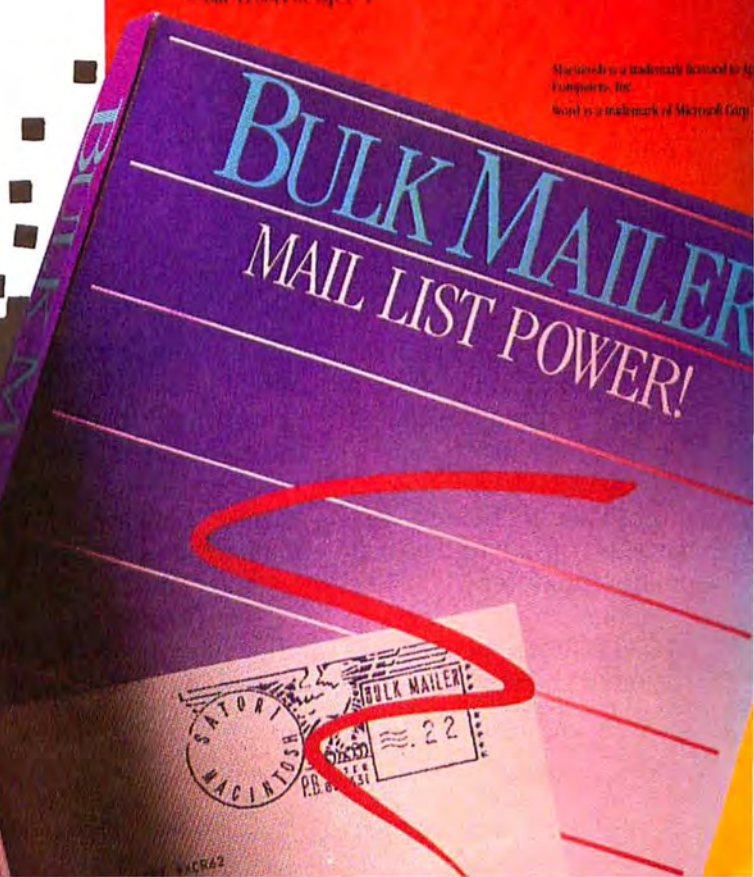
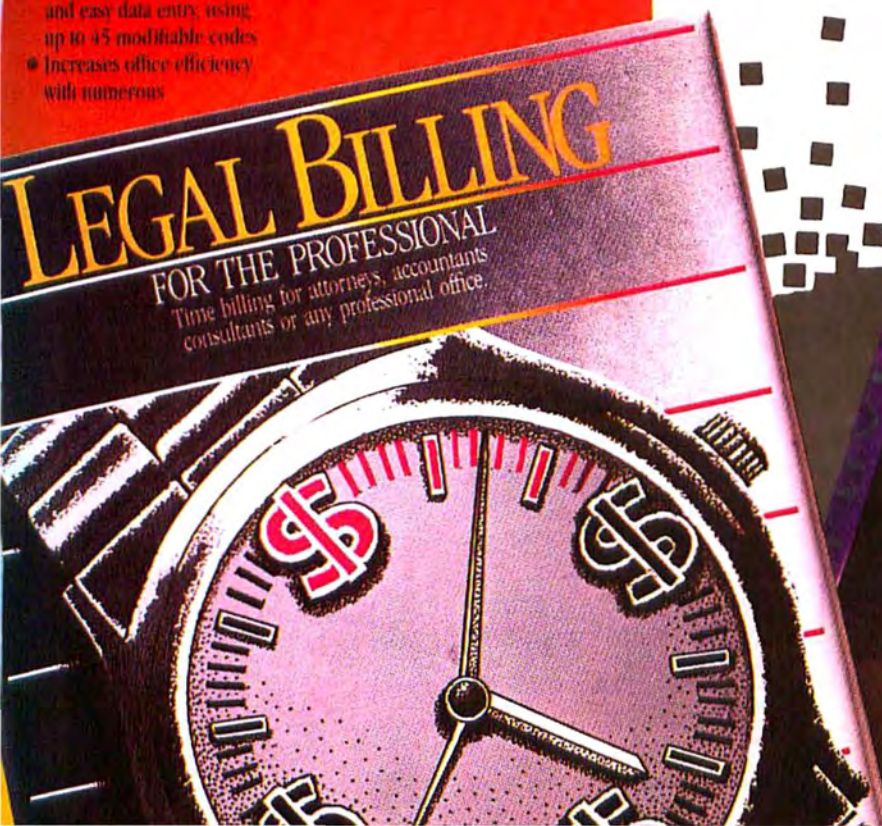
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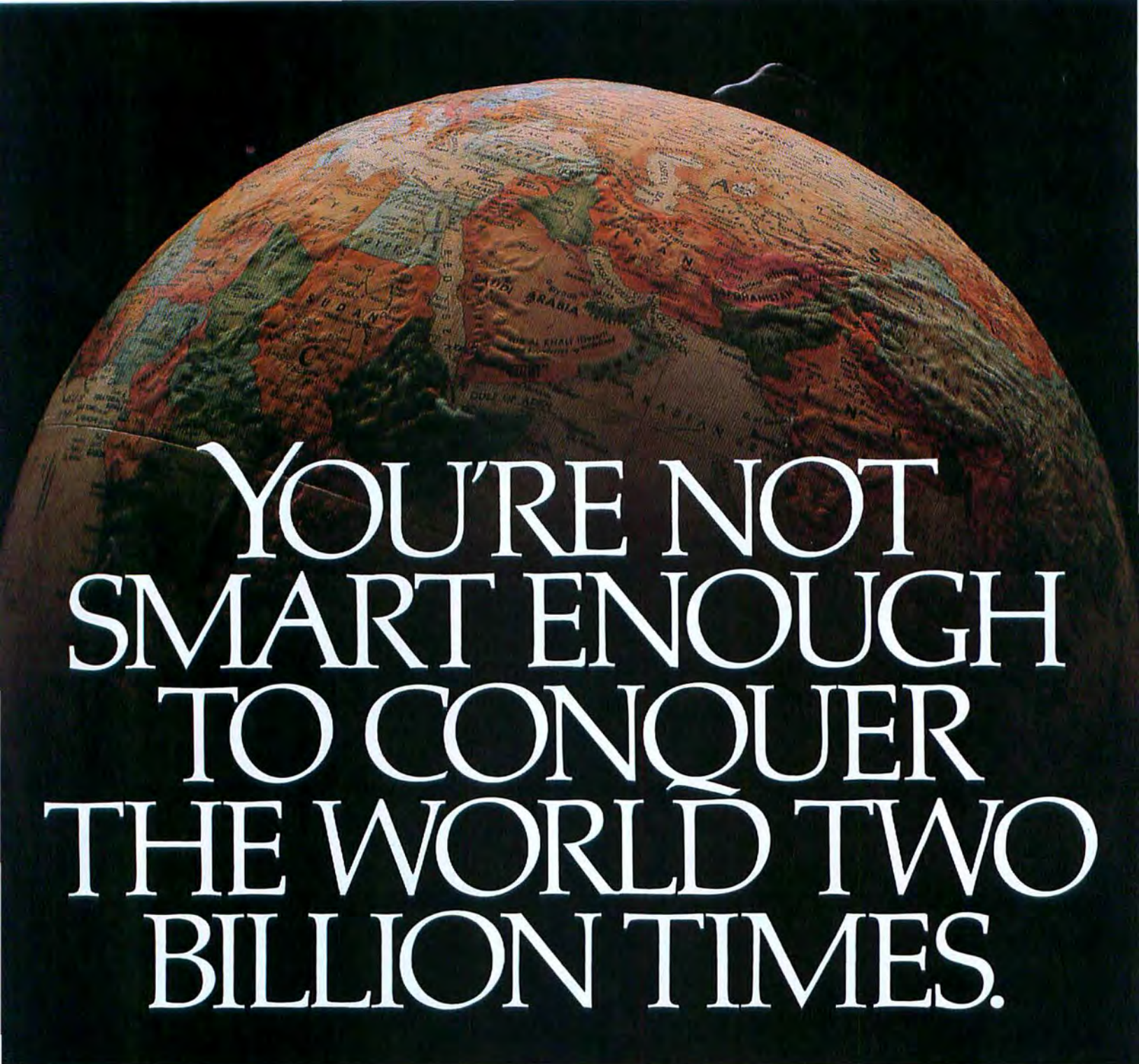
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Letters

Macworld hears from an envious IBM user, an indignant registered owner, and others

Envious in Ohio

Why is it that as an IBM PC user I feel like a peeping Tom when I read a copy of *Macworld*? In a recent issue of your fine magazine I saw an ad for MacCharlie, and I was impressed.

As a graphics designer I am envious of all the graphics programs and peripherals available for the Macintosh, such as *Page-Maker*, the *LaserWriter*, *ThunderScan*, and others. However, I cannot give up the IBM PC's speed, *WordStar*, and other programs available for the IBM PC. Does anyone produce an add-on system that will allow an IBM PC to run Mac programs and peripherals? If so, and if the price is right, I'll buy.

Robert Creager
Westerville, Ohio

We haven't heard of any reverse Mac-Charlie products. The Macintosh user interface requires much higher screen resolution than the IBM offers, so a direct translation of Mac software to the PC is unlikely. —Ed.

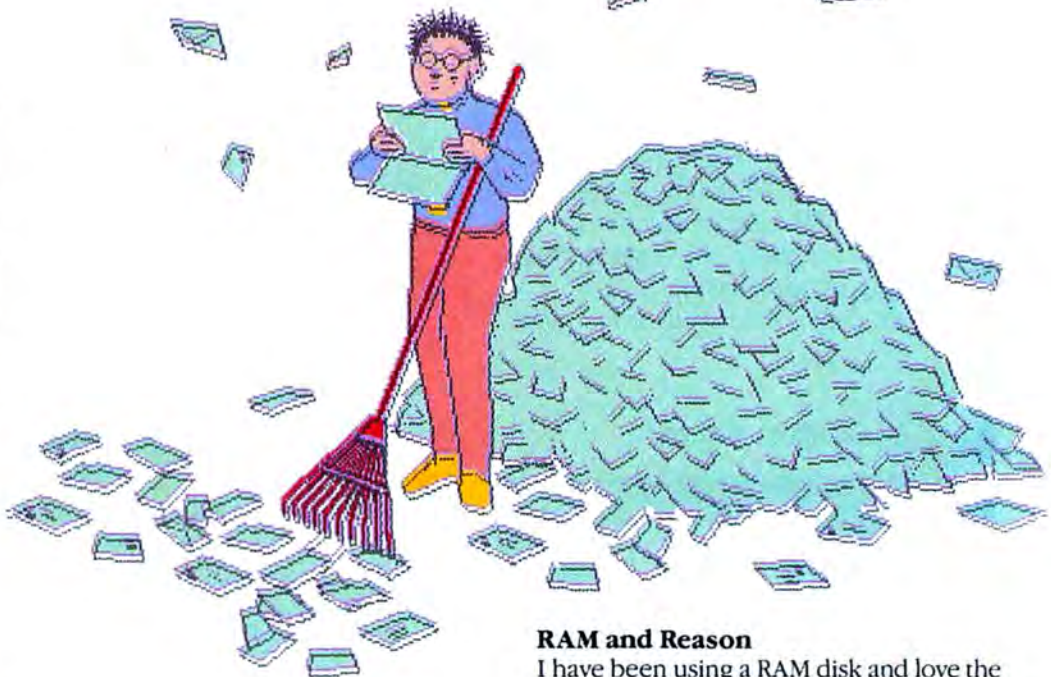
Jazzmatazz

Recently I left my *Jazz* manual on an airplane, and the ensuing search through the airline lost and found was fruitless. I am a registered user of the software, so I called Lotus to ask the replacement cost of the manual. I was told, "We don't sell manuals separately. Then all you would have to do is copy the program, and you could give it out to whomever you wanted." These were the first words of the Lotus employee answering their hot line. I was outraged. Is this

the kind of support I'm to expect for a \$600 piece of software from a company the size of Lotus? The company representative's concern that I could so easily copy and distribute their program makes me wonder why they incorporated a copy-protection scheme that prevents me from using *Jazz* on my hard disk without first inserting the master disk every time I use it. The industry's paranoia with software piracy is cutting its own throat.

The only way companies like Lotus will prevent piracy is to make it worthwhile to buy the product so people won't steal it. Copy protection will not do it; lawsuits will not do it; and certainly, keeping the documentation from registered owners will not do it. Supporting the product is the only way to achieve this goal.

Lawrence Terrill
Grand Prairie, Texas



RAM and Reason

I have been using a RAM disk and love the very fast performance that I gain from it. I find only one problem with the product—not enough RAM memory. Configuring the RAM disk for maximum memory, 316K, still does not allow me to maximize the use of *Dollars and Sense*, one of my most frequently used applications.

Ideally, the RAM disk offers peak performance when you can place an application program, the System file, and data files into it. With *Dollars and Sense*, the only file I can place into the RAM disk is the Account data file. This helps, but I am not satisfied. Ideally, I don't want to hear the disk drives turn.

Stephen V. Wilkerson
Plumsteadville, Pennsylvania

(continues on page 40)

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1 Control Center



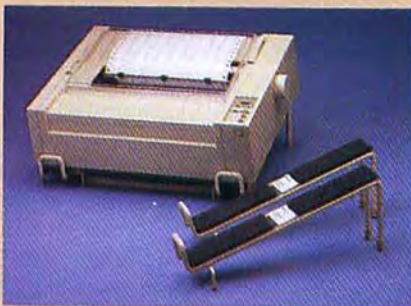
Organizes all your power needs. Styled to fit underneath your second disk drive, it provides fingertip control over your whole system. There's a master switch to power the whole system on and off, and individual switches for a printer, modem and one auxiliary device. And Control Center protects your entire Macintosh system from damaging power surges, line noise and static shocks.

2 Surge Suppressor



Portable protection for a travelling Macintosh. Surge Suppressor replaces your power cord, providing UL listed surge suppression and line noise filtering. It's light and fits easily into your carrying case.

3 Universal Printer Stand



Raises your Apple® Imagewriter® at a slight angle so you can monitor its performance more easily. It solves the problem of where to store paper—several hundred sheets are accommodated neatly underneath. (Also fits most other dot matrix printers.)

4 A-B Box



If you want to take advantage of the AppleTalk™ network, a Laserwriter™ printer or a hard disk in addition to your Imagewriter and modem, you'll have three peripherals competing for the two serial ports on your Macintosh. The A-B Box gives you the extra serial port you need. Just plug two of your peripherals into the A-B Box and plug the Box into one of your Macintosh serial ports. Then simply divert your data output to the peripheral of your choice—press A to send to one, B to the other. Fits perfectly underneath your external disk drive.

5 Tilt/Swivel



Gives you the flexibility to tilt and swivel your Macintosh to the viewing angle most convenient for you.

6 Polarizing Filter



The solution to a glaring problem. Made exclusively for Kensington by Polaroid®, it protects your eyes by reducing reflected screen glare by up to 99%. Also improves screen contrast. Easy to install.

7 Disk Case & Disk Pocket



Provides safe storage for 36 Macintosh disks. Comes with a packet of spare disk labels. Also includes a handy Disk Pocket for safe transportation of up to 5 disks.

8 Dust Covers



Protect your system from the elements. Anti-static dust covers for your Macintosh, Macintosh XL, Imagewriter, Imagewriter II and External Disk Drive.

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10 Mouse Cleaning Kit



A full year's supply of the cleaning materials you'll need to keep your mouse rolling at top speed. Also includes the Mouse Pocket.

11 Mouseway



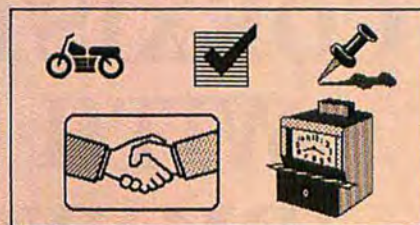
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Letters

(continued from page 37)

It's About Time

Even more interesting than the hard disks review ["The Megabyte Managers," *Macworld*, October 1985] was the time comparison at the end of the article. The Macintosh has a reputation for having a slow disk system, and those numbers seem to point out that fact. The figures demonstrate pretty well that a hard disk can speed up the Mac. But I have an Apple II in addition to my Mac, and I did a little timing test that opened my eyes a bit. Using a modified version of DOS 3.3 called Diversi-DOS, I can BSAVE a 65,000-character binary file in about 15 seconds—nearly twice as fast as the HyperDrive. I grant you that the Mac's user interface is very different from DOS 3.3, but the apparent speed losses here are phenomenally large.

If the Mac is going to compete in the real world, it had better not sacrifice much in the area of speed, or it will end up coming in last. The user interface is revolutionary, and the graphics are superb, but the watchword of any competitive computer is speed. And it often turns out that the raw speed of a computer is not as important as the speed of its disk system, especially for business applications.

Craig Peterson
Santa Monica, California

Assessing the Damage

This letter is in response to a review of our product *MacZap* in "Recovering Damaged Disks" in the November issue of *Macworld*.

We question your reviewer's judgment that *MacZap* is awkward and difficult to use in light of his other views on software recovery. Your reviewer praises *Fedit* for saving the day if the first two sectors of the disk—the boot blocks—are damaged, yet this kind of disk damage is very rare and does not stop the user from accessing any files if you use another disk as the system disk.

Most problems with damaged disks occur in allocation blocks or directory blocks. An error in any of these blocks causes the Macintosh to eject the disk or ask you to initialize the disk. *MacZap* can correct 80 to 90 percent of the problems in these blocks automatically. When you use *MacZap* tools and click on volume information, the error checking is done automatically. All you have to do is OK the fix. Clicking is "awkward"?

Fedit cannot rewrite tracks 0 and 1, which might be necessary to repair damage to allocation tables and directory blocks.

Most of the problems with damaged files fall into two main categories: deleted files, in which all directory information has been erased, and allocation problems, which come about due to many reasons when the allocation table is not accurate. *MacZap* can handle both these types of file problems if you supply the file number, though your reviewer complains about that technique.

No recovery program to date can automatically solve problems that occur due to power problems, memory glitches, or bugs in software that scramble the internal structure of a file, because the internal structures of files are usually secret.

Les Herbst
Austin, Texas

Mr. Herbst is correct in pointing out that MacZap has more advanced features than its competition; I stated that in my review. However, I maintain that MacZap is inferior to other disk editors because of its awkward design. The program's screen is littered with buttons that could be better organized into discrete dialog boxes. MacZap also has items on some of its menus that aren't commands but technical reminders. You choose what appears to be a command, but nothing happens.

Mr. Herbst is also correct that problems with a disk's boot blocks are rare and that you can still access files on the disk by starting the Mac with a different disk and then inserting the damaged one. Still, Fedit's ability to rewrite boot blocks is useful if this one-time-in-a-million problem happens to you.

It's also true that Fedit 3.0 cannot automatically correct errors in a disk's allocation table or directory blocks. In most cases, however, you can still recover a damaged file by copying its data to a new file. MacTools, on the other hand, is able to repair damaged directories.

In conclusion, I stand by my original assessment of MacZap. It's a powerful and potentially useful program if you're willing to wrestle with its unintuitive design and struggle through its poorly organized manual. People who aren't fa-

(continues on page 48)

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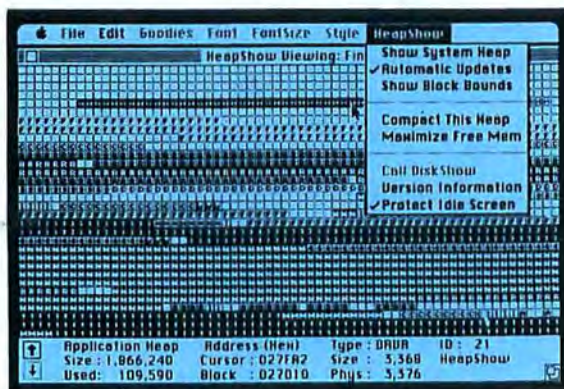
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Critic's Choice

"HeapShow can teach anyone - not just programmers - a lot about how the Mac actually works.

"This program should certainly be in all developers' toolkits. The rest of us can also get a lot out of it."

—Steven Bobker - MacUser Oct. '85

"For those of you who are heavily into programming on your Mac, a new utility, HeapShow . . . looks like a very useful development tool."

—Ebbe B. Ebbesen - The MACazine Sept. '85

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—Eric Zocher - The MACazine Sept. '85

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Letters

(continued from page 45)

miliar with the technicalities of disks, however, will find it more difficult to use than other disk editors. For them, Fedit and MacTools are the better choices. — Jim Heid

Delimited Edition

From time to time I run across a reference to a book entitled *Inside Macintosh* that contains information and documentation that could be helpful in developing one's own programs.

The book does not appear in the bookstores, and the local computer store is unable to find a copy. Can you tell me if it is out of print, out of date, or simply not available to the average Macintosh user?

Charles Allyn
Dayton, Ohio

Originally available directly from Apple Computer, *Inside Macintosh* is now published by Addison-Wesley. The hard-cover edition—1600 pages—costs \$79.95. The paperback edition comes in three parts that you can purchase separately: Volumes 1 and 2 work in tandem and retail for \$29.95 each. Volume 1 gives an overview of the ROM software covered in the three books and includes the user interface guidelines and QuickDraw and Toolbox documentation. Volume 2 covers the operating system, communications, and input/output. Volume 3, \$19.95, covers the Finder, hardware, and other areas and includes a glossary and a series of appendices for the set. If the books are not available in local bookstores, order directly from Addison-Wesley Publishing Company, Reading, MA 01867.

Warp Speed

Gordon McComb states in his article, "In Search of a Better Mouse" [*Macworld*, August 1985], that an entire 20-page typewritten manuscript could be entered into a Macintosh in about 5 minutes with an Omni-Reader from Oberon International. I believe that pace to be unattainable. Twenty pages in 5 minutes implies 15 seconds per page. My experience with the Omni-Reader is more like 15 seconds per line. I can't believe that entering a single page can take less than 5 minutes.

Pat Groves
Los Altos Hills, California

(continues on page 50)

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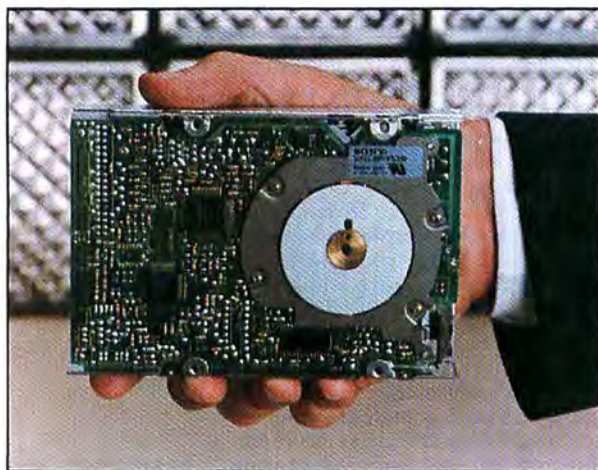
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(continued from page 48)

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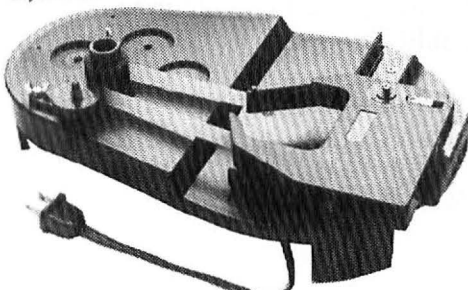
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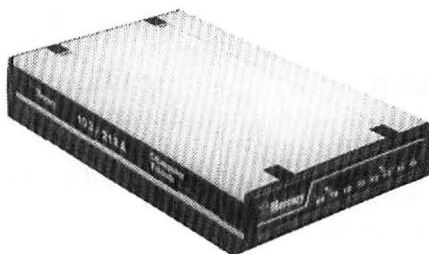
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You're right. Twenty pages in 5 minutes is a bit too much to expect from Omni-Reader. In later tests with the product, I achieved a speed of about one page every 1 to 2 minutes, assuming a double-spaced page containing approximately 200 words.—Gordon McComb.

Counting Blessings

With all the criticism of the Macintosh I read nowadays, I have to remind myself occasionally why I bought one.

• Sitting on my desk, it allows me space to do other work. With almost any other computer, I would have to have a separate "computer workstation."

• It doesn't have a fan, and that is important to me. I don't like machines that make noises while I'm trying to think. I used to use an IBM Selectric typewriter that whirred constantly as it waited—impatiently it seemed—for me to write something.

• The Macintosh looks good. Who knows from circuits and microchips?

• It is easy to use. Now that I have used the Macintosh for a year, using the Apple IIe I have at home reminds me of driving a car that has to be cranked by hand. Some automobile aficionados, I understand, like to adjust the choke by hand and signal a turn by sticking their hand out the window, but I'd rather not.

• The numerous fonts and sizes available on the Mac make documents look good.

• The Macintosh is an Apple, and that means plenty of third-party vendors, magazines, gadgets, and other people who own Macs.

Perhaps if I were a power user who ate power lunches and practiced a power handshake behind a huge desk, I'd buy an IBM PC AT. But in the meantime, I'll stick with the Macintosh.

*Kent Forrester
Murray, Kentucky*

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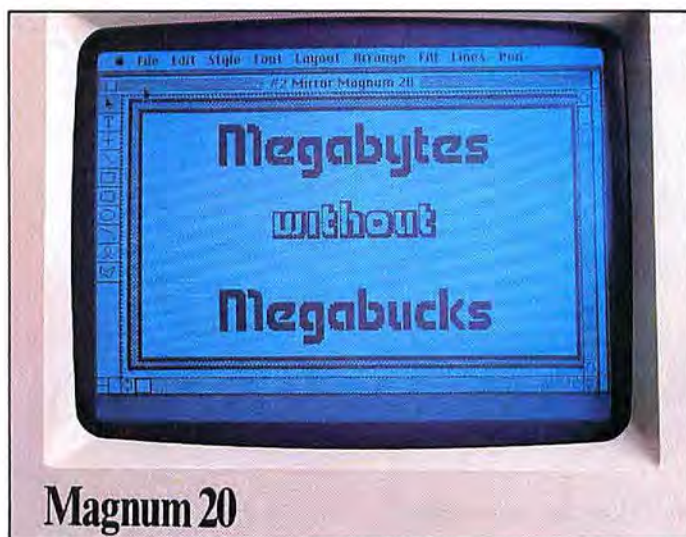
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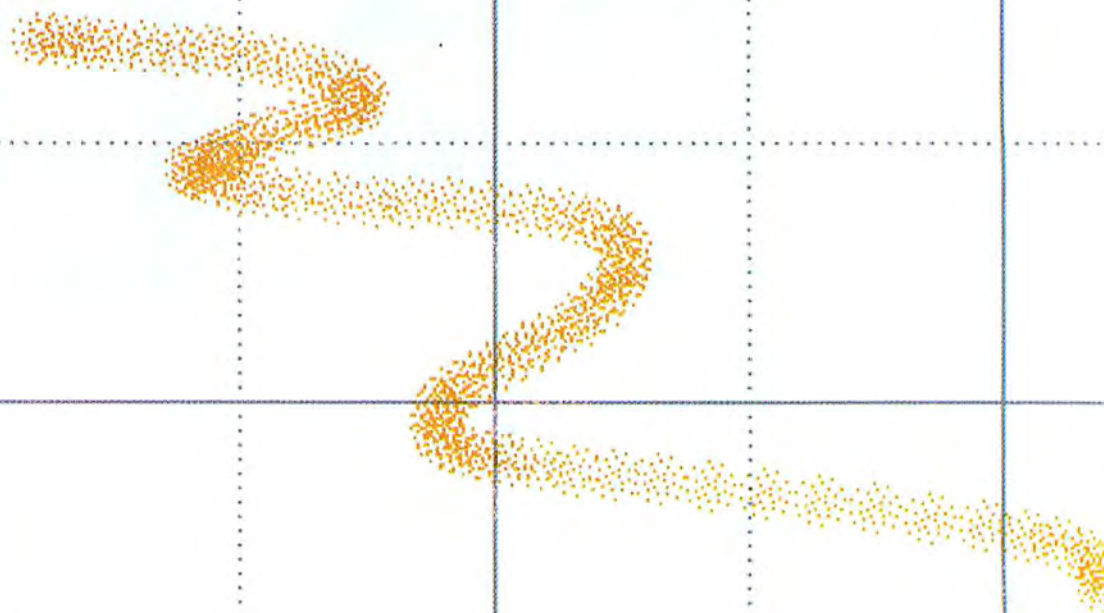
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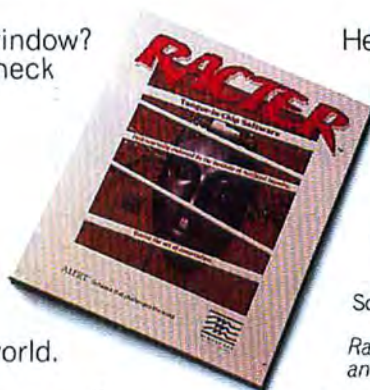
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TACK DAVIS

Macworld View

Color on the Macintosh, art for art's sake, news in desktop publishing, a paper medium for software, and more

Edited by Herschel Schmedick

Mac Avant-Garde



The artistic potential of the Macintosh is being tested and explored at The California Institute of the Arts (Cal Arts) in Valencia, near Los Angeles. Eric Martin, a faculty member who had been involved in computer animation at Xerox's Palo Alto Research Center, introduced the Mac to Cal Arts because he was interested in using the machine as a new artistic medium. During the past year, classes introduced the Macintosh, and students were challenged to create new ways of modeling ideas.

One problem Martin has found with the Macintosh, however, is that although students easily become familiar with programs like *MacPaint*, they have difficulty creating artistically interesting output. "Anyone can learn to bang on a piano, but it takes time to learn to play music. The same is true for the Mac," says Martin.

Martin does not believe that representational art—imitations of woodcuts, cartoons, or sketches in *MacPaint*, for instance—represent the Mac's real

(continues on page 57)



Facing the future. Eric Martin uses the Macintosh to introduce his students to the potential of the computer as an artistic medium.

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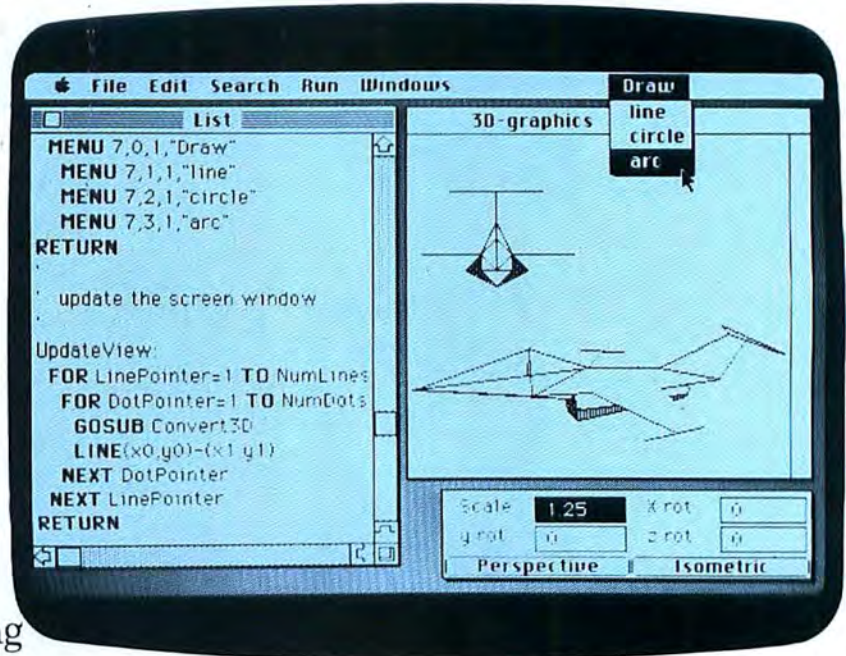
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Mac Avant-Garde (continued)

potential for artists. He gives the example of a student who produced a sound portrait on the Imagewriter. The student used *MacPaint* to design an image, which became a musical score played by the printer as if it were a high-tech player piano. The student constructed the image to produce a particular sequence of the sounds the Imagewriter makes as it prints. "Ultimately," Martin says, "the Macintosh and computers like it will generate art forms that hadn't been possible before."
—Janet McCandless

The Mac in Color



Since the day the Macintosh was introduced in early 1984, there has been talk, gossip, rumor, and more talk about a color Macintosh, or at least some type of add-on that would allow a monochrome Mac to display color.

Several enterprising companies have already developed devices that convert Macintosh black-and-white images to all (or nearly all) the colors of the rainbow. One of the most promising is the Chromatron, from Beck-Tech (415/548-4054). The Chromatron converts the Mac's black-and-white images to color for display on any composite color monitor. You specify colors on the Mac by choosing different patterns from a graphics program's pattern palette to use as placeholders for particular colors. The Chromatron translates the black-and-white patterns to color.

The Chromatron can generate up to 16 "pure" colors. Hundreds of other hues can be cre-

ated by alternating lines of two or three colors. In most cases, the Chromatron doesn't require special software to run. A new, out-of-the-box *MacPaint*, for instance, works without alteration. Other applications, like *MacDraw*, *MacDraft*, and *Business Filevision*, require a simple software modification. Beck-Tech provides a pattern editing utility with the Chromatron for use with these programs.

Besides turning monochrome images into color, the Chromatron converts the Mac's nonstandard video output to a standard National Television System Committee (NTSC) signal. This signal can be played through a conventional home or industrial video system or recorded on a videocassette recorder. With the addition of an optional genlock synchronizing device, the Chromatron can overlay a Macintosh picture on

top of another video signal generated by a video camera, VCR, videodisk player, or any other device with an NTSC output.

Currently, the Chromatron provides a composite color signal only. Beck-Tech promises a red-green-blue (RGB) version early this year. The RGB version promises to deliver sharper images than the composite model, but it may require more elaborate software modification to run.

So much for the good news; now for the bad. The Chromatron is priced at \$2995, so it's obviously not the color system for everyone. Beck-Tech is counting on sparking the interest of specialized markets, including professional video and TV stations, movie production companies, and educational institutions.—Gordon McComb



Beck-Tech's Steve Beck demonstrates his Chromatron, a device that converts Macintosh images for display in color.

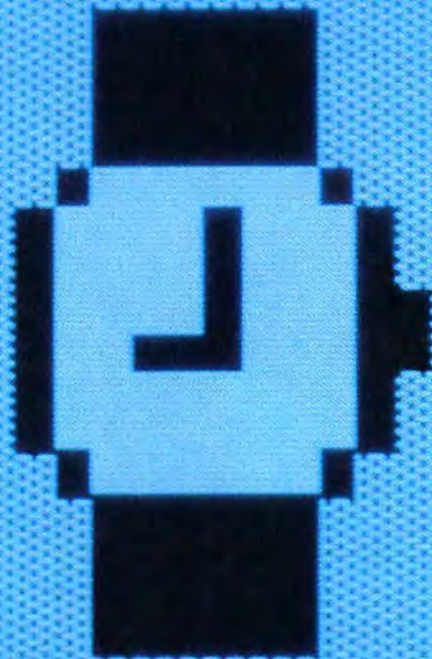
Grid Wars



You find yourself in the smoky, dimly lit corner of Alpbie's Galactic Bar and Grill after a particularly harrowing job of intergalactic smuggling. After evading squadrons of Authority sentry ships, Tinjikk space-jackers, and meteors, you deserve a drink. Unfortunately, humans aren't welcome at Alpbie's, and as a human galactic interloper, the house rules stipulate that you compete on the Grid Wars gaming table before tasting the potent Asteroid juice. A bunch of space cowboys from distant star systems drag you to the center of the bar and strap you into a seat at one end of the Grid Wars playing surface.

Grid Wars is a new Macintosh arcade-style game from Ann Arbor Softworks (313/996-3838). Written by Roy Harvey, Grid Wars is a well-designed shoot 'em up game. The object of the game is to keep the nefarious Grid Walkers from making their way to the front of the grid, while you dodge the Grid Nasties. At the controls you have three types of weapons: a laser cannon, torpedoes, and a vaporizer. If you can successfully prevent the attackers from breaking through your shields, you are free to drink; if not, you will be thrown out of the bar. The game's 12 skill levels challenge you, and the sound effects and graphics are simple but effective. You use the mouse, space bar, and backspace key to control the weapons. Remember to conserve your torpedoes and vaporizer.—A. Ashemski

(continues on page 59)



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Entertainment Tonight



Harry Marks, a graphic designer in Los Angeles, counts himself among the designers who spend more time in front of the Macintosh than the drafting table. Marks's firm creates logos and advertisements for the film and television industry. Among his credits are the logo for the Paramount program "Entertainment Tonight," the logo for NBC's "Monday Night at the Movies," and the graphics that accompanied the ads in NBC's promotion of its new schedule for fall 1985.

"I use the Mac to jot down graphic thoughts—in fact, I seldom pick up a pencil for de-

signing now," says Marks. He values the Mac because he can create preliminary designs quickly and then modify the images and typographic elements with ease. Recently, when creating the logo for a movie based on James Clavell's novel *Tai Pan*, Marks wanted to experiment with Chinese motifs to express the Oriental flavor of the film. He used Koala Technologies' *MacVision* to digitize images of Chinese dragons and symbols, and he manipulated the images and type in *MacPaint*. He came up with more than 20 design concepts in an afternoon. Often, Marks shows the Macintosh-

generated images to clients before having an artist render the finished logo design. On another occasion, Marks was asked to create a new logo for the TV show "Dynasty" when it went into syndication. He had just purchased Hayden Software's *VideoWorks* and decided to try out some ideas for title animation on it. Before the Macintosh, he would have had to develop a storyboard on paper for each design concept. With *VideoWorks*, he was able to devise an electronic storyboard and alter or save his designs with a click of the mouse.

Marks and his associates are also experimenting with programming three-dimensional animations with *ExperLogo*. They hope that eventually someone will develop a program like *VideoWorks* that will allow them to animate images in three dimensions.—Daniel Farber



Mac mock-ups of two film logos. Marks tries out ideas on clients with sketches like these before making a finished drawing.



Software on Paper



If a computer can automate the number crunching process, there must be some way to eliminate the need to type in the data. Bar-code and optical character recognition (OCR) systems have been available for several years, but those systems have not been widely used for distributing data and software. Bar-code strips cannot carry much information and have a significant error rate when being read. OCRs are slow and subject to human error.

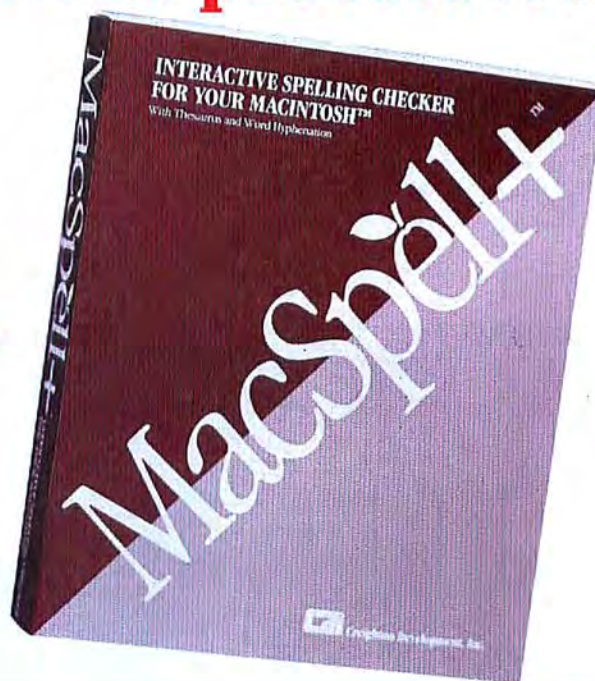
The latest product to address the problem of feeding data on paper into a computer comes from Cauzin Systems (203/573-0150). This company has developed the Cauzin Softstrip System, an encoding and reading process that enables software, data, graphics, or sound data to be printed on paper in a highly condensed format. The Cauzin Softstrip Reader, a hand-operated, optical/electronic scanning device, connects by a cable to the serial port and automatically reads information from the data strips into the computer.

Each data strip, measuring 9½ by ¾ inches, can hold up to 5500 bytes of information, or three typewritten pages. The Reader can feed a strip into a

(continues on page 61)

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Software on Paper (continued)

computer in about 30 seconds. A special encoding program lets you create data strips and print them on dot matrix or laser printers. The data strips can be read even if portions are soiled or scratched. Also, data strips can be copy-protected by using a special infrared ink.

At \$200, the Softstrip System offers a reliable, low-cost way to distribute information and programs. According to Neil Kleinfeld, vice president of marketing and sales for Cauzin Sys-

tems, several publishers already plan to distribute software via Cauzin Softstrips. Among the types of printed material that Softstrips will enhance are advertisements containing program demos; computer magazines that include program listings; and books, such as programming textbooks that have sample programs. Eventually, Kleinfeld says, Softstrips could store data for inventory control, utility and credit card billings, and bank statements. Currently the Cauzin Softstrip System is available for the Macintosh, Apple II, and IBM PC.—Heidi Mitchell

Desktop Publishing Update

Since *Macworld* last reviewed desktop publishing programs ("Publishing Turns an Electronic Leaf," July 1985), two of the programs have been enhanced. Both Manhattan Graphics' *ReadySetGo* and Boston Software's *MacPublisher* have new features to help them compete in the electronic publishing market. The new features of *ReadySetGo* version 2.0 let you create multi-page documents of up to 32 pages, introduce variable line spacing, reduce or enlarge pictures by any percentage, crop pictures and scroll through images, move blocks from page to page, import text documents from any Mac program without quitting *ReadySetGo*, and flow text through multiple columns on the same page or on different pages.

Boston Software's *MacPublisher II* includes several new features: a full-size page view; the ability to open *MacDraw*, *MacWrite*, and *MacPaint* files without quitting the program; automatic kerning,

page numbering, and repeating elements such as running heads; and depth justification to adjust interline spacing to make a block of text fit within an available column length. In addition, the program now allows you to change type styles within a line. The program has horizontal and vertical rulers for copy fitting and a zoom window for enlarging the layout 200 to 900 percent. The price for *MacPublisher II* is \$149.95 (\$49.95 to upgrade from *MacPublisher*). Boston Software also offers *Designs for MacPublisher* for \$39.95, a collection of *MacPaint* designs and fonts for illustrating newsletters, flyers, ads, and reports. Like the original *MacPublisher*, the enhanced version works on a 128K Macintosh.

Aldus Corporation has released an upgrade of *PageMaker*, version 1.1, which primarily corrects problems that were in the original program. Version 1.1 also includes the capability for smoothing bit-mapped images for printing on the LaserWriter. The upgrade is free of charge for registered *PageMaker* owners.

Newspeak

The Knight-Ridder newspaper chain, read by more Americans every Sunday than any other newspaper group, has begun a new graphics network starring the Macintosh. Already Knight-Ridder has installed 512K Macs and LaserWriters at the *Journal of Commerce* in New York, the *Charlotte Observer* in North Carolina, and the group's headquarters in Miami. Macintoshes are expected to arrive during 1986 at Knight-Ridder's 28 other newspapers as well as its news-service office in Washington.

Roger Fidler, Knight-Ridder newspapers' director of graphics and newsroom technology, says his Miami office now transmits charts and drawings by modem to the two newspapers on line. He hopes that his office and member papers will eventually store graphics in a central system and notify other papers of the available pictures

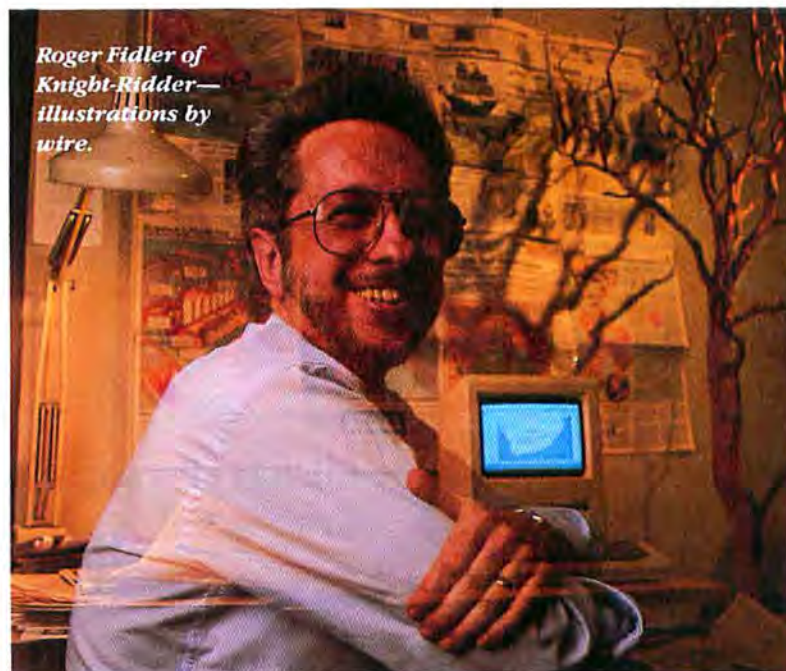
through the established Knight-Ridder news wire.

Fidler has plans for the completed network. He anticipates that his central graphics office will take over many of the routine tasks that all the newspapers perform—such as charting consumer price changes—and will generate illustrations to accompany stories written for the Knight-Ridder News Service.

"Most of the artists really don't enjoy plotting a chart," Fidler says. "It's time-consuming, and it's easy to make errors." But once the data is entered into a Macintosh, he says, "you can look at it in different ways and then enhance it."

And, Fidler notes, the central storage system will give the newspapers a library of charts, maps, and graphs for the future.—Craig Webb

(continues on page 63)



Roger Fidler of Knight-Ridder—illustrations by wire.

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ClickArt Publications

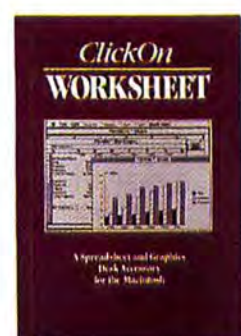
ClickArt Publications is a collection of images specifically designed for creating newsletters, flyers and invitations. It includes two- and three-column layout guides with illustrated headlines (like "Letters to the Editor," "On Vacation," "Party," "Thanks" and "Bon Voyage") sized to fit the layouts. It also contains cartoons, maps of the USA and Europe, illustrated alphabets, and much more.



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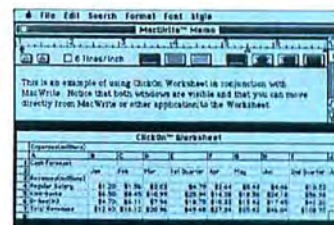


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ClickOn Worksheet

ClickOn Worksheet is a desk accessory that adds a spreadsheet and grapher to any application. The 50 row x 20 column spreadsheet includes features such as variable column widths, absolute/relative addressing, built-in financial calculations (like net present value, compounding, future value) and logical operators.



Requirements:
128k or 512k Macintosh™

ClickOn Worksheet
Price: \$79.95

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Mountain View, CA 94043
415/962-0195

New Macintosh Games

Apple's promotion of the Macintosh as a business computer has not had much effect on game developers, who are turning out products at an alarming rate. Here is a sampling of noteworthy games from the new crop:

Balance of Power, created by Chris Crawford and published by Mindscape, is a strategy game that uses the world as



its playing field and world leaders as its pieces. Playing *Balance of Power* is a little like taking the helm of one of the two world superpowers. You can choose to be the president of the United States, matching wits against your counterpart in the Soviet Union, or vice versa. As you play, you can retrieve all the political, geographic, and economic information you need—most of it accurate and up to date—by double-clicking the appropriate sections of the world map or using the game's pull-down menus. As well as being fun to play, *Balance of Power* is an educational experience, teaching you about current affairs and the psychology of world power.

Déjà Vu, by Icon Concepts and also published by Mind-

scape, is an adventure game with a twist: play progresses as you manipulate screen images using the mouse, with virtually no keyboard input. No longer do you have to second-guess the parser or gnash your teeth because the program cannot interpret your commands—just click and drag your way through the game. The action takes place in Chicago in the year 1941, with the object being to find out who you are and what you are doing there—which sounds a lot like real life.

Chess, from Psion, is the first real challenger to Hayden's best-selling *Sargon III*. Derived from a program that shared first place in the 1984 World Microcomputer Chess Championship, *Chess* boasts several features that *Sargon III* lacks, such as a time-keeping function and a three-dimensional view of the board. In addition, *Chess*, like the game itself, is multilingual and can be programmed to present its menu options in French, German, Spanish, Italian, and Swedish, as well as English. Best of all, the program plays a diabolical game of chess.

—Nicholas Lavroff

I suspect that many of you have had strange or enlightening encounters with the Macintosh. Or perhaps you've heard of someone else's unique application of the Mac. Your contributions are welcome. Macworld pays up to \$50 for each item published. All published submissions become the property of Macworld. Send your contributions to Macworld View, 555 De Haro St., San Francisco, CA 94107. I look forward to hearing from you. □

Macworld Best-Seller Software

This month	Business	Last month	Months on chart
1	Jazz, Lotus Development	1	3
2	Microsoft Word, Microsoft	2	7
3	Microsoft Multiplan, Microsoft	3	7
4	MacDraw, Apple Computer	6	4
5	Microsoft File, Microsoft	4	6
6	pfs:file, Software Publishing	—	6
7	pfs:report, Software Publishing	—	3
8	Megaform, Megabaus	—	0
9	MacTerminal, Apple Computer	—	5
10	Dollars and Sense, Monogram	5	7
11	MacProject, Apple Computer	—	6
12	Helix, Odesta	7	3
13	Microsoft Chart, Microsoft	7	7
14	ThinkTank, Living Videotext	8	2
15	Habadex, Haba Systems	—	1

Source: InfoCorp survey of over 300 retail stores

Software Watch

Editors' choice: other recent software of particular interest

My Office, DataPak Software
Business application

Tempo, Affinity Systems
Utility

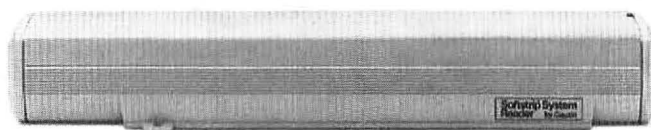
MacLink, Dataviz
Communications

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Introducing a shape that's about to turn on an entire industry.

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This new technology allows text, graphics, and data to be encoded on a strip of paper, then easily entered into



The Cauzin Softstrip System Reader replaces tedious typing by scanning the strip and reading it into your computer.

your computer using a scanning device called the Cauzin Softstrip™ System Reader.

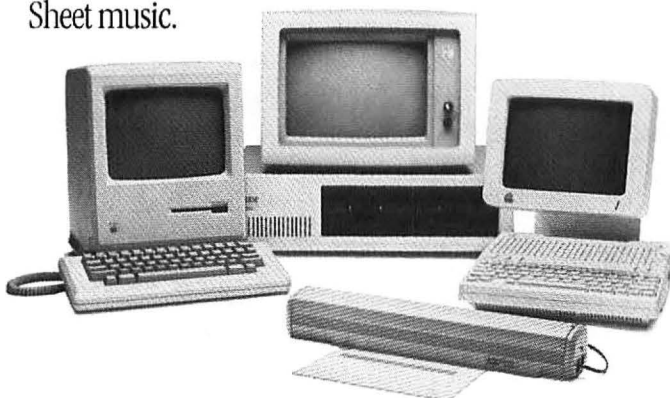
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And you'll be able to enter programs without typing a single line.

There is also software for you to generate your own strips.

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you can run by stripping.
Just take this ad to
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demonstration.**

1 HOW SOFTSTRIP™ WORKS

The three strips contain a file describing all the technical aspects of the SOFTSTRIP™ System (which covers two full pages of text). The file, named TECHSPEC.PRN, can be loaded into MACWRITE™. Just read the strip into your MAC and then open the file. Because it is an ASCII file you can also load it into other programs or computers just as easily.

2 TUMBLING MAC

This single strip contains a complete demo of a MAC application. Just read the strip into your MAC with a Softstrip™ Reader and then run the application DEMO3D. This demo will show you text, graphics, and animation. (Program courtesy of Mainstay Software.)

Softstrip

Softstrip

1a

1b

1c

2

New. TheMax 2.™

You've heard about TheMax. Now TheMax2 gives you even more – a full 2 Mb for the same low price. TheMax2 is more versatile than a RAM disk and runs circles around the fastest internal disk drive.

At the heart of the system is TheMax2, an expandable memory board that gives you 2 Mb of computing power, with software to let you configure the memory your way, plus a print spooler so you don't have to wait around while a document prints.

2Mb

The 4 Mb Future is Here

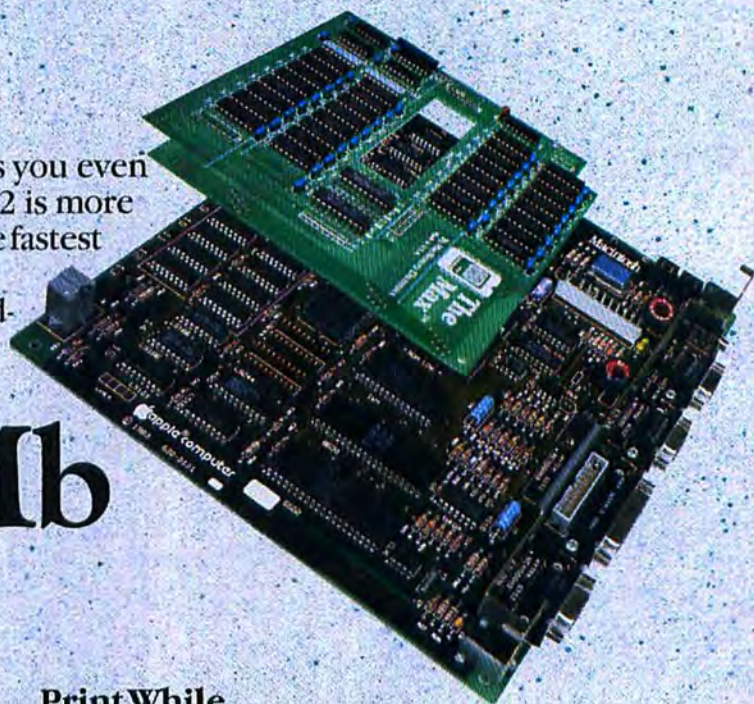
TheMax2 installs in minutes to give your Macintosh 2 Mb of memory with full Apple ROM compatibility. Even better, it's ready for expansion – just plug in 16 of the new megabit chips to realize the Macintosh's 4 Mb potential. And it adds less than 2 watts to your power consumption – so little, in fact, that it doesn't even require a fan.

A Memorable Approach

Because different users have different memory requirements, our MaxRAM software lets you have it the way you need it.

Configuration 1 gives you a 1.5 Mb of contiguous memory plus a 400K RAM disk. It's perfect for memory-intensive applications like databases, elaborate spreadsheets and integrated packages like Jazz. If you move between applications frequently, MaxRAM with Apple's Switcher lets you jump back and forth between as many as eight applications.

Configuration 2 gives you a 512K fat Mac with a 1.5 Mb RAM disk. Use the RAM disk like a floppy disk – only 10 times faster. Put your most frequently-used programs on your RAM disk in the morning and use them at RAM speed all day – without juggling disks. Unlike other RAM disks, a program crash isn't fatal. TheMax2 lets you reset and recover your 1.5 RAM disk intact.



Print While You Work

A welcome addition to TheMax2 is MaxPrint, a print spooler that takes the waiting out of printing. MaxPrint loads your text and graphics at RAM speed and feeds it to the printer so you can keep working. MaxPrint is a desk accessory that's there when you need it.

TheMax2 is Available Now

TheMax2, complete with memory board, MaxRAM software, MaxPrint and a 90-day warranty, is available for both the 128K and 512K Macintosh. MacMemory also continues to offer 512K upgrades at better-than-Apple prices. Both TheMax2 and 512K upgrades are also available as kits.



Ask Your Dealer for More Information, or contact MacMemory Inc., 473 Macara Avenue, Suite 701, Sunnyvale, California 94086. (408) 773-9922.

MacMemory Inc.

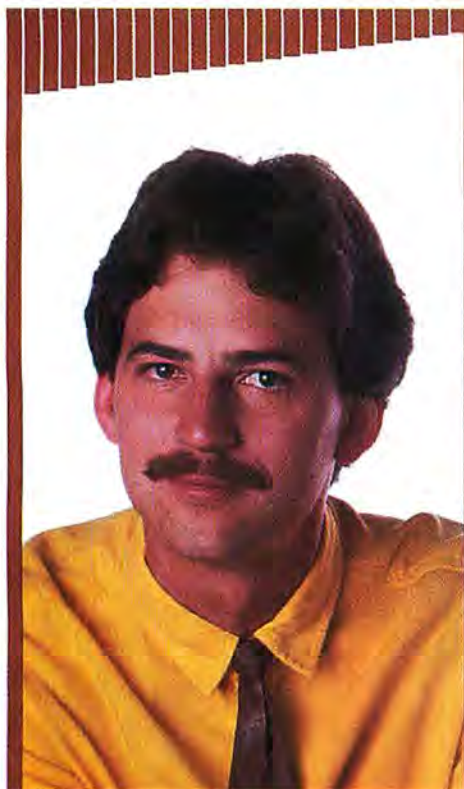
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Circle 337 on reader service card

Get Info

Macworld's tutor answers questions on LaserWriter formatting, copying folders, and getting started in telecommunications

Lon Poole



With the LaserWriter driver and fonts, you can format for the LaserWriter on any Mac.

This month a reader offers advice on retaining indentation in outlines transferred from ThinkTank to Microsoft Word. One person sounds a warning about copying folders, and another reader asks how to store graphics on disk for use in BASIC programs. I answer questions about formatting for LaserWriter printing on a Mac that isn't connected to a LaserWriter, the Mac's lack of built-in BASIC, controlling Multiplan formula recalculation, the effects of a 512K upgrade, the workings of the Clipboard, lubricating the Imagewriter, and how to avoid Imagewriter print head breakdown.

No Built-In BASIC

Q. I do my homework using my Macintosh hooked up to a computer at school. How can I halt *MacTerminal* in order to program the Mac in BASIC, which I can do on an Apple IIe by pressing the \mathbb{A} and C keys simultaneously?

*Abdi Ahmed
Anaheim, California*

A. Pressing \mathbb{A} -C on an Apple II interrupts the program in progress and transfers control of the Apple II to the built-in BASIC interpreter, and you must quit the current application in order to program.

To program the Macintosh yourself in BASIC, you need a disk that contains Microsoft BASIC. When you insert the BASIC disk and double-click on the BASIC icon, several windows appear. You type commands in one, type and edit program lines in another, and observe command and program output in a third. Microsoft BASIC does not come with the Mac; you must buy it separately.

LaserWriter Formatting without a LaserWriter

Q. I was pleased to find that some local copy shops and computer stores now offer LaserWriter printing at so much per page and per unit of time, but my first attempt to use this service was disappointing. The print quality was fantastic, but the formatting (margins, page breaks, and font size) was different from the Imagewriter printout I made at home. How can I format for the LaserWriter if I don't have one?

*Tom Fussy
Oakland, California*

A. According to Apple's LaserWriter product manager, you should be able to accurately format a document for printing on the LaserWriter when your Macintosh is not hooked up to that printer, as long as your System Folder has Apple's LaserWriter driver and fonts installed. The copy shop or computer store you patronize should help you install a LaserWriter System Folder on your application disk for a modest fee.

With the LaserWriter driver and fonts installed, you can format for the LaserWriter on any 128K or 512K Mac. Use the Choose Printer desk accessory from the Apple menu to select "no printer" by clicking in the white space below the last printer listed; then click OK. Change the fonts in your document to LaserWriter fonts by clicking the Font Substitution option in the LaserWriter version of the Page

(continues on page 72)

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All of us at Icon Review are active Mac users. We have hands-on experience with what works and what doesn't. Our highly qualified network of Mac experts help us evaluate specialized products. We believe in the quality and value of these products. We won't sell anything we wouldn't use ourselves!



Balance of Power \$33

From Mindscape

Could you take over as leader of the Western World and do any better than President Reagan? This one-or-two-player global simulation by renowned game designer Chris Crawford puts YOU in charge! Pit your wits against the leader of the USSR. Can you use insurgency, arms shipments, economic aid, troops, and diplomatic pressure to enhance your country's prestige without causing nuclear war? This all-too-real strategy game



will teach you a thing or two about geopolitics in the nuclear age. You'll learn the political stability, GNP, literacy rate, alliances, and rivalries of nations from historically accurate data. A modern classic for all to enjoy.

Macbottom 20 \$1149

From PCPC

This new 20 megabyte MacBottom wins our vote as the most Mac-like personal hard disk. We like it even better than the Apple Hard Disk 20. MacBottom is just as fast plus it's more compact, more portable, and powers up automatically. The Macbottom has earned our respect for the friendliness of its software, its reliability, and high performance. Software enhancements permit convenient backup to floppies (entire volume, changes only, or selected files) and allow you to quickly mount volumes from a desk accessory. Volumes can be resized. The built-in print spooler saves you time. No installation required—just plug it in to the printer port and go! Warranty is for 6 months parts and labor. We strongly recommend MacBottom. You can trust it to save your data and your time.



OverVUE 2.0 \$149

From ProVUE

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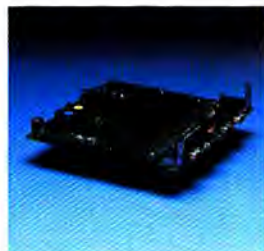
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Circle 298 on reader service card

Get Info

(continued from page 67)

Setup dialog box or by selecting the text to be printed and choosing a new font in the usual manner.

MacWrite 4.5, *MacDraw*, and other applications designed to work with the LaserWriter should now display fairly accurate LaserWriter formatting on the screen. For an illustrated discussion of LaserWriter formatting problems, see "Eye to Eye with the LaserWriter," *Macworld*, October 1985.

ThinkTank to Word with Indentation

Q. In October you described how a *ThinkTank* outline can be moved to *Microsoft Word* via the Clipboard and noted that indentations were lost in the process. It's also possible to open a *ThinkTank* document directly with *Word* and to use *Word*'s search and replace feature to restore the indentations automatically.

A *ThinkTank* document opened with *Word* looks odd. Attached to each line, at the left margin, is a prefix such as **.HEAD 0 +** (see "ThinkTank in Word"). Before you start to tinker, use the Save As command to save a copy of the *ThinkTank* document under a different name, and close the original *ThinkTank* document.

To transform the odd-looking document into a conventional outline, follow these steps:

- Select the entire document by pressing the **⌘A** key and clicking with the pointer in the left margin.

- Set tabs every half-inch or so, using the Tabs command in the Paragraph menu.

- Select and delete the prefix **.HEAD 0 +**. This prefix will be next to your summary headline, which you may wish to center and embellish now.

- Choose Change from the Search menu. In the dialog box that appears, search for **.HEAD 1 ?**. Don't forget the initial period and each of the blank spaces. Choose Show ¶ from the Edit menu to see exactly how many spaces there are between headings. Replace with nothing and click Change All to make your main headings flush against the left margin.

- In the Change dialog box, modify the phrase you're searching for to read **.HEAD 2 ?**. Replace this phrase with *Word*'s symbol for a tab character, namely the two characters **^t**. Click the Change Selection button—the entire document should still be selected—and all your second-level headings are indented to the first tab.

- Now modify the Change dialog box to replace **.HEAD 3 ?** with **^t^t**. Click Change All and all your third-level headings are indented to the second tab.

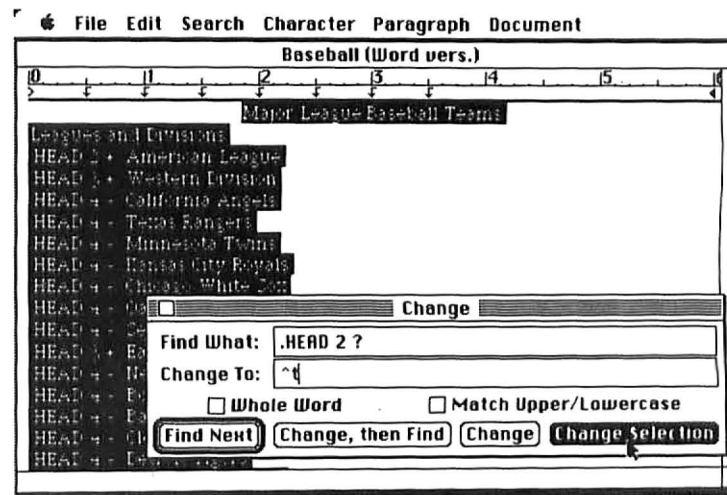
Continue as in the last two steps, modifying the Change dialog box to replace each additional heading level with one more tab character symbol than the previous level.

If a heading is too long for one line, it automatically wraps around to the next line at the left margin. You may wish to adjust such wraps manually so that they line up with the appropriate tabs. Also, if you typed text windows in *ThinkTank 512*, the text in them remains flush against the left

(continues on page 76)

ThinkTank in Word

After opening a *ThinkTank* outline in *Microsoft Word*, replace the **.HEAD** prefixes with tab characters to restore proper indentation.



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Get Info

(continued from page 72)

margin, and a return character is embedded at the end of each line. You should remove all return characters except the last one in each paragraph, and you may wish to adjust the margin and indentation settings as well.

John C. Weitnauer
Atlanta, Georgia

A. Thanks for the suggestion and the thorough explanation. While we're on the subject, *Word* treats pictures in a *ThinkTank* document as text. The result is gibberish. You have to clear out the gibberish—each picture begins with .*pic*t and ends just before .*HEAD*—and copy the pictures from *ThinkTank* to *Word* via the Clipboard.

Controlling Multiplan Calculation

Q. When I enter new numbers in a *Multiplan* formula, the affected values on the spreadsheet do not change until I give the Save command. How can I have the new values displayed immediately?

Ben H. Branch
Austin, Texas

A. Somewhere along the line, you or someone else inadvertently chose Manual Calculation from *Multiplan*'s Calculate menu, suppressing the automatic recalculation you desire. You can explicitly request formula recalculation as needed by choosing Calculate Now from the Calculate menu or by pressing ⌘ with the equal sign. You can reinstate automatic calculation by choosing the Automatic Calculation option.

Folder Copying Caveat

Q. I recently learned the hard way that copying a folder from one disk to another can result in lost files. If the destination disk contains a folder by the same name as the folder being copied, the Finder asks, "Replace items with same names with the selected items?" In this case, *items* means the folder on the destination disk and every last thing in it. I thought *items* only

(continues on page 80)



The C for the Macintosh

"Library handling is very flexible... documentation is excellent... the shell a pleasure to work in... blows away the competition for pure compile speed... an excellent effort."

COMPUTER LANGUAGES, 4/85

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Much of the commercial software for the Apple Macintosh including top selling titles from software publishers Broderbund, Hayden Software, and Spinnaker is developed using Manx Aztec C.

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Manx Aztec C68k for the Macintosh is available as a line of three upgradable development systems: Manx Aztec C68k-p, Manx Aztec C68k-d, and Manx Aztec C68k-c. Student, non-commercial, and small business discounts are available. Whatever your budget and requirements, there is a Manx Aztec C68k development system that offers you the best value and performance for your investment.

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The highly acclaimed, powerful, and professional Manx Aztec SHELL development environment now includes a mouse interface. Developers unfamiliar with UNIX or MS-DOS can work entirely with the mouse interface. Those interested in learning the advanced features of the SHELL can do so at their leisure. Developer's familiar with UNIX or MS-DOS can ignore the mouse, if they so choose, and work entirely in a familiar command driven environment.

Aztec C, The Most Portable C.

Manx Aztec C Development Systems are available for the Apple Macintosh, Apple II, IBM PC, PC compatibles, CPM-80 systems, Radio Shack Systems, and the Commodore 64/128. Manx Aztec C is also compatible with UNIX and UNIX ports. Manx currently is developing systems for the Amiga and other microcomputer systems. No other C Development System for the Macintosh comes close to the portability of Manx Aztec C.

Power To Spare

In benchmark after benchmark, Manx Aztec C appears in column after column as the clear winner.

The following sieve benchmark timings are reprinted with permissions of Computer Languages, 131 Townsend St., San Francisco, CA 94107 from a Macintosh review that appeared in the April, 1985 issue:

compiler	compile/link	run	size
Manx Aztec	49	7	13,274
Megamax	114	7	13,816
Softworks	201	9	46,914
consulair	152	10	17,654
Hippo 2	102	13	30,648

The following sieve benchmark timings are reprinted with permission of Macworld, 555 De Harro St., San Francisco, CA 94107, from the May, 1985 issue from "Mac Wins By a Length" in the Open Window column.

Language	Run Time
Aztec C 1.06C	6.55
McFORTH 2.0	20.01
Modula-II	71.60
MBASIC 2.00	1170.00
Pascal	1270.00

Sieve timings for Manx Aztec C68k 1.06g:

with register variables 3.37 secs 5,007 bytes
without register variables 6.02 secs 5,140 bytes

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code optimizer	symbolic debugger (512k)-c
MacRam Disk-c	UniTools (ul, make grep, diff)-c
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Summary

If you plan to program in C on the Macintosh or are currently doing so using a brand x C compiler, there is a Manx Aztec C68k system for you that offers the best value and the greatest degree of portability, power, and professional quality available.

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LA Times 7/29/85
Business Section

(RE: Beck-Tech's 1024K)
The extra memory enhances the machine in three ways. First, it can be used to create a high-speed "RAM disk drive"; second, it can be used to run several programs simultaneously, and, finally, it can make better use of programs designed to take advantage of as much as a megabyte of memory. Happily, Jazz recognizes the extra RAM in a one-megabyte system, allowing for much larger files.

—Lawrence J. Magid

InfoWorld 8/12/85
Review Board

"An Honest-1 Meg Mac!"

If you need 1 megabyte of memory in your Mac, MacMEGABYTES is a good solution... both versions consume very little power; therefore, any potential problems of overtaxing the Macintosh's power supply should not arise. MacMEGABYTES does not seem to be incompatible with any available applications.

—Steve Mann

San Francisco
Examiner 5/26/85
Business Section

Their real winner is the full 1024K stomper they create. The 1024K upgrade is quite elegant. I loaded up a 128K Mac with this upgrade and found it bug-free. I recommend it.

—John C. Dvorak

The New York
Times 8/18/85
Business Section

What is needed is a machine whose direct memory capability measures a full megabyte, or 1024K. The solution is within reach with a memory unit called MacMEGABYTES from Beck-Tech.

—Erik Sandberg - Diment

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(continued from page 76)

meant applications and documents with the same name. I expected files in the destination folder that had no like-named counterparts in the source folder to be untouched, but they were discarded.

Why does the Finder treat the contents of the folder as if they were the contents of a document? Surely it should at least warn you it is about to replace the entire contents of one folder with the contents of the other.

Chris Dole
Diamond Bar, California

A. I doubt there'd be any consensus as to which of the folder-copying schemes you describe is more intuitive. But there can be no argument that the potential for misunderstanding exists, and folder copiers



*Think twice
when you see the mes-
sage, 'Replace items
with same names with
the selected items?'*

should be forewarned. After all, when you copy disks, the Finder tells you it is about to replace the "entire contents" of one disk with the contents of another and even identifies the disks by name and location. It seems reasonable to expect the same warning when you copy folders. Until Apple makes the change you describe (if ever), think twice when you see the message, "Replace items with same names with the selected items?"

Fattening a French Mac

Q. I own a 128K Macintosh with a French keyboard (AZERTY instead of QWERTY). I intend to upgrade my Mac to 512K by swapping boards through the mail with one of the companies advertising in your magazine. Will the new board change the response of my keyboard?

J. L. Geyelin
Paris, France

(continues on page 84)

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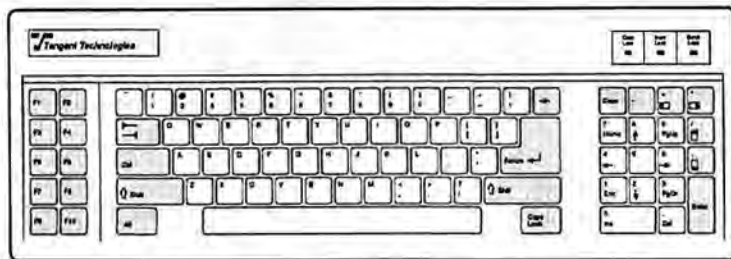
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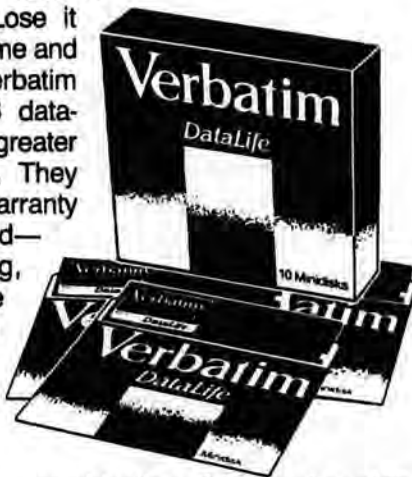
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82 February 1986

Get Info

(continued from page 80)

A. A memory upgrade should have no effect on any keyboard. Since the keyboard configuration is part of the System file on your startup disk, changing the hardware has no effect on the arrangement of keys.

Where Is the Clipboard?

Q. How much space is allocated for the Clipboard? Is the Clipboard normally stored in memory and saved to disk only if it's larger than a certain size? What determines which disk it is saved on? How many bytes can be transferred between applications via the Clipboard?

*Judy Englesberg
New Milford, New Jersey*

A. The Clipboard normally resides in the Macintosh's memory. The amount of memory the Clipboard requires varies, depending on how much information you cut or copy. The application program you use, which also takes up memory, causes the Clipboard to be saved to disk only if there's not enough memory for both. The application determines which disk the Clipboard goes to. Most applications save the Clipboard on the startup disk, but exceptions exist. The only limit on the Clipboard's size is that it must fit in memory. For more technical information, refer to the Scrap Manager and Volume Manager sections of *Inside Macintosh* (Addison-Wesley, 1986).

Getting Started on CompuServe and MAUG

Q. How do I get information on CompuServe, MAUG, and other Macintosh user groups and services?

*Paula Jean Clark
Bellevue, Washington*

A. To connect with information services over the phone lines, you need a modem and a terminal program. For CompuServe and MAUG, you also need a CompuServe subscription, which is often included with the purchase of a modem. You can buy a CompuServe Starter Kit from most computer stores.

(continues on page 87)

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DATALOGICA

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(continued from page 84)

For help getting started, I recommend you buy a book or two. *MacTelecommunications*, by Jonathan Erickson and William D. Cramer (Osborne/McGraw-Hill, 1985), describes how to connect a Mac to a modem and how to use the *MacTerminal* program to connect with CompuServe. The book doesn't include details on using CompuServe, but it does show how to use other information services. *Online*, by



MAUG has split into three groups, including one for Mac users and one for Mac developers.

Steve Lambert (Microsoft Press, 1985), describes how to connect a modem to a personal computer and discusses general features of terminal programs, but it doesn't mention Mac communications settings or terminal programs specifically. However, *Online* includes subscriptions and free connect time to seven information services, including CompuServe, and takes you through detailed sample sessions on each service.

Neither book describes how to use MAUG, which is hosted by CompuServe. You can get information on line from CompuServe (type the command **GO MACUS**) or read "Shopping the Electronic Software Shelves" (*Macworld*, June 1985), "Backstreets of the MAUG" (*Macworld*, January 1985), and "Into the Mouth of the MAUG" (*Macworld*, December 1984). Since those articles appeared, MAUG has split into three groups, one for Mac users (called MACUS), one for Mac developers (called MACDEV), and one for Apple II and Apple III owners. The split also affected the setup of the database library (DL), as you will see once you are connected.

Numerous user groups support face-to-face or U.S. Postal Service interfaces (no modem required) as well. You may be able to find one in your area by asking at your local computer store. Club Mac publishes a

list of user groups—most of them in North America—four times a year in the monthly newsletter it sends to members. Call or write them at 735 Walnut St., Boulder, CO 80302, 303/449-5533.

Imagewriter Head Breakdown

Q. In the course of printing a large (4 feet by 8 feet, 60 pages) *MacDraw* document containing many solid black areas, the Imagewriter print head became clogged and failed to print properly, requiring me to buy a new head. Should the head have been cleaned periodically? Could I have taken preventive action to forestall damage to the print head in heavy use of this kind?

Leonard Hutchinson
Athens, Georgia

A. The head failure you describe was probably caused by overheating, not by clogging. The Imagewriter has no protection against head overheating and was not designed to handle the heavy printing for which you were using it. To avoid head overheating, do not print pages that are more than 25 to 30 percent solid black. I suppose cleaning the head might help alleviate some problems, but only insofar as it would allow the head to cool off between pages. Incidentally, the ImageWriter II has built-in protection against head overheating.

Saving the Clipboard from BASIC

Q. The review of MBASIC 2.0 in the December 1984 issue ["Microsoft BASIC Comes of Age"] lists a short program for reading graphics from the Clipboard. Is there any way to save the graphics to disk for further use in BASIC programs?

Gregory L. Smith
Raymond, Alberta
Canada

A. The following program reads a picture from the Clipboard into string variable IMAGE\$ and then saves the contents of IMAGE\$ in a disk file named CLIPPINGS.

```
OPEN "CLIP:PICTURE" FOR INPUT AS #1
IMAGES = INPUT$(LOF(1),1)
OPEN "CLIPPINGS" FOR OUTPUT AS #2
PRINT #2, IMAGES
CLOSE
END
```

The next program reads the picture from the file CLIPPINGS and displays it in the middle of the output window.

```
OPEN "CLIPPINGS" FOR INPUT AS #1
IMAGES = INPUT$(LOF(1),1)
PICTURE(175,75)-(270,150),IMAGES
CLOSE
END
```

Squeaky Imagewriter

Q. The Imagewriter User's Manual suggests on page 29 lubricating the shaft with a light machine oil once a year. Then it adds a Catch-22: "Do not use electric motor oil or any lubrication that contains rust inhibitors." All the machine oil I have found contains rust inhibitors. What type of oil can I use?

Victoria Witte
Bloomington, Indiana

A. Apple recommends sewing machine oil—even if it contains a rust inhibitor—for lubricating the Imagewriter. According to Apple spokesperson Barbara Knaster, original plans called for a different carrier-bar metal than was actually used, and the manual was never corrected to remove the restriction.

Get Info answers questions about the Macintosh and how it works. Most inquiries deal with application programs, but no topic is too elementary or too advanced. Send your questions about the Macintosh, Macintosh software, and Macintosh programming to Get Info, Macworld, 555 De Haro St., San Francisco, CA 94107. Send electronic mail to CompuServe 70370,702 or The Source BCW440. The heavy volume of mail makes it impossible to personally reply to every question. All published submissions become the property of Macworld.

Lon Poole is a Contributing Editor of Macworld. □

The call is

✓denotes Mac XL compatibility.

SOFTWARE

Altsys

✓Fontastic (*create your own fonts*)\$27.

Ann Arbor Softworks

Animation Toolkit 1 31.

Apropos

Financial Planning (*reqs. Multiplan*) 51.

Investment Planning (*reqs. Multiplan*) 51.

Arrays/Continental

Home Accountant 52.

Assimilation

✓Mac-Tracks 22.

✓Mac-Memory-Disk 22.

✓Business-Essentials 65.

✓Mac-Spell-Right 69.

✓Right-Word 69.

ATI

Teach Yourself Multiplan 29.

MacCoach Training 39.

Jazz Training 39.

Batteries Included

The Mac BatteryPak 27.

Blyth Software

✓Omnis 3 (*requires 512k, external drive*) 245.

Borland International

✓Sidekick (*unprotected*) 44.

BrainPower

✓PowerMath (*requires 512k*) 52.

✓StatView (*statistics package*) 99.

Camde

Nutricalc 49.

Casady Company

✓Fluent Fonts (*two-disk set*) 29.

Central Point Software

Copy II Mac (*includes MacTools*) 20.

Chang Labs

Rags to Riches Ledger 105.

Rags to Riches Receivables 105.

Rags to Riches Payables 105.

Computer Software Design

MacLion 188.

Creighton Development

✓MacSpell+ (*requires 512k*) 55.

DataFood

✓DrawForms (*requires MacDraw*) 30.

✓MacForms (*requires MacPaint*) 42.

Desktop Software

✓1st Port (*communications software*) 48.

✓1st Merge 48.

✓1st Base 95.

Dilithium Press

PC to Mac & Back 79.

Dow Jones

Straight Talk 45.

Spreadsheet Link 56.

Market Manager PLUS 109.

Track portfolio information.

Dreams of the Phoenix

✓Day Keeper Calendar 27.

✓Mouse Exchange BBS 27.

✓Mouse Exchange Terminal 27.

✓Quick & Dirty Utilities Vol. 1 27.

✓Twelve-C Financial Desk Accessory 27.

Electronic Arts

Pinball Construction Set 27.

Financial Cookbook 32.

Deluxe Music Construction Set 32.

Enterset

✓Quickpaint\$29.

✓Quickset 29.

✓Quickword 32.

1st Byte

Speller Bee 42.

KidTalk 42.

Smoothtalker (*version 2.0*) 57.

Forethought

✓Typing Intrigue 29.

✓Factfinder 84.

✓FileMaker 108.

Fortnum/Southern

MacNooga Choo-Choo 21.

MacChemistry 89.

Great Wave Software

The Art of Fugue (*Bach*) 12.

Instrumental Favorites 12.

ConcertWare+ 39.

Harvard Associates

MacManager (*business simulation*) 29.

Desktoppers (*new desk accessories*) 29.

Hayden Software

✓DaVinci Buildings 29.

✓DaVinci Interiors 29.

✓DaVinci Landscapes 29.

✓DaVinci Building Blocks 46.

✓DaVinci Commercial Interiors 114.

✓Art Grabber with Body Shop 29.

Turbo Turtle 35.

I Know It's Here Somewhere 35.

MusicWorks 45.

Hayden:Speller 45.

Score Improvement System for the SAT 57.

VideoWorks 57.

Ensemble 155.

Hippopotamus Software

Hippo Computer Almanac 21.

✓Hippo-Lock (*file security program*) 68.

Hippo-C - Level 1 79.

Hippo-C - Level 2 219.

Human Edge Software

✓Mind Prober 26.

✓Communication Edge 99.

✓The Management Edge 127.

✓Sales Edge 129.

✓Negotiation Edge 149.

Ideaform

✓MacLabeler (*print disk labels*) 29.

Innovative Data Design

✓Paste-Ease (*requires MacPaint*) 35.

✓MacDraft (*requires 512k*) 139.

Kensington

✓Graphic Accents 29.

✓Type Fonts for Text 29.

✓Type Fonts for Headlines (*reqs. 512k*) 42.

Requires 512k.

Layered

✓Front Desk 77.

Linguist's Software

✓MacCyrillic 39.

✓SuperFrench/German/Spanish 39.

✓Tech (*1000 different symbols*) 59.

✓MacArabic 59.

✓MacKana/Basic Kanji 59.

✓MacKorean 59.

✓SuperGreek 59.

✓SuperHebrew 59.

✓SuperGreek/Hebrew/Phonetics 89.

Living Videotext

ThinkTank 128k\$75.

✓ThinkTank 512k 125.

Magnum

✓McPic - Volume I 28.

✓McPic - Volume II 28.

✓The Slide Show Magician 34.

Manhattan Graphics

✓Ready Set Go 2.0 (*requires 512k*) 65.

Mark of the Unicorn

Professional Composer (*reqs. 512k*) 249.

Microsoft

Entrepreneur 29.

Learning Multiplan and Chart 37.

Chart 72.

Logo 75.

Basic (*version 2.1*) 87.

Multiplan 107.

File 111.

Word 111.

Fortran 179.

Excel 225.

Business Pack 342.

Miles Computing

✓Mac the Knife - Volume 1 21.

✓Mac the Knife - Volume 2 25.

Mindscape

The Perfect Score: SAT 47.

Monogram

✓Forecast 40.

✓Dollars & Sense 81.

Nevins Microsystems

Turbocharger (*requires 512k*) 55.

New Canaan MicroCode

Mac Disk Catalog 25.

Northwest Analytical

NWA StatPak (*requires Basic, 512k*) 249.

Odesta

✓Helix (*requires 512k, external drive*) 219.

Organizational Development

✓Consultant (*idea management*) 119.

Paladin

✓Crunch (*requires 512k*) 165.

Palantir

✓MacType (*supports Dvorak keyboard*) 26.

✓MathFlash (*math flash card drills*) 26.

✓WordPlay 26.

Accounts Receivable (*requires Basic*) 69.

General Ledger (*requires Basic*) 69.

Inventory Control (*requires Basic*) 69.

inTouch (*communication to emulation*) 79.

PBI Software

✓Icon Switcher 14.

✓Icon Fun & Games Library 14.

✓Icon Business Library 14.

Peachtree

✓Back to Basics General Ledger 88.

✓Accounts Payable 88.

✓Accounts Receivable 88.

Protek-it Software

ProCopy/ProEdit 29.

ProVUE Development

✓OverVUE (*version 2.0*) 149.

QED Information Sciences

Typing Made Easy 36.

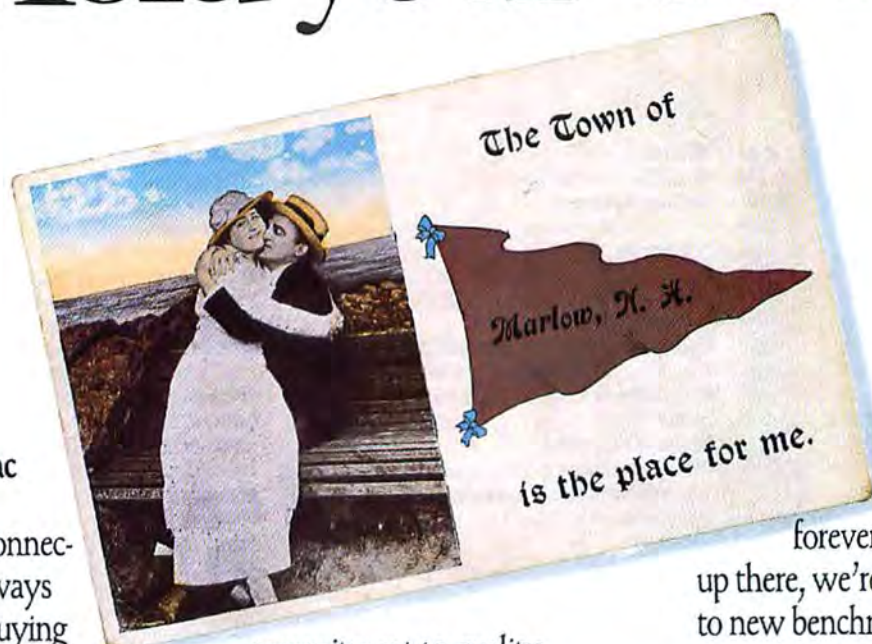
Reston Publishing

Construction Estimator (*reqs. Multiplan*) 45.

Rubicon Publishing

✓Dinner At Eight (*recipes to wines*) 35.

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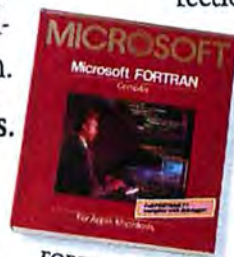
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Musical Wares

Jim Heid

At first the phrase computers and music sounds contradictory. The precise and logical ones-and-zeros world of computers seems directly opposed to the emotional, creative nature of music. The technicalities of music, however—its fixed number of beats per measure, the rigid rules of music notation, the fact that sound itself can be described mathematically—are well suited to a computer's unvarying precision. Computers can't replace the creative processes required to compose or perform music, but they can take over some of the technical functions and allow a musician to concentrate on creativity.

When it comes to music, the Macintosh can play a number of parts. As a scoring tool, or music processor, it simplifies the task of putting notes on paper. As a sequencer, it records the notes you enter and becomes a multitrack recording studio.

As a sound-wave editor, it controls tonal quality. Combine these three parts with an electronic synthesizer connected to the Mac, and you have a music laboratory that would have cost tens of thousands of dollars a few years ago.

Music History

The first music programs for the Macintosh, Hayden's *MusicWorks* and Great Wave Software's *ConcertWare*, are good introductions to computer music, but they have shortcomings (see "Roll Over Mozart," *Macworld*, June 1985). These programs don't generate certain elements of notation, such as beamed notes and triplets. More significantly, they play music using the Mac's built-in sound circuitry, which is limited to four simultaneous notes, or voices—sounds that would never be mistaken for an orchestra. In all, the software is excellent for beginners but is more suited to learning and experimenting than to serious musical applications.

Today Mac musicians can choose from nearly a dozen software and hardware products that are not only easy for beginning musicians to use but meet

professionals' notation and performance needs as well (see "They're Playing Our Song" in this issue for a review of *Professional Composer* and *Deluxe Music Construction Set*). Many of these products sound astoundingly good, thanks to their ability to control synthesizers through the Musical Instrument Digital Interface, or MIDI (see "The Music Link"). Play a piece through a MIDI-equipped synthesizer, and you'll never want to hear the Mac's four voices again.

After spending several enjoyable weeks working with some noteworthy products and annoying my neighbors with my musical experiments, I've seen that each product is suited to a particular kind of music application. I've developed some shopper's guidelines that will help you decide which products are best suited to your goals. "Music Makers," which shows the features provided by a selection of Macintosh music software, should help you choose the appropriate setup for you. Most developers are constantly enhancing their wares, so if an otherwise appealing program lacks a feature you want, a new version may provide it. Let's examine what Mac music products can do and what to look for when choosing your system.

Music Processors

It's said that Wolfgang Amadeus Mozart needed only a quill, some ink, and some parchment to compose his masterpieces. Those of us who are less musically blessed find putting notes on paper more of a chore than a creative process. But scoring programs, or *music processors*, make life easier for composers just as word processors liberate writers from correction fluid and overflowing wastebaskets.

With its mouse and crisp graphics, the Macintosh is well equipped for entering and editing musical notation. With most Mac music processors, you select notes, rests, and other music elements from a palette, then move them onto conventional musical staves (see Figure 1). Palettes often contain an eraser for removing notes and a pointer for selecting and inserting musical elements. The Clipboard lets you cut, copy, and paste portions of the score, making it easy to repeat passages. Music processors keep track of the number of

beats in each measure and automatically advance to the next measure when the current one is filled. Most music processors can also transpose all or part of a piece into other keys.

Some music processors simplify music entry by showing notes on a grid instead of on conventional staves. With this *proportional notation*, notes with a longer duration appear wider (see Figure 2). Proportional notation gives beginners a feel for the timing differences between various note values, but this form of notation has its drawbacks. If you're used to reading conventional music, proportional notation requires some getting used to. If you can't read music at all, proportional notation won't help you learn standard notation. An ideal compromise is a program that offers both notation forms.

Music processors provide a Play command for performing compositions. You can silence all but one voice to locate a sour note, and you can slow the tempo to a crawl or increase it to a frenzy. Some programs let you create a *concert document*, a list of pieces that are played in succession. Programs that play music through the Macintosh sound generator often provide a *waveform editor* (see Figure 3), which lets you alter the *harmonics* that govern a sound's tone quality, or timbre. Smooth-sounding instruments, such as flutes, have relatively simple harmonics compared to instruments like cymbals and drums. Waveform editors can also alter a sound's *envelope*, which determines the sound's percussive qualities. For example, notes played on plucked or hammered stringed instruments like guitars and pianos have a sharp attack, or initial phase,

and a gradual decay, or fade-out. Instruments like trombones have a more gradual attack and little decay—the note continues to sound at the same volume as long as the musician exhales with the same force.

What to Look For

Assessing your needs before shopping for a music processor will help you pick the most suitable program for you. First, evaluate your notation skills and requirements. Are you an experienced sight reader, or do you have to read notes using the old "every good boy does fine" memory jogger? Do you want to transcribe simple sheet music or complex pieces containing trills, changing time or key signatures, and dynamic markings? Do your compositions require lyrics, rehearsal marks, or above-the-staff guitar chord symbols with fret markings? Do you require tenor and alto clefs for horn arrangements?

Second, choose a program with a music-entry method that suits you. Some programs rely strictly on the mouse for entry and editing, while others let you enter notes from the Macintosh keyboard or a synthesizer keyboard. Some programs also provide an on-screen piano keyboard, which you click to enter notes (see Figure 4). Serious musicians will probably want to compose at a synthesizer keyboard; therefore, they should look for a program that can accept MIDI information from a synthesizer.

You should also assess your sheet music requirements. Do you want to print on an Imagewriter or a LaserWriter? Do you want descriptive headers and footers on each page? Do you want to include illustrations in the printed copy? Some music processors can create *MacPaint* files to which you can add lyrics and illustrations.

(continues on page 96)

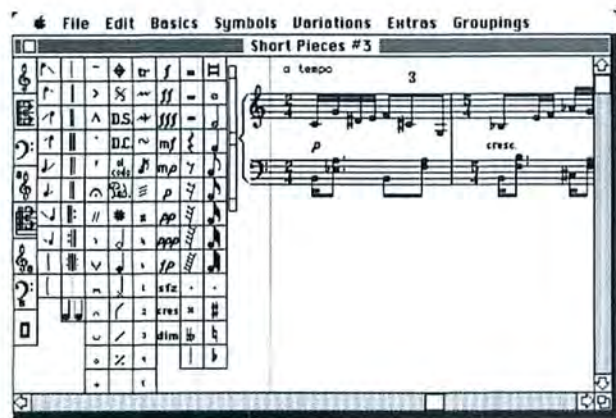


Figure 1

With most Macintosh music processors, you compose music by selecting notes, rests, and other music elements from a palette. The Clipboard lets you cut, copy, and paste portions of pieces, making it easy to repeat passages. Mark of the Unicorn's Professional Composer, shown here, offers more notation features than any other composition program but requires 512K and has few playback features.

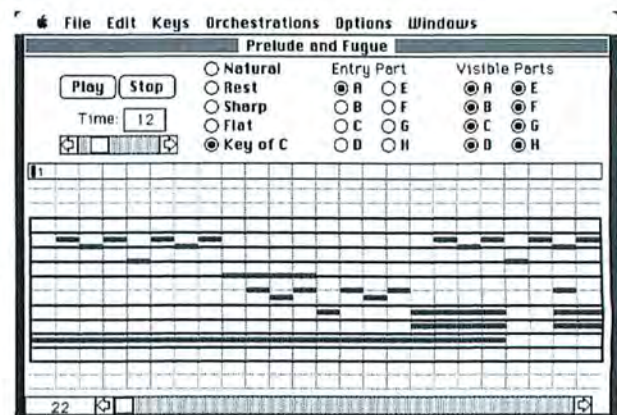


Figure 2

With proportional notation, longer notes appear wider. Creative Solutions' StudioMac offers proportional notation only, while Hayden's MusicWorks offers both proportional and standard notation. StudioMac, shown here, has several features designed for use with Casio's CZ-101 synthesizer, including the ability to store and retrieve CZ-101 sound settings.

The Music Link

One catalyst behind the increasing participation of computers in music is the Musical Instrument Digital Interface, or MIDI, a communications interface provided on virtually every synthesizer made today. Developed in 1982 by leading synthesizer manufacturers, MIDI provides a standard that allows products by different companies to communicate with each other. MIDI's original purpose was to allow a musician to control several synthesizers from one keyboard, rather than connecting a number of keyboard-equipped synthesizers, to produce multi-layered sounds. While MIDI wasn't specifically designed to link personal computers and synthesizers, it simplifies linking the microprocessors in synthesizers to their computer-cousins.

A network of MIDI instruments resembles a chain or a circle of people holding hands. The instruments can be keyboard synthesizers, drum or guitar synthesizers, or MIDI-equipped computers. Each component must have two connectors: MIDI Out and MIDI In. The MIDI Out connector sends digital signals from a controller, which can be a MIDI instrument or a computer, to other members of the network. The MIDI In connector receives incoming data. A component can also have a connector called MIDI Thru, which simply passes incoming information along to other devices in the network.

The MIDI standard provides for 16 channels. You can assign each channel to a specific synthesizer or synthesizer voice. If you record a sequence and assign it to channel 5, for example, only an instrument set to listen on channel 5 plays back the sequence. This feature enables MIDI networks to sound like orchestras. A drum synthesizer and a few keyboards can all play separate parts, provided each part is assigned its own channel. Upon receiving a command to play a note, each component determines if the command is intended for it by looking at the command's channel number. If the command is assigned to a different device, the message is passed along to other members of the network.

MIDI messages consist of two types: *channel messages*, which convey note information, and *system messages*, which control the settings of the synthesizers in the network. The Note On and Note Off channel messages are the lead performers of the MIDI system. When you press a key on a MIDI-equipped synthesizer, the synthesizer sends a Note On message indicating which key you've pressed. When you release the key, the synthesizer sends a Note Off message. These are the messages (among others) that sequencers record and play back.

MIDI information is transmitted at a relatively swift 31,250 bits per second—fast enough for chords to sound like chords, even though each note is sent and played separately. By contrast, the Macintosh transmits data to the Imagewriter at less

than 10,000 bits per second. The more devices installed in a MIDI network, however, the greater the chance that a perceptible time lag will occur. A MIDI *star adapter* solves that problem by structuring the network like a bicycle wheel, with the computer as the hub and each instrument radiating from it, instead of like a chain, in which signals must travel through each link to reach their destinations. Among the MIDI adapters available for the Macintosh, Musicworks' Mac MIDI Star and Southworth Systems' adapter are the only ones that structure MIDI networks in a star rather than a chain configuration.

Not all MIDI instruments make use of all existing MIDI characteristics. For example, if you play a touch-sensitive keyboard that is connected to a synthesizer that has no touch-sensing capabilities, the notes generated by the second synthesizer won't include the dynamics communicated by how hard the key is pressed. Before buying a synthesizer, you should be sure it provides the features you need for your compositions.

Copies of MIDI specification 1.0, which provides details on MIDI hardware connections and communications protocols, are available from the International MIDI Association, 11857 Hartsook St., North Hollywood, CA 91607, 818/505-8964.

(continued from page 94)

Finally, make sure that the program meets your playback requirements. Does the program use the Mac's internal synthesizer for playback, or can it control MIDI-equipped synthesizers? If the program offers both playback options, how easily can you switch between them? You might, for example, want to compose a piece at your desk and use the Mac for playback, then play the piece through a synthesizer later. If the program provides MIDI output, can it send MIDI messages to change the synthesizer's instrument settings during a performance? You might want to begin a piece with a flute, for example, then switch to a brass section for the dramatic parts. (Remember that your synthesizer must be capable of responding to the MIDI signals that change instrument settings.) If you have a synthesizer with an extensive MIDI command vocabulary, make sure the program you choose exploits its capabilities.

Synthesizers

Don't get the idea that synthesizers are huge machines resembling a cross between a telephone switchboard and an organ. Today, a few hundred dollars buys an instrument with sound-generating capabilities that

cost thousands of dollars not long ago. One such keyboard is Casio's remarkable CZ-101 (\$499), which crams a 49-key miniature keyboard, 16 preset instrument sounds, memory to store 16 sounds of your own design, and a MIDI interface into an under-10-pound package that runs on batteries. Other MIDI-equipped synthesizers that work with the Mac include Sequential Circuits' MAX (\$599), Korg's Poly 800 (\$800), Roland's JX-8P (\$1695), and Yamaha's DX-7 (\$1995). You can also spend a fortune on dazzlers like the \$7995 Emulator II from E-mu Systems, the \$12,000 Kurzweil 250, and New England Digital's Synclavier, which costs between \$40,000 and \$200,000 depending on the options you choose.

MIDI Adapters

You need more than music software to use a synthesizer with your Mac. A hardware device called a MIDI adapter allows the Macintosh to communicate with synthesizers that support the MIDI. At this writing, four MIDI adapters are available for the Mac: Assimilation's MIDI Conductor, the Mac MIDI Star from Musicworks (which should not be confused with Hayden's music program of the same name), Opcode Systems' MIDI Mac, and an adapter from Southworth Mu-

Music Makers

This table lists the features of ten Macintosh music programs. It should help you decide which program meets your needs.

	Deluxe Music Construction Set	Professional Composer	ConcertWare + Keyboard	ConcertWare + MIDI
Notation features				
Entry methods ²	1,2,3	1,2	1,2,4	1,2,4,5
Beamed notes	yes	yes	yes	yes
Triplets	yes	yes	yes	yes
Guitar chords	yes	no	no	no
Jazz notation	no	yes	no	no
Tenor and alto clefs	yes	yes	no	no
Lyrics	yes	yes	no	no
Transposition	yes	yes	yes	yes
Playback method ³	1,2	1	1	1,2
Waveform editing	no	no	yes	yes
Concert documents	no	no	no	no
Imagewriter printing	yes	yes	yes	yes
LaserWriter printing	yes	yes	yes	yes
Create MacPaint files	no	yes	yes	yes
Sequencing features				
Sequence transcription	—	— ⁴	yes	yes
Individual note editing	—	—	yes	yes
Transpose sequences	—	—	yes	yes
Punch in	—	—	no	no
Looping	—	—	no	no
Auto-correction	—	—	yes	yes
Memory requirements	128K	512K	128K	512K

sis Systems. Southworth Systems' MIDI adapter is designed to work only with the firm's *Total Music*, a sequencer and notation program, though a Southworth representative told me the unit also works with any software designed to work with Assimilation's adapter.

All four MIDI adapters connect to the Macintosh modem port and perform the same basic function: converting the high-speed flow of MIDI signals into a stream of information that the computer can use. Each adapter communicates with the Macintosh serial circuitry at a different speed. These speed differences don't affect the adapters' performance ability, since all the units can accurately respond to streams of notes faster than anyone can play. However, you must be sure that the MIDI software you intend to use can operate at the same speed as your MIDI adapter, or vice versa.

Opcode Systems' MIDI Mac takes a versatile approach to speed compatibility by providing a switch for changing the transmission speed. Musicworks' Mac MIDI Star operates at a fixed speed but includes a desk accessory that allows the adapter to work with any MIDI software. Assimilation's MIDI Conductor and Southworth's adapter operate at a fixed speed and include no compatibility software, making them the least flexible of the four. Overall, compatibility prob-

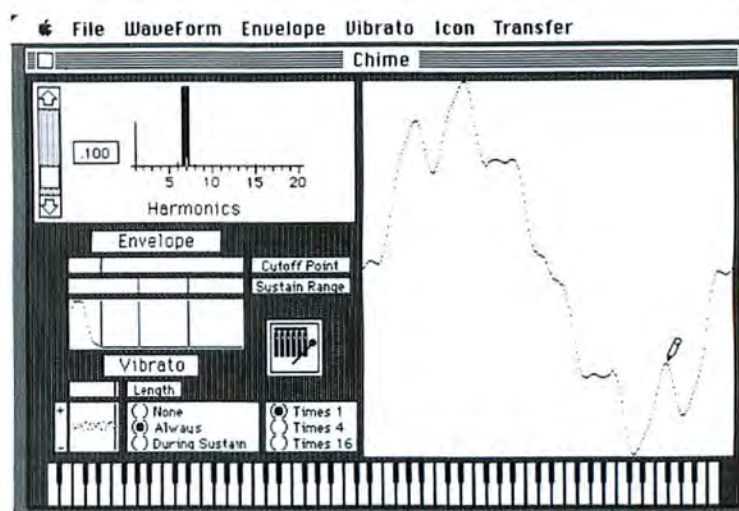


Figure 3

Programs that play music through the Macintosh sound generator often let you alter a sound's tonal qualities using a waveform editor. Great Wave Software's ConcertWare series offers waveform editors that produce remarkably good sound. Creative Solutions' StudioMac has a more limited waveform editor that doesn't permit envelope editing.

MusicWorks 512K ¹	Total Music	StudioMac	MIDI Mac	MegaTrack	MIDI Composer
1,2,3,5	1,5	1	5	5	5
yes	yes	no	—	—	—
yes	yes	no	—	—	—
no	no	no	—	—	—
no	no	no	—	—	—
yes	yes	no	—	—	—
yes	yes	yes	—	—	—
1,2	2	1,2	2	2	2
yes	no	yes	—	—	—
yes	yes	yes	—	—	—
yes	yes	no	—	—	—
yes	yes	no	—	—	—
yes	yes	no	—	—	—
yes	yes	—	no	no ⁵	no
yes	yes	—	no	no	no
yes	yes	—	yes	yes	no
yes	yes	—	yes	yes	no
yes	yes	—	yes	yes	no
yes	yes	—	yes	yes	no
512K	512K	128K	512K	128K	128K

¹This feature list is based on prerelease information from MacroMind, the developer of *MusicWorks 512K*.

²Entry method
 1. Mouse and palette
 2. Macintosh keyboard
 3. On-screen piano keyboard
 4. Kette Group's MacNifty keyboard
 5. MIDI instrument

³Playback method
 1. Macintosh speaker
 2. MIDI instrument

⁴*Professional Composer* has no sequencing features; however, *Professional Performer*, a companion product under development by Mark of the Unicorn, reportedly will have sequencing features.

⁵*MegaTrack* has no transcription features; however, a product called *MIDI Works*, also developed by Musicworks, translates documents between *MegaTrack* and *ConcertWare*, *MusicWorks*, and *Professional Composer*.

The Players

■ Music Software

ConcertWare + Keyboard, ConcertWare + MIDI

Great Wave Software
P.O. Box 5847
Stanford, CA 94305
415/325-2202
List price: ConcertWare +
Keyboard \$219.95 including
MacNifty keyboard, Concert-
Ware + MIDI \$139.95

Deluxe Music Construction Set

Electronic Arts
2755 Campus Dr.
San Mateo, CA 94403
415/571-7171
List price: \$50

MegaTrack

Musicworks
18 Haviland
Boston, MA 02115
617/266-2886
List price: \$150

MIDI Composer

Assimilation, Inc.
485 Alberto Way

Los Gatos, CA 95030
800/622-5464, 800/421-0243 in
California
List price: \$29

MusicWorks 512K

Hayden Software Co.
650 Suffolk St.
Lowell, MA 01854
800/343-1218
List price: to be announced

Professional Composer

Mark of the Unicorn, Inc.
222 Third St.
Cambridge, MA 02142
617/576-2760
List price: \$495

StudioMac

Creative Solutions, Inc.
4701 Randolph Rd. #12
Rockville, MD 20852
List price: \$125

Total Music

Southworth Music Systems, Inc.
Box 275, R.D. 1
Harvard, MA 01451
617/772-9471
List price: \$489 including MIDI
adapter

■ MIDI Adapters

Mac MIDI Star

Musicworks
18 Haviland
Boston, MA 02115
617/266-2886
List price: \$80

MIDI Conductor

Assimilation, Inc.
485 Alberto Way
Los Gatos, CA 95030
800/622-5464, 800/421-0243 in
California
List price: \$89

MIDI Mac

Opcode Systems
1040 Ramona
Palo Alto, CA 94301
415/321-8977
List price: \$150

Total Music

Southworth Music Systems, Inc.
Box 275, R.D. 1
Harvard, MA 01451
617/772-9471
List price: \$489 including
sequencing and notation
software

lems should be the exception rather than the rule; besides the compatibility measures taken by Opcode and Musicworks, many MIDI programs have dialog boxes that let you specify the speed of the adapter.

Recording Studio on a Disk

In addition to MIDI adapter hardware, you need a special program called a *sequencer* to use a synthesizer with the Macintosh. Many music programs include sequencers (see "Music Makers" for details). Sequencer software turns the Mac into a "tapeless tape deck" that stores a stream of MIDI information in memory as it is entered from a synthesizer. You can play back the performance by instructing the sequencer to send the stored MIDI data back to the synthesizer. To record a composition, you put the sequencer into record mode, then begin playing a MIDI-equipped synthesizer. The synthesizer sends MIDI signals to the sequencer for each note you play, and the sequencer stores them in the Mac's memory. When

you finish recording, the sequencer can play back your performance by sending MIDI signals to the synthesizer.

Even more exciting is a sequencer's ability to record more than one track to create a complete arrangement. For example, you can tell the sequencer to play your first track while you record on a second. When you finish, you can play both tracks or add more. Classical pianists can record complex pieces such as fugues with the left hand's part on one track and the right hand's part on a second. Jazz, blues, or rock musicians can have even more fun, recording a bass line on one track, chords on a second, and improvised solos on a third. Arrangers can save hours of studio time (and thousands of dollars) by working out the details of an arrangement on a sequencer and a few synthesizers, then taking everything into the recording studio and recording the finished piece perfectly on the first take.

Unlike an audio recording, a sequenced performance suffers no loss in sound quality as you add tracks. Every playback is an original performance, since the sequencer simply records and plays your key-

strokes, not the actual sounds of the synthesizer. That important distinction gives sequencers other advantages over audio recording. You can change the sound of the performance by altering your synthesizer settings before or during playback. If you want to hear what a piano solo sounds like coming from a tuba, push a button on your synthesizer. And if you upgrade to a better-sounding synthesizer, your recorded sequences will sound better, too.

Many sequencers go beyond simple recording and playback by providing features that let you alter recorded tracks. One such feature is *transposition*—the ability to change the key signature of recorded tracks. *Auto-correction* corrects timing errors by rounding off the notes in a track to the nearest sixteenth note or to other note values. *Looping* lets you repeat one or more tracks endlessly. You can record the bass line and chords for a single verse of a song, loop them, and play them while recording melody lines and solos on other tracks. Perhaps the most useful sequencer feature is *punch in*, which lets you play a track until you reach an error and then switch to record mode so you can rerecord the passage correctly. Many sequencers can also increase or decrease the tempo of a performance.

Of Tracks and Voices

The number of tracks you can record and play with a sequencer depends on several factors. One is the amount of memory available for storing sequences; a 128K Macintosh stores fewer tracks than a 512K machine. The exact number depends on the program you use and the music you record. Since each note requires two MIDI signals, one when a key is pressed and another when it's released, sequences containing more notes occupy more memory.

The factor that most influences the number of tracks you can play back has nothing to do with the sequencer but concerns the number of voices your synthesizer can play. With a six-voice synthesizer, you can record and play six single-voice tracks. If you play three- and four-note chords, however, you're limited to two or three tracks. You can record more, but your playback results will be disappointing because the synthesizer drops any notes exceeding its voice limit.

The way to increase the number of voices, undoubtedly to the delight of synthesizer manufacturers, is to add more synthesizers. Since MIDI lets you chain multiple instruments together, you can add voices to your electronic band by adding more instruments. You then assign each instrument its own MIDI channel for receiving and sending MIDI signals and assign each track in a sequence to a specific channel. Most sequencers can record dozens or even hundreds of tracks, so when it comes to synthesizer voices, the phrase "the more, the merrier" applies.

Settling the Score

Which music product is best for you? Notation-oriented programs like *Professional Composer*, *ConcertWare +*, and *Deluxe Music Construction Set*

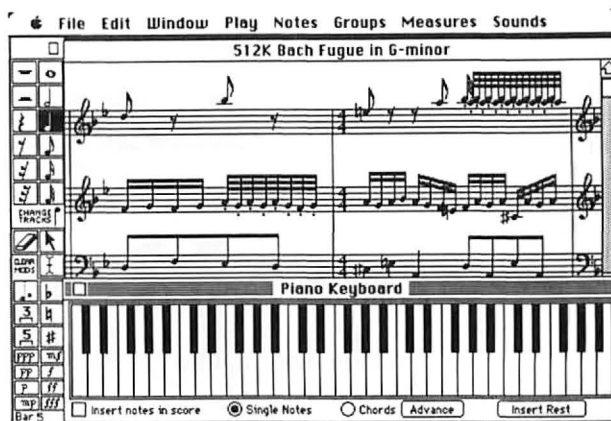


Figure 4

Some composition programs rely strictly on the mouse for entering and editing music, while others let you enter notes from the Macintosh keyboard or a synthesizer keyboard. Electronic Arts' *Deluxe Music Construction Set*, shown here, provides an on-screen piano keyboard on which you enter notes.

are best for people who want to compose sheet music or transcribe existing pieces. Sequencing programs like *MegaTrack*, *ConcertWare + MIDI*, and *Total Music* are more suited to musicians who want to record performances as they play them and build their own arrangements by playing and recording new parts.

I'd like to conclude with a few philosophical comments. Mac music software can be used in a number of ways, depending on a musician's needs and level of expertise. You might compose a symphony for synthesizers or simply enter a Bach cantata into a music processor and play it back on the Mac. Some critics say that transcribing and playing a piece of sheet music can't be called making music any more than typing a passage out of a book can be called writing. Technically, they're correct. Nevertheless, involving yourself in the musical process, even if only to transcribe sheet music, is a learning experience that will increase your musical appreciation far more than will dropping an album onto a phonograph. What's more, some people look down their noses at sequencers, claiming that sequencers' ability to control and play multiple synthesizers will force musicians into bread lines. I disagree. Without creative minds to record and program each track, sequencers are no more than floppy disks. The introduction of personal computers into music doesn't supplant human creativity, but rather supplements and encourages it by simplifying tedious tasks and allowing amateurs access to technology that previously only professionals could afford. Inexpensive music hardware and software open the door to an increased appreciation of music and to new possibilities for creative expression. □

■■■■■■■■■■ Jim Heid is a
Contributing Editor of Macworld.

Lighting a Path to the Future

Ted Nace

With the advent of optical disk drives for personal computers, lasers continue their march into new technological fronts. This new storage technology promises not only to augment present-day storage capabilities but to alter the nature of computing itself. Several examples from current research show the potential of optical disks to combine the traditional media of video, audio, and data into a single, interactive supermedium.

At the EPCOT exhibit at Disney World in Orlando, Florida, a child designs a roller coaster using a computer with a touch-screen display. As though she were playing with a toy construction set, she puts together turns, loops, and other components in her own unique configuration. But this game has an additional feature like no other. When the child has put the pieces together, she gets to take a test ride on her personal roller coaster, experiencing all the gut-wrenching ups and downs that full-speed, high-resolution graphics can provide.

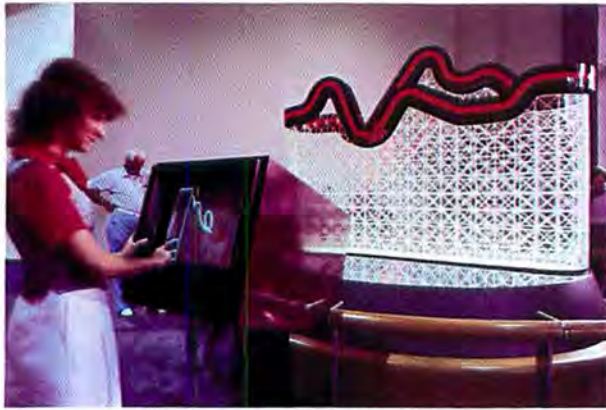
To date, such sophisticated applications have been unavailable for personal computers because of

the prodigious amounts of data storage the programs require. A single frame of animation or video on the Macintosh's 512- by 342-pixel screen requires 22 kilobytes of memory. Full-motion animation or video requires 1800 frames per minute, well beyond a floppy disk's capacity of several hundred kilobytes and even beyond a hard disk's capacity of tens of megabytes. But animated graphics and video are within the range of new data storage technologies that use a laser beam to read, and in some cases to record, information on *optical disks*. Depending on the size of the disk and the method of storage, these shiny platters can store amazing quantities of data (see "Optical Storage Techniques"). A typical 5¼-inch optical disk holds 550 megabytes of data; an 11-inch optical disk can hold as much as 4000 megabytes.

Optical storage has been available for nearly a decade but has been far too costly for the average personal computer owner. Optical disks for personal computers have recently become comparatively inexpensive as a result of the mass production of audio compact disks (see "When Technologies Collide").

The first optical disks available for personal computers are prerecorded, nonerasable CD ROMs (compact disk read-only memories). Like floppy disks, CD ROMs can be removed from the disk drive, and they





Drawn by a sleek model of a roller coaster, visitors at the EP-COT Center encounter computers with optical disks that allow thrill seekers to custom design a wild ride—and then hop on board for a simulated whirl.

are more durable than magnetic media. Like phonograph records, however, they can't be erased or recorded on. You can currently buy the catalog of the Library of Congress on a CD ROM. The catalog, including a CD ROM drive for an IBM Personal Computer, sells for about \$2200.

According to industry observers, by the end of the decade other types of optical disks will be available, including erasable disks and disks that can be written on once but not erased. Les Cowan of Edward Rothchild Consultants, a research firm that monitors the optical disk industry, projects that erasable disks will be available in 1987 or 1988. Cowan says there's no reason why Macintosh owners shouldn't be able to take advantage of erasable disks, as long as Apple provides the necessary hardware and software to attach the new drives.

Interactive video disk applications are already available for the Macintosh. Strictly speaking, interactive video cannot be classified with other optical disk applications because it uses laser disks to store only video images and not computer data. However, companies producing interactive video applications point the way to the future, when optical storage techniques will permit the combination of different media into a single, interactive supermedium. One such company, EduDisc, located in Nashville, Tennessee, sells a software development shell that lets universities and other institutions produce educational programs for the Mac that combine text, graphics, and video segments. Mike Moore, president of EduDisc, believes that when optical disk drives become available for the Mac, developing optical disk applications will be a likely outgrowth of his company's current efforts.

Adapting these new storage technologies to personal computers has required a number of engineering innovations, but the potential profits are high enough to lure many American, Japanese, and European firms—58 by the latest count—into the race to pro-

duce optical disk drives. Personal computers, however, must be modified before they can take advantage of all the benefits of optical mass storage. For example, animated applications require specialized chips, like the animation chip found on the Commodore Amiga, to enable personal computers to transmit images to the screen at a rapid rate.

Information Mansions

Despite the engineering hurdles that must be cleared before optical disks become commonplace, technology may ultimately prove to be less of a barrier to the deployment of optical disks than the limits of our own imaginations. What do you do with a gigabyte—1000 megabytes—of storage anyway? Even if you stored every program and file you own on a single optical disk, you'd still fill only a fraction of it.

With the advent of optical disks, software developers will certainly increase the size of the programs they design. Like cramped apartment dwellers who suddenly inherit spacious mansions, developers will enjoy the luxury of creating well-furnished programs. A word processing program, for example, might include a dictionary, a thesaurus, an elaborate help facility, and the complete documentation on a single disk—and still leave ample room for documents and other programs.

Beyond increasing the size and flexibility of software, optical storage may create a significant new option by enabling companies to offer large databases directly to personal computer owners. Such databases are available currently only from information services, such as Dialog and Nexus, which maintain the information on mainframe computers with banks of hard disks and allow subscribers to conduct searches and download information over the phone. Because of the unreliability and costliness of phone access, such services have not to date reached a wide audience. With optical disks, however, subscribers to a particular service could receive an entire library—for example, a database of medical journals—on a disk.

Encyclopedias, technical compendia, and other types of large reference works may also be made available on optical disks. Besides being less expensive than printed books, these optical disk reference materials will permit people to take advantage of computerized search techniques, such as searching by key words or phrases.

Optical Archives

In the office, optical disks may reduce paper buildup by enabling corporations to replace bulky paper files with facsimile storage systems that use optical disk drives. Facsimile systems have already been introduced in Japan, where most business letters and memoranda are still written by hand in kanji characters. Offices using facsimile storage systems digitize paper documents with a scanner and then store them on a nonerasable optical disk. Paper copies can be printed on a laser printer.

(continues on page 104)

Optical Storage Techniques

Like engineers everywhere, the developers of optical storage technologies are as prolific with new acronyms as they are with patents. While the blizzard of terms can be a bit bewildering, optical disk storage methods boil down to three main categories: prerecorded disks, disks that a drive can write on but not erase, and erasable disks. Each method has its own advantages and disadvantages, and each is adapted to specific applications.

OROM and CD ROM

The method used to produce audio compact disks (CDs) involves pressing an entire disk at once, including the tiny pits that hold the digital information. Since the pressing must be done in a factory, such disks cannot be recorded on by personal computers. When this type of optical disk is manufactured for personal computer applications, it is known as an OROM, for *optical read-only memory*, or a CD ROM, for *compact disk read-only memory*.

The main advantage of CD ROMs is economy. By using parts from audio compact disks and low-cost hard disk drives, manufacturers can build relatively inexpensive optical drives. An additional advantage to CD ROMs is that all manufacturers to date have agreed on the same storage format, which holds about 550 megabytes on a 5¼-inch disk. The big disadvantage of CD ROMs is slow access time. In contrast to an

average time of 70 to 90 milliseconds (thousandths of a second) for a hard disk, CD ROMs average about 1 second. That time can be shortened in higher-performance drives but not without increasing production costs. CD ROMs can be used for software but will probably be used chiefly to distribute large collections of data, such as encyclopedias or yellow pages.

WORM and DRAW

Write once, read many times (WORM) and *direct read after write* (DRAW) both refer to optical disk drives that can write information onto a disk but can't erase it. In such drives a high-intensity laser creates tiny pits or bubbles on the disk, which are then read by a lower-intensity laser.

Like CD ROMs, WORM disks can be removed from the drive, allowing the economical storage of large databases. But disk drives find information more quickly than CD ROMs and let you store new information on disk.

Rather than being a drawback, the lack of erasability of CD ROM and WORM disks can be an advantage. A WORM disk containing bank records, for example, provides an indestructible audit trail, making WORM disks ideally suited to facsimile storage systems in offices.

Erasable Disks

Although both CD ROM and WORM technologies are now commercially available, erasable optical disks won't enter

the marketplace until late 1986 or 1987. Since it's impossible to erase a disk once it has been pitted by a laser, erasable disk manufacturers will have to use a variation of this technology. One way of making an optical disk erasable is by using magnetic materials that become shiny or dull under the influence of a laser. A more promising technique, known as optically assisted magnetic recording, involves the use of a laser to heat a small spot on a disk, changing that spot's magnetic charge. Differences in charge can be detected because they alter the optical properties of lasers reflected off the spots. This technique packs information densely on a disk, because it creates a magnetic field that is perpendicular to, rather than in the same plane as, the disk.

Unlike other types of optical storage, erasable disks have the potential to replace hard disks. Erasable optical disks should have a few advantages over hard disks. First, a laser doesn't have to be positioned as close to a disk as a magnetic head does, eliminating the danger of losing data as a result of a head crash. The less sensitive head position also allows the use of removable disks, which lower storage costs and permit expansion. Finally, the elimination of head crashes makes optical disks more suitable than hard disks for portable computers.

(continued from page 102)

Facsimile document storage systems, including scanner, computer, optical disk, and laser printer, sell in Japan for about \$20,000. Besides saving space, the systems can find and reproduce files quickly and inexpensively. With today's paper file systems, for example, a Freedom of Information Act request for Environmental Protection Agency files on a toxic waste dump might easily necessitate photocopying several thousand pieces of paper. You'd need a truck to haul it home. In the future, your FOI request might be answered by a thin package containing an optical disk.

New Horizons

The optical disk applications mentioned so far augment existing applications and hardware by adding a new degree of convenience. While the benefits of storing multitudes of programs on a single disk, squeezing reference books inside portable computers, or shrinking file cabinets to the size of a small platter are significant, such applications don't radically change the way we use personal computers.

But the availability of extraordinary amounts of inexpensive storage has consequences that go beyond merely increasing the number of documents and programs a single disk can hold; it promises to change the kind of information a computer stores and displays. To the static text, numbers, and graphics of today will be added something new: full-motion video, animated

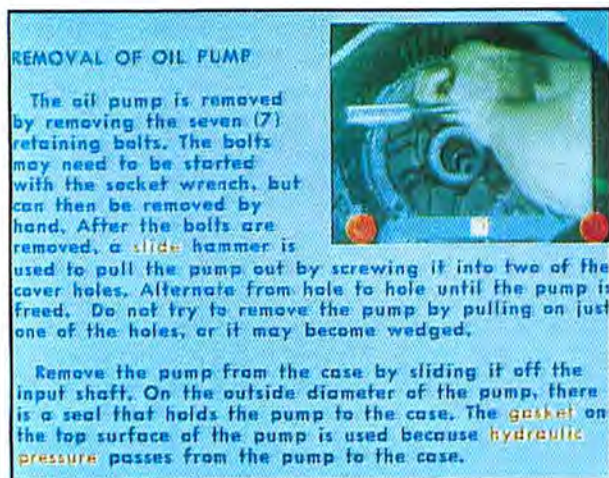
graphics, and high-fidelity audio. The new visual and aural elements will create entirely new applications and transform how traditional applications are approached.

At the Massachusetts Institute of Technology (MIT), for example, an experimental system developed by the Architecture Machine Group demonstrates a new type of program that might be called

To the static text, numbers, and graphics of today's computers will be added video, animation, and high-fidelity audio.

"multimedia software." Such applications involve more than the simple addition of an illustration to text. By combining existing media, the computer can create a whole that is greater than the sum of its parts. The MIT system is an on-screen book about how to fix an automobile transmission. Although the book appears on a computer display, it has a familiar format—text accompanied by photos. By touching an icon, an automotive trainee can flip through the pages quickly or one at a time, just as with a paper book.

But the computerized book does more than mimic the features of a real book. When the trainee touches any of the pictures, the image springs to life as



The Movie Manual lets apprentice auto mechanics learn by viewing; they can zoom in on details of an illustration or request a video demonstration of a specific technique. Students control the self-paced instruction; they turn "pages" by stroking the corner of the screen, can mark pages with dog-ears, and can even scribble notes and make quick sketches in the margins.



MIT researchers devised the Aspen Movie Map to allow strangers in other cities to "drive" through the streets of Aspen, Colorado, as in driver training simulations of yore, and get to know Aspen like the back of their hand. In a twist you won't remember from high school drivers' ed, you can turn a corner to explore wherever you want.

When Technologies Collide

The personal computer has suddenly become the focal point of a rapid convergence of technologies developed in the computer, video, and music industries. The differences in approach go all the way down to spelling: it's an optical *disc* to video and audio buffs, a *disk* to the computer world.

Optical disk research started in the late 1960s, pioneered by the Belgian company N. V. Philips. Once optical disks left the laboratory in the late 1970s, they gravitated toward three main areas. In the computer industry optical disks first became expensive data storage peripherals used mainly in specialized applications, such as on-line library systems, or "jukeboxes," storing as much as 80,000 megabytes of information for mainframes. In the video industry, videodisk systems have been used primarily for interactive training and retail sales displays.

The first mass market incarnation of the optical disk came recently, with the introduction of the audio compact disk (CD), used for storing high-fidelity music. Since its commercial introduction in early 1984, the compact disk has succeeded dramatically. As a consequence, manufacturers have been able to mass-produce disks and players, which have dropped in price from \$1000 to \$200.

The popularity of audio compact disks has resulted in an unexpected technological windfall for the personal computer industry. By using the same media and adapting a large number of parts from compact disk players, manufacturers can now produce optical disk drives for computers much less expensively than was previously thought possible.

But along with progress has come confusion, stemming from the fact that the basic technology of recording data onto a disk with a laser is fragmented among two major for-

mats and several storage techniques. Videodisks use an analog method, which provides an efficient means for storing the elaborate motion captured in television sequences. Optical disks in the computer and audio industries use a digital method. To complicate matters further, techniques exist for recording digital information on an analog videodisk and vice versa. For example, the *Aspen Movie Map* uses a videodisk, but each video frame also contains digital data that enables viewers to choose different sections of the map.

Finally, although all read-only compact disk manufacturers currently follow a spiral format introduced by Philips, some industry observers speculate that IBM may confuse the situation by introducing an optical disk with a concentric format.

a full-motion video segment. A picture of a mechanic tightening a bolt suddenly starts to move, demonstrating exactly how to perform a particular job. The trainee can watch the sequence at regular speed or in slow motion, zoom in on a particular part of the picture, and even reverse the action. The book is possible because it uses an optical disk to store the large quantities of data necessary for pictures, text, and video.

In the Driver's Seat

The biggest difference between traditional media and the new media made possible by optical disks is that the latter let you actively participate in the activity that you see and hear. Optical disk systems enable you to choose the sequence and pace of viewing, decide whether to get information in video or text form, or

zoom in on parts of a video frame. In contrast to the passivity of television and movies, you can, in effect, simultaneously direct and view your own movie.

Another MIT project demonstrates the interactive potential of optical disks. A man sitting at a computer display takes a drive through the ski resort of Aspen, Colorado. He's not hallucinating—he's experiencing a bit of "virtual reality" in the form of an interactive video program called the *Aspen Movie Map*. The *Movie Map* mimics an actual drive through Aspen in full-motion video. Turning corners at will, the man explores all the streets in the town. When he adjusts a dial, the scene shifts from summer to winter. Curious to learn about a particular building, he touches it, and a voice tells him about the business located at that site. Later, when the man goes to Aspen for the first time, he is already familiar with the town and can easily get around without a map.

The Face of the Future

These examples from current research are only the first steps toward taking advantage of optical disks, like the two-minute films of train crashes that were the precursors of the movie industry. Prior to World War I, no one could have imagined *Citizen Kane* or *Beverly Hills Cop*. Similarly, the ultimate dimensions of the in-

◆◆◆◆◆ *These first steps are like the two-minute films of train crashes that were the precursors of the movies.*

teractive, mixed media made possible by optical disks are only suggested by today's prototypes. In the future the spread of this technology will likely usher in entirely new forms of expression and information exchange—new ways to work and play.

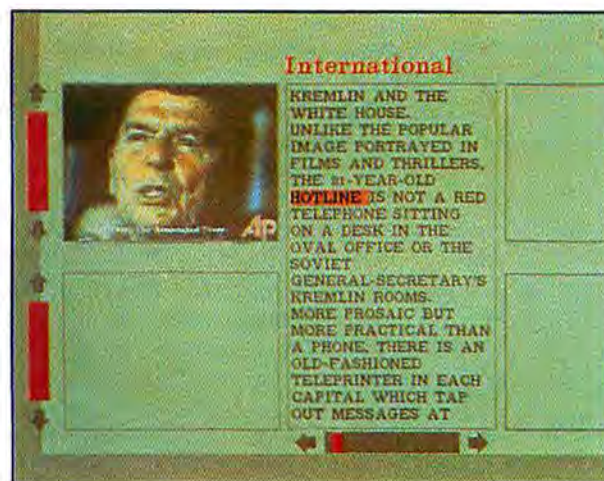
Another project using optical storage and devised at MIT, appropriately called *NewsPeek*, is like a combination of a weekly news magazine and an old-time newsreel. When you start *NewsPeek*, you see a "front page" of headlines. As with a newspaper, you then choose which stories to explore. Touching the headline on the screen reveals either a brief abstract of the story, the complete text, or a video segment.

The user interface in *NewsPeek* is not a desktop but a newspaper. The immense capacities of optical disks may force researchers to look past the desktop used in the Macintosh for a new way to guide people through complex programs and unprecedented quantities of information. A future database, for example, might be presented on screen as a city. When you turn on the computer, you find yourself on a street among different buildings, each containing a specialized library. In the corner of the screen might appear a map of the entire city. To enter a particular part of the database, you find the building of your choice and go inside, then either look up the item in a catalog, asking a "librarian" (a help screen) for assistance, or browse through the stacks. Cities, newspapers, and libraries employ organizational systems we all know.

Speculations about the degree to which optical disk storage will change the nature of computing must be tempered by an understanding of the current limits of the technology. In the immediate future, the relative

slowness of optical disks will inhibit their practical value. For example, it takes about 1 second for a CD ROM to retrieve information, compared with the 70 to 90 milliseconds it takes a hard disk to accomplish the same task. Engineers can find ways to speed up CD ROMs, but then the cost of the drive rises.

Even in the long run, optical disks, like magnetic disks before them, must run up against inherent physical limitations because infinite storage is as infeasible as perpetual motion. At first glance the storage limits of the optical disk may seem a farfetched concern, considering that the technology, which is still in its in-



MIT's NewsPeek mimics a weekly news magazine, with items compiled from the Nexis database and illustrations culled from TV broadcasts. You touch the screen to turn pages, to read more detail on a story, or to view a video segment that illustrates what's in the headline.

fancy, has already made it possible to put 4000 megabytes on a single 11-inch platter. But animation and video gobble up storage amazingly fast. Although a 550-megabyte CD ROM can hold five encyclopedias, it can store only about 12 minutes of full-motion video. Software developers who wish to incorporate video sequences in their programs may have to find efficient ways of compressing video information or simply use it sparingly.

Still, the means are now arriving to begin the great blending of media. Someday soon, upon powering up your computer, you may be confronted by a person's face—perhaps the face of your mother—telling you that you need to insert a system disk before proceeding. What more familiar user interface... than a human face? □

◆◆◆◆◆ *Ted Nace is a freelance writer based in Berkeley, California.*

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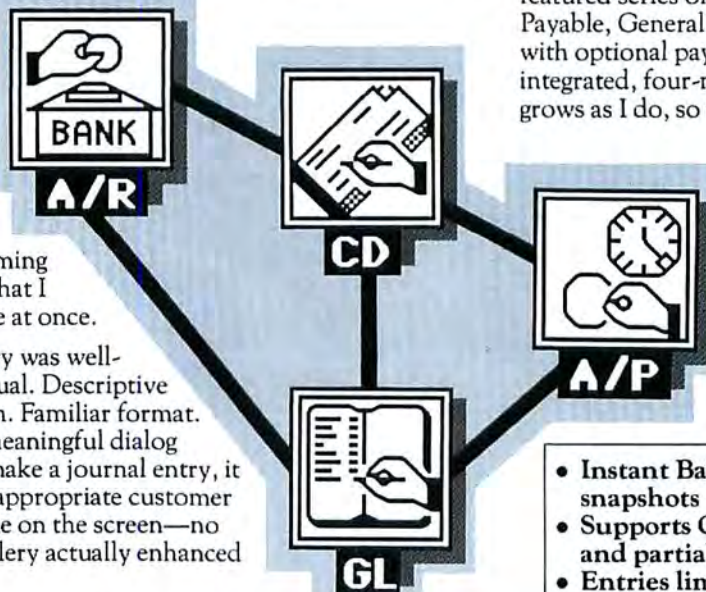
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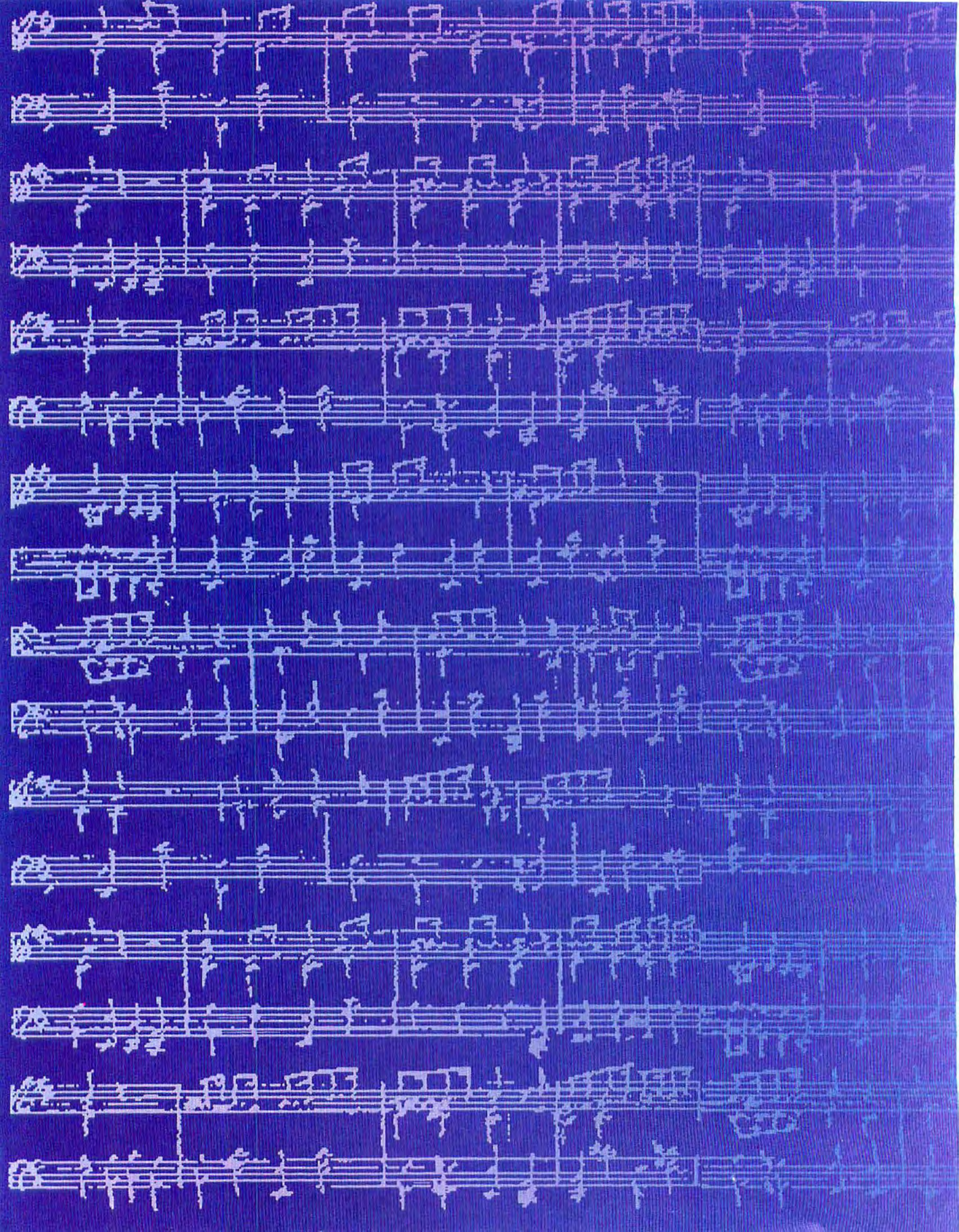


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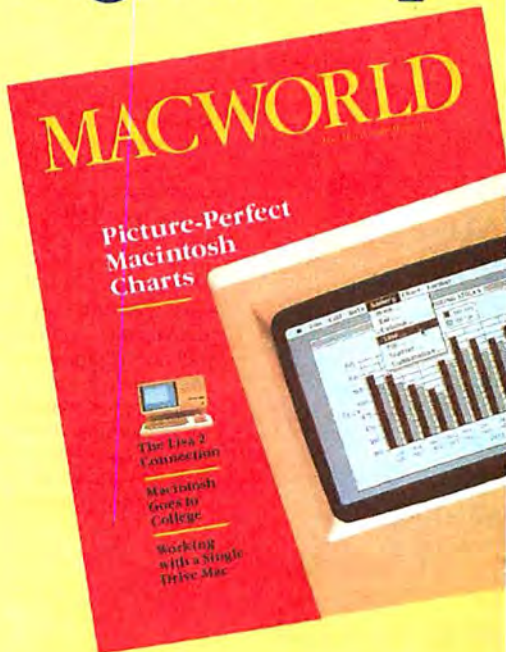
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They're Playing Our Song

Rob Swigart

Even in this day of \$95 Casio keyboards and multimillion-dollar recording studios on the Côte d'Azur, most music is still written by hand. People still sit in front of a piano keyboard, holding a pencil and facing empty staves on sheets of paper.

The situation may slowly be changing, though. Because written music consists of visual symbols, it is difficult and awkward to process through pre-Macintosh personal computers, which were originally designed to deal with letters and numbers. But software for the Macintosh is now available that offers the features serious composers need to write music and produce scores that conform to standards of musical notation.

Writing a musical score is a complex task. By placing symbols on a staff of five horizontal lines, you indicate which musical tones are to be played, for how long, and in what manner. Aside from notes, rests, and accidentals, the symbols include verbal and other visual elements to indicate the phrasing, volume, and inflection of a musical passage.

A program that helps with the task of writing music must do more than let you enter notes on a staff. It should offer you the means to edit the music. In addition to cutting or copying and then pasting passages, serious music composition software should allow you to set dynamics, transpose notes up or down the scale, change the key or time signature of sections of music or of a whole piece, and indicate special instructions

Figure 1

Deluxe Music Construction Set's *Score Setup* window gives you control over the written music's appearance on screen and on paper, as well as over the score's general characteristics.

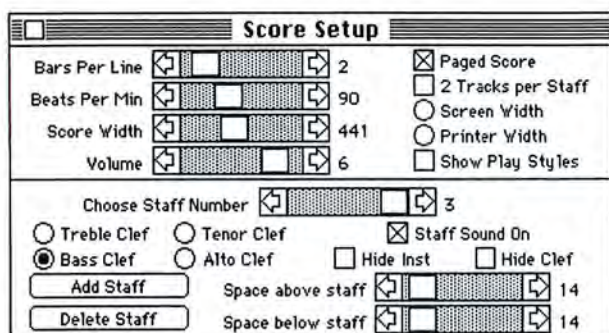


Figure 2

Professional Composer's *Symbols* menu allows you to display or hide up to nine palettes of notes, rests, dynamics, and other symbols, including jazz notes. Clicking a symbol places it on the staff at the location of the insertion marker.

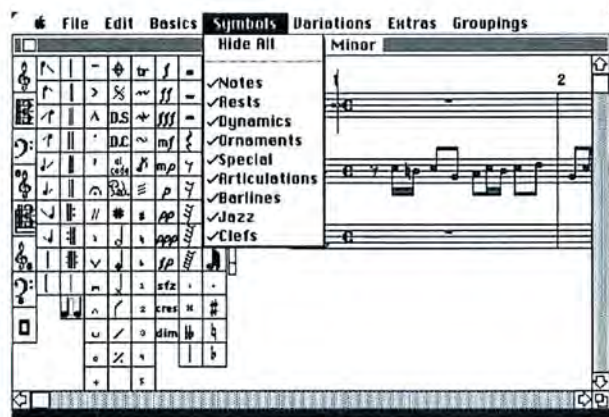
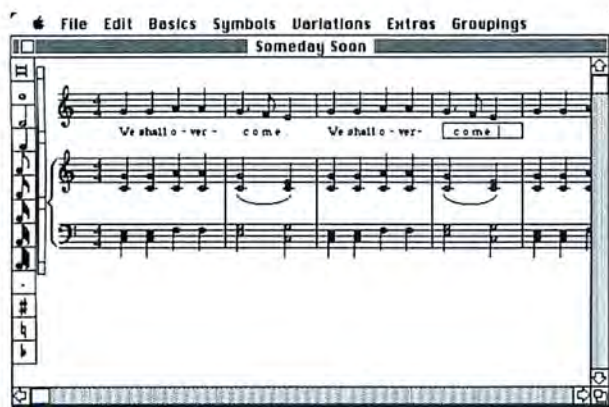


Figure 3

Typing lyrics onto a Professional Composer score is simplified by the *Insert Text* command, which starts a text box at the insertion marker. The box expands as you type and jumps to the next measure when you type *Shift-Tab*.



such as first and second endings. The software should let you play back the music you write to allow the ear to catch what the eye has missed, make aesthetic decisions about the look of the music on paper, and finally print a score that can be played by any trained musician.

Overture

Professional Composer version 2.0 from Mark of the Unicorn and *Deluxe Music Construction Set* from Electronic Arts offer similarly sophisticated features but at widely different prices. Both Macintosh programs let you enter and edit basic musical notation. Both can transpose music from one key to another and indicate how a piece or a passage should be played.

But at \$495 *Professional Composer* aims at the high end of the music market: the black-tie-and-tails set of musicians who write orchestral arrangements. With a \$49.95 sticker price and only slightly less powerful features, *Deluxe Music Construction Set* plays to the entire market. *Professional Composer*'s major advantage is that it allows a composer to write on up to 40 staves at a time compared to the 8 that *Construction Set* offers. While *Construction Set* has flexible—even delightful—playback features and adequate printing, *Professional Composer* is geared less toward playing back music on the Macintosh and more toward producing near-typeset-quality scores on the LaserWriter. *Professional Composer*'s designers slanted the program toward the advanced composer who doesn't need to hear the notes to know what the written music sounds like. *Deluxe Music Construction Set*, on the other hand, seems to have been designed to use the Mac as much as a playback instrument as a composing tool. *Professional Composer* requires a 512K Mac. *Deluxe Music Construction Set* runs, although slowly, on a 128K Mac but works best with 512K.

First Movement

Creating a music manuscript, or score, involves setting up each staff with the correct clef and setting the key and time signatures. In different ways, *Professional Composer* and *Deluxe Music Construction Set* simplify those mechanics.

You operate *Professional Composer* largely with pull-down menus and dialog boxes to set up staves and set time and key signatures. When the program opens a new score, the first screen you see is a dialog box asking the kind of staves you want—single, piano, piano-vocal, or multiple.

Deluxe Music Construction Set has a *Score Setup* window, selected from the *Windows* menu, that gives you control over the score's appearance and functions, including the number of staves, their clefs, the number of measures per line of printed score, the width of the score, and which staves are heard during playback (see Figure 1). *Deluxe Music Construction Set* limits a score to eight staves, sufficient for small groups or a single section of instruments in an orchestra. The string quartet version of *Eine kleine*

Nachtmusik can be rendered very well on *Construction Set*, for example, but scoring larger works can create problems. For instance, Beethoven scored the fourth movement of the Eroica symphony on 15 staves, including woodwinds, horns, timpani, and strings. You would have to break a work like that into three sections on *Construction Set*. On the other hand, with its ceiling of 40 staves *Professional Composer* handles large scores with ease.

The next task is entering single notes, chords, rests, and accidentals. The two programs differ greatly in the way they handle the job.

Professional Composer offers two ways of entering notation: from the Macintosh keyboard or from nine on-screen palettes. With the Symbols menu you can make available any or all of the palettes, including jazz notes and dynamic marks (see Figure 2).

A keyboard template of tones, notes, rests, accidentals, bar lines, and spaces—plus cursor control keys—allows typing directly onto the score, although the arrangement of the keys takes some getting used to. A vertical bar crossed by a short, thick horizontal bar marks the insertion point, which you position with the cursor keys or the mouse. You enter a note or other symbol by clicking on the appropriate notation on the palette. Even after you figure out the keyboard template, you can enter only notes, rests, and accidentals through the keyboard.

Once you enter a note at a certain tone, the only way to make a change is to delete the note and start again. I found it even more cumbersome to have to click twice, once on the insertion bar to set the tone and a second time on the note palette, each time I entered a note whose tone or duration differed from the previous note's.

Consistent with its design for the demanding musician, *Professional Composer* does not automatically calculate meter. To check a score for correct time, the Check Rhythm command on the Extras menu highlights incorrect measures. You then correct the measure yourself, if you desire. The program assumes that you would know how to make the correction or that you would have a good reason for not doing so.

Deluxe Music Construction Set also offers two ways of entering music: by clicking on a piano keyboard display or by selecting from a palette of notes, rests, accidentals, and tools such as a selection arrow and an eraser.

When you enter notes from the on-screen piano keyboard, *Deluxe Music Construction Set* gives you the choice of entering individual notes or chords. You set note and rest duration using the number keys on the Macintosh keyboard. Pressing 1 selects a whole note, for example, while pressing 5 selects a 16th note. The current note selected is highlighted on the note palette.

Deluxe Music Construction Set allows you to enter notes as short as 32nd notes, compared to the 128th notes allowed by *Professional Composer*. The *Construction Set* also keeps track of the time signature and alerts you when too many notes have been entered into a measure by dimming the extra note or

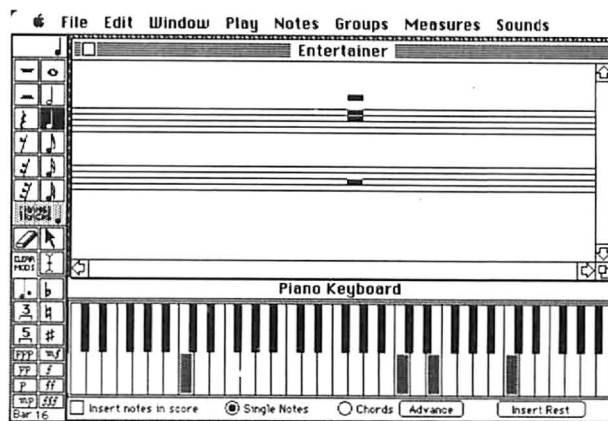


Figure 4

Deluxe Music Construction Set puts on a show when you play back music with the Player Piano option selected. Markers representing notes flash in sync with the appropriate piano keys on screen as the selection is played.

notes. I liked this feature because it let me concentrate on melody and harmonics and not worry about keeping strict time.

Entering notes and other symbols from the palette is facilitated by the fact that any selected symbol becomes the cursor. Putting a note on a staff becomes a matter of dragging the note into place and clicking. Accidentals and dotted notes involve a little more work, since several clicks are required to enter, say, a dotted quarter note.

You can move a note up and down or horizontally by dragging it with the arrow cursor. *Construction Set* lets you hear the pitch of the note you're considering—an instant playback feature that I found quite helpful.

Neither *Professional Composer* nor *Deluxe Music Construction Set* scrolls automatically when you have filled the staves on display. I disliked using the scroll bars in both programs to keep up with my music writing.

Variations on Some Themes

Both *Professional Composer* and *Deluxe Music Construction Set* allow you to cut or copy and then paste selected measures or musical passages. These editing functions, although basic, are the most obviously useful features of any music software because often a composition involves repetitions and variations on musical themes. *Professional Composer*'s Transpose Interval and Transpose Diatonic commands on the Variations menu allow you to select transpositions from a dialog box. With options such as a minor second or a diminished fourth, *Professional Composer* demands a knowledge of music theory but offers greater flexibility in such transpositions than *Construction Set*. *Deluxe Music Construction Set* allows you to transpose chords or passages only a half step, a whole step, or an octave at a time.

Both *Professional Composer* and *Deluxe Music Construction Set* allow for triplets, quintuplets, and similar groups of notes, as well as beaming, slurs, ties, dynamic marks, repeats, first and second endings, and special symbols such as fermata or staccato.

Professional Composer offers a wider selection of these finishing touches than *Deluxe Music Construction Set*, including one- and two-octave raisers, braces, breve marks, double sharps, glissando, and

grace notes. *Professional Composer* also lets you enter rehearsal marks anywhere along a staff, which simplifies the search for a particular section of the music.

To compensate for its small number of symbols, *Deluxe Music Construction Set* provides a special symbols font in its text mode. This font also allows entry of guitar chord symbols, although the guitar chords seem oversized relative to the rest of the score. *Professional Composer* and *Construction Set* allow you to move and edit their music fonts and add special symbols of your own.

Both programs also provide several fonts in which to enter text for lyrics. Typing lyrics in *Professional Composer* involves positioning the insertion bar at the appropriate height in relation to the staff and selecting the Insert Text option on the Extras menu. You then start typing, and conveniently, the box in which you enter text stretches as you type. You press Shift-Tab to jump to the next measure (see Figure 3).

Inserting lyrics in *Construction Set* is not quite so straightforward. After selecting the text-insertion symbol on the palette, you drag open a long rectangular box under the staff in which you type lyrics. Creating a text box of suitable dimensions seemed unnecessarily tricky to me, especially compared to *Professional Composer*'s text insertion method.

Take It from the Top

Professional Composer's playback capabilities are rudimentary. It gives no visual feedback, such as scrolling or flashing notes, while playing back a piece. You cannot pause the playback at a mistake to edit it, which suggests to me that perhaps the program is meant for composers who hardly make mistakes.

Deluxe Music Construction Set, on the other hand, provides detailed control over playback. Tempo, slurs, ties, and dynamic marks in the manuscript all have meaning during playback, although symbols entered in the text mode do not. Visual feedback comes either by means of a set of empty staves with flashing markers representing the notes being played, or, when only a selected section is playing, the notes themselves flashing (see Figure 4). An option called Player Piano flashes the keys on the piano keyboard as well. All in all *Construction Set* puts on quite a video display during playback.

Hitting the space bar stops the music, highlights the note you stopped on, and reveals the surrounding notes. You may edit on the spot, which makes perfect sense to me, and resume playback.

Construction Set allows for playback through a synthesizer as well, using a MIDI, or Musical Instrument Digital Interface (see "Musical Wares" in this issue). Neither program allows you to create your own instrument sounds, although *Professional Composer* lets you set the range of tones that an instrument can produce. Choosing the Check Range command on the Extras menu alerts you to any musical passages you've written for a particular instrument that cannot ordinarily be produced by that instrument.

Playing from Paper

Producing professional-quality scores is *Professional Composer*'s forte. The program allows you to print partial scores by selecting the passages for printing, as well as individual ensemble parts or pages. Version 2.0 automatically condenses parts with several rest measures and offers flexibility in determining a score's appearance, including indented lines, headers and footers, and page numbers. *Professional Composer* also allows you to convert scores into *MacPaint* documents so that a music teacher, for example, could insert lines of music into a text document.

While *Deluxe Music Construction Set* also lets you give a score a finished look, it can only print the entire score and does not print page numbers or headers and footers. To print out individual parts, you have to copy each part and paste it into a new score, which I find tedious. Both programs can print scores on the LaserWriter printer, although *Professional Composer*'s LaserWriter printouts seemed closer to typeset quality to me than *Construction Set*'s.

First and Second Endings

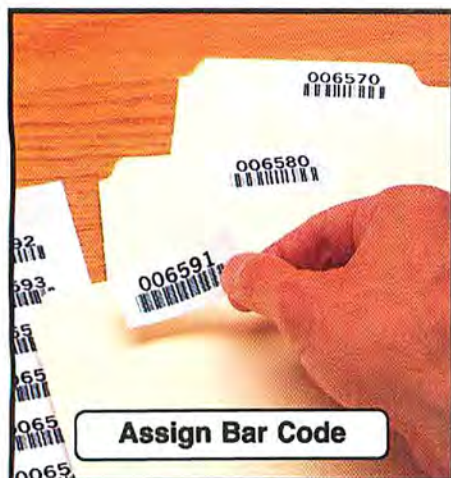
For professional composers and musicians doing orchestral scores, *Professional Composer* could be the program of choice despite its price, which to me seems to reflect more its packaging than the program itself. *Professional Composer* comes with an extremely well produced—almost over-produced—manual on very heavy paper, with dividers and designer white space. Aside from price, the program's lack of playback control and the awkwardness of its music entry might get in the way of amateur or intermediate composers. The bargain-priced *Deluxe Music Construction Set*, surprisingly enough, offers nearly as many features, greater ease of use, and far more flexibility of playback. Of course, either program can be bested by a sharpened pencil in the hand of a talented composer who knows a good musical copyist. □

▲▲▲▲▲▲▲▲ Rob Swigart plays the cello and is a free-lance writer and programmer based in the San Francisco Bay Area.

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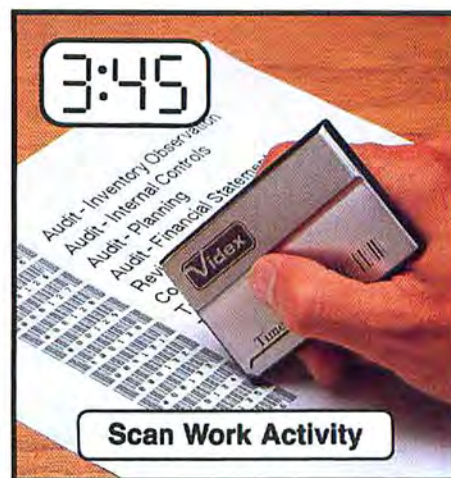
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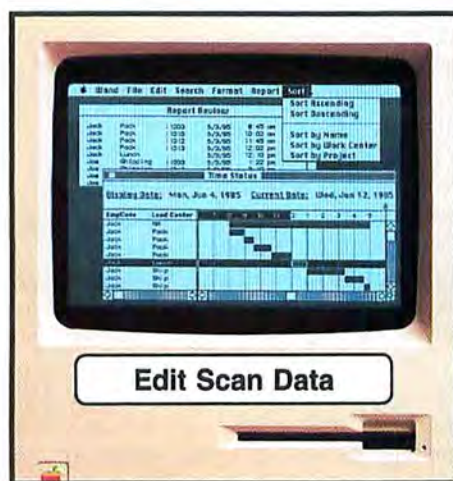
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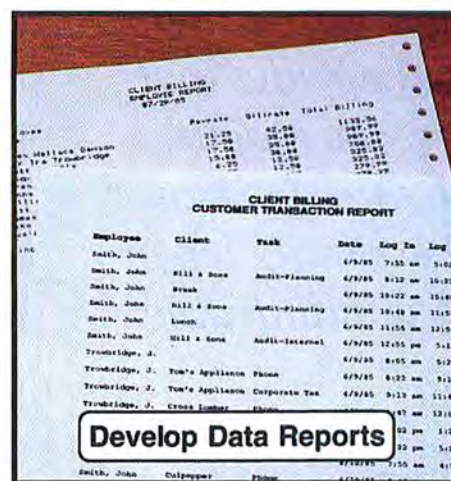
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Megabytes and Beyond

David L. Foster and David Ushijima

A look at five memory upgrades that bring the Macintosh one step closer to becoming a personal mainframe

Ask a group of mainframe enthusiasts what gives mainframe computers an advantage over the Macintosh, and "speed" and "memory" are two answers you're sure to hear. Computational speed and megabytes of memory are essential for large-scale tasks, such as building million-record databases. Not everyone has access to a room-size mainframe, but the possibility of owning a Macintosh with the power of a mainframe is not far off.

With a megabyte of memory, the Macintosh becomes a powerful machine. A 128K Mac is sufficient for writing memos or sketching *MacPaint* pictures, and a 512K Mac is well suited to tasks such as writing lengthy reports or calculating a medium-size plan with *Excel*. However, when you attempt more ambitious projects, such as setting up a 50,000-record database with *OverVUE* or building a 10,000-cell *Excel* spreadsheet, you begin to appreciate what a megabyte of memory can do.

While Apple probably won't overlook expandability in future models of the Macintosh, several products are now available that let you expand the Mac's memory beyond the 512K limit to as much as 2 megabytes of RAM. This article evaluates five of the heavyweight memory upgrades: Fast-Mac, from MassTech Development Labs; Micro Conversions' 1 Meg Upgrade; The Max, from MacMemory; Beck-Tech's Mac-Megabytes; and the MonsterMac, from Levco Enterprises.

Memory Divided

With something as ordinary as RAM chips you might think that the differences between memory upgrades would be inconsequential. But the Macintosh was not designed with memory expansion in mind, and developers have followed different strategies to solve the problems of supplementing the Mac's memory. Macintosh memory is divided into three portions: the portion used by the Mac's internal operating system, the portion used by application programs like *MacWrite* and *Excel*, and the buffer that holds screen information (see Figure 1). Different areas of memory are often referred to in terms of

relative position. Areas that correspond to low memory-address numbers are said to be at the "bottom" of memory, while those with high numbers are in the "top" portion. Because the Macintosh system software typically puts the screen buffer in the top section of memory, a problem arises when you add memory to a 512K Mac. If an upgrade board simply adds memory above the screen buffer, the two halves of memory are separated by the buffer. Some programs can't exploit extra memory properly unless the memory is in a continuous block. *OverVUE*, for example, requires a single expanse of memory to accommodate a large database.

To get around this problem, some manufacturers add memory above the existing RAM and then relocate the screen buffer to the top by modifying selected portions of code in the ROM. An alternative is to substitute the upgrade memory for the existing memory and then move the existing memory, screen buffer and all, to the top. Each method has its advantages and drawbacks.

To evaluate the five memory upgrades, each was tested with the following business programs: *MacWrite*, *MacPaint*, *MacDraw*, *Excel*, *Microsoft Word*, *Multiplan*, *Helix*, *OverVUE*, *Jazz*, *ThinkTank 512*, and *FileMaker*. In addition, the upgrades were tested with several games, including *Frogger* and *Maze Wars*.

AT LAST--
I'VE GOT ROOM
TO THINK!



FastMac

The FastMac from MassTech lets you add 1, 1.5, or 2 megabytes of RAM to the Macintosh without removing or replacing any of the existing chips on the computer's digital board. Of all the boards tested, the FastMac is the only one that lets you easily restore the Macintosh digital board to its original condition. The FastMac connects to the digital board via a clip that fits over the Mac's 68000 central processing chip. And although Apple hasn't endorsed a FastMac-equipped Macintosh for repairs under the warranty, you could avoid the issue by removing FastMac before sending the Mac for repairs.

The FastMac requires no specialized software to make use of 1 megabyte. However, a utility that comes with the upgrade lets you create a RAM disk that automatically loads programs and documents from an attached floppy or hard disk.

Although the FastMac has room for 2 megabytes of RAM, for this comparison the board was only available with 1 megabyte. Because the FastMac consumes more power than the other boards tested, upgrading to 2 megabytes requires a separate power supply, which developers at MassTech report they are working on. During

operation the FastMac produced more heat than all the other 1-megabyte boards, even with the fan installed.

One reason for the high power consumption is that the board contains its own 68000 processor, a design feature that speeds up the Mac's operation. In a test recalculation of 1000 cells in a *Multiplan* spreadsheet, a FastMac-equipped computer ran 12 percent faster than a 512K Mac.

One of the Max-Ram configurations can help prevent programmers from losing programs as a result of system errors.

The MassTech board ran reliably with all the test business software. Despite its thirst for power, the 1-megabyte FastMac ran within the limits of the Mac's power supply. If you want 1 megabyte and improved operating speed, and you want to be able to restore the Mac's digital board to its original form, the FastMac is a good choice.

1 Meg Upgrade

The 1 Meg Upgrade from Micro Conversions uses three small boards instead of one. Because of this design, the 1 Meg requires the smallest number of chips and consequently the least power of the tested upgrades.

The Micro Conversions board provides 1 megabyte of continuous memory. It gives you the option of running the Macintosh as a 512K machine by pressing the reset switch. With each reset, the Mac alternates between a 1-megabyte and a 512K mode of operation.

Although you don't need special software to use the 1 Meg, it comes with a disk that contains the *Switcher* and three other utilities: *RAMStart*, *Half Meg Disk*, and *MegUpdate*. The *Switcher* that came on the evaluation disk was version 3.5, which has since been superseded by Apple's release of version 4.4. *RAMStart* is a RAM disk program. The *Half Meg Disk* lets you create a RAM disk in the upper 512K of memory when you run the Mac in a 512K configura-

tion. And *MegUpdate* corrects a limitation in the original 1 Meg design: the inability to start up from disks created with System files prior to the one that accompanied Finder 4.1.

Unfortunately, a flaw in the 1 Meg design forced us to cut our tests short. At first we couldn't get the 1 Meg board to work. The failure was finally traced to a suspiciously loose-fitting connector on the cable that runs between the three-board upgrade and the Macintosh digital board. The 1 Meg was the only board tested that requires soldering wires directly to the original Mac board, a practice that compromises reliability. We can only recommend purchasing the 1 Meg Upgrade when the problem is eliminated. At the time this article went to press, Micro Conversions was working on new memory upgrade boards; however, final versions were not available for testing.

The Max

Of the five boards tested, only the Max from MacMemory requires specialized software. To take advantage of the Max's 1 megabyte, you need to start the Macintosh with the *MaxRam* startup disk that comes with the board. The *MaxRam* program prompts you to choose one of three memory configurations: 512K for applications and 1 megabyte for a RAM disk, 1 megabyte for applications and 400K for a RAM disk, or 1 megabyte for applications (see Figure 2).

Regardless of which configuration you choose, the screen buffer resides in the middle of memory, a trait that precludes you from running programs that demand continuous memory.

If you choose a configuration that creates a RAM disk, you can specify which application programs you want automatically loaded into the RAM disk at startup. Unfortunately you can load only programs that are stored on the *MaxRam* startup disk, limiting the number of applications you can automatically install.

Although theoretically *MaxRam* gives you some control over Macintosh memory allocation, in practice this freedom isn't very useful. Of the three possible memory configurations, the only one that ran all the test software reliably was the one that reserves 512K for applications and 1 megabyte for a RAM disk. *OverVUE* and *ThinkTank*, two programs that directly ad-

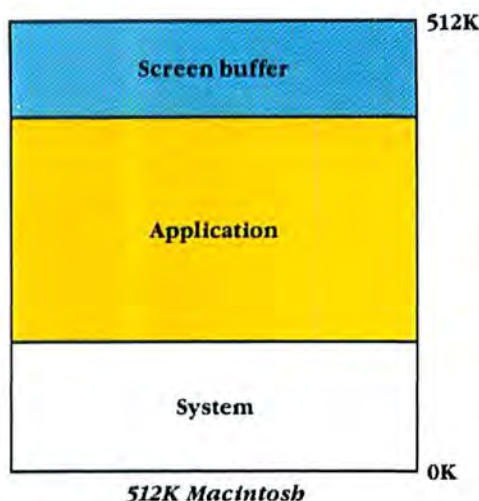


Figure 1
The RAM in a 512K Macintosh is apportioned into three areas: system memory, application memory, and the screen buffer.

dress the screen buffer, didn't run in either of the two configurations that reserve 1 megabyte for applications. Neither did Nevins' *Turbocharger*. In addition, there is no apparent reason why anyone would want to use the configuration with 1 megabyte for applications and no RAM disk, since it wastes a large portion of memory.

If you do any programming, you've probably lost a program or two as a result of system errors, which require you to reset the Macintosh before you can continue working. The *MaxRam* configuration that reserves 512K for applications and 1 megabyte for a RAM disk can prevent this eventuality. If you've selected that option, you don't lose information stored in the RAM disk when you reset the computer.

The Max is a well-designed and reliable memory upgrade. However, because the *MaxRam* startup software always positions the Macintosh screen buffer in the middle of memory, you may not be able to use software that doesn't strictly adhere to *Inside Macintosh* guidelines. MacMemory's advertisements claim that Ap-

ple's 128K ROM upgrade will fix the screen buffer problem, but the new ROMs were not available for testing at this writing.

If you use a hard disk, like Apple's Hard Disk 20, that requires a special startup disk, you must decide which of the two startup disks to use. After some difficulty, we got the Max to work with the HD 20 by starting up with the HD 20 startup disk, running *MaxRam* from floppy disk, and installing a RAM disk. Apple's 128K ROMs may solve these startup problems, but for now you must swap disks to take advantage of both the HD 20 and added memory.

MacMegabytes

One of the first megabyte upgrades developed for the Macintosh was MacMegabytes from Beck-Tech. MacMegabytes is a very reliable, well-designed board that ran all the test business software.

Beck-Tech's board has 512K of memory and two ROMs that override the Apple ROMs. This technique provides a continuous megabyte of RAM, repositions the screen buffer at the top of memory, and enables the board to start without startup

software. One possible drawback to the Beck-Tech ROMs is that when Apple releases a 128K ROM upgrade, MacMegabytes owners may be forced to go to Beck-Tech or one of its authorized dealers to get the Apple ROM upgrade installed.

MacMegabytes couldn't run several games. All of the upgrades, with the exception of the Levco MonsterMac, had the same problem in 1-megabyte mode. However, the other boards all offer the option of reverting back to 512K operation when desirable. It would be nice if MacMegabytes had a similar feature so that you could use programs that don't work with more than 512K of RAM.

Currently, MacMegabytes is the only Macintosh memory upgrade that works with the HyperDrive hard disk. Since the HyperDrive requires an additional circuit board, it creates a space conflict with any other product that uses a circuit board installed inside the Macintosh, making coexistence with most memory upgrades impossible. Beck-Tech offers an optional kit with MacMegabytes that allows the HyperDrive 10 board to be repositioned in the

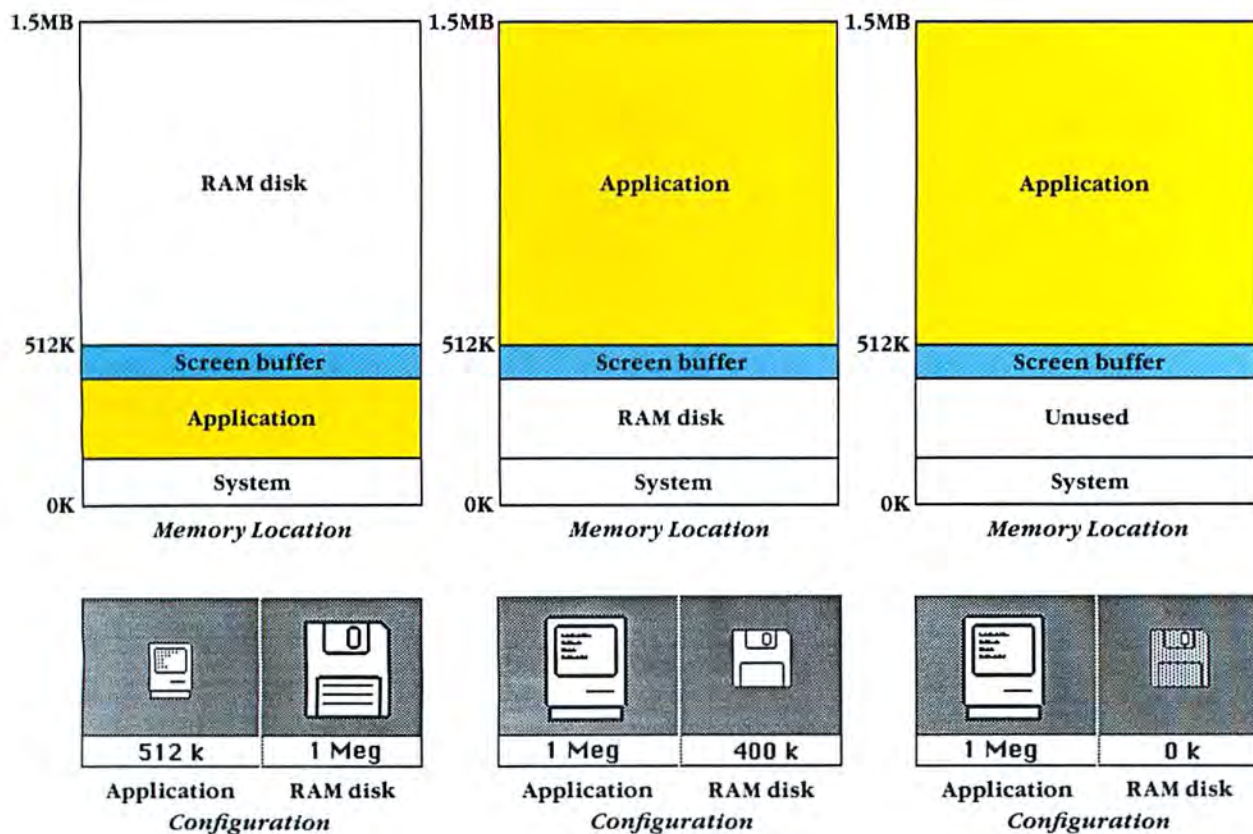


Figure 2
The Max from MacMemory is the only upgrade that requires special startup software to configure the additional memory. You can choose from the three configurations shown here. The setup with 1 megabyte (MB) for a RAM disk and 512K for application memory enables you to recover information from the RAM disk after you reset the Mac.

Megabytes at a Glance

	FastMac	1 Meg Upgrade	The Max	MacMegabytes	MonsterMac	512K Mac
Features						
Manufacturer	MassTech	Micro Conversion	MacMemory	Beck-Tech	Levco	Apple
Memory size (K)	1024	1024	1536	1024	2048	512
Screen buffer position ¹	standard	standard	nonstandard	standard	standard	standard
Requires software	no	no	yes	no	no	no
512K mode	yes	yes	yes	no	yes	—
Fan	yes	yes	no	no	yes	no
HyperDrive compatible	no	no	no	yes	no	yes
Requires modification	no	yes	yes	yes	yes	—
Warranty period	90 days	90 days	90 days	90 days	90 days	90 days
Performance						
Current draw (amps)	3.40	2.35	2.60	2.46	2.80	2.15
Temperature (degrees F) ²	97	94	93	93	97	93
Test recalculation (seconds) ³	7.99	9.06	9.08	9.06	7.02	9.08
Speed improvement over 512K Mac	12%	0	0	0	23%	—

¹Standard screen buffer position is above memory reserved for application programs.

²Temperatures were measured with the fan installed where applicable.

³Recalculation of 1000 cells in *Multiplan*.

Mac's hard plastic enclosure, freeing up room for the Beck-Tech board. Only the latest versions of the HyperDrive 10, which employ a clip-on attachment for the Mac's 68000 chip, will work with the Beck-Tech board.

Because MacMegabytes requires no special software, you don't know you have the extra memory until you need it. The RAM disk program that comes with the upgrade lets you set up a RAM disk of any size. However, the program contains a few bugs. If you want to use a RAM disk, you're much better off using a program like *RAMStart*, available from user groups or from CompuServe.

Even when the Macintosh was left on for long periods of time, MacMegabytes remained fairly cool (see "Megabytes at a Glance"). For added security, Beck-Tech sells an external fan that fits inside the Mac's recessed handle. In the final analysis, MacMegabytes' reliability and ease of use make it an excellent choice. And if you have a HyperDrive 10 installed, MacMegabytes is your only choice.

MonsterMac

If you consider 1 megabyte comfortable, then MonsterMac's 2 megabytes can only be described as luxurious. The MonsterMac comes in 1-, 1.5-, and 2-megabyte versions. Although not everyone needs 2 megabytes, for an extra \$200 you'll probably never have to worry about running out of memory. The extra memory also lets you work in ways that a Macintosh with less memory can't. The MonsterMac is the only upgrade that lets you set up and run the *Switcher* with two large applications—*Excel* and *Microsoft Word*, for example—in a 1-megabyte RAM disk, and still leave a megabyte for documents.

Once installed, the MonsterMac's memory occupies the lower portion of memory. The Mac's original 512K is relocated above the additional memory, leaving the original screen buffer intact (see Figure 3).

The MonsterMac gives you a speedy Macintosh. The Mac's processor normally shares the computer's memory with the screen display circuitry. As a result, the processor can't run at its full speed. However, replacing the Mac's memory with the MonsterMac's and moving the existing memory, including the screen buffer, to the

top of memory enables the processor to run programs in MonsterMac memory at full speed. In our tests the MonsterMac brought about a 23 percent increase in speed over a 512K Macintosh—more than twice the improvement of the second-speediest board tested.

MonsterMac is the only upgrade tested that successfully ran all the test software—including *Frogger* and *Maze Wars*, which failed to run on the other upgrades. While there's no guarantee that every Macintosh program runs on the MonsterMac, this upgrade looks like the most compatible way to add a megabyte or more of memory to your computer.

As you might expect with 2 megabytes of memory, the MonsterMac works up enough heat to require a fan. The fan Levco supplies is so quiet that you'll have to listen closely to hear it. In temperature tests the MonsterMac ran only 4 degrees warmer than an ordinary 512K Macintosh—well within the temperature limits of the Mac's other hardware components.

If you look at Levco's board, you'll notice it has its own 68000 processor (to address the extra memory) in addition to up to 1.5 megabytes worth of RAM chips. (You'll also notice four custom chips curiously named Harpo, Groucho, Chico, and Zeppo.) To install the MonsterMac, the Macintosh's original 68000 must be replaced with a double-sided connector to which the upgrade board attaches.

One of the biggest surprises of the MonsterMac is the connector labeled "Bus Extender" at one end of the board. The bus extender adds the equivalent of the expansion slots that Apple decided not to include in the Macintosh. Levco is currently working on an attachable disk controller that will let you connect any IBM-compatible hard disk drive to the Mac—a significant achievement, since the average IBM hard disk sells for around \$500, as opposed to approximately \$1000 for a Mac hard disk.

The MonsterMac offers more than just memory. If all you needed were 2 megabytes of RAM that reliably ran your existing software, the MonsterMac would be an excellent choice. Add a noticeable speed improvement and a much-needed expansion bus, and it becomes an outstanding alternative.

The Megabyte Solution

If you already own a Mac, it's reassuring to know that if successive versions of the Macintosh continue to be offered with increasing amounts of memory, your computer won't be left behind. However, until Apple decides which upgrades to approve for warranty work, you won't be able to take your souped-up Mac to an Apple dealer for service.

Each upgrade has something different to offer. For example, if in the course of developing new programs you often see the bomb icon and need to recover your data, you should consider the Max for its protected RAM disk. On the other hand, if modifying the Apple digital board is a concern, the FastMac lets you completely restore the original 512K board in addition to offering a 12 percent speed increase.

The one problematic board is the 1 Meg Upgrade. Unless Micro Conversions redesigns the board to eliminate the loose-fitting wire connector, the 1 Meg's reliability remains in question.

The two all-around best performers were Beck-Tech's MacMegabytes and Levco's MonsterMac. MacMegabytes is an

excellent choice if you want reliability and HyperDrive compatibility. The MonsterMac receives the highest recommendation for its speedy 2 megabytes, its compatibility with all the test software, and the lure of a real bus expansion port.

Whichever memory upgrade you choose, the extra memory can be put to use building bigger spreadsheets or loading a few programs into a large RAM disk. And although you won't have enough memory to compete with a mainframe, working with a megabyte and beyond is a start. □

David L. Foster is a biochemist in the biology and medicine division of the Lawrence Berkeley Laboratory, University of California, Berkeley. David Ushijima is Technical Editor of Macworld.

FastMac

MassTech Development Labs, Inc.
773 Boston Rd.
Groton, MA 01450
800/447-1215, 617/448-3450 in Massachusetts

List price: 128K to 1-megabyte \$799, 128K to 1.5 megabytes \$949, 128K to 2 megabytes \$1099, 512K to 1 megabyte \$699, 512K to 1.5 megabytes \$849, 512K to 2 megabytes \$999

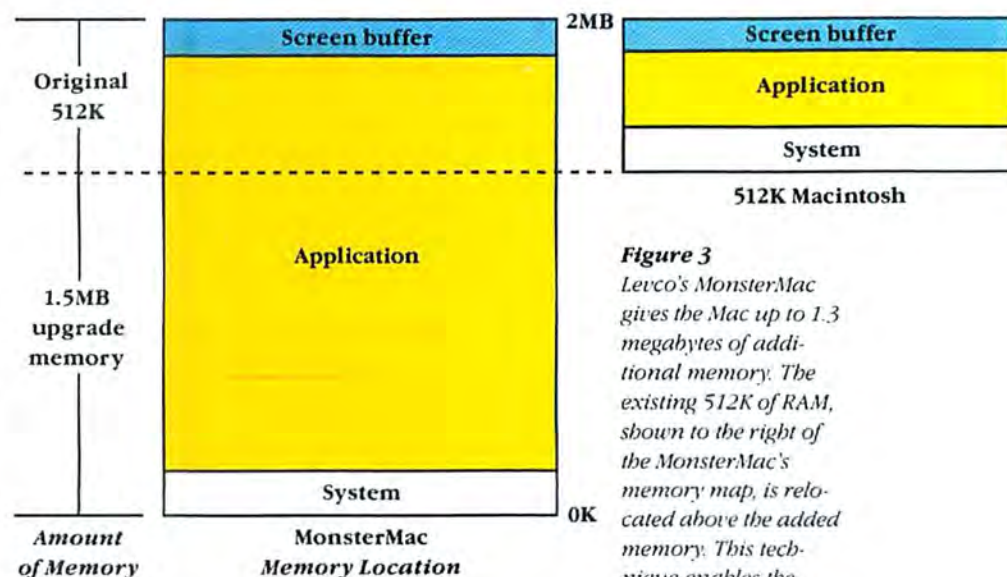


Figure 3

Levco's MonsterMac gives the Mac up to 1.3 megabytes of additional memory. The existing 512K of RAM, shown to the right of the MonsterMac's memory map, is relocated above the added memory. This technique enables the MonsterMac to run approximately 20 percent faster than a conventional 512K Mac.

1 Meg Upgrade

Micro Conversions, Inc.
3600 Knollcrest Dr.
Arlington, TX 76014
800/237-8622, 817/465-5758 in Texas
List price: 128K Mac \$599, 512K Mac \$449

The Max

MacMemory, Inc.
473 Macara Ave. #701
Sunnyvale, CA 94086
415/964-4176
List price: 128K to 1.5 megabytes \$795, 512K to 1.5 megabytes \$645

MacMegabytes

Beck-Tech
Claremont Hotel
41 Tunnel Rd.
Berkeley, CA 94705
415/548-4054
List price: 128K Mac \$928, 512K Mac \$648, HyperDrive installation kit \$99

MonsterMac

Levco Enterprises
6160 Lusk Blvd. #C-203
San Diego, CA 92121
619/457-2011
List price: 512K to 1 megabyte \$700, 512K to 1.5 megabytes \$800, 512K to 2 megabytes \$900, 128K to 2 megabytes \$1100

Here's Charlie

Nicholas Lavroff

What is MacCharlie, and why should PC programs run on the Mac?

MacCharlie, from Dayna Communications, is an IBM PC-compatible computer disguised as a Macintosh add-on. With software that lets a Macintosh run PC programs, MacCharlie gives the Mac a degree of PC compatibility—the Fortune 500 seal of approval. Whether MacCharlie succeeds in bridging the gap between the Mac and the PC or falls into the chasm depends more on corporate buying habits than on its own capabilities.

When Dayna Communications launched its advertising campaign for MacCharlie in the April 1985 issue of *Byte* magazine, it had no idea that some readers would interpret the ad as an April Fools' joke. After all, how could Dayna have known that *Byte* would run its own April Fools' follies a few pages after the MacCharlie ad, announcing non-products such as a knife sharpener mounted on the Macintosh and edible floppy disks made entirely of processed soybean?

But MacCharlie is no joke. When Dayna ran the same ad in *PC World*, it generated nearly 2000 reader inquiries. The reason for all the interest is obvious: Dayna announced a device that would run IBM PC software on a Macintosh, enabling the Mac to become the personal computer equivalent of the crafty politician who is all things to all people. The many questions that the announcement raised were born as much out of skepticism as enthusiasm. Would MacCharlie deliver as promised, or would reality fall short of expectation? Would it be more trouble than it's worth, or would it mean détente in the office divided? In short, would it be all things to all people, or would it be of no use to anyone?

Beyond Appearances

Physically, MacCharlie has a profile that matches the Macintosh's. It attaches to the right side of the Mac in a way that makes the two units look like one and increases the Mac's footprint by 50 percent. MacCharlie includes a keyboard extension that fits around the Mac's keyboard and provides the function keys and numeric

keypad familiar to IBM PC users. Assembled, the Macintosh-MacCharlie combination is an attractive desktop computer that takes up less room than a Macintosh XL.

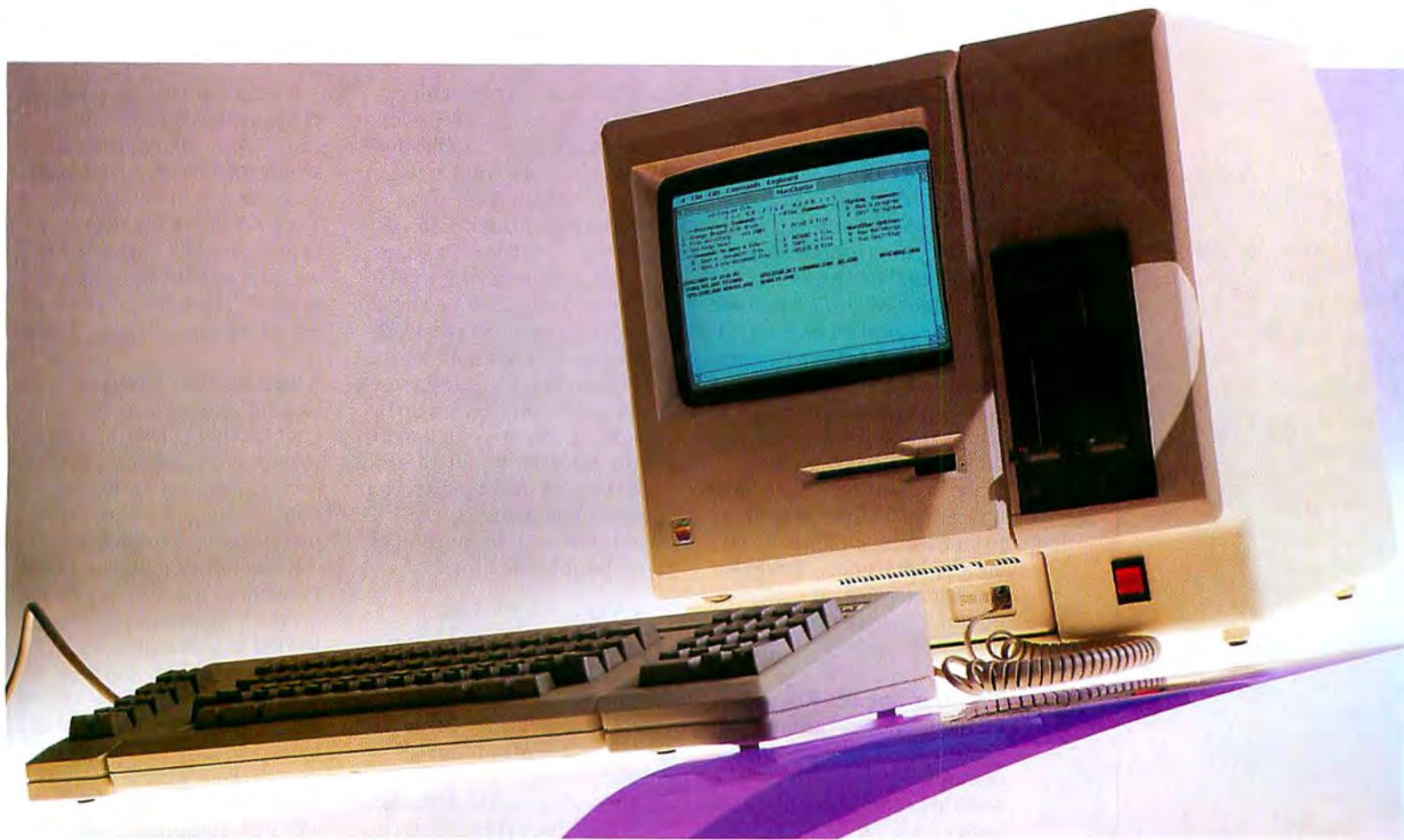
Beyond appearances, MacCharlie is an 8088-based IBM-compatible computer with two double-sided, 360K, 5¼-inch disk drives and 640K of RAM. It has two RS-422 serial ports (one of which is used to connect MacCharlie to the Macintosh through the latter's printer port), one RS-232 serial port, and a port for an expansion chassis. The hardware comes with 5¼-inch disks containing DOS (the PC's disk operating system) version 3.1 and a GW BASIC interpreter.

A 3½-inch MacCharlie program disk is also included. When running on the Macintosh, the MacCharlie application provides a window that displays the screen output of PC programs in the MacCharlie unit. The MacCharlie window has vertical and horizontal scroll bars and, like most Macintosh windows, can be resized and repositioned. Its menu bar, as you would expect, features the Apple menu of desk accessories, as well as File, Edit, Keyboard, and Commands menus.

Using MacCharlie

To start MacCharlie, you insert the MacCharlie application disk in the Macintosh's drive and the MS-DOS disk in MacCharlie's A: drive. When you select the MacCharlie icon from the desktop, the program automatically tests MacCharlie's RAM and then "boots" the MS-DOS disk. At that point you leave the Mac and enter the land of DOS (see Figure 1).

MacCharlie does not put a Macintosh user interface onto PC software; PC software works the same on MacCharlie as it



does on a PC. However, PC programs do benefit from certain Macintosh features available through the MacCharlie window's menus.

For example, using the menus you can transfer files between MacCharlie and the Macintosh, pause or restart MacCharlie, and activate the scroll bars. The Edit menu enables you to cut, copy, paste, and clear selected contents of the window, as well as to see the contents of the Clipboard.

When MacCharlie was released, the list of PC programs that Dayna claimed the machine could run included Microsoft's *Flight Simulator*, commonly regarded as the acid test of PC compatibility. I couldn't test this claim myself, since I didn't have the expansion chassis, the color graphics adapter, and the graphics monitor that a MacCharlie needs to run *Flight Simulator*. However, MacCharlie runs most popular MS-DOS programs as well as the more es-

oteric applications, although without graphics and—in the case of certain programs—with a sluggish screen display (see “MacCharlie: Trial by Program”). Dayna claims that MacCharlie's software upgrade version 2.0 improves the rate of screen updating by 30 percent over the version I tested. Version 2.0, which was not ready in time for this review, is also supposed to work with the *Switcher*.

The Peripherals Issue

The fact that MacCharlie is a computer in its own right is reflected in its price tag. At a suggested retail price of \$1795, MacCharlie costs about as much as a similarly equipped PC compatible.

Its advantage over a second computer is that MacCharlie takes up only 50 percent more room than the Mac itself, while the extended keyboard is no bigger, although bulkier, than the usual PC keyboard. And when the Macintosh is running its own applications, MacCharlie contributes no more than a steady hum and a lit-up power switch to the surrounding ambience.

The space savings and the integrated look can be misleading. Like any PC, MacCharlie requires its own, PC-compatible set of peripherals. Any hardware beyond a modem and a printer, such as a hard disk or a graphics board, has to be connected to Charlie through an as yet unreleased expansion chassis that will quickly occupy any space MacCharlie might have saved on your desk top. If you can't wait for Dayna's own expansion chassis, the company states that MacCharlie works with the IBM PC expansion chassis, which can be purchased only with a 10-megabyte hard disk. The chassis is listed at \$2595.

Questions of space aside, a fully equipped MacCharlie could end up costing nearly three times as much as the basic unit. To display the graphics of PC pro-

(continues on page 124)

MacCharlie: Trial by Program

David Ushijima

With the multitude of software available for the IBM PC, validating MacCharlie's PC compatibility absolutely is a little like searching for the largest prime number. Browsing through *PC World's* extensive software library, I envisioned endless tests of spreadsheets, databases, and word processors, not to mention wending my way through maze after maze of adventure games. Since I couldn't test them all, I ran representative programs from each major application area: spreadsheets, database managers, word processors, communications, and languages.

The Mac Speaks WordStar

Of the myriad programs that run on the PC, the first that comes to mind is *WordStar*, from MicroPro. Most Macintosh writers don't realize that *WordStar* documents probably number in the tens of millions. At some point, some of those documents need to be accessible from the Macintosh. So with the thought of gaining access to a document or two myself, I loaded *WordStar*.

True to Dayna's claim, *WordStar* ran—but not without significant drawbacks. First, the speed at which MacCharlie scrolls through a document is slow enough to make looking at anything longer than a few pages confusing. Second, MacCharlie sends unwanted control characters to the Macintosh,

which results in randomly boldfaced text. If you've ever read one of John Dvorak's *InfoWorld* columns, you get the idea. As a quick comparison of speed, I reformatted a 36K document in *WordStar*. On MacCharlie, the procedure took 6 minutes, while reformatting the same document on a similarly equipped PC took 3 minutes.

Dayna claims that the screen display will be speeded up by up to 30 percent in version 2.0 of the MacCharlie software, but until you get the upgrade, you have to deal with a jam of words that will remind you of rush hour in the rain.

1-2-3 Mac

Undoubtedly, after *WordStar*, the program most often used on the PC is Lotus Development's *1-2-3*. I loaded the *1-2-3* disk, and the Macintosh displayed the *1-2-3* grid familiar in businesses throughout the land. Whether due to Lotus's screen display techniques or to the fact that a spreadsheet is not as dense as a document of text, the slow scrolling that plagued *WordStar* on MacCharlie wasn't a problem with *1-2-3*. To check *1-2-3* recalculation times on MacCharlie, I recalculated 600 cells in a 46K worksheet. The recalculation took 20 seconds on both MacCharlie and a PC with 640K of RAM.

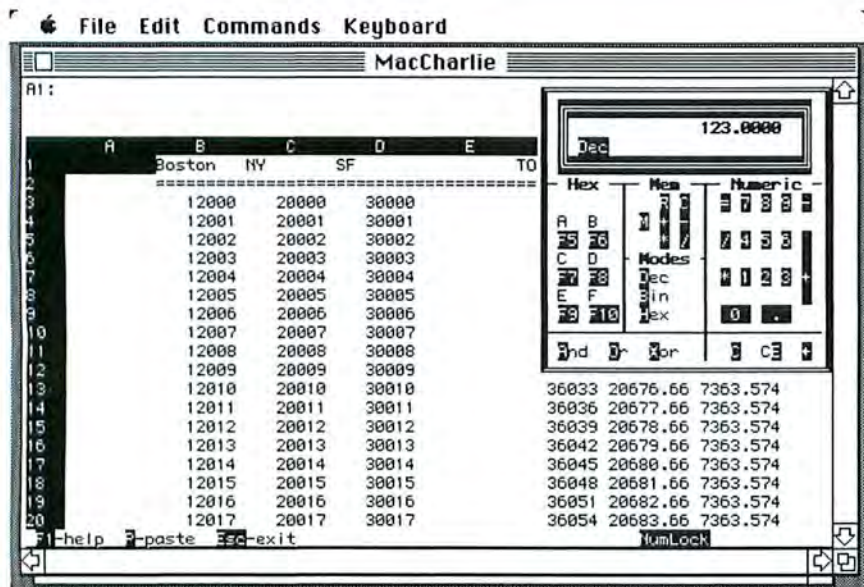
Be forewarned that you can't invoke the graphing features of *1-2-3* without adding an expansion chassis, a graphics adapter board, and a color or monochrome monitor—an expensive proposition. Lastly, you have to ask why you'd run *1-2-3* on MacCharlie when you could run *Excel* on the Mac, which conveniently reads *1-2-3* data files.

One of the largest concerns of businesses is the obsolescence of existing databases. When you talk about database programs on the PC, Ashton-Tate's *dBASE II* and *dBASE III* come to mind. I ran both and was able to load and sort a small database in each without any problems.

A Sidekick for Charlie

One hurdle that many PC compatibles fail to clear is running memory-resident programs such as *Sidekick*, by Borland. Often two or even three such programs can be loaded into the memory of a standard IBM PC without interfering with the primary application program. I loaded *Sidekick* into MacCharlie's memory and then ran *WordStar* 3.3, and I was able to invoke *Sidekick* with no problems. Similarly, I successfully ran *Sidekick* with *Microsoft Word* 1.1, *1-2-3*, and *dBASE III*, although running *Sidekick* with *dBASE III* resulted in a garbled character on *Sidekick's* hex calculator.

To see how far I could push MacCharlie's PC compatibility, I decided to try Ashton-Tate's *Framework* 1.1. Interestingly enough, I couldn't start the program by restarting MacCharlie with *Framework's* system disk in the A: drive. But when I restarted MacCharlie with the MS-DOS 3.1 disk, I was able to get *Framework* to run. Since *Framework* uses the PC's monochrome graphics extensively, running the program was a good test of MacCharlie's display. While *Framework's* graphics were faithfully re-



MacCharlie offered no unpleasant surprises when running RAM-resident PC programs, such as Borland's Sidekick, with a primary application, such as Lotus Development's 1-2-3. Macintosh desk accessories are also available—through the Apple menu on the MacCharlie window's menu bar—so you can pull down the calculator if you have a lot of figuring to do.

produced on the Mac, MacCharlie was laboriously slow in repainting the screen. Though *Framework* is one of the best-designed window-based applications on the PC, when you run it on MacCharlie, the responsiveness is lost in the translation.

On Line, Off Line, and Offside

Plenty of good communications software exists for the Macintosh, so I can't see using MacCharlie to go on line. But for the sake of testing MacCharlie's communications port, I attached a Hayes Smartmodem 1200 using the standard PC cable and ran Headland Press's *PC-Talk III* and Hayes's *Smartcom II*. When I dialed CompuServe with *PC-Talk III*, I was able to log on to MAUG and scan the program libraries with no problem. *Smartcom II* was another story. Although I was able to log on to CompuServe, once the information be-

gan scrolling off the screen, MacCharlie could not repaint the display fast enough. The resulting screen was difficult to read.

I tried several more PC programs on MacCharlie. Using Borland's TurboPascal I was able to edit, compile, and run a short Pascal program with no apparent side effects. I also ran Lotus's *Symphony 1.1* and discovered that while the spreadsheet worked fine, the word processor is extremely sluggish on MacCharlie. The delay between a keystroke and the time the character is displayed on screen is much too long. Finally, needing a respite from spreadsheets, word processors, and databases, I decided to try my hand at keyboard quarter-backing by running *NFL Challenge*, from Xor Corporation. Since MacCharlie doesn't have any color or graphics capabilities, you don't get the benefit of watching the Xs and Os rumble their way around the screen. Nonetheless, the program worked as it does on a PC with a monochrome display.

The Price of Compatibility

Overall, MacCharlie ran every program that I tried. But functional compatibility isn't everything. MacCharlie's main drawback is the speed with which it displays information on the screen. The screen is often so slow as to make programs like *Smartcom II* and *Symphony* unusable. Furthermore, since MacCharlie doesn't display color graphics, you can't make use of the graphics function in 1-2-3. The price of adding an expansion chassis, a color graphics adapter, and a color monitor makes true PC compatibility feasible only for those whose money is burning a hardware hole in their pockets. But if you own a Macintosh and need to get at the information created with a PC application, MacCharlie will let you run a wide range of PC software.

(continued from page 121)

grams, including arcade-style games and the business charts in *1-2-3*, MacCharlie requires a color graphics adapter (\$244 from IBM) and a color monitor (\$680 from IBM) or a monochrome graphics board and a monochrome monitor. And any PC software that requires a modem does not recognize a modem plugged into the Macintosh, requiring you to adapt your modem cable to MacCharlie's communications port. Because a graphics adapter is the most likely first addition to a MacCharlie system, Dayna would have done better to have built a graphics capability into the hardware, as Compaq did with its highly successful line of PC compatibles.

Mac Pluses

MacCharlie enhances the operation of the Macintosh itself in some ways. The Macintosh's printer is attached to MacCharlie's second serial port, allowing MacCharlie to operate as a 640K printer buffer for the Mac when MacCharlie is not running an MS-DOS application. Access to the buffer is automatic—all you have to do is start printing. With documents longer than one or two pages, the buffer enables you to start another task on the Mac while the document finishes printing. Because of the way the Mac sends data to a printer, the buffer's effect is not apparent when printing short documents.

The numeric keypad on the MacCharlie keyboard extension emulates the Apple numeric keypad. And to a limited ex-

tent, the Macintosh-MacCharlie combination enables you, for brief periods, to perform more than one task at a time. For example, you can use *MacWrite* on the Mac while MacCharlie crunches numbers in *1-2-3*. Note, however, that MacCharlie can perform this occasional multitasking only if the background application requires no keyboard input, screen display, or printer output.

Charlie Runs for Office

MacCharlie finds its raison d'être in the office that needs the different capabilities of both the Macintosh and the PC. For example, an architectural design firm may wish to use the Mac's graphic abilities while maintaining PC compatibility with the accounting department. To draw an example from real life, Carnegie-Mellon University has attached MacCharlies to its Macs to enable instructors to teach Macintosh and MS-DOS computing in one classroom.

MacCharlie can be useful in a number of other ways in a PC-Mac office. Long-time users of the IBM PC or its compatibles who subsequently develop a preference for the Mac have voluminous amounts of data stored in bread-and-butter MS-DOS programs such as *1-2-3*, *Framework*, and *WordStar*. Despite the availability of similar software on the Mac, many such people will want to use the programs already familiar to them.

MacCharlie can enable Macintosh users to take advantage of programs that would otherwise be unavailable to them. Even though the Mac currently boasts some 700 programs, the PC software library runs into the thousands and is particularly strong on specialized professional programs. Rather than waiting years for software developers to produce a civil engineering program or law office billing package for the Mac, a Macintosh owner might be better off buying a MacCharlie and using the existing PC versions of those applications, especially if he or she already owns the software in question.

MacCharlie can also be valuable to the PC-Mac office that has data files in one machine and wants to transfer them to the other. In the two years before the Macin-

The fact that MacCharlie is really a separate computer becomes obvious when you look behind the scenes at the tangle of cords and connectors that make the Macintosh and Charlie seem like one. You connect a printer or other device through the horizontal expansion port at the bottom of Charlie's cabinet.

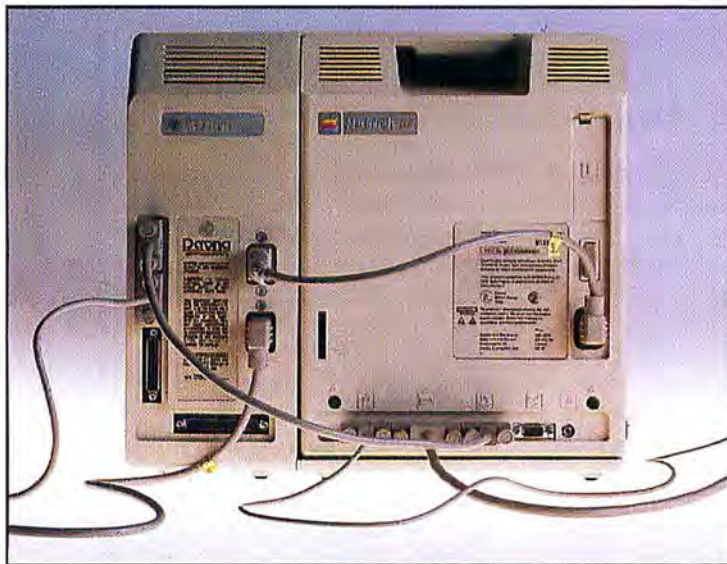
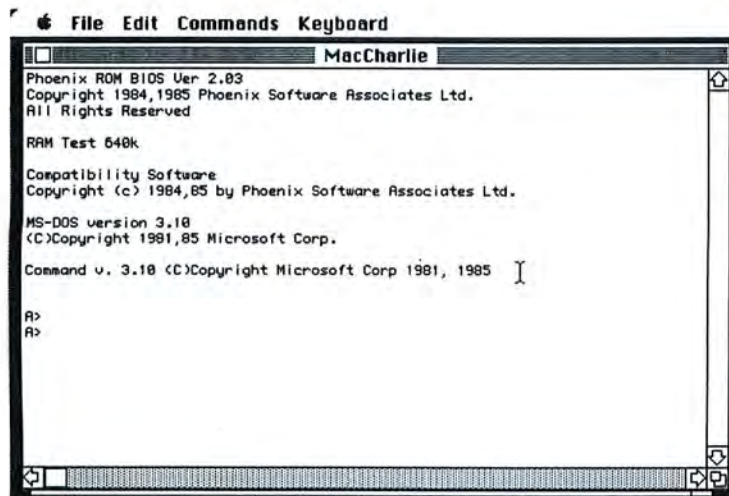


Figure 1

MacCharlie's Macintosh software opens a window for PC programs on the Mac screen. The A> prompt signals that you are operating in DOS, although the menu bar gives you access to certain Mac features, such as editing functions and desk accessories.



As a file transfer utility, MacCharlie is in a class by itself. It is always available for translating files from one operating system to the other and requires no connecting or disconnecting of cables. After you load MacCharlie's DOS disk, which contains the transfer utility, and the source and destination disks, all you need to do is select the appropriate transfer command from the File menu and then provide the name of the file at each end (see Figure 2).

MacCharlie comes with a clip-on keyboard extension that holds the function, cursor control, and numeric keys familiar to people who use the IBM PC. The numeric keys function like the Mac's numeric keypad with Macintosh programs.

Remember that file transfers exchange data only and not document formatting, macros, command sequences, or other features controlled by the specific software.

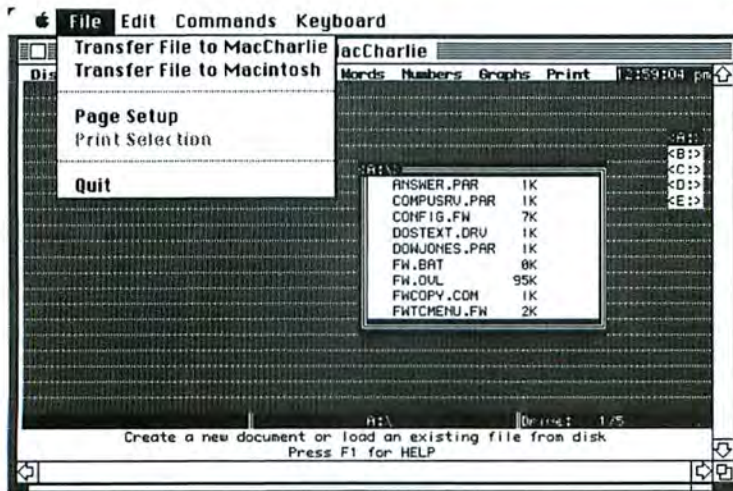
Even after understanding Mac-Charlie's strengths and limitations, features and capabilities, it remains a strange ani-

On the other hand, those who want to run PC programs for reasons of familiarity or existing data are likely to already have an MS-DOS machine. How else would they have become familiar with the programs or entered the data? If these people want to gain access to the Macintosh, they can simply buy a Mac, cables, and transfer software rather than selling their PC to buy MacCharlie and a Macintosh. Aside from the priesthood of technophiles, gadget freaks, and computer journalists, few people are likely to want MacCharlie on their desks. A personal computer is often personal enough so that its owner, clearly being one type of user or another, wants a computer that is clearly one type of machine or another.

Nevertheless, MacCharlie is likely to make an impact on the marketplace—not so much because of any features of the machine itself, but because of the long-standing regulations of large bureaucracies, both in government and the private sector. To data processing and management information systems managers, the significance of MacCharlie is that it gives the Macintosh IBM PC compatibility, a requirement of many large corporations and government agencies for any large-scale computer purchase. MacCharlie, therefore, might be called the first truly corporate personal computer, satisfying the rules of the bureaucracy while offering a choice to the individual. □



Figure 2
MacCharlie's File menu simplifies file transfers between MacCharlie and the Mac. Data must be saved in or converted to the appropriate format to clean out characters that may be unintelligible in the receiving application.



◆◆◆◆◆◆◆◆◆◆ *Nicholas Lavroff is a Contributing Editor of Macworld.*

MacCharlie
Dayna Communications
50 S. Main St.
Salt Lake City, UT 84144
801/531-0600
List price: \$1795

A Font of One's Own

Robert C. Eckhardt

Since the invention of movable type in the fifteenth century, skilled artisans have been painstakingly crafting typefaces, many of which are still in use hundreds of years later. Today the Macintosh allows you to choose from hundreds of digital fonts based on traditional typeface designs. And now you can even practice the art of type design yourself.

The article "The Mac Font Shuffle" in the December 1985 issue of *Macworld* showed you how Altsys Corporation's *FONTastic* can be used to rearrange the positions of special characters and to change the appearance of fonts by stretching and scaling them to other sizes. But modifying off-the-rack fonts doesn't offer the creative control of designing your own—the ultimate *FONTastic* project. Creating a new typeface can be time-consuming, but it's a learning experience that will increase your appreciation of typography, both inside and outside of the Macintosh's domain.

All it takes to start designing a font is an idea of how you want your font to appear. Or you can get a head start by digitizing typeface illustrations with an image digitizer, such as Thunderware's ThunderScan, and then pasting the digitized letters one by one into *FONTastic*'s Font window.

It is illegal to create a font by copying a typeface from a commercial type-specimen book, because the

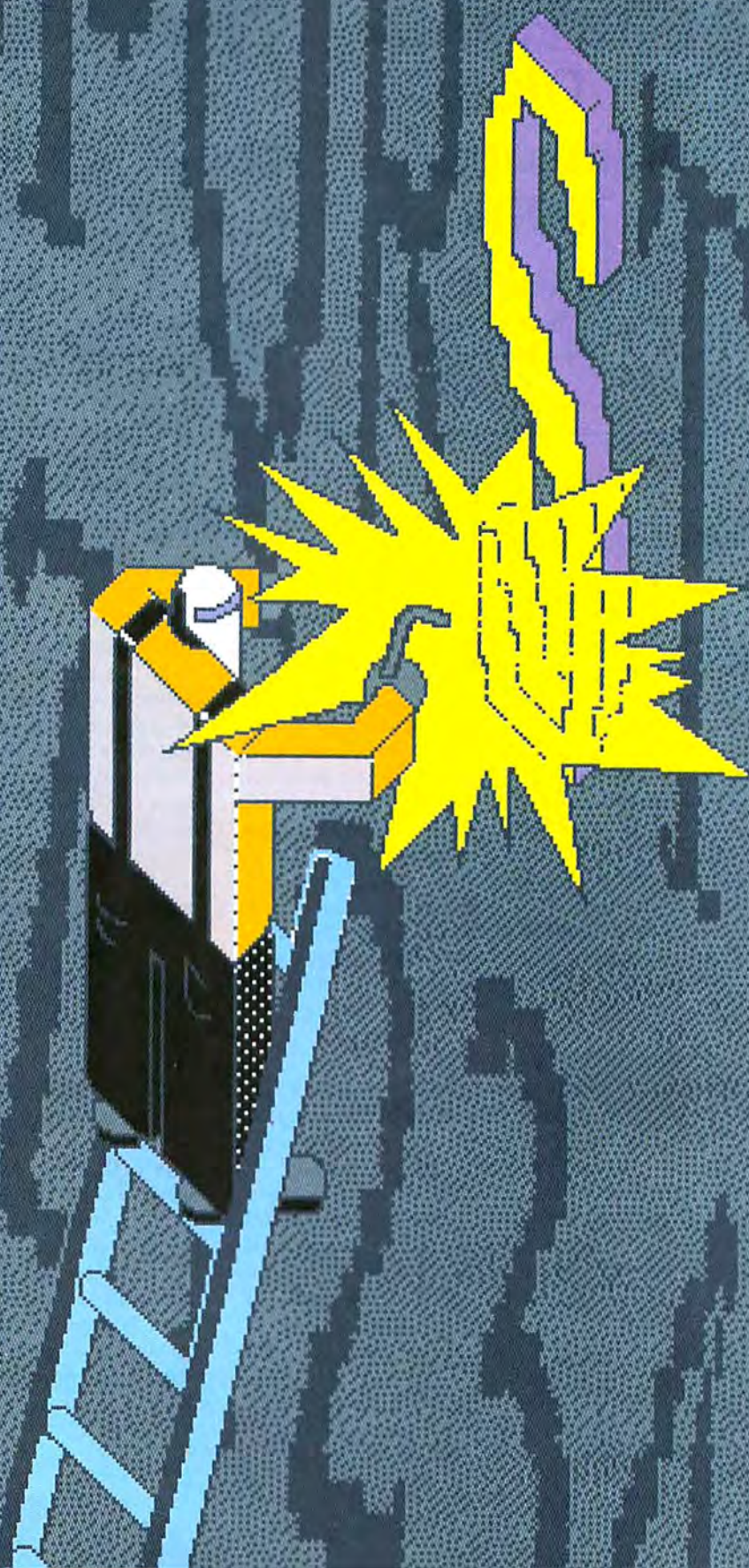
right to use and distribute the typeface belongs to the type designers. Other books contain public-domain typefaces that you can legally copy, however. The typeface I chose to copy, Rundgotisch (round gothic), is taken from the *Treasury of Authentic Art Nouveau Alphabets, Decorative Initials, Monograms, Frames and Ornaments*, edited by Ludwig Petzendorfer (Dover Publications, 1984).

Creating a new typeface is a learning experience that will increase your appreciation of typography.

Through the Digitizer

The first step in creating a digitized font is to copy the typeface that will be the foundation of the font. I digitized 48-point Rundgotisch with the ThunderScan at a 50 percent reduction to create a 24-point font. After you scan the typeface, save it as a *MacPaint* document with the Save as Paint Doc command. Figure 1 shows the scanned, reduced version of Rundgotisch. The characters look ragged, but remember that they're just rough guidelines that you can touch up with *FONTastic*.

If you use a digitizer that requires a camera (see "Pictures to Pixels," *Macworld*, April 1985), be sure to



Original Rundgotisch

ABCDEFGHIJRLMN
 OPQRSTUVWXYZ
 BRIGADE : NICKEL
 abcdefghijklmnopqrfs
 tuvw1234567890 xy3z
 Agram . Dublin . Reval
 EVA.METROPOLE

ThunderScanned Rundgotisch

ABCDEFGHIJRLMN
 OPQRSTUVWXYZ
 BRIGADE : NICKEL
 abcdefghijklmnopqrfs
 tuvw1234567890 xy3z
 Agram . Dublin . Reval
 EVA.METROPOLE

Figure 1

Compare the original Rundgotisch font with the digitized and reduced version before refining it in FONTastic.

focus the camera lens sharply, and check that the image plane is parallel to the page you're digitizing to avoid distorting the size or shape of the characters.

Switcher Setup

The most efficient way to cut and paste the Rundgotisch characters from *MacPaint* into *FONTastic* is via the *Switcher*. After quitting the digitizing program, start the *Switcher* and then load *FONTastic* into the *Switcher*. Use the *Switcher*'s Configure and Install commands to load *MacPaint* and allot it more than the *Switcher*'s default 128K. If you give *MacPaint* at least 190K of memory to work with, it won't need to go to the disk every time you use the Show Page command or the Grabber tool. Finally, choose the Options command from the *Switcher* menu and click the Always Convert Clipboard check box so you can transfer characters from *MacPaint* into *FONTastic* automatically. If you have any other *Switcher* preferences, such as reversing the direction of the switch, specify them at this stage.

Setting the Stage

Before you begin moving characters, set up *FONTastic*. Click the New button and respond to the dialog box that asks for the size of the new font and whether the character spacing is proportional or fixed. Under fixed spacing, or monospacing, all characters take up the same space on a line, as with a manual typewriter. Under proportional spacing, spaces are adjusted to match the widths of different characters. After

you specify the font's size and spacing—in this case 24-point proportional—*FONTastic*'s Font and Sample windows appear. The Sample window, which usually contains the classic phrase "The quick brown fox jumped over the lazy dog," is filled with black bars. If you change the Font window's display from the System view to Actual, you see an array of empty character slots, indicating that the font's characters have yet to be defined (see Figure 2).

Examine the digitized draft of your font in *FatBits* and count the pixels in the tallest character and in the descending stem of characters such as *j* and *p* to determine the *ascent* and *descent*. In Rundgotisch, the ascent is 18 pixels, and the descent is 4 pixels (see Figure 3).

Next, create a visual guide to help check the character alignment and scale in *FONTastic*. Using the straight line tool, draw guidelines above and below one row of characters, with a short mark at the baseline—the imaginary line upon which all the characters sit. Draw the guidelines one pixel away from the actual ascent and descent points to avoid obscuring the font's details. Make a copy of the row and its guidelines, erase the characters, and insert copies of the guidelines for each row of characters (see Figure 4).

Return to *FONTastic* and double-click any character in the Font window to open an editing window. Sketch a vertical line to act as a measuring stick and turn on the editing window's grid to help you count pixels. Move the ascent and descent bars and the baseline arrow to accommodate your font and its guidelines; add 3 extra pixels for the ascent and 3 for the descent. For the example, allow 21 pixels above the baseline and 7 pixels below. Then adjust the leading control—the lower arrow—starting at 2 pixels below the descent.

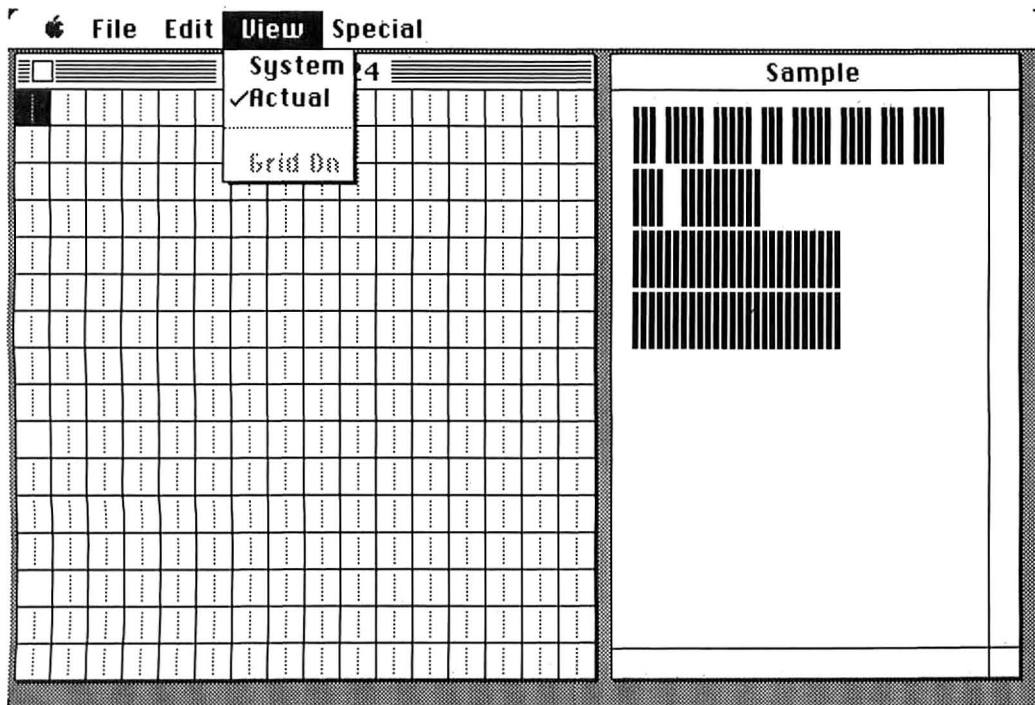


Figure 2
After you specify the new font's size, FONTastic's Font and Sample windows appear. The empty character slots in the Font window's Actual view indicate that the new font's characters have yet to be defined.

Making the Moves

To move a character, first open the *MacPaint* document containing the digitized font. Enter FatBits and surround the character plus a piece of both the ascent and descent guidelines with the lasso. Don't include any extraneous pixels above or below the guidelines when you select a character. Copy the selection to the Clipboard and then switch to *FONTastic*. Next, open an editing window for the character in transit by double-clicking on the appropriate character in the System view.

When the editing window opens, choose the Paste command, and the character appears along with its guideline fragments (see Figure 5). To make sure the character has not been rescaled by *FONTastic*, switch back to *MacPaint* and compare the two versions. If the ascent and descent controls have been set incorrectly, the characters will be improperly scaled. For example, if you mistakenly set the ascent at 16 pixels, *FONTastic* will compress the characters to fit them into the shallower space. If *FONTastic* rescales a character, adjust the ascent and descent controls to the proper settings and paste over previous attempts until the font is transferred intact and unaltered.

Continue bringing letters into *FONTastic*, watching your progress in the Sample window. Save your work occasionally to avoid losing it to a power failure or other calamity. The reference lines you drew in *MacPaint* should align, though the spacing between letters will be uneven at this stage (see Figure 6). Con-

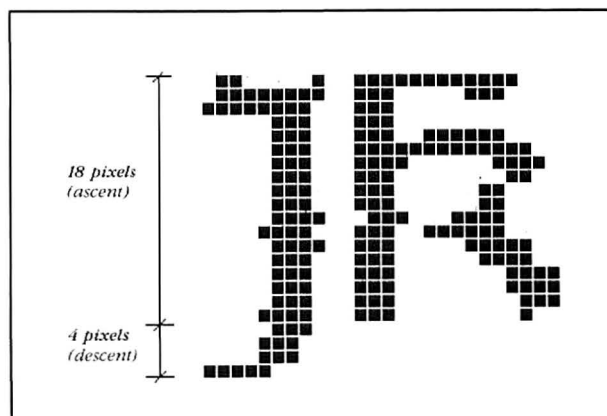


Figure 3
Before you transfer characters into FONTastic, determine the font's ascent and descent by counting the FatBits that comprise the characters.

tinue until you've pasted the entire character set. Then erase all the guidelines: in any open editing window, carefully drag the ascent and descent control bars to meet the actual maximum ascent and descent of the characters. If you go too far and erase parts of the characters, choose Revert and try again.

Cleanup

Cleaning up is the least enjoyable part of any project, and font design is no exception. After you move all the characters into place, you must smooth the rough edges introduced by the digitizing process. Don't touch up characters in *MacPaint* before the transfer; you'll do a better job if you monitor your progress in *FONTastic*'s Sample window, making modifications

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Words from a Man of Letters

Charles Bigelow, one of the nation's leading digital typeface designers, has used *FONTastic* to develop fonts for the Macintosh (see "More Than Meets the Eye," *Macworld*, November 1985). Bigelow believes that just as everyone has a personal handwriting style, the Macintosh can give everyone a personal font.

For the same reasons that there are only a few handwriting professionals—calligraphers, for example—professional typeface designers will continue to create most of the fonts used by the public. But don't let that discourage you from trying your hand at font design. Bigelow emphasizes that, whether you make a font for yourself or for the public, you must proceed methodically. "Don't just start hacking away at pixels," he advises. First, firmly establish the properties of your new font. Traditional guidelines can help you determine some of the properties of a font, but they are no more than guidelines. No hard and fast rules exist for digital typeface design.

Design Guidelines

Stem thickness is often about 10 percent of body size, or cell height—the distance from ascent to descent. If the body size is 10 pixels, a normal stem thickness would be 1 pixel. The measure of a letter without ascending or descending stems, the *x height*, is usually 50 percent of body size—5 pixels in our example. The width of the lowercase *n* is usually 75 to 80

percent of its *x* height, or 4 pixels in our example; more would make a wide font, and less would make a narrow one. Other lowercase letters follow the same ratios. If you use many uppercase letters (the English language does not), make them smaller than full height. Numbers should all have the same width so tables of numbers align properly. Dollar signs and other characters used with numbers should also have the same width.

Determine early on how you want to deal with diagonals and curves. Eliminating them gets rid of jagged edges and some design headaches, but a font made of mostly straight characters—Chicago, for example—can be hard on the eyes. Spacing in text should not be tight, and the spaces between letters should appear to be equal. Begin by making spaces exactly equal and then correct apparent inequalities by eye.

When you begin designing the letters, the best approach is not to start with the letter *A* and head down the alphabet. Decide on one or two test words and design their letters first. German designers like to design with the word *hamburger*, while many Americans prefer *champion*. Bigelow likes to use the words *nova* and *HERON*. Once you've worked out the letters for your test word, make a nonsense sentence consisting of the same letters in all possible combinations and reevaluate the way they look. When you are satisfied with your test words and sentence, go on to complete the font.

When you finish the basic design, Bigelow advises testing

it in large sections of real text and examining the design closely and critically. Unless you're the only one who will ever see it, show it to others and solicit their opinions. While you may be able to complete the basic design in one day, proper testing and refinement of a good, legible font can take a week, a month, or more.

Reference Material

If you are serious about typeface design, Bigelow suggests that you take a course in calligraphy. It will give you a good feeling for legibility, the alphabet as a system, and the history of letters and the way they are formed. Such knowledge is a valuable asset to a typeface designer.

Bigelow also suggests that you read what other designers have written and look at what they've created. In particular, the following books are recommended: *Italic Calligraphy and Handwriting*, by Lloyd J. Reynolds (Pentaclic Corporation, 1969, out of print); *Treasury of Alphabets and Lettering*, by Jan Tschichold (Reinhold Publishing, 1966, out of print); *Type Sign Symbol*, by Adrian Frutiger (Hastings House, 1980); *A Tally of Types*, by Stanley Morison (Cambridge University Press, 1973, out of print); *Printing Types: An Introduction*, by Alexander Lawson (Beacon Press, 1974).

(continued from page 129)

based on the appearance of the sample. Do a rough cleanup on the first pass and then make a second pass while you adjust the spacing between letters. Refer to the original font for assistance and continue to test the changes by typing text in the Sample window. Keep making adjustments until you are satisfied with the results.

You can experiment with digitizing small pictures or designs and adding them to pictorial fonts.

To set the spacing, bring the left-hand, or origin, control to meet the edge of the character and place the right-hand control to allow two pixels of space after the character.

Other Ideas

You can transfer digitized fonts into *FONTastic* with a 128K Mac, but you'll grow old in the process. Instead of using the *Switcher*, copy each character from *MacPaint* into the Scrapbook separately. Then quit *MacPaint*, start *FONTastic*, and transfer the characters in the Scrapbook. If you lack the disk space to store each character on its own Scrapbook page, you may have to move several characters at a time. Copy five or six characters to the Scrapbook, move them to *FONTastic*, and then throw away the Scrapbook file and copy another group.

If you don't want to tackle a project as ambitious as designing an entire font, you can experiment with digitizing small pictures or designs and adding them to pictorial fonts such as *Cairo* and *Taliesin*. If you want to design a typeface completely from scratch, you'll find some useful advice in "Words from a Man of Letters." Follow the rules of good design, and you'll end up with a tailor-made typeface that fits you like a glove. □

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FONTastic
Altsys Corp.
P.O. Box 865410
Plano, TX 75086
214/596-4970
List price: \$49.95



Figure 4
Using MacPaint's straight line tool, construct a template for reference lines above and below the characters. Draw the lines one pixel away from the letters' ascent and descent and add a short mark at the baseline to help you fit the guidelines to the lowercase letters.

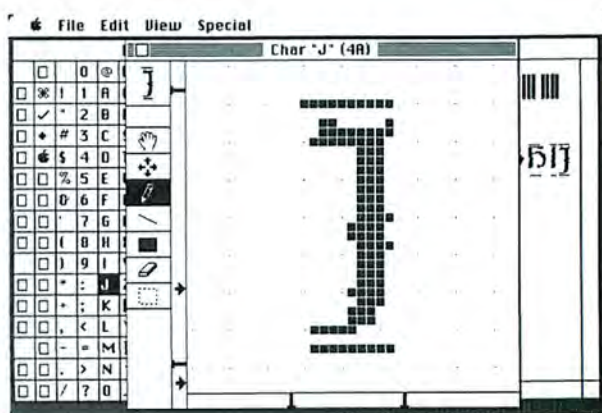


Figure 5
When a character's editing window opens, paste the character along with its guideline fragments. You can verify that *FONTastic* hasn't rescaled the character by switching back to *MacPaint* and comparing the two versions.

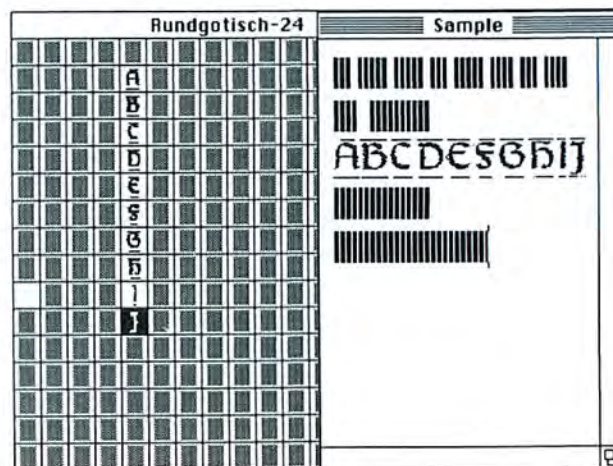
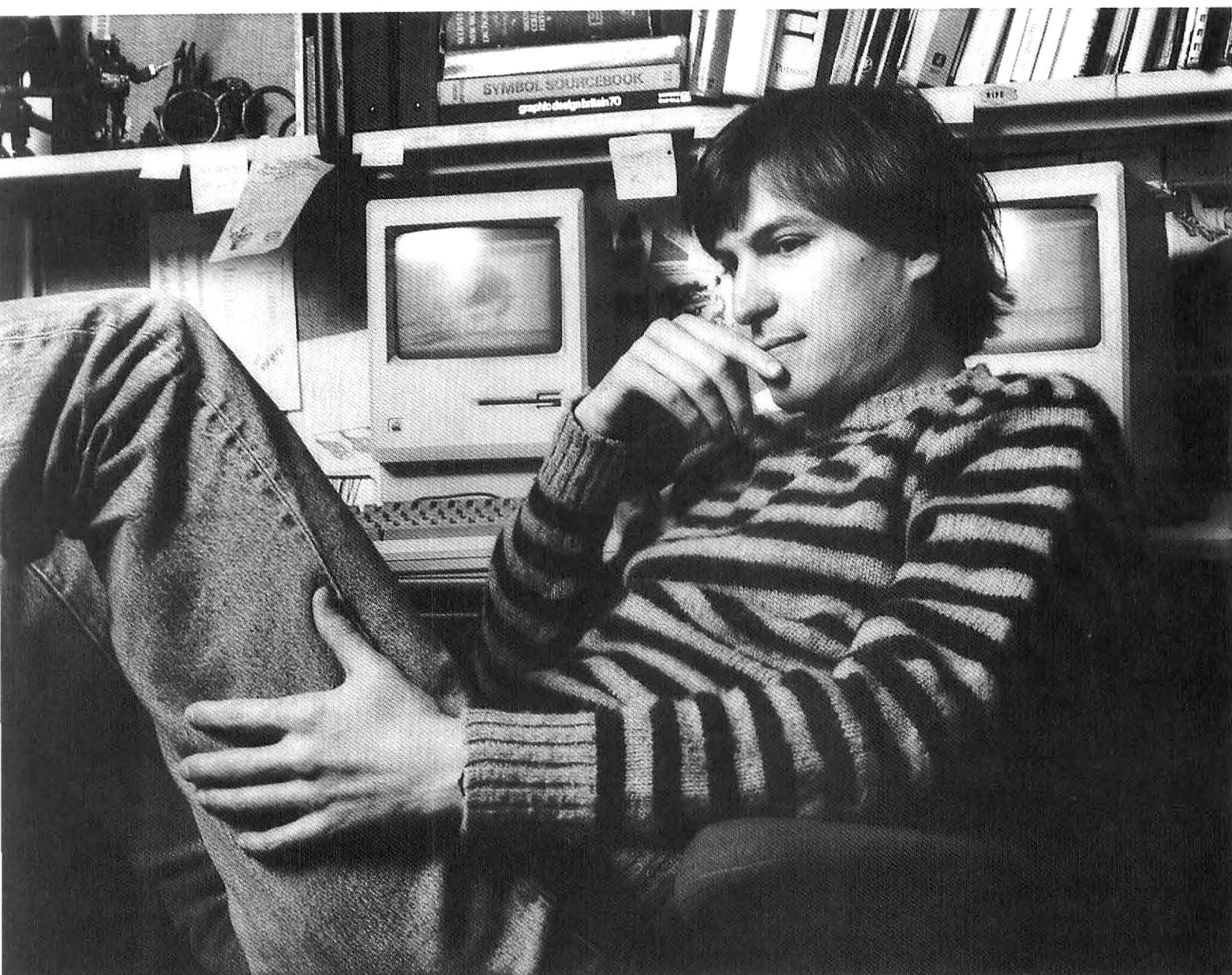


Figure 6
Continue bringing letters into *FONTastic*, watching your progress in the Sample window. The reference lines you drew in *MacPaint* should align, though the spacing between letters may be uneven at this stage.



It was Steve Jobs's vision and drive that made the Macintosh a reality; he provided the inspiration that fueled the Mac team. However, he also set the limits of invention: the Mac's closed architecture and small screen.

Tales of the Macintosh

Jeffrey S. Young

It's been over two years since the unveiling of the Macintosh in January of 1983. In those two years an estimated 500,000 to 600,000 machines were sold, a grand success by anyone's standards—anyone, that is, except Steve Jobs and the other Macintosh creators. Working in secrecy at Apple in the early eighties, Jobs and his hand-picked crew of designers, programmers, and marketing people believed their machine would change the world as well as topple IBM from its favored niche in the personal computer market. The genesis of the Macintosh is an example both of the accomplishments dedication and idealism can produce—the Mac may still change the world—and of the dangers of inexperience and overconfidence.

They came to Apple's sprawling campus of one-story buildings in the heart of the Silicon Valley in ones and twos. They were white, mostly men, and in their mid-twenties. A few of the Macintosh team members had been with Apple from its fabled beginnings, but most were hired specifically for the Macintosh project. More often than not people already involved in the project pulled in their talented friends. Something exciting was happening again at Apple, and the Mac team members didn't want their friends to miss it. The Macintosh team quickly evolved into an insular family, bound together by a belief that their creation would have an impact on the world. So strong was this group identity, in fact, that the signatures of the original team members would eventually be included in their creation, embossed on the inside of the Mac's plastic casing.

The idealistic group of programmers, engineers, writers, and marketers who became the Macintosh team had, with few exceptions, grown up in comfortable suburban surroundings. For the most part they had missed the heyday of Bob Dylan and the Beatles. Apple cofounder Steve Jobs was all of 14 when the

tribal gathering of Woodstock took place in the late sixties. The team members were too young to participate in the protests over the Vietnam War, and the political improprieties of Watergate were something their older brothers and sisters got excited about. They were looking for a cause that could light up the eighties, something they could pour their hearts into. As it happened, the Macintosh became their revolution—their Woodstock—and Steve Jobs became their guru.

The Revolutionaries

During the development of the Macintosh, Apple was a magical place, a high-tech utopia where the traditional operating rules of corporate America didn't apply. Within Apple, Jobs's hand-picked Macintosh band enjoyed special privileges that other divisions at Apple didn't. There were on-call massage therapists, a state-of-the-art stereo system in the Mac team's building, frequent catered lunches, and retreats to Big Sur. This special treatment, combined with the shroud of secrecy that surrounded the Macintosh project both inside and outside Apple, engendered a swashbuckling elitism encouraged by Jobs. The team even hung a skull-and-crossbones pirate flag from the top of their building.

But while the glamour, the massages, and the retreats helped, the true secret weapons that sustained Jobs's revolutionaries in their struggles were youthful idealism, blind faith, and the confidence of inexperience. If they had known where they were headed, they might never have undertaken the journey. Here was a project involving hundreds of millions of dollars run by a band of kids who had never shipped a prod-

uct. They were adopting a new technology that flew in the face of the IBM standard, and they even had plans for a new factory that would be driven entirely by robots.

Mike Murray, the son of an Oregon dairy farmer, was an early Mac team member. He came in to help design the marketing plan and stayed on as Jobs's right hand throughout the project. Murray came to Apple like many before him. He was working on an MBA at Stanford University when he first encountered Jobs.

The Macintosh became more than just another project; it was almost a religion.

It was during Murray's first year at Stanford. He went to a presentation given by three young guys in three-piece suits who said they worked for a company called Apple Computer. The discussion was fairly uninspiring until another young guy, wearing jeans and a down vest, walked in and took over the discussion. After a few minutes Murray was ready to quit school and join Apple's enterprising circus. Later that day he called Apple, asking the receptionist for "Steve, the guy who founded the company," because he had missed Jobs's last name. The receptionist told him that they had two Steves who founded the company, and which one did he mean?

George Crow was responsible for the power supply, the CRT, and the disk drive for the Mac, while Burrell Smith, whose title at Apple was Hardware Wizard, watched over the digital board.



And that was the way it went at Apple in those days. If the spirits were in tune, you stayed. The Macintosh project had started as experimental research to produce an all-in-one machine that would sell for about a thousand dollars on the home market. That was in 1980. By early 1981 the original team leaders, Jef Raskin and Bud Tribble, had left, and Jobs was fully in charge. He had been meddling in the Apple III and Lisa projects, making himself generally unpopular, and had finally settled in with the small group of designers working on the Macintosh.

By that time Burrell Smith, who had been fixing broken Apple IIs in Apple's service department before he was given the task of designing the Macintosh hardware, had a working prototype. And Andy Hertzfeld, one of the original software engineers, had written a demo program that wrote "Hello" in white letters on a black, bit-mapped screen. Not much, but it was enough to inspire the others. The group had come up with some great ideas of their own while adopting some of the best ideas floating around Silicon Valley, such as menus, windows, and the mouse.

Perhaps the most innovative idea embodied in the Mac's design is the user interface—the various elements that combine to give the Macintosh its remarkable ease of use. Chris Espinosa, one of the first employees at Apple, nursed the user interface through its development process. He was assigned to head the group writing the Macintosh documentation, but he spent a lot of his time consulting with the manufacturing, hardware, and software people, as well as with some of the independent developers like Microsoft. Espinosa made sure that the user interface conventions developed for the application programs were consistent. "I figured that if I made sure all the products followed the principles outlined in the user interface guidelines, writing the documentation would be easier. Eventually I got a reputation as the guardian of the user interface," says Espinosa.

The Jobs Touch

The Macintosh group was an oasis of suspended reality within Apple. Some people came to the project thinking that they could bring hard-nosed business sense to the team, but before they knew it, their attitudes would change, and they would embrace Jobs's utopian vision. The Macintosh became more than just another project; it was almost a religion. And if you didn't have the faith, you didn't last.

Joe Shelton was a marketing manager who had been with Apple since 1979 and had worked on every product that Apple had ever sold. He was drafted by Jobs to handle the software—*MacPaint*, *MacWrite*, *MacProject*, and *MacDraw*—that was to be available at launch in January 1984.

"I came into the group with a different perspective, probably with a lot more cynicism and realism than the average Macintosh team member had," says



Shelton. It was accepted within the company that the Macintosh group was a bunch of inexperienced wackos who were working on a computer under Jobs's protective wing. Shelton was expected to bring a dose of reality and experience to the team.

Shelton found, however, that keeping his sense of reality with Jobs running the organization was difficult. "Everyone in the group was saying we're going to sell millions and millions of computers. I kept looking at the forecast and thinking, well, I don't believe that's going to happen. And of course, it didn't. But I wanted to believe it, and pretty soon I'd hear myself saying it too. Steve's vision and force of character were very persuasive."

There's no doubt that the dynamic force behind the Macintosh was Steve Jobs. His presence, his ability to inspire, and his unwillingness to settle for anything less than the very best were integral to the project from start to finish. However, Jobs's personality had its dark sides. He could be temperamental, petulant, and arrogant. This side of Jobs colored the Macintosh group's experience too. He had his favorites, whom he designated as "stars." When reporters came around for interviews, the stars were the ones brought out to demonstrate the Mac's capabilities.

"Being associated with Steve is like being associated with a Henry Ford type of person," says Murray. "Steve doesn't have the same boundaries as the average person, and that's a very difficult concept to fathom."

Jobs understood that the team needed a leader, a person to focus the dreams and hopes of the entire group. He was able to push the team far beyond its normal limits by infusing the project with a sense of high drama. Typical of his manipulation of the troops were the monthly retreats he led. The entire Macintosh team would head south from the Silicon Valley to Carmel, Big Sur, or Pajaro Dunes for three days of meetings. The retreats were partly designed to let everyone blow off steam. The Apple group would take over a motel, build bonfires on the beaches, and swim naked in the pool at three in the morning.

During the strategic meetings, team members would present their lists of goals accomplished and goals for the near future. Jobs would usually keep silent, letting the team do the talking until the very end, when he would take charge and analyze the proceedings. Jobs would write inspirational maxims on the chalkboards, such as "The journey is the reward," "Real artists ship," and "Let's be pirates." At a retreat in Carmel during January of 1983, with early versions of *Write*, *Paint*, *Draw*, and *Multiplan* all running on a Mac prototype, Jobs orchestrated one of his most famous moments.

At the close of the retreat, the team was getting prepared to go into a final push to finish the product. One of the lingering problems was the computer's

A gathering of Macintosh software artists: Randy Wigginton, Jerome Coonen, Donn Denman, Rony Sebok, Andy Hertzfeld, Bruce Horn, Bill Atkinson, Susan Kare, Owen Densmore, Steve Capps, Larry Kenyon, Patti Kenyon, and the baby of the group, Tracie Kenyon.

name. They'd been calling it Macintosh since the beginning of the project, but there were legal problems with McIntosh Laboratories, the company that owned rights to the name. The Mac team had all voted to keep the name and were arguing about what they would do if they couldn't acquire rights to it.

Jobs rose to address the assembled group. He began talking about some general business issues, but then his voice suddenly got low. Saying that he had one thing left to tell the group, he picked up a model of the Macintosh and a bottle of Perrier, opened the bottle of Perrier, and said, almost speaking to himself, "I've just been in communication with the McIntosh Laboratories, and we got the name. So, I officially [pouring the Perrier over the Macintosh] dub thee Macintosh." The room exploded into a wild frenzy. Christening the computer was the best possible thing that Jobs could have done at the time.

The truth was that Apple hadn't yet obtained legal rights to the name. It was all an illusion, but that was Jobs's way. He had either arranged the christening beforehand or, more likely, hadn't arranged anything at all. But he knew that the group needed a shot in the arm to power them onwards, and he couldn't have chosen a better ploy.

The Final Days

By fall of 1983 marketing plans were in place, media tours were scheduled, and reporters and dealers were being shown the computer. The marketing plans were built around the concept of knowledge workers—the 25 million or so people who work with information and to whom the Macintosh marketing team believed the computer would be ideally suited. Selling the Apple dealers on the Mac was no problem, but selling the knowledge worker concept was not so easy. "They didn't know who knowledge workers were and were hard pressed to identify the group," says Steve Schier, who was in charge of organizing the events for presenting the Mac to Apple dealers. "They lumped the Mac into either a business, consumer, or educational grouping. Meanwhile, we were saying that the Mac was for everyone."

But this image difficulty didn't dampen the marketing team's spirits. They were on a crusade, and their enthusiasm and belief in the product carried them forward.

While all of the marketing and media hoopla was building outside, inside the software room at the Mac team headquarters the atmosphere was equally hectic. Lights burned all night. Food was delivered, and endless games of Ping-Pong were played after long stretches of program debugging.

The key Mac programs, Bill Atkinson's *MacPaint* and Ed Ruder's and Randy Wigginton's *MacWrite*, were just about finished. By the end of October, only one major piece of the product had yet to be finished. The

Finder, the essential software bridge between all applications and the Macintosh system—arguably the most important single piece of software—was late. Not only was it late, the person primarily responsible for it, Bruce Horn, was discouraged.

Horn particularly resented the star syndrome that let others bask in the limelight while he was slaving away on the Finder. He felt overlooked and unappreciated by Jobs and consequently made less and less headway writing the Finder code. Horn recalls, "I felt a little sad that the Macintosh heroes didn't spend more



Corporate

America wasn't significantly swayed by Apple's big-brother portrayal of IBM.

time saying, 'It was a team effort, and a lot of people were working together.' But I guess it was the first time they'd ever been heroes. Maybe the only time."

By November it was clear that a superhuman effort would be needed to clean up the bugs and fine-tune the Finder before the Mac's January 1984 shipping date. The solution to the problem was to lock Horn and Steve Capps in a room until they finished it. They spent about 16 hours a day in that room, including Thanksgiving and Christmas, until just before the official introduction of the Mac.

Meanwhile, in the marketing department, the commercial that was to be shown during the 1984 Super Bowl in January was creating a stir. The commercial, which cost \$500,000 to make, depicts Orwell's dehumanized world of 1984 liberated by the promise of a new Apple product. Some people thought the commercial was too controversial and that it wouldn't help sell the Macintosh. Others thought it was great. At one point Apple tried to sell the \$900,000 commercial slot, but couldn't. Finally Jobs and Murray made the decision to run the commercial.

The Macintosh Debut

Somehow all the elements came together for the introduction of the Macintosh. When the famous Apple ad ran during the second half of the Super Bowl, the software was working, and the Macintosh was ready to be sprung on the public at the shareholders meeting in three days. The computer was everything the team had hoped, and more.

The Macintosh team had taken an enormous risk and pulled it off. "We were naive, we were optimistic, and we had energy," says Murray. "If we had been old, cynical, and tired, we would never have done it because we would have said it couldn't be done. In retrospect, we made a lot of mistakes, but it's still hard to believe we accomplished what we did."

Unfortunately, the world votes on a product for reasons that may not be apparent to a group of technophiles isolated within the closed community of the Silicon Valley. The first hundred days after the introduction of the Mac were remarkable. Seventy thousand machines were sold, setting records for personal computer sales. Soon, however, the lack of Macintosh business software began to tell, and the Mac's initial momentum was lost.

When the Macintosh was launched, the joke among the Mac team was that four software products were available: *MacWrite*, *MacPaint*, *MacWrite*, and *MacPaint*. For the first few months, those remained the Mac's entire software repertoire. The Macintosh also lacked hard disks, file servers, and even a letter-quality printer. But those deficiencies didn't stop Apple, its eyes on IBM's lucrative Fortune 500 domain, from trying to push the Mac as a corporate business machine.

A lot of the mistakes the Mac team made were mistakes of youth and hubris. They were so sure they were right that they never bothered to take a realistic look at the marketplace. The world was waiting for them, and they believed the public would automatically leap onto their bandwagon. "We thought we had the most precocious child in the world. People would buy the machine, fall in love with it, and realize that we were right," says Capps. The Macintosh creators may have had the most precocious child in the world, but not everybody wanted to play with it.

Some of the Mac team's mistakes were rooted in their misunderstanding of American mass culture. Somewhere in the midst of their journey, they lost sight of Americans' fascination with faster and more powerful machines. They didn't expect people to be as voracious for more memory, speed, and software as they were. "I thought that people would fool around with it for a year before needing more power, but apparently, while we were locked away in an ivory tower, the world outside was moving very fast," Espinosa says.

The Mac team had thought that a second-generation Macintosh would be available by the time people needed more power and speed. But bringing the computer to market had been such a major effort that follow-up projects weren't planned with anything like the same intensity. People were drained by the time the Mac was released, and projects fell behind schedule or were canceled. In addition, a faction within Apple led by chief executive officer John Sculley was trying to take control of Jobs's Macintosh division. Things weren't going smoothly.

"Along the way certain things didn't get done that had to get done," Murray says. "We ran out of gas." The Macintosh team had played an extraordinary marketing game, pitting themselves against IBM and setting up expectations for the near future. But the products they had promised in the short term never appeared or were late, and corporate America wasn't significantly swayed by Apple's big-brother portrayal of IBM.



Two Years Later

It's been two years since the Macintosh was introduced to the world. Most of the Mac team members are no longer working at Apple, but the Macintosh continues to thrive. An estimated half million Macintoshes have been sold. As Apple has consolidated under new leadership, the company has begun to address some of the key problems with the original Macintosh: closed architecture, the small screen, and slow disk access. A shortage of software is certainly no longer a problem, since approximately 700 software products are now available.

The Mac was a great step in personal computer technology. Somewhere, in a garage or a secret set of offices belonging to one computer company or another, a new group of pioneers is undoubtedly working to bring their vision into the world. When they do, they'll owe a great deal to a team of young engineers and designers who took some fresh ideas, and a few old ones, and crafted a revolutionary computer. □

●●●●●●●●●● Jeffrey S. Young is a Contributing Editor of Macworld.

A few of the key members of the Macintosh team pose for the press. From the left: George Crow, Joanna Hoffman, Andy Hertzfeld, Burrell Smith, Bill Atkinson, Jerry Manock.

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Bernoulli Box 1-10MB	Call
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Sony Magnum 800K Drive	399.00
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Dasch External RAMdisk 500K	Call
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Apple Personal Modem 300/1200	279.00
Hayes Microcomputing	
Smartmodem 300	129.00
Smartmodem 1200	369.00
Smartmodem 2400	579.00
Transtel 1000	269.00
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Mac Modem 1200 w/Software	419.00
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Cat Comm Communications System	Call
Prentice Popcom X-100 Modem (Mac)	259.00
Prometheus	
Promodem 1200M with Mac Software	319.00
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Password 1200 (Male for Macintosh)	199.00
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HR-35	679.00
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DH-45 Dual Head Printer	859.00
w/Serial Interface	Call
Epson AP-80 ImageWriter Compatabile	Call
DX-10/20 DaisyWheel	Call
FX-85/185 w/Hanson Interface	Call
LQ-800/1500 w/Serial Interface	Call
SO-2000 w/Serial Interface	Call
Hewlett Packard Thinkjet	Call
Laserjet	Call
Laserjet Plus	Call
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6200 Serial	559.00
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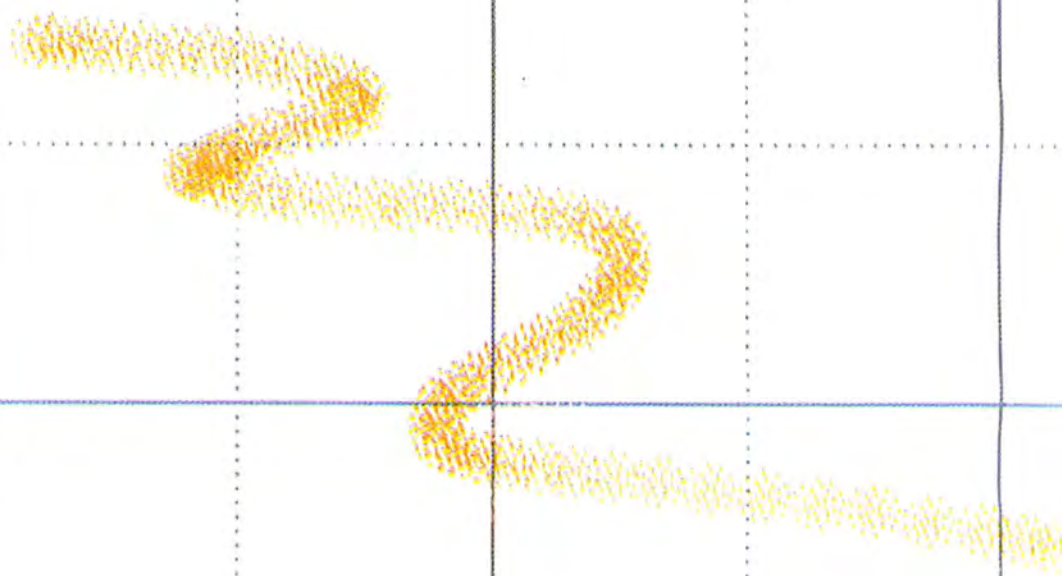
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Introducing FileMaker.

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You can pick up data from other programs, like MacWrite™, MacPaint™, Multiplan™, Jazz™, share the applications you've created with other members of your team, or consolidate group efforts into one database. And FileMaker is not copy protected, so it's easier to use, easier to back up, easier to configure for the Macintosh Office.

So for \$195 (suggested retail), things could look better for your entire division, department, practice, retail operation, organization, or principality.

To get a \$15 demo version of FileMaker, call 1 800 MACWARE today. From Forethought, Inc.



MACWARE™

Now data doesn't have to look base.

Item Number	Product Description	Price
AC2345	Water Bottle	15.00
AB26L	Ladies 26" Breeze 10 Speed	179.00
AB200	Bicycle Built For Two	249.00
AB100		69.00
AB27M		
HT100		
FCA911		
FCA901		
5792		
5796		
5650		
BBS200		
BBA101		
BBA102		
27AW		
26AW		
SB231		

The Spokesman
12 Bearing Street Wheeling, W.VA 26055
March 6, 1985

Jeremy Williamson, Jr.
1456 East Raybourne Road
Farmville VA 23944

Dear Jeremy:

Thank you for your recent order from The Spokesman Company. We are currently processing your order for immediate shipment. The following list represents the totals we have received in our shipping department.

2	27" alloy wheel	# 27AW	at \$62.00	\$124.00
1	Seat Post	# 5792	at \$22.78	\$22.78
4	Break Shoes	# BBS200	at \$3.00	\$12.00
2	Saddle Bags	# SB231	at \$38.00	\$76.00
			Total Order:	\$234.78

I am confident products for a free number of modify the on telephone price adequate need.

Thank you again in the future.

Sincerely,
John L. S.

PRICELIST

Vendor: MiracleTape Inc.
86 Tacky Drive
Sackville, MA 01701

To: American Bicycle
214 Main Street
Philadelphia, PA 03456

To: MiracleTape Inc.

Comments: Available in brown, tan, white.

Unstocked by: -2

Unstocked by: -2

Comments: Available in brown, tan, white.

Infoworld
REPORT CARD

FILEMAKER

	Poor	Fair	Good	Excellent
Performance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Ease of Use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Error Handling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INVENTORY
By Vendor
March 31, 1985

PURCHASE ORDER

To: Wainman, USA
86 Skid Flow
New York, NY, 01103

Description	Item Number	Units	Unit Price	Extended Price
Brake shoes	BBS200	2	\$0.50	\$1.00
Brake lever, right front tire	BBA101	1	\$5.45	\$5.45
Brake lever, left front	BBA102	2	\$5.45	\$10.90
				Amount of Purchase order: \$17.35
				Sales Tax: \$1.12
				Total Amount of Purchase order: \$18.47

The Spokesman

Vendor	Description	Item Number	Closing Stock	Order Stock	Unit Cost	Restocking Cost
Acme Water Bottle	Water Bottle	AC2345	8	4	\$11.34	\$45.36
American Bicycle	Ladies 26" Breeze	AB26L	1	8	\$4.50	\$36.00
American Bicycle	Bicycle Built For Two	AB200	3	-1	\$52.00	(\$52.00)
American Bicycle	Solo Unicycle	AB100	4	8	\$135.00	\$1,080.00
American Bicycle	Mens 27" Bazer	AB27M	5	1	\$49.50	\$49.50
MiracleTape Inc.	Handicapped Tape	HT100	3	1	\$99.00	\$99.00
Myka Bicycle	Chrome forks for 27"	FCA911	10	-2	\$0.50	\$1,130.50
Myka Bicycle	Flid Flyer Bikes	FCA901	10	-2	\$1.00	(\$1.00)
Myka Bicycle		FCA901	4	1	\$5.35	\$5.35
Myka Bicycle			2	2	\$78.85	\$78.85
Myka Bicycle			2	1	\$15.95	\$15.95
Myka Bicycle			5	3	\$1.75	\$5.25
Myka Bicycle			3	3	\$14.65	\$43.95
Myka Bicycle			10	7		\$65.15
Myka Bicycle			49	20		\$1,330.87

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Circle 289 on reader service card

Macware Reviews

My Office, DASCH, Sierra Championship Boxing, Speed Reader II, Quick and Dirty Utilities, Ultima III, Battery Pak, and Pinball Construction Set

Edited by Erfert Nielson

A Well-Stocked Office

In the Macintosh world, software imitates life. Mac owners are accustomed to metaphorical interpretations of real-life actions. To delete a document, for example, you toss a picture of a piece of paper into a picture of a trash can. DataPak's **My Office** is an on-screen version of a typical office, with icons representing a photocopier, a filing cabinet, a trash can, and a selection of paper stock. **My Office** includes a word processor, a database, and a graphics module. While each of the modules is somewhat limited, the program provides them all on a single disk that runs on a 128K Mac.

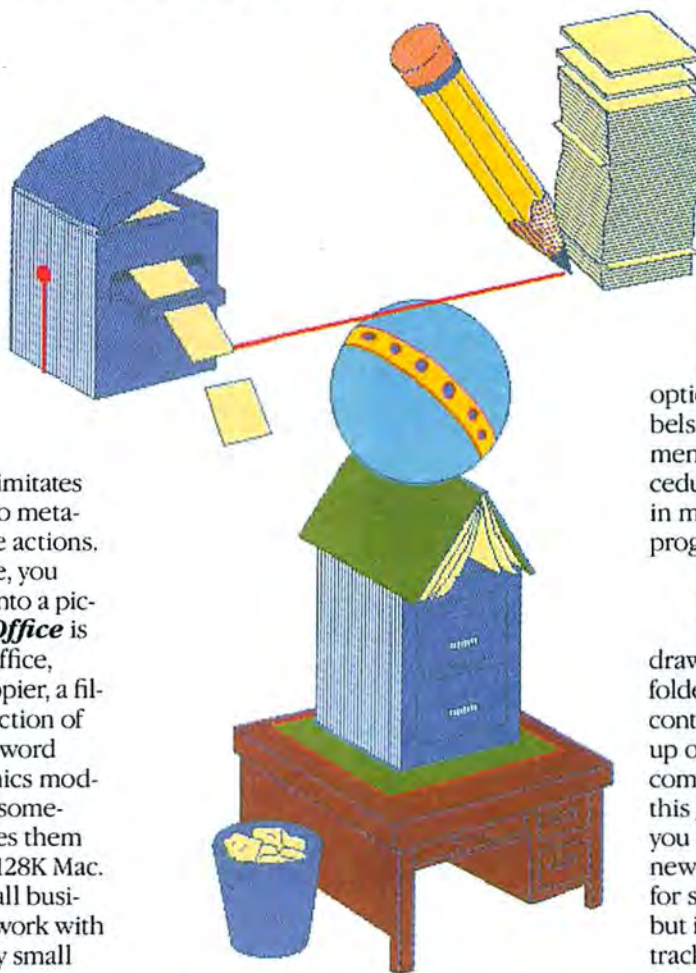
My Office is designed for small businesses and individuals. It doesn't work with the LaserWriter, but then not many small companies or individuals own a LaserWriter. The program should be a godsend to people who have found their mailing lists hard to manage or who want help with their form letters.

My Office displays its own desktop on which appears a large, three-drawer filing cabinet and four smaller icons labeled Stock, Copier, Archives, and Trash (see "A Small Office"). The Stock icon offers a choice of paper sizes. The Copier icon opens up to display a control panel that lets you select paper size, print quality, and number of copies. The Archives cabinet provides a place to store old documents,

and the Trash accepts unwanted documents. The only icon missing is a coffee machine.

The large filing cabinet contains alphabetized, labeled file folders. You define each drawer as a different category, such as customers, invoices, or correspondence. A drawer can contain as many folders as disk space allows. Each folder contains one or more documents.

My Office's File Clerk menu option, like its human counterpart, dutifully searches for folders or documents. You can ask the File Clerk to search for whole words or partial words in a folder label as well as for key words within a document. The File Clerk is extremely fast and makes finding documents a snap.



My Office's Print menu lets you select options such as Form Letters or Mailing Labels. Offering these printing options in a menu makes it easy to select printing procedures that are complicated to perform in most database or word processing programs.

Filling Folders

To set up a database, you open a file drawer and select the New Folder. The folder opens, and you see a window that contains the Folder Summary, a form made up of fields such as first name, last name, company, and salutation. While the fields in this generic database form are all useful, you can't change them, nor can you add new fields. The **My Office** database is fine for storing name-and-address information, but it won't meet your needs if you have to track more complicated data. The Folder Summary also lists all the documents stored in the folder you've opened. Clicking on the name of a document displays that document's contents.

You can create documents in **My Office** and later merge the information contained in a Folder Summary with the documents. To write a letter, for example, you first open the file folder in which you want to store the letter. Next, you click the Stock icon in the lower-left corner of the screen. The icon opens to reveal a selection of six

(continues on page 144)

(continued from page 143)

ited to documents created within the program, is one of the program's most useful features.

Mailing labels are created in much the same way as form letters, except that you select Mailing Labels from the Print menu. You then indicate the variables you wish to print.

Smart Stationery

My Office has a graphics module that lets you create freehand drawings or design business forms and print them on paper of any size. The graphics module provides many *MacPaint* features, such as a paintbrush, a pencil, and an eraser. Unfortunately, the module does not include an Undo command. You can save forms or stationery you design as templates. Like text documents, forms and drawings can be saved in the currently open folder or in the Stock supply.

The graphics module does more than let you create artwork, however. If you click on the Set Typing Fields button at the bottom of the graphics window, *My Office* lets you create forms that you can fill in while they are displayed on the screen. You can place fields anywhere in a form and later enter text or numbers into them. If you enter numerical data, *My Office* can add, subtract, multiply, or divide the data and place the result in another field.

The documentation that comes with *My Office* is on the brief side, but a cassette-tape tutorial is provided to guide you through the program's many features. The

(continues on page 146)

paper sizes, including standard 8½- by 11-inch letter size, 11- by 14-inch legal size, and even 3- by 5-inch cards. Double-click on the paper size you want, and a file called Untitled appears. You can then proceed to type your letter.

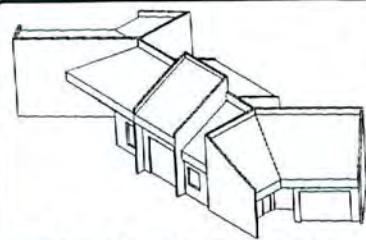
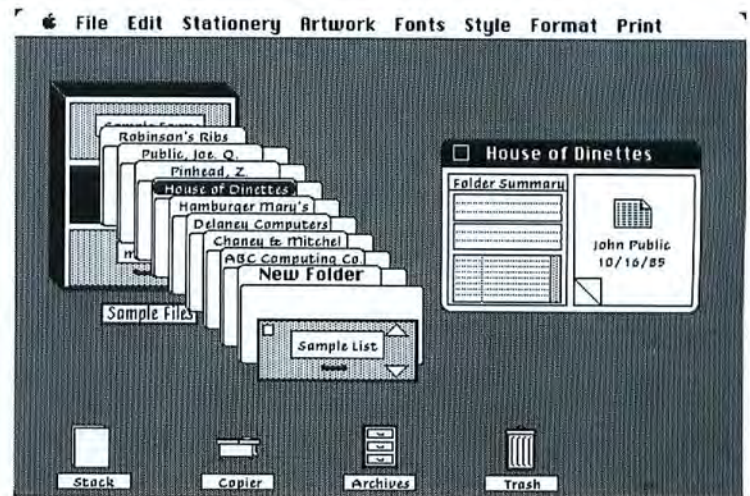
My Office's word processor includes features such as word wrap, the ability to move or delete blocks of text, and a selection of eight fonts (more can be added with Apple's Font Mover if you wish). The program has some notable omissions, however. For example, you can't place tabs in a document. Also, while you can cut and paste text within *My Office*, you can't use the Clipboard to cut and paste text from other applications, such as *MacWrite* or *Microsoft Word*. While *My Office*'s word processor is lacking in features compared to *MacWrite* or *Word*, it is adequate for typing short memos or letters.

When you save the letter, it is placed in the folder that is open on the *My Office* desktop. To write another letter, you must return to the filing cabinet, extract the appropriate folder, and then select a new sheet of paper from the Stock icon.

Form letters are easy to create with *My Office*. You simply type a document and precede variables with a caret symbol (^). For example, ^Company would be replaced by the company name listed in the Folder Summary of the currently selected file. To print your letter, select Form Letters from the Print menu. You can save a form letter template for future use, either in the Stock supply window or in a folder. *My Office*'s mail-merge capability, although lim-

A Small Office

My Office presents images familiar to office workers: filing cabinets, a stack of stationery, a copier, and a trash can. You can type letters and memos, fill in forms, search through filing cabinets for folders, and press a button on the copier to print several copies of a report.

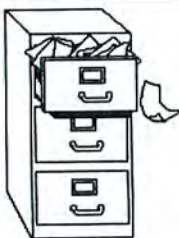


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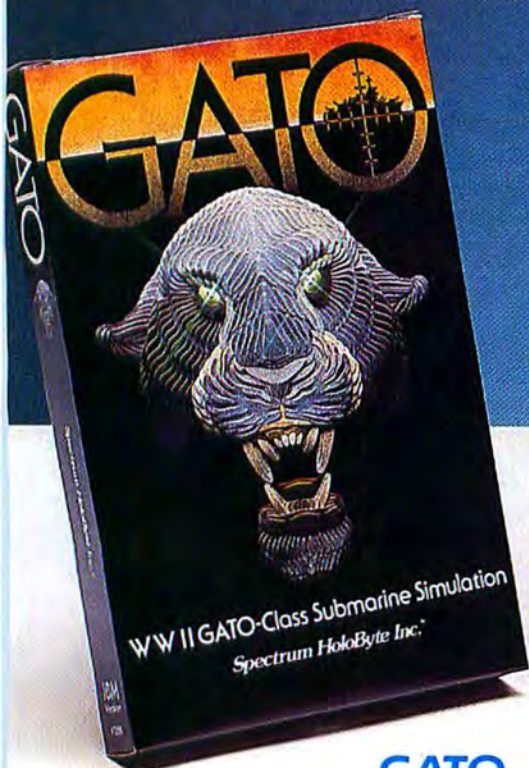
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Los Alamos, NM 87544
(505) 672-1998
Telex: 5101003099



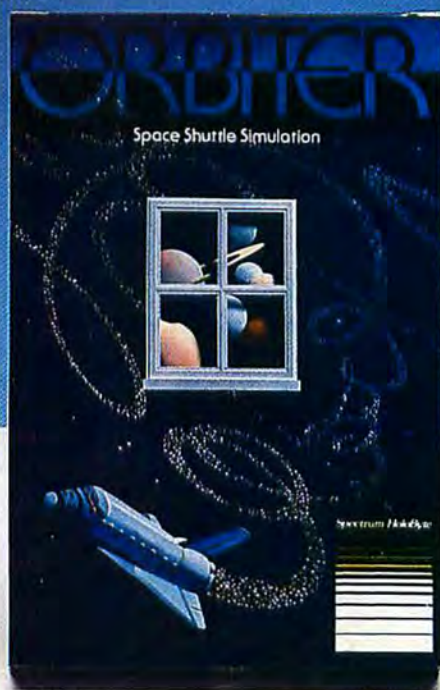
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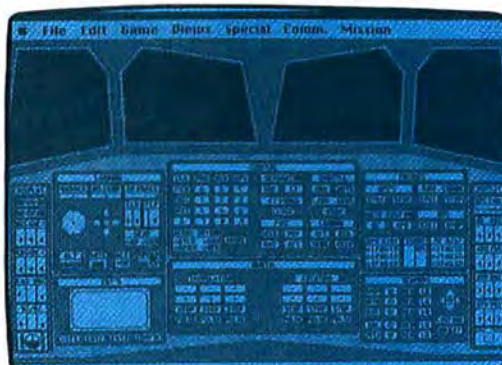
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(IBM requires 128K, color graphics card, graphics monitor, double-sided drive. Apple IIe™ or IIc™ requires 128K, single-sided drive. Joystick optional. Macintosh requires 128K.)



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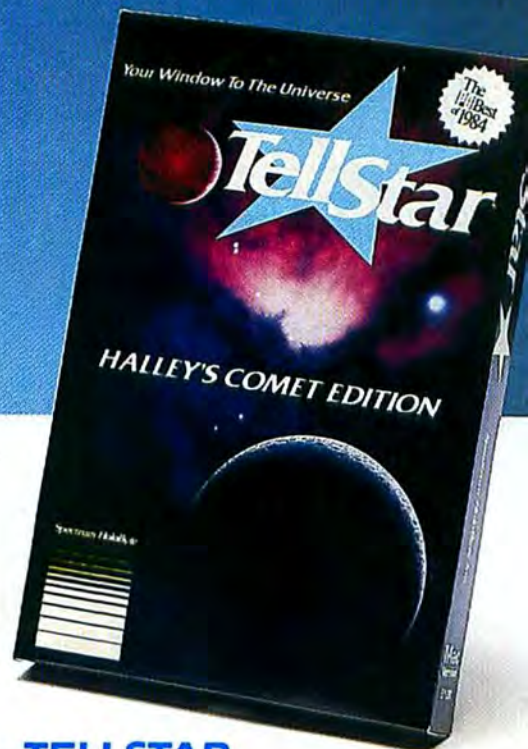


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(continued from page 144)

tape refers you to a few nonexistent menu items, but all in all it does a good job of initiating you to the program.

All in all, *My Office* is versatile integrated software that is suitable for 128K Macintosh owners who don't print on the LaserWriter or cut and paste information from other programs. The program offers an easy way to produce form letters and mailing labels but is not satisfactory for businesses with rigorous database requirements.

According to a DataPak representative, the company will soon release *The Executive Office*, an enhanced version of *My Office* that will work with the LaserWriter and the Clipboard and contain a full-fledged word processor. If *My Office* doesn't meet your needs, you might want to take a look at the enhanced version. —Diane Burns

My Office
 DataPak Software, Inc.
 14011 Ventura Blvd. #401
 Sherman Oaks, CA 91423
 818/905-6419
 List price: \$129.99

RAM in a Can

A faster Macintosh with more memory is on many a Mac owner's wish list. When you use a large integrated program like *Jazz*, *Excel*, or *Crunch*, a sizable portion of the Mac's 512K of RAM is taken up by the program. Similarly, the Mac's two 400K disk drives are pushed to their limits by integrated programs. For example, you can ordinarily keep only a limited number of documents on the disk in the internal drive along with the startup portion of *Jazz*, while the program itself occupies almost all of the space on the disk in the external drive. With *Excel*, you might end up swapping three disks between two drives: one for the program, a second for the System and Finder files, and a third for documents.

To cope with the fact that many new programs have outgrown the Macintosh, some Mac owners are installing memory upgrade boards. The boards can boost the amount of RAM to as much as 2 megabytes. Many of the upgrades void the Apple warranty, however. Another solution to the speed and space dilemma is purchasing a hard disk, which can store 5, 10, or 20 megabytes of applications and documents. Hard disks are an expensive option, however, running from \$1300 to \$3300.

(continues on page 150)

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When the Macintosh first came out, everyone looked at it and said, "Wow, wait 'till the gaming wizards get ahold of this baby..." And some of them did. But some of the "quick and dirty" products that have appeared have left some entertainment software for the Mac a little disappointing.

Here at **Miles Computing**, software designers who simply will not put up with second best, or half-baked concepts, have delivered entertainment products of such intensity of effort and such depth that our designers say "Wow, wait 'till people get ahold of *this*..."



MacAttack! was the first, an amazing best-selling programming feat. It's a 3-dimensional tank battle zone simulation where you defend a city in your radar-equipped Sherman Tank. You must survive by out-manuevering conventional and heat-seeking missiles coming from your opponents who can only be eliminated by accurate shooting on your part. Deadly tanks and planes roam about in this unique game with three levels.



Harrier Strike Mission is follow-up to MacAttack! in a tour-de-force of Assembly language utilizing sensational 3-D graphics. This flight combat simulator features the famous Harrier Jump Jet, a fighter aircraft which can maneuver like a heli-

copter but has all the punch of the latest in modern jet armament. You are pitted against an enemy-occupied island firing heat-seekers, not to mention fighter aircraft in mid-air combat. You must take off from an aircraft carrier, take out the command post and fuel depot on the island and return to your ship. With two skill levels and your choice of day or night mission, mouse or joystick controls, it's the ultimate 3-D flight combat simulator.



Then there's **Fusillade**. You're the last person stuck on Planet Fusill, and must defend a city from power-hungry kamakazee

equipped and shielded space ship. On the way to the enemy's planet-sized space station you must survive waves of enemy space paraphernalia, and only your mouse or joystick stand between you and destruction as the waves keep coming, and coming, making things "rather difficult indeed" for you.



For those who want to exercise brain muscles, we have **Overlords**. The object is galactic domination, with power struggles. Struggles against whom? Well, up to 32 players, that's who!

Players can be either people or the Macintosh itself, or can even be linked up via Apple Computer's Apple Talk network, the very first game to do this. You can have multiple players on one computer, or link up to other computers, each player with its own strategy and personality. You can use the

ships that come with it, over a dozen, or design your own, and by zooming in and out over the Galaxy, set out for high adventure.

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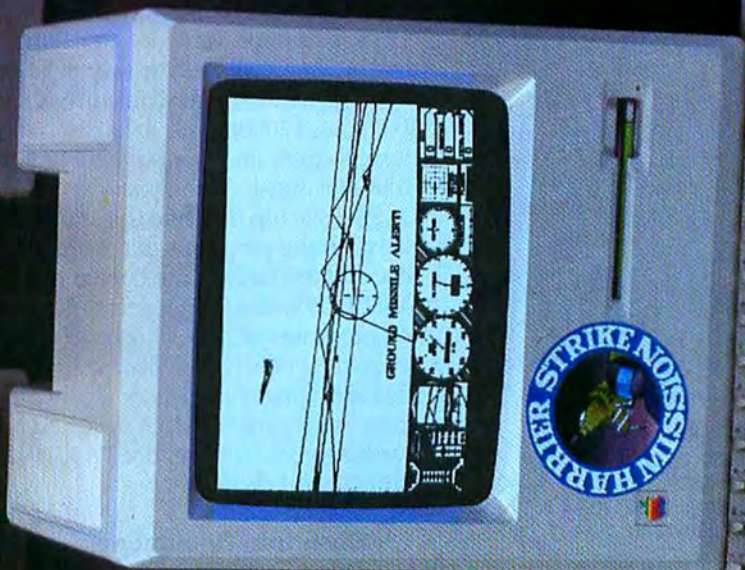
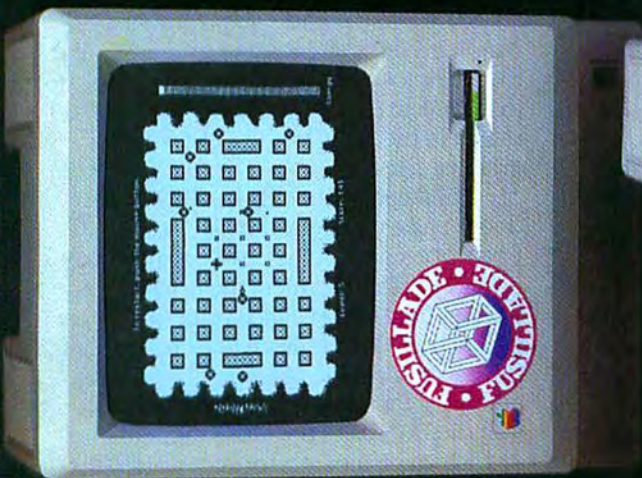
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looters in a fast-action shoot-out which escalates at dizzying speed as wave after wave attacks your position in over 30 knuckle-whitening levels. Mouse, keyboard or joystick controlled.



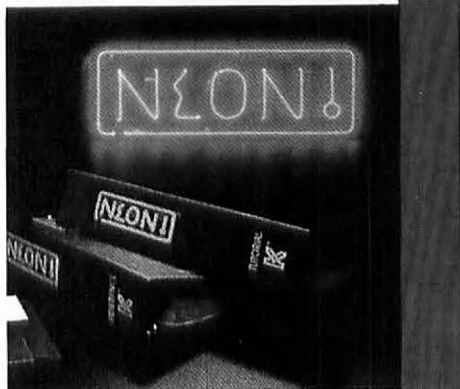
If real trouble is what you're looking for, **MacWars** has it. Miles Computing just can't keep away from 3-D, and this one has a black planet strewn with a deadly obstacle course of surface and sky targets through which you fly your laser cannon-

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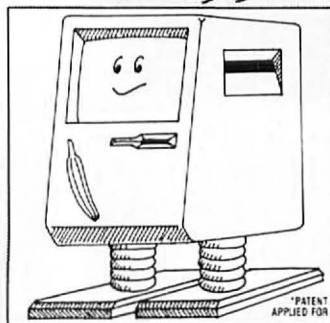
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(continued from page 146)

An External RAM Upgrade

Now a third option exists, the **DASCH** (Disk Acceleration/Storage Control Hardware) from Western Automation Laboratories. The DASCH is best described as a fast, large-capacity external drive. But unlike the Macintosh's present external drive, which stores data mechanically on a disk, the DASCH stores data electronically in RAM. This storage method offers considerable speed improvements over floppy disk drives when you open or save files.

The DASCH is available in 500K, 1000K, and 2000K sizes. It has its own power supply and works with a 128K or 512K Macintosh. When you insert the DASCH startup disk into the Mac's internal drive, all the programs that manage the Mac and the DASCH are copied into the DASCH. You can then insert disks containing programs or data, which are also copied to the DASCH. The display says which files are being copied, how much storage space is available on each disk, and how much room remains in the DASCH's RAM after each file is loaded.

Dash into Documents

Once the programs and documents are loaded into the DASCH, you can open them and load them into the Mac's RAM or into the Switcher. On the average, application programs load four to five times faster from the DASCH than from a floppy disk. For example, I was able to open a *MacPaint* document in 4 seconds, compared to the 22 seconds the operation takes from the external drive. Similarly, the DASCH increases the speed of any operation that requires the transfer of information between the Mac's memory and disk.

In addition to accelerating the opening and saving of files, the DASCH streamlines the steps involved in using programs like *Jazz*, *Excel*, and *Crunch*. With *Jazz*, for example, you can copy the startup disk, the program disk, and your *Jazz* documents to the DASCH. With all of *Jazz* in the DASCH, the program doesn't have to make time-consuming trips to a disk for different pieces of information. Instead of scattering the *Jazz* documents across several startup and storage disks, you can load the documents into DASCH, where they can be accessed without swapping disks.

You make more significant speed gains when you use programs like *Micro-soft Word* and disk-based *MacWrite*.

Rather than storing an entire document in memory while you work on it, both programs read and write parts of the document to disk—or to the DASCH—as necessary. Such disk access slows the programs considerably, which is especially annoying when you're scrolling through a long document. With the DASCH, however, access time is so fast that you don't notice a delay even when scrolling from the beginning to the end of a long report.

When you are ready to turn off the Mac, the DASCH backup program reverses the process performed by the startup program. The DASCH keeps track of documents you create and changes you make to existing documents. It updates files that you changed, asking you to insert the appropriate disks to save the changes. It also lists new files, letting you decide where to store them.

Spooling and Storage

The DASCH offers some advantages over hard disks and RAM upgrades. Unlike the Macintosh's RAM, internal upgrades to that RAM, and RAM disks, information stored in the DASCH is not lost if a program crashes.

Unlike most hard disks, the DASCH doesn't take up one of the Mac's serial ports. You connect the device to the Mac's printer port and connect the printer to a port on the DASCH. Since you can allocate part of the DASCH's RAM to print spooling, you can work at the Mac and print out documents at the same time. You can also attach the DASCH to the Mac's modem port so you can connect the printer port to the AppleTalk network.

The DASCH can make many programs run more efficiently, but it won't solve all your Mac memory problems. Although the DASCH adds RAM to the Macintosh, the DASCH's RAM is noncontiguous; it can't be used to expand the internal RAM activities of the Mac. The DASCH doesn't make it possible to create larger *Jazz* spreadsheets than you can with a 512K Mac with an external drive, nor does it allow you to load more programs into the Switcher.

The DASCH is neither a hard disk nor an internal RAM upgrade, but it offers some of the advantages of both. Although RAM-based programs must still work within the Mac's 128K or 512K limits, oper-

(continues on page 153)



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SOFTWARE

(continued from page 150)

ations that would normally slow down for a disk access happen almost instantly with the DASCH installed. And while you can't store 20 megabytes of data on a DASCH as you can on a hard disk, the DASCH holds up to 2 megabytes of programs and documents. You can leave the device on seven days a week without shortening its life span, making it function as a permanent storage device. Adding a battery pack further insures against loss of data.

If you want to soup up your Mac's speed and storage capabilities, the DASCH may be what you're looking for. You might consider buying a DASCH instead of an external drive. I think the \$300 price difference between the 1000K DASCH and Apple's 400K external drive is worth the money for a significant improvement in speed and storage capacity.—Charles Spezzano

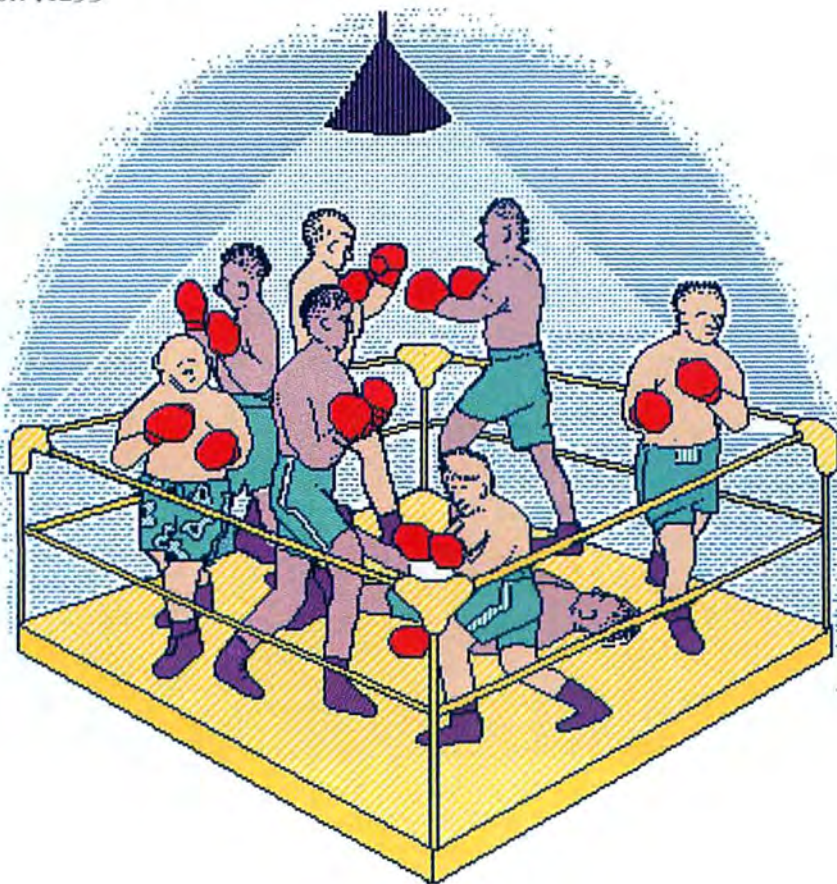
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Be a Contender

People have been fighting since the beginning of time. Most cultures have taken the human propensity to "mix it up" and developed sophisticated, ritualized forms of combat. The formal art of Western boxing, for example, goes back at least as far as the ancient Greeks. Homer describes a match in the *Iliad*. At that time few rules had been set down, and combatants often died of their injuries. Gradually, boxing became more civilized, and in 1865 a set of rules was adopted that defined the modern sport of boxing. The Marquis of Queensberry's rules established the use of gloves, a ring, and 3-minute rounds. Now, more than 100 years later, the sport of boxing has come to the Macintosh.

Sierra Championship Boxing is an arcade-style boxing simulation. The program includes a library of heavyweight champions and contenders from Jack Johnson to Larry Holmes, as well as the toughest competitors from other weight divisions. For each boxer the program keeps vital statistics in 21 categories such as age, weight, reach, best punch, speed, accuracy,

(continues on page 154)



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(continued from page 153)

killer instinct, ability to take a punch, and aggressiveness. In addition, you can create your own boxers or simulate any real boxer not already on the program's roster. The roster also includes a kangaroo and cartoon characters if you want an easy match.

Fight Modes

The program has three fight modes: simulation, strategy, and arcade. In simulation mode the computer controls the boxers' actions. The simulations are based on the program's list of statistics for each boxer. During a fight the program compares statistics for the two boxers and calculates how a boxer would most likely react to his opponent's actions. Don't expect the classic "Thriller in Manila" to come out exactly like the actual fight between Ali and Frazier, however. On any given day a bout between two closely matched boxers is difficult to predict. A fighter might not have gotten enough sleep or might be drained from training too hard to make his weight.

Although the simulated bouts can't mirror the many factors involved in a real fight, the program has a ring of authenticity. The creators of *Sierra Champion-*

ship Boxing, Dave and Barry Murry, spent a lot of time researching the statistical information for each boxer and working out how the program should use the information. For example, suppose a boxer is considered very fast with his hands, aggressive, and in his prime at the age of 27. If you change the boxer's age to 34, the program knows that the boxer is slower and less aggressive than when he was 27 and factors that information into the simulation.

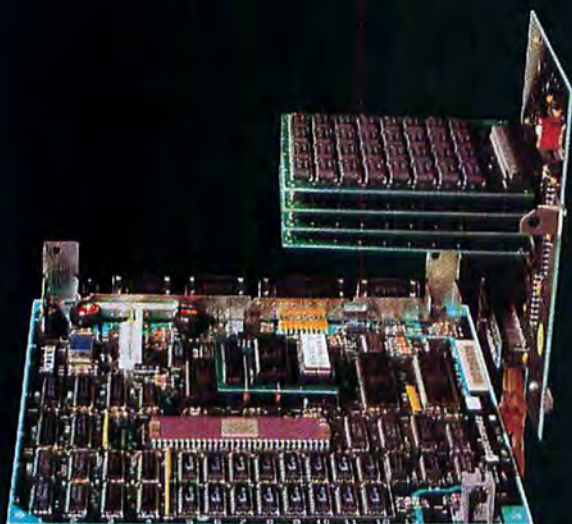
If you enjoy just watching the fights, you can set up some interesting matches. You can create your own contender and match him against boxing immortals like Joe Louis or Marvin Hagler. Or you can simulate a dream match, pitting Muhammad Ali against Joe Louis or Sugar Ray Leonard. You can adjust the weight, height, reach, and age of each fighter to even up the odds between boxers in differing weight classes or at different stages of their careers. I had welterweight Leonard go against Ali in a ten-rounder. I adjusted Leonard's weight, height, and reach for the heavyweight division to give him a fair chance against Ali. The winner? By unanimous decision: Ali.

Of course, competing against another player in arcade mode is the real test of your reflexes and strategic abilities. You can play against the computer or against another player, using the keyboard to control the fighters. Keys on the left side of the keyboard control the boxer on the left, and those on the right control the other boxer. It takes a good deal of practice before you can control a boxer's movements skillfully.

In strategy mode you act as manager or trainer for your boxer, giving him instructions from the corner. During a fight you press keys to instruct a boxer to cover himself or go for the knockout if he has his opponent in trouble. For example, when I matched Joe Frazier against Ken Norton, I told Frazier to cover up the first round and guard his ribs, because Norton is a good body puncher. Eventually Norton tired, and I let Frazier loose. You can also make between-round decisions to go for the knockout or rest on the ropes.

Round by Round

To begin a fight, you first choose the boxers who are going to duke it out. Then the Tale of the Tape appears on the screen (see "And in This Corner"). At that stage you can adjust the boxers' age, height,



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weight, reach, and won and lost records. Any modifications affect the odds, which are posted above the Tale of the Tape. You then choose the number and length of rounds and the fight mode. Whether you're playing against the computer or another player, you can set the fight mode to arcade or strategy. You can also handicap fighters in arcade mode. Giving a higher handicap to a better fighter evens out the odds. The higher the handicap, the more slowly the boxer completes his actions. If you want to modify other factors or get more information about a particular boxer, you must go to the Gym.

When you're ready to begin a match, the bell rings and the boxers come out fighting. The boxers stand toe to toe—no dancing around the ring. Nevertheless, the game's graphics are well done. The boxers have a repertoire of about 100 movements—combinations of moving the head, legs, and arms—which provide enough variation to keep the action from becoming too repetitive. When one boxer connects with a solid punch, you see the other's head thrown back or body double over, and sweat flies off his body. You can have a

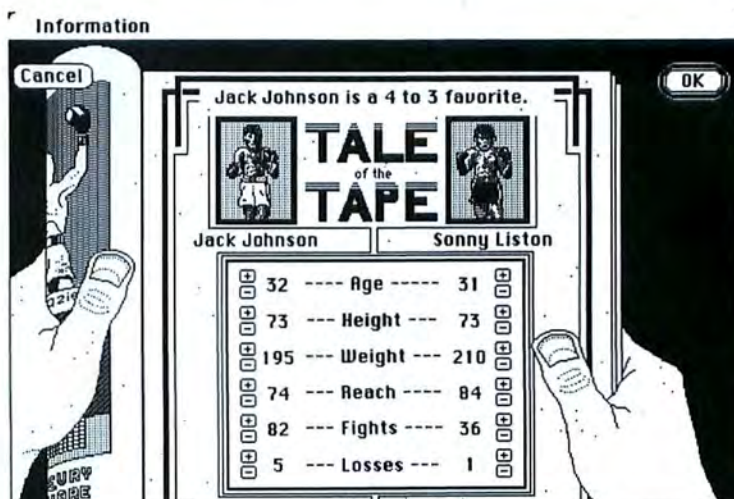
boxer do the Ali shuffle and bounce off the ropes. When the fighters are breathing heavily, you can see their chests moving up and down. Sounds dramatize punches that connect, but there are no groans or thuds when a boxer hits the canvas. Digitized sound would make the action seem more authentic.

You'll also notice that crowd scenes change during a fight. If you look closely, you can identify several famous silhouettes in the audience, including those of Alfred Hitchcock and Batman.

Between rounds the judges score the fight (10-point "must" scoring system, mandatory 8 count on a knockdown, 3 knockdown rule), and you are told the condition of the fighters: "Max Schmeling is breathing heavy and has a cut on the nose. Joe Louis is breathing heavy."

Basically, the fastest to the punch wins, but strategy also counts. If your opponent is breathing heavily or has a cut, try

(continues on page 160)



And in This Corner

Sierra Championship Boxing lets you go ten rounds with the boxing immortals of your choice or with boxing champions of your own design.

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Macware Reviews

(continued from page 155)

to capitalize on that weakness. If you don't know a jab from an uppercut, the game comes with a boxing primer that includes strategy tips as well as a brief history of the sport.

Problems

Sierra Championship Boxing is not without its irritating quirks. When you are punching your opponent in arcade mode, you don't know if your fighter will throw a right- or left-hand punch. Also, it's a little cramped when two players are shoulder to shoulder hammering at the keyboard in arcade mode. If you have a numeric keypad, you can gain more elbow room by using it to control the right-hand boxer.

I didn't have as much control as I would have liked over the game. You have to sit through the inane music that accompanies the opening screen before you gain control of the program. Similarly, between rounds you have to wait until the judges score the rounds before getting back to the action. This scoring procedure might be termed oversimulation. It's cute the first few times, but thereafter I felt it held up the action, which is what arcade games are all about.

In addition, moving around the program is somewhat cumbersome. For instance, you can't go directly to the Gym from the Tale of the Tape screen to get more information on a boxer; you must first get back to the screen that has the Go to the Gym menu option. Nor can you quit the program from the Gym. Having more menu options available from the various screens would alleviate those problems.

The Decision

Overall, *Sierra Championship Boxing* is a good introduction to the world of professional boxing and is fun to play—especially in the arcade mode. And best of all, no one gets hurt. If you keep getting knocked out by your opponents, you can handicap them so that they telegraph their moves. Then you'll be able to build your confidence and hold your own against the all-time boxing greats. —Daniel Farber

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(continues on page 163)

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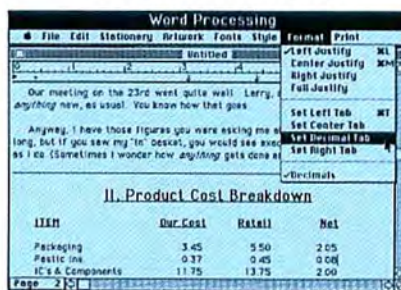
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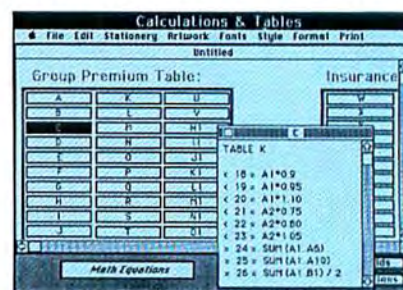
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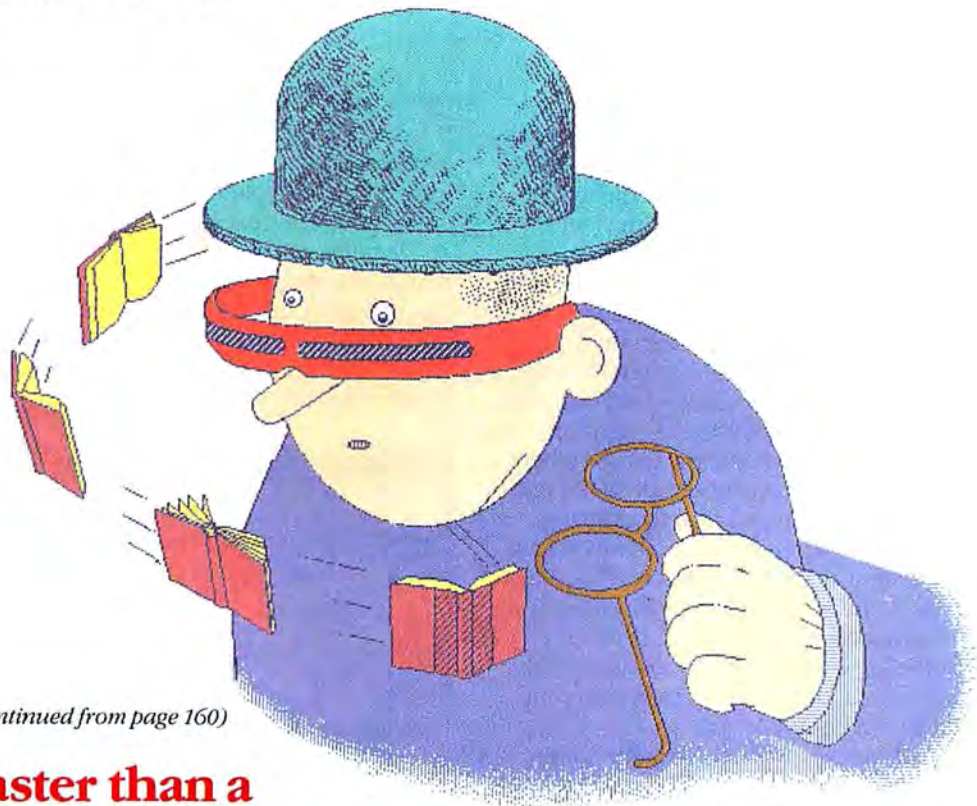
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(continued from page 160)

Faster than a Speeding Sentence

There's no doubt about it: I'm a slow reader. Working for a few years as a proof-reader—scrutinizing every letter of every word on a page—sent my reading speed into a decline from which it has never recovered. For that reason I was eager to see if Davidson & Associates' *Speed Reader II* would teach me to read faster.

It did, although the results were less than spectacular. The introduction to the documentation claims that high school and college students on whom the program was tested at least doubled their reading speeds and that some even quadrupled their speeds. The manual does state, however, that the students had private sessions with an instructor, which perhaps gave them an unfair advantage over those of us possessing only grim determination and a 128K Macintosh. I found that my reading speed, based on the tests supplied with the program, increased by about 33 percent.

The Macintosh is the ideal computer for *Speed Reader II*. Black text on a white screen looks similar to the printed page, so there's little difficulty involved in applying the skills you learn on the Mac to the pages of a book. In addition, *Speed Reader* lets you use the mouse to select responses to

exercises, allowing you to keep your attention focused on the screen even if you're not a touch typist. The program gives you the option of typing your responses if you prefer.

The Elements of Speed

Speed Reader offers six exercises. Some are designed to broaden your peripheral vision, enabling you to focus on and comprehend wider and wider expanses of text. Other exercises teach you to move your eyes from one chunk of words to the next. The Timed Reading section, which provides 15 reading selections, measures your reading speed and tests your comprehension.

You start by reading one of the Timed Reading passages, which cover an eclectic range of subjects from workaholicism to pig races. When you finish reading a selection, you click the mouse, and the program records your reading speed in words per minute. The program then presents you with a multiple-choice quiz to test your comprehension of the passage. You can

(continues on page 164)

(continued from page 163)

save your scores to measure your progress as you proceed through the course. The Graph option in the Exercise menu lets you see your progress over time (see "Timed Reading over Time").

When you've determined your initial reading speed, you proceed to the Warm-up Letters exercise. This exercise is intended to widen your peripheral vision and increase the speed at which you recognize letters. You are asked to focus on a dot on the screen and read the groups of letters that appear on either side of the dot. First a pair of letters is briefly displayed on the screen. When you successfully select the pair just displayed from two columns of miscellaneous letters that subsequently appear, another pair flashes on the screen for a briefer period. This process is repeated for three and then four letters, and your score is recorded.

When you feel you've made some progress with Warm-up Letters, you can move on to Warm-up Words. The exercise is the same as Warm-up Letters except that you must read groups of words rather than letters. Again, the purpose of the exercise

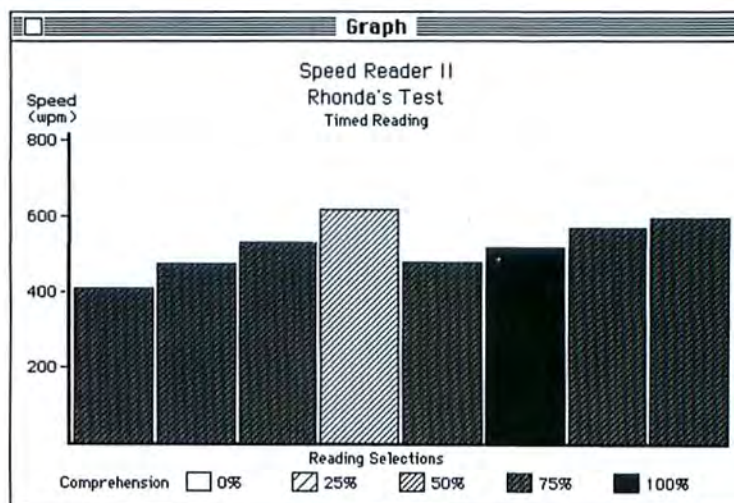
is to increase your peripheral vision and the rate at which you recognize words. Warm-up Words also makes you focus on a group of words as a unit, rather than reading each word separately. This technique is enforced in later exercises.

After you have completed Warm-up Words, you'll probably want to take a break. It's incredibly tiring to recognize sequences of four words—"sensitive accountants dance smoothly," for example—in 1/60 second. You might want to measure your

progress by perusing a Timed Reading selection or two. I found that after completing only one Warm-up Letters session and a Warm-up Words session, my reading speed had already increased by about 25 words a minute, with no loss in comprehension.

Speed Reader's Column Reading exercise teaches you to focus on chunks of words by highlighting one group of words

(continues on page 166)



Timed Reading over Time

The Graph option in Speed Reader II gives you a visual report on your progress in the program's six exercises. This graph shows a reader's progress, in words per minute, in the Timed Reading exercise.

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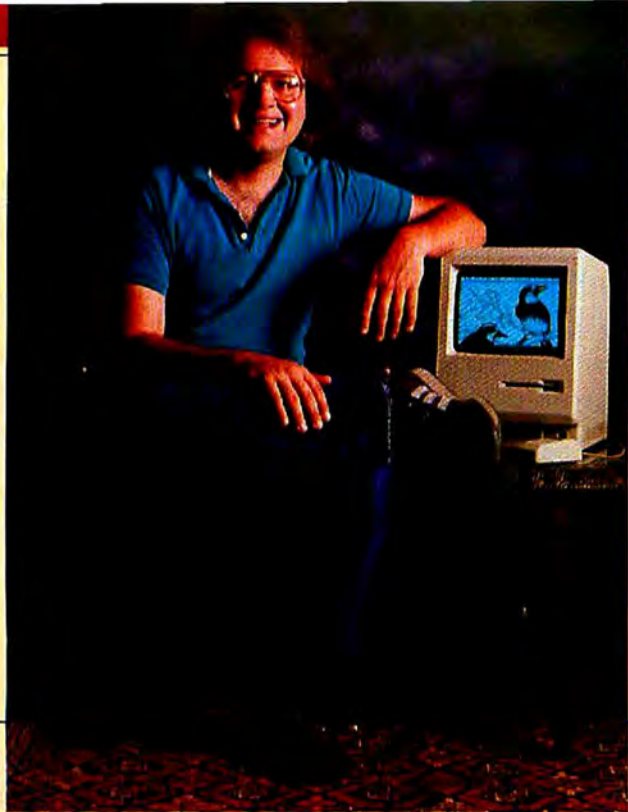
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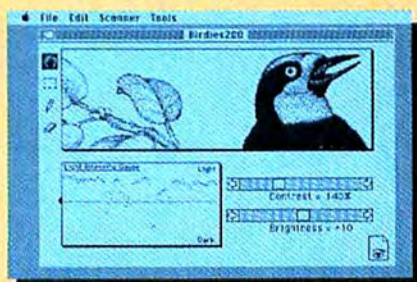


Hertzfeld on ThunderScan™

After three years on the Macintosh development team, Andy Hertzfeld began to work on the software for an easy-to-use, low-cost way to put images into Macintosh. The result: ThunderScan™. The high-resolution optical scanning device that turns the ImageWriter printer into an image reader. Recently, Andy shared some thoughts on the product he's dubbed, "MacPaint for the rest of us."

"...I was incredibly thrilled. I knew it would blow people's minds."

"I spent over three years developing Macintosh's operating system. I care a lot about Mac and wanted people to be able to use it to its full potential. But how do you get images into the machine? Most people can't draw. That's why I got involved with ThunderScan. To give people, especially non-technical users, an easy, low-cost way to get high-resolution images into Macintosh. When I first saw how beautiful ThunderScanned images were, I was incredibly thrilled! I knew it would blow people's minds."



ThunderScan's image processing tools let you enlarge, reduce, cut, paste, select, draw, scroll and erase, as well as control contrast, brightness and half-toning.

"You get to make artistic decisions. To change and improve what you see."

"Macintosh inspires creativity. ThunderScan is a vehicle for its expression. It lets you put any printed image into Mac. But you're never stuck with the image as is. You get to make artistic decisions. To change and improve what you see. You can control the contrast, brightness and half-toning. Over all or



A scanned image is just the start. Now you have micro-control over 32 shades of gray to enhance all or part of the image as you please.

just parts of the image. Even create reverse images and outlines. It's really fun. But the great thing is, when the novelty wears off, you have a useful tool.

"ThunderScan has a whole range of applications. Some people use it for inserting graphics into newsletters and reports. I know a fine artist at Stanford who makes collages with it. I use it a lot, too. The way I write a program is an expression of who I am, so in my new "Switcher" program, I included a ThunderScanned image of myself."

"...With LaserWriter you can create unbelievably exquisite images."

"We now have an enhanced version (available as a software upgrade for current users) that has some neat new features. It supports AppleTalk, the wide-carriage ImageWriter and LaserWriter. The output resolution of LaserWriter and ThunderScan's input resolution are a perfect match. So with

LaserWriter you can create unbelievably exquisite images.

"ThunderScan is a complete imaging system. You don't have to buy anything else. You just snap out ImageWriter's ribbon cartridge and snap in ThunderScan. It fits in any office or home environment, takes up no space and the lighting is always perfect.

"Developing ThunderScan was a lot like developing Macintosh. We were doing something for the first time. Making an important tool. We think we did a good job."

ThunderScan requires 128K. But to take full advantage of all its features, you'll need a 512K Mac.

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ThunderScan

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(continued from page 164)

after another in a column of text. After you finish a passage, you take a quiz to test your comprehension. You can increase the speed at which the word groups are displayed. The Eye Movement exercise expands on the concept introduced in Column Reading by making you read highlighted groups of words across entire lines of text. This exercise teaches you to move your eyes rhythmically from one group of words to the next.

Finally, Paced Reading forces you to read selections at a preset speed, "turning pages" for you at set intervals. This exercise lets you combine the techniques for increasing peripheral vision and speed of recognition that you learned in the earlier exercises. As usual, a comprehension quiz is presented at the end of a session.

To Speed or Not to Speed?

I recommend *Speed Reader II* to anyone who wants a crash course in speed reading. While my results were not as dramatic as those cited in the documentation, I must admit that I spent only a few hours

with the program. In six *Speed Reader* sessions, during which I performed all the program's exercises, I increased my reading speed from 439 words per minute to 582, with at least 87 percent comprehension. The program taught me how to scan groups of words rather than reading single words, which is a valuable speed-reading technique.

My only complaint is that many of the quiz questions are rather simplistic—reminiscent of those inane reading-comprehension tests presented to high school students. But since the program is aimed at high school students as well as adult readers, I suppose the level of the questions is appropriate. It's refreshing to see an effective training program invade the Macintosh software world, which seems to be dominated by business programs and games; I hope we'll see more.—*Erfert Nielson*

Speed Reader II
Davidson & Associates, Inc.
3135 Kasbiwa St.
Torrance, CA 90505
800/556-6141, 213/534-4070 in
California
List price: \$69.95

The Quick and the Dirty

If you've ever watched late-night TV, you've probably seen those commercials that hawk handy household gadgets—marvelous inventions from totable sewing machines to all-in-one slicers and dicers. To entice you into buying, the advertiser often throws in other goodies: a paring knife, maybe, or a couple of pots and pans. Dreams of the Phoenix has taken this "more for your money" approach to Macintosh programs with its latest offering, *Quick and Dirty Utilities Volume One*. Unlike a lot of the junk you get when you order TV gadgets, however, the *Q&D* package is well worth its \$39.95 price tag. And you don't have to be a Mac hacker to find the programs useful.

Q&D Volume One packs seven utilities and nine desk accessories onto one startup disk. The 59-page manual that accompanies the disk explains each program,

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Both Open For Business products provide key business indicators that have never been readily available to the smaller

although not in much detail. Most of the Q&D selections are simple and do only one job, however, so you really don't need lengthy instructions. You'll be happy to know that none of the utilities or accessories is copy protected. You're free to transfer all of them to your work disks.

Following is a list of the seven utilities in *Q&D Volume One* and their functions:

- Catalog Keeper produces a list of all the files on your disks.
- DA Finder provides an environment for running desk accessories.
- DA Installer installs and removes desk accessories.
- Font Manager lets you copy, rename, renumber, install, and remove fonts.
- Launcher provides a way to open a document immediately upon starting the Mac.
- Switch changes the Mac's default, or startup, disk.
- Reboot ejects the disks from both drives and resets the Mac.

Many of these functions are also available from the Macintosh desktop or from within other applications, but the *Q&D*

utilities often work faster and are less complicated than their standard counterparts.

Here's a rundown of the *Q&D* desk accessories:

- File Info displays information about a file's attributes—whether it's a document or an application, for example. This desk accessory also lets you create files that are invisible, locked, or protected.
- Q&D Filer duplicates some of the Finder's functions, including copying, renaming, and deleting files.
- Q&D Terminal enables you to communicate with other computers via a modem. Q&D Dialer can be used with Q&D Terminal to automatically dial often-used numbers.
- Q&D Xmodem is an error-checking program that can be added to a terminal program, such as Q&D Terminal, to ensure that telecommunicated files arrive without transmission errors.
- Super Note Pad works like the standard Macintosh Note Pad but provides 20 extra-large sheets, an index page, forward and backward paging, and a search feature.
- ScreenLocker password-protects a document, preventing unauthorized

people from reading your files while you're away from your desk.

- Mouse Position shows the pointer's pixel coordinates in the upper-right corner of the screen.

- Time displays the current time in the upper-right corner of the screen.

There's a lot to *Q&D Volume One*—too much to discuss in detail here. Instead, I'll highlight two utilities that are favorites of mine and that should prove useful to just about any Mac owner.

Keep On Catalogin'

At the top of my list is Catalog Keeper, which lets you keep track of the files on all your disks. The program reads the directory information off a disk, then stores it in memory. Files are arranged by any category you wish: size in K, file name, type, creator (the program that made the docu-

(continues on page 168)

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(continued from page 167)

ment), last date modified, or volume (disk) name. Unless you tell it otherwise, Catalog Keeper displays all of this information on the screen. You can change the display from single to double-spaced and alter the font and font size to suit your tastes.

Catalog Keeper makes it easy to create a disk directory. For each disk you want to add to the directory, choose the Add New Volume command and insert the disk. The rest is automatic. When the program has logged all the files on a disk, it ejects the disk and waits for another one.

Dreams of the Phoenix representatives told me that Catalog Keeper can track 2400 files on any number of disks. I tried to test this claim by cataloging my public-domain disks—all 103 of them. It turned out that I had a total of 1400 files; exceeding the 2400-file maximum is a lot harder than I thought.

Catalog Keeper lists every file on your disks, including invisible ones such as the Desktop file. To prevent a file from being listed, you can put it in the Exclude List.

File names that exactly match those in the Exclude List are omitted from the directory.

Re-sorting with Catalog Keeper is surprisingly fast. It took less than 25 seconds to re-sort my 1400 files. That's not bad, considering all the information the program has to track. I discovered, however, that each time you catalog a disk, Catalog Keeper re-sorts the entire directory—and you can't turn the sorting off. If you're cataloging a lot of disks, you'll be spending a considerable amount of time waiting for Catalog Keeper to sort the files. Fortunately, you can cut the sorting speed down to about 5 seconds by choosing the Volume Name sorting option. You could use this option when you're first cataloging a group of disks and change the sorting criterion later if you like.

Another useful feature of Catalog Keeper is its report generator. Besides defining page headers and footers, you can indicate the names and types of files you want included in your printout. Those that don't match the criteria you've set up aren't printed. You can print out a report or save it as a text-only file that can be opened and used by applications such as *MacWrite* and *Microsoft Word*.

A Real Find

Another worthy program on *Q&D Volume One* is DA Finder. This program acts as an empty, or "shell," application, from which you can call up a number of desk accessories. By installing a series of desk accessories in a disk's System file, you can create custom applications. You could, for example, combine CE Software's MockWrite, MockChart, MockPrint, and MockTerminal desk accessories with Hayden's CheapPaint desk accessory and come up with an application that lets you do simple word processing, *MacPaint*-like freehand graphics, business graphics, text printing, and telecommunications.

DA Finder lets you "preload" up to four accessories. When you open DA Finder, the four preloaded accessories are automatically opened. You can change the lineup at any time, and you can still open as many accessories manually as the Macintosh's memory allows.

You can automatically open DA Finder by selecting it as the Set Startup application. Or if you're pinched for disk space,

(continues on page 170)

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Product Review

It's all quite interesting and sexy in a technological way, but how well does it work? I have used the VCS for a week. The first day was something of a strain, as I found myself overshooting screen targets and making exaggerated head motions. After a few days, using the system became second nature. My thumbs fell readily on the buttons below the space bar, and the cursor always seemed to be just where I was looking. After a week, you'll wonder how you managed without it. On the whole, the View Control System represents a real advantage over the mouse for many Mac tasks.

ICON—Magazine of the Assoc. of Apple 32 Users.

Customer Letters

I just received my VCS and am more than delighted with its performance. I couldn't believe that it would be able to work one pixel at a time but it does, and that with less than an hour's use. It's the best thing yet that I have seen for controlling the Macintosh.

My daughter and I are certainly enjoying our "flying mouse." Not only is it terribly ingenious, it really works very smoothly and with fine sensitivity. Congratulations on an innovative advance.

I am a university professor and I do a substantial amount of writing. I just finished a monograph of about 64 single-spaced pages. I used the VCS for the entire project and it performed beautifully. If there were a market for my mouse, I might sell it.

Join us for a test flight.



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(continued from page 168)

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you can employ DA Finder as a substitute Finder. DA Finder takes up 5K, compared to the standard Finder's 47K.

I removed the original Finder and replaced it with DA Finder on several of my disks by simply renaming DA Finder "Finder." Now when I start the Mac, DA Finder loads, with my four preloaded accessories. Two accessories I always use are Q&D Filer and Extras (a shareware program available through user groups). Like the Macintosh Finder, these accessories allow me to start other applications as well as print, copy, rename, and delete files. The only thing I give up is the icon-based desktop.

Catalog Keeper and DA Finder themselves are worth the Q&D disk's \$39.95 price, so you could consider the other programs a bonus. *Quick and Dirty Utilities Volume One* definitely represents a good value for the dollar. And though it may not slice and dice, it can cut the time it takes you to accomplish many of your Macintosh tasks.

If you like what's in *Q&D Volume One*, you should take a look at the recently released *Quick and Dirty Utilities Volume Two*. *Q&D Volume Two* also sells for \$39.95, and it includes a text editor, an editor desk accessory, a BASIC desk accessory, a pie and bar chart creator, and a desk accessory maker.—Gordon McComb

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The *Ultima* games, from Origin Systems, are complex puzzles set in fantasy worlds plagued by evil magic. Like its pred-

(continues on page 172)



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(continued from page 170)

processors, **Exodus: Ultima III** is not a text adventure game with long paragraphs of narrative but is more like a computerized board game. In this third chapter of the *Ultima* series, an unknown Evil has resurfaced after 20 years of peace to torment the inhabitants of Sosaria. Your task is to seek out the Evil and destroy it, returning peace to the land. *Ultima III* players are discouraged from undertaking the perils of the quest alone; instead, you create and control teams of up to four characters.

The Battles Begin

After setting your characters' attributes—race, sex, strength, dexterity, intelligence, and wisdom (see "A Character Is Born")—you set your winking icon in motion across an open plain bordered by mountains. By using mouse, keyboard, and menu commands, you direct your team members in their first battle against a band of trolls. Footfalls, battle noises, and the sounds of magic spells emanate from the Macintosh speaker. The reward for victory is a chest of gold.

You proceed to a town and click on the town's icon to enter it. A hum and a whirl bring a new map to the screen. In the town, your team uses your newly won gold to buy weapons, armor, magic spells, and objects with special powers.

As the game proceeds, you can request a list of your characters' status and possessions at any time. With some experimentation (and many lost battles), you learn the relative values of each team member's attributes. You can create a roster of

up to 20 differently configured characters, each with a unique combination of strengths and skills.

Persistence to the point of obsession is required to fully explore the castles, dungeons, and time/space warps in the landscape of *Ultima III*. The game's scope makes it challenging, but on the other hand an epic repetition of basic tasks—

(continues on page 174)

A Character Is Born

Ultima III lets you create up to 20 characters with different combinations of talents. You build teams of up to four characters, drawing on the abilities of each to make the team as powerful and versatile as possible.

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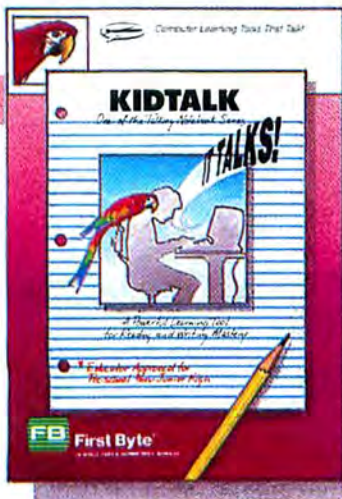
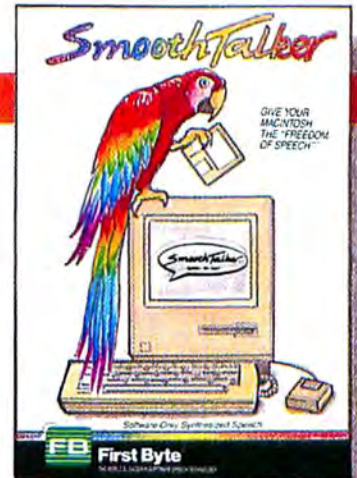
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(continued from page 172)

moving about the playing field, talking to townsfolk, fighting countless battles—tends to drag out the action. Don't expect final victory to be yours in a few hours or even a few days. According to Origin Systems, the average player requires between 300,000 and 500,000 moves to win the game.

Ultima Evolution

Ultima III will be familiar to those who have played the original *Ultima*, which is still not available on the Macintosh, or *Ultima II*, from Sierra On-Line (see "Beyond Space and Time," *Macware Reviews*, *Macworld*, December 1985). Generally, experienced players will be pleased by the new features in this edition. Although they're not state of the art, the graphics improve upon those of earlier versions.

Some of *Ultima III*'s new features are not improvements, however. For example, you can't move a character diagonally, as you can in *Ultima II*. *Ultima III*'s most frustrating change over previous editions is that you can no longer use the old com-

puter standby Revert as a means of resurrecting defeated characters. When a character is killed, that information is immediately saved to disk and can't be altered by restarting the game. Resurrecting a character is possible from within the game, but at a cost in gold that sets back your quest considerably. Running away from conflict is therefore a much more important tactic in *Ultima III* than it is in *Ultima II*.

Like its predecessors, *Ultima III* is a single-player game. Unlike them, however, the game is designed to be played on the master disk rather than on a separate game disk. This method permits only one game to exist at a time, which means that the game must be completed before anyone else can begin a new game. An Origin Systems representative explained this grievous flaw as a programming decision made to facilitate the conversion of the game to Macintosh format, not a decision to discourage illegal copying. Whatever the reason, the result is that only one person at a time can play the game. If a family purchases *Ultima III*, some members may have to wait weeks or even months to play.

The *Ultima III* package includes a cloth map of the land of Sosaria and three nicely illustrated booklets: a rule book and

two books of magical spells. An hour or so of study is required before you start a game. Further mapping is required, as well as note taking and strategy planning—all of which can be supplemented by the purchase of the 48-page *Secrets of Sosaria* from Origin Systems. The booklet is shamelessly overpriced at \$12.95 but provides valuable advice and complete maps of towns, castles, and dungeons that can cut hours from your playing time.

I am an *Ultima II* victor, but I suffered two weeks of repetitious and humiliating defeat before I developed a strategy to get through the early phases of the game: two teams composed of different types of characters who rotate duties and share resources. After many grueling hours, I finally conquered *Ultima III*. I'll have to rest up before embarking on *Ultima IV: Quest of the Avatar*. —Keith McCandless

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(continues on page 176)

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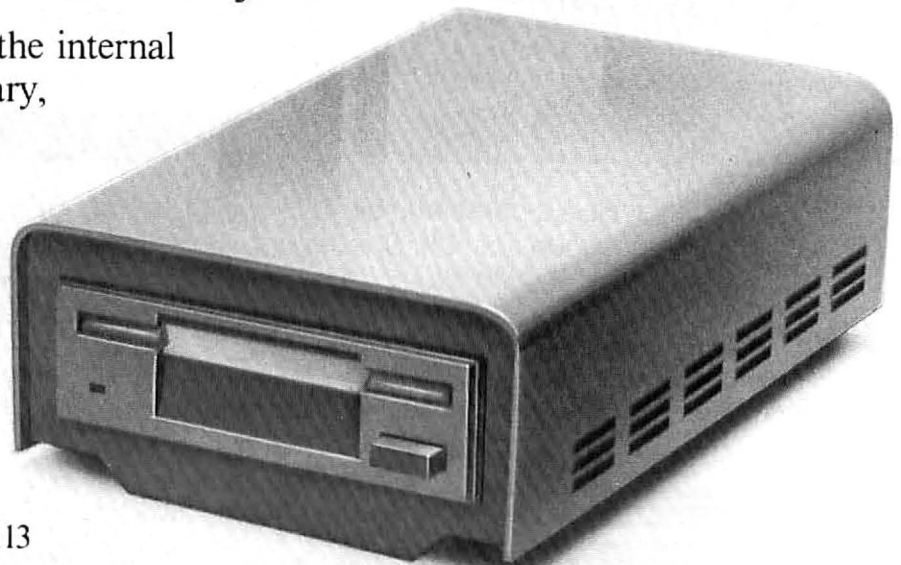
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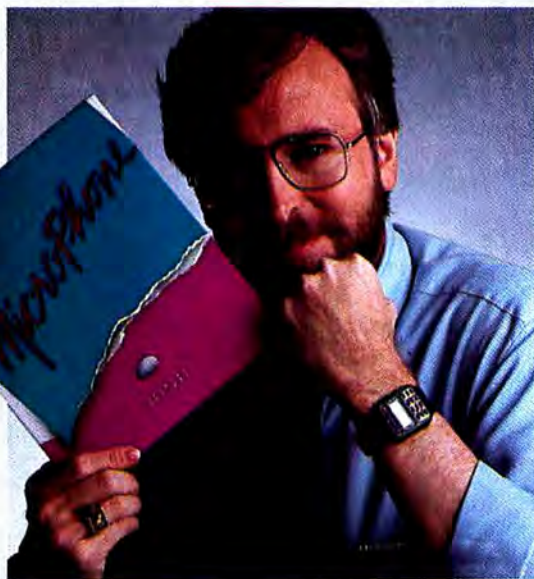
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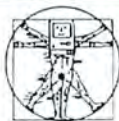
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Macware Reviews

(continued from page 174)

Pinball Wizardry

When Bill Budge's *Pinball Construction Set* was first released for the Apple II, it helped start a minor software revolution. There were already several outstanding pinball simulations on the market, but *Pinball Construction Set (PCS)* was the first to allow the player to create custom games by using only a joystick and a little imagination. The success of *PCS* resulted in a new genre of entertainment software, the build-it-yourself game. Instead of merely reacting to scenarios created by programmers, a computer gamer could take control of the digital universe on the screen, exercising creativity as well as coordination.

Flippers, Bumpers, Kickers

The Macintosh version of *PCS* has the same screen layout as earlier versions of the program: the left half of the screen contains the pinball game board; the right side is your construction toolbox (see "Tools of the Game"). The program provides a seemingly endless supply of pinball parts—balls, flippers, launchers, bumpers, kickers, slingshots, rollovers, spinners, drop targets, knife-edge targets, ball hoppers, one-way gates, lane guideposts, magnets, and ruthless ball eaters—ready to be dragged onto the game area. Like the tab wells in *MacWrite*, the parts box is self-replenishing, so you can drag as many of each part onto your design as you want, within the program's limit of 128 parts per game. Since *PCS* is object oriented, like *MacDraw*, parts can be moved, or re-

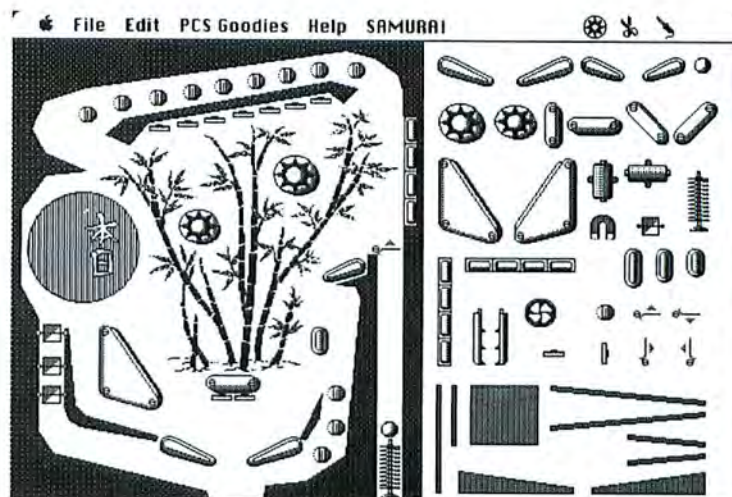
moved, with the mouse after they've been added to the game's landscape. No decision is irreversible.

The only pinball parts that don't have a fixed shape and orientation are called polygons. These miscellaneous shapes, which are grouped at the bottom of the parts box, can be bent and pounded with the hammer icon into just about any shape, with sharp or smooth edges. Polygons are especially useful for creating irregular boundaries around the playfield. The corners of polygons are defined by "nails"—square black spots that are visible when you're editing the game board. A click of the hammer between existing nails adds a new one, which can then be moved in or out to change the shape of the polygon.

Art for Parts' Sake

Pinball Construction Set doesn't limit you to rearranging hardware. The program automatically creates a *MacPaint* file for every game you design, so you can use *MacPaint*'s toolbox to perform cosmetic surgery on a game board. Using *MacPaint*, you can even add digitized photos or commercial clip art to the game field or the scoreboard for an added touch of realism. If reality doesn't interest you, then use *MacPaint* to disguise or erase crucial parts of the playfield. Those parts will still work when the game is played, but they'll be invisible. To streamline the *MacPaint* connection, *PCS* provides a menu option that lets you launch *MacPaint* while you're constructing a game.

(continues on page 178)



Tools of the Game

Pinball Construction Set's Parts Box contains a wealth of pinball parts, including polygons that can be hammered into almost any shape imaginable.

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(continued from page 176)

You can also customize the number of points a part is worth, as well as the sound effect associated with the part. If you aren't happy with the program's predetermined sound effects and point values, you can select the soldering iron icon, take it under the board, and modify selected parts. AND gates—electronic switches that read signals from parts connected to them—allow you to assign bonus points for hitting a combination of targets, adding an element of strategy to the game. If customizing games with the soldering iron and the paintbrush doesn't make them interesting enough, you can select the World option and change the settings for gravity, ball elasticity, speed, and other factors normally off limits to terrestrial pinball builders. Have you ever wondered what it would be like to play pinball on the moon?

If you're not feeling creative, just kick back and play ball with one of the games that comes on the disk. Chances are, though, that you'll soon find yourself tinkering with the game to make it a little easier, harder, or more interesting.

Tommy, Can You Hear Me?

Pinball Construction Set's sound is especially noteworthy. On a 128K Macintosh, you can choose from among eight different sounds for each part. The sounds are the usual beeps and whistles associated with modern electronic pinball games. 512K Mac owners have eight additional sounds to choose from; these are bells, clicks, and buzzes that have been digitized from classic pinball games—the old-fashioned kind that don't sound like computers. If you're playing at the office and feel that pinball noises emanating from your Mac might be deemed inappropriate by your superiors, you can use the Mac's Control Panel to turn off the game's sound.

The Final Score

How does *Pinball Construction Set* for the Macintosh compare with its Apple II ancestors? Of course, it's easier to use. The Mac's high-resolution graphics and mouse control are perfect for a build-it-yourself program. The Mac version is so easy to use, in fact, that the 16-page manual that comes with the Apple II version has been replaced by a 4-page pamphlet and a few on-screen help windows. This minimal documentation is generally clear and complete, although novices may have some trouble deciphering the instructions for using

AND gates to assign bonuses. The Mac version's *MacPaint* connection is another big plus.

On the negative side, the lack of color is an unfortunate fact of life for Mac pinballers. In addition, the Mac animation seems a little off when compared with some of the pinball games available for other computers. The ball sometimes unexpectedly hesitates in midflight, occupies the same space as a flipper, or does something equally impossible, temporarily puncturing the pinball illusion. However, I found these animation quirks a minor flaw in an otherwise impressive product.

The verdict: *Pinball Construction Set* is fun! If you've ever dreamed of owning your own pinball machine, check this game out. It should keep you busy for hours—or even weeks—playing, creating, playing, tinkering, and playing some more.—George Beekman

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(continues on page 180)

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(continued from page 178)

Get Organized

Someone great once said, "A clean desk is the sign of a sick mind." It's human nature to be messy. But when the pile of junk on your desk gets so deep that finding a memo you got yesterday is a job for Indiana Jones, it's time to clean up your act.

There are several programs for the Macintosh that will help you organize your daily affairs and keep your desk free of clutter. One of the better offerings is **Battery Pak**, a collection of useful desk accessories from Batteries Included. You can use *Battery Pak's* accessories with any application that has an Apple menu.

Packed with Accessories

Battery Pak's eight desk accessories include a text-only document printer, a 250-page phone pad with a modem auto-dialer, a program launcher, a calendar, a five-function disk utility, a menu that lets you bring a selected window to the front,

and two calculators. Neither the disk nor the accessories are copy protected.

You can install any or all of the accessories onto a startup disk. Together, the eight accessories take up 39K on your disk. Most of the accessories consume less than 8K of RAM, so they can be run on a 128K Mac. Some accessories (notably the calculators and Phone Pad) are larger, however, and work best on a 512K Mac.

You install the *Battery Pak* accessories onto your work disks with the *Battery Pak Mover* or Apple's *Font/DA Mover*. The *Battery Pak Mover* is similar to the one offered by Apple, with one important improvement: you can try out an accessory before you install it into a disk's System file. If you're not sure exactly what an accessory does and want to put it through its paces before installing it, this feature can save you time.

Here's a rundown of some of *Battery Pak's* more interesting accessories.

Phone Pad

The Phone Pad accessory is perhaps the most useful desk-organizing tool on the *Battery Pak* disk. The Phone Pad stores 250 pages of text, so it can be used for jot-

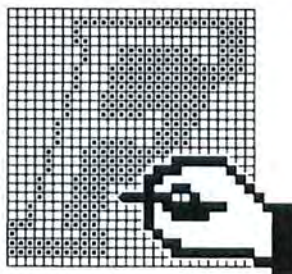
ting down notes, phone messages, or other information. Each page holds about 700 characters, or about 115 words.

You can jump to any page on the Phone Pad by choosing the Go To Page command from the Phone Pad menu. You can also set any page as the top page, the one that will appear as the first page of the Phone Pad the next time you open it. You might use this feature to keep a "Things to Do" page readily accessible on the top of the stack of notes. Unfortunately, the Phone Pad doesn't have an automatic index feature, as do some other notepad accessories.

You can use the Mac's screen printing feature (⌘-Shift-4) to print a copy of the currently displayed Phone Pad page. You can also print the Phone Pad using a separate application included on the disk. You choose the page range to print, whether you want normal size or 50 percent reduction, and how the sheets are to be arranged on the page.

(continues on page 182)

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(continued from page 180)

The Phone Pad accessory lets you search for any text string. This can come in handy if, for example, you're using the pad to store a list of names and commonly used phone numbers. To find a particular number, you just search for the corresponding first or last name.

The Phone Pad can also be used for automatically placing calls through a Hayes or Hayes-compatible modem. Highlight the phone number, then choose the Dial Number command from the Phone Pad menu—or triple-click the number—to initiate the call automatically. You can include modem dialing commands with the phone number.

A Well-Appointed Calendar

Battery Pak's Calendar is straightforward and easy to use. When you open the Calendar, the current day is selected for you. You can switch to another day, month, or year by clicking the appropriate buttons. You can write notes on a scrollable pad for

any day of the month. Days that have notes are marked on the Calendar; clicking on a marked day reveals that day's notes.

The Calendar has no alarm feature to remind you of appointments, but it does let you search for text strings. This system isn't as good as a true alarm, but it's better than nothing. The search starts from the first notes in the Calendar, no matter what day you have selected. That can be a bother, since the search may find old entries. You can avoid this nuisance by deleting old entries, either manually or by using the Calendar Manager program supplied on the disk. Past entries can be archived in a separate file if you wish.

Higher Math

Battery Pak has two powerful calculators: RPN and Scientific. Actually, both calculators are RPN-oriented; the RPN calculator is really a subset of the Scientific calculator. Both allow chain calculations and display the results in a single-line read-out. Neither offers a paper or printable tape.

The Scientific calculator provides stack memory, store, recall, exponential, logarithmic, statistical, and trigonometric functions, along with polar/rectangular co-

ordinate conversion. *Battery Pak's* manual goes into some depth on how to use these calculators, so if their design is new to you, you're not left out in the cold.

Battery Pak isn't the perfect desk organizer—it lacks a true appointment-tracking feature, for example—but the free-form design of the Phone Pad largely makes up for any deficiencies. The fact that *Battery Pak's* applications are installed as desk accessories is another plus; you don't have to quit the program you're using and start up a separate program simply to take notes during a phone call. In addition, *Battery Pak* costs \$30 to \$40 less than most other desk organizing programs, so cleaning up your life needn't be expensive. —Gordon McComb

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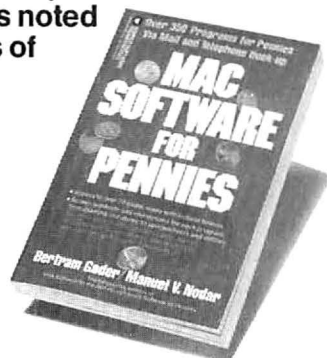
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12 MEMBERSHIP REFERRAL BONUS—Our most valuable source of new members is you! To date almost 40% of our members have been referred by word of mouth from other satisfied members. For those of you who refer new members, The NETWORK will credit a cash bonus to your account applicable to any future purchase.

13 CORPORATE ACCOUNT PROGRAM—Almost 50% of The NETWORK's members are corporate buyers and users (see opposite page left). The NETWORK can establish open account status and assign designated account managers to expedite orders, and coordinate multiple location shipments.

14 QUANTITY DISCOUNTS—For large corporations, clubs, and repeat or quantity buyers The NETWORK can extend additional single order discounts, when available to us from our manufacturers and distributors.

15 PRICE PROTECTION—The PC Industry is crazy!! Prices change not yearly or monthly or even weekly but often day by day! These changes are sometimes up but are mostly down!! **THE NETWORK GUARANTEES THAT IN THE EVENT OF A PRODUCT PRICE REDUCTION, BETWEEN THE TIME YOU PLACE YOUR ORDER AND THE TIME THE PRODUCT SHIPS YOU WILL ONLY PAY THE LOWER AMOUNT!!**

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Axon Art Portfolio, or Card Shoppe 31.00*	Mark of The Unicorn Mouse Stampede 19.00*
Bluechip Baron, Millionaire, Tycoon 26.00*	Miles Computing Mac the Knife 18.00*
CBS Software Murder by the Dozen 20.97*	Miles Computing Mac Attack 23.00*
Expertelligence ExperLogo 65.00*	Palantir Mac Type 23.50*
1st Byte Smooth Talker 47.00*	Penguin Graphics Magician—Mac Only 28.97*
Great Wave Concertware Plus 33.00*	Penguin Pensate or Xyphus 20.00*
Hayden Videoworks, or Musicworks 50.00*	Penguin Transylvania 20.00*
Hayden Sargon III 25.75*	Priority Software Forbidden Quest 21.00*
Hayden DaVinci—Houses, Interiors or Landscapes 24.75*	Scarborough MasterType 26.50*
Hayden Art Grabber 26.00*	Sierra On-Line Championship Boxing 20.50*
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Infocom Suspect, Infidel, Sorcerer 22.00*	T-Maker Click Art 25.00*
Infocom Hitchhiker's Guide, Seastalker 20.00*	Videx Fun Pack 19.77*
Magnum McPic! Volume 1 or 2 26.00*	Videx Mac Gammon & Cribbage 25.17*

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Apple Apple IIc CALL	(with Mac kit)
Apple Apple IIe CALL	Apple Imagewriter 15" Carriage 485.00*
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Form 1040		Department of the Treasury — Internal Revenue Service		1985																																																													
U.S. Individual Income Tax Return		TaxEase		Spreadsheet Templates																																																													
For the year January 1 - December 31, 1985																																																																	
Macintosh Election		Do you want to make this year's taxes much easier to figure? If so, do you want to use your Macintosh?		Yes <input type="checkbox"/>	No <input type="checkbox"/>																																																												
Schedules Included		<table border="0"> <tr> <td>1</td> <td><input checked="" type="checkbox"/></td> <td>Schedule A — Deductions</td> <td>For paperwork reduction, order one today</td> </tr> <tr> <td>2</td> <td><input checked="" type="checkbox"/></td> <td>Schedule B — Interest and Dividend Income</td> <td></td> </tr> <tr> <td>3</td> <td><input checked="" type="checkbox"/></td> <td>Schedule C, F — Profit or (Loss) From Business or Profession, or Farm</td> <td></td> </tr> <tr> <td>5</td> <td><input checked="" type="checkbox"/></td> <td>Form 4562 — Depreciation</td> <td></td> </tr> <tr> <td>6</td> <td><input checked="" type="checkbox"/></td> <td>Form 3468 — Investment Credit</td> <td></td> </tr> <tr> <td>7</td> <td><input checked="" type="checkbox"/></td> <td>Schedule D — Capital Gains and Losses</td> <td></td> </tr> <tr> <td>8</td> <td><input checked="" type="checkbox"/></td> <td>Schedule E — Supplemental Income Schedule</td> <td></td> </tr> <tr> <td>9</td> <td><input checked="" type="checkbox"/></td> <td>Schedule G — Income Averaging</td> <td></td> </tr> <tr> <td>10</td> <td><input checked="" type="checkbox"/></td> <td>Schedule SE — Computation of Social Security Self-Employment Tax</td> <td></td> </tr> <tr> <td>11</td> <td><input checked="" type="checkbox"/></td> <td>Schedule W — Deduction for a Married Couple When Both Work</td> <td></td> </tr> <tr> <td>12</td> <td><input checked="" type="checkbox"/></td> <td>Form 2441 — Credit for Child and Dependent Care Expenses</td> <td></td> </tr> <tr> <td>13</td> <td><input checked="" type="checkbox"/></td> <td>Form 6251 — Alternative Minimum Tax Computation</td> <td></td> </tr> <tr> <td>15</td> <td><input checked="" type="checkbox"/></td> <td>Forms 2119, 3503 — Sale of Residence, Moving Expense</td> <td></td> </tr> <tr> <td>17</td> <td><input checked="" type="checkbox"/></td> <td>Forms 2106, 5695 — Employee Expenses, Energy Credit</td> <td></td> </tr> <tr> <td>18</td> <td><input checked="" type="checkbox"/></td> <td>Schedule R — Credit for the Elderly and Disabled</td> <td></td> </tr> </table>				1	<input checked="" type="checkbox"/>	Schedule A — Deductions	For paperwork reduction, order one today	2	<input checked="" type="checkbox"/>	Schedule B — Interest and Dividend Income		3	<input checked="" type="checkbox"/>	Schedule C, F — Profit or (Loss) From Business or Profession, or Farm		5	<input checked="" type="checkbox"/>	Form 4562 — Depreciation		6	<input checked="" type="checkbox"/>	Form 3468 — Investment Credit		7	<input checked="" type="checkbox"/>	Schedule D — Capital Gains and Losses		8	<input checked="" type="checkbox"/>	Schedule E — Supplemental Income Schedule		9	<input checked="" type="checkbox"/>	Schedule G — Income Averaging		10	<input checked="" type="checkbox"/>	Schedule SE — Computation of Social Security Self-Employment Tax		11	<input checked="" type="checkbox"/>	Schedule W — Deduction for a Married Couple When Both Work		12	<input checked="" type="checkbox"/>	Form 2441 — Credit for Child and Dependent Care Expenses		13	<input checked="" type="checkbox"/>	Form 6251 — Alternative Minimum Tax Computation		15	<input checked="" type="checkbox"/>	Forms 2119, 3503 — Sale of Residence, Moving Expense		17	<input checked="" type="checkbox"/>	Forms 2106, 5695 — Employee Expenses, Energy Credit		18	<input checked="" type="checkbox"/>	Schedule R — Credit for the Elderly and Disabled	
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Open Window

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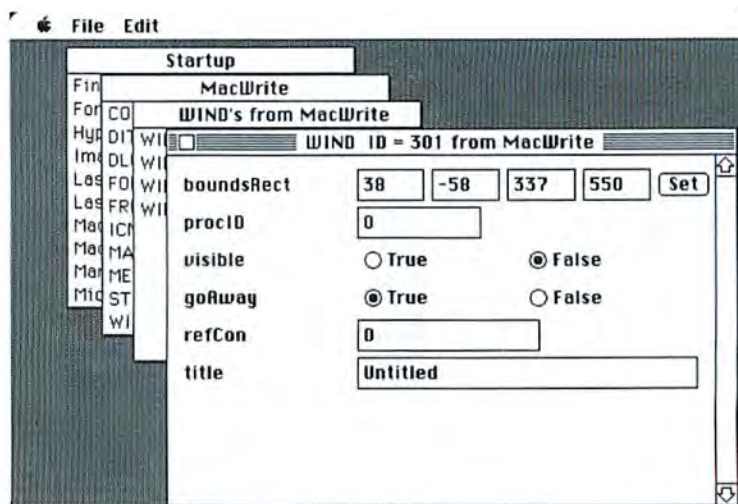
Edited by Jim Heid

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 column shows how to use Apple's *ResEd* resource-editing utility to change the preset sizes and positions of a program's windows and how to avoid unwanted line spaces when you use *Microsoft Word's* Print Merge command. We also present an undocumented feature of General Computer's *HyperDrive* that lets you assign \mathbb{H} -key shortcuts to *HyperDrive* drawers, and a *Microsoft BASIC* program that removes extraneous characters from *ThinkTank* outlines so you can use the outlines with a word processor. Finally, we tell how to properly delete characters with *MacTerminal*, how to get sharp results when you produce mimeograph masters with the *Imagewriter*, and how to remedy sore mouse feet.

Changing Windows with ResEd

Most *MacWrite* users know you can create documents wider than *MacWrite's* preset margins by dragging the document window an inch or so to the left, widening the window, and resetting the right margin. Because I frequently create documents with wide margins, however, I quickly grew tired of having to perform the drag-and-resize routine every time I started *MacWrite*. Using Apple's *ResEd* utility, available



Changing WINDs

You can modify *MacWrite* so that its document window automatically opens up sized and positioned for a wide document. Use Apple's *ResEd* utility to open *MacWrite*, then locate its *WIND* resource and open *WIND ID 301*. Change the *boundsRect* values to match those shown here.

on CompuServe's MAUG and from many Apple dealers and user groups, I modified *MacWrite* so that its document window automatically opens sized and positioned for a wide document.

- Open *ResEd* and insert the disk containing *MacWrite*. Locate *MacWrite* and open it by double-clicking its name. A window opens containing a list of *MacWrite's* resources.

- Double-click the resource named *WIND*. Another window opens that lists the four window resources in *MacWrite*. Window resource 304 contains the resource information for the Clipboard window. Window resources 303 and 302 correspond to the footer and header windows, respectively. Window 301 represents the document window, so double-click on the line reading *WIND ID = 301*. A larger window opens containing the resource information for the document window.

- The four boxes labeled *boundsRect* control the size and position of the document window. Change the values to match

those in "Changing WINDs," choose *Quit* from the *File* menu, and click *yes* when asked if your changes should be saved. If you want to stretch the header and footer windows as well, don't choose *Quit*. Instead, close the 301 window and open window resources 302 and 303, changing the *boundsRect* values to 45, -58, 205, and 550 for each.

Now when you start *MacWrite*, the document window will be sized and positioned as if you dragged it to the left and then widened it until the 8-inch mark on the ruler is visible. Drag the ruler's right margin to the desired width, and you're ready to create a wide document. After you change the right margin, you may want to resize the window to make the scroll bar accessible.

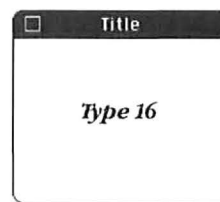
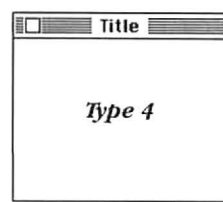
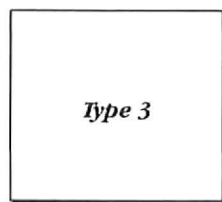
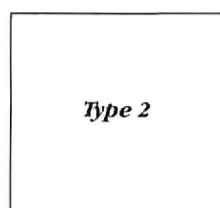
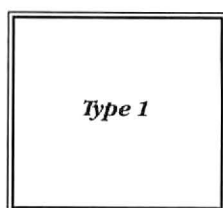
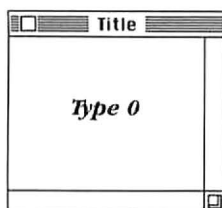
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(continues on page 196)

(continued from page 195)

You can apply this tip to any program that uses the WIND resource. If, for example, you'd like Microsoft BASIC's List window to be larger when it first appears, change BASIC's WIND ID 258 resource. You can skip the step of calculating the correct coordinates for the boundsRect values by clicking the Set button in the ResEd window-resources window. After you click Set, you can draw a marquee on the screen that determines the window's new size and position. As you change the size of the marquee, the boundsRect values change accordingly. When you release the mouse button, the marquee disappears, and the values are set.

What do the other parts of the WIND window mean? The procID indicates the type of window (see "Window Types"). The buttons adjacent to the word visible indicate whether the window will be displayed, while those next to goAway indi-



Window Types

A window's procID indicates its type. Type 0 are standard document windows. Type 1 are dialog boxes, types 2 and 3 are plain boxes, and type 4 are document windows without size boxes. Type 16 windows are like that of the Calculator desk accessory.

cate if the window has a close box. The refCon value is a reference number that an application can use for its own purposes, while title contains the window's title, which appears in windows with title bars.

For more information on these resources and ResEd, see "Mining the Mac's Hidden Resources," Macworld, July 1985, and Inside Macintosh (Addison-Wesley, 1986). And remember that ResEd crashes occasionally. Save your work often and never experiment with a disk or program you can't replace.—Ed.

Merge Printing without Blanks

Microsoft Word's Print Merge command lets you customize form letters to use information from a database of names and addresses. There's a problem with the feature, however, that isn't discussed in the Word manual. If the main document—the one containing the text of the letter—includes field names for which no entries exist in certain records, Word produces an

(continues on page 198)

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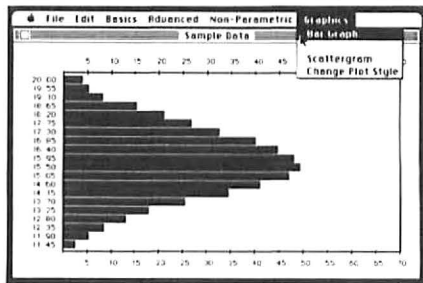
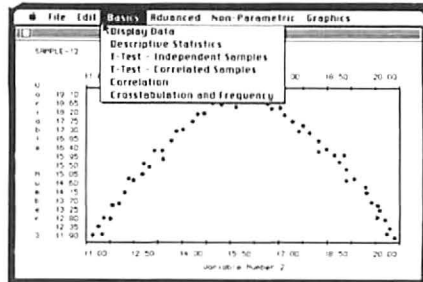
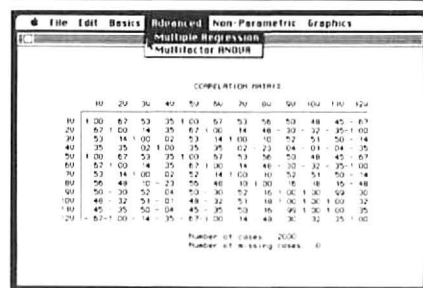
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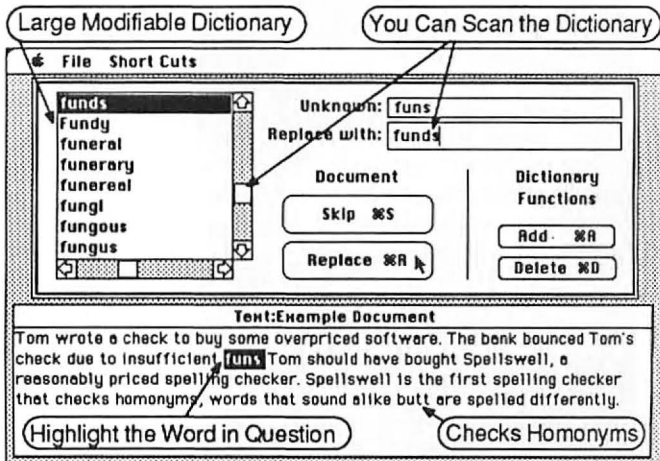
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Open Window

(continued from page 196)

unwanted blank line in that position. For example, if an address contains a field called Title positioned between the Name and Company fields, but John Smith's database record contains no title, Word produces a blank line between John Smith's name and his company name.

To eliminate the extra line spaces, you must bend the rules concerning the IF... ELSE... ENDIF statements. Instead of enclosing the ELSE statement within Word's merge characters (guillemets, or international quotation marks: « and »), omit the close quotation mark (see "Merge Printing"). Doing so instructs Word to print the next line without advancing a line, eliminating the extra line space when a field is empty.

Edwin Bernbaum
Berkeley, California

(continues on page 200)

Listing A

```
«name»
«IF position»«position»
«ELSE»
«ENDIF»«IF organization»«organization»
«ELSE»
«ENDIF»«street address»
«city», «state» «zip»
```

Listing B

```
«name»
«IF position»«position»
«ELSE»
«ENDIF»«IF organization»«organization»
«ELSE»
«ENDIF»«street address»
«city», «state» «zip»
```

Merge Printing

To eliminate the extra lines that Microsoft Word prints when merge-printing records with empty fields, omit the merge characters after the ELSE statements, as shown in Listing B.

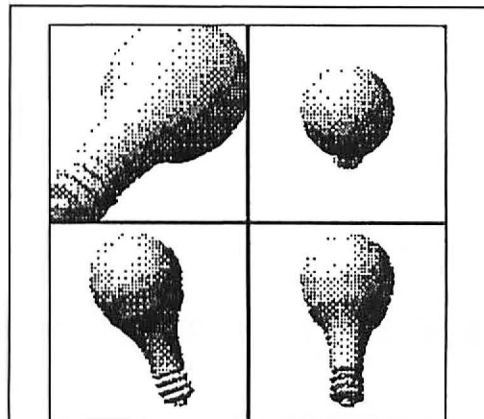
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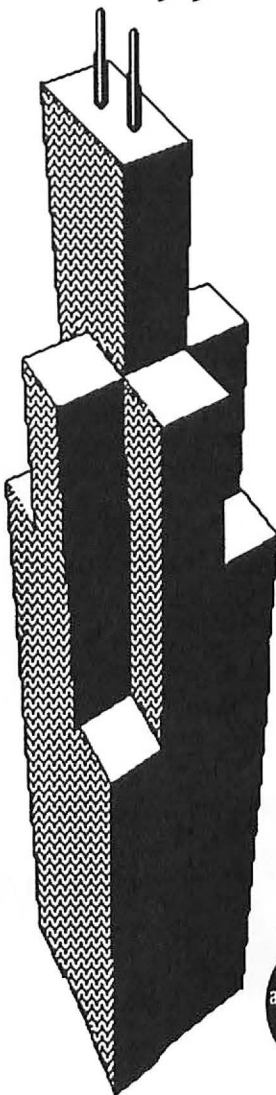
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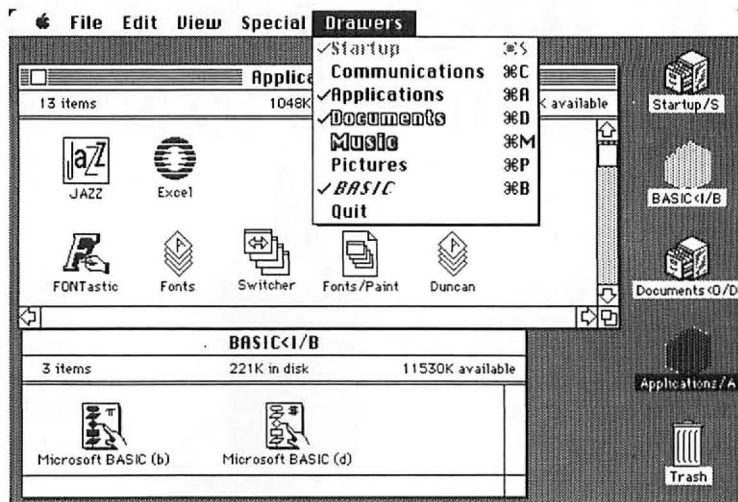
(continued from page 198)

Quick on the Drawer

I've found a convenient undocumented feature of the Drawers desk accessory in General Computer's HyperDrive internal hard disk. You can add ⌘-key shortcuts to a drawer by ending its name with a slash (/) followed by the letter you want to be the shortcut (see "Drawer Shortcuts"). This technique makes the drawer names look odd, but it makes opening and closing numerous drawers more convenient. You can add the keyboard shortcut to a new drawer that you're creating using the HyperDrive Manager, or you can add one to an existing drawer by editing the drawer's name using the Finder.

Charles O. Foster
Farmington, New Mexico

This technique is undocumented for a reason: it doesn't always work. According to General Computer's Tom Westberg, you can cause problems if you give a drawer a keyboard shortcut that already exists as one of the Finder's commands. For example, if you assigned ⌘-D to a



drawer named Documents, the Finder can't tell whether you're issuing the Duplicate command or trying to open or close the Documents drawer. Westberg recommends using Option-key characters to avoid conflicts with existing keyboard shortcuts.

You can also change the type style in which drawer names appear by appending a less-than sign (<) and a style character to the drawer's name. <B, <I, <U, <O, and <S cause the name to be dis-

played in bold, italic, underline, outline, and shadow, respectively. One more thing: never use parentheses in a drawer name. An open parenthesis causes the name to become disabled on the Drawers menu, making it impossible to access.

(continues on page 204)

Drawer Shortcuts

You can add ⌘-key shortcuts to a HyperDrive drawer by ending the drawer name with a slash (/) followed by the shortcut letter. This undocumented feature of the Drawers desk accessory is worth trying, though it doesn't always work and can occasionally cause a system error.

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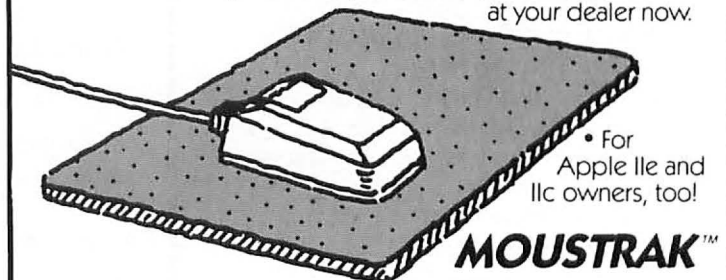
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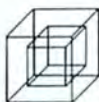
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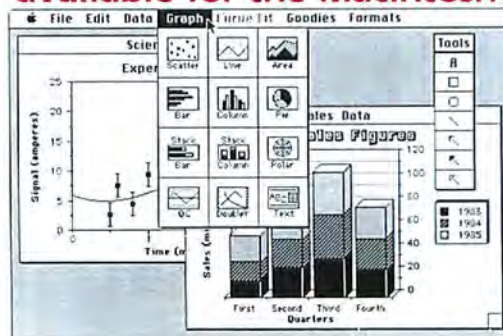


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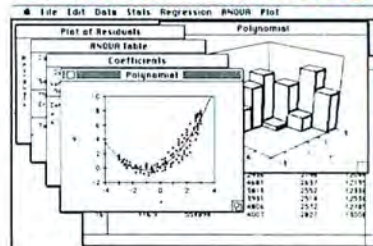


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(continued from page 200)

All these special characters influence the appearance of drawer names because of the way the Mac's Menu Manager operates.—Ed.

Converting ThinkTank Outlines

When I write, I like to develop detailed outlines with Living Videotext's *ThinkTank*, then open the outlines with *MacWrite* or *Word* and expand them into the finished product. Unfortunately, however, *ThinkTank* documents contain special text at the beginning of each line that indicates how deeply that line should be nested in the outline. Removing this text and indenting each line "by hand" is time-consuming. You can transfer outlines using the Clipboard, but the outlines still contain plus and minus signs, and the subordinate head-lines are not indented. I've written a short Microsoft BASIC 2.0 program that reads a *ThinkTank* document and writes a new, text-only document containing properly indented lines with no extraneous text or plus and minus signs (see "Outline Converter Listing").

```
REM ThinkTank translator - by Jerry Bono
REM This MBASIC 2.0 program reads a ThinkTank file
REM and creates a text file from it, stripping the ThinkTank
REM HEAD text and the plus and minus signs that appear on
REM each line, and indenting each line according to your outline.
```

```
OPEN FILES$(1,"TEXT") FOR INPUT AS #1
OPEN FILES$(0,"Name for new file?") FOR OUTPUT AS #2
WHILE NOT EOF(1)
  LINE INPUT #1,D$
  I=VAL(MID$(D$,7,1))
  PRINT #2,SPC(5*I);MID$(D$,12)
WEND
CLOSE #1
CLOSE #2
CLS:PRINT "Translation Complete"
PRINT
END
```

To use the program, run it and then choose the name of your *ThinkTank* document from the file selection box. Next, the program asks for a name for the converted file. Type a name, press Return, and the program creates a new file, leaving the original *ThinkTank* document unchanged.

Jerry Bono
Corte Madera, California

People without Microsoft BASIC should read "ThinkTank to Word with Indentation" in this issue's Get Info, which explains how to restore indentation in outlines from *ThinkTank* with Word's search-and-replace function.—Ed.

(continues on page 208)

Outline Converter Listing

This Microsoft BASIC 2.0 program opens a *ThinkTank* document and creates a new, text-only document containing properly indented lines with no extraneous text or plus and minus signs.

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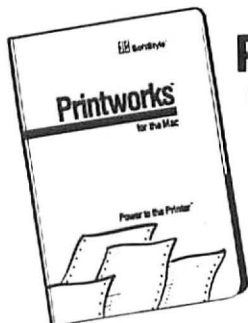
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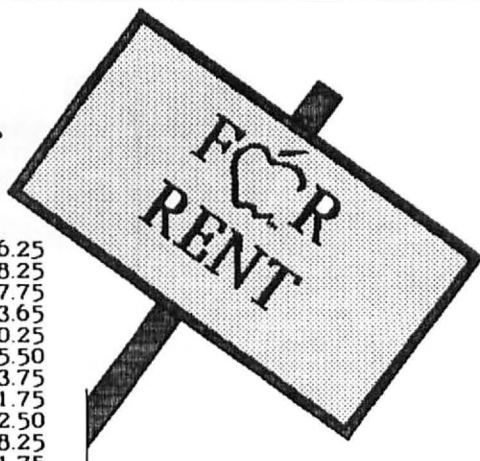
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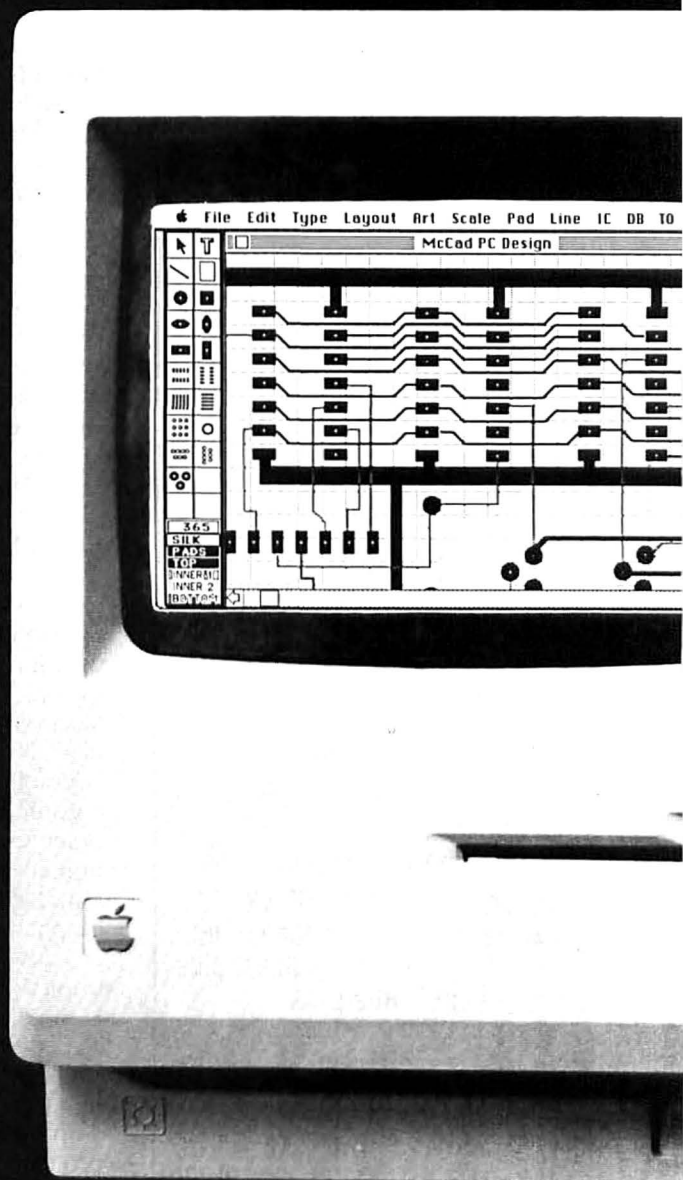
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Open Window

(continued from page 204)

The Deceiving Backspace

As a college student, I frequently use *MacTerminal* to communicate with my university's DEC 11/70 and VAX computers. My first communications session went smoothly until I realized that characters I thought were being deleted with the Macintosh Backspace key were not being deleted at all. Both the DEC 11/70 and VAX computers gave the appearance of having backspaced and typed over my original typing error, but both the error and the correction remained in the minicomputer's memory. Thus, my commands became gibberish, even though they looked perfect on the screen.

The solution, I've found, is to press **⌘-Backspace**. Doing so gives you a destructive backspace in that situation.

Michael R. Walter
Winneconne, Wisconsin

Better Mimeo Masters

Even in this day of fast copiers and laser printers, some of us—particularly educators faced with budget restrictions—still rely on the mimeograph machine for producing multiple copies of a document. For me, the Macintosh and the Imagewriter have replaced the typewriter for creating mimeograph masters. However, 12-point type consumes too much space and paper. Ten-point text saves paper but becomes almost unreadable when the original is printed out, transferred to stencil, and mimeographed.

My solution is to print the original using the Tall Adjusted option in the Page Setup dialog box. While Tall Adjusted is designed to print pictures in the correct proportions, it also spreads text just enough so that 10-point Geneva printed in high quality produces a sharp mimeographed product.

Barbara Larson
Cullowhee, North Carolina

Soft Shoes for Mice

I've heard several tales of woe concerning Macintosh mice whose plastic "feet" are wearing, causing erratic operation (see "Worn-Out Mouse Feet," *Get Info, Macworld*, September 1985). While a mouse pad is one solution, I've come up with another. Hardware stores sell self-stick felt

pads that are usually used to prevent the bottoms of objects from scratching furniture or to silence the banging of cabinet doors. The kind I bought are circles about 1/16 inch thick and 3/8 inch in diameter. Four of them placed at the corners of the mouse's bottom plate do the trick by barely lifting the mouse off its rolling surface. The pads are durable; my first set has survived more than a month of daily use and seems to have many miles of service remaining. Felt feet don't take up desk space like a mouse pad, and a lifetime supply costs about a dollar.

Ken Pribbeno
Denver, Colorado

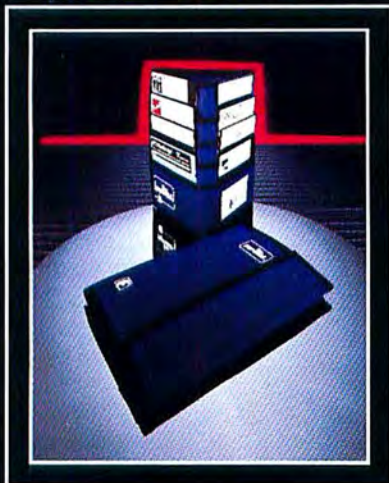
Better still, the soft shoes quiet the mouse and smooth its travel. I see one possible drawback: the feet shed small bits of lint, so you need to clean the mouse more often according to the directions in the Macintosh owner manual.

While you're in the hardware store, pick up a set of two plastic furniture tips, the kind that slide over the leg ends of a metal ironing board or a high chair to keep them from scratching floors. One placed under each front foot of the Macintosh angles the computer just enough to eliminate pains in the neck. Mine are 1/4 inches long and have a 1-inch opening. The Mac's weight keeps them in place, though you have to hold on to them if you move the computer.—Ed.

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